



Trade Credit or Bank Credit? Evidence on the Financing of Portuguese SMEs

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Dissertation written under the supervision of Professor Diana Bonfim

Dissertation submitted in partial fulfilment of requirements for the MSc in Economics with Specialization in Finance and Banking, at the Universidade Católica Portuguesa, January 2026.

Abstract

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The goal of this dissertation is to examine how Portuguese small and medium-sized enterprises (SMEs) adjust their use of bank credit and trade credit between 2016 and 2023. Using a panel of 50,744 firms, the study evaluates three dimensions of trade credit to understand whether firms rely more on suppliers when bank credit declines (trade credit received), whether they redistribute liquidity through credit granted to customers (trade credit granted), or whether they adjust their net financing position within the supply chain (net trade credit). The empirical strategy relies on fixed effects models and explores heterogeneity according to firm size, financial constraints and sector of activity.

The results provide evidence of a substitution mechanism, which means that SMEs increase their reliance on trade credit when bank credit decreases. This pattern persists across all specifications, highlighting the central role of supplier financing in a bank-based economy. In Portugal, no evidence supports the redistribution theory, that is, firms with higher levels of bank credit do not tend to grant more trade credit. During the COVID-19 pandemic, however, a temporary increase in trade credit granted is observed, although this effect disappears in subsequent years. Regarding the net effect, SMEs with greater access to bank credit are more likely to hold positive net trade credit positions, acting as net suppliers within the supply chain, whereas firms with lower access tend to remain net borrowers of supplier financing.

Keywords: Trade Credit, Bank Credit, Small and Medium Size Enterprises (SME), Corporate Financing Structure, Credit Substitution, COVID-19, Portugal

JEL Classification: D22, G21, G32

Resumo

Crédito Comercial ou Crédito Bancário? Evidência sobre o Financiamento de PMEs

Portuguesas

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O objetivo desta dissertação de mestrado é analisar de que forma as pequenas e médias empresas (PME) portuguesas ajustam a utilização de crédito bancário e comercial, entre 2016 e 2023. Com base num painel de 50,744 empresas, este estudo avalia três dimensões do crédito comercial para compreender como as empresas recorrem aos seus fornecedores quando os níveis de crédito bancário diminuem (crédito comercial recebido), se redistribuem liquidez através de crédito a clientes (crédito comercial concedido) ou se ajustam a sua posição líquida na cadeia de fornecimento (crédito comercial líquido). A estratégia implementada assenta em modelos com efeitos fixos e explora heterogeneidade segundo a dimensão das empresas, as suas condições financeiras e o setor de atividade.

Os resultados revelam evidência de um mecanismo de substituição, ou seja, as PME aumentam o recurso ao crédito comercial quando o crédito bancário diminui. Este padrão mantém-se em todas as especificações, destacando o papel do crédito comercial de fornecedores como essencial numa economia fortemente baseada no crédito bancário. Em Portugal, não se verifica evidência do mecanismo de redistribuição, isto é, empresas com maiores níveis de crédito bancário não tendem a conceder mais crédito comercial. Durante a pandemia, contudo, observa-se um aumento temporário de crédito comercial concedido, que não se prolonga nos anos seguintes. Relativamente ao efeito líquido, as PME com maior acesso a crédito bancário tendem a assumir posições líquidas positivas, atuando como financiadoras dentro da cadeia de fornecimento, contrastando com as empresas com menores níveis de crédito bancário.

Palavras-chave: Crédito Comercial, Crédito Bancário, Pequenas e Médias Empresas (PME), Estrutura de Financiamento Empresarial, Substituição de Crédito, COVID-19, Portugal

Classificação JEL: D22, G21, G32

Acknowledgements

Completing this thesis marks the end of a long and challenging academic journey.

I want to start by thanking my supervisor, Diana Bonfim, for her expertise and guidance throughout the development of this thesis. To the BPLIM team at Banco de Portugal for providing me with the resources and data necessary to develop this project.

I am also grateful to my friends, Filipa, Mónica and Tiago, for their companionship and support, which helped me to stay motivated during these past five years. And to my oldest friends, Laura and Camila, for always celebrating my achievements, despite the distance, and for reminding me of the importance of balance beyond academic life.

My deepest appreciation goes to my family, and in particular to my parents, who have always done everything they could. For the effort and unconditional support they have always given to me and to my sister. Their trust in us, as well as their desire to see us succeed, made it possible for us to pursue our academic paths and achieve our goals. To my sister, my best friend for life, who shared this journey closely with me, for being patient, understanding and always being there for me through this period, thank you for everything.

Finally, I want to dedicate this thesis to my grandparents José and Esmeralda, whose memory remains very present in my life. Although they are no longer here to see the completion of this chapter, their love, values and examples continue to guide my choices and inspire me every day.

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1. Introduction

An important distinction in corporate finance lies between trade credit and bank credit. Regarding this, a central question about this subject still comes forward: why is trade credit available when other financing options exist in the market? (Biais & Gollier, 1997; Chen et al., 2019).

Trade credit is one of the most important financing instruments available to firms. The World Trade Organization (2016) highlights that around 80% of global trade relies on some form of trade finance, including trade credit. According to Chen et al. (2019), it is also one of the most important sources of short-term financing for firms, especially when considering SMEs, which often face financing constraints. While bank credit remains the dominant source of external finance in many economies (Altavilla et al., 2024), firms also depend on supplier credit to support their working capital needs, mitigating liquidity pressures. This reliance is especially relevant in countries with bank-based financial systems, such as Portugal, where SMEs represent a “99.9% of all enterprises in the non-financial business sector” (Instituto Nacional de Estatística, 2025), and where alternative sources of external financing are not available. In this sense, understanding how SMEs balance bank credit and trade credit is important for discussing financial stability and firms’ resilience to shocks.

In this context, this dissertation investigates how Portuguese SMEs adjusted their financing structure in response to changes in bank credit between 2016 and 2023. The study is based on theoretical mechanisms commonly discussed in literature, such as the substitution hypothesis, where firms tend to rely more on supplier financing when bank credit contracts (Biais & Gollier, 1997; Cuñat, 2007; Meltzer, 1960); the redistribution hypothesis, which suggests that firms with more access to bank credit may extend more trade credit to customers (Gropp & Boissay, 2013; Petersen & Rajan, 1997); and the supply chain financing mechanism, capturing the willingness of firms to position themselves as net lenders after account for the trade credit they receive (Yang, 2011).

The COVID-19 pandemic is a unique context to understand shock dynamics. The unexpected disruption led to increased liquidity needs, supply chain disruptions, and increased uncertainty for firms across sectors. In Portugal, the shock was accompanied by large public guaranteed schemes, like “*Linha de Crédito de Apoio à Atividade Económica – COVID 19*”, that expanded access to secured bank credit, even if some SMEs remained vulnerable (Banco de Portugal, 2021).

Taking all this into account, this study aims to address the central questions: do Portuguese SMEs tend to increase their reliance on trade credit when access to bank credit is limited? Do firms with greater access to bank credit appear to redistribute liquidity to customers? How did these associations evolve during the COVID-19 crisis and the subsequent uncertainty years?

To answer these questions, the dissertation conducts an empirical analysis using a panel dataset of 50,744 Portuguese SMEs, examining the financing behavior along three dimensions: trade credit received, trade credit granted and net trade credit. The empirical strategy develops estimating the baseline fixed-effects models to analyze the relationship between bank credit and each of trade credit measures, analyzing the three mechanisms. To assess firm heterogeneity, the mechanisms are tested across sub-samples, to see how they vary with firm size, financial constraints and sectors. To capture the effect of COVID-19 and the subsequent years, crisis interactions are included. Finally, some robustness checks are included to assess the stability of the results.

The main findings reveal patterns consistent with the substitution effect, which means that Portuguese SMEs tend to rely more on trade credit when bank credit decreases, highlighting the role of credit suppliers as buffers in a bank dependent economy (Biais & Gollier, 1997; Nilsen, 2002). No evidence is found for the redistribution hypothesis, meaning that greater access to bank financing is not associated with more trade credit granted to the customers. However, during the pandemic a temporary increase in trade credit granted is observed, but this pattern is consistent with receivable accumulation rather than liquidity redistribution, as disappears in the following years (Love et al., 2007). Lastly, SMEs with higher access to bank loans tend to hold more positive net positions, consistent with net lender profiles within the supply chain, whereas financially constrained firms remain net borrowers.

The dissertation is structured as follows. The second chapter reviews the theoretical and empirical background on trade credit, bank credit and SME behavior, and develops the hypothesis guiding the analysis. The third chapter describes the data, variables and descriptive statistics. The fourth chapter presents the empirical methodology and the model specifications, and in the fifth chapter the results are presented and the respective discussion. Lastly, chapter six concludes with the main implications, contributions and directions for future research.

2. Literature Review

The following sections review the theoretical and empirical foundations of trade credit and how it interacts with bank credit, leading to the hypotheses that structure the empirical analysis.

2.1. Conceptual Background

The literature on firm financing offers several perspectives on the use of trade credit and how it interacts with bank credit.

Bank credit consists of a loan provided by financial institutions to customers or firms under a contract and regulatory framework, while trade credit can be defined as a loan that a supplier provides to its customer to delay the payment of goods or services that were already delivered. In accounting terms, trade credit will appear in accounts receivable (accounts payable) on the balance sheet of the suppliers (customers) (Petersen & Rajan, 1997). Nilsen (2002) defines it as a “loan a supplier provides to its customers in conjunction with product sales”, and Cuñat (2007) describes it as a contractual delay of payment.

Previous literature has established the importance of trade credit as a financing channel, suggesting that suppliers may be better positioned to evaluate a customer's creditworthiness and evaluate the risk, due to their direct contact, compared to banks (Petersen & Rajan, 1997). Regarding this, Cuñat (2007) adds that suppliers can enforce payment more easily than banks, by threatening to suspend future deliveries.

Beyond trade credit, the bond market can also act as a substitute for bank credit. Research shows that firms are observed to increase bond issuance when banks restrict credit (Becker & Ivashina, 2014). However, access to bond market is not widely available across firms. According to Becker and Ivashina (2014) and Massa and Zhang (2013), while large firms can access bond markets, the relevance of this is limited for SMEs, making trade credit a more appealing alternative.

A wide range of theories tries to explain the existence of trade credit and in what conditions it expands when compared to bank credit.

The substitution hypothesis suggests that trade credit emerges as an alternative for bank credit, when lending is restricted (Biais & Gollier, 1997; Burkart & Ellingsen, 2004; Cuñat, 2007). Meltzer (1960) argued that during a period of economic uncertainty, firms with higher liquidity extend credit to financially constrained ones. Hence, under normal economic conditions firms rely on inexpensive bank loans, but in periods of illiquidity they will turn to

more expensive trade credit. Petersen and Rajan (1997) and Nilsen (2002) found evidence consistent with the substitution effect for US firms, while more recent studies, like Love et al. (2007) and Chen et al. (2019) confirm this pattern, by finding that trade credit increases right after crises in emerging markets and that firms rely less on trade credit once bank lending conditions improve, respectively. This outcome reflects the demand-supply effect where constrained customers (suppliers) reduce the ability to accept (offer) more credit. Although many studies support substitution, some literature also points for a complementary hypothesis, where firms use both sources simultaneously to diversify the forms of financing (Palacín-Sánchez et al., 2019).

Another explanation relies on the informational and relational advantages of suppliers. Long-term relationship between suppliers and customers may be positive when looking for trade credit. Some theoretical models provide evidence that firms with information advantage of the customer are more willing to offer trade credit (Biais & Gollier, 1997; Cuñat, 2007; Wilner, 2000). Through business relationships, theoretical models suggest that suppliers obtain information about customer behavior, relative to payments, and can monitor them more effectively than banks, who do not have access to this information in the first instance, without an extra cost (Burkart & Ellingsen, 2004). Even though this relationship can facilitate access to financing, Wilner (2000) states that it may create dependency because weaker firms become dependent on supplier credit. Similar mechanisms are documented by Ongena and Smith (2001) that found evidence that long-term bank relationships reduce information asymmetry, improving screening and monitoring, facilitating the access to credit. Nevertheless, concentrated banking relationships may increase the vulnerability of firms, particularly for constrained borrowers (Detragiache et al., 2000).

The redistribution theory proposes that trade credit can redistribute liquidity from financially strong firms to constrained ones (Calomiris et al., 1995; Gropp & Boissay, 2013; Meltzer, 1960; Nilsen, 2002; Petersen & Rajan, 1997). Love et al. (2007) and Garcia-Appendini and Montoriol-Garriga (2013) found empirical support for this theory, showing that firms with higher liquidity extend credit to their customers during periods of crisis, acting like a financial intermediary.

In addition to these theoretical mechanisms, firms do not rely on the two sources of financing uniformly. Previous literature highlights how firm characteristics influence access to bank and trade financing. Smaller firms face greater financial constraints, relying more heavily

on supplier financing (Kestens et al., 2012; Palacín-Sánchez et al., 2019), while larger firms benefit from greater bargaining power and stronger access to formal credit. The financial health of the firms also shapes their financing choices. Firms with low liquidity or high leverage tend to depend more on trade credit (Carbó-Valverde et al., 2016), while more profitable firms may rely less on external sources.

Despite the advantages of trade credit, Meltzer (1960) showed that it is a more expensive source of financing when compared to bank loans. The higher cost is justified by an insurance premium (since suppliers anticipate their customers' liquidity needs) and a default premium (suppliers may provide credit when banks do not). Consequently, this makes trade credit a riskier option, since suppliers are exposed to late payments, defaults and additional costs of monitoring and enforcement (Cuñat, 2007).

The literature argues that periods of economic uncertainty and financial crises influence the firm's financing choices. When banks restrict credit due to policy or monetary constraints, firms are left without access to other sources of financing and therefore turn to trade credit, reflecting its importance as a buffer in those periods (Biais & Gollier, 1997; Calomiris et al., 1995; Nilsen, 2002). The impact of uncertainty, however, is heterogeneous. D'Mello & Toscano (2020) found that the financial health of the firms is important. Stronger firms will expand trade credit while distressed firms will reduce both accounts payable and receivable.

Focusing on crisis periods, Garcia-Appendini and Montoriol-Garriga (2013) and Casey and O'Toole (2014) documented that during the global financial crisis of 2008, firms with stronger liquidity pre-crisis tend to act as "liquidity providers" to firms without access to bank credit, particularly SMEs. Carbó-Valverde et al. (2016) further demonstrates that constrained SMEs relied on suppliers as their primary external financing channel. More recently, studies examining the COVID-19 crisis report opposite results. Beck and Keil (2022) find, for the US, that smaller firms increased trust in suppliers and in trade credit. However, the Pandemic Emergency Purchase Program (PEPP) and other measures like Paycheck Protection Program (PPP), helped to reduce funding constraints and mitigate the need for firms to rely on trade-credit and other substitutes. After this period, Europe has faced overlapping shocks, such as rising inflation, energy crisis and the war between Russia and Ukraine, which led to increased economic uncertainty. Nevertheless, there is still limited evidence of an impact on firm financing. This makes the COVID-19 period a relevant context for examining whether the relation trade-bank credit shifts under stress.

Overall, the literature on trade credit defines it as a substitute for bank lending when firms are constrained, a facilitator in commercial transactions, a tool for strengthening the relationship supplier-costumer, a way of redistributing liquidity across firms and occasionally a complement to bank credit.

2.2. Hypotheses Development

This subsection presents the research hypotheses that guide the empirical analysis. Considering the previous literature, the hypotheses examine how trade credit, bank credit and firms' financial characteristics interact under the period in study among Portuguese SMEs.

2.2.1. Trade Credit Received: Financing Mechanisms

These hypotheses concern how firms adjust their use of supplier financing when bank financing conditions change.

H1) Substitution Hypothesis: Trade credit acts as substitute for bank credit, meaning that firms increase the reliance on supplier financing when access to bank credit is restricted (Biais & Gollier, 1997; Meltzer, 1960).

H2) Complementary Hypothesis: Trade credit can complement bank loans to help firms meet their capital needs (Palacín-Sánchez et al., 2019).

2.2.2. Trade Credit Granted: Redistribution Mechanisms

This hypothesis concerns whether firms extend liquidity to their customers.

H3) Redistribution Hypothesis: Firms with greater access to bank credit extend more levels of trade credit to their customers, redistributing liquidity along the supply chain (Gropp & Boissay, 2013; Nilsen, 2002).

2.2.3. Net Trade Credit: Supply Chain Mechanism

This hypothesis captures the firm's net financial role as lender or borrower.

H4) Net Trade Credit and Bank Substitution: Firms facing tighter access to bank financing exhibit weaker net trade credit positions, reflecting greater reliance on supplier financing.

2.2.4. Firm-Level Determinants of Trade Credit Behavior

These hypotheses capture the role of firm-level characteristics in trade credit behavior of SMEs.

H5) Financial Constraints Hypothesis: Firm financial conditions shape their ability to obtain and provide trade credit.

H5a) Highly leveraged and less liquid SMEs depend more on supplier credit to maintain operations (Carbó-Valverde et al., 2016).

H5b) Highly leveraged and less liquid SMEs have limited capacity to extend trade credit to their customers (Garcia-Appendini & Montoriol-Garriga, 2013).

H6) Size Hypothesis: Firm size affects access to credit markets and trade credit usage.

H6a) Smaller SMEs are expected to hold higher levels of trade credit received than larger firms (Kestens et al., 2012; Palacín-Sánchez et al., 2019).

H6b) Larger SMEs are expected to have more capacity to grant credit to their customers.

H7) Banking Relationship Hypothesis: Banking relationships shape the firms' trade credit behavior, influencing both their reliance on supplier financing and their capacity to extend credit to customers.

H7a) Firms with fewer banking relationships exhibit greater reliance on supplier financing due to more limited access to formal financial channels.

H7b) Firms with more banking relationships exhibit greater trade credit extended, supported by improved access to external financing sources.

H8) COVID-19 Adjustment Hypothesis: Crisis periods, such the COVID-19 pandemic, influence firms' credit behavior.

H8a) During the pandemic crisis, firms may increase reliance on supplier credit as an alternative source of financing.

H8b) During the pandemic crisis, the capacity or willingness of firms to extend trade credit to customers may decrease.

3. Methodology

This chapter describes the data, variables and descriptive statistics used in the analysis. It details the sample construction, variable definitions and provides an overview of the main characteristics of the firms included in the dataset.

3.1. Data and Sample

The panel dataset consists of Portuguese private firms obtained from Central Balance Sheet Database (CB) combined with loan information from Harmonized Central Credit Register (HCRC), provided by Banco de Portugal Microdata Research Laboratory (BPLIM), covering the period between 2016 and 2023. According to the definition established by the European Commission, and to ensure that the analysis is restricted to SMEs, only firms with below 250 workers, with turnover lower than 50 million and balance sheet total lower than 43 million euros were considered. To guarantee consistency, the sample was restricted to firms with non-missing values in the key variables. Firms with negative equity, negative assets, negative liabilities and negative turnover were also excluded to avoid financial distress bias in the sample. Moreover, firms with negative observations in explanatory variables like size and liquidity were also not included, as well as firms with negative values in the variables trade credit received and trade credit granted. Additionally, to mitigate the influence of extreme outliers, the firm-level ratios, the ratios trade credit to total assets and bank credit to total assets, were winsorized at the 1st and 99th percentiles. Furthermore, for the purpose of this study, only non-financial firms were included. The final sample constitutes a panel data of 50,744 firms for 2016-2023.

3.2. Description of the variables

The present section describes the variables used in the empirical analysis. The dataset combines firm-level financial and structural information collected from firms' accounting statements.

3.2.1. Dependent Variables

The analysis relies on three measures of trade credit that allow to capture how firms adjust their financing behavior when access to bank credit is restricted.

Trade Credit Received (TCR) measures the amount of financing obtained from the suppliers, reflecting the role of trade credit as a source of external financing. Following studies such as Palacín-Sánchez et al. (2019) and Yang (2011), TCR is calculated as accounts payable

divided by total assets, allowing to capture the importance of supplier financing within firms' capital structure.

Trade Credit Granted (TCG) is defined as trade receivables scaled by total assets and captures the amount of credit firms extend to their customers (Yang, 2011). This variable allows to examine patterns related to the redistribution mechanism.

Net Trade Credit (NTC) is computed as the difference between trade credit granted and trade credit received. This measure captures the firm's net financing position within the supply chain, indicating whether they are net borrowers or net lenders of inter-firm credit. It reflects a firm's net willingness to grant trade credit, after accounting for the supplier's financing it receives (Love et al., 2007; Yang, 2011).

3.2.2. Explanatory Variables

Bank Credit (BC) represents the amount of financing obtained from financial institutions. This information was obtained using the HCRC dataset, provided by BPLIM, which contains data on bank loans granted to non-financial firms. The variable corresponds to the total amount of outstanding regular credit of each firm, scaled by total assets, to reflect the firm's financing structure. According to the substitution view and Chen et al. (2019), this variable is expected to have a negative relationship with trade credit, as firms tend to rely more on supplier financing when bank credit declines. In addition, a second variable, **Bank Credit Secured**, was included to account for the share of loans backed by collateral, which becomes particularly relevant during the period in analysis. This variable is defined as the ratio of total outstanding secured loans to total assets.

To control firm-level heterogeneity, several control variables, scaled by total assets, were included, such as size, profitability, liquidity and leverage. **Size** is computed by the natural logarithm of total assets (Cuñat, 2007; Gonçalves et al., 2018); **Profitability** is defined as EBIT divided by total assets, measuring the ability of the firms to generate operating income from its resources (Love et al., 2007; Palacín-Sánchez et al., 2019); **Liquidity** is measured as cash and short-term deposits divided by total assets, capturing the capacity of the firms to meet the short-term obligations (Cuñat, 2007; D'Mello & Toscano, 2020); **Leverage** is calculated as total financial debt over total assets (Phan et al., 2019). **Tangibility** is defined as the ratio of tangible fixed assets to total assets and reflects the amount of collateralizable assets that may ease the access to external finance (Massa & Zhang, 2013).

To capture differences in firm's access to bank financing, an additional variable measuring the diversification of banking relationship is added. **Bank Relationship** was retrieved from HCRC dataset and counts the number of banks providing outstanding credit to each firm in a given year. Given the strong skewness in the raw distribution of this variable, it was transformed into a dummy equal to 1 for firms with more than one banking relationship, helping to distinguish differences between one single bank dependent firms and those with diversified credit sources.

Furthermore, to represent shocks associated with COVID-19, two dummy variables were created: **COVID** for 2020-2021 and **postCOVID** for 2022-2023. This helps to capture the disruption in credit markets during the pandemic years.

3.3. Descriptive Statistics

This subsection outlines the descriptive statistics of the variables used in the empirical analysis, providing an overview of the main characteristics of the sample over the study period.

Table 1 presents the descriptive statistics of the variables after winsorizing. The sample comprises 405,952 firm-year observations.

Table 1 – Descriptive Statistics of Main Variables

	N	Mean	Std. Dev.	Min	P25	Median	P75	Max
Headcount	405,952	13.18	22.60	0.00	3.00	6.00	13.00	249.00
Trade Credit Received	405,952	0.14	0.13	0.00	0.03	0.09	0.20	0.59
Trade Credit Granted	405,952	0.21	0.20	0.00	0.03	0.17	0.34	0.80
Net Trade Credit	405,952	0.07	0.20	-0.59	-0.03	0.04	0.19	0.80
Bank Credit	405,952	0.22	0.18	0.00	0.07	0.19	0.34	0.76
Bank Credit Secured	405,952	0.20	0.18	0.00	0.06	0.17	0.31	0.73
Liquidity	405,952	0.17	0.19	0.00	0.03	0.10	0.24	0.84
Leverage	405,952	0.56	0.23	0.05	0.40	0.58	0.74	0.97
Profitability	405,952	0.10	0.10	-0.16	0.04	0.09	0.15	0.48
Tangibility	405,952	0.34	0.27	0.00	0.10	0.28	0.53	0.97
Size	405,952	13.20	1.41	7.77	12.20	13.04	14.10	17.58
Bank Relationship	405,952	3.02	2.02	1.00	2.00	3.00	4.00	19.00

Notes: Table 1 reports summary statistics for Portuguese SMEs between 2016 and 2023. Headcount represents the average number of employees. Trade Credit Received represents the value of supplier financing received relative to Total Assets. Trade Credit Granted corresponds to trade receivables scaled by Total Assets. Net Trade Credit is the difference between trade credit granted and trade credit received. Bank Credit corresponds to total credit outstanding to Total Assets. Bank Credit Secured includes only those loans backed by collateral or public guarantees to Total Assets. Liquidity measures firms' cash and short-term financial resources relative to Total Assets. Leverage reflects the proportion of total debt in the firm's capital structure. Profitability captures firms' returns relative to Total Assets. Tangibility is defined as the ratio of tangible fixed assets to Total Assets. Size is based on the natural logarithm of Total Assets. Bank Relationship counts the number of banks' lending to each firm and is shown as continuous count variable.

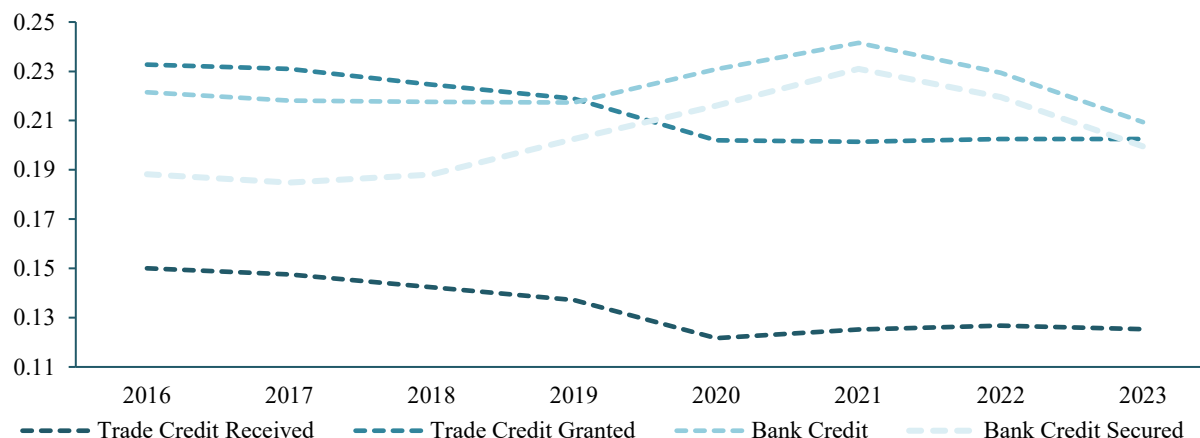
On average, TCR and TCG represents 14% and 21% of total assets, highlighting the importance of supplier finance to Portuguese SMEs. This pattern is consistent with European evidence, where Palacín-Sánchez et al. (2019) report levels of trade credit between 8% and 28%. Net trade credit averages 8%, suggesting that Portuguese firms grant more trade credit that they receive. On the bank credit side, it averages 22% of total assets, reflecting a level of bank credit dependence similar to the levels found by Wang et al. (2021) for Cypriot, Greek and British SMEs.

Regarding the financial structure, the mean leverage ratio of 56% shows that debt finances more than half of total assets, confirming that firms depend substantially on debt to support their operations. This result aligns with Wang et al. (2021), who report similar leverage levels for European SMEs. The liquidity ratio averages 17% indicating that Portuguese firms hold modest cash buffers, consistent with the limited short-term liquidity documented by Palacín-Sánchez et al. (2019). Profitability on average represents 10% of total assets, a figure that stands out positively from those observed in other European studies (Palacín-Sánchez et al., 2019; Wang et al., 2021). The average tangibility ratio (0.34) indicates that tangible fixed assets represent around one-third of firms' total assets. This value is also consistent with evidence found by Palacín-Sánchez et al. (2019). The average firm size is 13.10 (in logarithm) and the mean headcount is 13 which corresponds to medium-sized firms under the European Commission classification.

Overall, the evidence indicates that Portuguese SMEs hold a significant share of debt in their capital structure, maintain on average relationships with around three banks, operate with modest cash reserves and depend substantially on external sources of finance.

To further explore the evolution of financing sources, Figure 1 presents the trend in trade credit received and granted, bank credit and bank credit secured, for Portuguese SMEs.

Figure 1 – Evolution of Trade Credit Received and Granted, Bank Credit and Bank Credit Secured



Notes: Figure 1 illustrates the evolution of trade credit received, trade credit granted, bank credit and secured bank credit among Portuguese SMEs between 2016 and 2023. All variables are expressed as ratio to total assets. Trade Credit Received represents the value of supplier financing received relative to Total Assets. Trade Credit Granted corresponds to trade receivables scaled by Total Assets. Bank Credit corresponds to total credit outstanding to Total Assets. Bank Credit Secured includes only those loans backed by collateral or public guarantees to Total Assets. The values correspond to the yearly average across firms.

The graph shows a decreasing pattern for trade credit (both received and granted) over the period. After 2016, the average of trade credit declines until 2020, suggesting a gradual reduction in supplier financing.

During the last years, both TCR and TCG display a slightly expanding movement, indicating that firms increased their reliance on trade credit after the COVID-19 pandemic years. This behavior may be associated with the shock in the economy and firms facing higher uncertainty and disruptions in supply chains. However, unlike evidence from other crises, trade credit did not rise sharply during the pandemic period and neither did in the following years.

The upward trend in total and secured bank credit, in the pandemic period, shows that Portugal expanded access to bank credit mainly due to measures like “*Linha de Crédito de Apoio à Atividade Económica – COVID 19*”. The variable Bank Credit Secured represents the bank credit that was granted with collateral, like public guarantees. The pattern in Figure 1 allows us to observe how much of firms’ borrowing relied on secured instruments, which became relevant during the pandemic, and to identify the extent to which the overall increase in bank financing may have been influenced by temporary support mechanisms. Beck and Keil (2022) also shows for US, that under April 2020 PPP, bank loans were made available to small businesses, lending a normalization in bank lending.

Extending the overview over time, Table 2 summarizes how credit usage differs across sectors, highlighting structural differences in financing patterns across industries.

Table 2 – Sectoral Distribution of Firms and Average Credit Ratios by Sector

	N° Firms	% of total	Trade Credit Received	Trade Credit Granted	Net Trade Credit	Bank Credit	Bank Credit Secured
Agriculture, forestry and fishing	2,401	4.73	0.11	0.13	0.02	0.27	0.25
Mining and energy	502	0.99	0.11	0.17	0.06	0.23	0.21
Manufacturing	8,701	17.15	0.16	0.26	0.10	0.23	0.21
Construction	5,447	10.73	0.16	0.30	0.14	0.18	0.17
Wholesale and retail trade	15,896	31.33	0.19	0.22	0.03	0.22	0.20
Hotels and restaurants	2,598	5.12	0.07	0.02	-0.05	0.26	0.24
Transport and communications	3,597	7.09	0.11	0.28	0.17	0.23	0.21
Business services	7,403	14.59	0.07	0.21	0.14	0.22	0.20
Education, health and social work	4,199	8.28	0.05	0.09	0.04	0.25	0.23
Total	50,744	100.00	0.14	0.21	0.07	0.22	0.20

Notes: Table 2 reports the number and percentage of firms in each economic sector, along with the average ratios of Trade Credit Received and Granted, Net Trade Credit, Bank Credit and Bank Credit Secured to total assets. All financial variables are expressed as firm-level averages over the sample period. Trade Credit Received represents the value of supplier financing received relative to Total Assets. Trade Credit Granted corresponds to trade receivables scaled by Total Assets. Net Trade Credit is the difference between trade credit granted and trade credit received. Bank Credit corresponds to total credit outstanding to Total Assets. Bank Credit Secured includes only those loans backed by collateral or public guarantees to Total Assets.

The Wholesale and retail trade sector is the largest in the sample, representing around 31% of all firms, followed by Manufacturing (17%) and Business services (15%). On average, firms in the Manufacturing, Construction and Wholesale and retail trade sectors rely more heavily on both trade credit received and granted, as well as bank financing, compared to those in service-oriented industries. In contrast, sectors such as Education, health and social work and Business Services exhibit lower reliance on trade credit, reflecting a more limited use of inter-firm credit. Regarding net trade credit, Transport and communications, Construction and Manufacturing display the highest positive values, indicating that firms in these sectors act mainly as net lenders. Bank credit and bank credit secured are particularly high in sectors such as Agriculture, forest and fishing (27% and 25%, respectively) and Hotels and restaurants (26% and 24%, respectively), suggesting that firms in these sectors tend to rely more on bank loans supported by guarantees or collateral.

To explore heterogeneity across firm sizes, Table 3 present descriptive statistics disaggregated by firm size, helping to assess whether this characteristic influence access to financing sources. Trade credit received increases with firm size, rising from 13% for micro firms to 16% for medium. A similar pattern emerges for trade credit granted, increasing from

20% to 23%. This suggests that larger SMEs have greater access to supplier financing, possibly due to perceived reliability (Cuñat, 2007; Petersen & Rajan, 1997).

Table 3 – Evolution of Variables by Firm Size

	Micro	Small	Medium	Total
Trade Credit Received	0.13	0.14	0.16	0.14
Trade Credit Granted	0.20	0.22	0.23	0.21
Net Trade Credit	0.07	0.08	0.07	0.07
Bank Credit	0.21	0.22	0.24	0.22
Bank Credit Secured	0.20	0.21	0.21	0.20
Liquidity	0.20	0.17	0.13	0.17
Leverage	0.53	0.59	0.58	0.56
Profitability	0.10	0.11	0.11	0.10
Tangibility	0.30	0.34	0.40	0.34
Bank Relationship	2.02	2.66	4.38	3.02
Number of Firms	271,111	11,337	21,469	405,952

Notes: Table 3 reports the average level of trade credit across micro, small and medium-sized Portuguese SMEs between 2016 and 2023. Trade Credit Received represents the value of supplier financing received relative to Total Assets. Trade Credit Granted corresponds to trade receivables scaled by Total Assets. Net Trade Credit is the difference between trade credit granted and trade credit received. Bank Credit corresponds to total credit outstanding to Total Assets. Bank Credit Secured includes only those loans backed by collateral or public guarantees to Total Assets. Liquidity measures firms' cash and short-term financial resources relative to Total Assets. Leverage reflects the proportion of total debt in the firm's capital structure. Profitability captures firms' returns relative to Total Assets. Tangibility is defined as the ratio of tangible fixed assets to Total Assets. Size is based on the natural logarithm of Total Assets. Bank Relationship counts the number of banks' lending to each firm and is shown as continuous count variable.

On the other hand, bank credit is more stable across firm sizes, averaging around 22% of total assets. Nonetheless, small and medium sized firms appear to access bank credit more easily than micro firms. In what concerns liquidity, decreases with firm size, consistent with the idea that smaller firms maintain higher cash reserves as a buffer and as a form of self-insurance (Casey & O'Toole, 2014). Leverage and tangibility increase with firm size, while profitability remains stable across size categories. The number of bank relationships increases with firm size, suggesting that larger firms engage with more banks on average.

Generally, these results suggest that micro firms face tighter financial constraints, reflected in greater reliance on internal liquidity, while larger SMEs exhibit greater access to both trade and bank financing. These is consistent with Uchida et al. (2013) and the idea that stronger credit profiles and more established relationships with both suppliers and banks allow firms to obtain easily external financing.

Table 4 provides the correlation matrix for the main variables used in the analysis. In general, correlations are moderate and display the expected signs, with no strong linear dependence observed among the explanatory variables.

Table 4 – Correlation Matrix of Main Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Trade Credit Rec.	1.00									
(2) Trade Credit Gra.	0.35	1.00								
(3) Net Trade Credit	-0.31	0.78	1.00							
(4) Bank Credit	-0.08	-0.09	-0.03	1.00						
(5) Bank Credit Sec.	-0.10	-0.10	-0.04	0.96	1.00					
(6) Liquidity	-0.12	-0.17	-0.09	-0.21	-0.19	1.00				
(7) Leverage	0.40	0.11	-0.16	0.45	0.43	-0.30	1.00			
(8) Profitability	-0.13	-0.02	0.06	-0.04	-0.05	0.24	-0.21	1.00		
(9) Tangibility	-0.30	-0.44	-0.25	0.25	0.25	-0.32	0.07	0.01	1.00	
(10) Size	0.09	-0.01	-0.07	0.03	0.02	-0.24	0.03	-0.09	0.20	1.00

Notes: Table 4 presents the correlation matrix for the main variables used in the analysis. Trade Credit Received represents the value of supplier financing received relative to Total Assets. Trade Credit Granted corresponds to trade receivables scaled by Total Assets. Net Trade Credit is the difference between trade credit granted and trade credit received. Bank Credit corresponds to total credit outstanding to Total Assets. Bank Credit Secured includes only those loans backed by collateral or public guarantees to Total Assets. Liquidity measures firms' cash and short-term financial resources relative to Total Assets. Leverage reflects the proportion of total debt in the firm's capital structure. Profitability captures firms' returns relative to Total Assets. Tangibility is defined as the ratio of tangible fixed assets to Total Assets. Size is based on the natural logarithm of Total Assets.

Overall, the descriptive patterns provide an initial overview of the relationship between firms' financing sources and firm characteristics.

4. Empirical Strategy

Relying on the data and variable definitions introduced in the previous chapter, this section develops the empirical framework for analyzing the relationship between trade credit, bank credit and firm characteristics over 2016-2023.

4.1. Initial Model

The empirical analysis relies on panel data regressions and the model is progressively expanded to incorporate firm-level controls, interaction terms to explore crisis periods and firm heterogeneity.

The general models' specifications:

$$Trade\ Credit_{it} = \alpha + \beta_1 Bank\ Credit_{it} + u_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where:

- $Trade\ Credit_{it}$ denotes one of the three measures of trade credit (trade credit received, trade credit granted or net trade credit) scaled by total assets for firm i in year t ;
- $Bank\ Credit_{it}$ represents bank credit scaled by total assets for firm i in year t ;
- u_i and λ_t denote firm and year fixed effects, respectively;
- ε_{it} is the idiosyncratic error term.

The analysis begins with the direct relationship between supplier financing and bank credit, testing the substitution and complementary mechanisms (H1 and H2). In this case, the dependent variable corresponds to trade credit received, capturing the amount of supplier financing obtained by the firm. This allows to understand whether SMEs in Portugal tend to rely more on trade credit when bank credit levels are lower (Meltzer, 1960), or whether both forms of credit are used jointly. In this context, $\beta_1 < 0$ indicates substitution, while $\beta_1 > 0$ supports complementarity.

Beyond firms' reliance on supplier financing, it is relevant to assess whether firms with more access to bank credit tend to redistribute liquidity along the supply chain, by extending more trade credit to their customers. To test the redistribution mechanism (H3), as done by Love et al. (2007), the analysis considers Trade Credit Granted as the dependent variable, reflecting the volume of credit firms extend to their customers. If liquidity redistribution occurs, a positive coefficient between trade credit granted and bank credit would be expected.

Finally, to assess firms' net financing position, the analysis considers Net Trade Credit, defined as the difference between trade receivables and trade payables (Love et al., 2007; Yang,

2011). Using NTC as the dependent variable allows testing H4, by examining whether firms facing lower levels of bank credit tend to become net receivers of supplier credit, while financially stronger firms tend to act as net lenders. A positive value of NTC means that the firm extends more trade credit to customers than it receives from suppliers. Conversely, a negative value indicates that the firm receives more trade credit from suppliers than it grants, reflecting a borrowing position.

All specifications include firm and year fixed effects, controlling for unobserved time-invariant firm characteristics and time-specific shocks affecting all firms. Standard errors are clustered at the firm level to account for potential correlation within firms over time (D'Mello & Toscano, 2020; Love et al., 2007).

4.2. Initial Model with Controls

Extending the general model specification, including firm-specific controls (X_{it} is a vector of control variables, liquidity, profitability, leverage, tangibility and firm size), accounts for differences in financial characteristics across firms, allowing testing H5 and H6.

$$Trade\ Credit_{it} = \alpha + \beta_1 Bank\ Credit_{it} + \beta_2 Bank\ Relationship_{it} + \gamma X_{it} + u_i + \lambda_t + \varepsilon_{it} \quad (2)$$

To examine banking relationships (H7), the model is extended by adding the Bank Relationship variable. Firms who borrow from a larger number of banks are typically associated with different external finance patterns, which may relate to reduced dependence on trade credit, while firms with less access to bank credit may rely more on trade financing. On the other hand, firms with more bank relationships may extend more trade credit to their customers.

4.3. Crisis Adjustment Model: the role of COVID-19

Following Love et al. (2007), the analysis evaluates how the relationship between trade credit and bank credit varies under periods of financial stress (H8). COVID and postCOVID dummy variables capture the pandemic shock. Interacting bank credit with these indicators shows whether reliance on supplier credit differs over periods:

$$Trade\ Credit_{it} = \alpha + \beta_1 Bank\ Credit_{it} + \beta_2 (Bank\ Credit_{it} \times COVID_t) + \beta_3 (Bank\ Credit_{it} \times postCOVID_t) + \beta_4 Bank\ Relationship_{it} + \gamma X_{it} + u_i + \lambda_t + \varepsilon_{it} \quad (3)$$

where β_2 and β_3 capture how the association between bank credit and trade credit changes in each period, relative to the omitted benchmark category (2016-2019).

The COVID-19 pandemic represents an unexpected and external financial shock that influenced firms' liquidity and bank lending. In Portugal, firms may have adjusted their reliance on suppliers during this period. By introducing interactions with period-specific dummies, the model examines how firms' reliance on supplier financing differs when traditional credit channels become more or less accessible due to an external disturbance.

4.4. Firm-level Differences in Financing Behavior

To explore heterogeneity and how differences in firms according to their financial constraints, size and sector affect the trade-bank credit relation, an estimation of the baseline model for distinct subsamples of firms was introduced.

First, the sample is split according to the SME size classification. Micro firms have fewer than 10 employees, small firms have fewer than 50, and medium-sized firms have up to 250 employees. Larger firms typically have better access to both trade credit and bank credit, while smaller firms tend to face more limited access to external financing (Kestens et al., 2012; Palacín-Sánchez et al., 2019).

Next, firms are classified according to their financial constraints, using leverage and liquidity ratios. Firms above the median leverage or below the median liquidity are considered financially constrained, while the remaining firms are classified as unconstrained. As suggested by Yang (2011), this will allow to compare whether constrained firms exhibit a stronger substitution pattern.

Finally, to capture sectoral heterogeneity, the model is also estimated for each sector of activity, allowing to identify structural differences in financing patterns across industries.

For each subgroup the Equation (3) is estimated. The comparison of the estimated coefficients on bank credit, represent by β_1 , cross groups reveals whether the substitution effect differs with firm characteristics.

5. Empirical Results and Discussion

This chapter discusses the empirical results from the models outlined in Chapter 4. The goal is to assess the determinants of firms' reliance on trade credit, both received and granted, with particular focus on bank credit, firm-level characteristics, and the impact of COVID-19 pandemic. The chapter is structured to first analyze trade credit received followed by trade credit granted, and finally net trade credit.

5.1. Trade Credit Received: Substitution Dynamics

Table 5 presents the results for trade credit received, examining the relationship between access to bank financing and reliance on supplier credit. Across all specifications, bank credit is negatively and significantly associated with trade credit received, a pattern consistent with the substitution effect. This is consistent with prior literature and the idea that firms with weaker access to formal finance rely more on suppliers (Love et al., 2007; Nilsen, 2002; Petersen & Rajan, 1997).

In the initial model, on average, a one unit increase in the ratio of bank loans to total assets is associated with a decrease in trade credit received of 11.3 percentage points, *ceteris paribus*. Once firm-level controls are included (column 2), the coefficient becomes more negative (-0.193), suggesting that part of the effect was previously absorbed by differences in firms' characteristics. The result remains stable in column (3) and column (4), where banking relationship control and crisis dummies are added. All variables are statistically significant at 1% level and R-squared increases with additional controls, indicating that 82.8% (column 4) of the variation in trade credit received is explained by the variables in the model.

Overall, the evidence suggests that Portuguese SMEs with lower levels of bank financing rely more on supplier credit, consistent with the substitution hypothesis (H1) and not consistent with the complementary hypothesis (H2).

Accounting for the differences in firm's characteristics, in model (2), the control variables behave as expected. Liquidity and profitability are negatively associated with trade credit received, consistent with financially stronger firms relying less on supplier credit (Kestens et al., 2012). Furthermore, leverage is positively and significantly related to trade credit, confirming the previous pattern and aligned with H5a. Tangibility and size are both negatively associated with trade credit received, suggesting that firms with more collateralizable assets or

larger operational scale tend to face fewer financing constraints, consistent with the evidence find by Casey and O'Toole (2014) and Nilsen (2002), in line with H6a.

Table 5 – Effect of Bank Credit on Trade Credit Received

(Dependent Variable: Trade Credit Received)				
	(1)	(2)	(3)	(4)
Variable	Initial Model	With Firm-Level Controls	With Bank Relationship Controls	With Covid Interactions
Bank Credit	-0.113*** (0.002)	-0.193*** (0.002)	-0.195*** (0.002)	-0.193*** (0.002)
Bank Credit × COVID				-0.013*** (0.001)
Bank Credit × postCOVID				0.006*** (0.002)
Liquidity		-0.038*** (0.002)	-0.038*** (0.002)	-0.038*** (0.002)
Profitability		-0.011*** (0.002)	-0.011*** (0.002)	-0.012*** (0.002)
Leverage		0.240*** (0.002)	0.241*** (0.002)	0.241*** (0.002)
Tangibility		-0.070*** (0.002)	-0.070*** (0.002)	-0.070*** (0.002)
Size		-0.005*** (0.001)	-0.006*** (0.001)	-0.006*** (0.001)
Bank Relationship			0.003*** (0.001)	0.003*** (0.001)
Constant	0.160*** (0.000)	0.144*** (0.09)	0.146*** (0.009)	0.146*** (0.009)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	405,952	405,952	405,952	405,952
R-squared	0.798	0.828	0.828	0.828

Notes: Table 5 presents the relationship between Trade Credit Received and Bank Credit. The dependent variable is Trade Credit Received measured as trade payables over total assets. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finally, the banking relationship dummy is positive and significant at 1% level suggesting that, on average, firms with multiple banking relationships tend to use more trade credit, when compared to SMEs with a single bank relation, holding everything else constant. This is not consistent with H7a, which expected that having multiple bank relationships might reduce the need for supplier financing. As highlighted by Detragiache et al. (2000) and Ongena and Smith (2001), maintaining several banking relationships may reflect higher perceived risk or insufficient credit provision rather than financial strength, a pattern consistent with the evidence for Portuguese SMEs.

The pandemic period can be useful to understand the financing patterns of Portuguese SMEs observed during an external disturbance. The interaction between bank credit and the COVID dummy (column 4) is statistically significant and negative (-0.013), indicating that the negative association between bank loans and supplier credit persisted during 2020-2021. Although bank credit expanded at the macro level (Figure 1), associated with public guarantee programs, many SMEs continued to show higher reliance on suppliers, consistent with the persistence of the substitution pattern. In contrast, the postCOVID interaction is positive and significant (0.006) suggesting that, from 2022 onwards, the association between bank credit and trade credit received began to move closer to pre-crisis patterns, consistent with the normalization of credit conditions and the decline in guaranteed lending. Although the years following the pandemic still presented economic uncertainty, this result suggests that the relationship between the two sources of financing partially stabilized in this period. These results are consistent with prior evidence showing that credit supply becomes an important buffer during financial crises (Cuñat, 2007; Meltzer, 1960). As documented by Love et al. (2007), trade credit increased shortly after the crisis but contracts in the subsequent periods. These results support H8a.

Focusing on heterogeneity and exploring whether firm characteristics shape the extent of reliance on supplier financing, Table 6 describes the results by firm size and financial health. In Panel A, the negative relationship between trade credit received and bank credit holds. However, the magnitude of the effect increases with firm size, indicating a stronger negative association in larger SMEs and that they adjust their use of supplier financing more strongly when bank credit varies (Casey & O'Toole, 2014; Nilsen, 2002). These size differences are consistent with the descriptive statistics in Table 3, where larger SMEs hold higher levels of trade credit received and operate with lower liquidity, making them more sensitive to changes in bank credit. Covid patterns found for the whole sample also hold regardless of firm size.

As respects whether financially constrained firms behave differently from unconstrained, Panel B of Table 6 shows a clear divergence. Constrained SMEs exhibit a stronger negative association between bank credit and trade credit received (-0.145) compared to unconstrained firms (-0.070), meaning that when bank credit contracts, they tend to rely more heavily on supplier credit (Biais & Gollier, 1997; Carbó-Valverde et al., 2016). Unlike in the size split, COVID interactions are not statistically significant for either group, suggesting that the crisis, in Portugal, did not differentially affect constrained versus unconstrained SMEs.

Table 6 – Firm-level Differences in Trade Credit Received

(Dependent variable: Trade Credit Received)					
	Panel A – By Firm Size			Panel B – By Financial Constraints	
	(1)	(2)	(3)	(1)	(2)
	Micro	Small	Medium	Constrained	Unconstrained
Bank Credit	-0.180*** (0.003)	-0.224*** (0.005)	-0.206*** (0.010)	-0.145*** (0.003)	-0.070*** (0.003)
Bank Credit × COVID	-0.010*** (0.002)	-0.018*** (0.003)	-0.019*** (0.005)	-0.003 (0.002)	0.002 (0.003)
Bank Credit × postCOVID	0.005** (0.002)	0.008*** (0.003)	0.018*** (0.007)	0.022*** (0.002)	0.019*** (0.004)
Liquidity	-0.029*** (0.002)	-0.061*** (0.003)	-0.084*** (0.008)		
Profitability	-0.014*** (0.002)	-0.007** (0.004)	0.006 (0.008)	-0.090*** (0.003)	-0.038*** (0.002)
Leverage	0.225*** (0.003)	0.277*** (0.004)	0.244*** (0.010)		
Tangibility	-0.064*** (0.002)	-0.084*** (0.004)	-0.102*** (0.008)	-0.075*** (0.002)	-0.023*** (0.002)
Size				0.004*** (0.001)	0.004*** (0.001)
Bank Relationship	0.002*** (0.001)	0.000 (0.001)	0.005 (0.003)	0.002*** (0.001)	0.001 (0.001)
Constant	0.065*** (0.001)	0.089*** (0.003)	0.110*** (0.007)	0.178*** (0.013)	0.056*** (0.013)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	271,111	113,372	21,469	284,109	121,843
R-squared	0.825	0.856	0.880	0.822	0.817

Notes: Table 6 presents the relationship between Trade Credit Received and Bank Credit by size and by financial constraints. The dependent variable is Trade Credit Received measured as trade payables over total assets. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Financially constrained firms are those with above-median leverage or below-median liquidity. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Sector-level results (Table B1, Annex B) support the robustness of the substitution mechanism across industries, with the coefficient of bank credit being negative and statistically significant at 1% in all nine sectors considered. The strongest associations arise in Wholesale and retail trade, Construction and Manufacturing, sectors that typically rely heavily on supply chain relationships and financing and which have the highest levels of TCR in the sample (Table 2). In contrast, weaker effects appear in Hotels and restaurants and in Education, health and social work, sectors characterized by comparatively low reliance on supplier financing. COVID interaction term is negative and significant at 1% level in sectors such as Manufacturing, Construction, Wholesale and retail trade and Business services, reflecting sectors more exposed to supply chain disruptions during this period. In the post-pandemic period, the interaction term

is only relevant at 1% for Transports and communications, suggesting a partial adjustment relative to the pandemic years. Across all industries, firm-level controls exhibit similar patterns to those observed in the main sample.

5.2. Trade Credit Granted: Redistribution Effects

Table 7 presents the results for trade credit granted, examining whether firms with more access to bank credit tend to act as liquidity providers, extending more trade credit to customers. All variables are statistically significant at 1% level, and the model explains 87.4% of the variation in trade credit granted.

Across all specifications, the coefficient on bank credit is negative and significant at 1% level, indicating that firms with higher levels of bank loans tend to extend less trade credit to their customers. At column (4), a one-unit increase in the ratio of bank credit to total assets is associated, on average, with a 0.070 decrease in trade credit granted, keeping everything else constant. This is not consistent with H3 and earlier evidence suggesting a positive relationship driven by liquidity redistribution along the supply chain (Cuñat, 2007; Wilner, 2000). One possible interpretation is that Portuguese SMEs may prioritize holding internal liquidity or debt repayment when the access to bank financing improves, reducing their willingness to extend credit to costumers. Given that trade credit granted already represents a substantial share of assets for Portuguese SMEs (Table 1), firms may be reluctant to expand receivables when bank credit levels improve, preferring to preserve liquidity. The absence of a positive relationship in the results is also consistent with evidence that payment delays did not increase significantly to improve receivables, and as highlighted by Love et al. (2007), outsides crisis conditions firms tend to conserve liquidity rather than channel bank resources.

The negative coefficients on liquidity and tangibility, combined with the positive effects of leverage, suggest that SMEs with tighter liquidity and higher levels of debt tend to grant more trade credit, providing no support for H5b. This is consistent with Cuñat (2007) and the idea that financially constrained firms may act as liquidity providers as a strategic tool to sustain sales and preserve customer relationships. At the same time, the positive coefficient of profitability suggests that more profitable firms are also able to extend credit to customers. The negative coefficient for firm size does not support H6b, and larger Portuguese SMEs tend to extend less credit.

Regarding an external shock, the interaction between bank credit and COVID dummy is positive and significant (0.006) at 1% level. This indicates that firms with higher levels of bank

credit were associated with higher amounts of trade credit they granted during the crisis, in contrast with the results found above and with H8b. One possible explanation, in line with Casey and O'Toole (2014), who found that while redistribution is generally limited among SMEs, healthy financial firms may extend additional trade credit during periods of financial stress. However, as noted by Love et al. (2007), such increases may reflect delayed customer payments accepted by suppliers rather than deliberate redistribution, helping to explain why the effect disappears in the subsequent years.

Table 7 – Effect of Bank Credit on Trade Credit Granted

(Dependent variable: Trade Credit Granted)				
	(1)	(2)	(3)	(4)
	Initial Model	With Firm-Level Controls	With Bank Relationship Controls	With Covid Interactions
Bank Credit	-0.096*** (0.003)	-0.067*** (0.003)	-0.069*** (0.003)	-0.070*** (0.003)
Bank Credit × COVID				0.006*** (0.002)
Bank Credit × postCOVID				-0.001 (0.002)
Liquidity		-0.365*** (0.003)	-0.365*** (0.003)	-0.365*** (0.003)
Profitability		0.091*** (0.003)	0.091*** (0.003)	0.092*** (0.003)
Leverage		0.056*** (0.003)	0.056*** (0.003)	0.056*** (0.003)
Tangibility		-0.328*** (0.003)	-0.328*** (0.003)	-0.328*** (0.003)
Size		-0.012*** (0.001)	-0.012*** (0.001)	-0.012*** (0.001)
Bank Relationship			0.003*** (0.001)	0.003*** (0.001)
Constant	0.236*** (0.001)	0.521*** (0.013)	0.523*** (0.013)	0.523*** (0.013)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	405,952	405,952	405,952	405,952
R-squared	0.837	0.874	0.874	0.874

Notes: Table 7 presents the relationship between Trade Credit Granted and Bank Credit. The dependent variable is Trade Credit Granted measured as trade receivables over total assets. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The bank relationship dummy is positive and significant, indicating that firms with multiple banking relationships are associated with higher levels of trade credit granted than SMEs that only rely on a single bank, consistent with H7b. The results suggest that firms with higher levels of bank credit are better positioned to extend credit to their customers, consistent with the idea

that diversified banking connections provide financial flexibility. This is aligned with the results found by Garcia-Appendini and Montoriol-Garriga (2013), for European SMEs, during the financial crisis, where firms with larger capacity extended significantly more trade credit.

Heterogeneity analysis (Table 8 and Table B2, Annex B) confirms that the negative association between bank credit and trade credit granted holds across firm sizes, constraint levels and sectors. However, the magnitude decreases with firm size, suggesting that micro firms adjust their provision of customer financing more strongly when bank credit changes. A similar dynamic is observed when comparing unconstrained and constrained firms. The effect is stronger among financially constrained SMEs, as reflected in the more negative coefficient on bank credit (-0.063 versus -0.049). This indicates that when bank lending conditions change, constrained firms adjust their trade credit granted more sharply than unconstrained firms.

Sector-level evidence reveals additional insights. The negative effect between trade credit granted and bank credit remains and is significant in almost all industries, with particularly strong effects in Manufacturing, Construction, Wholesale and Retail Trade and Transport and communications, sectors characterized by longer production cycles. Conversely, the effect is negligible in Hotels and Restaurants, where trade credit plays a limited operational role. This pattern is consistent with the descriptive evidence in Table 2, which shows that firms in this sector sustain lower levels of TCG relative to total assets.

During the pandemic period, the COVID interaction coefficient is positive and significant for unconstrained SMEs, as well as in sectors such as Transport and communications and Education, health and social work. These industries typically rely less on long production cycles and supplier financing, as shown in Table 2, which may have enabled additional support to customers during the crisis. This is consistent with Love et al. (2007), who show that firms less exposed to financial stress extend more trade credit under shock conditions. By contrast, constrained firms show no significant adjustment during COVID, consistent with Garcia-Appendini and Montoriol-Garriga (2013), who documented that firms facing financial constraints are unable to expand the supply of trade credit during periods of crisis.

Overall, there is no evidence in favor of redistribution hypothesis. The capacity of Portuguese SMEs to redistribute liquidity appears limited, as trade credit granted is not positively associated with bank financing conditions.

Table 8 – Firm-level Differences in Trade Credit Granted

(Dependent variable: Trade Credit Granted)					
	Panel A – By Firm Size			Panel B – By Financial Constraints	
	(1)	(2)	(3)	(1)	(2)
	Micro	Small	Medium	Constrained	Unconstrained
Bank Credit	-0.069*** (0.003)	-0.064*** (0.005)	-0.055*** (0.010)	-0.063*** (0.003)	-0.049*** (0.006)
Bank Credit × COVID	0.006** (0.003)	0.009** (0.004)	0.008 (0.007)	-0.002 (0.003)	0.037*** (0.006)
Bank Credit × postCOVID	0.001 (0.003)	-0.001 (0.004)	0.018** (0.008)	0.007** (0.003)	0.048*** (0.007)
Liquidity	-0.347*** (0.004)	-0.419*** (0.006)	-0.436*** (0.014)		
Profitability	0.091*** (0.003)	0.092*** (0.005)	0.074*** (0.011)	0.051*** (0.004)	0.023*** (0.004)
Leverage	0.052*** (0.003)	0.047*** (0.005)	0.028*** (0.011)		
Tangibility	-0.306*** (0.004)	-0.392*** (0.006)	-0.409*** (0.014)	-0.251*** (0.003)	-0.153*** (0.004)
Size				-0.011*** (0.001)	-0.015*** (0.002)
Bank Relationship	0.000 (0.001)	-0.000 (0.001)	-0.003 (0.004)	0.003*** (0.001)	0.002* (0.001)
Constant	0.341*** (0.002)	0.423*** (0.004)	0.437*** (0.010)	0.472*** (0.016)	0.422*** (0.024)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	271111	113372	21469	284109	121843
R-squared	0.871	0.900	0.914	0.872	0.863

Notes: Table 8 presents the relationship between Trade Credit Granted and Bank Credit by size and by financial constraints. The dependent variable is Trade Credit Granted measured as trade receivables over total assets. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Financially constrained firms are those with above-median leverage or below-median liquidity. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.3. Net Trade Credit: Firms' Financing Position

This subsection analyzes how bank credit relates to firms' net financing position within the supply chain. As proposed in H4, firms with stronger access to bank loans would be expected to hold more positive net trade credit positions, acting as net lenders. All variables are statistically significant at 1% level, except for the interaction between bank credit and the post-Covid period, which is significant at 5% level, and the bank relationship dummy, which is not statistically significant. The model explains 81.1% of the variation in NTC, as indicated by the R-squared.

Table 9 – Effect of Bank Credit on Net Trade Credit

(Dependent variable: Net Trade Credit)				
	(1)	(2)	(3)	(4)
	Initial Model	With Firm-Level Controls	With Bank Relationship Controls	With Covid Interactions
Bank Credit	0.017*** (0.003)	0.126*** (0.003)	0.126*** (0.003)	0.123*** (0.003)
Bank Credit × COVID				0.019*** (0.002)
Bank Credit × postCOVID				-0.007** (0.003)
Liquidity		-0.327*** (0.004)	-0.327*** (0.004)	-0.328*** (0.004)
Profitability		0.102*** (0.003)	0.102*** (0.003)	0.103*** (0.003)
Leverage		-0.185*** (0.003)	-0.185*** (0.003)	-0.185*** (0.003)
Tangibility		-0.259*** (0.003)	-0.259*** (0.003)	-0.258*** (0.003)
Size		-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)
Bank Relationship			-0.001 (0.001)	-0.000 (0.001)
Constant	0.076*** (0.001)	0.377*** (0.015)	0.377*** (0.015)	0.377*** (0.015)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	405952	405,952	405,952	405,952
R-squared	0.777	0.811	0.811	0.811

Notes: Table 9 presents the relationship between Net Trade Credit and Bank Credit. The dependent variable is Net Trade Credit measured as the difference between Trade Credit Granted and Trade Credit Received. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Across all specifications in Table 9, the coefficient in bank credit is positive and statistically significant at 1% level, indicating that firms with higher levels of bank credit tend to hold higher net trade credit positions. In other words, SMEs in Portugal with greater access to bank financing are associated with positive net lending positions within the supply chain, extending relatively more credit to their customers after account the credit they receive from suppliers (Petersen & Rajan, 1997). This is consistent with the intuition behind H4 and with Yang (2011), who argues that NTC reflects a firm's liquidity capacity and willingness to act as net lenders within the supply chain.

During the pandemic, SMEs with stronger bank support slightly improved their net financing positions compared to earlier periods, consistent with reduced negative NTC

positions. In contrast, the post crisis interaction is negative and significant at 5% level, suggesting a reverse pattern.

Financially stronger firms, more liquid, profitable and tangible, tend to hold higher net trade credit positions, while leverage is negatively associated with NTC. These results are consistent with the idea that constrained SMEs rely heavily on net borrowing from suppliers, while financially stronger firms are better positioned to maintain net financing roles within the supply chain. This pattern aligns with the descriptive statistics in Table 1, where Portuguese SMEs operate with modest liquidity buffers and significant levels of leverage, structural features that limit their capacity to sustain positive net trade credit and help explain why many firms hold negative NTC positions on average.

For NTC, the coefficient of the bank relationship dummy is zero and statistically insignificant, indicating that maintaining multiple relations with banks is not associated with differences in firms' net financing position within the supply chain.

The heterogeneity results (Table 10 and Table B3, Annex B) support the robustness of the main findings. Across size groups and sectors, bank credit consistently has a positive and significant effect on NTC, demonstrating that SMEs with better access to bank loans improve their willingness to extend credit after account for the trade credit received. This association is stronger among small and medium sized firms and especially pronounced in supply chain intensive sectors such as Wholesale and retail trade, Manufacturing and Construction, where trade credit plays a central role (Table 2).

Panel B of Table 10 shows that both groups have a positive association between bank credit and NTC. Nevertheless, the magnitude is stronger for constrained firms (0.082 versus 0.021), suggesting that even moderate increases in bank credit availability allows them to reduce supplier dependence and, in that way, reinforce their net trade credit position.

During the COVID-19 crisis, the dynamics differ. Unconstrained firms show a significant positive COVID dummy interaction, indicating that stronger SMEs were associated with more favorable net lending positions. This is consistent with previous findings where financially stronger firms may temporarily extend more support to customers during external shocks (Garcia-Appendini & Montoriol-Garriga, 2013; Love et al., 2007). In contrast, constrained SMEs display no additional adjustment during the COVID period and experience a weaker relation after the pandemic.

Sectoral patterns mirror these results, industries such as Manufacturing, Construction, Transport and communication and Business Services exhibit positive COVID interactions, while low trade credit sectors such as Hotels and restaurants show no significant response.

Table 10 – Firm-level Differences in Net Trade Credit

(Dependent variable: Net Trade Credit)					
	Panel A – By Firm Size			Panel B – By Financial Constraints	
	(1)	(2)	(3)	(1)	(2)
	Micro	Small	Medium	Constrained	Unconstrained
Bank Credit	0.111*** (0.004)	0.160*** (0.006)	0.151*** (0.014)	0.082*** (0.004)	0.021*** (0.006)
Bank Credit × COVID	0.016*** (0.003)	0.027*** (0.004)	0.027*** (0.009)	0.000 (0.003)	0.036*** (0.006)
Bank Credit × postCOVID	-0.003 (0.004)	-0.009* (0.005)	-0.000 (0.010)	-0.016*** (0.004)	0.029*** (0.008)
Liquidity	-0.317*** (0.004)	-0.358*** (0.007)	-0.352*** (0.015)		
Profitability	0.105*** (0.004)	0.099*** (0.006)	0.068*** (0.013)	0.142*** (0.004)	0.060*** (0.004)
Leverage	-0.173*** (0.004)	-0.230*** (0.006)	-0.216*** (0.014)		
Tangibility	-0.242*** (0.004)	-0.308*** (0.006)	-0.306*** (0.014)	-0.176*** (0.004)	-0.130*** (0.004)
Size				-0.014*** (0.001)	-0.019*** (0.002)
Bank Relationship	-0.001 (0.001)	-0.001 (0.002)	-0.008 (0.005)	0.001 (0.001)	0.001 (0.001)
Constant	0.276*** (0.003)	0.334*** (0.005)	0.326*** (0.012)	0.294*** (0.019)	0.366*** (0.025)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	271111	113372	21469	284,109	121,843
R-squared	0.811	0.844	0.868	0.807	0.827

Notes: Table 10 presents the relationship between Net Trade Credit and Bank Credit by size and by financial constraints. The dependent variable is Net Trade Credit measured as the difference between Trade Credit Granted and Trade Credit Received. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Financially constrained firms are those with above-median leverage or below-median liquidity. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Overall, these results suggest that SMEs with greater access to bank credit tend to rely less on supplier financing and are more likely to sustain positive net financing positions within their supply chains.

5.4. Robustness Checks

To ensure that the main results are not driven by the measurement of bank credit, timing or the scaling of operational activity, several robustness checks confirm the stability of the results.

First, replacing total bank credit with secured bank credit (Table C1, Annex C) addresses potential heterogeneity in credit composition and examines whether the results depend on the type of financing available during the pandemic, especially given the support programs available to SMEs. If the findings were driven exclusively by guaranteed credit, the estimates would differ substantially. However, the results remain stable across all specifications, indicating that the substitution, non-redistribution and net position patterns do not depend on the composition of bank credit, even under the exceptional credit expansion associated with government support measures.

Second, using bank credit lagged by one year (Table C2, Annex C) mitigates concerns about simultaneity and reverse causality, since trade credit conditions may influence contemporaneous lending decisions and bank loans often involve multi period arrangements. Once again, the results remain stable, suggesting that the association between bank credit and trade credit dynamics is persistent.

Third, redefining trade credit using COGS (for trade payables) and Sales (for trade receivables) as alternatives scaling factors (Table C3, Annex C) ensures that differences in firms' operating cycles or in asset structures do not bias the estimates. The core patterns are preserved under these alternative definitions, reinforcing the robustness of the main findings.

Fourth, a sectoral robustness check splits the sample into sectors more and less affected by COVID-19 (Table C4, Annex C). Based on evidence from Instituto Nacional de Estatística (2021), Manteu et al. (2020) and OECD (2021), the most affected group includes Hotels and restaurants, Transport and communications, Business services and Wholesale and retail trade, while the less affected group comprises Agriculture, mining and energy, Manufacturing, Construction and Education, health and social work. The findings remain consistent across both subsamples. Bank Credit continues to reveal a negative and statistically significant, at 1% level, association with trade credit received, with a stronger magnitude among the most affected sectors, consistent with the substitution mechanism among Portuguese SMEs. The COVID interaction is also negative and statistically significant for the most affected sectors, indicating that the substitution intensified during the pandemic. For trade credit granted, Bank Credit remains negative in both groups, reinforcing the absence of a redistribution effect. Net trade

credit is again positive and statistically significant, at 1% level, associated with bank credit, with slightly larger coefficients in the most affected sectors, consistent with sharper reductions in supplier financing in those industries. Overall, the sectoral split supports the fact that the main findings are not driven by sectoral exposure to the pandemic.

Finally, the analysis is replicated for a sample of large firms, defined as those with more than 250 employees, accordingly with the definition established by the European Commission (Table C5, Annex C), to assess whether the mechanisms identified for SMEs generalize to large firms in Portugal. The results differ in predictable ways, although the overall direction of effects align with the main results. For large firms, the negative association between bank credit and trade credit received is weaker and only significant at 5% level, and neither the COVID nor the post-COVID interactions are statistically significant. This suggests that large firms do not reveal the strong substitution effect observed in SMEs, consistent with their lower dependence on supplier financing and greater access to alternative funding sources. Similarly, bank credit remains negatively associated with trade credit granted, reinforcing the absence of a redistribution effect. For the NTC, the coefficient on bank credit is statistically insignificant, suggesting that the net financing position of large firms is not affected by their access to bank loans. Overall, the comparison confirms that the mechanisms found in the main analysis are specific to SMEs, while large firms reveal weaker sensitivity of trade credit dynamics to bank credit conditions.

6. Conclusions

The evidence presented in this study shows how Portuguese SMEs adjust their financing decisions between bank credit and trade credit from 2016 to 2023, with the COVID-19 crisis as an external shock to observe changes in observed patterns.

Across all specifications, the results consistently supports the substitution mechanism, aligning with Love et al. (2007), Nilsen (2002) and Petersen & Rajan (1997). Portuguese SMEs appear to increase their reliance on supplier financing when access to bank credit is limited. This relationship is robust with the inclusion of firm-level controls and persists across size groups, financial constraint levels, and sectors, indicating that trade credit acts as a buffer for SMEs in a bank dependent economy.

In contrast, the redistribution mechanism is observed only during the pandemic period. The temporary increase in trade credit granted during COVID-19 appears to reflect customers delaying payments and suppliers accepting longer receivables rather than deliberate liquidity redistribution. This aligns with the results of Love et al. (2007), who highlight that expansions in trade credit granted driven by crisis tend to be short-term and caused by accumulated receivables. Consistently, the association dissipates in the post-COVID period, demonstrating the short-term nature of redistribution in this context.

The dynamics of net trade credit further support the previous results. Firms with greater access to bank credit tend to hold more positive net positions, effectively acting as net lenders within the supply chains, while more constrained firms tend to remain net borrowers. During the pandemic, financially stronger firms improve their net positions, while constrained firms do not adjust, highlighting the asymmetry in SMEs' capacity to support customers.

These findings align with the Portuguese institutional context. SMEs in Portugal rely heavily on short-term liquidity management and have limited access to alternative financing channels, making supplier credit essential when bank credit decrease. Although bank lending increased during the pandemic due to public guarantee schemes, this expansion was concentrated among firms with lower risk. As a result, many SMEs remained credit constrained (Banco de Portugal, 2021), helping to explain why the substitution mechanism remained strong despite the rise in lending.

Further than documenting empirical evidence, this study contributes to literature by providing new insights from a bank dependent European economy. The results show that

substitution remains the dominant mechanism, even in the presence of credit support programs, that financial constraints are a key driver of trade credit reliance and that redistribution is a crisis short-run mechanism.

Despite the richness of the dataset, some limitations remain. The analysis captures only formal bank and trade credit channels and does not capture the full range of financing instruments SMEs may employ. Firms may substitute bank lending not only with trade credit, but also with informal borrowing, leasing, factoring or liquidity adjustments. Moreover, the period under analysis is marked by a major economic shock and post-crisis uncertainty. As a result, it cannot be ruled that during periods of economic expansion, when credit constraints are fewer and growth opportunities expand, trade credit may operate more as a complement to bank credit rather than as a substitute. Future research could therefore explore alternative financing channels, incorporate more detailed payment behavior data as renegotiation terms or supplier-customer transactional data, and examine how complementarity or substitution evolves across different phases of the business cycle.

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List of Abbreviations

BC – Bank Credit

BPLIM – Banco de Portugal Microdata Research Laboratory

CB – Central Balance Sheet Database

HCRC – Harmonized Central Credit Register

NTC – Net Trade Credit

PEPP – Pandemic Emergency Purchase Program

PPP – Paycheck Protection Program

SME – Small and Medium Size Enterprise

TCR – Trade Credit Received

TCG – Trade Credit Granted

Appendix

Annex A – Variables Definitions

Table A11 – Definitions and Construction of Variables

Variable	Variable Description
Trade Credit Received	Trade Payables / Total Assets
Trade Credit Granted	Trade Receivables / Total Assets
Net Trade Credit	Trade Credit Granted – Trade Credit Received
Bank Credit	Total amount of outstanding regular credit / Total Assets
Bank Credit Secured	Total amount of outstanding collateralized credit / Total Assets
Liquidity	Cash and Short-term Deposits / Total Assets
Profitability	EBIT / Total Assets
Leverage	Total Financial Debt / Total Assets
Tangibility	Tangible Fixed Assets / Total Assets
Size	Ln (Total Assets)
Bank Relationship	Dummy variable equal to 1 for multi-bank relationship; 0 otherwise
Covid Dummy	Dummy variable equal to 1 for 2020-2021; 0 otherwise
PostCovid Dummy	Dummy variable equal to 1 for 2022-2023; 0 otherwise

Notes: Table A1 describes the variables used on the empirical analysis.

Annex B – Sectoral Regression Results

Table B12 – Firm-level Differences in Trade Credit Received: by sector

(Dependent variable: Trade Credit Received)

	Agriculture, forestry and fishing	Mining and energy	Manufacturing	Construction	Wholesale and retail trade	Hotels and restaurants	Transport and communications	Business services	Education, health, social work
Bank Credit	-0.162*** (0.010)	-0.164*** (0.021)	-0.204*** (0.006)	-0.218*** (0.008)	-0.272*** (0.005)	-0.101*** (0.007)	-0.175*** (0.008)	-0.121*** (0.005)	-0.091*** (0.005)
Bank Credit × COVID	0.002 (0.005)	-0.012 (0.011)	-0.021*** (0.004)	-0.027*** (0.006)	-0.014*** (0.003)	-0.008 (0.005)	-0.014** (0.006)	-0.012*** (0.003)	-0.006* (0.003)
Bank Credit × postCOVID	0.001 (0.007)	-0.011 (0.014)	0.004 (0.004)	0.003 (0.007)	0.004 (0.004)	0.006 (0.006)	0.019*** (0.006)	-0.001 (0.004)	-0.002 (0.004)
Liquidity	-0.049*** (0.008)	-0.076*** (0.022)	-0.064*** (0.005)	-0.032*** (0.005)	-0.042*** (0.004)	0.003 (0.006)	-0.033*** (0.005)	-0.024*** (0.004)	-0.020*** (0.004)
Profitability	-0.011 (0.008)	-0.008 (0.021)	0.003 (0.004)	-0.030*** (0.006)	-0.022*** (0.004)	-0.005 (0.006)	-0.010** (0.005)	-0.014*** (0.004)	-0.012*** (0.004)
Leverage	0.215*** (0.010)	0.222*** (0.020)	0.277*** (0.006)	0.283*** (0.007)	0.338*** (0.005)	0.130*** (0.007)	0.225*** (0.008)	0.143*** (0.005)	0.108*** (0.005)
Tangibility	-0.072*** (0.008)	-0.084*** (0.017)	-0.109*** (0.005)	-0.063*** (0.006)	-0.101*** (0.004)	-0.013** (0.005)	-0.075*** (0.005)	-0.041*** (0.003)	-0.023*** (0.003)
Size	-0.011*** (0.003)	-0.020*** (0.007)	-0.009*** (0.002)	-0.004* (0.002)	-0.003** (0.002)	-0.027*** (0.002)	0.002 (0.002)	0.002 (0.002)	-0.011*** (0.002)
Bank Relationship	0.002 (0.002)	-0.002 (0.005)	0.001 (0.001)	0.003** (0.002)	0.003*** (0.001)	0.002 (0.002)	0.002 (0.002)	0.003*** (0.001)	0.003** (0.001)
Constant	0.222*** (0.044)	0.372*** (0.094)	0.209*** (0.025)	0.115*** (0.029)	0.128*** (0.021)	0.383*** (0.031)	0.046 (0.029)	0.012 (0.019)	0.174*** (0.019)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,208	4,016	69,608	43,576	127,168	20,784	28,776	59,224	33,592
R-squared	0.795	0.795	0.820	0.773	0.835	0.748	0.805	0.750	0.717

Notes: Table B1 presents the relationship between Trade Credit Received and Bank Credit by sector. The dependent variable is Trade Credit Received measured as trade payables over total assets. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B13 – Firm-level Differences in Trade Credit Granted: by sector
(Dependent variable: Trade Credit Granted)

	Agriculture, forestry and fishing	Mining and energy	Manufacturing	Construction	Wholesale and retail trade	Hotels and restaurants	Transport and communications	Business services	Education, health, social work
Bank Credit	-0.070*** (0.011)	-0.065*** (0.022)	-0.056*** (0.007)	-0.096*** (0.011)	-0.068*** (0.005)	0.000 (0.005)	-0.092*** (0.011)	-0.078*** (0.007)	-0.041*** (0.008)
Bank Credit × COVID	0.005 (0.007)	-0.013 (0.015)	-0.010** (0.005)	0.010 (0.009)	0.004 (0.004)	-0.006 (0.005)	0.029*** (0.008)	-0.001 (0.005)	0.012** (0.005)
Bank Credit × postCOVID	0.007 (0.010)	0.021 (0.018)	-0.013** (0.006)	-0.003 (0.011)	-0.003 (0.005)	0.001 (0.006)	0.021** (0.010)	-0.020*** (0.007)	0.007 (0.006)
Liquidity	-0.358*** (0.017)	-0.306*** (0.034)	-0.469*** (0.008)	-0.477*** (0.009)	-0.348*** (0.006)	-0.065*** (0.007)	-0.407*** (0.012)	-0.390*** (0.008)	-0.209*** (0.010)
Profitability	0.122** (0.012)	0.121*** (0.028)	0.146*** (0.007)	0.107*** (0.009)	0.080*** (0.005)	0.025*** (0.005)	0.139*** (0.009)	0.094*** (0.006)	0.046*** (0.007)
Leverage	0.039** (0.010)	0.099** (0.020)	0.056*** (0.007)	0.053*** (0.009)	0.049** (0.005)	0.010** (0.005)	0.114*** (0.010)	0.046*** (0.007)	0.030*** (0.007)
Tangibility	-0.315*** (0.013)	-0.325*** (0.034)	-0.458*** (0.008)	-0.428*** (0.011)	-0.324*** (0.006)	-0.068*** (0.007)	-0.385*** (0.012)	-0.326*** (0.008)	-0.176*** (0.008)
Size	-0.003 (0.004)	-0.023** (0.009)	-0.013*** (0.002)	-0.023*** (0.003)	0.003 (0.002)	0.002 (0.002)	-0.016*** (0.004)	-0.026*** (0.002)	-0.017*** (0.003)
Bank Relationship	0.001 (0.003)	-0.007 (0.008)	0.003* (0.002)	0.002 (0.002)	0.002 (0.001)	0.000 (0.001)	0.000 (0.003)	0.002 (0.002)	0.002 (0.002)
Constant	0.353*** (0.054)	0.649*** (0.124)	0.630*** (0.032)	0.754*** (0.042)	0.299*** (0.024)	0.037 (0.024)	0.627*** (0.046)	0.718*** (0.031)	0.421*** (0.033)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,208	4,016	69,608	43,576	127,168	20,784	28,776	59,224	33,592
R-squared	0.808	0.853	0.854	0.822	0.892	0.760	0.851	0.863	0.835

Notes: Table B2 presents the relationship between Trade Credit Granted and Bank Credit by sector. The dependent variable is Trade Credit Granted measured as trade receivables over total assets. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B14 – Firm-level Differences in Net Trade Credit: by sector

(Dependent variable: Net Trade Credit)									
	Agriculture, forestry and fishing	Mining and energy	Manufacturing	Construction	Wholesale and retail trade	Hotels and restaurants	Transport and communications	Business services	Education, health, social work
Bank Credit	0.093*** (0.014)	0.099*** (0.027)	0.148*** (0.009)	0.122*** (0.013)	0.204*** (0.007)	0.101*** (0.009)	0.083*** (0.012)	0.043*** (0.008)	0.049*** (0.009)
Bank Credit × COVID	0.003 (0.009)	-0.001 (0.018)	0.012* (0.006)	0.037*** (0.011)	0.018*** (0.005)	0.002 (0.007)	0.042*** (0.009)	0.011* (0.006)	0.018*** (0.006)
Bank Credit × postCOVID	0.006 (0.011)	0.031 (0.021)	-0.017** (0.007)	-0.007 (0.013)	-0.007 (0.006)	-0.006 (0.008)	0.002 (0.011)	-0.019** (0.007)	0.009 (0.007)
Liquidity	-0.309*** (0.018)	-0.230*** (0.040)	-0.405*** (0.009)	-0.444*** (0.010)	-0.306*** (0.007)	-0.068*** (0.009)	-0.374*** (0.013)	-0.366*** (0.009)	-0.190*** (0.010)
Profitability	0.133*** (0.014)	0.129*** (0.035)	0.144*** (0.008)	0.138*** (0.010)	0.102*** (0.006)	0.029*** (0.007)	0.149*** (0.010)	0.108*** (0.007)	0.058*** (0.008)
Leverage	-0.176*** (0.014)	-0.123*** (0.025)	-0.221*** (0.009)	-0.230*** (0.011)	-0.289*** (0.006)	-0.121*** (0.008)	-0.111*** (0.011)	-0.096*** (0.007)	-0.078*** (0.008)
Tangibility	-0.243*** (0.014)	-0.242*** (0.036)	-0.349*** (0.009)	-0.364*** (0.011)	-0.224*** (0.007)	-0.055*** (0.008)	-0.310*** (0.011)	-0.285*** (0.008)	-0.153*** (0.008)
Size	0.008* (0.005)	-0.003 (0.010)	-0.004 (0.003)	-0.019*** (0.004)	0.006*** (0.002)	0.029*** (0.003)	-0.017*** (0.004)	-0.027*** (0.003)	-0.006* (0.003)
Bank Relationship	-0.000 (0.003)	-0.005 (0.008)	0.002 (0.002)	-0.002 (0.003)	-0.001 (0.002)	-0.002 (0.002)	-0.001 (0.003)	-0.001 (0.002)	-0.001 (0.002)
Constant	0.131* (0.068)	0.277* (0.143)	0.420*** (0.038)	0.639*** (0.048)	0.172*** (0.029)	-0.346*** (0.037)	0.582*** (0.051)	0.706*** (0.034)	0.247*** (0.037)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,208	4,016	69,608	43,576	127,168	20,784	28,776	59,224	33,592
R-squared	0.740	0.737	0.791	0.752	0.832	0.714	0.776	0.813	0.780

Notes: Table B3 presents the relationship between Net Trade Credit and Bank Credit by sector. The dependent variable is Net Trade Credit measured as the difference between Trade Credit Granted and Trade Credit Received. Bank credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Annex C – Robustness Checks

Table C15 – Effect of Bank Credit Secured on Trade Credit Received, Granted and Net Trade Credit

	(1)	(2)	(3)
Dependent Variable	Trade Credit Received	Trade Credit Granted	NTC
Bank Credit Secured	-0.179*** (0.002)	-0.068*** (0.003)	0.110*** (0.003)
Bank Credit Secured × COVID	-0.010*** (0.002)	0.009*** (0.002)	0.019*** (0.002)
Bank Credit Secured × postCOVID	0.010*** (0.002)	0.003 (0.003)	-0.007** (0.003)
Liquidity	-0.038*** (0.002)	-0.365*** (0.003)	-0.327*** (0.004)
Profitability	-0.011*** (0.002)	0.092*** (0.003)	0.103*** (0.003)
Leverage	0.232*** (0.002)	0.054*** (0.003)	-0.179*** (0.003)
Tangibility	-0.075*** (0.002)	-0.330*** (0.003)	-0.255*** (0.003)
Size	-0.005*** (0.001)	-0.012*** (0.001)	-0.007*** (0.001)
Bank Relationship	0.001** (0.001)	0.002*** (0.001)	0.001 (0.001)
Constant	0.138*** (0.009)	0.521*** (0.013)	0.382*** (0.015)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	405952	405952	405952
R-squared	0.826	0.874	0.811

Notes: Table C1 presents the relationship between Bank Credit Secured and Trade Credit Received, Granted and Net Trade Credit. The dependent variables are Trade Credit Received, Trade Credit Granted and Net Trade Credit. Bank Credit Secured measures total bank loans with collateral or guarantee over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C16 – Effect of Lagged Bank Credit on Trade Credit Received, Granted and Net Trade Credit

	(1)	(2)	(3)
Dependent Variable	Trade Credit Received	Trade Credit Granted	NTC
Bank Credit Lagged	-0.073*** (0.002)	-0.031*** (0.003)	0.042*** (0.003)
Bank Credit Lagged × COVID	0.001 (0.002)	0.010*** (0.002)	0.008*** (0.002)
Bank Credit Lagged × postCOVID	0.021*** (0.002)	0.004* (0.002)	-0.016*** (0.003)
Liquidity	-0.042*** (0.002)	-0.365*** (0.004)	-0.323*** (0.004)
Profitability	0.001 (0.002)	0.098*** (0.003)	0.097*** (0.003)
Leverage	0.196*** (0.002)	0.044*** (0.003)	-0.152*** (0.003)
Tangibility	-0.093*** (0.002)	-0.334*** (0.003)	-0.241*** (0.003)
Size	-0.003*** (0.001)	-0.013*** (0.001)	-0.010*** (0.001)
Bank Relationship	-0.006*** (0.001)	-0.001 (0.001)	0.005*** (0.001)
Constant	0.117*** (0.011)	0.530*** (0.014)	0.413*** (0.016)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	355208	355208	355208
R-squared	0.833	0.885	0.826

Notes: Table C2 presents the relationship between Bank Credit Lagged and Trade Credit Received, Granted and Net Trade Credit. The dependent variables are Trade Credit Received, Trade Credit Granted and Net Trade Credit. Bank Credit Lagged measures total bank loans over total assets, lagged one year. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C17 – Effect of Bank Credit on Trade Credit (Alternative Scaling)

	(1)	(2)	(3)
Dependent Variable	Trade Payables / COGS	Trade Receivables / Sales	NTC
Bank Credit	-1.230*** (0.083)	-0.081*** (0.006)	1.147*** (0.083)
Bank Credit × COVID	-0.006 (0.075)	0.021*** (0.005)	0.028 (0.075)
Bank Credit × postCOVID	-0.121 (0.085)	-0.003 (0.005)	0.126 (0.084)
Liquidity	-0.397*** (0.065)	-0.372*** (0.005)	0.032 (0.064)
Profitability	-0.754*** (0.085)	-0.211*** (0.005)	0.554*** (0.084)
Leverage	1.236*** (0.071)	0.051*** (0.005)	-1.183*** (0.071)
Tangibility	-0.356*** (0.072)	-0.331*** (0.005)	0.031 (0.072)
Size	0.167*** (0.026)	0.055*** (0.002)	-0.107*** (0.026)
Bank Relationship	-0.011 (0.022)	-0.003** (0.002)	0.008 (0.022)
Constant	-1.270*** (0.341)	-0.290*** (0.024)	0.884*** (0.338)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	321315	405919	321315
R-squared	0.679	0.776	0.676

Notes: Table C3 presents the relationship between Bank Credit and Trade Payables / COGS, Trade Receivables / Sales and Net Trade Credit. The dependent variables are Trade Payables / COGS, Trade Receivables / Sales and Net Trade Credit. Bank Credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C18 – Effect of Bank Credit on Trade Credit: Across COVID Exposure Sectors

Dependent Variable	Panel A – Sectors more affected by COVID			Panel B – Sectors less affected by COVID		
	(1)	(2)	(3)	(1)	(2)	(3)
	Trade Credit Received	Trade Credit Granted	NTC	Trade Credit Received	Trade Credit Granted	NTC
Bank Credit	-0.201*** (0.003)	-0.066*** (0.004)	0.134*** (0.004)	-0.182*** (0.003)	-0.075*** (0.004)	0.107*** (0.005)
Bank Credit × COVID	-0.014*** (0.002)	0.006** (0.003)	0.020*** (0.003)	-0.013*** (0.002)	0.007** (0.003)	0.020*** (0.004)
Bank Credit × postCOVID	0.007*** (0.002)	-0.003 (0.003)	-0.010** (0.004)	0.004* (0.003)	0.003 (0.004)	-0.002 (0.005)
Liquidity	-0.032*** (0.002)	-0.343*** (0.004)	-0.311*** (0.005)	-0.046*** (0.003)	-0.397*** (0.005)	-0.351*** (0.005)
Profitability	-0.013*** (0.002)	0.085*** (0.003)	0.097*** (0.004)	-0.011*** (0.003)	0.104*** (0.004)	0.115*** (0.005)
Leverage	0.245*** (0.003)	0.054*** (0.003)	-0.191*** (0.004)	0.233*** (0.003)	0.059*** (0.004)	-0.174*** (0.005)
Tangibility	-0.068*** (0.002)	-0.309*** (0.004)	-0.241*** (0.004)	-0.072*** (0.003)	-0.354*** (0.005)	-0.281*** (0.005)
Size	-0.003*** (0.001)	-0.009*** (0.001)	-0.005*** (0.001)	-0.009*** (0.001)	-0.017*** (0.002)	-0.008*** (0.002)
Bank Relationship	0.003*** (0.001)	0.002** (0.001)	-0.001 (0.001)	0.003*** (0.001)	0.003** (0.001)	-0.000 (0.001)
Constant	0.115*** (0.012)	0.456*** (0.016)	0.341*** (0.019)	0.192*** (0.014)	0.615*** (0.020)	0.423*** (0.023)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	235952	235952	235952	170000	170000	170000
R-squared	0.837	0.885	0.831	0.813	0.859	0.776

Notes: Table C4 presents the relationship between Bank Credit and Trade Credit Received, Granted and Net Trade Credit across COVID exposure sectors. The dependent variables are Trade Credit Received, Trade Credit Granted and Net Trade Credit. Bank Credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Most affected sectors include Hotels and restaurants, Transport and communications, Business services, and Wholesale and retail trade; less affected sectors include Agriculture, mining and energy, Manufacturing, Construction, and Education, health and social work. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C19 – Effect of Bank Credit on Trade Credit: Large Firms Sample

	(1)	(2)	(3)
Dependent Variable	Trade Credit Received	Trade Credit Granted	NTC
Bank Credit	-0.075** (0.032)	-0.047* (0.025)	0.027 (0.040)
Bank Credit × COVID	-0.010 (0.015)	0.001 (0.020)	0.011 (0.024)
Bank Credit × postCOVID	0.011 (0.018)	-0.032 (0.026)	-0.043 (0.032)
Liquidity	-0.068*** (0.021)	-0.337*** (0.030)	-0.269*** (0.035)
Profitability	-0.037* (0.022)	0.044 (0.027)	0.081** (0.037)
Leverage	0.105*** (0.020)	0.075*** (0.021)	-0.030 (0.027)
Tangibility	-0.092*** (0.017)	-0.280*** (0.031)	-0.188*** (0.034)
Size	-0.030*** (0.010)	-0.008 (0.011)	0.021 (0.014)
Bank Relationship	-0.001 (0.004)	-0.005 (0.008)	-0.004 (0.009)
Constant	0.685*** (0.177)	0.495** (0.199)	-0.189 (0.251)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	4222	4222	4222
R-squared	0.892	0.928	0.922

Notes: Table C5 presents the relationship between Bank Credit and Trade Credit Received, Granted and Net Trade Credit. The dependent variables are Trade Credit Received, Trade Credit Granted and Net Trade Credit. Bank Credit measures total bank loans over total assets. COVID and postCOVID are dummy variables equal to one for the years 2020-2021 and 2022-2023, respectively. Firm-level controls include Liquidity, Profitability, Leverage, Tangibility and Size. Bank Relationship is a dummy variable equal to 1 for firms with more than one banking relationship. Standard errors (in parentheses) are clustered at firm level. Trade Credit, Bank Credit, Liquidity, Profitability, Leverage and Tangibility are winsorized at the 1st and 99th percentile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Disclaimer

This project was developed in accordance with principles of academic integrity. All research and analyses presented were conducted by me, except where otherwise cited. For the sake of transparency, I declare that I used artificial intelligence (AI) tools, during the development of this work. These tools were used exclusively to improve the clarity and conciseness of the written text and did not compromise the originality or integrity of this work.

Ana Lúcia Leitão,

01/01/2026