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Does Trade Credit Facilitate Access to Bank Finance? An Empirical Evidence from Portuguese and Spanish Small Medium size Enterprises

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Abstract

To assess the existence of credit rationing, we examine if trade credit is a substitute and/or a complement to bank credit. Using a data set of Portuguese and Spanish small and medium sized enterprises, and controlling for endogeneity problems by using GMM estimators, our results confirm the existence of credit rationing. This effect is particularly strong for firms that maintain an exclusive relationship with one bank, which indicate a greater severity of adverse selection problems for those firms. However, our results indicate that the substitution and complementary hypothesis are not mutually exclusive, especially for the younger and smaller firms. In line with the theories that emphasize the informational role of trade credit, due the informative advantage of suppliers, our empirical results confirm that trade credit allow the younger and smaller firms to improve their reputation, as trade credit reveals the private information of the supplier to the bank, in turn, banks can update their beliefs about customer default risk and agree to increase bank credit.

Keywords: Small firms finance, credit rationing, trade credit, asymmetric information, bank credit.
JEL Classifications Codes: C33, L14, G21, G24, G32.

1. Introduction

The trade credit represents 17.8% of total assets for all American firms in 1991 and in European countries trade credit represents more than a quarter of total corporate assets (Petersen and Rajan, 1995). Mateut and Mizen (2006) recently confirm these numbers. Attending to these numbers a relevant question arises: Why do companies rely on their suppliers to obtain financing, rather than specialized financial intermediaries such as banks?

In the presence of specialized financial intermediaries, it is far from obvious why the exchange of goods is bundled with a credit transaction: When trade credit is cheaper than bank credit, as is often

the case, the puzzle is that suppliers are willing to lend. When trade credit is more expensive, the puzzle is that banks are unwilling to lend. Indeed, a sizeable fraction of firms repeatedly fails to take advantage of early payments discounts and thus end up borrowing from their suppliers at annual interest rates above 40% (Petersen and Rajan, 1994, 1997)[1]. Why do not banks increase these firms' credits instead?

A common explanation for trade credit is that suppliers have a monitoring advantage over banks. In the course of business, suppliers obtain information about the borrower that other lenders can only obtain at a cost (see Schwartz and Whitcomb, 1978, 1979; Emery, 1987; Freixas, 1993; Biais and Gollier, 1997 and Jain, 2001; among others). This explanation is particularly true when the customers are small, young and opaque firms (Berger and Udell, 1995; Wilner, 2000) or operate in countries with poorly developed financial institutions (Fishman and Love, 2003). Thus, equilibrium credit rationing related to ex-ante asymmetric information could result in more use of trade credit (Schwartz, 1974; Stiglitz and Weiss, 1981). Based on these arguments bank and trade credit are two (somehow imperfect) substitutable financial resources, which is referred to in the previous literature as the substitution hypothesis (Meltzer, 1960).

However, recent theoretical papers such as Biais and Gollier (1997) and Burkart and Ellingsen (2004) suggest that bank credit and trade credit could also be considered two complementary sources of financing. According to the model of Biais and Gollier (1997) the use of trade credit can alleviate the credit constrains for firms that suffer from imperfect information and credit rationing *directly*, in accordance with the substitution hypothesis but also *indirectly*. Trade credit acts as a signal that reveals supplier's unique customer information to the bank. Consequently, banks will be more likely to lend when suppliers also lend to their customers. Burkart and Ellingsen´s (2004) agency model finds a similar result. In their model, additional trade credit increases the investment size and thereby the entrepreneur's residual return and hence decreases the entrepreneur's incentive to divert cash. Consequently, the bank debt increases, making bank debt and trade credit complements.

Previous studies approached the choice between trade credit and bank credit by examining differences in transaction costs (Wilson and Summers, 2002); incentives to price discrimination (Smith, 1987; Brennan et al. 1988); on suppliers´ private information about product quality (Smith, 1987; Lee and Stowe, 1993; Long et al. 1993); on suppliers´ advantage in liquidating collateral (Frank and Maksimovic, 2005); on tax effects (Brick and Fung, 1984) and on a long-term buyer/seller relationship (Wilner, 2000). However, these theories cannot account for trade credit in competitive markets. Instead, this paper focuses on informational role of trade credit. Our main objective is to provide empirical evidence if trade credit could be considered as a substitute and/or as a complement to bank debt in order to assess the existence of credit rationing. We analyse if trade credit could contribute to build a "good reputation" in the borrower market. In other words, we ask if the availability of trade credit facilitates the access to bank credit, especially for young small firms, due to their financial opacity. We argue that lending through trade credit has an informational role. We take the viewpoint of a loan customer who faces severe financing restrictions and finances predominantly through a relationship lender. We believe that the main contribution of this paper lies in presenting this rather uncommon approach, and analysing if trade credit enables private information of the seller to be used in the lending relationship.

We focus on small firms for various reasons. First, because small medium size firms (SMEs) are more likely to suffer from information problems in capital markets. They are typically restricted to obtain external finance only from financial institutions and suppliers. Public markets are only accessible for large firms. Second, because due to the lack of credit history, small firms cannot credibly disclose their quality. Thus, the asymmetric information increases between insiders and outsiders (lenders). Third, because SMEs play an important role in the world economies (Berger and Frame, 2006). In Portugal, SMEs are responsible for 75% and 83% of employment in industry and services, respectively. A similar situation is found in Spain (the percentage of employment created in industry

[1] See Wilner, (2000) and Ng et al. (1999) to know how implicit rates can be calculated from trade credit terms.

and services is 72% and 79%, respectively; see IAPMEI, 2007). We use a panel data set of small and medium sized Portuguese and Spanish firms for the period 1998-2006 to test the complementary role of trade credit versus the substitution hypothesis. The option to study Portuguese and Spanish firms is sustained in the evidence provided by Breig (1994). According to Breig (1994), the role of trade credit is more important in bank-oriented countries compared to economies such as the United States, where financial markets play an information transmission and monitoring role. In fact, the previous research has been conducted in the United States, a country strongly immersed in the common-law system (see Petersen and Rajan, 1997; an exception is Cook, 1997). We define the common-law model, which is built on Anglo-Saxon principles, as one with a pronounced leaning towards market, as opposed to bank debt financing. Legally, a common-law model is characterized by its relative strong protection to minority investors. Conversely, the European continental civil-law model is characterized by bias towards bank debt financing and relative minority-investor protection. In our research, we broaden the previous research by looking at Portugal and Spain, which are civil-law countries. Both countries have a financial system dominated by the presence of financial intermediaries, mostly banks.

Our results suggest that since the substitution hypothesis is confirmed, SMEs are credit rationed. This effect is particularly strong for firms that maintain an exclusive relationship with one bank, which indicate a greater severity of adverse selection problems for these firms. Even though the substitution hypothesis is confirmed, our empirical results indicate that the substitution and complementary hypothesis are not mutually exclusive, if we take into account a specific class of firms being the younger and smaller firms. For that group of firms, trade credit seems to help solve the principal agent problems of managerial behaviour, due to the lack of separation between ownership and management. The illiquidity of trade credit also facilitates borrowing by limiting the borrower´s discretion. In sum, these results support the idea that trade credit stimulates SMEs to improve their reputation, as it acts as a signal about the firm´s quality, which facilitates the access to bank debt. Due the informational advantage of suppliers in assessing the credit worthiness of their customers, they are able to provide SMEs with financial support better than banks can do, especially during tightening monetary policy periods.

The paper is structured as follows. In Section 2 we review the relevant literature on trade credit. In Section 3 we present the data and describe the method that we use for contrasting our hypothesis. In Section 4 we examine the relation between trade credit and bank debt, and the effect of the strength of a banking relationship on the availability of bank credit. Section 5 concludes with a summary of the main findings.

2. Literature Review

There are quite a few empirical studies that suggest that firms suffering from credit rationing use trade credit. Nilsen (2002) finds that during monetary contractions, small firms are likely to be particularly bank credit rationed, and that they react by borrowing more from their suppliers. Biais et al. (1995) and Petersen and Rajan (1994, 1995) provide similar empirical evidence. These empirical findings raise the question of why is trade credit available when bank credit is rationed. During monetary contractions, suppliers are themselves more likely to be credit constrained and have a higher cost of funds than banks. Hence, when banks cannot lend, suppliers should not be able to lend either.

However, there is a broader set of trade credit theories that explains its use without referring to credit rationing. Nadiri (1969) was the first author to formally consider trade credit extension as part of an optimal selling policy. Since the advent of contract theory, authors have identified more precisely how the extension of trade credit differs from a decrease in price or an increase in advertising, and why trade credit is not crowed. Another early theoretical contribution is Ferris (1981), who argues that trade credit allows the suppliers and the customers to pool liquidity risks. However, Ferris (1981) does not explain why financial intermediaries do not use risk pooling. Other explanations for the use of trade credit are based on buyers' private information about their own willingness or ability to pay and the

seller's resulting incentive to price discriminate (Smith, 1987; Brennan et al. 1988); on suppliers' private information about product quality (Smith, 1987; Lee and Stowe, 1993; Long et al. 1993); on trade credit as a warranty for product quality (Long et al. 1993); on suppliers´ advantage in liquidating collateral (Frank and Maksimovic, 2005); on taxes effect (Brick and Fung, 1984) and on a long-term buyer/seller relationships (Wilner, 2000). For a historical account of trade credit, see Cameron (1967).

More recently, assuming that suppliers have private information about their customers (monitoring advantage theory), Biais and Gollier (1997) demonstrate theoretically that trade credit can facilitate the aggregation of the supplier´s information with the bank's information, and thus alleviate an information asymmetry which otherwise would preclude financing of positive net present value (NPV) projects. As an example, consider a market for an input good. There are different types of buyers. Some of these buyers are "good" and the projects for which they need the input have a positive NPV. Other buyers are "bad", i.e., they have negative NPV projects. The buyers privately know their own type, while the bank and the supplier have different signals about the buyers' types. If bank credit is the only source of financing, and if the proportion of negative NPV buyers is large and if the information of the banks is not precise, then all buyers, including the "good", are denied credit. Consequently, positive NPV projects will not go forward due to the existence of asymmetric information (Stiglitz and Weiss, 1981). In contrast, if trade credit can be used and if sellers have sufficient expected future cash flows to pledge collateral, then there exists a separating equilibrium without credit rationing. In this equilibrium, sellers extend trade credit to their customers only if they have received a good signal, and if the positive information contained in the availability of trade credit induces the bank to lend. In this context, trade credit plays an important role, because it is a credible way for the seller to convey its private information to the bank. If the seller is willing to extend trade credit and thus to bear the default risk of the buyer, then it must be that it has good information about the latter. On observing this, the bank updates positively its beliefs about the buyer, and therefore agrees to lend. In other words, trade credit enables the private information of the seller to be used in the lending relationship, and this additional information can alleviate credit rationing which arises due to adverse selection.

According to Burkart and Ellingsen (2004), firms simultaneously give and take credit because receivables can be collateralized. Once an invoice is pledge as collateral, it becomes completely illiquid from the firm's perspective, and the firm can obtain additional bank credit against the receivables. Thus, offering an additional dollar of trade credit does not force a firm to reduce its real investment by one dollar. For these authors, the monitoring advantage theory is intuitively appealing; however, the available models suffer from some shortcomings. First, they fail to explain why a bank, being specialized in the evaluation of borrowers´ creditworthiness, would have less information than suppliers do. Second, if it is accepted that suppliers have information that banks do not have, why do not these theories explain why suppliers regularly lend inputs, but only very rarely lend cash.

Starting with the conventional idea that moral hazard at the investment stage gives rise to credit rationing of poor entrepreneurs, the main innovation of the Burkart and Ellingsen (2004) model is that the source of the suppliers´ informational advantage is the input transaction itself, that is, unlike other lenders an input supplier automatically knows that an input transaction has been completed. Other lenders can only obtain this information by incurring monitoring costs. The value of input monitoring stems in turn from the fundamental difference between inputs and cash. Cash is easily diverted in particular if diversion is interpreted broadly as any use of resources, which does not maximize the lenders´ expected return. Most inputs are less easily diverted, and input illiquidity facilitates trade credit[2]. A salient result of the input transaction model is that the availability of trade credit increases the amount that banks are willing to lend. For a given bank loan, obtaining additional trade credit permits the borrower to engage in higher levels of diversion as well as investment. However, due to the relative illiquidity of trade credit the borrower´s return from investing increases by more than the return

[2] Myers and Rajan (1998) explore the idea that illiquid assets facilitate borrowing by limiting the borrower's discretion. These authors argue that banks are able to attract depositors precisely because banks´ loan portfolios are relative illiquid.

from diversion. Anticipating the availability of trade credit boost investment rather than diversion, banks are willing to increase their lending[3].

3. Data and Method

We obtain the data for this research from AMADEUS, data set collected by Bureau Van Dijk. This database includes standardized annual accounts (consolidated and unconsolidated) for approximately nine million companies through Europe, including Western and Eastern European countries. Due to the fact that the Amadeus data set only begins in 1998, we use 1998 as the starting point for our analysis. To be included in the data set, the firms must have at least one employee and must have fulfilled the requirements established in the European Commission Recommendation of 6 May 2003 (2003/361/EC)[4]. To control for the survivor bias effect, we select both active and inactive firms operating in manufacturing industry. We study this sector because the the trade credit is more expressive in manufacturing industries compared to other industries (Blasio, 2005; Marotta, 2005). After eliminating firms with a majority of missing values, our final sample consists of an unbalanced panel data set of 468 Portuguese and 7019 Spanish SMEs for the period 1998 - 2006.

To assess the existence of credit rationing, we analyze the relation between trade credit and bank debt. Evaluating this link could indicate the presence of the adverse selection that prevents firms from obtaining the bank financing they need. So, to contrast whether trade credit acts as a substitute and/or a complement of bank debt when assessing the existence of credit rationing, we express the following model:

$$TC_{it} = \alpha + \beta_1 BC_{it} + \sum_{j=1}^{J} \beta_j X_{ij} + \eta_i + \lambda_t + v_{it} \quad (1)$$

We define the dependent variable (TC – trade credit), which follows Blasio (2005), as the difference between trade receivables and trade payables to total assets. To examine how Company I resorts to credit from suppliers when facing different values of bank financing in studied periods, we use the variable bank credit (BC_1). The ratio of bank debt to total assets serves as our proxy for bank credit. We also include age and size as independent variables. According to Berger and Udell (1995, 1998), the age of the firm reflects the reputation that is openly transmitted to the market. It plays a different role from the information that the bank acquires through the level of trade credit used by the firm. We define age as the natural logarithm of the time elapsed between a firm's founding date and the year of measurement. We use the natural logarithm of total assets as our proxy for the size of the firm. To explain variations in the use of trade credit by firms, we also include asset structure, accounts turnover, inventory turnover, sales growth, liquidity, and profitability as independent variables (e.g. Petersen and Rajan, 1997; Blasio, 2005; Marotta, 2005; Cunat, 2007). Appendix I contains a detailed definition of variables.

We complete our study by analyzing if the information conveyed by trade credit could affect the level of indebtedness of small firms. To do so, we investigate the nexus between the level of debt and the interest rate. We test how financial institutions price the bank debt they provide to small firms, depending on the strength of their relationship. To do this test, we split the sample into companies that obtain funds from just one bank and those doing so from several banks by introducing a dummy variable that takes the value of one if the firm obtains funds from just one financial institution, and zero otherwise.

To test this point, we use bank credit (BC_1) as dependent variable, using the following regression:

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[3] See Bond (2005), Berlin (2003) and Burkart et al. (2004) for recent assessments on the nature of trade credit vis-à-vis bank debt.

[4] According to the European Commission Recommendation (2003/61/CE) to be considered a small firm, for at least two criteria need to be respected: i) having less than 250 employees and ii) having an annual business volume not exceeding € 50 million or assets not exceeding € 43 million.

$$BC_{it} = \alpha + \beta_1 \, TC_{it} + \beta_2 \, Interest_{it} + \sum_{j=1}^{J} \delta_j \, X_{ij} + \eta_i + \lambda_t + v_{it} \quad (2)$$

The independent variables include: interest rate, proxied by the ratio of financial expenses to bank debt; debt coverage; tangibility which is also a proxy for the ability to pledge collateral; the Altman Z-Score to capture the firm credit risk; age; size; and trade credit. Appendix I provide a detailed definition of variables.

Models (1) and (2) assume that bank debt is exogenous or predetermined. However, we argue that trade credit is used in spite of the high interest rates and implicit delayed payment prices (Wilner, 2000; Ng et al. 1999). It might seem paradoxical that firms would be using two sources of financing simultaneously, one of which is more expensive than other. Nevertheless, if they did not use trade credit, then information from the seller could not be conveyed to the bank and the bank would not make available credit at a relatively low interest rate (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). Thus, bank debt is potentially endogenous with trade credit, which would lead to inconsistent estimations for models 1 and 2.

We address this potential problem of reverse causality by using the Generalized Method of Moments (GMM) (Arellano, 2003), which makes it possible for us to control for endogeneity by using instruments. We follow the estimation strategy proposed by Arellano and Bond (1991), which consists of using as instruments all the right-hand-side variables, lagged twice or more. To verify if the number of instruments is not excessive we use the Sargan test, which also tests for the absence of correlation between instruments and the error term. This method assumes that there is no second-order serial correlation in the errors in first differences. For this reason, to test the consistency of the estimations, we use the test for the absence of second-order serial correlation proposed by Arellano and Bond (1991).

A second estimation problem comes from the fact that the relation between trade credit and bank debt may be neither a correlation running from bank debt to trade credit nor a reverse correlation, but rather a spurious relation attributed to unobservable individual heterogeneity among firms. For instance, a manager with good negotiation skills may be able to maintain strong relationships with suppliers and at the same time be able to bargain debt to a lower cost. Using panel data is a way to solve the endogeneity caused by a spurious relationship. Furthermore, by using the panel data structure we can control for the existence of a factors that are constant in time and characteristics of the individual's companies. The coefficient η_i reflects this heterogeneity. The parameters λ_t are temporary dummy variables that change over time, but are equal for all firms in each period considered. Thus, we include the economic variables that firms cannot control (e.g., interest rates, prices). Finally, ν_{it} is the symbol for regression error.

Table 1 presents the mean value of different variables of interest considering samples of different firm age (Panel A) and firm size (Panel B).

Table 1: Distribution of Sample by Age and Size

	Spain					Portugal				
	(%) of firms	**DBank$_1$ [a)] (%)**	**DBank$_2$ [b)] (%)**	**Bank Credit$_1$ [d)] (%)**	**Trade Credit [d)] (%)**	**(%) of firms**	**DBank$_1$ [a)] (%)**	**DBank$_2$ [b)] (%)**	**Bank Credit$_1$ [c)] (%)**	**Trade Credit [d)] (%)**
Panel A: Distribution of Sample by age [e)]										
Infant [0,5]	17.56	55.07	29.26	27.61	21.37	43.59	46.15	30.77	27.14	30.17
Adolescent]5,10]	25.25	56.09	28.85	24.76	22.77	32.26	52.00	32.00	30.22	21.32
Middle-age]10;15]	27.32	51.70	30.96	21.70	21.08	7.91	22.73	40.00	23.09	27.72
Old firms]15;25]	29.87	48.78	26.83	17.47	22.20	16.24	26.00	26.00	25.37	28.78
Panel B: Distribution of Sample by size [f)]										
Micro firms	19.24	55.62	29.30	18.28	19.88	50.17	64.06	25.58	20.03	24.02
Small firms	80.58	50.89	28.63	22.06	22.45	49.15	35.78	36.36	30.75	29.83
Medium firms	0.19	20.00	20.00	41.62	3.9	0.68	12.94	23.17	60.90	18.26

(a) $Bank_1$ is a dummy variable that takes the values one if the firm obtain funds from just one financial institution, and zero otherwise.
(b) $DBank_2$ is a dummy variable that takes the values one if the firm obtain funds from two or more financial institutions, and zero otherwise.
(c) Bank credit is the ratio of bank debt to total assets.
(d) Trade credit is the difference between trade receivables and trade payables to total assets.
(e) Age is the natural logarithm of the time elapsed between a firm´s founding date and the year of measuring.
(f) Size is the natural logarithm of total assets.

When analyzed by age, Spanish SMEs report a nearly identical amount of bank credit and trade credit. For Portuguese SMEs, the younger firms exhibit more trade credit. In contrast, the medium and older firms show a higher financial leverage. This result could be the result of consolidating the company's reputation. The dummy variables in both samples indicate that older and larger firms work with more lenders. It would seem logical that the complexities deriving from size may encourage large firms to divide their business across several banks (Beck et al. 2005). In addition, lenders likely want to maintain their connections with larger firms because large firms can be overseen more easily (Lehmann and Newberger, 2001; Giannetti, 2003). The descriptive statistics and the correlations for both of samples are presented in Appendixes II, III, IV and V.

4. Empirical Results

In the presence of information asymmetry, Myers and Majluf (1984) claim that companies establish a hierarchy of sources to be used for financing, preferring those carrying a lower cost, and also a lower risk. If we assume that suppliers offer discounts for prompt payment, then resorting to the delayed payment facility thereby offered becomes a form of financing that is more expensive than bank loans (Wilner, 2000; Ng et al., 1999). Although higher costs are associated with trade credit, we hypothesize that if the small young firm did not use trade credit, then information from the seller could not be conveyed to the banks and banks would not be willing to lend[5]. To test the relation between trade credit and bank credit, we estimate model 1.

To contrast the correlation between the individual effects (η_i) and the independent variables, we use the Hausman (1978) test. According to this test, if the effects are uncorrelated with the independent variables, then the fixed effects and random effects estimates should not be significantly different. The Hausman test shows that for the Spanish sample, the independent variables are correlated with nonobservable heterogeneity. For this sample, we use the fixed effects models. We include firm and year fixed effects. For the Portuguese sample, the fixed effects and random effects estimators are not statistically different. We use random effects estimators.

[5] However, we note that the existence of trade credit on firm's balance sheet does not mean that the firm has exhausted its capacity to borrow from a bank. Although suppliers grant some of their credit without charge and firms use these funds before resorting to bank debt. Nevertheless, these free resources are not unlimited.

Table 2: The relation between trade credit and bank credit

	Spain				Portugal			
	Regression Trade Credit (1)	**Regression Trade Credit (2)**	**Regression Trade Credit (3)**	**Regression Trade Credit (4)**	**Regression Trade Credit (1)**	**Regression Trade Credit (2)**	**Regression Trade Credit (3)**	**Regression Trade Credit (4)**
Bank Credit$_1$	-0.011** (0.0043)	----------	-0.013*** (0.0004)	-0.008* (0.0045)	-0.006*** (0.0016)	----------	0.011*** (0.0021)	0.011*** (0.001
Bank Credit$_2$	----------	-0.311*** (0.0242)	----------	----------	----------	-0.080*** (0.002)	----------	----------
DBank1*Bank Credit$_1$	----------	----------	----------	-0.021* (0.0109)	----------	----------	----------	-0.073*** (0.0027
Size	0.016*** (0.0041)	0.017*** (0.0038)	0.0067*** (0.000)	0.016*** (0.0041)	0.017*** (0.0006)	0.023*** (0.0006)	0.019*** (0.006)	0.017*** (0.0006)
Age	-0.023*** (0.0045)	-0.022*** (0.0042)	----------	-0.023*** (0.0045)	-0.037*** (0.0017)	-0.059*** (0.0020)	----------	-0.037*** (0.0017
Asset Structure	0.517*** (0.0071)	0.521*** (0.0071)	0.472*** (0.0004)	0.517*** (0.0071)	0.254*** (0.0037)	0.280*** (0.0046)	0.288*** (0.0038)	0.251*** (0.0037)
Accounts Turnover	0.00017** (0.000)	0.0002** (0.000)	0.0001*** (0.000)	0.0002** (0.000)	0.001*** (0.0002)	0.010*** (0.0002)	-0.0003 (0.003)	0.000 (0.0002)
Liquidity	0.000* (0.0000)	0,000* (0.000)	0.000*** (0.000)	0.000* (0.000)	0.049*** (0.0006)	0.074*** (0.006)	0.036*** (0.005)	0.049*** (0.006)
Profitability	0.011* (0.006)	0.012* (0.0060)	-0.024*** (0.0005)	0.011* (0.006)	-0.0002 (0.0001)	0.000 (0.0003)	-0.002*** (0.0002)	-0.0002 (0.0001)
Inventory Turnover	0.000** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Sales Growth	-0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)	0.0003*** (0.000)	0.0002*** (0.000)	0.0004*** (0.000)	0.0003** (0.000)
Infant	----------	----------	0.006*** (0.004)	----------	----------	----------	0.052*** (0.0031)	----------
Adolescent	----------	----------	0.005*** (0.0004)	----------	----------	----------	0.066*** (0.003)	----------
Middle age	----------	----------	-0.001*** (0.0004)	----------	----------	----------	0.056*** (0.0039)	----------
Constant	-0.058** (0.0241)	-0.066*** (0.022)	-0.034*** (0.007)	-0.058** (0.0242)	-0.056*** (0.0040)	-0.079*** (0.0049)	-0.218*** (0.0055)	-0.053*** (-12.889)
Sargan Test	0.985	0.968	0.943	0.957	0.754	0.619	0.701	0.820
Hausman Test (χ^2)	142.320	133.077	117.496	163.900	38.864	36.753	15.848	50.920

(1) We estimate all regressions by using GMM estimators, which are robust to the heterokedasticity. Sargan Test tests of absence of over identification. Standard errors are in parentheses.

(2) According to the Hausman Test, we estimate the trade credit model for the Spain sample by using fixed effects. We base the estimation for Portuguese sample on random effects.

(3) We use the ratio of the difference between trade receivables and trade payables to total assets as our proxy for Trade Credit, the dependent variable. We define bank credit is the ratio of bank debt to total assets for the regressions (1), (3) and (4) in both samples. In model 2 (both samples), the variable bank credit is the ratio of short-term debt to total liabilities. The variables Infant, Adolescent and Middle age are dummies variables that take value one if the age of the firm is between zero and five years, five to ten years and ten to fifteen years, respectively. For the definition of other variables, see Appendix I.

*** Indicates significance at 1% level; ** Indicates significant at 5% level; * Indicates significant at 10% level.

The results we report in Table 2, regression 1, show that the coefficient of the variable bank credit is negative and statically significant for both samples. This result is consistent with the substitution hypothesis. Indeed, we find that the coefficient of the variable age is negative and statistically significant at the 1% level, which means that older firms may have lower financial needs and, because their level of retained earnings is sufficient, they may prefer to use internal financing. This result is strengthened by the variable size. Since large firms are less opaque, it is reasonable to assume that suppliers offer more credit to firms of higher quality. A supplier may want to protect the value of its implicit equity stake in the customer, i.e., the present value of the margins he makes on current and future sales, especially in growing firms (Petersen and Rajan, 1997:689).

The other control variables are positive and statistically significant. These results indicate that in line with the results reported by Emery (1987) and Fishman and Love (2003), trade credit may be related to a firm's revenues and to current assets items such as accounts turnover, inventory turnover, liquidity, and profitability, which are themselves related to a firm's field of activity or industry. For example, we find that firms who report higher liquidity, higher accounts turnover, and higher inventory turnover as a proxy for the quality of management are likely to rely more on trade credit.

Detragiache et al. (2000), claim that asymmetric information prevents small firms from renewing their loans. It is understandable to observe a more direct substitution effect between trade credit and short-term loans. Following Berger and Udell (1995), in regression 2 we focus exclusively on short term debt (BC_2). We find that for both samples, the coefficient of bank credit (BC_2) is negatively and statistically significant at the 1% level. This result is consistent with empirical evidence (e.g, Wilner 2000; Blasio, 2005; Petersen and Rajan 1997), indicating that trade credit is an expensive substitute for bank debt, and confirming that the small firms in our sample are credit rationed.

We then ask why suppliers should extend credit to companies that have been rationed by the banks. According to Biais and Gollier (1997) and Burkart and Ellingsen (2004), the suppliers have a comparative advantage over traditional financial intermediaries in collecting information on nonfinancial firms, in assessing their creditworthiness, and in controlling their actions. Based on this informational advantage, in regression (3) we introduce dummy variables for firm age for both samples[6]. Berger and Udell (1995, 1998) note that age reflect public information but the strength of the relationship with banks and/or suppliers reflects private information, available only to the lender. This private information corresponds to the difference between information obtained as a result of reputation rather than information obtained from monitoring.

We find that the variable age is positively and significantly related to trade credit for young firms. We obtain an opposite coefficient for older firms, which reinforces the result that the small, young firms are credit rationed. The positive relation between young firms and trade credit is explained by trade credit helping to solve the principal/agent problems of managerial behaviour, which is more pronounced for small firms because of the lack of separation between ownership and management. This result is in line with the complementary hypothesis. In fact, suppliers can circumvent the traditional problems of informational asymmetry and moral hazard at least as well, if not better than banks. Suppliers are supposed to possess a better knowledge of the technology and of the markets of its customers, and hence can appraise their quality with a better precision than banks do; suppliers may also threaten to stop future supplies, and thus may be in a better position to repossess and resell goods in case of default than banks; and in lending goods, not cash, suppliers are less concerned with cash diversion by their customers (Petersen and Rajan, 1997; Cunat, 2007).

If we accept that the cost of trade credit is higher than bank debt and that small firms tend to experience faster growth than old firms, then follows that a company will increase its trade credit when bank debt no longer available but the firm still needs funds. Furthermore, since the possibility of resorting to alternative financing sources apart from trade credit depends on the problems raised by adverse selection, we expect the degree of substitution between trade credit and bank credit to be higher for firms that are subject to a greater monopoly. The establishment of a relationship between moneylender and borrower is a way of reducing the problems of asymmetric information (Leland

[6] We also include the square of the variable age to account for the possibility of nonlinearity. The variable appears nonsignificant and was eliminated from the regressions.

and Pyle, 1977; Diamond, 1984, 1991; Rajan, 1992; Boot and Thakor, 2000). Nevertheless, maintaining a loan relationship with only one financial institution may also have some disadvantages (Detragiache et al. 2000; Sharpe, 1990). In fact, companies that borrow from just one financial intermediary are "informationally captured", since no one else knows the real risk of the firm**.** In these circumstances, the bank may exploit the monopolistic relationship so that it can charge a greater interest rate on new loans, or even ration additional borrowing.

To distinguish the degree of substitution between trade credit and bank credit for firms that obtain funds from just one bank ($DBank_1$) and those who obtain credit from several banks, in regression (4), table 2, we introduce for both samples the variable $DBank_1*BC_1$, which we create by the interaction between the variable Bank Credit (BC_1) and the variable $DBank_1$. The latter is dummy variable that takes the value of one if the firm obtains its funds from just one bank, and zero otherwise. The results confirm the substitution hypothesis. The coefficient of the variable $DBank_1*BC_1$ is significantly negative if firms maintain a link with just one bank. For our Portuguese sample, the variable Bank $Credit_1$ reverses the signal when we introduce the variable $DBank_1*BC_1$. Further, the empirical evidence points to substitution between trade credit and bank credit being related, which may indicate the existence of rationing by financial institutions. Furthermore, firms that work with just one bank obtain a greater degree of substitution. This result indicates that such firms are subject to a greater monopoly by the financial institutions, and that this monopoly impedes their opportunity to obtain alternative financing other than from their trade credit suppliers. This monopolist effects is reinforced when we substitute the variable $Dbank_1*BC_1$, by the variable $Dbank_2*BC_1$, because the coefficient reverse the signal (positive) and is statistically significant[7].

Our results indicate that those firms with a higher degree of substitution between bank credit and trade credit are firms that do business in a more asymmetric environment. In fact, we could argue that small firms basically have only two sources of external finance: trade credit and bank credit, because these firms do not have access to the capital markets. However, the situation is more complex. In recent years, the banking industry has experimented with modifications and restructurings and has also faced regulatory and technological changes, such as the single market program in the European Union, The Gramm-Leach-Bliley Act in the U.S., and the Basel II agreement, that can affect both the aggregate amount of credit supplied to the economy and the composition of banks' credit portfolios (Degryse and Ongena, 2007). Small firms may be particularly affected by these changes because of their dependency of financial institutions for external finance (Berger and Udell, 1995; Berger et al. 2001a; Berger et al. 2001b).

Because credit rationing appears particularly harmful for SMEs, we analyse the information conveyed by trade credit to determine if it could affect the level of the indebtedness of the small firms. Our goal is to assess if, in lending to small firms, financial institutions consider the strength of the relationship in pricing the debt. This point is important, based on results obtained for regression 4, table 2: firms that obtain debt from fewer financial institutions are more likely to be subject to monopolist conditions.

Thus, we divide the two samples into companies that obtain funds from just one bank and compare them to those that obtain funds from several banks. We organize the samples according to the number of banks the firms worked with in 2006. Due the lack of information in the database, we reduce the Portuguese and Spanish samples to 110 and 2471 firms, respectively, and use the samples to estimate model (2).

We measure the variable bank credit (BC) as the ratio of bank debt to total assets, trade credit (TC) as the ratio of the difference between trade receivables and trade payables to total assets, and interest as the ratio of financial expenses to total bank debt. As our control variables we consider size, age, profitability, tangibility, coverage, and the Altman Z-Score. These are the variables that banks take into account when they lend and price loans (e.g., Petersen and Rajan, 1994; Berger and Udell, 1995; Canovas and Solano, 2006). To control for the possibility of a nonlinear relation, as suggested by Stiglitz and Weiss (1981), we also express the variable interest in quadratic form. The results are reported in Table 3.

[7] The results are available from the authors upon request.

Table 3: The Effect of information conveyed by trade credit on the availability of bank credit

	Spain				Portugal			
	Regression Bank Credit (1)	**Regression Bank Credit (2)**	**Regression Bank Credit (3)**	**Regression Bank Credit (4)**	**Regression Bank Credit (1)**	**Regression Bank Credit (2)**	**Regression Bank Credit (3)**	**Regression Bank Credit (4)**
Trade Credit	-0.079***	-0.078***	-0.085***	-0.082***	0.198***	0.067***	0.123**	0.093***
	(0.0163)	(0.0211)	(0.0238)	(0.0212)	(0.0669)	(0.0065)	(0.0541)	(0.0091)
Interest	-0.001*	-0.0004	-0.006***	-0.0004	-0.190***	-0.128***	-0.775***	-0.056***
	(0.0004)	(0.0003)	(0.0014)	(0.0003)	(0.0505)	(0.0019)	(0.2191)	(0.0008)
Interest x $Dbank_1$	-0.007***	-0.0004	----------	----------	-0.768**	0.077***	----------	----------
	(0.0018	(0.0003)			(0.2991)	(0.0016)		
Interest x $Dbank_2$	----------	----------	0.006***	-0.002***	----------	----------	0.688***	-0.050***
			(0.0015)	(0.0008)			(0.2576)	(0.0018)
$Interest^2$	0.000	----------	0.000***	----------	0.021	----------	0.064***	----------
	(0.000)		(0.000)		(0.0153)		(0.0193)	
$Interest^2$x $Dbank_1$	0.000***	----------	----------	----------	0.058*	----------	----------	----------
	(0.000)				(0.0336)			
$Interest^2$ x $Dbank_2$	----------	----------	-0.000***	----------	----------	----------	-0.083***	----------
			(0.000)				(0.0307)	
Size	0.099***	0.098***	0.098***	0.097***	-0.050***	-0.047***	-0.042***	-0.049***
	(0.0068)	(0.0136)	(0.0119)	(0.0135)	(0.0104)	(0.0025)	(0.0067)	(0.0026)
Age	-0.115***	-0.114***	-0.111***	-0.110***	0.001***	0.031***	0.008	0.031***
	(0.0103)	(0.0121)	(0.0164)	(0.0123)	(0.0311)	(0.0038)	(0.0309)	(0.0038)
Profitability	0.986***	1.017***	1.012***	1.031***	0.558***	0.562***	0.640 ***	0.581***
	(0.0774)	(0.2248)	(0.2463)	(0.2236)	(0.1825)	(0.0095)	(0.1644)	(0.0181)
Tangibility	0.204***	0.206***	0.198***	0.199***	-0.148***	-0.067***	-0.221***	-0.063***
	(0.0142)	(0.0199)	(0.0225)	(0.0199)	(0.0513)	(0.0053)	(0.0520)	(0.0053)
Debt Coverage	-0.000***	-0.000*	-0.000	-0.000*	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Altman Z-score	-0.014***	-0.015*	-0.016*	-0.019*	-0.169***	-0.160***	-0.166***	-0.165***
	(0.0045)	(0.0085)	(0.0077)	(0.0086)	(0.0150)	(0.0015)	(0.0153)	(0.0022)
Constant	-0.165***	-0.160*	-0.162*	-0.150*	1.160***	0.984***	1.135***	1.003***
	(0.0498)	(0.0909)	(0.0867)	(0.0909)	(0.0697)	(0.0169)	(0.0709)	(0.0178)
Sargan Test	0,989	0.976	0.981	0.963	0.997	0.995	0.997	0.992
Hausman Test (χ^2)	187.419	115.885	123.277	115.885	37.842	12.572	45.512	12.435

(1) We estimate all regressions by using GMM estimators, which are robust to the heterokedasticity. Sargan Test tests of absence of over identification. Standard errors are in parentheses.

(2) According to the Hausman Test, we estimate the Bank Credit model for the Spain sample by using fixed effects. We base the estimation for Portuguese sample on random effects.

(3) We use the ratio of bank debt to total assets as our proxy for Bank Credit, the dependent variable. Dbank is a dummy variable that takes the value one if the firm works with just one bank (or more than two banks) in the regressions 1 and 2 (3 and 4) and zero otherwise. Interest is the ratio of financial expenses to total debt. For other variables, see definition in Appendix I.

*** Indicates significant at 1% level; ** Indicates significance at 5% level; * Indicates significance at 10% level.

In analyzing the results presented in table 3, we observe that the variable trade credit (TC) is significantly and negatively related to bank finance for Spanish firms. This result confirms the substitution effect between bank credit and trade credit. Curiously, we obtain an opposite result for Portuguese firms. We find a positive and significant coefficient for trade credit, which is in line with the complementary hypothesis. This result may be due the fact that Portuguese SMEs are younger and smaller compared to the Spanish SMEs (see table 1). When we concentrate our analysis on the variables Interest and Interest*$Dbank_1$ (regression 1) for both samples, we find that the coefficient for both variables is negative. Thus, it is not clear that the firms that borrow from just one bank are more financially restricted. However, regression (1) shows that the coefficient of the variable Interest squared is not statistically significant, which indicates that the nonlinearity is not a problem. To control for the existence of nonquadric performance and also to reduce potential problems of multicollinearity between the variable Interest and $Interest^2$, we create a linear model in regression (2) of table 3. We obtain a positive coefficient for the variable Interest*$Dbank_1$ for the Portuguese sample, which indicates that these firms are more financially restricted. Therefore, they obtain the same amount of bank funds but face an increase in interest rate. For Spanish firms the results are more ambiguous, since both the variables Interest and Interest*$Dbank_1$ are not statistically significant.

According to Von Thadden (2004), borrowing from just two banks is sufficient to eliminate the negative aspects of a monopolistic relationship, e.g., the asymmetric evolution of the information between the bank and other lenders allow the bank to extract monopoly rents from the relationship. At the same time, such borrowing enables the company to enjoy the advantage of the relationship with each bank. Thus, we introduce in regression (3), table 3, the dummy variable $Dbank_2$, which takes the value one if the firm maintains a relationship with two or more banks. For both samples, regression (3) shows the concave relationship: the coefficient of the variable $Interest^2$*$Dbank_2$ is negative and statistically significant. Clearly this relation holds for firms working with more than two banks. When we remove the variables $Interest^2$ and $Interst^2$*$Dbank_2$ from the model, the result reported by the variable Interest*$Dbank_2$ indicate that firms that work with two or more banks can obtain credit at more favourable conditions (regression 4). These results are consistent with those we report in table 2, indicating that the problem of adverse selection is much stronger for firms that work with less than two financial intermediaries. This result is particularly relevant in our samples: more than 50% of small, young firms maintain a relationship with just one bank (see table 1). We note that the maximum number of banks that Spanish and Portuguese firms work with is seven and six banks, respectively.

For the control variables, the results we obtain for the Spanish sample (regression 1, 2, 3, and 4 - table 3) confirm our expectations: large companies have more access to bank financing. Bank credit also increases for more profitable firms, firms with more collateral to pledge, and less riskier firms. The means of the variable Altman Z-Score are 3.5 and 2.2 for Spanish and Portuguese SMEs, respectively, values that could be considered in the range of uncertainty of default risk (Neves, 2006). The results are quite different for our Portuguese sample. Older and more profitable firms obtain higher levels of bank credit, and smaller, younger firms are more credit constrained. We conclude that Portuguese banks avoid the fixed costs of screening and monitoring SMEs.

5. Conclusions

Using a panel data from a representative sample of Spanish and Portuguese SMEs operating in manufacturing industry, we ask why trade credit is available when banking credit is rationed. To answer this question and to assess the existence of credit rationing, we first test if trade credit could be considered as a substitute and/or a complement to bank credit. We then verify whether the availability of trade credit facilitates the access to bank credit, especially for small, young firms, by improving their reputation on the borrower market.

Our results indicate the existence of credit rationing among Spanish and Portuguese SMEs, thus confirming the substitution hypothesis. Our results also confirm that firms that maintain an exclusive relationship with one bank report a higher degree of substitution between both bank and trade credit as sources of financing, which indicates the greater severity of adverse selection

problem in those companies. This monopolistic relationship puts the informed bank in a position to exert market power, which could impose hold-up costs for the firm. The soft-budget constrain problem is more likely to prevail because the lender has the option to bail out the firm in case of distress. The establishment of relationships with more than one bank, as suggested by Von Thadden (2004) and Degryse and Ongena (2007), could reduce such exploitation, as confirmed by our results.

Nevertheless, despite the fact that the substitution hypothesis is confirmed, our empirical results indicate that if we take into account as a specific class of firms the younger and smaller firms, then the substitution and complementary hypotheses are not mutually exclusive. In fact, small, young firms have not yet been able to establish a reputation, so banks do not have any information about the competency and honesty of managers, nor about the type of projects that may arise. This context elevates the cost of generating this information and also increases the fixed costs of screening and monitoring such firms.

Notwithstanding, suppliers have a monitoring advantage over banks. When firms are small, young, and opaque, this informational advantage allows suppliers to provide financial support better than can banks, do (Huyghebaert et al. 2007). Our empirical evidence for the variable age agrees with that of Berger and Udell (1995, 1998), and confirms that the variable age is positively related to trade credit for young firms. This positive relation is in line with the theories that emphasize the informational role of trade credit (Biais and Gollier, 1997; Burkar and Ellingsen, 2004). Thus, because it signals a firm´s quality, trade credit stimulates small firms to improve their reputation, thus facilitating access to bank debt.

This study focuses on the signalling role of trade credit, a topic that is still not yet much explored in the literature, however further research should investigate how the interaction between information motivated bank credit rationing and trade credit varies with the business cycle; how this affects the conduct of monetary policy and how trade credit, by generating a chain of bankruptcies can have a feedback effect on the economic development.

Appendixies

APPENDIX I. Variable Definitions

$$\text{Trade Credit (TC)} = \frac{Trade\ \ receivables - Trade\ \ payables}{Total\ \ Assets}$$

$$\text{Bank Credit}_1\ (BC_1) = \frac{Total\ \ Debt}{Total\ \ Assets}$$

$$\text{Bank Credit}_2\ (BC_2) = \frac{Short\ \ term\ \ Debt}{Total\ \ Liabilities}$$

$$\text{Bank Credit}_3\ (BC_3) = \frac{Long\ \ Term\ \ Debt}{Total\ \ Liabilities}$$

Size = Ln (Total Assets)

$$\text{Asset Structure} = \frac{Current\ \ Assets - Cash}{Total\ \ Assets}$$

Age = Ln (time elapsed between the firm's founding date and the year of measurement)

$$\text{Accounts Turnover} = \frac{Sales}{Current\ \ Assets}$$

$$\text{Liquidity} = \frac{Current\ \ Assets - Stocks}{Current\ \ Liabilities}$$

$$\text{Inventory Turnover} = \frac{Net\ \ Sales}{Stocks}$$

$$\text{Sales Growth} = \left(\frac{Sales\ \ (t+1)}{Sales\ \ (t)} \right) - 1$$

$$\text{Profitability} = \frac{EBIT^{*}}{Total\ \ Assets}$$

*EBIT – Earning Before Interest and Taxes

$$\text{Interest} = \frac{Financial\ \ Expenses}{Total\ \ Bank\ \ Debt}$$

$$\text{Interest}^2 = (\text{Interest})^2$$

$$\text{Debt Coverage} = \frac{Net\ \ profit}{Interest\ \ Expenses}$$

Altman Z–Score = 1.2 [Working Capital / Total Assets] + 1.4 [Retained Earnings / Total Assets] + 3.3 [EBIT / Total Assets] + 0.6 [Capital / Total Liabilities] + 1 [Sales / Total Assets]

$$\text{Tangibility} = \frac{Tangible\ \ Fixed\ \ Assets}{Total\ \ Assets}$$

DBank1 = Dummy that takes value 1 if the company works with just one bank and 0 in the opposite case.

DBank2 = Dummy that takes value 1 if the company works with two or more banks and 0 in the opposite case

APPENDIX II. Descriptive Statistics – Spain

	Trade Credit	Bank Credit$_1$	Bank Credit$_2$	Bank Credit$_3$	Size	Age	Asset Structure	Accounts Turnover	Liquidity	Profitability	Inventory Turnover	Sales Growth	Interest	Tangibility	Debt Coverage	Altman Z-score
Mean	0.203	0.350	0.52	0.01	6.341	13.972	0.4169	3.911	1.232	0.047	55.055	15.316	0.032	0.421	18.443	3.549
Median	0.163	0.313	0.210	0.000	6.287	14.000	0.400	2.811	0.689	0.041	10.527	0.064	0.025	0.415	0.967	2.470
Maximum	0.952	0.998	0.991	0.758	11.034	25.000	0.998	163.91	86.360	1.978	63015.07	287953.0	2.341	0.994	55431	4881.597
Minimum	-0.750	0.000	0.000	0.000	1.890	1.000	0.000	0.000	0.000	-0.956	0.000	-0.999	0.000	0.000	-15939.5	-3508.034
Std. Dev	0.176	0.243	0.198	0.060	1.256	5.333	0.227	4.749	3.027	0.083	59.069	20.2707	0.047	0.228	54.90	39.277
Skewness	0.932	0.538	0.869	7.125	0.202	0.134	0.272	9.307	12.834	1.212	70.167	142.01	20.81	0.132	64.72	44.723
Kurtosis	4.034	2.422	3.164	58.137	2.855	2.251	2.205	192.16	229.766	33.135	6714.75	20172.44	716.65	2.166	5952.8	7751.267

For definition of the variables, see appendix I. All variables are measured in thousand of Euros, except ratios.

APPENDIX III. Descriptive Statistics – Portugal

	Trade Credit	Bank Credit$_1$	Bank Credit$_2$	Bank Credit$_3$	Size	Age	Asset Structure	Accounts Turnover	Liquidity	Profitability	Inventory Turnover	Sales Growth	Interest	Tangibility	Debt Coverage	Altman Z-score
Mean	0.345	0.411	0.302	0.099	7.092	11.69	0.4159	3.502	2.282	0.043	46.593	1.969	0.093	0.480	24.180	2.030
Median	0.292	0.401	0.251	0.037	7.808	10.00	0.4150	2.542	0.790	0.034	15.406	0.075	0.053	0.479	1.510	1.892
Maximum	1.669	0.914	0.913	0.514	10.378	25.000	0.997	18.319	16.179	0.379	623.38	103.576	2.024	0.945	1707.0	4.934
Minimum	0.000	0.011	0.000	0.000	3.293	2.000	0.022	0.146	0.071	-0.147	0.314	-0.418	0.001	0.002	-23.44	0.339
Std. Dev	0.312	0.199	0.222	0.133	1.870	7.036	0.237	3.353	2.022	0.076	10.43	11.618	0.206	0.2321	16.87	0.972
Skewness	1.517	0.193	0.734	1.421	-0.361	0.425	0.098	2.444	5.045	1.293	4.119	7.476	8.110	0.154	9.628	0.619
Kurtosis	6.246	2.92	2.960	3.98	1.787	1.897	2.125	9.367	33.321	7.455	20.092	61.427	75.817	2.330	96.236	3.044

For definition of the variables, see Appendix I. All variables are measured in thousand of Euros, except ratios.

APPENDIX IV. Matrix of Correlations – Spain

Correlation (T-statistic)	Trade Credit	Bank Credit$_1$	Bank Credit$_2$	Size	Asset Structure	Age	Accounts Turnover	Liquidity	Inventory Turnover	Sales Growth	Profitability	Interest	Debt Coverage	Altman Z-score	Tangibility
Trade Credit	1.000														
Bank Credit$_1$	-0.135*** (-28.559)	1.000													
Bank Credit$_2$	-0.084*** (-17.478)	0.099*** (20.960)	1.000												
Size	0.141*** (29.826)	0.161*** (34.061)	0.247*** (53.095)	1.000											
Asset Structure	0.617*** (163.718)	-0.180*** (-38.314)	0.084*** (17.507)	0.154*** (32.527)	1.000										
Age	0.052*** (10.751)	-0.093*** (-19.282)	0.104*** (21.630)	0.260*** (55.540)	0.115*** (23.818)	1.000									
Accounts Turnover	-0.179*** (-37.574)	-0.028*** (-5.754)	-0.024*** (-4.959)	-0.420*** (-95.595)	-0.384*** (-85.905)	-0.0515*** (-10.652)	1.000								
Liquidity	0.391*** (88.553)	-0.039*** (-8.145)	0.017*** (3.589)	0.040*** (8.319)	0.040*** (8.424)	0.153*** (31.987)	-0.122*** (-25.412)	1.000							
Inventory Turnover	0.126*** (25.218)	-0.052*** (-10.341)	-0.004 (-0.708)	-0.256*** (-52.684)	-0.439*** (-97.135)	-0.016*** (-3.204)	0.696*** (192.599)	0.330*** (69.320)	1.000						
Sales Growth	0.023*** (4.421)	0.081*** (15.560)	0.017*** (3.248)	0.097*** (18.813)	0.031*** (-5.909)	-0.163*** (-31.622)	0.064*** (12.208)	-0.035*** (-6.716)	0.061*** (11.325)	1.000					
Profitability	0.069*** (14.428)	-0.089*** (-18.674)	0.032*** (6.745)	-0.009* (-1.939)	0.003 (0.709)	0.055*** (11.399)	0.197*** (41.558)	0.282*** (61.180)	0.273*** (56.333)	0.147*** (28.454)	1.000				
Interest	0.231*** (42.168)	-0.562*** (-120.696)	-0.052*** (-9.148)	0.023*** (4.056)	0.288*** (53.449)	0.114*** (20.155)	0.094*** (16.656)	-0.099*** (-17.538)	0.023*** (3.874)	-0.030*** (-4.907)	0.234*** (42.686)	1.000			
Debt Coverage	0.034*** (6.726)	-0.321*** (-67.618)	0.018*** (3.607)	0.015*** (3.045)	-0.020*** (-3.943)	0.134*** (26.669)	0.110*** (21.862)	0.304*** (63.538)	0.225*** (44.156)	0.096*** (17.743)	0.678*** (183.672)	-0.020*** (-3.605)	1.000		
Altman Z-score	0.217*** (46.288)	-0.440*** (-102.177)	-0.008* (-1.668)	-0.239*** (-51.340)	0.205*** (43.664)	0.130*** (27.053)	0.468*** (109.406)	0.405*** (92.169)	0.404*** (87.854)	0.023*** (4.405)	0.506*** (122.243)	0.348*** (65.959)	0.469*** (105.694)	1.000	
Tangibility	-0.433*** (-100.405)	0.306*** (67.040)	-0.035*** (-7.248)	0.042*** (8.842)	-0.670*** (-188.789)	-0.106*** (-22.070)	0.287*** (61.775)	-0.348*** (-77.219)	0.144*** (28.850)	0.065*** (12.580)	-0.129*** (-27.014)	-0.240*** (-43.915)	-0.138*** (-27.665)	-0.367*** (-82.159)	1.000

For definition of the variables, see Appendix I. All variables are measured in thousand of Euros, except ratios. T-statistics are in parenthesis

*** Indicates significant at 1% level; ** Indicates significance at 5% level; * Indicates significance at 10% level.

APPENDIX V. Matrix of correlations – Portugal

Correlation (T-statistic)	Trade Credit	Bank Credit$_1$	Bank Credit$_2$	Size	Asset Structure	Age	Accounts Turnover	Liquidity	Inventory Turnover	Sales Growth	Profitability	Interest	Debt Coverage	Altman Z-score	Tangibility
Trade Credit	1.000														
Bank Credit$_1$	0.155*** (6.000)	1.000													
Bank Credit$_2$	0.302*** (12.144)	0.554*** (25.526)	1.000												
Size	0.227*** (8.940)	0.342*** (13.960)	0.448** (19.210)	1.000											
Asset Structure	0.105*** (4.048)	0.026 (1.01)	0.222*** (8.718)	0.269*** (10.700)	1.000										
Age	0.122*** (4.600)	0.0856*** (3.228)	0.255*** (9.887)	0.470 (19.975)	0.271*** (10.587)	1.000									
Accounts Turnover	0.084*** (3.184)	-0.121*** (-4.587)	-0.133*** (-5.058)	-0.350*** (-14.086)	-0.284*** (-11.156)	-0.136*** (-5.151)	1.000								
Liquidity	-0.098*** (-3.771)	-0.050* (1.900)	-0.092** (-3.515)	0.169*** (6.553)	0.209 (8.176)	0.185*** (7.044)	-0.157*** (-5.959)	1.000							
Inventory Turnover	0.059** (2.126)	-0.122*** (-4.450)	-0.125 (-4.532)	-0.182*** (-6.673)	-0.401*** (-15.805)	-0.134*** (-4.869)	0.558*** (24.239)	0.274 (10.255)	1.000						
Sales Growth	0.029 (0.876)	-0.031 (0.960)	0.028 (0.866)	0.070** (2.160)	0.021 (0.649)	-0.142 (-4.363)	0.035 (1.082)	-0.018 (-0.561)	0.033 (0.967)	1.000					
Profitability	0.027 (1.026)	-0.133*** (-5.146)	-0.016 (-0.560)	0.079*** (3.043)	0.068*** (2.601)	0.102*** (3.866)	0.127*** (4.820)	0.371*** (15.261)	0.218*** (8.054)	0.178*** (5.532)	1.000				
Interest	0.148*** (4.482)	-0.530*** (-18.647)	0.114*** (3.439)	0.086*** (2.578)	0.117*** (3.526)	0.076** (2.245)	0.140*** (4.186)	-0.122*** (-3.668)	0.097*** (2.774)	0.070* (1.752)	0.0001 (0.004)	1.000			
Debt Coverage	-0.089** (-2.172)	-0.281** (-7.143)	-0.186** (-4.620)	0.006 (0.152)	-0.007 (-0.167)	0.085** (2.082)	0.039 (0.958)	0.442*** (12.001)	0.225 (5.330)	0.111*** (2.167)	0.091*** (2.227)	-0.075 (-1.549)	1.000		
Altman Z-score	-0.067** (-2.558)	-0.292*** (-11.714)	0.055** (-2.118)	0..004 (0.017)	0.240*** (9.482)	0.169*** (6.449)	0.375*** (15.245)	0.482*** (21.004)	0.291*** (10.977)	0.778*** (2.381)	0.512*** (22.828)	0.246*** (7.567)	0.134*** (3.309)	1.000	
Tangibility	-0.007 (-0.264)	0.143** (5.502)	-0.052** (-2.000)	-0.0516** (-1.968)	-0.657*** (-33.239)	-0.155*** (-5.838)	0.257*** (9.963)	-0.455*** (-19.421)	0.128*** (4.639)	0.018 (0.554)	-0.099*** (-3.807)	-0.107*** (-3.189)	0.0123 (0.309)	-0.393*** (-16.276)	1.000

For definition of the variables, see appendix I. All variables are measured in thousand of Euros, except ratios. T-statistics are in parenthesis.
*** Indicates significant at 1% level; ** Indicates significance at 5% level; * Indicates significance at 10% level.

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