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## Firms' trade credit and the local level of development of the banking system in Europe

### Abstract

Trade credit is an important complement to lending by financial intermediaries, especially in light of the current credit crisis. This paper links firms' use and provision of trade credit with the local state of development of the bank system. We question whether the use of trade credit is larger in regions with more developed banking systems and find that there is a degree of substitutability between suppliers and banks in the demand for short-term financing. Companies mainly obtain financing from suppliers when the prospects of obtaining from the banks are not particularly good, which results in a lower level of local development in the banking system. Empirical evidence comes from an extensive dataset of 25,000 Continental European companies over the period of 2002-2006.

**Keywords:** trade credit, banking system, suppliers, regional development, Europe.

**JEL Classification:** D92, G20, G30, L26.

### Introduction

Trade credit arises when a supplier allows a customer to delay payment for goods already delivered. As it represents an important part of firms' finance, it is challenging that banks do not take over this potentially profitable business, offering more credit lines for financing commercial transactions. Nevertheless, financing through suppliers is a subject that has been little studied in the financial literature. Although several hypotheses have been put forward to explain the different reasons behind this phenomenon, trade credit is not based on a general theory. Researchers have suggested comparative advantages for product sellers in funding, production/inventory management, price discrimination, or product quality guarantees. Some have also suggested that suppliers may have an informational advantage over other lenders in evaluating their customers' ability to pay or repossessing and reselling goods in the event of default. However, traditional financial theories yield ambiguous predictions, as they do not predict whether a more competitive banking system is superior in financing transactions which firms would otherwise finance on trade credit.

This paper explores whether trade credit may offset bank credit. The conjecture is that flows of borrowing between firms may ameliorate the effects of imperfections in the intermediated credit market. This is of particular interest in light of the current credit crisis. The periods of economic crisis are indeed particularly conducive to the emergence of new thoughts on trade credit practices. The change in behavior of lenders over the last year has indeed vexed many small and medium enterprises, desper-

ate for cash to sustain their business operations. Management of both new and established firms increasingly need to seek alternative sources of funding to reduce dependency on their finance providers. Because of restricted availability and rising costs of bank finance, businesses are extending their payment relationships with suppliers. Anecdotal evidence suggests that as the economy slides into recession and the credit crunch starts to bite, trade credit may emerge as a new growth area of debt, with non-financial firms acting also as intermediaries in the provision of credit. The hypothesis is, therefore, that there is a substitutability between bank and trade credit.

This paper relates possible motivations of the recourse to trade credit to the level of development of the banking system at a regional level. The objective of this paper is indeed to estimate whether the different degrees of recourse to trade credit are influenced by the characteristics of the local banking systems. A direct empirical investigation of the effect of banking development on firms' propensity to rely on trade credit is exactly what we carry out in this paper. In general, trade credit may be particularly important in economies with weak financial systems, where industries with higher dependence on trade credit exhibit higher growth rates (Demirguc-Kunt and Maksimovic, 2001; Fisman and Love, 2003). However, even in well developed market economies, such as the United States, the supply of capital is frequently bundled with the supply of goods, in the form of trade credit, and vendor financing more generally. Trade credit represented indeed one-third of the debt of US SMEs as of 1998, nearly that extended by commercial banks (Robb, 2002). As for Europe, we find that Accounts Payable represent on the average 17 percent of the total cost of goods sold, while Accounts Receivable are 22 percent of total sales.

Given such numbers, we broaden the focus and ask whether the state of development of a region's banking system affects the provision of short-term capital by firms. In particular, we examine the factors determining the recourse to trade credit in relation to the environmental conditions the particular company is operating in, and especially in relation to the level of the banking system development at a local level. In other words, we question whether the use of trade credit is greater in region with a more developed banking system. To this extent, focusing on Continental Europe is very informative because of the bank-based financial system. Moreover, there is considerable spatial diversity in the degree of banking development, and it is reasonable to assume that "distance" matters in banking relationships.

We find that there is a degree of "substitutability" in recourse to trade credit compared to bank financing and that companies mainly obtain financing from suppliers when the prospects of obtaining bank financing are not particularly good, which results in a lower level of development in the local banking system. This hypothesis is examined by an empirical analysis of a sample of approximately 25,000 European companies over the period of 2002-2006, and shows that companies operating in provinces with a less well developed banking system have a greater propensity to financing through suppliers. Certainly, we are not the first ones to investigate the relation between use of trade credit and the characteristics of the banking system at the local level. Several recent contributions have greatly enhanced our understanding in this area. However, this is one of the first papers that investigates this issue at the firm level, with such a large and recent dataset.

The remainder of the paper is structured as follows. Section 1 contains the theoretical background on the motivations to the use of Trade Credit. The empirical design and methodology are described in Section 2. Section 3 presents the results and the final section concludes.

## 1. Theory

Several authors focus on the motivations for a firm's demand for trade credit, from different perspectives. For instance, it has been argued that trade credit is used to reduce transactions cost or to allow firms to offer implicit quality guarantees. In this section, we briefly review these motivations and possible advantages of suppliers over other credit providers, and later focus on the financial hypothesis of substitution and complementarity with bank credit, which is central to our approach. The third sub-section takes instead a different perspective as it encompasses macro-economic effects.

**1.1. Advantages of suppliers over other credit providers.** Since the seminal paper of Schwartz (1974), the theory has it that suppliers have an advantage over other credit providers. First, suppliers may have an advantage in acquiring information about the credit-worthiness of a buyer during the course of normal business. In a market characterized by asymmetric and imperfect information, lenders must support a series of costs in acquiring information. To this aim, trade creditors have an informative advantage over banks, since they know presumably most of the companies in the industry (Rodriguez – Rodriguez, 2006). Moreover, the negotiation itself may be instructive for trade creditors, in that it induces clients to (indirectly) reveal whether or not financial problems are likely. For instance, a client accepting an increase in prices significantly above the cost of money for the same period is signalling a solvency risk (Petersen and Rajan, 1997; Pike et al., 2005).

Second, suppliers may use deferment of payments as a lever to effect price discrimination between their various clients and so satisfy part of the demand that would otherwise not be satisfied. When a supplier increases deferred payments to a particular client, the supplier is essentially granting, *ceteris paribus*, an interest free loan, thereby reducing the current value of the price that the client pays. Should the supplier not vary the terms of payment according to the information concerning the structure of client liabilities and the consequent quality of credit, the effective price given to the client with a lower level of solvency is reduced. On the other hand, it is reasonable to hypothesize that the market segment to which credit is rationed is characterized by greater price flexibility<sup>1</sup>. Consequently, trade credit may also be viewed as an instrument of price discrimination. In a nutshell, the level of trade credit sometimes means more sales can be generated without reducing the nominal price granted to existing clients (Petersen and Rajan, 1997; Bougheas et al., 2009).

Third, there could be an enforcing advantage in the hands of suppliers. This holds especially if it can credibly threaten to cut off future supply to a client with few other alternative sources for the good. The goods themselves may represent a form of collat-

<sup>1</sup> If anti-trust laws prevent direct price discrimination, high-priced trade credit may be a subsidy targeted toward risky clients, which will accept trade-credit conditions, because they may not have any other alternatives. A version of the price discrimination theory is that suppliers do not favor risky customers but are rather interested in the long-run survival of their clients (Wilner, 2000). In case the supplier has no potential substitutes for his customers, he takes into account the present value of the profit margins on future sales when deciding whether to extend short-term financing to his clients. The supplier thinks about protecting his implicit equity stake in the customer (Mateut, 2005).

eral, in that a non-monopsonist supplier will presumably have a network for reselling any repossessed goods. Moreover, the short-term loans given by trade creditors leave more limited space to debtors to make recourse to opportunistic behavior.

Last, reputation and specific investments also matter. Specifically investing both physically and relationally in building relationships with clients is extremely important to suppliers in maintaining their portfolio of clients. In this context, the granting of improved credit terms can be used as an instrument of financial help to those clients who temporarily find themselves in the grip of finance constraints. Trade credit can therefore form part of a long-term strategy of client portfolio management. Consequently, because of the long-term benefits accruing from the relationship and its future profits, the supplier may decide to extend trade credit to the client even if doing this makes a loss in the short term (Ng et al., 1999).

**1.2. Substitution and complementarity with bank credit.** The most recent theory of trade credit is composed of the hypotheses of substitution and complementarity between trade credit and bank debts. The substitution hypothesis relies on trade credit being an alternative to bank credit as a source of finance. Potential borrowers that are constrained from access to capital will turn to substitute sources of financing, in particular non-financial corporations. Accordingly, non-financial firms act as intermediaries channelling short-term funds from the financial institutions in an economy to the greatest use. Non-financial firms act in this way because they may have a comparative advantage in exploiting informal means of ensuring that their borrowers to repay. This comparative advantage may arise because the lending firms are better informed about their customers' situation (Biais and Gollier, 1997), because they can take advantage of product market imperfections (Brennan et al., 1988). This 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 (Stiglitz and Weiss, 1981). Based on these arguments bank and trade credit are two (somehow imperfect) substitutable financial resources, which are referred to in the literature as the substitution hypothesis.

While it may seem natural to conclude that borrowers are likely to view bank and trade credit as substitutes, the supply of trade credit may be greater if supplying firms have access to bank loans. Biais and

Gollier (1997), for instance, suggest that the use of trade credit may be viewed as complementary with financing by financial intermediaries. For transactions where direct monitoring by financial intermediaries is efficient, financial intermediaries and markets provide capital directly to firms. However, in cases where suppliers are more efficient at monitoring, or in enforcing contracts, it may be optimal for financial intermediaries to lend to suppliers, who then relend to the buying firms (Jain, 2001). Such efficiencies may arise because suppliers have proprietary information about buyers, because they can threaten to suspend future deliveries, or because they have a higher opportunity cost of any repossessed inventory than do financial intermediaries. Consistent with this view, Cull et al. (2007) find that state-owned Chinese firms, which have privileged access to loans, redistribute credit to private firms with less privileged access. Profitable private firms in China lend part of their formal credit via trade credit to their customers.

Finally, suppliers may also act as liquidity providers. This idea is related to a new stream of literature that concentrates on the role of trade credit in liquidation, default, or renegotiation. For example, Santos and Longhofer (2003) explained the existence of trade credit as the result of suppliers having an advantage in liquidating intermediate goods in case of default by their buyers, given that they have the distribution channels to re-sell them. In a context of limited enforceability of contracts suppliers may have a comparative advantage over banks in lending to customers because they are able to stop the supply of intermediate goods (Cuña, 2007).

**1.3. Macro-economic approach.** Trade credit, which is an element of microeconomic analysis at the firm level, involves considerable amounts of money when apprehended from the aggregate point of view (Ziane, 2008). It has therefore been investigated from a macroeconomic perspective. As early as in 1960, Meltzer observed that "When money was tightened, firms with relatively large cash balances increased the average length of time for which credit was extended and this extension of trade credit appears to have favored those firms against whom credit rationing is said to discriminate" (Meltzer, 1960, p. 429). Existing theoretical works have shown that monetary tightenings induce small firms to switch from bank finance to trade credit. In Wilner (2000), when macroeconomic interest rates rise, dependent trade creditors restrict credit terms (i.e. the trade credit interest-rate rises), but the change in the trade-credit interest rate is less than the change in the credit-market rate, implying that trade creditors dampen the effects of macroeconomic interest-rate fluctuations. In a survey paper,



Mateut (2005) reviews the literature analyzing whether trade credit plays an offsetting effect on the traditional credit channel of monetary policy transmission<sup>1</sup>.

Love et al. (2007) study the behavior of trade credit around the time of financial crises. They find an increase in trade credit at the peak of financial crises, followed by a subsequent collapse of this source of financing right after crisis events. Before a crisis, firms with a high proportion of short-term debt are significant providers of trade credit. After a crisis, however, these firms sharply cut the amount of credit they extend to customers and they increase their reliance on credit from suppliers. In other words, what could be viewed as a favorable pre-crisis financial position (i.e. short-term debt) turns into a heavy disadvantage right after a crisis event. In the long aftermath of a crisis, trade credit contracts as a result of both an overall shortage of funds and difficulties experienced<sup>2</sup>.

Last, trade credit is also investigated in a Law and Finance perspective, with particular reference to the European context. Trade credit practices are indeed quite heterogeneous, with a strong disparity in financial behaviors between the south and the north of the Old World. This particular situation is not without serious problems within the scope of an Economic and Monetary Union which involves the existence of a single monetary policy for all Member States (for a review on the political problems associated with the reduction of payment terms in Europe in a Law and Finance perspective, see Ziane, 2008).

## 2. Empirical design and methodology

**2.1. The sample.** Our sample is composed of 24,479 companies in the Euro countries selected from the Amadeus database with accounting data available

over the period of 2002-2006<sup>3</sup>. All companies were considered except for those in the financial, health, education, and public administration sectors. Table 1 provides variable definitions and sources, while Table 2 describes the sample. France, Italy, Spain, Belgium, and Finland are the most represented countries, for which the data are available for more than one thousand firms. The average turnover of companies in the sample is approximately 133 million Euro. The smallest average size is found in Italy, probably because of the structure of its economy, which is characterized by the substantial number of small scale companies. The variable TRADECREDIT is defined as the ratio Accounts Payable over the total cost of goods sold. The average of this variable for each individual country shows that Italy is the country with the largest use of trade credit (21.5%), followed by Spain (19.8%). At the other extreme are Finland (6.8%) and Belgium (14.0%). Of all the sectors, the construction industry is the largest user of liabilities due to suppliers (31.4%)<sup>4</sup>.

On the other side, for TRADEDEBT (defined as Accounts Receivable, divided by the Total Sales), the highest average values are for Spain and Italy (29.0% and 27.7%, respectively). In terms of sector, construction companies have the higher propensity to average value of accounting receivables (35.1%). These results point at a relationship between TRADECREDIT and TRADEDEBT. In a particular context (i.e. country and sector) of client-supplier relationship where there is a propensity to request deferment of payments to suppliers, it is not surprising that there is an analogous propensity of suppliers to grant a similar deferment to clients (although the causality issue between trade debt and credit has not been disentangled yet). It actually seems that, in this field, the cultural frontiers, commercial customs, habits, and traditions have a significant explanatory power. According to the European Economic and

<sup>1</sup> Mateut (2005) resorts to the credit-channel view, that contrasts with the classical macroeconomic models, in which monetary policy transmission takes place through interest rate influences on economic activity. Trade-credit issuance can increase in periods of tight money, because the risks of issuing trade credit are lower than those of issuing bank loans: suppliers can in fact closely monitor their clients during the normal course of business. Thus, ignoring trade credit during periods of monetary tightening may explain the lack of consistent evidence for the importance of a distinct bank-lending channel in the transmission of monetary policy.

<sup>2</sup> The redistribution view of Meltzer (1960), Petersen and Rajan (1997), and Nilsen (2002), among others, posits that firms with better access to capital will redistribute the credit they receive to less advantaged firms via trade credit. However, for redistribution to take place, some firms first need to be able to raise external finance to pass on to less privileged firms. During a financial crisis, alternative sources of financing become scarce as stock markets crash and foreign lenders and investors pull out their money. That is, as all the potential sources of funds dry up, there may be nothing left to redistribute through trade credit. Thus, the credit crunch that affects financial lenders also affects nonfinancial lenders (i.e. trade credit).

<sup>3</sup> Amadeus contains about 150,000 companies belonging to countries in the Euro zone. The 24,479 companies thus selected are found in the following countries: Austria, Belgium, Finland, France, Germany, Italy, Holland, Portugal, and Spain. The sample is made of all the firms of the Euro countries with financial data contained in the Amadeus database. This database is collected by Bureau Van Dijk for commercial use and includes balance sheet data, profit and loss statements, and some complementary information on quoted and non quoted European firms from 1993. Additional data sources are the central banks of each country and Eurostat. See Table 1 for further details.

<sup>4</sup> It can be seen that the data indicated are relevant in the statutory company statement of accounts which report the production costs net of VAT in the Profit and Loss Account, while the liabilities towards suppliers are shown in the Balance Sheet ex tax. Therefore, the relationship between the two values is not homogeneous but is valid as an indicator of the dynamic of trade credit. The separation of the tax regarding liabilities towards suppliers is not immediate since the tax rates are different and inter alia are a function of the type and category of the purchase.

Social Committee (1998), Mediterranean countries would be characterized by the existence of a structural “late payment culture”. In practice, this phenomenon would lead all economic players to adopt a specific behavior aimed at maximizing systematically the actual terms of payment of market transactions. On the other hand, the enterprises of Nordic and Germanic countries are regarded as the best payers in Europe, with an average payment period of less than 40 days (or even 30 days for Finland).

Finally, we split the sample by size into small (total sales less than 20 M €), medium (less than 40 € M) and large firms<sup>1</sup>. Contrary to expectations, we find that smaller firms make higher recourse to trade credit and debt (Panel C of Table 2). However, this result is biased by the large number of small firms in Italy and Spain, where terms of payments are longer. Controlling for country and industry effects, the regression models presented in Section 3 disentangle this issue.

**2.2. The financing of purchases.** In this paper, we employ a standard measure of trade financing used by financial analysts. The commonly used measure of the extent to which a firm borrows from its suppliers is computed as the ratio of Accounts Payable over the total cost of goods sold. This variable, labelled TRADECREDIT, indicates how the firm finances the flow of inputs received from its suppliers. Although it is commonly used by finance practitioners, it differs from the familiar ratio measures of leverage used in academic research, with the exception of a few recent papers such as Demirgüç-Kunt and Maksimovic (2001). The ratios typically used in the literature are computed by dividing the value of Accounts Receivable by total assets or total equity or current liabilities. As Demirgüç-Kunt and Maksimovic (2001, p. 14) point out, “while these measures are appropriate for studying some corporate finance policy decisions, such as the capital structure decision, they do not directly measure the use of trade credit, which primarily finances sales and purchases”<sup>2</sup>.

We use TRADECREDIT as the dependent variable on a regression model to investigate the determinants of the financing of purchases. As independent

variables, we use four firm-specific variables. The first is TRADEDEBT, defined as Accounts Receivable over Total Sales. A positive correlation is indeed expected between TRADECREDIT and TRADEDEBT, although we do not attempt to investigate the causality issue. Firms that obtain trade credit also extend trade credit to their own customers, or vice versa. Among the numerous determinants resulting from the policy of granting trade credit, the size of the supplier company is expected to play a role, for the reasons of economies of scale. Moreover, larger suppliers, who presumably serve a larger number of clients, may also be able to be more intuitive as to whether or not a financial problem of one specific client is an isolated problem or affects the whole sector. This consideration leads to the SIZE (sales) of the company being taken into consideration as possible determinants in decisions to grant trade credit (Ng et al., 1999; Ge and Qiu, 2007; Rodriguez - Rodriguez, 2006). The third firm-specific control variable is LEVERAGE, measured as externally raised debt relative to total financing sources. A positive relation is expected between this variable and the propensity to trade credit, as a higher leverage indicates lower company “stability” and therefore lower possibilities of access to bank credit. Also, the volume of turnover generated by a firm in relation to its current assets (TURNASSET) is an indicator of firms’ activity, as well as a measurement of the degree of income generation. It is therefore expected to have a negative correlation with TRADECREDIT, as the larger the TURNASSET the smaller the need to delay payment to suppliers, as a greater income generating capacity would enable firms to benefit from prompt payment discounts. Finally, besides firm-specific control variables, we also consider the level of inflation (INFLATION), to control for the effect of using nominal values. The regression equation we estimate is expressed in Model (1), including industry and country control dummies to avoid the influences of the characteristics of the national legal systems enforcement and bankruptcy procedures. Industry and country dummies control for these context effects.

The national legal system, in particular, has a direct impact on the recourse to trade credit, with higher levels of exposures in countries with less efficient.

Model (1).

$$\begin{aligned} \text{TRADECREDIT} = & \alpha + \beta_1 \text{TRADEDEBT} + \beta_2 \text{SIZE} \\ & + \beta_3 \text{LEVERAGE} + \beta_4 \text{TURNASSET} + \\ & + \beta_5 \text{INFLATION} + \beta_i \text{COUNTRY-DUMMY}_i + \beta_j \\ & \text{INDUSTRY-DUMMY}_j + \varepsilon. \end{aligned}$$

<sup>1</sup> In this way, we have a similar number of firms in each group. Using the EU definition of small (total sales less than 10 M €) and medium (less than 50 € M) firms, we would have a group of small firms with only 233 observations.

<sup>2</sup> As a robustness check, in our paper we compute TRADECREDIT also using two alternative measures proposed by the literature (e.g. Rodriguez - Rodriguez, 2006). These are the ratio between accounts payable and current liabilities, and the ratio defined by accounts payable on total liabilities. We find similar results.

Table 1. Variable definitions and sources\*

Panel A: Dependent variables: measures of trade credit	
TRADECREDIT	Accounts Payable over the total cost of goods sold <sup>1</sup> .
TRADEDEBT	Accounts Receivable over total sales. Source: Amadeus.
NTC	(Accounts Payable – Accounts Receivable)/ total sales. Source: Amadeus.
Panel B: Independent variables: control variables	
SIZE	Sales. Source: Amadeus.
LEVERAGE	Externally raised debt over total financing sources. Source: Amadeus.
TURNASSET	Total sales over total assets. Source: Amadeus.
INFLATION	Rate of inflation measured in each individual country. Source: Eurostat.
Panel C: Independent variables: banking system	
COUNTERS	Number of counters open in banks in the province where each individual company is located. Source: Banque de France, Banca d'Italia, Banca de España.
COUNTERS/POP	Ratio between the number of bank counters and the number of inhabitants in a province. Source: Eurostat, Banque de France, Banca d'Italia, Banca de España.
BANKCREDIT	Claims on the private sector by deposit money banks in the province where each individual company is located. Source: Banca d'Italia, Banca de España.
BANKCREDIT/GDP	Ratio of the claims on the private sector by deposit money banks to the local GDP. Source: Eurostat, Banca d'Italia, Banca de España.
ATMs	Number of bank ATMs in the province where each individual company is located. Source: Banca d'Italia (Bollettino Statistico).
ATMs/POP	Number of bank ATMs to the number of inhabitants in a province. Source: Eurostat, Banca d'Italia (Bollettino Statistico).

Notes: \* The sample is made of all the firms of the Euro countries with financial data contained in the Amadeus database. This database is collected by Bureau Van Dijk for commercial use and includes balance sheet data, profit and loss statements, and some complementary information on quoted and non quoted European firms from 1993.

For each model, we present two specifications, as in Demirgüç-Kunt and Maksimovic (2001). The first specification is estimated using firm level pooled data over the 2002-2006 period using firm and year random effects (results reported in Table 3). The use of firm-level random effects is a conservative estimation procedure, in that some of the differences in the use of trade credit by firms in different regions may be picked up by the firm-level effect. An alternative procedure is to use industry-level random effects, thereby implicitly assuming that the differences in the use of trade credit by firms in the same industry are not caused by unobserved firm-level heterogeneity across regions (results reported in Table 4).

**2.3. The financing of sales.** The commonly used measure of extended TRADEDEBT is defined as Accounts Receivable, divided by the Total Sales. A low measure indicates that the credit a firm is extending to customers is a small proportion of total sales. This may occur if the firm only extends credit for a short period, or if it extends longer term credit to only a fraction of its customers.

TRADEDEBT is therefore a measure of receivables turnover that indicates how the firm finances the flow of output shipped to customers. Although TRADECREDIT is commonly used by finance practi-

tioners, it differs from the familiar ratio measures of leverage used in academic research, with the exception of a few recent papers such as Demirgüç-Kunt and Maksimovic (2001).

TRADEDEBT is the dependent variable of the regression Model (2) that shares the same covariates of Model (1).

$$TRADEDEBT = \alpha + \beta_1 TRADECREDIT + \beta_2 SIZE + \beta_3 LEVERAGE + \beta_4 TURNASSET + \beta_5 INFLATION + \beta_i COUNTRY-DUMMY_i + \beta_j INDUSTRY-DUMMY_j + \varepsilon.$$

Finally, we also study net credit (NTC), defined as the difference between Accounts Payable and Accounts Receivable, scaled by sales (Love et al., 2007).

Firms that obtain more credit from their suppliers are likely to extend more credit to their customers. In this sense, net credit reflects the relative willingness of firms to extend trade credit, net of the credit that the firms receive themselves.

Model (3).

$$NTC = \alpha + \beta_1 SIZE + \beta_2 LEVERAGE + \beta_3 TURNASSET + \beta_4 INFLATION + \beta_i COUNTRY-DUMMY_i + \beta_j INDUSTRY-DUMMY_j + \varepsilon.$$

Table 2. Description by country, by industry and by size of the sample of 24,479 companies  
(average values)\*

	No. of firms (%)	SIZE (sales) (M €)	Shareholder's equity/ Total assets (%)	ROI (%)	TRADECREDIT (%)	TRADEDEBT (%)
Sample	24,479	133.1	31.4	6.5	17.0	22.0
Panel A: by Country						
Italy	6,441 (26.3)	72.6	25.4	5.3	21.5	27.7
Spain	5,372 (22.0)	129.2	34.6	6.4	19.8	29.0
France	7,410 (30.3)	110.9	32.2	6.9	15.1	16.2
Belgium	3,017 (12.3)	101.2	31.9	7.1	14.0	17.8
Finland	1,012 (4.1)	154.7	39.3	8.4	6.8	10.0
Others <sup>1</sup>	1,227 (5.0)	662.0	36.4	6.9	8.2	16.3
Panel B: by Industry						
Construction	1,908 (7.8)	112.1	21.2	5.9	31.4	35.1
Manufacturing	10,619 (43.4)	146.6	35.4	6.6	17.4	25.2
Commerce	10,116 (41.3)	101.2	28.5	6.8	14.4	16.0
Others <sup>2</sup>	1,836 (7.5)	252.6	34.9	4.7	14.2	22.7
Panel C: by Size						
Small	6,797 (27.8)	16.1	31.8	6.5	18.1	23.4
Medium	8,457 (34.5)	27.9	30.6	6.3	17.8	22.5
Large	9,225 (37.7)	315.7	31.9	6.6	15.5	20.6

Note: \* Detailed variable definition and sources are given in Table 1. <sup>1</sup> This item groups the values for companies in Austria, Germany, Holland, and Portugal since there were very few in the other countries considered. <sup>2</sup> This item groups the values of companies operating in the "Agriculture, forestry, and hunting", "Extraction of minerals", "Production and distribution of Electrical Energy, Gas, and Water", "Hotels, restaurants, bars", and lastly, "Terrestrial transport; transport by canals, and pipelines" because of the small numbers for the other sectors considered.



**2.4. The substitution hypothesis and the local banking system.** According to the Substitution Hypothesis, non-financial firms act as financial intermediaries in that they channel short-term funds from the financial institutions in an economy to their greatest use. The substitution hypothesis holds therefore that trade credit is a substitute for short-term financing by banks. As a consequence, reliance on trade credit is likely to be highest in regions where financial systems are undeveloped. In this sense, trade credit and bank credit are substitutes.

In our empirical work, we use six indicators of banking development. These are also an inverse measure of distance between borrower and lenders. Geographical closeness may indeed allow banks to be more effective in collecting soft information on borrowers and to reduce screening and monitoring costs, particularly for small firms<sup>1</sup>. A decrease in such costs has beneficial effects on the cost of and access to finance in a variety of models with asymmetric information. There are therefore strong reasons to believe that a higher level of development of the local banking system can increase the access to bank financing. However, a higher competition between banks may also disrupt the financing of more opaque borrowers such as small firms.

There is evidence (Degryse and Ongena, 2005) that loan rates increase with detailed measures of distance between the firm and competing banks in Belgium and decrease with the distance between the firm and the lender. The effect of the number of bank branches is not statistically significant when added to the equation. Cross country evidence suggests that bank concentration decreases the likelihood of bank finance (see Beck et al., 2004). Bonaccorsi di Patti and Gobbi (2001) find that measures of concentration are positively and significantly associated with the quantity of credit going to firms in local provincial markets. The overall empirical evidence on the effect of bank competition is somewhat mixed (Benfratello et al., 2008). The sign and magnitude of the effect of the level of development of local bank system on

firm's propensity to trade credit is ultimately an empirical issue that our paper addresses.

In an effort to analyze the influence of the local level of the banking system development on the propensity to raise trade credit, we pooled the dataset by adding banking information on European regions. In our dataset, regional boundaries are defined referring to the Nomenclature of Units for Territorial Statistics (NUTS), a hierarchical classification of spatial units that provides a breakdown of the European Union's territory for producing regional statistics which are comparable across the Union. In particular, we used the NUTS 3-level corresponding to "départements" for France, "provincie" for Italy and "provincias" for Spain. The sources of the data, for years 2002-2006, are the French, Spanish, and Italian national banks. Since it was not possible to obtain information with the same degree of detail about local development of the banking system for the other countries in the sample, this section of the study (identified by the variable BANKINGSYS) only refers to companies operating in three countries (i.e. France, Italy and Spain).

We use several descriptors of the local level of development of the banking system, identified in line with the empirical literature on local banking development (see, for instance, Beck et al., 2004; Beck et al., 2007; Degryse and Ongena, 2005; Demirgüç-Kunt and Maksimovic, 2001). All the measures are computed for each NUTS 3-level region. We gather data from alternative sources, including government publications and official websites. A detailed list of all the sources used for each country can be found in Table 1. We construct the following indicators of banking sector outreach for each region:

- ◆ The first considers the number of counters open in banks in the province where each individual company is located (COUNTERS).
- ◆ The second is the ratio between the number of bank counters and the number of inhabitants in a region (COUNTERS/POP).
- ◆ The third variable measures the claims on the private sector by deposit money banks in the province where each individual company is located (BANKCREDIT).
- ◆ The fourth variable is the ratio of the claims on the private sector by deposit money banks to the local GDP (BANKCREDIT/GDP).
- ◆ The fifth variable is the number of bank ATMs in the province where each individual company is located (ATMs).
- ◆ The sixth variable is the ratio of bank ATMs over population (ATMS/POP).

<sup>1</sup> It has been argued that with the greater use of computers and communication equipment the importance of distance for small firms may be decreasing in countries such as the USA (Petersen and Rajan, 2002). However, there is ample evidence for Europe that distance between borrowers and bank branches still matters. Bonaccorsi di Patti and Gobbi (2001) find that branch density exerts a positive effect on credit flows, particularly to small firms, and it reduces the percentage of bad loans. Benfratello et. al. (2008) find that the level of local (province) banking development affects the probability of firms' process innovation.

Table 3. Determinants of trade credit and trade debt (\*\*\*) significant at 99%)

Model	1	2	3	4	4	4	4	4	4
Dependent variable	TRADECREDIT	TRADEDEBT	NTC	TRADECREDIT	TRADECREDIT	TRADECREDIT	TRADECREDIT	TRADECREDIT	TRADECREDIT
TRADEDEBT	0.285***	-	-	0.295***	0.257***	0.253***	0.252***	0.201***	0.198***
TRADECREDIT	-	0.466***	-	-	-	-	-	-	-
SIZE	0.024**	0.058***	0.031**	0.034**	0.036***	0.052***	0.037***	0.032**	0.023**
LEVERAGE	0.154***	-0.087***	0.363***	0.158***	0.172***	0.176***	0.177***	0.056**	0.077**
TURNASSET	-0.011***	0.008***	-0.052***	-0.014***	-0.017***	-0.017***	-0.018***	-0.021***	-0.019***
INFLATION	0.017***	0.054***	0.021***	0.010***	0.036***	0.047***	0.041***	0.056***	0.062***
COUNTRY-DUM	***	***	***	***	***	***	***	***	***
INDUSTRY-DUM	***	***	***	***	***	***	***	***	***
BANKING SYS	-	-	-	-0.421***	-0.235***	-0.049***	-0.601***	-0.698***	-0.342**
				COUNTERS	COUNTERS /POP	BANKCREDIT	BANKCREDIT /GDP	ATMs	ATMs /POP
R <sup>2</sup>	0.288	0.262	0.279	0.275	0.250	0.250	0.249	0.164	0.157
Countries	Euro	Euro	Euro	F + I + S	F + I + S	I + S	I + S	I	I
No. of firms	24,479	24,479	24,479	19,223	19,223	11,813	11,813	6,441	6,441
No. of obs.	102,811	102,811	102,811	102,811	102,811	80,655	80,655	49,583	49,583

Note: Regressions are estimated using firm level pooled data over the 2002-2006 period using firm and year random effects. The regression model (1) is:  $TRADECREDIT = \alpha + \beta_1 TRADEDEBT + \beta_2 SIZE + \beta_3 LEVERAGE + \beta_4 TURNASSET + \beta_5 INFLATION + \beta_i COUNTRY-DUMMY_i + \beta_j INDUSTRY-DUMMY_j + \varepsilon$ . The dependent variable is TRADECREDIT that is measured as Accounts Payable over the total cost of goods sold. Models 2 and 3 are expressed as Model 1 where TRADEDEBT and NTC (Net Trade Credit) are the respective dependent variables. Trade Debt is computed as Accounts Receivable over total sales. NTC is defined as the difference between Accounts Payable and Accounts Receivable, scaled by sales. Model 4 adds to Model 1 an independent variable measuring the level of the local banking system development. Detailed variable definition and sources are in Table 1.

Table 4. Determinants of trade credit and trade debt (\*\*\*) significant at 99%)

Model	1	2	3	4	4	4	4	4	4
Dependent variable	TRADECREDIT	TRADEDEBT	NTC	TRADECREDIT	TRADECREDIT	TRADECREDIT	TRADECREDIT	TRADECREDIT	TRADECREDIT
TRADEDEBT	0.156***	-	-	0.174***	0.175***	0.179***	0.180***	0.156***	0.163***
TRADECREDIT	-	0.341***	-	-	-	-	-	-	-
SIZE	0.056***	0.114***	0.066***	0.078**	0.090***	0.066***	0.071***	0.052**	0.086***
LEVERAGE	0.151***	-0.174***	0.303***	0.045***	0.048***	0.052***	0.053***	0.043**	0.039**
TURNASSET	-0.023***	0.017*	-0.110***	-0.022***	-0.021***	-0.022***	-0.019***	-0.054***	-0.038***
INFLATION	0.034***	0.046***	0.021***	0.025***	0.028***	0.033***	0.034***	0.033***	0.034***
COUNTRY-DUM	***	***	***	***	***	***	***	***	***
BANKING SYS	-	-	-	-0.035***	-0.086***	-0.039***	-0.037***	-0.037***	-0.029**
				COUNTERS	COUNTERS /POP	BANKCREDIT	BANKCREDIT /GDP	ATMs	ATMs /POP
R <sup>2</sup>	0.212	0.211	0.214	0.204	0.195	0.201	0.209	0.185	0.172
Countries	Euro	Euro	Euro	F + I + S	F + I + S	I + S	I + S	I	I
No. firms	24,479	24,479	24,479	19,223	19,223	11,813	11,813	6,441	6,441
No. obs.	102,811	102,811	102,811	102,811	102,811	80,655	80,655	49,583	49,583

Notes: Regressions are estimated using industry-level random effects. The regression model (1) is:  $TRADECREDIT = \alpha + \beta_1 TRADEDEBT + \beta_2 SIZE + \beta_3 LEVERAGE + \beta_4 TURNASSET + \beta_5 INFLATION + \beta_i COUNTRY-DUMMY_i + \beta_j INDUSTRY-DUMMY_j + \varepsilon$ . The dependent variable is TRADECREDIT that is measured as Accounts Payable over the total cost of goods sold. Models 2 and 3 are expressed as Model 1 where TRADEDEBT and NTC (Net Trade Credit) are the respective dependent variables. Trade Debt is computed as Accounts Receivable over total sales. NTC is defined as the difference between Accounts Payable and Accounts Receivable, scaled by sales. Model 4 adds to Model 1 an independent variable measuring the level of the local banking system development. Detailed variable definition and sources are given in Table 1.

The first and second indicators (available for France, Italy and Spain) measure outreach of the financial sector in terms of access to banks' physical outlets. Indicators 3 and 4 (available for Italy and Spain) measure the use of banking services. The indicators of branches and ATMs (available only for Italy) help characterize the geographic penetration of the banking sector. They can also be interpreted as proxies for the average distance of a potential customer from the nearest physical bank outlet. Higher geographic penetration would thus indicate smaller distance and easier geographic access. Per capita measures of branches and ATMs are used to capture the demographic penetration of the banking sector. They proxy for the average number of people served by each physical bank outlet. Higher demographic penetration would indicate fewer potential clients per branch or ATM, and therefore easier access.

Model (4).

$$\text{TRADECREDIT} = \alpha + \beta_1 \text{TRADEDEBT} + \beta_2 \text{SIZE} + \beta_3 \text{LEVERAGE} + \beta_4 \text{TURNASSET} + \beta_5 \text{INFLATION} + \beta_6 \text{BANKINGSYS} + \beta_i \text{COUNTRY-DUMMY}_i + \beta_j \text{INDUSTRY-DUMMY}_j + \varepsilon.$$

### 3. Results

Results confirm that the banking system plays an important role in financing companies (Tables 3 and 4). Whatever variable we use to measure the local level of the banking system development, we find that it is negatively related to the firms propensity to rely on trade credit. This means that companies operating in regions where the banking system is less developed tend to rely more on suppliers as funds suppliers. This evidence is coherent with the substitution hypothesis, with trade credit being an alternative to bank credit as a source of finance. Moreover, it suggests that regional factors do play a role on the firms financing policy.

The positive coefficients recorded for *SIZE* also confirm the hypothesis put forward in this paper. Large companies have a larger client base and a greater probability that business relationships may provide information about the risk of insolvency among the other clients. Higher turnover (variable *TURNASSET*) can be associated with greater financing from banks, given that, other things being equal, the parameter can be associated with virtuous behavior both in terms of stock management and regarding sales. On the contrary, higher *LEVERAGE* ratios indicate lower company "stability" and therefore lower access to bank credit. This variable has indeed a positive relation with trade credit, as it reduces the need for short-term financing from suppliers. On the other hand, leverage

might be associated with greater availability and granting of trade credit to clients, as testified by the negative coefficient in Model 2. Finally, the variable that measures inflation has a positive coefficient, meaning that upon increase in the rate of inflation companies tend to make recourse to financing from suppliers and analogously they tend to grant a greater level of trade credit to their own clients.

### Conclusions

The payment of business to business transactions is often deferred. Consequently, the acceptance and granting of trade credit play an important role in both company management and financial management processes. As part of the range of services offered in the marketing mix, in negotiating and granting credit, trade credit is used by suppliers as an instrument to develop new relationships with clients, while they also form an important factor in the decision making process of the client. The granting of trade credit is also viewed as an investment instrument in the strategic development of the company as it is used to build long-term partnerships in order to increase business. It can also be treated as an instrument of price discrimination so that even though the nominal price for the supplier is the same for each client, each client pays a different global cost of supply compared to the other clients of the supplier. Furthermore, its universal character makes it a potential subject of interest as much to the economists as to the historians, jurists, philosophers, or sociologists. These numerous implications contribute to its being regarded as an ever-recurring economic and financial issue.

Companies turning to trade credit see it as an instrument of brokerage or financial intermediation that forms an alternative source of financing to borrowing from the capital markets. This paper examines the reasons for recourse to trade credit, identifying the determining factors in choosing it in preference to alternative sources of short-term business financing. Several theoretical papers have analyzed the advantages and disadvantages of bank over trade credit financing. The literature has suggested that the trade credit allows superior allocation of credit when the financial system is not informationally efficient. Our focus is on exploring whether the use of trade credit between firms is a substitute for borrowing from the financial intermediaries.

This study has examined liabilities due to suppliers from the point of view of a hypothesis of substitutability/complementarity of trade credit and bank credit by analyzing the determinants of trade debts for an individual company using a sample of approximately 25,000 companies in the Euro zone. We find that the local level of development of the bank-



ing system does influence the short-term financing policies of companies. NUTS 3-level regions where the banking system is not so well developed (in terms of number of bank counters, number of bank counters per capita, amount of claims on the private sector by deposit money banks, claims over GDP, number of ATMs and number of ATMs per capita) are in fact those where there is most recourse to liabilities due to suppliers. Evidence of higher trade

credit by companies operating in regions where the indicators of bank system development have lower values leads to the conclusion that these companies make recourse to their own suppliers with greater intensity in order to attenuate the constraints of the rationing of financing. Therefore, the hypothesis that suppliers may represent a source of capital funds in alternative to short-term bank financing is validated.

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