

Effect of the Number of Banking Relationships on Credit Availability: Evidence from Panel Data of Spanish Small Firms

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ABSTRACT. This paper investigates how the choice between single or multiple banking relationships affects credit availability for a complete panel of small and medium-sized Spanish firms. The results seem to indicate the existence of rationing, since a substitution relation has been found between trade and bank credit. We also analyse the relationship between the level of indebtedness and the interest rate for each group of firms. The results show that those SMEs that work with fewer financial intermediaries obtain fewer funds for the same increase in the interest rate, which indicates that these companies have more financial restraints.

KEY WORDS: banking relationships, asymmetric information, small business, panel data, interest rate and credit rationing

JEL CLASSIFICATION: G21, G24, G32

1. Introduction

The existence of asymmetric information in capital markets means financial institutions cannot adequately assess the investment projects of their borrowers. This effect becomes marked in the case of small businesses, owing to the

greater difficulties they encounter in transmitting reliable information about their real status and performance (Berger and Udell, 1998). As a consequence, smaller firms have greater problems obtaining both their required levels of bank financing and sufficiently favourable conditions of borrowing.

The establishment of a relationship between moneylender and borrower is one way of reducing the problem of asymmetric information; as such a relationship can reveal valuable information about the client's status. As can be gathered from diverse theoretical contributions (Bhattacharya and Chisea, 1995; Bhattacharya and Thakor, 1993; Boot et al., 1993; Boot and Thakor, 1994; Boyd and Prescott, 1986; Campbell, 1979; Diamond, 1984, 1991; Fama, 1985; Leland and Pyle, 1977; Ramakrishnan and Thakor, 1984; Rajan, 1992; Von Thadden, 1995; Yosha, 1995), the establishment of a close relationship with financial institutions may generate advantages such as improved conditions of financing and increased credit availability.

Focusing on small Spanish businesses, the great diversity in the number of financial intermediaries they work with is remarkable. In the sample used in the present study, the number of banking relationships ranges from one to ten. Despite this fact and the serious problems of asymmetric information for the Spanish small firms, current literature has not analysed the influence of lending relationships on credit availability. To be precise, the literature has only studied the effects of banks' participation in the body of shareholders of big companies and the consequences of belonging to a banking group

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(Berges and Sánchez, 1991; García-Marco and Ocaña, 1999; Giner and Salas, 1997; Hernando and Valles, 1992; Sanchis et al., 1998; Zoido, 1998).

The aim of the present study involves analysing the effects of strengthening the banking relationship on the Spanish small firms' access to bank credit. To do this, the sample is divided into companies obtaining funds from just one bank and those doing so from several banks. In each group two different methodologies are used in order to contrast the credit availability. First, following Petersen and Rajan (1994), it is assumed that businesses using financing from suppliers have a need for funds that is unsatisfied in the banking sector, owing to the high opportunity costs associated with discounts for prompt payment. We focus on these two types of financing because, assuming a funding constraint by the owners, usually they are the main sources of funds of the small and medium-sized firms. So we have analysed the relationship between trade credit and bank loans in order to determine the existence of rationing. Furthermore, the evaluation of this link could indicate the presence of adverse selection that prevents firms from obtaining the bank financing they need. In this respect, those firms with a higher degree of substitution between bank and trade credit are the ones immersed in a more asymmetric information environment. Second, we complete our study with an analysis of the nexus between the level of debt and the interest rate for each group of businesses. In this way we test how financial institutions price the debt they lend to small firms depending on the strength of their relationship. It is expected that companies with more problems of adverse selection are also more financially restricted and, therefore, obtain fewer bank funds for the same increase in the interest rate.

To our knowledge, this way of contrasting the influence of the banking relationship on the severity of the adverse selection problem and on the existence of rationing have not yet been used. Although close to the spirit of Petersen and Rajan's paper, our study allows us to more directly test the influence of the existence of a banking relationship on credit availability. This is so because we separate our sample of firms into two groups representing both the

companies maintaining the closest relationship with their financial institution and the others with a more distant link. Also, in this paper, we have used a complete panel data in order to control the influence of non-observable firm-specific factors that cannot be measured. If these elements are not considered, they could distort the effect of the banking relationship on the credit availability.

In this respect, the complete panel has been formed with small and medium-size Spanish businesses, which are perfect for our purposes. According to Petersen and Rajan (1994), it is unlikely that rating agencies or the financial press supervise the small firms and therefore the asymmetric information between these companies and potential moneylenders is considerable. Furthermore, most of the firms in our sample are very young organizations, which have not yet been able to establish a reputation, so the bank does not have any information about the competence and honesty of the board of directors, nor about the type of projects that may arise. This elevates the cost of the production of information, at the same time increasing the value of maintaining a relationship with a single financial intermediary.

The results seem to indicate the existence of rationing among the Spanish SMEs, since a substitution relationship has been found between trade and bank credit. In this respect, those firms maintaining an exclusive relationship with their bank report a higher degree of substitution between both financing sources, which indicates the greater severity of the adverse selection problem in these companies. In fact, this problem increases the monopoly power of the internal bank and this could increase the financial restrictions. In order to test this point, we analyse the relation between the level of indebtedness and the interest rate for each group of firms. As was expected, those businesses that work with fewer financial intermediaries obtain fewer funds for the same increase in the interest rate, which confirms that these companies are more restricted.

The study is structured in the following way. In the next section, a brief review of the literature is compiled. In the third section, data are presented and the methodology used for

contrasting our hypotheses is described. In the fourth section, the effect of the number of banking relationships on credit availability is studied. In the final section, the main conclusions are stated.

2. Literature review

Since the seminal paper of Diamond (1984), the exclusive banking relationships arise as the best way to channel the resources toward the investment in the company when serious problems of asymmetric information exist because small firms can get closer to the financial intermediary. In this way, the amount of information that can be obtained from this relationship is greater, since the debtor uses a wider range of the services offered by that particular bank (Petersen and Rajan, 1994). Then, if the information generated by the bank in its relationship with the firm has a lasting nature, is owned exclusively and cannot be observed by or transferred to institutions external to this relationship, it is more valuable (Bhattacharya and Chisea, 1995; Bhattacharya and Thakor, 1993; Carletti, 2004; Chan et al., 1986; Cole, 1998; Diamond, 1984; Foglia et al., 1998; Yosha, 1995).¹ At the same time, if only one financial institution is giving loans to the company, that institution bears all the generated risk, but it also reaps all the benefits arising from its decisions, thereby eliminating the *free-rider* problem (Cole, 1998; Diamond, 1984; Foglia et al., 1998);² moreover, it enjoys greater flexibility in fulfilling its intermediary role (Boyd and Prescott, 1986; Boot and Thakor, 1994, 1997; Hauswald and Marquez, 2003; Ramakrishnan and Thakor, 1984; Von Thadden, 1995). All of these factors should increase the credit availability of the small firms that work with one bank.

Nevertheless, maintaining a loan relationship with only one financial institution may also convey some disadvantages (Blackwell and Santomero, 1982; Bolton and Scharfstein, 1996; Detragiache et al., 2000; Dewatripont and Maskin, 1995; Greenbaum et al., 1989; Kane and Malkiel, 1965; Rajan, 1992; Sharpe, 1990). In fact, Sharpe (1990) and Rajan (1992) claim that companies borrowing from just one financial

intermediary are “informationally captured”, as no one else knows the real risk of the company. In these circumstances, the monopolistic relationship may be exploited in order to charge a greater interest rate on new loans or even to ration additional borrowing. The establishment of relationships with more than one bank will reduce such exploitation. In fact, some theories claim that borrowing from just two banks is sufficient to eliminate the negative aspects of monopoly, while enabling the company to enjoy the advantages of a relationship with each bank (Von Thadden, 1994).

Furthermore, as is claimed by Detragiache et al. (2000), if the financial institution suffers liquidity problems, the company might be obliged to look elsewhere for external financing. In this situation the borrower would face the problem of adverse selection, because, if other intermediaries do not know the actual degree of risk that the company carries, they may believe that the risk is too high. For small businesses, which are less transparent from the information point of view, adverse selection can be so severe that it can prevent them from getting the necessary financing outside their established bank relationship. The creation of multiple links therefore increases the number of financial intermediaries possessing information about the small firm’s real risk, thereby increasing the possibility that at least one of them may offer financing. From this point of view, therefore, those companies that borrow from several financial institutions should have greater credit availability.

In recent years, several papers have tried to verify, among other aspects, these effects. Petersen and Rajan (1994) found, from a sample of small businesses in the United States, that those obtaining funds from just one financial institution have greater credit availability at a lower cost. From a sample of small and middle-size US enterprises, Cole (1998) found that the probability of obtaining a loan is lower among those firms keeping several banking relationships. Inside the United States, Houston and James (1996) found that large companies that borrow from just one financial intermediary have more financial restraint when investing. In the European framework, Angelini et al. (1998)

obtained evidence in favour of a lower rationing and lower interest rates among those Italian small firms receiving loans from fewer banks. In Germany, Harhoff and Körting (1998) and Machauer and Weber (1998) verified the existence of more credit availability among smaller companies maintaining fewer relationships. Finally, with data of loans given by one of the biggest Belgian banks, Degryse and Van Cayseele (2000) verified a reduction in the interest rate among the small borrowers deriving most of their services just from one financial intermediary, whereas de Bodt et al. (2001) found that Belgian small firms that work with more banks have more financial restraints.

3. Data and methodology

The data of the study were obtained from the S.A.B.E. database³ taking into account the annual accounts deposited by companies in business registry offices throughout Spain. Non-financial and non-agricultural small businesses⁴ have been included in establishing a complete three-year panel (from 1996 to 1998). After eliminating observations with mistakes in the annual accounts and lost values, the panel consists of 705 small firms (2115 observations).

As the study was designed to cover a period of three years, it was decided to include in the

panel all those companies who had fulfilled the requirements established in the European Community *Official Bulletin* (30 April 1996) for considering a company small for at least two years. These include:

- having fewer than 250 employees,
- having an annual business volume not exceeding €40 million or assets not exceeding €27 million.

The sample of companies was organized according to the number of banks the firms had worked with in 1998. In this way, we came up with one group of 105 firms that had maintained relationships with just one financial intermediary, and a second group of 600 companies that had worked with more than one intermediary.⁵ Table I presents the distribution of the sample by the number of banking relationships, as well as by age and size groups. Less than 15% of firms were found to have been working with just one bank. This coincides with evidence found by Ongena and Smith (2000) in a sample of 1079 companies of 20 European countries.

The variables used in the subsequent econometric analysis are given in detail in Appendix I, while the descriptive statistics and the correlations are presented in Appendix II.

TABLE I
Distribution of the sample by age and size according to the number of banking relationships

	More than one bank			One bank			Total		
	Cases	Row	Column	Cases	Row	Column	Cases	Row	Column
Distribution of the sample by age									
Until 5 years	104	75.9%	5.8%	33	24.1%	10.5%	137	100%	6.5%
From 5 to 10 years	294	85.7%	16.3%	49	14.3%	15.6%	343	100%	16.2%
From 10 to 15 years	375	83%	20.8%	77	17%	24.4%	452	100%	21.4%
More than 15 years	1027	86.8%	57.1%	156	13.2%	49.5%	1183	100%	55.9%
Total	1800	85.1%	100%	315	14.9%	100%	2115	100%	100%
Distribution of the sample by size									
Small	142	77.2%	7.9%	42	22.8%	13.3%	184	100%	8.7%
Medium	1658	85.9%	92.1%	273	14.1%	86.7%	1931	100%	91.3%
Total	1800	85.1%	100%	315	14.9%	100%	2115	100%	100%

Under the denomination of “Cases” has been included the number of observations that belong to the category of its row (age or size). “Row” is the percentage that represent the observations over the row’s total number of cases and “Column” is the percentage that represent the observations over the column’s total number of cases. The small companies are those with less than 50 employees and annual business volume not exceeding €7 millions or assets not exceeding €5 millions.

In order to contrast the effect of the number of banking relationships on a small firm's access to financing, we have considered two models with panel data. These models have the following generic form:

$$y_{it} = x'_{it}\beta + \eta_i + v_{it} \quad (1)$$

where y_{it} is the dependent variable, x'_{it} is the vector of independent variables of the model for the company i in the year t , η_i is defined as *non-observable heterogeneity*, and v_{it} is the random error. Of these elements, the one involving the most problems is the non-observable heterogeneity (η_i), which occurs because of the existence of a series of *non-observable individual effects*. As the name indicates, such effects are associated with the individual companies making up the panel, but in addition have the peculiarity of being constant in time. However, the main drawback arises from the impossibility of measuring these effects in any way, as they are non-observable.

Nevertheless, the method of estimation to be used will depend on whether these non-observable effects are regarded as fixed or random. They are *fixed* when they are correlated with the independent variables of the model, distorting the estimates of the coefficients. If, on the contrary, it is accepted that the non-observable effects are not correlated with the variables, they will be considered as *random* and will be included in the random error part of the model.

In order to contrast the correlation between the individual effects and the independent variables, the Hausman test can be used (Hausman, 1978). According to this method, if the effects are uncorrelated with the variables, the fixed-effects random-effects estimators should not be significantly different. However, Arellano (1993) suggests performing a similar evaluation by means of a Wald test,⁶ as this test is robust against heteroscedasticity and/or autocorrelation. Following this procedure, it was discovered that the independent variables included in both models are correlated with non-observable heterogeneity.

A within-groups estimator is used to estimate the fixed effects model, by applying ordinary

least squares (OLS) on the following transformation:

$$y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)' \beta + v_{it} - \bar{v}_i \quad (2)$$

where $\bar{y}_i = \frac{1}{T_i} \sum_{t=1}^{T_i} y_{it}$, $\bar{x}_i = \frac{1}{T_i} \sum_{t=1}^{T_i} x_{it}$, $\bar{v}_i = \frac{1}{T_i} \sum_{t=1}^{T_i} v_{it}$.

As heterogeneity does not have any temporal variation, it is eliminated when its mean is subtracted.

Nevertheless, in order that the within-groups estimates are consistent (when T is fixed and $N \rightarrow \infty$), strict exogeneity of the independent variables⁷ is required (Arellano, 1988). This means that their value must be completely independent of past, present and future shocks taking place in the organization. However, variables used in these models are characteristic of the company and economic and financial magnitudes that are affected by past shocks. In this respect, it can be supposed that variables are predetermined,⁸ so their values are affected by past disruptions, but not by present and future ones. Under these assumptions, Arellano (1998) recommends use of the Generalized Method of Moments (GMM) on a system of equations transformed into first differences, which eliminates the problem of non-observable heterogeneity; he also recommends including valid instruments in every moment.⁹

Up to now, it has been supposed that every independent variable is correlated with the fixed effects, and therefore that only transformations in first differences eliminating such heterogeneity can be used. However, if any of the variables are not correlated with the fixed effects, the levels of these contain information about interest parameters whose use would provoke more efficient estimates, particularly if, as is the case, temporal variation is so small (Arellano and Bover, 1990). Besides, in the models presented, calculation of the constant is considered of interest; but this would be eliminated if equations in first differences were used. For this reason, we have tested for absence of correlation for each of the variables, to determine whether it is possible to use the information contained in the levels of the equations.

The method of estimation that was finally used in the models presented below, therefore, is the GMM, applied to a system of equations in first differences and in levels. The instruments used were those mentioned previously for the equations in differences and non-correlated variables with fixed effects, lagged one period for the equations in levels. In order to verify that the number of instruments is not excessive, the Sargan test was calculated. This test verified the absence of over-identification in the specification of models.

4. Analysis of the results: access to debt financing

In this section, we analysed the effects of the number of banking relationships on the credit availability of small and medium-size firms. The sample is divided into companies obtaining funds from just one bank and those doing so from several banks. In each group, two different relationships are studied. First, the use of trade credit is analysed. It is assumed that firms using financing from suppliers have a need for funds that is unsatisfied in the banking sector, owing to the high opportunity costs associated with discounts for early payment. Second, since the link between the availability and the cost of the credit may indicate the existence of rationing, the relation between these two groups is analysed.

4.1. Relation between trade and financial credit

In the presence of asymmetric information, 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 it is assumed 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. According to the hierarchy of financing sources, therefore, a company will resort to funds from suppliers only when its bank credit has run out and it still has an unsatisfied demand for funds. Trade credit then becomes a source of financing replacing financial credit, referred to as the substitution hypothesis in the literature (Alphonse et al., 2004).

It should be pointed out that the existence of trade credit on a firm's balance sheet does not mean that it has exhausted its capacity to borrow from a bank. It is well known that suppliers grant some of their credit without charge and firms therefore use these funds before resorting to bank debt. Nevertheless, these free resources are not unlimited; otherwise the firms would not have any bank credit on their balance sheet. Moreover, if trade credit were totally free of any cost or cheaper than financial debt, firms should exhaust it independently of the availability of bank credit. Consequently, we should not find any relation at all between both resources.

The consideration of trade credit as an alternative to the credit given by financial institutions has been reflected in several studies in recent years. Elliehausen and Wolken (1993), Petersen and Rajan (1997) and Danielson and Scott (2000), considering a sample of small firms from the United States, describe how these companies use credit from suppliers once they have used up their financial source of funds. In Spain, Hernández and Hernando (1999) have studied the factors determining trade credit for a sample of large manufacturing companies. They obtain results supporting a greater use of this financing source by firms that, because of their size, liquidity or profitability, have a lower capacity for accessing other intermediate financing sources.

If it is accepted, therefore, that the cost of trade credit is higher than that of bank credit, it is quite understandable that a company will increase the former when the latter is not available. Furthermore, since the possibility of resorting to alternative financing sources apart from trade credit depends on the problems raised by adverse selection, the degree of substitution between trade credit and bank credit is expected to be higher for firms that are subject to a greater monopoly.

In order to contrast these relations between trade credit and financial credit, and taking into account model (1), we propose the following regression:

$$TC_{it} = \alpha_1 + \alpha_2 D_i + \beta_1 BC_{it} + \beta_2 D_i BC_{it} + \delta X_{it} + \eta_i + \lambda_t + v_{it} \quad (3)$$

where TC_{it} (Trade Credit) has been measured with the ratio of trade creditors to purchases,¹⁰ whereas BC_{it} (Bank Credit) has been proxied with the ratio of bank debt to total assets. This model establishes how the company i resorts to the credit from suppliers when facing different values of bank financing in the studied periods. It could be argued that both trade and bank credit are endogenous variables, but the use of lagged instruments in the estimation of the model helps to control for this hypothetical problem.

In order to distinguish whether the degree of substitution between both groups of companies is different, the variable *Dinteraction* ($D_i \times BC_{it}$) is introduced, created by the interaction between the variable *Bank Credit* (BC_{it}) and the variable *Dbank* (D_i). The latter is a dummy that takes the value one if the firm obtains its funds from just one financial institution, and zero otherwise. The dummy variable is also introduced in an additive way (D_i) for controlling whether being included in one group or another has an effect on the constant.

Those elements (X_{it}) that are correlated with trade credit (size, age, asset structure, employees, accounts turnover, inventory turnover, net profits, liquidity and inventory)¹¹ have been introduced as control variables. Furthermore, we employ the panel data structure to control for the existence of a series of factors¹² that are constant in time and characteristic of the individual companies. The coefficient η_i of the model reflects this heterogeneity. At the same time, it has been controlled by general variations of economy, including a temporal dummy variable for such variations, represented as λ_t . Finally, v_{it} is the symbol for regression error.

In the first place, the dummy variable *Dbank* has been defined as one if the firm works with one bank and as zero otherwise. The results obtained in this way are shown in regressions (1), (2) and (3) of Table II. As for the estimate (1), it has been found that the coefficient of the variable *Bank Credit* is significant and has a negative sign, which indicates the existence of a substitution relationship between trade and financial credit. This result is consistent with the existing

empirical evidence (Danielson and Scott, 2000; Elliehausen and Wolken, 1993; Petersen and Rajan, 1997) and indicates that trade credit is an expensive substitute for bank debt, as suggested by the credit rationing approach of trade credit, indicating, therefore, that the small firms of this sample are rationed.

It could be argued that small firms basically have only two sources of external credit: trade credit and bank credit. There are no other alternatives because these firms do not have access to the capital markets. Thus, controlling for firm size and assuming a funding constraint by the owners, if bank credit falls, trade credit must go up. That is, one would expect a significant coefficient on trade credit regardless of whether credit rationing (and the information conditions that foster it) exists or not. But the situation is more complex. It is well known that a part of the credit granted by the suppliers has cost and that this is superior to that of the bank debt. Hence, according to the Pecking Order Theory (Myers and Majluf, 1984), a company will finance its assets appealing first to the free financing offered by its suppliers; next it will use the bank debt and finally it will pay more for additional trade credit. Therefore, the existence of bank debt implicitly means that the free trade credit has been exhausted and a reduction in the availability of bank debt will force the firm to resort to the more expensive credit from suppliers. This analysis suggests that the substitution between both financing sources will only occur when the bank restricts access to financial debt, in other words, when credit rationing exists (Danielson and Scott, 2000; Elliehausen and Wolken, 1993; Petersen and Rajan, 1997). It would not be rational for a company to give up bank credit to pay more for additional trade credit and hence raise its capital cost.

Next, one could wonder why suppliers should extend credit to companies that have been rationed by the banks. According to Petersen and Rajan (1997) and Danielson and Scott (2000, 2002), the suppliers have a comparative advantage over traditional financial intermediaries in collecting information on other non-financial firms, in assessing their credit worthiness and finally in controlling their actions.

TABLE II
Effect of the number of banking relationships on the substitution between trade and bank credit

	Regression (1) Trade Credit	Regression (2) Trade Credit	Regression (3) Trade Credit	Regression (4) Trade Credit	Regression (5) Trade Credit	Regression (6) Trade Credit
Constant	0.587*** (0.124)	0.297** (0.122)	0.257** (0.115)	0.774*** (0.171)	0.357** (0.176)	0.274 (0.177)
Dbank (one banking relationship)	-0.142 (0.201)	0.208 (0.232)	0.285 (0.216)			
Dbank (one or two banking relationships)				-0.262 (0.160)	0.005 (0.165)	0.085 (0.162)
Bank Credit (bank debt to total assets)	-0.482*** (0.124)			-0.0477*** (0.141)		
Bank Credit (short-term bank debt to total assets)		-0.416*** (0.111)			-0.378*** (0.116)	
Bank Credit (short-term bank debt to total liabilities)			-0.331*** (0.069)			-0.289*** (0.079)
Dinteraction	0.172 (0.382)	-1.076* (0.643)	-0.701* (0.366)	0.136 (0.274)	-0.545 (0.337)	-0.442* (0.226)
Size	0.009 (0.014)	0.018 (0.015)	0.019 (0.014)	0.014 (0.020)	0.003 (0.022)	0.010 (0.021)
Age	-0.060 (0.040)	-0.020 (0.043)	-0.007 (0.040)	-0.036 (0.041)	-0.004 (0.044)	0.013 (0.042)
Asset structure	-0.058 (0.087)	0.165 (0.107)	0.093 (0.092)	-0.115 (0.093)	0.094 (0.113)	0.049 (0.102)
Employees	0.338** (0.148)	0.360*** (0.139)	0.328** (0.138)	0.312** (0.147)	0.355** (0.150)	0.331** (0.150)
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)
Liquidity	-0.096*** (0.023)	-0.132 (0.030)	-0.115* (0.024)	-0.094*** (0.024)	-0.121*** (0.028)	-0.108*** (0.024)
Net profits	0.005 (0.012)	0.007 (0.012)	0.004 (0.012)	0.003 (0.012)	0.006 (0.012)	0.004 (0.012)
Accounts turnover	0.0008*** (0.0003)	0.0005* (0.0003)	0.0006** (0.003)	0.0008*** (0.0003)	0.00007*** (0.0002)	0.0007*** (0.0002)
Inventory	-0.048 (0.093)	-0.210* (0.106)	-0.102 (0.274)	-0.063 (0.091)	-0.164* (0.098)	-0.083 (0.092)
Wald	0.000	0.000	0.000	0.000	0.000	0.000
Sargan	0.141	0.528	0.827	0.264	0.486	0.764

GMM has been used for all the estimations, which are robust to the heteroscedasticity. *Trade Credit*, which is proxied with the ratio of trade creditors to purchases, is the dependent variable. *Dbank* is a dummy variable that takes the value one if the company works with just one bank (or with one or two) in the regressions 1, 2 and 3 (4, 5 and 6) and zero in the opposite case. *Bank Credit* is the ratio of bank debt to total assets for the regressions (1) and (4), it is the ratio of short-term bank debt to total assets in the regressions (2) and (5) and it is the ratio of short-term bank debt to total liabilities for the estimations (3) and (6). The definition of the other variables it is shown in the Appendix I. *Wald* is the Wald test of general significance. *Sargan* is the test of absence of over-identification. The results do not change significantly after controlling for temporal effects. Standard errors appear in parentheses.

***Significant at 1%; ** significant at 5%; * significant at 10%.

This informative advantage allows suppliers to discriminate between good and bad firms and thus to provide some of these firms in financial distress with financial support better than banks can do, especially when the firms are small, young and opaque (Wilner, 2000). Therefore, it may be the case that suppliers can sometimes lend when banks cannot.

Also, it could be argued that the relation between bank loans and trade credit is contaminated by other factors. Besides the control variables, the amount of credit from suppliers depends on the terms they establish and the level of activity of the client. The former are usually dictated by the custom of the activity sector, this being an individual characteristic of the firm that stays constant in time, so the panel structure of our data control for this fact. As for the level of activity, we have standardized trade credit using provisioning expenses in order to control variations of such credit resulting from activity and not financial reasons. Therefore, once we have controlled for these elements, the only reason a company would increase trade credit as a response to a reduction in bank credit, is that it has an unsatisfied demand of funds.

As for the control variables, it has been found that the liquidity is significant. Its negative nature implies that companies with a lower liquidity tend to resort to trade credit to cover their shortcomings. The ratio of employees over assets and the accounts turnover are also significant, the effect of the latter being very reduced.

Although the substitution relation has been confirmed, no significant difference in performance has been observed when companies maintain a link with just one bank, as is revealed by the lack of significance in the variables *Dinteraction* and *Dbank* of regression (1) of Table II. This may be because of the inclusion of all types of external loans. Bank debt includes a number of different types of loans for which reputation and relationship effects may not be important, such as mortgages, equipment loans, motor vehicle loans and other spot loans, many of which may be one-time loans or loans for nonrecurring credit needs. According to Berger and Udell (1995), these loans tend to be “transaction-driven”

rather than “relationship-driven” and they can dilute the effect of relationships. Besides, if, as Detragiache et al. (2000) claim, asymmetric information prevents small firms from renewing their loans, there is understandably a rather more direct substitution relationship between trade credit and short-term loans.

In order to overcome this problem, we follow Berger and Udell (1995) and focus exclusively on short-term loans. Hence, in the second regression of Table II, the ratio of short-term debt with credit institutions to total assets has been used as an independent variable. With this new definition, coefficient β_1 (coefficient of the variable *Bank Credit*) is negative and significant, which establishes a relation of substitution between short-term bank credit and trade credit. Furthermore, coefficient β_2 (coefficient of variable *Dinteraction*) is significant and negative (-1.076), indicating that companies maintaining just one relationship have a greater degree of substitution between both financing sources. This suggests that the influence of banking relationships is more relevant in short-term bank debt than in long-term bank debt. Moreover, this result may not be an artefact of the firm's capacity to pledge equipment and fixed assets as collateral, because we have excluded from our analysis most loans that are “transaction-driven” rather than “relationship-driven”. Also, we do not think that the results are caused by other characteristics of the firm, since the panel data methodology allows us to control for this kind of heterogeneity in the sample.

As for the variable *Dbank* (α_2), it does not have any statistical significance, so that the constant is the same for both groups. In order to strengthen the results, bank financing has been proxied with the ratio of short-term bank debt to total liabilities. The results obtained are shown in regression (3) of Table II, where no significant differences may be appreciated with previous results.

Up to now, two groups of companies have been differentiated, depending on whether they maintain one or more than one relationship with credit institutions, to test the theory that the effects of linking are maximized when working with just one bank. However,

Von Thadden (1994) establishes two as the optimum number of banking relationships that a company should maintain. Asymmetric information is reduced in this way, and the benefits of monopoly accruing to the financial institution are also reduced. In this regard, the dummy variable has been defined as one if the firm works with one or two banks and as zero otherwise. The results obtained in this case are shown in Table II (regressions 4, 5 and 6); they are not significantly different from the previous ones.

In short, the evidence points to a relation of substitution between trade and bank credit, which may indicate the existence of rationing by financial institutions. Furthermore, when considering short-term bank financing, a greater degree of substitution is obtained by companies working with fewer than three financial intermediaries. This appears to indicate that such firms are subject to monopoly to a greater extent by the internal bank, which impedes their obtaining alternative financing apart from that of their trade suppliers when they are restricted by the intermediary (ies) with which they work.

4.2. *Relation between bank indebtedness and interest rate*

The results described in the previous section appear to indicate that those companies indebted with fewer than three financial institutions are more likely to be subject to monopolistic conditions. We next want to confirm whether these small firms are also more financially restricted. To that end, we examine the relationship between financial leverage and interest rate.

It is a fact that banks elevate the interest rate as the borrower increases the demand for funds. According to Stiglitz and Weiss (1981), high interest rates will encourage the debtor to choose projects with a greater risk because it now has to assume greater financial expenses. In the context of asymmetric information, such an increase in risk is too expensive, so that on some occasions financial institutions may prefer to restrict the loans they give before increasing their interest rates. Therefore,

the credit availability will increase with the interest rate until it reaches a maximum. Furthermore, Jaffee and Russell (1976) claim that banks have incentives for establishing this maximum so that the market stays in a rationing situation.

If, then, as the previous results may indicate, small and medium-size businesses maintaining more than two banking relationships are less subject to adverse selection problems, they should also be less financially restricted. In order to contrast this point, the following regression is set out over model (1):

$$BC_{it} = \alpha_1 + \alpha_2 D_i + \beta_1 I_{it} + \beta_2 D_i I_{it} + \beta_3 I_{it}^2 + \beta_4 D_i I_{it}^2 + \delta X_{it} + \eta_i + \lambda_t + v_{it} \quad (4)$$

where BC_{it} (Bank Credit) has been measured with the ratio of bank debt to total assets, whereas I_{it} (Interest) has been proxied with the ratio of interest expense to bank debt and, alternatively, to total liabilities. This model analyses the evolution of the indebtedness of the firm i when facing different values of the interest rate through out the studied periods. It could be argued that both, bank credit and interest rate are endogenous variables, but using lagged variables in the estimation of the model helps to control for this hypothetical problem.

In order to control for the possibility of a non-linear relation as in the proposal by Stiglitz and Weiss (1981), both specifications of the interest rate have been included in their quadratic form. Dummy variables (both additive and multiplicative), heterogeneity, temporal variation and estimate error are as defined in model (3). Regarding control variables (X_{it}), those factors that may influence the dependent variable are used, including: size, age, profitability, tangible assets and interest coverage.¹³ As is shown in Table III, larger companies have a greater access to bank financing, whereas older firms use this financing to a lesser extent.

As can be observed in equation (1) of Table III, β_2 and β_4 (coefficients of variables $Dinterest$ and $Dinterest^2$, respectively) are significant and their signs (positive and negative, respectively) indicate the existence of a concave

TABLE III
Effect of the number of banking relationships on the link between bank credit and its cost

	Regression (1) Bank Credit	Regression (2) Bank Credit	Regression (3) Bank Credit	Regression (4) Bank Credit	Regression (5) Bank Credit	Regression (6) Bank Credit
Constant	-1.336 (1.154)	-1.602 (1.648)	-1.441 (1.182)	-0.029 (0.450)	-0.841 (0.571)	-0.915 (0.791)
Dbank (one banking relationship)	4.785 (4.815)	4.104 (7.701)	5.069 (5.007)			
Dbank (one or two banking relationships)				0.751 (0.584)	1.069 (0.835)	1.668 (1.050)
Interest (interest expense to bank debt)	-0.144 (0.839)		0.742* (0.427)	-0.244 (0.840)		0.806* (0.444)
Interest (interest expense to total liabilities)		0.432 (6.142)			-1.310 (3.092)	
Dinterest	24.830*** (7.915)	35.297 (21552)	-0.289 (0.460)	6.085** (2.840)	10.514 (7.021)	-0.799** (0.367)
(Interest) ²	0.442 (1.790)	21.152 (38.061)		0.762 (1.883)	10.949 (15.864)	
D(interest) ²	-106.528*** (38.347)	-455.505 (311.566)		-25.724*** (9.190)	-40.474 (91.245)	
Size	0.287** (0.113)	0.239** (0.114)	0.241** (0.098)	0.143** (0.056)	0.171*** (0.063)	0.211** (0.089)
Age	-0.396*** (0.134)	-0.214 (0.132)	-0.240*** (0.087)	-0.271*** (0.083)	-0.116 (0.088)	-0.243*** (0.091)
Profitability	-0.177 (0.318)	0.067 (0.653)	-0.361 (0.232)	-0.190 (0.226)	-0.301 (0.273)	-0.291 (0.240)
Tangible	-0.691 (0.426)	-0.000 (0.653)	-0.396 (0.311)	-0.720** (0.292)	-0.448* (0.251)	-0.507 (0.316)
Coverage	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.0007* (0.0003)	0.000 (0.000)	-0.000 (0.000)
Wald	0.001	0.048	0.082	0.000	0.000	0.051
Sargan	0.501	0.972	0.065	0.004	0.217	0.074

GMM has been used for all the estimations, which are robust to the heteroscedasticity. *Bank Credit*, which is proxied with the ratio of bank debt to total assets, is the dependent variable. *Dbank* is a dummy variable that takes the value one if the company works with just one bank (or with one or two) in the regressions 1, 2 and 3 (4, 5 and 6) and zero in the opposite case. *Interest* is the ratio of interest expense to bank debt for the regressions 1, 3, 4 and 6 and it is the ratio of interest expense to total liabilities for estimations 2 and 5. The definition of the other variables it is shown in the Appendix I. *Wald* is the Wald test of general significance. *Sargan* is the test of absence of over-identification. The results do not change significantly after controlling for temporal effects. Standard errors appear in parentheses.

***Significant at 1%; ** significant at 5%; * significant at 10%.

relationship between bank financing and the cost of resources for the group of companies maintaining just one relationship. However, it is impossible to make comparisons about the rationing level of one or the other group, as coefficients β_1 and β_3 are not significant. For verifying alternative specifications, in regression (2) of Table III the ratio of interest expense to total liabilities has been used to proxy the cost of the bank debt.

To control the existence of a non-quadratic performance, and also to reduce the problems of multicollinearity between the variables *Interest* and *Interest*², a linear model was also set up in Equation (3) of Table III, obtaining a positive and significant relation between interest rate (proxied in this case with the ratio of interest expense to bank debt) and bank financing.

All previous analyses have been undertaken in Equations (4), (5) and (6) of Table III, assuming that the dummy variable (*Dbank*) takes value one if the company maintains fewer than three relations and zero otherwise. As is shown in regression (4) of Table III, the concave relation holds for firms working with one or two banks. However, it disappears when in estimation (5) the ratio of interest expense to total liabilities is used to proxy interest rate.

However, the most remarkable finding relates to the linear model of Equation (6), where the coefficients of the variables *Interest* and *Dinterest* are significant. The former has a coefficient of 0.806, whereas the latter has one of -0.799. This seems to mean that firms maintaining less than three relationships obtain a lower amount of debt for the same increase in the interest rate. Furthermore, these results are consistent with the ones in the previous section, indicating that the problem of adverse selection is of greater importance in companies working with fewer than three financial intermediaries.

5. Conclusions

This study follows the research framework that analyses the advantages of maintaining links between companies and financial institutions.

In particular, the effect of the number of banking relationships established by firms on adverse selection and their access to financing has been appraised. Taking into account panel data formed by a sample of 705 Spanish small firms from 1996 to 1998, we have sought to determine whether companies working with just one bank (or one or two), present a higher or lower degree of financial rationing and adverse selection. With this aim, we contrasted the existence of a substitution relationship between trade and financial credit and the relationship between the credit availability and its cost.

In the first relationship, it is assumed that suppliers offer discounts for prompt payment. If a firm does not accept such terms, the result is usually a form of trade credit that is more expensive than a bank loan. If it is accepted that the cost of trade credit is higher than that of the bank credit, then it is quite understandable that a company will increase the former only when the latter is not available. Furthermore, since the possibility of resorting to alternative financing sources apart from trade credit depends on the problem of adverse selection, the degree of substitution between trade and bank credit, and therefore the severity of rationing, is expected to be higher for firms subject to greater monopoly. According to this, the substitution relation between both financing sources obtained in our sample may indicate that these firms suffer financial restrictions. Moreover, as the small firms working with just one bank (two at most) show a greater degree of substitution between trade and bank credit, we can conclude that such companies have greater problems of monopoly and are subject to a higher degree of rationing.

If, then, as previous results may indicate, small firms maintaining more than two banking relationships are more transparent and present fewer financial restrictions, this should be reflected in the relation between the availability of credit and its cost. Banks use these terms (disposability and cost) in controlling a firm's risk on the basis of its informational opacity. The sign and the intensity of this relationship therefore may indicate the existence of rationing. In

this regard, it has been found that those companies working with fewer than three financial institutions have to pay higher interest rates in order to obtain the same amount of resources.

These results would appear to confirm that the small businesses getting funds from fewer banks are subject to a larger monopoly and suffer greater financial restrictions.

Appendix

APPENDIX I Variables

Denomination	Definition
Trade Credit	$\frac{\text{Trade Creditors}}{\text{Purchases}}$
Indebtedness	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$
Bank Credit	$\frac{\text{Short- and Large-term Debt with Financial Institutions}}{\text{Total Assets}}$ $\frac{\text{Short-term Debt with Financial Institutions}}{\text{Total Assets}}$ $\frac{\text{Short-term Debt with Financial Institutions}}{\text{Total Liabilities}}$
Coverage	$\frac{\text{Net Profit}}{\text{Interest Expenses}}$
Interest	$\frac{\text{Interest Expenses}}{\text{Short- and Large-term Debt with Financial Institutions}}$
Tangible	$\frac{\text{Interest Expense}}{\text{Total Liabilities}}$
Asset Structure	$\frac{\text{Tangible Fixed Assets}}{\text{Total Assets}}$
Liquidity	$\frac{\text{Current Assets} - \text{Short-term Investments} - \text{Cash}}{\text{Total Assets}}$
Employees	$\frac{\text{Current Assets} - \text{Stocks}}{\text{Current Liabilities}}$
Inventory Turnover	$\frac{\text{Number of Employees}}{\text{Total Assets}}$
Accounts Turnover	$\frac{\text{Net Sales}}{\text{Stocks}}$
Net profits	$\frac{365}{(\text{Net Sales} / \text{Trade Debtors})}$
Profitability	$\frac{\text{Net Profit}}{\text{Capital and Reversers}}$
Size	$\frac{\text{Net Profit of Exploitation}}{\text{Total Assets}}$
Age	Ln (Total Assets)
Dbank	$\text{Ln (1 + time elapsed between the firm's founding date and the year of measurement)}$ Dummy that takes value 1 if the company works with just one bank (or with one or two) and 0 in the opposite case.
Dinteraction	$\text{Dbank} \times \text{Bank Credit}$
Dinterest	
Interest ²	$(\text{Interest})^2$
Dinterest ²	$\text{Dbank} \times (\text{Interest})^2$
Sectorial dummy variables	Dummy that takes the value 1 if the company belongs to the sector and 0 in the opposite case.

APPENDIX II

Descriptive statistics of the used variables and its correlations

Panel A. Correlations																						
	Trade Credit	Bank Credit ^a	Bank Credit ^b	Bank Credit ^c	Size	Age	Asset Structure	Employees	Inventory Turnover	Liquidity	Net Profits	Accounts Turnover	Inventory	Interest ^d	(Interest) ^{2e}	Interest ^f	(Interest) ^{2g}	Profitability	Tangible	Coverage	Indebtedness	
Trade Credit	1.000																					
Bank Credit ^a	-0.091 ¹	1.000																				
Bank Credit ^b	-0.088 ¹	0.821 ¹	1.000																			
Bank Credit ^c	-0.173 ¹	0.696 ¹	0.915 ¹	1.000																		
Size	0.084 ¹	0.051 ²	0.016	0.058 ¹	1.000																	
Age	0.010	-0.182 ¹	-0.088 ¹	-0.011	0.085 ¹	1.000																
Asset Structure	-0.022	0.130 ¹	0.398 ¹	0.314 ¹	-0.166 ¹	0.032	1.000															
Employees	0.056 ¹	-0.092 ¹	-0.085 ¹	-0.109 ¹	-0.357 ¹	0.016	0.017	1.000														
Inventory Turnover	0.017	-0.058 ¹	-0.082 ¹	-0.092 ¹	-0.054 ²	-0.036 ³	-0.114 ¹	0.046 ²	1.000													
Liquidity	-0.114 ¹	-0.439 ¹	-0.454 ¹	-0.358 ¹	-0.030	0.165 ¹	-0.079 ¹	-0.001	0.126 ¹	1.000												
Net Profits	-0.049 ²	-0.053 ²	-0.046 ²	-0.021	-0.008	-0.016	0.002	0.026	0.014	0.047 ²	1.000											
Accounts Turnover	0.379 ¹	0.149 ¹	0.221 ¹	0.218 ¹	0.242 ¹	-0.019	0.254 ¹	-0.202 ¹	-0.017	0.115 ¹	-0.035	1.000										
Inventory	-0.086 ¹	0.111 ¹	0.208 ¹	0.216 ¹	-0.026	0.080 ¹	0.529 ¹	-0.006	-0.211 ¹	-0.334 ¹	-0.012	-0.212 ¹	1.000									
Interest ^d	0.059 ¹	-0.359 ¹	-0.286 ¹	-0.327 ¹	-0.157 ¹	0.047 ²	-0.026	0.154 ¹	-0.004	.0004	-0.034	-0.168 ¹	0.028	1.000								
(Interest) ^{2e}	0.033	-0.296 ¹	-0.243 ¹	-0.273 ¹	-0.103 ¹	0.031	-0.041 ³	0.101 ¹	-0.007	0.007	-0.019	-0.124 ¹	0.013	0.872 ¹	1.000							
Interest ^f	-0.086 ¹	0.395 ¹	0.318 ¹	0.340 ¹	-0.086 ¹	-0.025	-0.039 ³	0.060 ¹	-0.051 ²	-0.233 ¹	-0.058 ¹	-0.078 ¹	0.108 ¹	0.468 ¹	0.275 ¹	1.000						
(Interest) ^{2g}	-0.062 ¹	0.309 ¹	0.240 ¹	0.260 ¹	-0.103 ¹	-0.007	-0.036 ³	0.073 ¹	-0.040 ³	-0.179 ¹	-0.051 ²	-0.083 ¹	0.099 ¹	0.476 ¹	0.295 ¹	0.958 ¹	1.000					
Profitability	-0.052 ²	-0.271 ¹	-0.232 ¹	-0.196 ¹	-0.029	0.017	0.023	-0.006	0.077 ¹	0.230 ¹	0.141 ¹	-0.162 ¹	-0.061 ¹	0.119 ¹	0.088 ¹	-0.036 ³	0.003	1.000				
Tangible	-0.002 ¹	0.014 ²	-0.200	-0.111	0.155	-0.061 ³	-0.701	-0.027	0.002	-0.210 ¹	-0.015	-0.176 ¹	-0.304 ¹	0.027	0.034	0.168 ¹	0.137 ¹	-0.126 ¹	1.000			
Coverage	-0.045 ²	-0.273 ¹	-0.224 ¹	-0.210 ¹	-0.025	0.061 ¹	-0.053 ²	-0.002	0.030	0.350 ¹	0.042 ²	-0.063 ¹	-0.075 ¹	-0.091 ¹	-0.036	-0.259 ¹	-0.166 ¹	0.226 ¹	-0.095 ¹	1.000		
Indebtedness	0.158 ¹	0.635 ¹	0.567 ¹	0.254 ¹	-0.079 ¹	-0.025 ¹	0.310 ¹	0.004	-0.043 ²	-0.588 ¹	0.082 ¹	0.111 ¹	0.092 ¹	-0.042 ³	-0.034	0.146 ¹	0.106 ¹	-0.367 ¹	-0.174 ¹	-0.263 ¹	1.000	

APPENDIX II (Continued)

Panel B. Descriptive statistics

	Trade Credit	Bank Credit ^a	Bank Credit ^b	Bank Credit ^c	Size	Age	Asset Structure	Employees	Inventory Turnover	Liquidity	Net Profits	Accounts Turnover	Inventory	Interest ^d	(Interest) ^e	Interest ^f	(Interest) ^g	Profitability	Tangible	Coverage	Indebtedness
Mean	0.310	0.300	0.210	0.317	7.347	2.867	0.582	0.050	14.35	0.930	0.76	118.3	0.192	0.115	0.174	0.047	0.002	0.077	0.286	3.899	0.640
Standard Deviation	0.145	0.143	0.129	0.169	0.661	0.637	0.159	0.037	57.36	0.448	1.023	55.86	0.117	0.064	0.028	0.229	0.02	0.066	0.152	17.85	0.164
Minimum	0.01	0.01	0	0	5.72	0	0.034	0	0.7	0.07	-45.03	5.82	0	0.01	0	0	0	-0.023	0	-15.29	0.21
1st Percentile	0.05	0.02	0	0.01	6.03	1.098	0.213	0	1.33	0.26	-0.89	21.33	0.01	0.03	0	0.01	0	-0.09	0.02	-3.208	0.25
25th Percentile	0.2	0.19	0.1	0.19	6.87	2.484	0.471	0.0279	4.77	0.67	0.05	86.09	0.11	0.07	0.004	0.03	0	0.04	0.17	0.323	0.52
Median	0.3	0.3	0.2	0.32	7.31	2.944	0.583	0.043	7.27	0.84	0.11	112	0.18	0.1	0.01	0.05	0.002	0.07	0.27	1.066	0.66
75th Percentile	0.4	0.41	0.3	0.44	7.79	3.295	0.700	0.065	12.43	1.07	0.19	139	0.25	0.14	0.019	0.06	0.003	0.11	0.39	3.225	0.76
99th Percentile	0.7	0.6	0.54	0.72	8.89	4.060	0.9	0.183	118	2.57	0.54	307	0.55	0.34	0.115	0.11	0.012	0.28	0.68	40.04	0.95
Maximum	1.07	0.79	0.68	0.84	10.39	4.532	0.98	0.268	2138	5.55	0.89	673	0.77	0.94	0.883	0.13	0.016	0.4	0.77	494	0.99

^aBank Credit is the ratio of bank debt to total assets.

^bBank Credit is the ratio of short-term bank debt to total assets.

^cBank Credit is the ratio of short-term bank debt to total liabilities.

^dInterest is the ratio of interest expense to bank debt.

^e(Interest)² is the square of the ratio of interest expense to bank debt.

^fInterest is the ratio of interest expense to total liabilities.

^g(Interest)² is the square of the ratio of interest expense to total liabilities.

***Significant at 1%; **significant at 5%; *significant at 10%.

Notes

¹ According to Foglia et al. (1998), the value of the information that the financial institution creates is reduced as the company's number of bank relationships increases.

² The "free-rider" problem is generated by the presence of more than one financial intermediary when the company suffers financial difficulties. In this case, the moneylender giving the additional financing supports the whole additional risk if bankruptcy takes place, but possibly just a part of the profits in case of success. For this reason, no financial institution wants to give loans in such a situation. Another interpretation of the "free-rider" problem is the one given by Foglia et al. (1998), according to whom the presence of several banks does not encourage supervision work, as one financial institution supports the cost, whereas the benefits are distributed among all of them.

³ S.A.B.E. is a database that contains financial statements of Spanish firms.

⁴ Following the main studies about bank relations in SME's (Petersen and Rajan, 1994 and Cole, 1998), non-financial and non-agricultural companies were included.

⁵ Likewise, a complementary classification has been carried out dividing the sample into those companies working with one or two banks and those working with more than two. In the first case, the number of companies in such situation is 200 and 505 for the latter.

⁶ The Wald test is applied on a system of equations in levels and first differences, so that if the equality of the coefficients is accepted, individual effects are not correlated with independent variables.

⁷ For this, $E[x_{it}v_{is}] = 0$ for every t and s has to be fulfilled.

⁸ Which takes places when $E[x_{it}v_{is}] = 0$ only if s is higher than t .

⁹ In this case, since the variables are considered predetermined, valid instruments for the t -nth equation in first differences would be determined by the vector $z_{it} = [x_{i1}, x_{i2}, x_{it-1}]$.

¹⁰ The use of purchases rather than total assets for standardizing trade creditors allows us to control the variations of such credit resulting from activity and non-financial reasons, this being the object of study. In a similar way, Hernández and Hernando (1999) use the ratio of suppliers to purchases as a dependent variable for studying the determining factors of trade credit. Petersen and Rajan (1996) use as dependent variable the product of the percentage of credit purchases by the cost of goods sold over the assets.

¹¹ All the factors have been taken from studies into the determining factors of trade credit (Danielson and Scott, 2000; Elliehausen and Wolken, 1993; Hernández and Hernando, 1999; Petersen and Rajan, 1997).

¹² These factors, some of them non-observable, and others observable as the activity sector, can slant the estimate of the coefficient.

¹³ All of them following Titman and Wessels (1988).

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