TRADE CREDIT POLICY AND FIRM VALUE

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ABSTRACT

This manuscript studies the shape of the relation between firm value and trade credit for a sample of Spanish listed firms in the period 2001 to 2007. Considering the tradeoff between benefits and costs of investing in trade credit we estimate a non-linear relationship between accounts receivable and firm value. As expected, the results obtained show a positive relation between firm value and trade credit at low levels of receivables and a negative one at high levels. To give robustness to the results, we analyze whether deviation from target accounts receivable level reduces firm value. Consistent with the previous analysis, we find that deviations from this level of receivables decrease firm value.

***Keywords*:** Accounts receivable; Trade credit; Firm value

***JEL Classification*:** G30, G31

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1. INTRODUCTION

Trade credit is given by a seller who does not require immediate payment for delivery of a product. Ferris (1981) consider trade credit as a particular type of short-term loan, which tied in both timing and value with the exchange of goods. Trade credit plays an important role in corporate financing policy. From the seller's point of view, the investment in accounts receivable is an important element in a firm's balance sheets. Specifically, in European countries, the level of trade debtors represents on average a quarter of total assets (Giannetti, 2003). Given the significant investment in accounts receivable by most firms, the choice of credit management policies could have important implications for the value of the firm (Pike and Cheng, 2001).

There is a wealth of empirical literature that analyses the determinants of accounts receivable in order to explain the existence and use of trade credit (Elliehausen and Wolken, 1993, Long, Malitz and Ravid, 1993; Deloof and Jegers, 1996; Petersen and Rajan, 1997; Cheng and Pike, 2003; Pike, Cheng, Cravens and Lamminmaki, 2005; Niskanen and Niskanen, 2006; among others). However, despite the huge amount of literature on trade credit, there are no studies that focus on the straight link of effect of accounts receivable on firm value.

The literature has explained the use of trade credit based on the advantages for suppliers from the financial, operational and commercial perspective. Some motivations for trade credit include mitigating customers' financial frictions (Meltzer, 1960); reductions in transaction costs (Ferris, 1981; Emery, 1987); stimulation of sales in slack demand periods by relaxing the credit terms (Emery, 1984); reductions in information asymmetry between buyer and seller (Smith, 1987; Long et al., 1993; Pike et al., 2005), because trade credit acts as a signal for product quality (Lee and Stowe, 1993; Emery and Nayar, 1998); a mechanism of price discrimination between cash and credit customers (Brennan, Maksimovic and Zechner, 1988; Petersen and Rajan, 1997). Finally, credit provision might improve the supplier-customer relation (Ng, Smith and Smith, 1999; Cuñat, 2007). Consequently, granting trade credit enhances a firm's sales.

However, trade credit is costly and involves an opportunity cost (Nadiri, 1969; Oh, 1976). Moreover, trade credit increases the level of investment in current assets and, therefore, may affect the profitability and liquidity of the company. Trade credit also involves bearing the credit risk, due to the exposure to payment default, so granting trade credit may have negative effects on profitability and liquidity because of debt defaults (Cheng and Pike, 2003). Also, extending trade credit leads the seller to incur some additional administrative costs (Mian and Smith, 1992), due to costly credit management activity.

Thus, a firm's accounts receivable level can be viewed as being determined by a trade-off between costs and benefits of trade credit granted. The firm balances the benefits of credit granted against the various costs of holding large accounts receivable. Actually, Nadiri (1969) developed a model to select the optimal trade credit in order to maximise net profit. Afterwards, Emery (1984) established that there is an optimal level of accounts receivable when the marginal revenue of trade credit lending equals the marginal cost, and this condition produces an optimal credit period.

The purpose of this paper is to analyze the effect of trade credit policy on firm value. The paper hypothesizes that financial, operational and commercial benefits for trade credit preponderate at lower level of receivables, while opportunity and financing costs as well as credit risk dominate at higher levels of receivables. Accordingly, there may be a non-monotonic (concave) relation between firm value and the investment in trade credit; positive for low levels of trade credit granted and negative for high levels. In order to do this, we have chosen a sample of listed Spanish firms. We use these firms because of the great importance of trade credit in Spain, where firms have one of the longest effective credit periods in Europe (Marotta, 2001). Additionally, studying Spanish firms is interesting since there is previous literature which shows that those firms have a target level of trade credit to which they attempt to converge (Garcia-Teruel and Martinez-Solano, 2010).

The importance of trade credit in Spain could be explained by the characteristics of the financial and legal system of the country. Trade credit should be more important than bank credit when creditor protection is weaker, because cash is easily diverted, while inputs are more difficult to divert, and inputs illiquidity facilitates trade credit (Burkart and Ellingsen, 2004). Demirguc-Kunt and Maksimovic (2002) found that trade credit is relatively more prevalent in countries with weaker legal protection (La Porta, Lopez-de-

Silanes, Shleifer, and Vishny, 1998), as in the case of Spain. Another reason could be the different degree of development of financial markets between countries. In Spain there has been no real disintermediation process, as has happened in other countries, because the development of capital markets and, in particular, institutional funds has been led by banks (Gallego, Garcia and Saurina, 2002). As Demirguc-Kunt and Maksimovic (2002) suggest, firms operating in countries with more developed banking systems grant more trade credit to their customers**.**

To our knowledge, no study to date provides empirical research on the effect of trade credit on firm valuation from the supplier's point of view. Our study fills this gap. This paper contributes to the literature by testing empirically the existence of a non-linear relationship (concave) between accounts receivable and firm value. Later, with the aim of giving robustness to our initial analysis, we estimate the target level of trade credit and then study how deviations from the target affect firm value. The results obtained confirm our hypothesis showing that firm value increases with receivables up to a point and then starts decreasing with receivables. One of the main implications for researchers and managers is that management of trade credit is an important element which affects shareholder value.

The remainder of this paper is organized as follows: in section 2, we review the trade credit literature and develop the hypothesis. In section 3, we give a general description of the sample and variables employed. Section 4 describes the model linking accounts receivable and firm value, and reports the results. Next, we analyse the effect on firm value of the deviation from target accounts receivable level. Finally, in section 5, we present the main conclusions and implications of our study.

2. THEORETICAL FOUNDATIONS AND HYPOTHESIS

Lewellen, McConnell and Scott (1980) develop a model in which, under competition and certainty, credit policy does not influence firms' market value. Relaxing these assumptions and taking into account the existence of uncertainty, they postulate that in an uncertainty environment, where there will exist the likelihood of default, and where there are costs involved in the credit evaluation process, there could be an effect of credit policy on firm value. Put another way, the existence of market imperfections

might impact on the trade credit decision and allow an opportunity for the credit policy to affect firm value, implying an optimal trade credit policy.

Firms may have incentives to offer credit, mainly because this can help to increase their sales and, consequently, result in higher profitability. Also, the incremental cash flows arising from the decision to extend credit can offer a valuable asset to the firm (Schwartz, 1974; and Kim and Atkins, 1978). The benefits of granting trade credit to customers stem from several motives.

First, trade credit reduces the information asymmetry between buyer and seller (Smith, 1987; Long et al., 1993; Pike et al., 2005) alleviating moral hazard problems between the firm and their customer, since it allows the customer to verify product quality before paying. This is especially relevant for products or services that take longer to verify (Smith, 1987). Trade credit is employed by the vendor firm to signal for product quality (Lee and Stowe, 1993; Emery and Nayar, 1998). Trade credit can also be interpreted as an implicit quality guarantee (Lee and Stowe, 1993; Long et al., 1993; Deloof and Jegers, 1996). In this sense, trade credit is used by firms' customers as a device to manage and control the quality of the items purchased (Smith, 1987; and Long et al. 1993). Hence, trade credit can help firms to strengthen long-term relationships with their customers (Ng et al., 1999; Wilner, 2000).

Trade credit can also be viewed as part of the firm's pricing policy designed to stimulate demand. Firms may extend the credit period or increase the cash discount, thus reducing the price of stimulating sales (Pike et al., 2005), so allowing firms to practice price discrimination. Similarly, Brennan et al. (1988) pointed out that vendor financing enables price discrimination between cash and credit customers. These authors also argue that vendor financing can be used to reduce competition since some firms can concentrate on the credit market while other firms maintain a larger market share in the cash market.

Ferris' Transaction Theory (1981) postulates that trade credit use brings down exchange costs. By permitting the exchange of the goods to be separated from the immediate use of money, trade credit may play an intermediary role in the synchronization of receipt from sales with the outflow of money for the supplier firm. It permits a reduction in precautionary money holdings, because supplier firms can anticipate the flow of

payments from its customers, and can manage net money accumulations more efficiently.

Finally, following Cuñat´s (2007) reasoning, granting trade credit, especially when customers experience temporally liquidity shocks that may threaten their survival, could reinforce the supplier-customer relation. Recent research (Kestens, Van Cauwenberge, and Bauwhede, 2011) finds that the negative impact of financial crisis on firm profitability is reduced for firms that have increased their trade receivables during the crisis period. This supports the idea that trade credit mitigates customers' financial frictions (Meltzer, 1960). Furthermore, trade credit can be viewed as a strategic investment in seeking to retain customers, in this sense trade credit acts as a signal to the customer that the supplier seeks a mutually beneficial longer-term trading relation (Cheng and Pike, 2003).

From an investment perspective, trade credit can generate an implicit interest income for delayed payment if the seller can charge a higher price by offering credit terms. Firms should invest in trade credit if the net present value of the revenue receivable with trade credit is greater than the net present value without it (Ferris, 1981).

As a result of these benefits, we can expect a positive relationship between receivables and value. However, investing in accounts receivable also has costs. On the one hand, granting trade credit exposes the firm to financial risks. The role of firms as liquidity providers implies a risk of late payment and/or renegotiation in case of default and, at worst, an increase in delinquent accounts. It creates a potential cost of financial distress. According to the European Payment Index Report (2011)[1], 25% of all bankruptcies are due to late and/or non-payment of outstanding invoices. Late payment limits firms growth, exposes companies to liquidity problems, and in some cases firms go bankrupt. On the other hand, the granting of credit on sales requires the firm to forgo funds on which interest could be earned. Nadiri (1969) states that one cost of trade credit is "the carrying cost"; this is the real income foregone by tying up funds in receivables. This approach implies an opportunity cost. Also, granting credit forces firms to obtain additional funds from the capital market to fund the extra investment in receivables, thereby increasing their reliance on external funding. Actually, trade credit granted will

[1] The European Payment Index Report, made by *Intrum Justitia*, provides an insight into the payment behavior of the 25 European countries participating in the survey.

depend on the creditworthiness of the supplier and its access to capital markets (Schwartz, 1974; Emery, 1984; Smith, 1987; Mian and Smith, 1992; Petersen and Rajan, 1997).

Moreover, extending trade credit leads the seller to incur credit management costs. In particular, the seller must devote some time and energy to assessing the credit risk of the buyer and to structuring the delayed payment contract. The seller must also incur some costs to collect the payment from the buyer. According to Ng et al. (1999), the transaction costs associated with trade credit information and monitoring are incurred when informational asymmetries between buyer and seller are present, reputations are hard to establish, and a high level of specialized investment is involved.

Therefore, it might be argued that the initial positive trade credit-value relation would become negative at high levels of receivables because the costs of trade credit would surpass the benefits as the investment in receivables increases. Consequently, we test for two different effects of trade credit on firm value. At lower levels of trade credit, firms would benefit from the advantages of granting trade credit, such as increased sales and increase in revenues through interest income and reduction in transaction costs. However, at higher levels of trade credit, the existence of financing and opportunity costs as well as non-payment or late payment would exceed the benefits and reduce firm value. If a firm is having difficulty recovering its existing accounts receivable then granting more credit to its customers may reduce firm value.

In short, the theoretical basis for our hypothesis is that trade credit literature suggests the existence of an optimal accounts receivable (Nadiri, 1969; Lewellen et al., 1980; Emery, 1984). In this sense, Emery (1984) establishes that there is an optimal level of accounts receivable when the marginal revenue of trade credit lending equals the marginal cost, and this condition produces an optimal credit period. For that reason, credit managers should try to keep accounts receivable at their target level in order to avoid the erosion of the value of the firm by lost sales or uncollectable sales (Pike and Cheng, 2001). Consequently, one might expect a non linear relationship between trade credit and firm value determined by a tradeoff between costs and benefits of supplying trade credit, where there is a level of trade credit granted which maximizes firm value. Based on the above discussion, we test the following hypothesis:

H1: The relationship between the investment in accounts receivables and firm value will be non-monotonic (concave); positive for low levels of trade credit granted and negative for high levels.

3. DATA AND VARIABLES

Data

The dataset comprises Spanish listed non financial firms in the SABI database for 2001 to 2007. Because of the small size of the Spanish stock market (Yang, Min and Li, 2003), the sample consists of an unbalanced panel of 54 companies for which the information is available for at least five consecutive years[2] between 2001 and 2007. It represents 349 firm-year observations (after excluding observations with errors, missing values, and outlying observations).

Variables

The dependent variable in the study is firm value, which has usually been measured in the financial literature with Tobin's Q[3] (McConnell and Servaes, 1990; Berger and Ofek, 1995). In our paper we specifically use the approximation for Tobin's Q that Chung and Pruitt (1994) suggest, which is defined as the market value of assets divided by the book value of assets. Specifically, it is calculated as the ratio of market value of equity plus book value of total debt to book value of total assets (Q) (this proxy has also been used in several papers such as La Porta, Lopez-de-Silanes, Schleifer and Vishny, 2002; Durnev and Kim, 2005; and Gaio and Raposo, 2011). We employ this simple measure to avoid a possible distortion because of the arbitrary assumptions about depreciation and inflation rates to estimate the firm's replacement value (Perfect and Wiles, 1994). Moreover, Chung and Pruitt (1994) demonstrate that at least 96.6 percent of the variability of Tobin's q is explained by their proxy market value of equity plus

[2] To estimate with General Method of Moments it is a necessary requisite to have at least five years of continuous data to perform the m_2 test.

[3] It is worth pointing out that a firm's market value includes assets in place, as well as assets not yet in place, namely the net present value of current and future investment opportunities (Myers, 1977; and Smith and Watts, 1992). So, many studies also employ Tobin's Q as a proxy for a firm's growth opportunities.

book value of total debt to book value of total assets (Q). We have also constructed an additional proxy for firm value in order to test the robustness of the results. This is Market-To-Book ratio (MBOOK), defined as the ratio of market value of equity to book value of equity (Lins, 2003). The correlation between these two measures for firm value is 0.91.

The main independent variable to analyze is accounts receivable. We use two proxies: REC_1 as the fraction of accounts receivable over total sales (Petersen and Rajan, 1997; Niskanen and Niskanen, 2006) and REC_2 as the fraction of accounts receivable over total assets (Deloof and Jegers, 1999; Cuñat, 2007; Boissay and Gropp, 2007). We include the square of these variables (REC^2) to allow for nonlinearities. We expect a positive relationship between accounts receivable and firm value at lower levels of accounts receivable. Similarly, we expect a negative association between receivables and value at higher levels of accounts receivable. Hence, we expect a positive sign for variable REC and a negative one for REC squared.

We also include variables that could have an impact on firm value. Following the literature cited above, these control variables include firm sales growth, firm size, and leverage. GROWTH is measured as the annual sales growth rate. We expect this variable to be positively related to firm value, since firms that have grown well so far are better prepared to continue to grow in the future (Scherr and Hulburt, 2001). Also, growing firms have better investment opportunities (Niskanen and Niskanen, 2006). The size of the firm (SIZE) is measured by the natural logarithm of total sales. The empirical evidence on the relation between value and size of the firm is mixed. For instance, Lang and Stulz (1994) find a negative relation between firm size and firm value for U.S. companies, Berger and Ofek (1995) find a positive relation, and Demsetz and Villalonga (2001) report a nonsignificant relation. Therefore, we do not have a clear prediction for the relation between size and firm value. Finally, leverage (LEV) is measured as total debt divided by shareholder equity. Previous literature points in different directions with respect to the impact of debt on firm value (Harris and Ravid, 1991). Debt may yield a disciplinary effect when free cash flow exists (Jensen, 1986; Stulz, 1990). Firms can also debt to create tax shields (Modigliani and Miller, 1963). However, leverage can also have a negative effect on firm value because of the agency cost of debt (Jensen and Meckling, 1976). Hence, as with firm size, we cannot predict the effect of leverage on firm value.

Finally, trade credit granted has sector-specific levels and trends. Several authors, such as Smith (1987), Ng et al. (1999) and Fisman and Love (2003) find that trade credit terms are uniform within industries and differ across industries. Smith (1987) argues that within an industry both parts, buyers and sellers, face similar market conditions, while across industries market conditions and investment requirements in buyers may vary significantly. For this reason, we control for activity sector by including industry dummies in all regressions.

Appendix A provides a brief description of the variables used in this paper. Table 1 reports the summary statistics of the variables.

INSERT TABLE 1 HERE

First, we note that the mean investment in accounts receivable in our sample is about 21 per cent over assets. This is in line with those reported in previous European studies. Giannetti (2003) provides details on firm balance sheets by country (Belgium, France, Ireland, Italy, Netherlands, Portugal, Spain, and UK). It represents the average balance sheet of a private company. Italy (42 per cent) and Spain[4] (35 per cent) present the highest ratios of trade debtors to total assets followed by Belgium, France and Portugal, holding more than a quarter of its assets invested in trade credit. The countries with less reliance on trade credit are UK (20.47%), and Netherlands (13.28%).

In table 2 we present the correlation matrix. There are no high correlations between independent variables, which could lead to multicolineality problems and, consequently, inconsistent estimations.

INSERT TABLE 2 HERE

4. TRADE CREDIT AND FIRM VALUE

In order to study the effect of trade credit on firm value, we estimate Model 1, where firm value is regressed against accounts receivable, its square, and the control variables described above. The inclusion of variables REC and REC squared in the value model

[4] This higher ratio of receivables in Giannetti 2003 is because of the data used. The study employs mainly data on unlisted companies.

allows us to explicitly test both the benefits of trade credit and the negative effects of an excessive investment in accounts receivable.

Model 1:

$$V_{it} = \beta_0 + \beta_1 (REC_{it}) + \beta_2 (REC^2_{it}) + \beta_3 (GROWTH_{it}) + \beta_4 (SIZE_{it}) + \beta_5 (LEV_{it}) + \eta_i + \lambda_t + I_s + \varepsilon_{it} \quad (1)$$

where V_{it} is the firm value proxied as Tobin's Q, ratio of market value of firm to book value of firm, and MBOOK, ratio of market value of equity to book value of equity. The independent variable is REC_1, which measures accounts receivable to total sales by firm i at time t, and REC_1^2 (accounts receivable squared), which tests for a non-linear relation accounts receivable-value. In order to test the robustness of the results we employed an additional proxy for accounts receivable, REC_2, calculated as the fraction of accounts receivable over total assets. $GROWTH_{it}$, $SIZE_{it}$, and LEV_{it} are control variables; $GROWTH_{it}$ is the annual growth rate of sales, $SIZE_{it}$ is computed as the natural logarithm of total sales, and LEV_{it} is measured as total debt divided by shareholder equity. η_i is the unobservable heterogeneity. λ_t control for time effects and are year dummy variables that change in time but are equal for all firms in each of the periods considered. In this way we try to capture the economic variables that firms cannot control and which may affect their value. Parameter I_s controls by the industry in which the firm operates. ε_{it} is the error term.

Following Arellano and Bond (1991), we employ the GMM method of estimation on the model in first differences, which controls for unobservable heterogeneity and prevents potential endogeneity problems of trade credit decisions. We use this technique because the firms are heterogeneous, and there are always factors influencing firm value that are difficult to measure or hard to obtain (see Himmelberg, Hubbard, and Palia, 1999). Examples of this potential endogeneity are; abnormally high level of sales would lead to higher profits and also to more trade credit given; or profitable firms tend to act as intermediaries and borrow more in organized markets to lend more to their customers (Nilsen, 2002). This estimation assumes that there is no second-order serial correlation in the errors in first differences. For this reason, we use the test for the absence of second-order serial correlation proposed by Arellano and Bond (1991). We also employed the Hansen test for over-identifying restrictions, which tests for the absence of correlation between the instruments and the error term.

Table 3 contains the corporate value regressions using two different proxies for firm value (Model 1). In Columns 1 and 2 we calculate firm value as Tobin's Q (Q). In the third and fourth columns we calculate firm value as Market-To-Book ratio (MBOOK). The second and fourth columns present some robustness checks of this specification by altering the independent variable (REC). The results are qualitatively very similar.

INSERT TABLE 3 HERE

Consistent with our expectations, REC is positive and statistically significant, while REC^2 is negative and significant at 1% for the two different specifications of dependent variables (firm value), and, moreover, for two alternative measures of accounts receivable. Our findings provide evidence of a significant non-monotonic relation between investment in accounts receivable and firm value. Specifically, the shape of the above-mentioned relationship is concave. We find two opposing effects related to the benefits and cost of trade credit. This means that accounts receivable increase the value of the firm up to the breakpoint, after which, increases in receivables reduce the firm's value. At low levels of trade credit, the relation receivables-value is positive (consistent with financial, operational, and commercial motives for trade credit). On the contrary, at high levels of trade credit the relation between receivables and firm value is negative (consistent with the arguments of opportunity and financing costs, as well as financial risks).

However, it should be noted that Tobin's q and the ratio of market value of equity to book value of equity are not unambiguous measures of value. Previous literature has also used them as measures of growth opportunities. In this sense an alternative explanation is possible; trade credit policy designed to capture customers may increase firm growth by increasing market share and maintaining and establishing new commercial relations. However these benefits could not be unlimited, since at high levels of trade credit, extending credit to customers implies that there are fewer funds for profitable investment projects, thus limiting firm growth opportunities.

Regarding the control variables**,** GROWTH is positively related to the two proxies of firm value in all four cases. Empirical evidence (Claessens, Djankov, Fan, and Lang, 2002; La Porta et al., 2002; Durnev and Kim, 2005; Maury and Pajuste, 2005; Tong, 2008) also reports a positive sign for sales growth. As for firm size, like Demsetz and Villalonga (2001), we report a non-significant relation between SIZE and firm value.

Finally, LEV is significant in two of the four regressions (when the dependent variable is MBOOK). The positive coefficient on the debt variable is consistent with a tax argument (Modigliani and Miller, 1963), and a free-cash-flow argument (Jensen, 1986). In general, the stability of the estimated coefficients for two different specifications of the dependent variable and for different proxies of accounts receivable supports our findings for the non-linear relationship between accounts receivable and firm value[5].

Suppliers will be willing to finance their customers as long as the benefit of investment in accounts receivable is higher than the costs of trade credit granted. To the extent that firms can reap the benefits of investing in trade credit (e.g. reducing asymmetries in product quality; lower transaction costs; lower cash inventories; improved relations with customers; increased demand and sales) and that these benefits outweigh credit management costs, financial risks, and opportunity costs, firms should continue to extend trade credit. In contrast, firms should not finance their customers in cases where granting trade credit adversely affects the profitability and liquidity of the firm. These two effects imply a "reverse U-shaped" distribution of the level of accounts receivable with respect to a firm value.

Robustness: Deviation from the target trade credit level

We have shown that there is a quadratic relation (concave) between firm accounts receivable and firm value, as a consequence of two contrary effects. In order to give robustness to the results we provide evidence that firm value would be reduced if firms under- or overinvest in trade credit.

A firm's accounts receivable deviations are defined relative to benchmark accounts receivable. Tong (2008) develops an approach to study the relation between deviations on either side of optimal CEO ownership and firm value. We follow this approach to analyze the relation between deviations from target or desired accounts receivable and

[5] The results do not change if we introduce interest rates, measured as 1-year treasury bills.

firm value. So, if a non-linear accounts receivable-value relation is confirmed in our first study, where a level which maximizes firm value exists, it is expected that deviations from this accounts receivable level will reduce firm value.

In order to do this, we consider that the benchmark specification for the determinants of accounts receivable is explained by the equation below, which has been supported by previous studies on the determinants of accounts receivable (for instance, Petersen and Rajan, 1997; Niskanen and Niskanen, 2006; Garcia-Teruel and Martinez-Solano, 2010)

Model 2:

$$REC_{it} = \beta_0 + \beta_1 (GROWTH_{it}) + \beta_2 (SIZE_{it}) + \beta_3 (STLEV_{it}) + \beta_4 (FCOST_{it}) + \beta_5 (CFLOW_{it}) + \beta_6 (TURN_{it}) + \beta_7 (GPROF_{it}) + \eta_i + \lambda_t + I_s + \varepsilon_{it} \quad (2)$$

where REC_{it} is accounts receivable. As in the previous section we employ two measures; REC_1, which is the ratio of accounts receivable to total sales and REC_2, which is the ratio of accounts receivable to total assets; $GROWTH_{it}$ is the annual growth rate of sales; $SIZE_{it}$ is the natural logarithm of sales; $STLEV_{it}$ is short-term financing calculated as current liabilities to total sales; $FCOST_{it}$ represents the cost of external financing measured as the ratio of financial expenses to outside financing less trade creditors; $CFLOW_{it}$ is the internal financing computed as earnings after tax plus depreciation-amortization to total sales; $TURN_{it}$ is the proxy for product quality, total sales to total assets less net account receivable; $GPROF_{it}$ is the profit margin measured as earnings before interest and taxes, depreciation and amortization to total sales. As above, η_i is the unobservable heterogeneity, λ_t control for time effects, parameter I_s controls by industry, and ε_{it} is the error term. A brief description of the variables used in this section is provided in Appendix A.

Next, we obtain residuals from Model 2 and we include these residuals in model 3. In this way, we define DEVIATION as the absolute value of these residuals. The aim is to find if deviations from the target accounts receivable level affect a firm's value. In order to do this we estimate the following model:

Model 3:

$$V_{it} = \beta_0 + \beta_1 (DEVIATION_{it}) + \beta_2 (GROWTH_{it}) + \beta_3 (SIZE_{it}) + \beta_4 (LEV_{it}) + \eta_i + \lambda_t + I_s + \varepsilon_{it} \quad (3)$$

where V_{it} is firm value, proxied as Tobin's Q, and MBOOK. The main dependent variable is $DEVIATION_{it,}$ defined as the absolute value of residuals of equation 2. The rest of the variables are defined as above. We expect $\beta_1 < 0$ in Model 3, implying a negative relation between deviations from target accounts receivable level and firm value.

In Table 4 we present panel data regressions to explain whether deviations from target accounts receivable influence firm value (model 3). In line with our expectations, DEVIATION is inversely related to firm value, since its coefficient is negative and significant at 1%. These results confirm that as firms move away from the target accounts receivable level this decreases its value. As before, we proxy value as Tobin's Q (columns 1 and 2) and MBOOK (columns 3 and 4) and we obtain the same results. Regarding control variables, the coefficient of the variable GROWTH is positive and significant at 1%, SIZE is not significant in any of the four regressions, and LEV is positively related to firm value in all columns.

INSERT TABLE 4 HERE

Finally, the results confirm our hypothesis. All in all, we find a quadratic relationship between accounts receivable and firm value and, moreover, deviations from the desired level of accounts receivable significantly reduce firm value.

5. CONCLUSIONS

Trade credit policy might have important implications for corporate value because of the large amount of capital invested in accounts receivable. Lewellen et al. (1980) postulate that the existence of market imperfections might impact on the trade credit decision and allow an opportunity for the credit policy to affect firm value, so implying an optimal trade credit policy. Following this line of argument, in this paper we contrast the effect of trade credit granted on firm value, assuming that the relation trade credit-value is non-linear, and consequently, there should be a level of trade credit which maximizes firm value.

A salient result of our paper is that accounts receivable both entail costs and confer benefits. Hence, investment in accounts receivable is no longer uniformly beneficial and investors will pressure firms to limit trade credit granted to mitigate opportunity cost and financial risk, and reduction in profitability and liquidity while also encouraging managers to maintain an investment in accounts receivable which maximizes operational, financial, and commercial benefits. Firm value increases with receivables up to a point and then starts decreasing with receivables. So we can conclude that, in effect, there is an inverted U-shaped relationship between the investment in accounts receivable and firm value, where a level of trade credit exists at which firm value is maximized. The relation between these variables is positive when the investment in trade credit is low, and it becomes negative for higher levels of trade credit. Moreover, deviations from the desired receivables level reduce firm value.

It is worth pointing out the implications of our study for researchers and managers. We find that the management of trade credit is an important element, which affects shareholder value. It may be tempting to argue that, given that the average accounts receivable in our sample is below target receivables, on average firms could increase their firm value by increasing their investment in accounts receivable. However, our estimations do not incorporate firm-specific costs or benefits of receivables. Perhaps for firms that are below the desired level of receivables, increasing investment in receivables any higher is costly. The target value found may be not necessarily right for an individual firm. However, we can state that trade credit affects firm value and that there is a target value on average.

One limitation of this approach is that analyzing the relation between accounts receivable and firm value is not sufficient to conclude that there is an optimum level of accounts receivable, but it is a theoretical question, which should be solved analytically.

The analysis might be extended in several directions by investigating the value of investment in accounts receivable across industries or countries. It would be also interesting to test whether there is a nonlinear receivables-profitability relation for a sample of SMEs. These firms may be forced to grant trade credit despite the costs associated to it, because not granting trade credit would lose sales, and profitability would decrease, implying a linear relation between the investment in trade credit and profitability.

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Table 1

Descriptive Statistics

Variable	*Obs*	*Mean*	*Std. Dev.*	*Median*	*perc 10*	*perc 90*
Q	349	1.3465	0.5508	1.2152	0.8954	1.8362
MBOOK	349	1.9097	1.2473	1.5809	0.7433	3.6533
REC_1	349	0.3302	0.1724	0.2906	0.1664	0.5533
REC_2	349	0.2102	0.1140	0.1803	0.0896	0.3809
GROWTH	349	0.1375	0.2759	0.0892	-0.0734	0.3419
SIZE	349	13.0707	1.8839	13.2554	10.6354	15.5197
LEV	349	1.8980	1.2122	1.6196	0.6319	3.7145

This table provides descriptive statistics for the data employed in the analysis. The data is from 2001 to 2007. The variables are the followings: ratio market value of firm to total assets (Q), ratio between market capitalisation to equity book value (MBOOK), ratio of accounts receivable to total sales (REC_1), ratio of accounts receivable to total assets (REC_2), annual growth rate of sales (GROWTH), natural logarithm of sales (SIZE), and ratio of total liabilities and debt to shareholders' equity (LEV).

Table 2

Correlation Matrix

	Q	**MBOOK**	**REC_1**	**REC_2**	**GROWTH**	**SIZE**	**LEV**
Q	1.0000						
MBOOK	0.9100***	1.0000					
REC_1	0.1337**	0.2053***	1.0000				
REC_2	-0.0120	0.0890*	0.5261***	1.0000			
GROWTH	0.0085	0.0703	-0.0259	-0.0057	1.0000		
SIZE	-0.1009*	0.0278	-0.3032***	-0.0627	0.1191**	1.0000	
LEV	-0.1419***	0.1268**	0.2032***	0.2086***	0.1109**	0.4686***	1.0000

The variables are the followings: ratio market value of firm to total assets (Q), ratio between market capitalisation to equity book value (MBOOK), ratio of accounts receivable to total sales (REC_1), ratio of accounts receivable to total assets (REC_2), annual growth rate of sales (GROWTH), natural logarithm of sales (SIZE), and ratio of total liabilities and debt to shareholders' equity (LEV). ***significant at 1%, **significant at 5%, *significant at 10% level.

Table 3

Trade Credit and firm value

	TOBIN´S Q		MBOOK	
	(1)	**(2)**	**(3)**	**(4)**
REC_1	2.2748***		4.1095***	
	6.52		4.83	
REC_1^2	-2. 0539***		-4.3197***	
	-7.38		-6.32	
REC_2		4.6915***		10.8655***
		9.59		10.76
REC_2^2		-6.3037***		-15.0724***
		-9.32		-11.07
GROWTH	0.0651***	0.0604***	0.1775***	0.1732***
	3.50	3.52	4.02	4.64
SIZE	0.0431	0.0783	-0.0582	0.1695
	0.89	1.44	-0.39	1.30
LEV	-0.0343	-0.0070	0.3137***	0.3630***
	-1.32	-0.40	4.08	6.13
m_2	0.063	0.116	0.082	0.056
Hansen test	30.77	39.80	35.71	34.52
(df)	(95)	(95)	(95)	(95)

All estimations have been carried out using the two-step GMM estimator. All variables are treated as endogenous and the lagged independent variables are used as instrument. In columns (1) and (2) the dependent variable is Q (Tobin's Q), which is market value of firm to total assets. In columns (3) and (4) the dependent variable employed to proxy firm valuation is MBOOK, which is the ratio of market capitalisation to equity book value. REC_1 and REC_2 measure accounts receivable. Control variables are GROWTH, SIZE, and LEV. Time and industry dummies are included in all regressions.

m_2 is test statistic for second order autocorrelations in residuals, distributed as standard normal N (0,1) under the null hypothesis of no serial correlation. Hansen test is a test for overidentifying restrictions, distributed as chi-square under the null of instrument validity.

***significant at 1%, **significant at 5%, *significant at 10% level.

Table 4

Deviation from the target accounts receivable level and firm value

	TOBIN'S Q		MBOOK	
	(1)	**(2)**	**(3)**	**(4)**
DEVIATION	-0.2977***	-0.5430***	-0.7644***	-0.8467***
	-7.34	-5.02	-5.18	-3.21
GROWTH	0.0713***	0.0765***	0.1609***	0.1698***
	5.84	6.56	4.66	6.72
SIZE	-0.0627	-0.0625	-0.1540	-0.1029
	-1.46	-1.23	-1.51	-1.21
LEV	0.0472**	0.0564***	0.2211***	0.2984***
	2.40	2.67	3.60	5.73
m2	0.143	0.117	0.081	0.063
Hansen test	39.65	41.01	37.68	39.77
(df)	(42)	(42)	(42)	(42)

All estimations have been carried out using the two-step GMM estimator. All variables are treated as endogenous and the lagged independent variables are used as instrument. In columns (1) and (2) the dependent variable is Q (Tobin's Q), which is market value of firm to total assets. In columns (3) and (4) the dependent variable employed to proxy firm valuation is MBOOK, which is the ratio of market capitalisation to equity book value. Columns (1) and (3) correspond to the dependent variable REC_1 (trade credit divided by total assets) in the determinants regression. Likewise, Columns (2) and (4) correspond to REC_2 (trade credit divided by total sales). Control variables are GROWTH, SIZE, and LEV. Time and industry dummies are included in all regressions.

m_2 is test statistic for second order autocorrelations in residuals, distributed as standard normal N (0,1) under the null hypothesis of no serial correlation. Hansen test is a test for overidentifying restrictions, distributed as chi-square under the null of instrument validity.

***significant at 1%, **significant at 5%, *significant at 10% level

Appendix A

Variables definition

Variable	*Definition*
Q_{it}	Tobin's Q (Chung and Pruitt, 1994) is the proxy for firm value. Ratio of market value of firm to book value of firm. It is calculated as market value of equity plus book value of total debt to total assets.
$MBOOK_{it}$	Market-To-Book ratio is defined as the ratio of market value of equity to book value of equity.
REC_{1it}	Accounts receivable. Fraction of accounts receivable over total sales.
REC_{2it}	Accounts receivable. Ratio of accounts receivable to total assets.
$GROWTH_{it}$	Growth opportunities, which is the rate of annual sales growth.
$SIZE_{it}$	The size of the firm is computed as the natural logarithm of gross sales.
LEV_{it}	Leverage is measured as total debt divided by shareholder equity.
$DEVIATION_{it}$	DEVIATION is defined as the absolute value of residuals of optimal accounts receivable.
$STLEV_{it}$	Short-term leverage is short-term financing calculated as current liabilities to total sales
$FCOST_{it}$	Cost of external financing is the ratio of financial expenses to outside financing less trade creditors
$CFLOW_{it}$	Cash-Flow is the internal financing computed as earnings after tax plus depreciation-amortization to total sales

$TURN_{it}$	Firm's asset turnover is calculated as the ratio of sales over assets minus accounts receivable
$GPROF_{it}$	Profit margin is Earnings Before Interest, Taxes, Depreciation and Amortization to total sales