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Abstract: SME investment opportunities depend on the level of financing constraints that firms face. Earlier research has mainly focused on the controversial argument that cash flow-investment correlations increase with the level of these constraints. We focus on bank loans rather than cash flow. Our results show that investment is sensitive to bank loans for unconstrained firms but not for constrained firms, and trade credit predicts investment, but only for constrained firms. We also find that unconstrained firms use bank loans to finance trade credit provided to other firms. Our results illustrate alternative mechanisms that firms employ both as borrowers and lenders (100 words).

Keywords: SMEs, financing constraints, bank lending, trade credit, predictability.

JEL classification: G21, D21, L26

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1. INTRODUCTION

The ability of firms to optimally exploit investment opportunities may crucially depend on the level of financial constraints that they face. SMEs may be particularly vulnerable because these firms are more opaque and thus susceptible to more credit rationing. Inquiry into the presence of financing constraints began in earnest with Fazzari *et al.* (1988) and their investigation of investment-cash flow sensitivity. However, this line of inquiry has been quite controversial. In particular, Kaplan and Zingales (1997 and 2000) have shown that correlation between investment and cash flow may not be a good indicator of financial constraints.

In this paper we move this line of inquiry in a somewhat different direction. In some sense we look at the "dual" of the cash flow-investment sensitivity argument. Fazzari *et al.* (1988) argue that because financially constrained firms have limited access to external finance, their ability to exploit wealth-improving investment opportunities will be sensitive to their ability to finance these projects internally – that is, it will be sensitive to their cash flow. From an econometric perspective the cash flow variable may be problematic because, among other things, it may be correlated with omitted variables (e.g., Caballero and Leahy, 1996). To minimize these problems we take a more direct approach. Specifically, we instead focus on bank loans rather than cash flow in a sample of SMEs for whom bank loans are likely the least costly form of external finance. Our argument here is that just as the capital expenditures of less constrained firms are less likely to be sensitive to cash flow, they are more likely to be sensitive to bank loan funding. That is, unconstrained firms will utilize low cost bank loans to finance capital expenditures. In particular, we hypothesize that increased bank loan funding will (not) be associated with increased capital expenditures for unconstrained (constrained) firms.

The only other economically significant source of external funding for SMEs is trade credit, although it is generally considered to be more costly than bank loans (e.g., Petersen and Rajan, 1994, 1995). So, we also examine the sensitivity of investment to trade credit. Our investigation of trade credit will enable us to draw some inferences about the substitutability of trade credit and bank loans. In addition, we investigate the supply side of trade credit – in particular, whether unconstrained firms are more likely to extend trade credit (i.e., "invest in" trade credit) by using bank loans.

We also extend the literature on financial constraints by examining predictability. That is, we go beyond just the estimated correlation (between bank loans and investment, between trade credit and investment, and between accounts receivable and bank loans) and investigate the casual links. By way of preview we find that investment is sensitive to bank loans for unconstrained firms – but not for constrained firms. We also find that trade credit predicts investment, but only for constrained firms. This suggests that constrained firms, whose access to bank loans is limited, resort to trade financing. Finally, we find that for unconstrained firms, bank loans cause accounts receivable – that is, unconstrained firms use bank loans to finance trade credit (i.e., invest in accounts receivable).

The remainder of our paper is organized as follows: Section 2 discusses the relevant literature on investment and financing constraints and presents our hypotheses. Section 3 presents the empirical strategy, the data set and the methodology. Section 4 shows our results and Section 5 offers conclusions.

2. LITERATURE REVIEW AND HYPOTHESES

2.1. The literature on financing constraints, external finance and investment

Firms depend on a variety of sources of financing, both internal and external. The relationships among these sources and their effects on investment, however, remain unclear in the literature. In the case of SMEs, bank loans and trade credit are the main two alternatives of external funding. Since bank lending may be the cheapest source of external funding (e.g. Petersen and Rajan 1994, 1995), access to bank lending may condition the demand for trade credit. Dependence on trade credit, arguably the most expensive source of credit and the degree of financial constraints will also depend on the internal source of funding from cash flow.

The effects of bank loans on investment decisions have been mostly explored in cross-country studies. In particular, as predicted in the finance-growth literature, bank lending to firms may foster investment and growth. This finance-growth nexus has been presented both as an endogenous growth model whereby bank loans (and even trade credit) stimulate firm investment (Greenwood and Jovanovic, 1990; King and Levine, 1993; Galetovic, 1996, Fisman and Love, 2004) and from a monetary perspective, showing the response of lending by banks to changes in monetary policy and its effects on aggregate output or even the likely substitution of bank loans for trade credit during a monetary tightening (Gertler and Gilchrist, 1993; Calomiris *et al.*, 1995; Oliner, and Rudebusch, 1996; Nielsen, 2002; Fukuda *et al.*, 2006).

Much of the previous literature on financing constraints has focused on cash flow-investment sensitivity. This literature has been embroiled in considerable controversy with two main opposing views. On one side, Fazzari *et al.* (1988, 2000) suggest that financing constraints increase with investment-cash flow sensitivity.[1] On

[1] See Caggese (2007) for a recent discussion of the literature.

the other side, Kaplan and Zingales (1997, 2000) suggest that investment-cash flow correlations are not necessarily monotonic in the degree of financing constraints. As an explanation for these controversial and conflicting results, Kaplan and Zingales (2000) suggest that unobserved changes in environmental conditions such as changes in firm investment criteria, changes in precautionary savings of firms that influence investment over time and changes in bank lending behavior are likely important. Hines and Thaler (1995) also suggests that firms may be conservative and that they only invest when they generate cash flow so that they prefer not to expand using external funding unless they are forced to so.

An alternative strand of the literature on financing constraints has focused on the extent to which bank loans and trade credit are complements or substitutes. This strand of the literature might be especially applicable to SMEs. Some of these studies suggest that external financing is costly because of potential adverse selection in the market for capital. They argue that trade credit may play a critical role in lower funding costs and in reducing credit rationing. In particular, it may be more efficient for large, less informationally opaque vendors with relatively low cost access to the banking and capital markets to obtain external financing and advance trade credit (Myers and Majluf, 1984; Calomiris *et al.*,, 1995; Petersen and Rajan, 1997; Demirguç-Kunt and Maksimovic, 2001; Frank and Maksimovic, 2005). Cuñat (2007) shows that trade suppliers may have an advantage in enforcing noncollateralized debt contracts. This advantage allows suppliers to lend more than banks and to lend when their customers are rationed in the bank loan market. Trade credit also allows their customers to increase their leverage. Large trade creditors have also been shown to provide trade credit to firms experiencing idiosyncratic shocks or monetary policy shocks (Calomiris *et al.*, 1995; Gropp and Boissay, 2007). Many hypotheses have been suggested to

explain why trade creditors might have an advantage over other lenders (specifically, banks) in providing credit to opaque firms.[2] Among these arguments is the possibility that vendors may act as "relationship lenders" because they have unique proprietary information about their customers (McMillan and Woodruff, 1999; Uchida *et al.*, 2007). Smith (1987) and Biais and Gollier (1997) argue that in the normal course of business a seller obtains information about the true state of a buyer's business that is not known to financial intermediaries.

As noted by Demirguç-Kunt and Maksimovic (2001) the information on the buyer is potentially valuable and the seller acts on this information to extend credit to buyers on terms that they would not be able to receive from financial intermediaries. Similarly, it has been suggested that the information advantage that vendors may have over banks in funding opaque firms may imply a complementary use of trade credit and bank loans (Cook, 1999; Ono, 2001; García-Appendini, 2006). However, this argument does not necessarily contradict the view of bank loans are a cheaper substitute for trade credit (Meltzer, 1960; Brechling and Lipsey, 1963; Jaffee, 1971; Ramey, 1992; Marotta, 1996; Uesugi and Yamashiro 2004; Tsuruta, 2008). Interestingly, it is suggested that both views (substitutes and complements) can be reconciled when not only prices are considered but also whether firms are financially constrained or not (García Appendini, 2006).

2.2 Our Hypotheses

Like this second strand of the literature on financing constraints, we focus on the two main sources of SME external financing: bank loans and trade credit. However, our approach also borrows from the first strand of the literature in that we also examine

[2] For recent summaries of the literature on the comparative advantage of vendors as commercial lenders see Burkart *et al.* (2007), and Uchida *et al.* (2007).

investment sensitivity -except our focus is not on cash flow-investment sensitivity, but rather bank loan- and trade credit-investment sensitivity. In some sense, this can be viewed as the converse of the cash flow-investment sensitivity strand of the literature. That literature analyzes whether financially constrained firms who are denied full access to external credit markets link their investment decisions to available cash flow. We examine the flip side of this issue – whether these financially constrained firms can link their investment to either bank loans or trade credit. If financially constrained firms are linking their investment decision to cash flow, then they should not be linking their decision to bank loans (to which they are denied full access). If they are denied access to the bank loan market, they may turn to the trade credit market. So we also examine whether constrained firms link their investment to trade credit (i.e., trade credit-investment sensitivity).

In order to derive our hypotheses, we make several key assumptions. First of all, as in most of the previous literature we will assume that financing constraints are directly related to borrowing from banks so that a firm is considered to be financially constrained when the desired amount of lending is larger than the amount of lending that banks provide to that firm[3]. Second, as noted elsewhere in the literature we assume that firm financing and investment are dynamic and non-contemporaneous (Clementi and Hopenhayn, 2006). This allows us to examine the predictability/causality relationships as a primary tool in analyzing the link between bank loans and investment, and trade credit and investment. This is also interesting because the direction of predictability between many of these financing and investment variables has not been explored yet.

[3] This is also the definition in studies classifying firms into constrained and unconstrained using survey data where firms are asked whether banks have denied them credit in a given period. In this context, an indication of financially constraint status is that a firm's loan application is denied (Garmaise, 2008). Since we do not have information on loan applications we offer a novel way to classify firms into financially constrained and financially unconstrained.

We can now state our two main testable hypotheses:

Hypothesis 1: *Since the desired amount of loans exceeds the supplied amount of loans at constrained firms, loans will not predict/cause investment at constrained firms. Therefore the expected causality/predictability relationship between bank loans and investment should only be significant in the case of unconstrained SMEs.*

Hypothesis 2: *Since constrained SMEs are not provided with the amount of loans that they need for investment, they have to rely on (more expensive) trade credit to finance their investment projects. Therefore, both the relative amount of accounts payable and the accounts payable turnover will cause/predict investment decisions at constrained SMEs.*

3. EMPIRICAL METHODOLOGY

3.1. Empirical strategy and data

Our empirical strategy involves three steps. First of all, cash-flow investment correlations are estimated as a benchmark to make our data and results comparable with previous research. The second empirical step in our analysis involves the identification of financially constrained firms. Under certain restrictive conditions, accounting ratios can be consistent proxies of firm financing constraints. However, it is likely that financial ratios are correlated among themselves and with other variables such as cash flow or sales growth which are relevant key and control variables in our dataset. Therefore, we rely on a direct estimation of the probability that a firm experience borrowing constraints from a so-called *disequilibrium model*. This methodology permits us to classify firms as constrained or unconstrained. The main estimations are then undertaken in the third step, using Granger predictability tests to test our hypotheses.

The data have been gathered from the Bureau-Van-Dijk Amadeus database and include annual information on 30,897 Spanish SMEs during 1994-2002. SMEs are defined as those with less than 250 employees[4]. All of the selected firms were active during the entire sample period. This balanced panel consists of 278,073 observations.

In order to analyze the relationship between firm investment, bank loans and other internal and external sources of financing, two sets of variables are employed, one related to investment and financing decisions[5] and the other to firm-level and environmental control variables. Table 1 contains the definitions and explanatory comments on the variables as well as their sample means.

3.2. Benchmark definitions: cash-flow investment correlations

We begin by estimating cash flow-investment sensitivities to benchmark our analysis against the standard approach in the literature. We have the advantage of estimating these cash flow-investment correlations using a relatively homogeneous sample of firms, SMEs in Spain, in terms of financial structure and firm sizes. However, we also note that because most of our sample firms are unquoted, investment-cash flow sensitivities can be, to a certain extent, affected by non-optimizing behaviour by managers (Kaplan and Zingales, 2000).

We use the approach offered in Bond and Meghir (1994) to estimate cash-flow investment correlations in unquoted firms. The methodology consists of an Euler equation[6]. In the general specification of the model, the current investment rate (*Capital*

[4] This is the standard definition of SMEs according to the European Commission's Recommendation 2003/361/EC. All SMEs in the sample are below 40 million of euros in total assets.

[5] We focus on bank loans and trade credit as the external sources of funds for SMEs. There are other external sources (such as the deferred taxes and black market loan sharks) that have not been considered because of marginal importance and/or lack of data.

[6] The Euler equation is a structural model, explicitly derived from a dynamic optimization problem under the assumption of symmetric, quadratic costs of adjustment. This has the advantage that, under the maintained structure, the model captures the influence of current expectations of future profitability on

expenditure$_t$ / *capital*$_{t-1}$) is related to lagged values of the investment rate, a quadratic-adjustment term for the investment rate, cash flow, sales growth and a quadratic adjustment term for bank debt (bank loans):

$$\begin{aligned} &\text{C}apital\ expenditure_t / capital_{t-1} = \alpha^*(\text{C}apital\ expenditure_{t-1} / capital_{t-2}) \\ &+ \beta^*(\ \text{C}apital\ expenditure_t / capital_{t-1})^2 + \chi^*(Cash\ flow_t/capital_{t-1}) \\ &+ \delta^* sales\ growth_t + + \gamma^* bank\ loans_t^2 \end{aligned} \quad (1)$$

In the Euler equation, the estimated value of the coefficient "χ" is interpreted as the cash-flow investment correlation.

3.3. Identifying constrained vs. unconstrained firms

We employ a disequilibrium model (Maddala, 1983) consisting of two-reduced form equations: a demand equation for bank loans, and a supply equation that reflects the maximum amount of loans that banks are willing to lend on a collateral basis. A third equation is added as a transaction equation restricting the value of loans as a min equation of desired demand and loan supply. Similar empirical applications have been employed by Ogawa and Suzuki (2000) and Shikimi (2005) for Japan, Atanasova and Wilson (2004) for the United Kingdom and Carbó *et al.* (2006) for Spain. The loan demand equation ($Bank\ loans_{it}^d$), the loan supply equation ($Bank\ loans_{it}^s$), and the transaction equation ($Bank\ loans_{it}$) of firm *i* in period *t* are:

$$\begin{aligned} &Bank\ loans_{it}^d = \beta_0^d + \beta_1^d (Sales)_{it}^d + \beta_2^d Cash\ flow_{it} \\ &+ \beta_3^d (Loan\ interest\ spread)_{it} + \beta_4^d \log(GDP) + u_{it}^d \end{aligned} \quad (2)$$

$$\begin{aligned} &Bank\ loans_{it}^s = \beta_0^d + \beta_1^s Tangible\ assets_{it} + \beta_2^s Bank\ market\ power \\ &+ \beta_3^s Default\ risk_{it} + \beta_4^s \log(GDP) + u_{it}^s \end{aligned} \quad (3)$$

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current investment decisions. The Euler-equation model has the advantage of controlling for all expectational influences on the investment decision.

$$Bank\ loans_{it} = Min(Bank\ loans_{it}^{d}, Bank\ loans_{it}^{s}) \quad (4)$$

The amount of bank loan demand is modelled as a function of the level or the expansion of firm activity (*Sales*), other sources of funding that are substitutes for bank loans (*Cash flow*), and the interest spread on bank loans (*Loan interest spread*) which is computed as the difference between the loan interest rate and the interbank interest rate[7]. The maximum amount of credit available to a firm is modelled as a function of the firm's collateral (*Tangible assets*), the banks' market power in the area where the firm operates (*Banks' market power*) -our market power indicator is the Lerner index[8]- and a proxy for firm default risk (*Default* risk) which is defined as the ratio of operating profits over interest paid. All level variables are expressed in terms of ratios (of total assets) to reduce heteroscedasticity. As a consequence, the size (scale) effect of "total assets" in the demand function above is estimated as part of the constant term since the constant term is estimated as a coefficient of the reciprocal of total assets[9]. Both demand and supply equations contain *log(GDP)* to control for macroeconomic conditions across the regional markets where the SMEs operate[10].

The simultaneous equations system shown in (2), (3) and (4) is estimated as a switching regression model using a full information maximum likelihood (FIML) routine with fixed effects. The model allows us to compute the probability that loan demand exceed credit supply (Gersovitz, 1980) and, therefore, to classify the sample

[7] The loan interest rate is computed as a ratio of loan expenses and bank loans outstanding. We implicitly assume that the year-end loan balance is roughly equal to the weighted average balance during the year.

[8] See Cetorelli and Gambera (2001). The Lerner index is defined as the ratio "(price of total assets - marginal costs of total assets)/price". The price of total assets is directly computed from bank-level auxiliary data as the average ratio of "bank revenue/total assets" for the banks operating in a given region using the distribution of branches of banks in the different regions as the weighting factor. Marginal costs are also estimated from the auxiliary sample.

[9] The constant term is them estimated as the parameter for "1/total assets" and, therefore, the estimated value of the coefficient of the estimated constant term or reciprocal of total assets is considerably large.

[10] Since some of the variables are computed from regional data, errors are clustered by region since these variables would be equal or very similar across firms in the same region.

into constrained and unconstrained firms. Further details on this procedure are provided in Appendix A.

3.4. Testing the hypotheses: Granger predictability tests

We use Granger predictability tests to study the relationships between different sources of financing and investment and among the financing measures. One, two and three lags (l) of the variables were employed since these relationships are not necessarily contemporary but likely to present long-term effects (Rosseau and Wachtel, 1998)[11].

Since our dataset consists of cross-section and time series firm-level observations, the causality/predictability includes fixed effects (f) in the regression. The empirical specification follows Holtz-Eakin *et al.* (1988) for Granger predictability with panel data. Considering N firms ($i=1,\ldots,N$) and t time periods ($t=1,\ldots,T$) and firm-specific fixed effects (f_i). we will consider, for example, that "bank loans/total liabilities" will Granger-cause investment if two conditions are met:

i) The bank loans ratio is statistically significant in a time-series regression of the firm investment rate:

$$(Capital\exp enditure_{it} / capital_{\text{it-1}})_{\text{t}} = \alpha_0 + \sum \beta_i (Capital\exp enditure_{it} / capital_{\text{it-1}})_{t-l} + \sum \gamma_i (Bank\ loans_{it} / total\ liabilities_{it})_{t-l} + \psi_t f_i + u_{it} \quad (5)$$

ii) The investment rate variable is not significant when it is included in a time-series regression of the bank loans ratio:

$$(Bank\ loans_{it} / total\ liabilities_{it})_{t} = \alpha_0 + \sum \beta_i (Bank\ loans_{it} / total\ liabilities_{it})_{t-l} + \sum \gamma_i (Capital\exp enditure_{t} / capital_{\text{t-1}})_{t-l} + \psi_t f_i + u_{it} \quad (6)$$

[11] An Augmented Dickey-Fuller (ADF) procedure is applied as a test for unit roots. First differencing the variables was sufficient to achieve stationarity.

If instead, the situation is reversed – so that the $\sum \gamma_i$ in the first set of regressions is not significant while in the second set $\sum \beta_i$ is significant, then investment Granger-predicts the bank loans ratio. Finally, if the added bank loans variable in equation (5) and the firm investment rate variable in equation (6) were both significant, there will be predictability in both directions and probably a third factor will be also explaining both the evolution of firm investment and bank loans. As control variables, the Granger equations incorporate *Interbank interest rates*, *Cash flow*$_t$*/capital*$_{t-1}$, *Sales growth* and the *Defaults in commercial paper*. The statistical significance of the Granger test is measured using an F-test.

The identification of the equation is easier when the individual effects and the lagged coefficients are stationary, so that the individual effects are eliminated. All variables are expressed in first-differences since standard Augmented-Dickey-Fuller tests suggest that first-differencing is sufficient to achieve stationarity. The estimation of hypothesis 1 requires running predictability tests between investment rates and bank loans. For hypothesis 2, the tests should relate "accounts payable/total liabilities" and investment rates. Importantly, in order to properly analyze these hypotheses, the Granger predictability equations are estimated separately for both constrained and unconstrained firms.

The vector of instrumental variables that is available to identify the parameters of the equations in first differences includes various additional lags of the dependent and the explanatory variables in levels. A necessary condition for identification is that there are, at least, as many instrumental variables as right-hand side variables. The standard Sargan test for identification is employed.

4. MAIN RESULTS

4.1. Defining financially constrained firms

The estimations of the FIML disequilibrium model that are employed to compute the probability that a given firm is financially constrained are shown in Table 2.

All coefficients are found to be significant at 1% level excluding *Default risk*, which is not significant. As shown in Table 3, 33.90% of the firms in the sample are estimated to have experienced borrowing constraints during the period. These values remain very stable over time.

Table 4 shows the mean values of the ratios of bank loans, investment and cash flow as well as the cash-flow investment correlations for SMEs of different sizes using the quartile distribution of firms by assets[12] with the first quartile corresponding to the smallest firms and the fourth quartile to the largest firms in the sample[13]. The values are shown for both constrained and unconstrained firms according to the classification of the disequilibrium model. As for the bank loans ratio, constrained firms exhibit a slightly higher proportion of bank loans even if their access to bank financing is, at least partially, restricted. The lower ratio of bank loans for unconstrained firms is compensated by a higher cash flow generation. The latter suggests that lower cash flow generation may induce constrained firms to rely more on bank lending although their higher demand of loans is not completely satisfied. It is not surprising that constrained SMEs exhibit a significantly lower investment ratio (0.428) than unconstrained firms (0.507). The larger diversification of funding sources at unconstrained firms may also

[12] The assets distribution and any other quartile distribution of firms according to assets in this study are undertaken on a yearly basis. This means that some firms may shift from a size category to any other size category over the sample period but this should not affect the economic significance of "size" in our main hypotheses tested.

[13] Similar distributions using the number of employees as a criterion were also employed (not shown) and offered very similar results. These results are available upon request.

explain why they show, on average, lower cash flow-investment sensitivities (0.481) than their restricted counterparts (0.742). These correlations are the highest for the firms in the first quartile although they decrease for firms in the second and third quartiles and paradoxically increase again in the case of firms in the fourth quartile.

As shown in Table 5, the sector breakdown reflects a significant degree of heterogeneity in financial ratios and estimated cash-flow investment sensitivities. While the percentage of constrained firms is the lowest in sectors such as "transport services" (21.31%) and "construction" (22.43%), other industries such as the "sale, maintenance and repair of motor vehicles" (41.75%) or "manufactures of textiles and dressing" (41.73%) show a higher percentage of constrained firms within the sample. Interestingly, some of the highest levels of firm investment are found in sectors suffering significant borrowing constraints such as "sales, maintenance and repair of motor vehicles", "hotels and restaurants" or "computer and related activities".

4.2. Granger predictability tests

Table 6 and 7 show the detailed results of the Ganger predictability tests for unconstrained and constrained firms respectively. For simplicity, only the one-lag results are shown while Appendix B summarizes the results of all Granger-causality tests for 1 up to 3 lags. The values from the Sargan test for overidentifying restrictions suggest that the instruments employed are valid. Since the coefficients are shown as log-differences of the variables, they can be interpreted as marginal effects.

The results shown in equations (1) and (2) in Table 6 suggest that bank loans Granger-predicts investment but, investment does not Granger predict bank loans at unconstrained firms[14]. In equation (2), where investment is the dependent variable, other

[14] In the case of some constrained firms, short term capital investments may be more important than long-term capital investments. As a robustness check for the relative importance of short-term investment

explanatory factors are also significant and exhibit the expected signs. In particular, interest rates and the level of defaults in commercial paper are found to be negatively and significantly related to investment while sales growth has a positive effect. The last tests for unconstrained firms relate the payables turnover and "accounts payable to total assets" to investment. Results for these tests are shown in equations (3) to (6) in Table 6. None of the relationships among these variables were found to be significant.

The six equations are then estimated for constrained firms in Table 7. First of all, equations (1) and (2) in Table 7 reveal that there is not any predictability relationship between investment and bank loans at constrained firms consistent with hypothesis 1. However, unlike unconstrained firms, the payables turnover and "accounts payable/total liabilities" are found to predict investment at constrained firms which, in turn, supports hypothesis 2. These results also imply that trade credit seems to be a substitute for bank lending in funding investment projects. For robustness purposes, hypothesis 2 is also tested on a sub-sample with no bank loans on their balance-sheets (2426 firms). This sub-sample includes fully-constrained firms. In this sub-sample, the payables turnover and "accounts payable/total liabilities" are also found to predict investment rates. This additional result may imply that the sensitivity of trade credit to investment at unconstrained firms may be irrespective of the level of these financial constraints.

4.3. Exploring the role of unconstrained firms as lenders

Considering the significant differences in the sensitivity of loans to investment between constrained and unconstrained firms, we also investigated whether unconstrained SMEs may be more willing to extend trade credit to other firms. Since

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decisions at constrained firms, we alternatively tested the sensitivity of loans and trade credit to net working capital as an alternative to our reported results using total capital expenses to compute the investment variable. The results obtained using working capital are very similar and they are available upon request.

they get at least as much lending as they desire, bank loans at unconstrained firms may predict not only investment but also the capacity of the unconstrained firm to extend trade credit (i.e. accounts receivables).

Equations (1) to (4) in Table 8 test the relationship between the bank loans and the inclination of an unconstrained firm to extend trade credit at unconstrained firms. For robustness purposes the capacity to extend (and to demand) trade credit has been estimated using both definitions based on the value of the accounts (receivable or payable) and their turnover. While neither the receivables turnover nor the ratio "accounts receivable/total assets" seem to predict the bank loans ratio – as shown in equations (1) and (3) - there appears to be predictability in the other direction –as shown in equations (2) and (4). In particular, the bank loans ratio has a significant impact on both measures of receivables turnover –as the bank loans ratio increases in one period firms tend to be inclined to extend more trade credit in the next period. Equations (5) to (8) in Table 8 replicate these Granger-predictability tests for constrained firms. The results show that the bank loans ratio is not found to predict receivables turnover and "accounts receivables/total assets" at constrained firms.[15]

5. CONCLUSIONS

This paper employs a new approach to investigate the mechanisms that SMEs employ to finance their investment projects depending on whether they are financially constrained or not. The paper also illustrates how easier access to bank lending may encourage unconstrained firms to extend trade credit to other firms. Unlike the main strand of the previous literature in this area, the approach in this paper relies on predictability/causality tests and does not look primarily at cash flow-investment

[15] These results appear to be consistent with Cuñat (2007) who finds that trade creditors are willing to lend more than banks when customers are rationed in the bank loan market.

sensitivity, but rather at bank loan- and trade credit-investment sensitivity. This can be viewed as the converse of the cash flow-investment sensitivity approach. Specifically, we investigate how financially constrained firms link their investment to these external sources of credit and how this may differ from unconstrained firms. In this regard, we contribute to the broader debate on financial constraints and investment behaviour by offering an alternative the approach in Fazzari et al. (1988).

These relationships are tested on a sample of 30,897 Spanish SMEs during 1994-2002. The results suggest that constrained firms with restricted access to the bank loan market may turn to the trade credit market to exploit their investment opportunities. Unconstrained firms, however, turn to the bank loan market. Additionally, we analyze the supply side of the trade credit market by testing whether the extension of trade credit is sensitive to bank lending. We find a significant sensitivity of the extension of trade credit to bank lending at unconstrained firms which suggests that these firms may act as "lenders" due to their easier access to a less costly source of funding (bank loans).

These results may help explain the (important) role of trade credit in alleviating borrowing constraints, in a country (Spain) where we estimate that around one third of the SMEs face significant financing constraints. These results also illustrate the role of unconstrained firms as lenders and suggest that they may exploit informational benefits from customer relationships and their access to low cost bank funding. This can be interpreted as complementing findings elsewhere in the literature that firms extend trade credit to help alleviate problems related to monetary policy shocks and idiosyncratic firm shocks.

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TABLE 1. VARIABLES: DEFINITION AND SAMPLE MEANS

VARIABLE	DEFINITION	MEAN
MAIN INVESTMENT VARIABLE		
Capital expenditure$_t$ / capital$_{t-1}$	The ratio of total capital expenditures at end-year relative to the total amount of capital at the beginning of the year is our investment variable (Kaplan and Zingales, 1997; Fazzari *et al*., 2000).	0.33601
VARIABLES RELATED TO FINANCING DECISIONS		
Bank loans	Outstanding amount of loans in the liability side of firm's balance sheet (thousand of euros)	5,531.6
Banks loans/total liabilities	A ratio that reflects bank-leverage, the relevance of bank loans as a source of external finance.	0.20785
Receivables turnover	Computed by dividing the total sales of the firm in year t by the average of the "accounts receivable" between the end of year t and the end of year t-1. A high ratio suggests a combination of tight credit terms to the firm's customers and an aggressive collections policy. A low ratio suggests that the firm is offering loose credit terms to its customers and/or that the firm has a weak collections policy. These loose credit terms could either reflect an optimal risk/return trade-off between increased sales volume and increased credit risk – or, weak risk management on the part of the firm.	6.2365
Accounts receivable/total assets	It indicates the relative amount of accounts receivable in the assets portfolio. It shows the actual extent to which the firm extends trade credit.	0.17532
Payables turnover	Computed by dividing the total costs of the goods sold by the firm in year t by the average of the "accounts payable" between the end of year t and the end of year t-1. This ratio is a short-term liquidity measure used to quantify the rate at which a company pays off its suppliers. Because accounts payable are a source of credit to the firm, the payables turnover proxies for the maturity of this source of credit.	8.02354
Accounts payable / total liabilities	It reflects the importance of trade credit relative to other sources of financing.	0.30451
FIRM-LEVEL AND ENVIRONMENTAL CONTROL VARIABLES		
Total assets	Total assets on firm's balance sheet (thousand of euros)	9,832.6
Tangible assets	Fixed assets on firm's balance sheet (thousand of euros). This is considered as proxy of collateral.	1,466.9
Cash flow	Net income plus depreciation plus changes in deferred taxes.	1,899.4
Cash flow$_t$/ capital$_{t-1}$	This ratio is defined as cash flow in relative terms to the proportion of capital at the end of the previous year (Kaplan and Zingales, 1997, 2000; Fazzari *et al.*, 2000)	0.41220
Sales	Total sales during the year (thousand of euros)	18,621.6
Sales growth	Sales growth offers another alternative measure of firm financing constraints. It has been employed as a measure of investment opportunities and current cash-flows, which are expected to reduce borrowing constraints and as an indicator of financial distress for constrained firms (Fazzari *et al.*, 2000, Lamont *et al.*, 2001).	0.4721
Interbank interest rates	The three-month interbank deposit rate, obtained from the Bank of Spain, and computed as the average monthly rate over the year. This interest rate controls for the costs of external financing. A shock to interest rates may affect both bank lending and trade credit (Nielsen, 2002; Fukuda et al., 2006).	0.07952
Loan interest spread	This spread is defined as the difference between loan interest rates and interbank rates. The loan interest rate is computed as a ratio of loan expenses and bank loans outstanding. We implicitly assume that the year-end loan balance is roughly equal to the weighted average balance during the year.	0.01320
Default risk	This risk variable is defined as the ratio of operating profits to interest paid. A proxy for operating risk showing how many times interest paid are covered by operating profits.	4.25660
Banks 'market power	Bank market power is measured estimating the Lerner index (%). This index defined as the ratio "(price of total assets - marginal costs of total assets)/price". Marginal costs are estimated from a translog cost function with a single output (total assets) and three inputs (deposits, labor and physical capital) using two stage least squares and bank fixed effects (Cetorelli and Gambera, 2001).	22.3620
Defaults on commercial paper	This is a regional measure of the growth in defaults on commercial paper in the region where the firm operates. It provides a control for trade credit quality. This is the only business default rate available at the regional level.	0.0236
Log (GDP)	Logarithm of regional GDP in the region where the firm is located	5.23374

TABLE 2. ESTIMATED PARAMETERS OF THE DISEQUILIBRIUM MODEL.

Switching regression model estimated by full information maximum likelihood (FIML) with fixed effects
p-values in parenthesis
Standard errors are clustered at the regional level

Demand for bank loans	**Coefficient**	**Std. Error**
Sales/total assets(t-1)	0.6509*** (0.000)	0.01
Cash-flow/total assets(t-1)	-2.2918*** (0.000)	0.08
Loan interest spread	-1.4678*** (0.000)	0.04
Log(GDP)	0.0232** (0.018)	0.11
Supply of bank loans		
Tangible fixed assets/total assets(t-1)	2.4367*** (0.000)	0.01
Banks' market power	-0.9812*** (0.002)	0.01
Default risk	0.000042 (0.831)	0.01
Log(GDP)	-0.0886** (0.014)	0.09
Reciprocal of total assets in the loan demand equation	340228.0*** (0.000)	1156.15
Reciprocal of total assets in the loan supply equation	211297.2*** (0.000)	2170.12
S.D. of demand equation	1.5322*** (0.000)	0.01
S.D. of supply equation	0.4688*** (0.000)	0.01
Correlation coefficient	0.6749*** (0.000)	0.07
Log likelihood	158955	
Observations	278.073	
Number of firms	30.897	

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

TABLE 3. PERCENTAGE OF BORROWING CONSTRAINED FIRMS

Time	*%*
Entire period (1994-2002)	33,90
1994	34,62
1995	31,88
1996	34,22
1997	32,30
1998	34,25
1999	34,93
2000	35,16
2001	34,14
2002	33,60

TABLE 4. FINANCING CONSTRAINTS, BANK LOANS, INVESTMENT AND CASH FLOW: BREAKDOWN BY SAMPLE ASSETS QUARTILES

ALL SMEs			
	Constrained	**Unconstrained**	**Differences in means: constrained vs. unconstrained (p-values)**
Bank loans/total liabilities	0.227	0.206	0.128
Capital expenditure$_t$/ capital$_{t-1}$	0.309	0.346	0.041*
Cash flow$_t$/ capital$_{t-1}$	0.428	0.507	0.039*
Cash flow-investment correlation	0.742	0.481	0.002*
FIRST QUARTILE			
	Constrained	**Unconstrained**	**Differences in means: constrained vs. unconstrained (p-values)**
Bank loans/total liabilities	0.212	0.151	0.006*
Capital expenditure$_t$/ capital$_{t-1}$	0.267	0.304	0.010*
Cash flow$_t$/ capital$_{t-1}$	0.316	0.541	0.011*
Cash flow-investment correlation	0.911	0.844	0.041*
SECOND QUARTILE			
	Constrained	**Unconstrained**	**Differences in means: constrained vs. unconstrained (p-values)**
Bank loans/total liabilities	0.227	0.202	0.013*
Capital expenditure$_t$/ capital$_{t-1}$	0.289	0.320	0.009*
Cash flow$_t$/ capital$_{t-1}$	0.401	0.488	0.005*
Cash flow-investment correlation	0.568	0.483	0.007*
THIRD QUARTILE			
	Constrained	**Unconstrained**	**Differences in means: constrained vs. unconstrained (p-values)**
Bank loans/total liabilities	0.249	0.221	0.021*
Capital expenditure$_t$/ capital$_{t-1}$	0.344	0.336	0.132
Cash flow$_t$/ capital$_{t-1}$	0.467	0.516	0.011*
Cash flow-investment correlation	0.415	0.353	0.016*
FOURTH QUARTILE			
	Constrained	**Unconstrained**	**Differences in means: constrained vs. unconstrained (p-values)**
Bank loans/total liabilities	0.202	0.200	0.225
Capital expenditure$_t$/ capital$_{t-1}$	0.355	0.399	0.081*
Cash flow$_t$/ capital$_{t-1}$	0.559	0.538	0.033*
Cash flow-investment correlation	0.427	0.356	0.016*
* Differences in means are significant at the 5% level or lower.			

TABLE 5. FINANCING CONSTRAINTS, BANK LOANS, INVESTMENT AND CASH FLOW: BREAKDOWN BY SECTOR

Sector	*% borrowing constrained firms*	*Bank loans/total liabilities*	*Capital expenditure$_t$ / capital$_{t-1}$*	*Cash flow$_t$/ capital$_{t-1}$*	*Cash flow-investment correlation*
MANUFACTURES OF FOOD PRODUCTS AND BEVERAGES	26,29	0.208	0.348	0.523	0.421
MANUFACTURES OF TEXTILES AND DRESSING	41,73	0.243	0.287	0.341	0.404
MANUFACTURES OF WOOD, PAPER, PRINTING AND RECORDED MEDIA PRODUCTS	39,00	0.237	0.312	0.346	0.599
MANUFACTURES OF CHEMICAL, PLASTIC, MINERAL AND METAL PRODUCTS	35,29	0.232	0.302	0.382	0.577
MANUFACTURES OF MACHINERY AND EQUIPMENT AND TRASNSPORT VEHICLES	25,22	0.199	0.336	0.588	0.503
MANUFACTURES OF FURNITURE AND RECYCLING	34,89	0.236	0.301	0.411	0.437
ELECTRICITY, GAS AND WATER SUPPLY	24,36	0.218	0.351	0.603	0.557
CONSTRUCTION	22,43	0.240	0.353	0.449	0.634
SALE, MAINTENANCE AND REPAIR OF MOTOR VEHICLES	41,75	0.246	0.328	0.423	0.614
WHOLESALE TRADE AND COMISSION TRADE	39,85	0.237	0.303	0.351	0.329
HOTELS AND RESTAURANTS	48,43	0.251	0.317	0.488	0.555
TRANSPORT SERVICES	21,31	0.197	0.303	0.538	0.329
REAL STATE ACTIVITIES	30,46	0.207	0.298	0.403	0.346
RENTING OF MACHINERY AND EQUIPMENT	32,14	0.213	0.304	0.416	0.530
COMPUTER AND RELATED ACTIVITIES	37,44	0.220	0.331	0.374	0.587
OTHER RETAIL TRADE PRODUCTS AND SERVICES	30,36	0.204	0.311	0.412	0.431
OTHER	33,33	0.211	0.321	0.502	0.488

TABLE 6. UNCONSTRAINED FIRMS: PANEL DATA GRANGER PREDICTABILITY TESTS. FIRM FINANCING AND INVESTMENT (FULL EQUATIONS) (1994-2002)

2SLS with instrumental variables. (95% significance level)

(p-values in parentheses)

Standard errors are clustered at the regional level

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	Bank loans/total liabilities	*Capital expenditure/ capital$_{t-1}$*	*Capital expenditure/ capital$_{t-1}$*	*Payables turnover*	*Capital expenditure/ capital$_{t-1}$*	*Accounts payable/ total liabilities*
Constant	0.01879* (0.014)	0.03822* (0.018)	0.03744* (0.026)	-0.02154* (0.038)	0.03259* (0.021)	0.01871* (0.031)
Dependent variable$_{t-1}$	0.02681* (0.031)	0.03644* (0.029)	0.02559* (0.035)	-0.01151* (0.036)	0.02154* (0.026)	-0.03325* (0.022)
(Capital expenditure/ capital$_{t-1}$)$_{t-1}$	0.6828 (0.119)	-	-	0.03448 (0.226)	-	0.02663 (0.441)
Bank loans/total liabilities$_{t-1}$	-	0.22148** (0.002)	-	-	-	-
Receivables turnover$_{t-1}$	-	-	-	-	-	-
(Accounts receivable/ total assets)$_{t-1}$	-	-	-	-	-	-
Payables turnover$_{t-1}$	-	-	0.12364 (0.237)	-	-	-
(Accounts payable/ total liabilities)$_{t-1}$	-	-	-	-	0.11457 (0.416)	-
Interbank interest rates	-0.01250* (0.027)	-0.01854* (0.019)	-0.01481* (0.022)	-0.01264 (0.188)	-0.01328** (0.009)	-0.02256 (0.230)
Cash flow$_t$/ capital$_{t-1}$	0.02319 (0.126)	0.4921** (0.005)	0.26142** (0.003)	-0.30234 (0.221)	0.22594** (0.008)	-0.25481 (0.137)
Sales growth	0.0326 (0.213)	0.01241* (0.043)	0.01029* (0.037)	-0.02314 (0.186)	0.00985* (0.036)	-0.02114 (0.238)
Defaults in commercial paper	-0.01977* (0.043)	-0.01882* (0.031)	-0.01633* (0.029)	-0.03140* (0.025)	-0.01884* (0.022)	-0.01477* (0.021)
F-test for overall significance (p-value)	0.092	0.002	0.045	0.058	0.034	0.067
Sargan test (p-value)	0.129	0.149	0.187	0.123	0.202	0.152

* significantly different from zero at 5% level

** significantly different from zero at 1% level

TABLE 7. CONSTRAINED FIRMS: PANEL DATA GRANGER PREDICTABILITY TESTS. FIRM FINANCING AND INVESTMENT (FULL EQUATIONS) (1994-2002)

2SLS with instrumental variables. (95% significance level)

(p-values in parentheses)

Standard errors are clustered at the regional level

	(1) *Bank loans/total liabilities*	*(2)* *Capital expenditure$_t$/ capital$_{t-1}$*	*(7)* *Capital expenditure$_t$/ capital$_{t-1}$*	*(8)* *Payables turnover*	*(9)* *Capital expenditure$_t$/ capital$_{t-1}$*	*(10)* *Accounts payable/ total liabilities*
Constant	0.01359* (0.026)	0.02639* (0.011)	0.04118* (0.031)	-0.02881* (0.021)	0.04339* (0.016)	0.02663* (0.028)
Dependent variable$_{t-1}$	0.03308* (0.012)	0.02541* (0.023)	0.02661* (0.041)	-0.06224* (0.011)	0.01772* (0.031)	-0.05544* (0.022)
(Capital expenditure$_t$/ capital$_{t-1}$)$_{t-1}$	0.34290 (0.193)	-	-	0.01238 (0.267)	-	0.01091 (0.347)
Bank loans/total liabilities$_{t-1}$	-	0.12088 (0.210)	-	-	-	-
Receivables turnover$_{t-1}$	-	-	-	-	-	-
(Accounts receivable/ total assets)$_{t-1}$	-	-	-	-	-	-
Payables turnover$_{t-1}$	-	-	0.53652** (0.003)	-	-	-
(Accounts payable/ total liabilities)$_{t-1}$	-	-	-	-	0.61178** (0.002)	-
Interbank interest rates	-0.01358** (0.020)	-0.03539* (0.029)	-0.01788* (0.018)	-0.02504 (0.142)	-0.01880* (0.031)	-0.03348 (0.352)
Cash flow$_t$/ capital$_{t-1}$	0.03626 (0.139)	0.50244** (0.004)	0.28440** (0.004)	-0.42115 (0.336)	0.25447** (0.004)	-0.3351 (0.371)
Sales growth	0.01841 (0.151)	0.01327* (0.034)	0.01661* (0.041)	-0.00343 (0.533)	0.01541* (0.032)	-0.00256 (0.215)
Defaults in commercial paper	-0.02150* (0.022)	-0.02366 (0.033)	-0.02644* (0.014)	-0.05607* (0.035)	-0.01771* (0.031)	-0.02270* (0.033)
F-test for overall significance (p-value)	0.061	0.003	0.003	0.052	0.003	0.079
Sargan test (p-value)	0.136	0.151	0.191	0.158	0.121	0.186

* significantly different from zero at 5% level

** significantly different from zero at 1% level

TABLE 8. THE ROLE OF UNCONSTRAINED FIRMS AS LENDERS: PANEL DATA GRANGER PREDICTABILITY TESTS (FULL EQUATIONS) (1994-2002)

2SLS with instrumental variables. (95% significance level)

(p-values in parentheses)

Standard errors are clustered at the regional level

	UNCONSTRAINED FIRMS				***CONSTRAINED FIRMS***			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
	Bank loans/total liabilities	*Receivables turnover*	*Bank loans/total liabilities*	*Accounts receivable/ total assets*	*Bank loans/total liabilities*	*Receivables turnover*	*Bank loans/total liabilities*	*Accounts receivable/ total assets*
Constant	0.04669* (0.022)	-0.24200* (0.039)	0.03274* (0.031)	-0.03370 (0.131)				
Dependent variable$_{t-1}$	0.02344* (0.027)	0.25879* (0.014)	0.02482* (0.031)	0.02355* (0.022)	0.03228* (0.031)	-0.35571* (0.042)	0.05158* (0.021)	-0.07226* (0.036)
(Capital expenditure$_t$/ capital$_{t-1}$)$_{t-1}$	-	-	-	-	0.03025* (0.022)	0.20152* (0.011)	0.02361* (0.018)	0.01554* (0.013)
Bank loans/total liabilities $_{t-1}$	-	0.85987** (0.001)	-	0.63685** (0.003)	-	-	-	-
Receivables turnover $_{t-1}$	0.02360 (0.288)	-	-	-	-	0.23590 (0.129)	-	0.16307 (0.258)
(Accounts receivable/ total assets)$_{t-1}$	-	-	0.02057 (0.441)	-	0.01058 (0.328)	-	-	-
Payables turnover $_{t-1}$	-	-	-	-	-	-	0.01025 (0.352)	-
(Accounts payable/ total liabilities)$_{t-1}$	-	-	-	-	-	-	-	-
Interbank interest rates	-0.01327* (0.025)	0.02328 (0.126)	-0.01217* (0.021)	0.03391 (0.266)	-	-	-	-
Cash flow$_t$/ capital$_{t-1}$	0.01807 (0.139)	0.02699 (0.126)	0.01397 (0.103)	0.02152 (0.243)	-0.01458* (0.026)	0.03147 (0.390)	-0.01380* (0.016)	0.06781 (0.134)
Sales growth	0.02448 (0.321)	0.01255* (0.040)	0.03658 (0.423)	0.01650* (0.032)	0.01743 (0.164)	0.02170 (0.153)	0.01746 (0.302)	0.01583 (0.393)
Defaults in commercial paper	-0.02018* (0.032)	-0.01233** (0.005)	-0.01641* (0.040)	-0.01399** (0.002)	0.02148 (0.258)	0.01436* (0.031)	0.04473 (0.250)	0.02669* (0.022)
F-test for overall significance (p-value)	0.049	0.003	0.061	0.004	-0.0315* (0.048)	-0.01662 (0.003)	-0.24733 (0.031)	-0.01844* (0.017)
Sargan test (p-value)	0.151	0.132	0.125	0.246	0.058	0.044	0.058	0.048

* significantly different from zero at 5% level

** significantly different from zero at 1% level

APPENDIX A: COMPUTING PROBABILITIES FROM THE DISEQUILIBRIUM MODEL OF FIRM FINANCING CONSTRAINTS

According to the results from the disequilibrium model in section 4.1., a firm is defined as financially constrained in year *t* if the probability that the desired amount of bank credit in year *t* exceeds the maximum amount of credit available in the same year is greater than 0.5. Following Gersovitz (1980), the probability that firm will face a financial constraint in year is derived as follows:

$$\Pr(loan_{it}^{d} > loan_{it}^{s}) = \Pr(X_{it}^{d}\beta^{d} + u_{it}^{d} > X_{it}^{s}\beta^{s} + u_{it}^{s}) = \Phi\left(\frac{X_{it}^{d}\beta^{d} - X_{it}^{s}\beta^{s}}{\sigma}\right) \qquad \text{(A1)}$$

where X_{it}^{d} and X_{it}^{s} denote the variables that determine firms' loan demand and the maximum amount of credit available to firms, respectively. The error terms are assumed to be distributed normally, $\sigma^2 = \text{var}(u_{it}^{d} - u_{it}^{s})$, and $\Phi(.)$ is a standard normal distribution function. Since $E(loan_{it}^{d}) = X_{it}^{d}\beta^{d}$ and $E(loan_{it}^{s}) = X_{it}^{s}\beta^{s}$, $\Pr(loan_{it}^{d} > loan_{it}^{s}) > 0.5$, if and only if $E(loan_{it}^{d}) > E(loan_{it}^{s})$.

APPENDIX B. SUMMARY OF PANEL DATA GRANGER PREDICTABILITY TESTS (1-3 LAGS). FIRM FINANCING AND INVESTMENT: UNCONSTRAINED FIRMS VS. CONSTRAINED FIRMS. (1994-2002)

2SLS with instrumental variables. (95% significance level)
Standard errors are clustered at the regional level

UNCONSTRAINED FIRMS					
"Bank loans/total liabilities" predicts "Capital expenditure$_t$ / capital$_{t-1}$"			***"Capital expenditure$_t$ / capital$_{t-1}$"predicts "Bank loans/total liabilities"***		
	Lags (l)	F test		Lags (l)	F test
YES	1	10.13	*NO*	1	0.02
YES	2	11.25	*NO*	2	0.09
YES	3	7.80	*NO*	3	0.71
"Bank loans/total liabilities" predicts "Receivables turnover"			***"Receivables turnover" predicts "Bank loans/total liabilities"***		
	Lags (l)	F test		Lags (l)	F test
YES	1	11.02	*NO*	1	0.11
YES	2	4.26	*NO*	2	0.17
YES	3	6.89	*NO*	3	0.10
"Bank loans/total liabilities" predicts "Account receivables/total assets"			***"Account receivables/total assets" predicts "Bank loans/total liabilities"***		
	Lags (l)	F test		Lags (l)	F test
YES	1	11.02	*NO*	1	0.12
YES	2	4.26	*NO*	2	0.14
NO	3	0.89	*NO*	3	0.16
"Payables turnover" predicts "Capital expenditure$_t$ / capital$_{t-1}$"			***"Capital expenditure$_t$ / capital$_{t-1}$" predicts "Payables turnover"***		
	Lags (l)	F test		lags (l)	F test
NO	1	0.21	*NO*	1	0.09
NO	2	0.16	*NO*	2	0.07
NO	3	0.08	*NO*	3	0.17
"Accounts payable/total liabilities" predicts "Capital expenditure$_t$ / capital$_{t-1}$"			***"Capital expenditure$_t$ / capital$_{t-1}$" predicts "Accounts payable/ total liabilities"***		
	Lags (l)	F test		lags (l)	F test
NO	1	0.32	*NO*	1	0.06
NO	2	0.11	*NO*	2	0.04
NO	3	0.02	*NO*	3	0.14
CONSTRAINED FIRMS					
"Bank loans/total liabilities" predicts "Capital expenditure$_t$ / capital$_{t-1}$"			***"Capital expenditure$_t$ / capital$_{t-1}$" predicts "Bank loans/total liabilities"***		
	Lags (l)	F test		lags (l)	F test
NO	1	0.21	*NO*	1	0.03
NO	2	0.08	*NO*	2	0.07
NO	3	0.16	*NO*	3	0.09
"Bank loans/total liabilities" predicts "Receivables turnover"			***"Account receivables/total assets" predicts "Bank loans/total liabilities"***		
	Lags (l)	F test		lags (l)	F test
NO	1	0.08	*NO*	1	0.08
NO	2	0.09	*NO*	2	0.09
NO	3	0.11	*NO*	3	0.12
"Bank loans/total liabilities" predicts "Account receivables/total assets"			***"Account receivables/total assets" predicts "Bank loans/total liabilities"***		
	Lags (l)	F test		lags (l)	F test
NO	1	0.02	*NO*	1	0.06
NO	2	0.06	*NO*	2	0.05
NO	3	0.09	*NO*	3	0.04
"Payables turnover " predicts "Capital expenditure$_t$ / capital$_{t-1}$"			***"Capital expenditure$_t$ / capital$_{t-1}$" predicts "Payables turnover/ total liabilities"***		
	Lags (l)	F test		lags (l)	F test
YES	1	9.59	*NO*	1	0.07
YES	2	11.42	*NO*	2	0.05
YES	3	6.27	*NO*	3	0.03
"Accounts payable/total liabilities" predicts "Capital expenditure$_t$ / capital$_{t-1}$"			***"Capital expenditure$_t$ / capital$_{t-1}$" predicts "Accounts payable/ total liabilities"***		
	Lags (l)	F test		lags (l)	F test
YES	1	11.16	*NO*	1	0.03
YES	2	8.19	*NO*	2	0.04
NO	3	0.05	*NO*	3	0.06

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