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THE ROLE OF BANKS IN RELAXING FINANCIAL CONSTRAINTS: SOME EVIDENCE ON THE INVESTMENT BEHAVIOR OF SPANISH FIRMS *

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Abstract

There is a growing body of evidence in the literature suggesting that the financial healh of a firm is likely to affect its investment behavior. This sort of capital market imperfection is often attributed to information problems that typically arise when debt and equity are diffusely held and no individual investor has an incentive to monitor the firm. We find that the neoclassical investment model cannot be rejected for a sample of Spanish firms with a close bank relationship while it is rejected for the subsample made up with the remaining firms. An augmented model incorporating borrowing constraints yields the opposite results. These results suggest that banks may play a role in alleviating capital market imperfectios in Spain. A second finding is that the effects of borrowing constraints in the augmented model vary only with the firm's cash flow, but not with the asset liquidity or the firm's financial health.

Key Words and Phrases
Borrowing constraint, Investment, Monitoring bank.

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1 Introduction

There is a growing body of evidence in the literature suggesting that the financial health of a firm is likely to affect its investment behavior. This sort of capital market imperfection is often attributed to information problems that typically arise when debt and equity are diffusely held and no individual investor has an incentive to monitor the firm. The purpose of this paper is to test the hypothesis that banks can compensate for capital market imperfections due to asymmetric information.

Most of the available evidence (e.g., Kaplan and Minton, 1994; Roe, 1994; among others) on the role of banks as monitors comes from the US and Japan. Firms in these countries provide good examples of extreme cases of corporate governance. US firms tend to rely on anonymous investors more heavily than firms in other countries[1]. Constraints imposed by regulatory barriers (Glass-Steagall Banking Act) imply that the banks cannot exercise close monitoring and, indeed, the objective of such legislation is that the banks should not have a significant influence over a client firm's decisions. In the case of Japanese firms the main control over managers often comes not from large shareholders, but from the so-called "main bank", which is simultaneously a large shareholder and the principal lender. In any event, both the US and Japan are very developed countries with large, liquid and developed capital markets[2]. The case of Spain is interesting because it is an intermediate case between these two countries.

1.1 The role of banks as monitors

A number of reasons have been proposed to support the view that firms with a close bank relationship are more likely to avoid or mitigate information problems that typically arise when debt and equity are diffusely held and no individual investor has an incentive to monitor the firm. Authors such as Jensen and Meckling (1976) argue that incentive problems raise the cost of external finance. Outside financing dilutes management's ownership stake, thereby exacerbating

[1]Among financial institutions it is only US insurance firms and pension and mutual funds which are comparatively important shareholders; in particular, banks' holdings are especially small (0.3 per cent in 1995). By contrast, in Japan the ownership of exchange-listed firms by banks is very important (26.7 per cent in 1995).

[2]In other OECD member countries such as Germany (OECD 1995b, Cable 1985), banks also seem to have traditionally played a greater monitoring rule.

incentive problems that arise when managers control the firm, but do not own it.

Supporters of the hypothesis that banks can compensate for capital market imperfections caused by asymmetric information, point out the innate advantage that bank-based monitoring has in reducing the information problem. Diamond (1984), among others (see also Broecker, 1990 and Mayer, 1996), argues that banks serve as corporate monitors which bear the costs of becoming informed about their client firms and ensure that these make efficient business decisions.

In principle, banks have the same incentive to monitor concentrated claims as other stakeholders. However, various arguments have been given to support the hypothesis that banks are better monitors than other stakeholders. Firstly, by lending short term, the borrower is forced to come back regularly to the banks for funds, whereas equity never has to be repaid. Secondly, the incentive to monitor is enhanced to the extent that, because intermediated loans are less standardized than other debt, they are less liquid and likely to be held longer (Prowse, 1994). It has been also argued, that banks are, to a large extent, concerned only with default risk, implying that their interests may diverge from those of shareholders.

Hoshi et al. (1996) and James and Wier (1987) are empirical works that find support for the hypothesis that the banks can reduce the information problems. Hoshi et al. use the forward-looking information in Tobin's q, whilst James and Wier document a more positive share price response for firms that announce that they have borrowed money from a bank than for firms that issue bonds. James and Wier interpret this finding as evidence that banks exercise the monitoring function, while public bondholders do not. Although these results are consistent with our findings, there is clearly more work to be done on how banks affect firms' real business decisions.

1.2 Spanish Financial Markets

Spain has a more mixed system of corporate governance than the US and Japan, that is, unlike US banks, Spanish banks hold large stakes in some sectors[3] but their role in disciplining management and monitoring performance does not seem to be as important as it is in Japan

[3]For instance the electricity and telecommunications sectors.

or Germany. The Spanish financial system may be seen as a hybrid model, lying somewhere between the Japanese and German models, on the one hand, and the US model on the other.

Furthermore, the Spanish capital market is somewhat less developed than in these other countries. Thus, it may be argued that the existence of capital market imperfections is more plausible in this case. Financial markets in Spain are not yet fully developed, in the sense that most firms cannot get funds through bond and share issues. Obtaining bank loans is, in practice, the only source of external finance for many firms. The flow of funds to the firms quoted on the Stock Market is very small as compared to debt finance (see Bergés et al., 1989). The share and debt markets are less developed than in countries such as the USA and the United Kingdom. The financial institutions are the main source of financial resources for firms (as in Germany and Japan), with the banks being the principal offerent of credit for the firm. According to García Cestona (1996) and OECD data, Spanish firms have relied on banks as the main source of external finance for the period 1983-1992.

The ownership structure of the sample of Spanish firms is similar to the structure found in many European countries, in the sense that the separation of ownership and management is not as radical as in the US. This feature means than the separation of ownership from control in the firm is not likely to create important governance problems, because the control group can exercise a close vigilance over the managers' behavior and mitigate the agency problem. Gálvez and Salas (1995) have shown that the ownership structure and control of Spanish firms is similar to the European structure, with share ownership being very concentrated. In the light of this, the discussion in Spain should not be so much on the implication of a separation between ownership and control derived from limited shareholder concentration, but on the implications for efficiency of the nature of the control group, in our case, the banks [4]. These authors observed a predominance of the group holding and/or financial corporation as the control group, although a notable family and individual firm presence was still maintained.

[4]Gálvez and Salas (1992) found that, in 1990, the principal shareholder in the quoted Spanish firms was a national firm in 27 percent of the cases, a family or individual in 26.1 percent, a banking entity in 25.1 percent, a foreign firm in 17.4 percent, and the public sector in 2.2 percent of the firms.

1.3 Methodology

All models that assume some sort of information problem in the capital market conclude that more liquid firms should invest more. These models also predict that liquidity is irrelevant when there are no information problems. These predictions have led to authors such as Fazzari, Hubbard and Petersen (1988) to adopt the following methodology. Firms are divided into two groups according to their a priori beliefs about whether a firm faces information problems in the capital market. Then the null hypothesis that liquidity does not affect investment behavior is tested for each group of firms. Following this line, Hoshi, Kashyap and Scharfstein (1996) suggest using the forward-looking information in Tobin's q, the ratio of the market value of the firm to the replacement cost of its assets, to finally distinguish constrained firms from unconstrained ones. The theory predicts that, if liquidity constraints are unimportant, Tobin's q should be the only determinant of investment. They examine two sets of Japanese firms according to whether they have close financial ties with a main bank or not and they find that the firms with weaker links to a main bank presumably face greater problems raising capital.

Tobin's q has some well known problems. The marginal q is not directly observable, and there are concerns that observed stock market valuations may not accord with the predictions of the efficient markets hypothesis (due either to irrational behavior or to the very problems of asymmetric information stressed in alternative models). These problems can be avoided by using an estimation strategy developed by Whited (1992) and based on the Euler equation representation of firms' investment decisions. The starting point is a comparison of the investment behavior of one set of firms for which the neoclassical model is assumed to hold, with the investment behavior of another set for which "financial constraints" are assumed to be important. Using this approach we construct two samples based on the percentage of firm's shares owned by a bank. Firms with a close bank relationship are assumed, a priori, to be more likely to face capital-market frictions. This hypothesis would be true if bank monitoring can mitigate market imperfections.

1.4 Findings

This paper shows some evidence on the existence of financial constraints for those firms without a close bank relationship from a sample of Spanish manufacturing firms quoted in the period 1991-1994. For the rest of the sample the neoclassical investment model is not rejected. Using firm-level panel data, the Euler equation for investment fits well for firms with a close bank relationship or what amounts to the same thing, the Euler equation will be observationally equivalent to the unconstrained Euler equation obtained under the assumption of perfect financial markets. However, the Euler equations for the rest of the firms (those without a close relationship) will differ from the unconstrained Euler equation; that is, the orthogonality conditions implied by the standard model are decisively rejected for firms without a close bank relationship.

In trying to further understand this finding, we examine the particular type of financing constraint that the firms face. We find that the effects of borrowing constraints in our extended model (constrained Euler equation) vary only with firms' individual fortunes (cash flows), but not with the firm's financial health, that is, variables that measure the firm's lack of collateral and the likelihood of financial distress. The recent literature[5] emphasizes the spread between risky and default-risk-free interest rates as a measure of the tightness of overall borrowing conditions. Thus, we parameterize borrowing constraints so that both, a firm's own cash flow and these spreads, may affect the extent to which the constraints are binding. It is found that, as expected, a greater availability of internal finance (cash flow) reduces the impact of financial constraints on investment. However, the financial health of the firm does not seem to affect the impact of the constraint on investment. The Spanish evidence shows how the financially constrained firms' investment behavior seems to be affected by their financial structure (debt, liquidity of assets...)[6].

The rest of the paper is organized as follows. In the next Section, we describe the institutional

[5] See Gertler, Hubbard and Kashyap (1991) and Kashyap, Stein and Wilcox (1993) for further discussion of the information content of the spread.

[6] Estrada y Vallés (1995) obtain an alternative model of investment, where the credit offer depends not only on the level of debt, but also on the level of the firm's liquid assets. This finding differs from that of Alonso-Borrego (1994), who accepts the Bond and Meguir model only for the Spanish dividend-paying firm, and also finds that these firms have a negative external financial premium.

features of Spanish corporate finance that enable us to analyze the effects of information problems on investment. Section 3 derives an investment model based on the Euler equation corresponding to firms' intertemporal optimization problems for capital accumulation. In the presence of financial constraints, the Euler equation contains testable implications for alternative models. In Section 4, we describe the econometric specifications necessary to obtain the investment equations to be estimated. The data and our empirical tests are reported in Section 5. Section 6 concludes the paper with a review of the results we have obtained.

2 A neoclassical investment model

In this section we present two dynamic investment models. The first is a standard neoclassical investment model that assumes perfect capital markets. The Euler equation corresponding to the firms' intertemporal optimization problems for capital accumulation yields an investment equation representing investment behavior as a function of only non financial variables. Secondly, we modify the model to account for the presence of financial constraints and we derive a new set of investment equations in which financial variables may affect investment.

2.1 A neoclassical investment model with perfect capital markets

Let's consider first a neoclassical environment in which all agents are risk neutral[7], managers act on behalf of the shareholders and aim to maximize the value of their firms. Because of the well known Modigliani and Miller results we do no explicitly consider the issue for new shares. All new investment is financed through retained earnings and/or debt. The model is of partial equilibrium, in the sense that the behavior of the financial sector is taken as exogenous. Additionally, at any time t, all present variables are known to the firm with certainty, although all future variables are stochastic. Finally, the firms are assumed to have rational expectations.

Each firm maximizes the present value of the current and future internal resources (IR_t),

[7]We suppose that the possible relation between finance and investment does not necessarily mean risk aversion

$$V_t(K_{t-1}) = E_t \sum_{s=0}^{\infty} \beta_{t+s} IR_{t+s}, \quad (1)$$

where β_{t+s} is the discount factor between t and $t+s$, (that is $\beta_{t+s} = IR_{n=1}^{s}(1 + r_{t+n})^{-1})$[8]. The firm maximizes equation (1) subject to two constraints. The first is of a financial nature, where the resources generated by the company are devoted to the payment of the contracted debt in the previous period, and the other resources can be distributed as dividends or become part of the firms' equity. That is, internal resources cannot be negative,

$$IR_{t+s} \geq 0. \quad (2)$$

The technological restriction is the capital stock accounting identity,

$$K_t = I_t + (1 - \delta)K_{t-1} \quad (3)$$

where K_t is the capital stock of the firm at the end of time t, I_t, is its investment at time t, and δ is the constant rate of economic depreciation.

The results of the firm satisfy the following equality in each period, namely

$$IR_t = (1 - \tau)(R(K_t, N_t, I_t) - r_{t-1}D_{t-1}) + D_t - (1 - \pi_t^e)D_{t-1} - q_t I_t, \quad (4)$$

where,

N_t = a vector of variable factors of production for the firm at time t.

w_t = a vector of real factor prices at time t.

D_t = the real value of outstanding net debt for the firm at time t.

r_t = the nominal interest rate paid at time t.

π_t^e = the expected inflation rate at time t.

q_t = the real effective price of capital goods at time t.

τ = the corporate income tax.

$R(K_t, N_t, I_t)$ is the firm's revenue function (that is, it does not include investment expenditures), which depends on K_t, N_t and I_t.

$$R(K_t, N_t, I_t) = p_t(F(K_t, N_t) - \Psi(I_t, K_t)) - w_t N_t, \quad (5)$$

[8]The discount factor in a given period is the rate which the investors (shareholders) apply to their expected equity return.

where $F(K_t, N_t)$ is the production function, which is assumed to be a concave and homogeneous function of degree one in K and N. $\Psi(I, K)$ is a function of quadratic adjustment costs of the investment, defined in terms of output loss (so that net output is given by $Y = F - G$). We assume increasing and convex adjustment costs, that is, the faster the rate of gross investment, the greater the productivity lost to devoting resources to the installation of new capital goods. Finally, $w_t N_t$, is the nominal cost of the variable inputs (labor costs plus cost of intermediate inputs).

We impose the transversality condition which prevents the firm from borrowing an infinite amount,

$$\lim_{T\to\infty} \left[\prod_{j=0}^{T-1} \beta_j\right] D_t = 0, \forall t. \tag{6}$$

Let λ_t be the series of Lagrange multipliers associated with constraint (2). Substituting (4) into (2) and using the capital stock accounting identity (3), the first-order conditions for the capital stock (K_t) and the stock of net external debt (D_t) for the firm can be calculated as

$$\beta_t \quad E_t \quad \left[\frac{(1+\lambda_{t+1})}{(1+\lambda_t)}(1-\delta)\left((1-\tau)(-p_{t+1})\psi_I(K_t, I_t) - q_{t+1}\right)\right]$$

$$= \quad p_t\left(F_K(K_t N_t) - \psi_K(K_t, I_t) - \psi_I(K_t, I_t)\right) - q_t, \tag{7}$$

$$(1+\lambda_t) - \beta_t(1+(1-\tau)r_t - \pi_t^e)E_t(1+\lambda_{t+1}) \;=\; 0. \tag{8}$$

Equation (7) shows that the current value of an investment unit must be equal to expected profits for each firm. Equation (8) equates the appropriately discounted marginal internal resources over time. Under the assumptions of risk neutrality and perfect capital markets, the after-tax return on debt must equal the required return on internal resources of the equity of the firm. Note that this condition implies an indeterminate capital structure.

If the generated resources are strictly positive, then $\lambda_t = \lambda_{t+1} = 0$, and the intertemporal rate of discount of each firm would be equal to the inverse of effective interest rate on debt. On the other hand, if the non-negativity constraint on generated resources is not binding today, but is expected to bind tomorrow, the firm can save, thereby transferring current resources to the next period, where they are more needed, and $\lambda_t = E_t\lambda_{t+1} \neq 0$.

So, in order to estimate the equation under the assumption of perfect capital markets, we assume that either the generated resources constraints (IR_t) is verified with strict inequality being β_t the inverse of the effective interest rate, or we suppose that the conditional covariance between the shadow cost associate with such restriction (λ_{t+1}) and the variable in $t+1$ is constant. In either event, the following rule of optimum investment is obtained:

$$\frac{1}{1+(1-\tau)r_t-\pi_t^e}E_t\left[\frac{(1+\lambda_{t+1})}{(1+\lambda_t)}(1-\delta)\left((1-\tau)(-p_{t+1})\psi_I(K_t,I_t)-q_{t+1}\right)\right]$$

$$-p_t\left(F_K(K_tN_t)-\psi_K(K_t,I_t)-\psi_I(K_t,I_t)\right)+q_t = 0. \quad (9)$$

2.2 A Model with financial constraints

In order to analyze how the standard neoclassical investment model would be modified in the presence of financial constraints, we add an additional constraint to the initial problem, namely

$$D_t \leq D_t^*, \quad (10)$$

where D_t^* is the exogenously given maximum amount of outstanding debt set for the firm at time t. This additional constraint has been used by some authors, such as Whited (1992) [9]. We assume that the firm takes that the lending sector determines its level each period according to an assessment of the firm's ability to repay. This series of exogenous constraints implies that the firm cannot affect its credit limit.

Let α_t be the multiplier associated with constraint (10). The new first order condition for the stock of net external debt analogous to (8), for each firm results:

$$(1+\lambda_t)-\beta_t(1+(1-\tau)r_t-\pi_t^e)E_t(1+\lambda_{t+1})-\alpha_t = 0. \quad (11)$$

where either $\alpha_t = 0$ or $D_t = D_t^*$ (or both).

To understand the effect of the financial constraint on the allocation of investment, substituting (11) into (7), the first order conditions for the capital stock (K_t), one obtains,

$$\frac{\beta_t}{1+\alpha_t+E_t\lambda_{t+1}} \quad E_t \quad \left[(1+\lambda_{t+1})(1-\delta)\left((1-\tau)(-p_{t+1})\psi_I(K_t,I_t)-q_{t+1}\right)\right]$$

[9] Following Whited (1992), we assume that the firm takes D_t^* as given, and that the lending sector determines its level each period, according to an assessment of the firm's ability to repay.

$$- \quad p_t\left(F_K(K_t N_t) - \psi_K(K_t, I_t) - \psi_I(K_t, I_t)\right) + q_t \;=\; 0. \tag{12}$$

Compared to an unconstrained firm, a firm facing a binding liquidity constraint, $\alpha < 0$, incurs a higher marginal opportunity cost of investment today, versus delaying it until tomorrow. That is, the value of revenues from an extra unit of investment is forced to be higher today than tomorrow in the face of a binding constraint. It also suggests, all else being equal, that the firm will intertemporally substitute investment tomorrow for investment today.

3 Issues for econometric estimation

To estimate equations (9) and (12) we substitute the functional forms for the revenue function $F(\ )$ and the adjustment cost $\Psi(\ )$. $F(\ )$ is a homogeneous function of degree one and $\Psi(\ )$ is positive and convex in the gross investment. The traditional literature on Tobin's q and investment, Summers (1981) and Hayashi (1982), assumes that adjustment costs are linearly homogeneous in investment and capital, so that marginal and average "q" are equal. A convenient parameterization that adheres to these constraints is,

$$\psi(I_t, K_t) \;=\; \frac{b}{2}\left[\left(\frac{I}{K}\right)_t - v\right]^2 K_t, \tag{13}$$

where v can be interpreted as a "normal rate of investment". Substituting the parameterization above and substituting expectations by realizations plus an expectational error, yields the following neoclassical investment model under perfect capital markets (see Appendix II for details)[10]

$$\frac{1}{1+(1-\tau)r_t}\left[(1-\tau)(1-\delta)b\left(\left(\frac{I}{K}\right)_{t+1} - v\right) + \frac{q_{t+1}}{p_{t+1}}(1-\delta)\right]$$

$$+\frac{p_t}{p_{t+1}}\left[\left(\frac{CF}{K}\right)_t - b(v+1)\left(\frac{I}{K}\right)_t + b\left(\frac{I}{K}\right)_t^2 + vb\right] - \frac{q_t}{p_{t+1}} \;=\; e_{t+1}, \tag{14}$$

where $\left(\frac{CF}{K}\right)_t$ is the ratio of real cash flow to the capital stock and $\left(\frac{I}{K}\right)_t$ the ratio of investment to capital stock. On the other hand, we have replaced the expectation operator with a white noise expectational error, e_t where $E_t(e_{t+1}) = 0$ and $E_t(e_{t+1}^2) = \sigma_t^2$.

[10] For the estimate $\pi_t^e = 0$ although we have considered $\frac{p_t}{p_{t+1}}$, the price of the output in two consecutive periods.

The model is nonlinear in both the parameters and in the ratio of investment to capital. This requires estimation by the Generalized Method of Moments or GMM (Hansen (1982)). Rational expectations imply that the error in (14) should be orthogonal to any additional information known at time t. Therefore, any time t variable that is correlated with the variables in the regression will qualify as a valid instrument. If the error term is not orthogonal to the instruments, it should be rejected. The exact set of instrumental variables used is discussed below and shown in the tables which present our estimation results.

When the firm has market power in the goods market and assuming constant price elasticity of demand ϵ with $|\epsilon| < \infty$ and $\epsilon > 1$, both the marginal productivity and the marginal adjustment cost are multiplied by the term $\left(1 - \frac{1}{\epsilon}\right)$. One benefit of this specification is that it provides us with an estimated markup parameter that can be used to assess the model.

The model without financial constraints, and under the hypothesis of imperfect competition in the goods market, takes the following form[11]:

$$\frac{1}{1+(1-\tau)r_t}\left[(1-\tau)(1-\delta)b(1-\frac{1}{\epsilon})\left(\left(\frac{I}{K}\right)_{t+1}-v\right)+\frac{q_{t+1}}{p_{t+1}}(1-\delta)\right]+\frac{p_t}{p_{t+1}}(1-\frac{1}{\epsilon})$$

$$\left[\frac{\epsilon}{\epsilon-1}\left(\frac{CF}{K}\right)_t-\frac{1}{\epsilon-1}\left(\frac{Y}{K}\right)_t-b(v+1)\left(\frac{I}{K}\right)_t+b\left(\frac{I}{K}\right)_t^2+vb\right]-\frac{q_t}{p_{t+1}}=e_{t+1}. \quad (15)$$

This equation appears amplified with respect to equation (14) by the term $\left(\frac{Y}{K}\right)_t$, that is, the ratio of output to capital, and by the price elasticity of demand, ϵ.

Both investment equations are obtained under the hypothesis of perfect capital markets, that is to say, the non-negativity constraint on generated resources is not binding for two consecutive periods, or the shadow cost is no higher today than it is expected to be tomorrow ($\lambda_t \neq E_t\lambda_{t+1}$).

The alternative model estimated to test for the existence of financial constraints (equation 12), is as follows:

$$\frac{1-\Lambda_t}{1+(1-\tau)r_t}\left[(1-\tau)(1-\delta)b(1-\frac{1}{\epsilon})\left(\left(\frac{I}{K}\right)_{t+1}-v\right)+\frac{q_{t+1}}{p_{t+1}}(1-\delta)\right]+\frac{p_t}{p_{t+1}}(1-\frac{1}{\epsilon})$$

$$\left[\frac{\epsilon}{\epsilon-1}\left(\frac{CF}{K}\right)_t-\frac{1}{\epsilon-1}\left(\frac{Y}{K}\right)_t-b(v+1)\left(\frac{I}{K}\right)_t+b\left(\frac{I}{K}\right)_t^2+vb\right]-\frac{q_t}{p_{t+1}}=e_{t+1}. \quad (16)$$

[11]See Appendix II

Here, we have re-normalized the relative shadow cost by defining the term,

$$\Lambda_t = 1 - \frac{(1+\lambda_{t+1})}{(1+\lambda_t)} \qquad (17)$$

In the absence of any constraints on outside finance, this variable should equal zero.

One requirement for estimating (16) is a specification for the term Λ_t. Under the hypothesis of perfect capital markets, $\Lambda_t = 0$, given that $\lambda_t = \lambda_{t+1} = 0$, or if $\lambda \neq 0$ it is expected that $\lambda_t < E_t\lambda_{t+1}$, or that the conditional variance of shadow cost associated with such restriction (λ_{t+1}) and the variables in $t+1$ is constant. However, under the alternative model with capital-market frictions, Λ_t is not restricted to zero, and the null hypothesis would have to be rejected. The degree to which the debt constraint binds depends on the firm's desired level of borrowing relative to its exogenous debt limit, D_t^*. Since equation (11) implies that, ceteris paribus, a change in α_t, will affect Λ_t, the latter will be a complicated function of the Lagrange multipliers associated with the constraint that $D_t \leq D_t^*$, and, therefore, a function of the determinants of the demand for borrowing, as well as of the debt limit.

Finally, each model is estimated depending on whether the constraints on outside finance bind or not. First, we split the sample into two groups, namely those that are, a priori, constrained and those that are not, using, as a criterion the relations that exist between a credit entity and the firm. We test the hypothesis that the investment behavior of the firm with a credit entity in its shareholding body will be closer to optimum, because such an entity exercises a certain control. This control is measured by the percentage of shares that the credit entity possesses in the firm. If the lender knows the characteristics of the structure of the firm, as well as the inherent risk of the investment project in which it is participating, the asymmetrical information problem will reduce and the firm will be able to have access to the quantity of debt that needs in order to optimize its investment decisions.

We use the full sample and the two subsamples to estimate the model in (14), when the multiplier, Λ_t, is constrained to equal to zero. To estimate the unconstrained model, we parameterize, Λ_t as a function of observable variables.

4 The data

The main data set is the database of the CNMV (Comisión Nacional del Mercado de Valores)[12]. The CNMV base has surveyed the end-of-year balance sheet and other complementary information of Spanish firms since 1990 on a year-by-year basis. The samples used in our paper are quoted manufacturing firms, with the financial and service sector firms having been suppressed from the initial sample.

The final data set is a balanced panel of 129 firms which reported complete information for four consecutive years between 1991 and 1994 (one year is lost after computation of the capital stock and investment).

The main problem in the construction of the data set from the raw data has been that of matching reported book values to their corresponding market values. In order to do this, several assumptions are required, particularly in the computation of the market value of the capital stock. The details of the construction of the data set are described in Appendix III. The capital stock is measured as the replacement cost of the book value of net capital stock using the perpetual inventory method (See Salinger and Summers (1983)). We have obtained an individual average depreciation rate for each firm, calculated as the rate between the average values of accounting depreciation and accumulated depreciation (amortization) for four years.

The cash flow is calculated as the difference between the added value and the personnel expenses. The gross output, Y_t, coincides with the added values, that is, the value of the production less intermediate consumption. The price of the capital goods (q_t) has been measured as the implicit deflator of the gross capital stock. The price of firm's output p_t is measured at sectorial level, taking industrial price indices (Source: INE, Spanish National Institute of Statistics).

As stated above, we have divided the sample into two sets of firms, those where a credit entity has more than 10 per cent of its shares, and the rest. The first subsample is made up of 35 firms. To this group of firms we have added 4 more firms where the credit entity is the second most important shareholder and its percentage is so relevant as to reach 80 percent of the

[12]The Spanish Securities and Exchange Commision (SEC)

principal shareholder. The total number of firms in this subsample is 39. The null hypothesis is that the neoclassical model should be verified for this group of firms and not for the rest (90 firms).

Summary statistics for the sample are shown in Table 1. The first column in the Table reports the mean and standard deviations for the full sample of 129 firms. The subsamples appear in the second and third columns. We can observe that the firms with a banking representation in the shareholding have a large debt ratio (debt-asset ratio) and the interest rate calculated to replacement cost[13] is smaller than the rest of the sample, in spite of its debt ratio being higher. The higher interest rate, together with the debt ratio of the rest of the sample, seems to indicate the possible presence of financial constraints. However, this affirmation cannot be made with a certain reliability due to the high values of the standard deviation, which indicate confidence intervals of the debt cost that are very similar in both subsamples.

Comparing the mean value of the number of personnel reveals that there is a certain variation in the size of our sample firms. Although the study is carried out with large firms (all quoted), the size effect is apparently inversely related to the control of the credit entities. This is due to the fact that there is a dispersion of shareholders in the large firms and, therefore, the type of control is more diffuse. On the other hand, the characteristics of the sample prevent us from subdividing the sample between large and small firms, as has been done in other studies[14].

4.1 Investment equation estimates

The analysis we present is sequential. Our first step is to estimate equation (15), the baseline neoclassical investment model that assumes perfect capital markets. Under the assumption of no capital-market fictions, there are two structural parameters which can be recovered: b, the quadratic adjustment parameter, and ϵ, the price elasticity of demand. The point estimates for these parameters, along with standard errors and the χ-statistics computed to test the model's overidentifying restrictions, are shown in Table 2. This test indicates the probability that the orthogonality conditions of expectations error $e_t + 1$, are not rejected with the selected

[13] See Appendix III

[14] See Estrada and Vallés.

instrumental set. Our list of instrumental variables includes twice and once-lagged values of each of the variables in the model. When we estimate the augmented model (with the Λ_t parameterization) the instrumental set is augmented with variables used to parameterize Λ_t. We do not introduce the variable $\left(\frac{\text{cash flow}}{\text{capital}}\right)$ lagged in $t-1$ and $t-2$ because we assume that the firms face particular types of financing constraints, which are related to firms' cash flow, so that the effective discount rate for one of these firms depends on its cash flow [15]. To the extent that the marginal product of capital is mismeasured, variables such as "cash flow" are correlated with this measurement error, this is a proxy for managers' perceived profitability.

The estimates based on the full sample (of 129 firms) are given in the first row. We have used the two-step and three step estimates for the full sample, as well as for each subsample. For the full sample of firms, the overidentifying restrictions are decisively rejected; the residuals from the equation are strongly correlated with at least some of our instruments, which are listed at the bottom of the table.

Having demonstrated that the standard model is rejected for the full sample, we next investigate whether this rejection is related to the initial hypothesis that those firms whose shareholders include a credit entity with a significant stake will not have their debt restricted (therefore, $\Lambda_t = 0$).

The next two rows present the results when the model is reestimated separately for both subsamples. The model operates quite well for those subsamples with banking participation. In particular, the overidentifying restrictions are rejected for those firms which have no relevant banking participation amongst their shareholders and not rejected for the rest of the firms. If the significance of the parameters is analyzed in the model (b and ϵ), solely in the first subsample, that is, for firms with a banking participation in their shareholding, neither model is rejected, while in the full sample and in the rest of the sample only the elasticity of demand, ϵ, is accepted. With respect to the values of elasticity of demand, a high magnitude of the coefficient of elasticity can be observed, which indicates a low market power. In relation to other studies, the more plausible value corresponds to the first subsample; here, the market value implies a mark-up, that is, $\left(\frac{1}{\epsilon}\right)$, close to 20 percent[16], in agreement with the findings of Mazón (1992).

[15]See Hubbard et al. (1995).

[16]The estimate value of ϵ is identified in this case because these are constant returns to scale.

On the other hand, the adjustment cost estimated are only significant for the subsample that verifies the neoclassical model; for the rest they are not significant. This parameter is higher than the estimates of Estrada and Vallés (1995) for the Spanish economy, but it does not reach those calculated by Whited (1992) and Hubbard et al. (1995). To understand the economic significance of this parameter, the adjustment cost function is valued at the average value of the sample. That is, under the assumption that $v = 0$, and the ratio $\frac{I}{K} = 0.1$, a firm with a capital stock of 500 million dollars which invests 50 million dollars, the value of b in the sample without financial constraints and with a credit entity equals 0.9827. This implies that adjustment costs will be 2.45 million, or about 5 percent of investment expenditure. These values are lower than those estimated by Whited (1992) which were about 10 percent, but they coincide with the estimates for the Spanish economy in a "q-model" for Spanish industrial firms, that vary between 2 and 6 percent (Alonso-Borrego and Bentolila (1994)).

We have not detected important variations between the two-step and three-step estimates, with the latter being the most efficient.

4.2 Specification of financial constraints

The second objective of this article is to give a specification to Λ_t, the multiplier that arises as a result of financing constraints. Two different specifications have been tried. Our simplest specification allows the extent to which this constraint binds to depend on the firm's cash position. There are several studies that try a similar approach, including those of Hubbard et al. (1992), Whited (1992) and Himmerberg (1991). The first employs the following specification.

$$\Lambda_t = \mu_0 + \mu_1 \left(\frac{CF}{K}\right)_t . \tag{18}$$

where μ_1 measures the change in the firm's effective discount factor that occurs as a result of an increase in internal funds, holding investment opportunities constant. One would expect that $\mu_1 < 0$, that is, increases in internal funds, ceteris paribus, relax the constraint on external finance [17].

[17] The same justification is provided by the reduced-form test, which includes measures of internal funds in regressions of the Tobin's q model.

The results from estimating this augmented model are shown in the first column of Table 3. We reestimate the model for the second subsample of non-affiliated firms. We can note that, in both cases, the overidentifying restrictions are not rejected, with the neoclassical model, therefore, being verified. As expected μ_1 parameters estimates are negative, that is to say, increasing the internal funds reduces the shadow cost of the constraint; in other words, the constraint is relaxed. Similarly we can observe a decrease in the adjustment cost parameter (b). The values obtained are superior to those of the first subsample (bank-affiliated), shown in Table 2, and they are the equivalent of about 8 percent of investment expenditure, three percentage points above the previous figure. When analyzing the impact of the cash flow on the discount factor, we find that, if the $\left(\frac{\text{Cash flow}}{\text{Capital}}\right)$ ratio decreases by 20 percent (from 0.15 to 0.12), this would lower the discount factor by just over 0.0078 (0.26 x 0.03). On the other hand, we can observe a market power similar to the firms of the first subsample (bank-affiliated) (19%).

The second parameterization follows Whited (1991) who parameterized Λ_t as a function of contemporaneous variables which indicate the firm's financial health, using variables that measure the firm's lack of collateral and the likelihood of financial distress. Specifically, he used the ratio of the market value of the firm's debt to the market value of its total assets and the ratio of the firm's interest expense to the sum of interest expense plus cash flow,

$$\Lambda_t^* = \omega_0 + \omega_1 \left(\frac{D_R}{A_R}\right)_t + \omega_2 \left(\frac{GF}{GF + CF}\right)_t , \tag{19}$$

where,

$\left(\frac{D_R}{A_R}\right)$ = Debt to replacement cost / assets to replacement value.

$\left(\frac{GF}{CF+GF}\right)_t$ = Interest expense /(interest expense plus cash flow)[18].

The estimated coefficients of equation (19) appear in the second column of Table 3. First, note that the overidentifying restrictions are rejected, thus the parameters which define the shadow cost Λ_t are not significant. We find that the ratios of collateral and covering are not relevant for relaxing the financial constraints. Although, a priori, ω_1 and ω_2 have to be positive, it is solely the second which is positive, but none of the parameters are significant and the overidentifying restrictions are rejected. The b value is 0.87, equivalent to 4.35 percent of investment expenditure, and the elasticity is 8.36%, indicating a market power of 11 %. The results of three

[18] Covering ratio

-step estimator appear in Table 4. Note that the model continues to be rejected, and that even the p-value of the overidentifying restriction is smaller. Therefore only cash flow seems to have a significant effect on investment behavior. This may be so because other financial variables are somehow already taken into account .

5 CONCLUDING REMARKS

In this paper we have presented evidence of the fact that firms with a close relationship to a bank -those firms where a bank exercises a control over its shareholding- are nearer to optimum investment than firms which do not have this relationship. If the banks are relevant shareholders, then the limits to the borrowing capacity of the firms are relaxed or disappear, verifying the neoclassical investment model.

This evidence lends some support to the hypothesis that information problems, such as moral hazard, can be attenuated when there is a mechanism of control and monitoring by the lender, for example, shareholding control of the firm.

To test this hypothesis, we have estimated a neoclassical investment model without financial constraints and we have demonstrated that this model is only verified when there is a close relationship with a bank. For the rest of the sample the extended neoclassical model with financial constraints is verified. However, in our sample, lack of collateral and financial health do not affect the financial constraints in that both models, the neoclassical and the alternative, are rejected.

Some relevant questions remain open. Firstly, other variables may affect investment behavior, but econometric techniques limit the number of sub-samples that can be constructed. Firm size, for instance, could be positively correlated with bank affiliation and in this case, size itself may be responsible for relaxing financial constraints because they signal the severity of informational asymmetry faced by a firm. Size may also proxy for the magnitude of transaction costs encountered when accessing external sources of finance. Secondly, the analysis performed in this paper as well as in the rest of the relevant literature, does not test for causality. It is unclear if bank affiliated firms behave according to the neoclassical model because of bank control and monitoring, as theory suggest, or if banks choose non financially constrained firms in the first place. At least two directions for future research appear promising. The first is to identify the precise mechanism by which banks may be able to relax constraints. The second is to consider other types of financial constraints. We have considered a constraint over the maximum amount of outstanding debt, and other possible kinds of constraints may be relevant.

APPENDIX

APPENDIX I Derivation of the Euler equation for investment

Each firm maximizes the present value of the current and future internal resources (IR_{it}),

$$\max_{I,D} V_t = E_t \sum_{s=0}^{\infty} \beta_{t+s} IR_{t+s} \qquad (A.1)$$

s. a.

$$IR_{t+s} \geq 0$$

The firm faces the capital accumulation constraint,

$$K_t = I_t + (1-\delta)K_{t-1}. \qquad (A.2)$$

With the internal resources (IR_{t+2}) being

$$IR_t = (1-\tau)(R(K_t, N_t, I_t) - r_t D_{t-1}) + D_t - (1-\pi_t^e)D_{t-1} - q_t I_t \qquad (A.3)$$

Let λ_t be the series of Lagrange multipliers associated with the nonnegativity constraint. The Bellman equation for the firm is as follows,

$$\begin{aligned} V(K_t) &= E_t^* \{(1+\lambda_t)[(R(K_t, N_t, I_t) - r_t D_{t-1})(1-\tau) \\ &+ D_t - (1-\pi_t^e)D_{t-1} - q_t I_t] + V(K_t(1-\delta) + I_{t+1}\} \end{aligned} \qquad (A.4)$$

The first order conditions are the following,

I_t :

$$(1+\lambda_t)\left[(1-\tau)\left(\frac{\partial R_t}{\partial K_t} + \frac{\partial R_t}{\partial I_t}\right) - q_t\right] + E_t\left[\beta_t \frac{\partial V_{t+1}}{\partial K_t}\right] = 0 \qquad (A.5)$$

$$\frac{dV(K_t)}{dD_t} ==$$

That is,

$$(1+\lambda_t) - \beta_t(1 + (1-\tau)r_t - \pi_t^e)E_t(1+\lambda_{t+1}) = 0 \qquad (A.6)$$

and (by the envelope theorem)

$$\frac{\partial V(K_t)}{\partial K_{t-1}} = (1+\lambda_t)\left[(1-\delta)\frac{\partial R_t}{\partial K_t}(1-\tau)\right] + E_t\left[\beta_t \frac{\partial V_{t+1}}{\partial K_t}(1-\delta)\right]. \qquad (A.7)$$

Multiplying (A.5) (the first order condition) by $(1-\delta)$, subtracting (A.7) and operating with (A.6),

$$\begin{aligned} &E_t\beta_{it}\left[\tfrac{(1+\lambda_{t+1}}{1+\lambda_t}((1-\tau)(-p_{t+1}\Psi_I(K_t,I_t)(1-\delta))-q_{t+1}(1-\delta))\right] = \\ &p_t\left(F_K(K_t,N_t)-\Psi_K(K_t,I_t)-\Psi_I(K_t,I_t)\right)-q_t \end{aligned} \qquad (A.8)$$

to derive the neoclassical model, $\lambda_t = E_t\lambda_{t+1}$, that is,

$$\beta_t = \frac{1}{1+(1-\tau)r_{t+1}-\pi_t^e} \qquad (A.9).$$

Appendix II Econometric Specifications

Under the assumption of rational expectations, the conditional expectation can be substituted by the observed value, including an expectational error term, (e_{t+1}).

$$\begin{aligned}&\frac{1}{1+(1-\tau)r_{t+1}-\pi_t^e}\left[(1-\tau)(1-\delta)\Psi_I(K_{t+1},I_{t+1})+\frac{q_{t+1}}{p_{t+1}}(1-\delta)\right]\\&+\frac{p_t}{p_{t+1}}\left(F_K(K_t,N_t)-\Psi_K(K_t,I_t)-\Psi_I(K_t,I_t)\right)-\frac{q_t}{p_{t+1}}=e_{it+1}\end{aligned}\quad (A.10)$$

As $\Phi_I(K_{t+1},I_{t+1})=b\left(\left(\frac{I}{K}\right)_{t+1}-v\right)$, with b being the adjustment cost parameter, we have that,

$$\begin{aligned}p_t(F_K-\Psi_K-\Psi_I)&=p_t\left(\frac{Y}{K}\right)_t-\frac{w_tN_t}{K_t}+p_tb\left(\frac{I}{K}\right)^2-b(v+1)p_t\left(\frac{I}{K}\right)_t^2+p_tbv\\&=p_t\left(\frac{CF}{K}\right)_t+p_tb\left(\frac{I}{K}\right)^2-b(v+1)p_t\left(\frac{I}{K}\right)_t+p_tbv\end{aligned}\quad (A.11)$$

Substituting (A.11) in (A.10), the neoclassical investment model is,

$$\begin{aligned}&\frac{1}{1+(1-\tau)r_{t+1}-\pi_t^e}\left[(1-\tau)(1-\delta)b\left(\left(\frac{I}{K}\right)_{t+1}-v\right)+\frac{q_{t+1}}{p_{t+1}}(1-\delta)\right]\\&+\frac{p_t}{p_{t+1}}\left[\left(\frac{CF}{K}\right)_t-b(v+1)\left(\frac{I}{K}\right)^2+b\left(\frac{I}{K}\right)_t^2+vb\right]-\frac{q_t}{p_{t+1}}=e_{t+1}\end{aligned}\quad (A.12)$$

Relaxing perfect competition

Assuming constant price elasticity of demand ϵ, with $|\epsilon|<\infty$, the output price is $p(1-1/\epsilon)$ instead of p_t. Hence,

$$\begin{aligned}p_t(1-\tfrac{1}{\epsilon})(F_K-\Psi_K-\Psi_I)&=p_t(1-\tfrac{1}{\epsilon})\left(\frac{Y}{K}\right)_t-\frac{w_tN_t}{K_t}+p_tb\left(\frac{I}{K}\right)^2\\&\quad-b(v+1)p_t(1-\tfrac{1}{\epsilon})\left(\frac{I}{K}\right)_t+p_tbv(1-\tfrac{1}{\epsilon})\\&=p_t\left(\frac{CF}{K}\right)_t-\tfrac{1}{\epsilon}p_t\left(\frac{Y}{K}\right)_t+p_tb(1-\tfrac{1}{\epsilon})\left(\frac{I}{K}\right)^2\\&\quad-b(v+1)p_t(1-\tfrac{1}{\epsilon})\left(\frac{I}{K}\right)_t+p_t(1-\tfrac{1}{\epsilon})bv\end{aligned}\quad (A.13)$$

The neoclassical model we obtain is the following,

$$\begin{aligned}&\frac{1}{1+(1-\tau)r_{t+1}-\pi_t^e}\left[(1-\tau)(1-\delta)b(1-\tfrac{1}{\epsilon})\left(\left(\frac{I}{K}\right)_{t+1}-v\right)+\frac{q_{t+1}}{p_{t+1}}(1-\delta)\right]\\&+\frac{p_t}{p_{t+1}}(1-\tfrac{1}{\epsilon})\left[\frac{\epsilon}{\epsilon-1}-\frac{1}{\epsilon-1}\left(\frac{Y}{K}\right)_t\left(\frac{CF}{K}\right)_t-b(v+1)\left(\frac{I}{K}\right)^2+b\left(\frac{I}{K}\right)_t^2+vb\right]-\frac{q_t}{p_{t+1}}=e_{t+1}\end{aligned}\quad (A.14)$$

APPENDIX III Construction of the data set

The final sample consists of a balanced panel of 129 manufacturing firms and 5 years of data, reported to the Spanish Securities and Exchange Commission (SSEC) from 1990 to 1994.

To obtain this final sample, the following filters have been applied:

1. Accounting equity must be positive.
2. Book value of the interest expense must be positive.
3. The investment rate $\frac{I}{K}$ for two consecutive periods has to be less than 2 (In the contrary case, we consider that two firms have merged).
4. Book value of the Debt must be positive.
5. Book value of the total capital stock must be positive.
6. Sales and gross output must be positive.
7. Labor costs must be positive.

Variable construction

1. Debt to replacement value (Fazzari et al. (1988), Hernando and Vallés (1991)
   Short-term Debt = Book value / Long-term Debt = Book value x $\left(\frac{1+r_t}{1+r_{it}}\right)^m$,
   with:
   m = average maturities of long-term debt = 3 years
   $$r_{it} = \frac{\text{GF}}{\text{Dc} + \text{Dl}}$$
   r_{it} = interest rate of new operations on long-term bank loans (three or more years)
   GF_t = Interest expense
2. Cost of Debt = Interest expense / Debt to replacement value

3. Capital stock and Investment

Since the Spanish Securities and Exchange Commission does not have any independent estimates of investment available, the gross nominal investment I_t must be imputed from changes in the book value of capital with a correction for depreciation, that is,

$$I_t = KNB_t - KNB_{t-1} + Dep_t$$

where, KNB_t is the book value of the net capital stock, $KNB_t = KGB_t - ADep_t$, KGB_t is the book value of the gross capital stock; $ADep_t$ is the accumulated depreciation of the capital stock; Dep_t is the accounting depreciation during the year.

To calculate the market value (replacement value) of these two assets, we employ a perpetual inventory method,

$$K_t = I_t + \frac{q_t}{q_{t-1}} K_{t-1}(1 - \delta)$$

$$\delta = \frac{1}{T} \sum_{t=1}^{T_i} \frac{Dep_t}{KGB_t}$$

where T_i is the number of years of available data for firm i. The advantage of this measure is that it allows us to compute different depreciation rates for firms. The disadvantage is that the accounting depreciation rate can differ significantly from the economic depreciation rate, which is approximated.

q_t is the price of capital goods; we use the corresponding implicit deflator of investment (Source: Spanish National Institute of Statistics, INE).

The recursive method employed here can generate negative market values $q_t K_t$ or market values significantly above zero when the book value of the capital is zero. This fact is taken into account in order to eliminate firms with implausible values for the capital stock.

4. The cash flow is calculated as net income plus depreciation and the gross output is calculated as total production value less net sales.

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TABLE 1

SUMMARY STATISTICS FOR SELECTED VARIABLES FOR 190 SPANISH MANUFACTURING FIRMS,

1990-1994

		Full Sample 129 firms	**Subsample (1) 39 firms**	**Subsample (2) 90 firms**
$\left(\frac{I}{K}\right)_t$	mean	0.1171	0.09938	0.12488
	standard deviation	0.2422	0.28185	0.2229
$\left(\frac{I}{K}\right)_t^2$	mean	0.0723	0.088	0.06515
	standard deviation	0.2403	0.2803	0.2208
$\left(\frac{CF}{K}\right)_t$	mean	0.2055	0.3190	0.15643
	standard deviation	1.8507	0.9196	2.1308
$\left(\frac{B_R}{AR}\right)_t$	mean	0.3046	0.3773	0.2730
	standard deviation	0.2136	0.2350	0.1957
r_t	mean	0.1655	0.1282	0.1816
	standard deviation	0.1333	0.0955	0.1439
$\left(\frac{Y}{K}\right)_t$	mean	1.3298	1.0789	1.4385
	standard deviation	1.6186	1.4112	1.6910
dep_t	mean	0.065	0.061	0.066
	standard deviation	0.036	0.037	0.035
N_t	mean	1889	1233	2174
	standard deviation	6750	22517	7932

Subsample (1) is where a credit entity has more than 10 per cent of its shares. Subsample (2) is the rest of the firms.

$\left(\frac{I}{K}\right)_t$ = Investment / Replacement value of capital stock.

$\left(\frac{CF}{K}\right)_t$ = Operating income plus depreciation charges / Replacement value of last year's capital stock.

$\left(\frac{B_R}{AR}\right)_t$ = Market value of debt / Replacement value of assets.

r_t = Interest rate calculated at replacement cost.

$\left(\frac{Y}{K}\right)_t$ = Output / Replacement value of capital stock.

dep_t = Depreciation measured as (accounting depreciation during the year / accumulated depreciation of the capital stock).

N_t = Number of personnel.

TABLE 2

ESTIMATES OF THE NEOCLASSICAL INVESTMENT MODEL

(1991-1994)

The estimated parameters are b, the adjustment cost parameter and ϵ, elasticity of demand. The Euler equation takes the following form:

$$\frac{1}{1+(1-\tau)r_{it}}\left[(1-\tau)(1-\delta)b(1-\tfrac{1}{\epsilon})\left(\left(\frac{I}{K}\right)_{it+1}-\delta\right)+\frac{q_{it+1}}{p_{it+1}}(1-\delta)\right]+\frac{p_{it}}{p_{it+1}}(1-\tfrac{1}{\epsilon}) \\ \left[\frac{\epsilon}{\epsilon-1}\left(\frac{CF}{K}\right)_{it}-\frac{1}{\epsilon-1}\left(\frac{Y}{K}\right)_{it}-b(\delta+1)\left(\frac{I}{K}\right)_{it}+b\left(\frac{I}{K}\right)^2_{it}+\delta b\right]-\frac{q_{it}}{p_{it+1}}=e_{it+1}. \tag{15}$$

		Adjustment Cost parameter b	Elasticity of demand ϵ	Test of Overidentifying Restrictions χ^2_{16}
	(1)	0.1412	15.082*	34.1426
Full sample		(0.2436)	(0.404)	(0.025)
129 firms	(2)	0.1558	14.005*	36.58
		(0.1620)	(0.3702)	(0.013)
	(1)	0.9827*	4,330*	26.9292
Bank-affiliated		(0.118)	(0.0359)	(0.13726)
39 firms	(2)	0.9485*	4.4014*	26.8154
		(0.1162)	(0.0358)	(0.1405)
	(1)	0.0995	46.72*	35.75
non bank-affiliated		(0.5797)	(0.7751)	(0.016)
90 firms	(2)	0.0963	47.07*	35.81
		(0.5612)	(0.7814)	(0.016)

(1) is the two-step estimator and (2) is the three-step estimator.
Standard errors are shown in parentheses. The estimates have been calculated using GMM and levels. Significant coefficients at the 5 percent confidence level are indicated with one asterisk. Significance levels to test for overidentifying restrictions are shown in parentheses beneath the test statistic (p-value).
The instruments set used in the estimation includes $\frac{I}{K}$, $\left(\frac{I}{K}\right)^2$, $\frac{r}{K}$, $\frac{Y}{K}$, $\frac{q}{p}$, $\frac{p_t}{p_{t-1}}$, and $\frac{DR}{AR}$, lagged in $t-1$ and in $t-2$.

TABLE 3

NEOCLASSICAL INVESTMENT MODEL AUGMENTED FOR FIRMS WITHOUT RELEVANT BANKING CONTROL Subsample 2, (90 firms)
1991-1994 Period

The estimate parameters are b the adjustment cost parameter and ϵ elasticity of demand of equation (16) and μ_0 and μ_1 if Λ_t is parameterized as expression (18), and ω_0, ω_1 and ω_2 if it is parameterize as (19). The Euler equation takes the following form

$$\frac{1-\Lambda_{it}}{1+(1-\tau)r_{it}}\left[(1-\tau)(1-\delta)b(1-\tfrac{1}{\epsilon})\left(\left(\tfrac{I}{K}\right)_{it+1}-\delta\right)+\frac{q_{it+1}}{p_{it+1}}(1-\delta)\right]+\frac{p_{it}}{p_{it+1}}(1-\tfrac{1}{\epsilon})$$
$$\left[\frac{\epsilon}{\epsilon-1}\left(\frac{CF}{K}\right)_{it}-\frac{1}{\epsilon-1}\left(\frac{Y}{K}\right)_{it}-b(\delta+1)\left(\frac{I}{K}\right)_{it}+b\left(\frac{I}{K}\right)^2_{it}+\delta b\right]-\frac{q_{it}}{p_{it+1}}=e_{it+1}. \quad (16)$$

being $\Lambda_{it} = \mu_0 + \mu_1\left(\frac{CF}{K}\right)_{it}$ in (1) and $\Lambda^*_{it} = \omega_0 + \omega_1\left(\frac{D_R}{A_R}\right)_{it} + \omega_2\left(\frac{GF}{GF+CF}\right)_{it}$, in (2)

	(1)	(2)
Adjustment cost b	1.7308* (0.3627)	0.8738* (0.2936)
Elasticity ϵ	5.3392* (0.3200)	8.368* (0.314)
shadow cost Λ_{it} Parameter μ_0	−0.14795* (0.0557)	−−
shadow cost Λ_{it} parameter μ_1	−0.26173* (0.0466)	−−
shadow cost Λ^*_{it} parameter ω_0	−−	−0.3044 (0.0965)
shadow cost Λ^*_{it} parameter ω_1	−−	−0.0037 (0.005)
shadow cost Λ^*_{it} parameter ω_2	−−	0.2842 (1.295)
Test of Overidentifying χ^2_{18}	25.8587 (0.1030)	32.122 (0.0420)

(1) is the two-step estimator and equation (15). (2) is the two-step estimator and equation (17). The three-step estimator appear in Table 4. Standard errors are shown in parentheses. The estimates have been calculated using GMM and levels. Significant coefficients at the 5 percent confidence level are indicated with one asterisk. Significance levels for the test of overidentifying restrictions are shown in parentheses beneath the test statistic (p-value).
The instruments set used in estimation includes $\frac{I}{K}$, $\left(\frac{I}{K}\right)^2$, $\frac{r}{K}$, $\frac{Y}{K}$, $\frac{q}{p}$, $\frac{p_t}{p_{t-1}}$, and $\frac{DR}{AR}$, lagged in $t-1$ and in $t-2$. In column (2) the instruments set is augmented with $\left(\frac{GF}{GF+CF}\right)$

TABLE 4

NEOCLASSICAL INVESTMENT MODEL AUGMENTED FOR FIRMS WITHOUT RELEVANT BANKING CONTROL Subsample 2, (90 firms)
1991-1994 Period

The estimate parameters are b the adjustment cost parameter and ϵ elasticity of demand of equation (16) and μ_0 and μ_1 if $\Lambda_i t$ is parameterized as expression (18), and ω_0, ω_1 and ω_2 if it is parameterize as (19). The Euler equation takes the following form

$$\frac{1-\Lambda_{it}}{1+(1-\tau)r_{it}}\left[(1-\tau)(1-\delta)b(1-\tfrac{1}{\epsilon})\left(\left(\tfrac{I}{K}\right)_{it+1}-\delta\right)+\frac{q_{t+1}}{p_{it+1}}(1-\delta)\right]+\frac{p_{it}}{p_{it+1}}(1-\tfrac{1}{\epsilon}) \\ \left[\frac{\epsilon}{\epsilon-1}\left(\frac{CF}{K}\right)_{it}-\frac{1}{\epsilon-1}\left(\frac{Y}{K}\right)_{it}-b(\delta+1)\left(\frac{I}{K}\right)_{it}+b\left(\frac{I}{K}\right)^2_{it}+\delta b\right]-\frac{q_t}{p_{it+1}}=e_{it+1}. \quad (16)$$

being $\Lambda_{it}=\mu_0+\mu_1\left(\frac{CF}{K}\right)_{it}$ in (1) and $\Lambda^*_{it}=\omega_0+\omega_1\left(\frac{D_R}{A_R}\right)it+\omega_2\left(\frac{GF}{GF+CF}\right)_{it}$ in (2).

	(1)	(2)
Adjustment cost b	1.2202* (0.4089)	0.7436* (0.3137)
Elasticity ϵ	9.6432* (0.3200)	11.11* (0.351)
shadow cost Λ_{it} Parameter μ_0	−0.0292* (0.045)	−−
shadow cost Λ_{it} parameter μ_1	−0.2735* (0.0513)	−−
shadow cost Λ^*_{it} parameter ω_0	−−	−0.0676 (0.0702)
shadow cost Λ^*_{it} parameter ω_1	−−	−0.0052 (0.004)
shadow cost Λ^*_{it} parameter ω_2	−−	0.1995 (0.150)
Test of Overidentifying χ^2_{18}	24.183 (0.1491)	36.931 (0.0134)

(1) is the three-step estimator and equation (15). (2) is the three-step estimator and equation (17). Standard errors are shown in parentheses. The estimates have been calculated using GMM and levels. Significant coefficients at the 5 percent level are indicated with one asterisk. Significance levels for the test of overidentifying restrictions are shown in parentheses beneath the test statistic (p-value).
The instruments set used in estimation includes $\frac{I}{K}$, $\left(\frac{I}{K}\right)^2$, $\frac{r}{K}$, $\frac{Y}{K}$, $\frac{q}{p}$, $\frac{p_t}{p_{t-1}}$, and $\frac{DR}{AR}$, lagged in $t-1$ and in $t-2$. In column (2) the instruments set is augmented with $\left(\frac{GF}{GF+CF}\right)$

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