BANK MARKET POWER AND SME FINANCING CONSTRAINTS*

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Abstract

Some studies find that greater market power is associated with higher credit availability (*information hypothesis*); others find that less competitive banking markets lead to more credit rationing (*market power hypothesis*). For the first time we directly test these two competing hypotheses using alternative measures of market power -- the traditional concentration ratio and a structural competition indicator, the Lerner index. The results are quite sensitive to the choice between these two market power indicators. However, the Lerner index is the more consistent indicator and exhibits a larger (and positive) marginal effect on the probability that a firm is financially constrained. (100 words)

JEL CLASSIFICATION: G21, L11

KEY WORDS: Bank market power, financing constraints, SME

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Abstract

Some studies find that greater market power is associated with higher credit availability (*information hypothesis*); others find that less competitive banking markets lead to more credit rationing (*market power hypothesis*). For the first time we directly test these two competing hypotheses using alternative measures of market power -- the traditional concentration ratio and a structural competition indicator, the Lerner index. The results are quite sensitive to the choice between these two market power indicators. However, the Lerner index is the more consistent indicator and exhibits a larger (and positive) marginal effect on the probability that a firm is financially constrained. (100 words)

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1. INTRODUCTION

The potential impact of financial market structure on access to external finance and economic growth has garnered considerable interest recently among researchers as well as policymakers (e.g., Demirguc-Kunt and Maksimovic, 1998, 1999; Rajan and Zingales, 1998; Boot and Thakor, 2000; Berger *et al.*, 2004). A particularly interesting dimension of financial market structure is the competitiveness of the banking industry. The traditional *market power* view has been that less competitive banking markets are associated with less credit availability and a higher price for credit. However, an alternative view has emerged over the past decade that argues that the impact of competition on credit may be related to the level of asymmetric information in the market (Dell'Ariccia and Marquez, 2005). In particular, this *information hypothesis* argues that competitive banking markets can weaken relationship-building by depriving banks of the incentive to invest in soft information. Therefore, less competitive markets may be associated with more credit availability (Petersen and Rajan, 1995).

The issue of bank competition and credit availability may matter most for small and mid-sized enterprises (SMEs) for two reasons. First, SMEs are more vulnerable to information problems. Second, SMEs are much more bank-dependent than large enterprises. Despite the policy relevance of this issue, empirical interest in this topic is relatively recent and existing papers find different and conflicting results. We add to this empirical literature in several ways. We are the first study to employ a structural competition indicator in a firm-level analysis of market power and firm financing constraints. This distinguishes us from other firm level studies that have relied

exclusively on concentration measures to proxy for market power.[1] The structural estimate of market power that we use is the Lerner Index. The Lerner Index has two key virtues over concentration measures such as the Herfindahl-Hirschman Index (HHI). First, as a measure of marginal pricing the Lerner Index is conceptually a more direct proxy for market power than concentration measures. (We develop this argument in more detail in Section 2.) Second, relatively recent empirical work in banking has found that the HHI as a measure of market power lacks consistency and robustness (Berger, 1995; Rhoades, 1995; Jackson 1997; Hannan, 1997). In light of these differences, we compare our results using the Lerner Index to our results using the HHI. This comparison is important if the empirical link between market power and credit availability is sensitive to how market power is measured. This comparison is absent in the extant literature.

We also contribute to the literature on competition and credit availability by utilizing a particularly attractive data set. Our data set on Spanish SMEs is quite large and contains extensive information about both borrowing firms and the banks from which they obtain financing. Moreover, Spain is a particularly good laboratory to investigate this issue. Spain has a banking-oriented financial system with a large fraction of its economic activity driven by bank-dependent SMEs. Moreover, relationship lending may be relatively more important in Spain than other developed countries such as the U.K. and the U.S. because some methods of transactions lending that exist in the U.K. and the U.S. are not available in Spain. Thus, the information hypothesis may have more power

[1] We are aware of one other study that indirectly examined financing constraints at the country level using a different measure of structural competition, the Panzar and Rosse H statistic. This study examined the link between banking competition and industrial growth (Claessens and Laeven, 2005). As we discuss in a later footnote, however, the Panzar and Rosse H statistic is not apropriate in our empirical setting.

to explain lending behaviour in Spain where fewer alternatives to relationship lending exist.[2]

By way of preview, our most important finding is that our regression results depend crucially on how market power is measured. In particular, our results generally indicate a negative association between market power and credit availability when the Lerner Index, our more powerful measure of market power, is used. However, when measures of concentration are used, in general, our findings are reversed. This suggests that researchers and policymakers need to be very careful in drawing strong conclusions about market power and credit availability based on analyses that rely exclusively on concentration as a measure of market power.

Our paper proceeds as follows. In the next section we briefly review two strands of the relevant literature: that on relationship lending and concentration, and that on measures of market power. Our data are described in Section 3. In Section 4 we introduce our dynamic panel methodology to analyse firm financing constraints based on accounting ratios. In Section 5 we introduce a disequilibrium model as an alternative method of distinguishing among constrained and unconstrained firms. We then estimate the probability that a firm is financially constrained using this alternative measure of

[2] Two important transactions-based lending technologies that exist in the U.K. and the U.S., but not in Spain, are small business credit scoring and asset-based lending. Of course, if the choice of lending technology is endogeneous then the existence of more lending technologies in the U.K. and the U.S. may not affect tests of market power and credit availability in these countries. For example, banks in the U.K. and the U.S. might employ relationship lending in markets where they have more market power (as predicted by the information hypothesis), and employ one of these alternative transactions technologies in markets where they lack market paper. However, research suggests that the choice of lending technologies may not be entirely endogeneous. Small business credit scoring appears to be limited to very small business loans and may dominate all other lending technologies for loans in this size category (under about $100,000) for those banks that offer it because of its very low cost (e.g, DeYoung et al. 2007). The use of asset-based lending which involves intense monitoring of accounts receivable and inventory is limited to high risk borrowers (Carey, Post and Sharpe 1998, Udell 2004). Thus, in the U.K. and the U.S. banks might employ small business credit scoring or asset-based lending for certain types of borrowers (instead of relationship lending) regardless of whether they have local market power. For these types of borrowers we would not find any association between market power and credit availability.

financing constraints. We discuss some additional robustness check in Section 6. Section 7 offers conclusions.

2. RELATED LITERATURE

2.1. THE LITERATURE ON RELATIONSHIP LENDING AND COMPETITION

In the 1990s researchers began to examine a potentially comprehensive explanation for how banks and other financial institutions might mitigate information problems in SME lending. This approach has focused on "lending technologies" rather than on individual elements of the commercial loan contract. A lending technology can be defined as a combination of screening mechanisms, contract elements, and monitoring strategies (Berger and Udell, 2006). Most of the attention in this strand of the literature has focused on one specific lending technology, "relationship lending" as first formally modelled in Petersen and Rajan (1995). Relationship lending is primarily based on proprietary soft information about the SME gathered over time "through multiple interactions with the borrower, often through the provision of multiple financial services" (Boot 2000). Soft information can include assessments of an SME's future prospects compiled from past interactions with its suppliers, customers, competitors, or neighboring businesses (Petersen and Rajan, 1994; Berger and Udell, 1995; Mester *et al.*, 1998; Degryse and van Cayseele, 2000). The balance of the empirical evidence suggests that the strength of the bank-borrower relationship is positively related to credit availability and credit terms such as loan interest rates and collateral requirements (e.g., Petersen and Rajan, 1994, 1995; Berger and Udell, 1995; Cole, 1998; Elsas and Krahnen, 1998; Harhoff and Körting 1998).[3]

[3] There is now very large literature on relationship lending much of which addresses the specific issue of the association between the strength of the bank-borrower relationship and credit availability and price. No

A key unresolved issue associated with relationship lending is the effect of market power on the feasibility of this lending technology. In particular, a key feature of the Petersen and Rajan (1995) (PR) theoretical model of relationship lending is the role of competition.[4] PR demonstrate theoretically that when loan markets are competitive commercial lenders have less incentive to invest in relationship building. This is the essence of the *information hypothesis*[5], which contradicts the traditional *market power hypothesis*, arguing that competition promotes credit availability – our *market power hypothesis*. Unlike our analysis, however, the extant empirical literature on market power and credit availability has relied solely on concentration variables to measure market power in local banking markets.

Some of the empirical papers on this issue have used dependence on trade credit as a proxy for credit availability. The implicit assumption in these papers is that trade credit is one of the most expensive forms of external finance. Some papers, for example, find support for the information hypotheses by showing a positive correlation between the level of competition and dependence on trade credit (Petersen and Rajan, 1995; de Mello, 2004; and Fischer, 2005). Other papers have found support for the information

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less than four survey articles and studies have been published that are substantially or entirely devoted to the subject of relationship lending (Berger and Udell, 1998; Boot, 2000; Ongena and Smith, 2000; and Elyasiani and Goldberg, 2004). Collectively these surveys contain a comprehensive assessment of the evidence linking relationship strength and credit availability – both pro and con.

[4] Another theoretical model suggests that the impact of competition involves a trade-off between the borrower's incentive problem and higher monitoring effort and that when the second effect dominates it is optimal for banks to have some market power (Caminal and Matutes, 2002). There is also a model that includes both the informational effects associated with the incentive to acquire private information along with the traditional (i.e., SCP) effects that work to restrict the supply of credit. This model shows that the net effect depends on the cost of information acquisition (de Mello 2004). Thus, the issue is ultimately empirical.

[5] An alternative theoretical model suggests that competitive markets may be conducive to relationship building (Boot and Thakor, 2000). There is also theoretical work that suggests that increased competition in loan markets is associated with more credit availability for "informationally captured" firms and is associated with a decrease in quality of informed banks' loan portfolios (i.e., a "flight to captivity") (Dell'Ariccia and Marquez, 2005).

hypothesis using alternative measures of credit availability: Zarutskie (2003) using U.S. Internal Revenue Service data on small firms finds that higher concentration increases the probability of receiving a bank loan; Cetorelli and Gambera (2001) and Bonaccorsi di Patti and Dell'Ariccia (2004) find that in cross-country data concentration is associated with growth in industrial sectors that are more dependent on external finance. Fischer (2005) finds that banks in more concentrated markets acquire more information about their borrowers which could lead to more credit availability in concentrated markets.

Several other analyses have either found a lack of evidence for the information hypothesis or found support for the *market power* hypothesis. Jayaratne and Wolken (1999) and Berger *et al.* (2005) do not find any association between concentration and dependence on trade credit. Elsas (2005) documents that Hausbank status is positively correlated to better access to information and that the likelihood of observing a Hausbank relationship is positively related to competition in the market, at least for low and intermediate levels of concentration. Degryse and Ongena (2008) show that more concentrated markets are associated with significantly larger spreads in both deposit markets and loan markets. In particular, fiercer competition lowers spreads and may also spur banks to tie customers in relationships that possibly encompass more fee-related products and cross-selling. The positive correlation between concentration and credit conditions is also shown by Montoriol (2006) in an analysis of the impact of regional concentration on lending conditions in Spanish banking. Scott and Dunkelberg (2005), who use survey data, find that entrepreneurs' perception of the quality of service and credit availability was positively related to competition (although loan rates were not). [6]

[6] Some studies report indirect evidence against the information hypothesis. Ongena and Smith (2001) and Karceski, et al. (2005) find evidence inconsistent with the "lock-in" element of bank relationships.

2.2. THE LITERATURE ON PROXIES OF MARKET POWER

It is quite common for empirical studies of the structure-conduct-performance hypothesis in banking to use measures of concentration such as the Herfindahl-Hirschman Index (HHI) to proxy for market power (e.g., Berger and Hannan, 1989; Hannan and Berger, 1991). However, a number of papers have cast doubt on the consistency and robustness of concentration as an indicator of market power in banking (Berger, 1995; Rhoades, 1995; Jackson 1997; Hannan, 1997). So in this analysis we employ a more direct measure of market power – the Lerner Index – as an alternative to the HHI. We are the first paper in this literature on market power and credit availability to examine the sensitivity of our findings to the choice between these alternative measures.

The Lerner index (L) is defined as the spread between prices (P) and marginal costs (C'), divided by prices $L = ((P - C')/P)$. The HHI is related to the Lerner index through the equality $L = (P - C'/P) = HHI\alpha/\varepsilon$, where α is a conjecture parameter showing the response of industry output to changes in firm output, and ε is the industry price elasticity of demand[7]. It can be seen from this equation that the use of HHI as proxy for market power is problematic because HHI is only one of the determinants of market power. It is also problematic that as contestability increases, the reliability of HHI falls. Moreover, changes in the banking industry driven by consolidation and liberalization have likely affected the stability of the conjecture and elasticity parameters casting doubt on the reliability of HHI as a dynamic measure of competition.[8]

[7] Numerous studies have examined the link between concentration and the HHI beginning with Saving (1970) and Cowling and Waterson (1976).

[8] Although the SCP hypothesis of a positive relationship between concentration and profits can be derived from oligopoly theory under specific assumptions in a Cournot setting, it is not robust to alternative

In the context of the so-called New Empirical Industrial Organization (NEIO) perspective, researchers have estimated the parameters of a firm's behavioral equation to directly obtain measures of marginal cost such as the Lerner Index (Schmalensee, 1989). Applications to the banking industry have shown that these measures are often uncorrelated with the HHI and that the HHI often produces spurious results (e.g., Shaffer 1993, Ribon and Yosha 1999, and Maudos and Fernández de Guevara 2004). Given these findings and the fact that the Lerner index focuses directly on bank-level observation of pricing behaviour, we rely on the Lerner index as the more accurate measure of realized bank competition than the HHI – although as a basis of comparison we also use the HHI.

3. DATA

The data set contains firm-level information from the Bureau-Van-Dijk Amadeus database. Our sample consists of annual data on 30,897 Spanish SMEs for the period 1994-2002. The panel is balanced with 278,073 panel data observations. We consider firms with less than 50 employees to be small and firms between 50 and 250 employees to be medium-sized. 75.71% of the firms are small (23,394), while 24.29% (7,503) are medium-sized. We define the 17 administrative regions of Spain as the relevant markets for firms[9]. Consistent with our market definition, the set of variables that describe the banking conditions have been computed as weighted averages of the values of these variables for the banks operating in these regions (using bank branches as the weighting

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assumptions (Lau, 1982). Furthermore, some empirical studies have rejected the hypothesis of Cournot conduct in the banking industry (Roberts, 1984; Berg and Kim, 1994).

[9] This regional breakdown offers a wide range of variability in firm financing constraints and bank competition levels. For more detailed summary statistics by region (as well as by sector and firm size), see a previous working paper version of the paper:
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=910226#PaperDownload

factor). As a result, some of the variables may be similar across firms in the same region during certain periods. Consequently, in all the estimations, the errors are clustered at the regional level. These bank market variables have been computed from an auxiliary sample of individual bank balance sheet and income statement data that represent more than 90% of total bank assets in Spain[10]. Using deposits as the weighting factor produced virtually the same variables (the correlation with the variables computed using branches as a weighting factor is 0.98).

There are four different sets of variables: (i) firm financing constraints that comprise our dependent variables; (ii) firm characteristics that affect firm financing decisions; (iii) bank market characteristics, including concentration and price to marginal cost competition indicators; and (iv) environmental financial and economic control variables.

3.1. DEPENDENT VARIABLES

For our dependent variables, firm financing constraints, we use two trade credit ratios:

- Trade credit/total liabilities, our first measure of financing constraints, reflects dependence on trade credit. Probably the most widely employed proxy for firm financing constraints, it assumes that trade credit is the most expensive source of SME financing based on the practice of offering high discounts for early payment (e.g., Petersen and Rajan 1995, de Mello 2004 and Fischer 2005).

- Trade credit/tangible assets is an alternative measure of trade credit dependence. Tangible assets may support more external financing because tangibility mitigates

[10] The bank sample consists of 38 commercial banks and the 46 savings banks operating in Spain. Balance sheet and income statement information were provided by the Spanish Commercial Banks Association (AEB) and the Spanish Savings Bank Confederation (CECA).

contractibility problems (Almeida and Campello, 2004). We control for the possibility that firms may differ in their tangible/intangible assets mix for technological reasons (and, thus, their ability to get more secured financing), by examining the amount of trade credit per euro of tangible capital.

3.1.1. Explanatory Variables – Market Power

Our key explanatory variables, and the main focus or our paper, are our two alternative measures of market power:

- HHI bank deposits, our first measure is the Herfindahl-Hirschman concentration index in the deposit markets. This index is computed as the sum of the squared market shares of each one of the banks operating in a given region.

- The Lerner index, our alternative measure, is defined as the ratio "(price of total assets - marginal costs of total assets)/price". The price of total assets is directly computed from the 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 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. To the best of our knowledge, there are no previous papers employing the Lerner index as a measure of competition to study firm financing constraints.

3.1.2. Explanatory Variables – Other Bank Market Characteristics

- Average bank size is the log of the ratio between the total assets of banks operating in a given region and the number of bank institutions in that region. Some previous studies of the relationship between bank size and SME financing argue that

large banks are at A disadvantage in lending to informationally opaque small businesses, because of their organizational diseconomies in providing relationship lending (Williamson 1967, 1988) and because "soft" information may be difficult to transmit within large organizations (Stein 2002) and may create agency problems (Berger and Udell 2002). However, Berger et al. (2007) did not find evidence that larger banks make disproportionately fewer small business loans. They argue that large banks tend to adjust to the competitive conditions in local markets. They also may be able to do so via their internal capital markets: as they operate in various regional markets, large banks may transfer liquidity from one region to another region (Houston and James, 1998). This advantage may compensate for organizational disadvantages in processing soft information.

- Bank credit risk is measured by the average ratio of "loan losses to total loans" in a given region. This variable controls for differences across regions in the propensity of banks to supply credit to borrowers of different risk and differences in credit supply related to the *ex post* performance of their loan portfolios.

- The number of bank branches reflects the physical bank infrastructure in the region where a firm operates. Lending constraints are expected to be lower in those regions where bank services are more widespread. Studies such as Jayaratne and Wolken (1999) have shown that branching deregulation, and the subsequent increase of bank branches in regional markets in the US resulted in lower financing constraints for SMEs.

- Bank profitability, measured as the return on assets (ROA), is typically used as a control variable to capture any link between bank performance and the local supply of credit (Carter *et al.,* 2004).

- Bank inefficiency is the average ratio "operating expenses/gross income" in a given region. More inefficient bank markets may lead to an inferior allocation of resources and higher financing constraints (Schiantarelli, 1995; Hubbard, 1998).

3.1.3. Explanatory Variables – Firm Characteristics

- Firm inefficiency, the ratio of firm operating costs to income, is included to control for the potential effects of differences in firm cost management. Firms that exhibit higher operating inefficiency may rely more frequently on trade credit and other expensive sources of funding (Petersen and Rajan, 1995). Similarly, operating inefficiency as an input into bank credit scoring models may affect loan supply (Becchetti and Sierra, 2003).

- Firm profitability, the ratio of profit before taxes over total assets is employed as a measure of performance. It also controls for observable firm quality.

- Firm size is defined as the log of total assets. Cross-country studies of financing choices have found different financing patterns for small and large firms, in the use of long-term financing and trade credit (e.g., Demirguc-Kunt and Maksimovic, 1999 and 2001). Large firms may benefit from internal capital markets and may face less financing constraints.

3.1.4. Explanatory Variables – Environmental and Regional Controls

Our environmental control variables are also computed on a regional basis in order to control for other regional factors that may affect credit availability (source: Spanish Statistical Office, INE):

- GDP, the real regional gross domestic product, accounts for differences in the economic development across the regions where SMEs are located.

- Taxation, as measured by taxes scaled by earnings before interest and taxes, reflects differences in taxation across regions that may affect performance and observable firm quality and influence access to external financing.

- Percentage urban population, measured by the ratio between population in areas with more than 10,000 inhabitants in the region to total population in the region, captures any differences in urban versus rural markets.

- The percentage of bankruptcies, measured as a ratio of total bankruptcies over the total number of SMEs in the region where the firms operate, proxies for firm financial stability across regions.

The mean values of all variables across time and for the entire period are shown in Table 1.

4. MARKET STRUCTURE AND FIRM FINANCING CONSTRAINTS: AN INSTRUMENTAL VARIABLES APPROACH

4.1. ESTIMATION PROCEDURE: THE INSTRUMENTAL VARIABLES MODELS

Because of the longitudinal nature of our data set, we employ panel data techniques in our regression analysis. As in other empirical studies on bank competition and/or firm financing constraints there is a potential endogeneity problem with some of the regressors such as firm inefficiency or profitability. To address this problem, we use a panel instrumental variable estimation methodology by Arellano and Bond (1991) where the estimated equation is expressed in first-differences. This Arellano-Bond estimator is called the *difference-estimator* and uses a set of instruments based on a combination of strictly lagged exogenous variables (the environmental and regional controls) and the lagged values of the potential endogenous variables. The specification is estimated by

using two-stage least squares with a consistent variance-covariance matrix. It is not, however, a "dynamic" technique because the lagged dependent variable does not appear as a regressor in the main equation:

$$y_{i,t} - y_{i,t-1} = \beta'(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (1)$$

where y is the financing constraint variable, X is a set of explanatory variables representing firm characteristics, bank market conditions and environmental control factors, and ε is the error term. The subscripts i and t represent the firm and time period, respectively.

A second issue is the possibility that lagged values of the financing constraints variables might affect, at least partially, the current values of borrowing constraints. In this case, a "dynamic" specification with lagged dependent variables as regressors can address these feedback effects. So we employ an alternative dynamic panel methodology that relies on the Generalized-Method of Moments (GMM) estimator following Arellano and Bover (1995) and Blundell and Bond (1998) and refined by Blundell *et al.* (2000). This GMM estimator is called the *system-estimator* since it combines, in a system, the regression in differences with the regression in levels. The instruments for the equation in differences are again the lagged exogenous variables (the environmental and regional controls) and the lagged values of the potential endogenous variables. The instruments for the equation in levels are the lagged differences of the corresponding variables. These are appropriate instruments under the following additional assumption: although there may be correlation between the levels of the right-hand side variables, there is no correlation between the differences of these variables and the firm-specific effect.

With regard to the system-estimator, consider the following regression equation:

$$y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (2)$$

where *y, X* and ε, are defined as in equation (1) and η_i is an unobserved firm-specific effect. Equation (2) can be rewritten as:

$$y_{i,t} = \alpha y_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (3)$$

The firm-specific effect is eliminated by taking first-differences in equation (2) so that:

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (4)$$

All variables are expressed in logs so that the differences can be interpreted as growth rates. The use of appropriate instruments is necessary to deal with the likely endogeneity of the explanatory variables, and also to deal with the fact that the new error term ($\varepsilon_{i,t}$-$\varepsilon_{i,t-1}$) is correlated with the lagged dependent variable ($y_{i,t-1}$-$y_{i,t-2}$).

We will compare the two alternative methodologies -- the difference-estimator (without lagged dependent variables) and the system-estimator (with lagged dependent variables) -- to assess whether feedback effects significantly alter the relationship between financing constraints and the set of regressors.

4.2. RESULTS: INSTRUMENTAL VARIABLES MODELS

Table 2 shows the results for both alternative methodologies: the single-equation difference estimator approach and the system-estimator dynamic panel approach. The dependent variable is "trade credit/total liabilities" There are two specifications for each approach – one using the HHI of bank deposits as the measure of competition and one using the Lerner index. The values of the F-test indicate a high overall statistical significance for these equations and the Sargan test indicates that the instruments are appropriate.

The main focus of our analysis is our two alternative measures of market power: the HHI of bank deposits and the Lerner index. Table 2 shows that the concentration measure (HHI) and the structural competition indicator (Lerner Index) are both statistically significant and they yield opposite results. In particular, when the HHI is used, market power is associated with lower financial constraints (i.e., less dependence on trade credit), and when the Lerner index is used, market power is associated with more financial constraints (more dependence on trade credit). These results suggest that, at a minimum, studies of financing constraints that rely exclusively on concentration as a measure of market power may not be robust to alternative specifications.

Other bank market characteristics are also found to affect firm borrowing constraints significantly. Of particular interest is the result that average bank size is negatively and significantly related to firm borrowing constraints. This evidence is consistent with Berger *et al.* (2007) and the view that large banks are not necessarily disadvantaged in providing loans to small business since they can benefit from internal capital markets and they have the ability to adapt to local market competitive conditions.

Table 3 shows the results of the dynamic panel estimations when "trade credit/tangible assets" is used as an alternative measure of financing constraints. The results are consistent with those in Table 2, indicating that our results are robust to this alternative specification of borrower financial constraints. That is, the results in Table 3 confirm that higher market power measured by the Lerner index is negatively related to credit availability and higher market power measured by HHI of bank deposits is positively related to credit availability.

5. MARKET STRUCTURE AND FIRM FINANCING CONSTRAINTS: A DISEQUILIBRIUM MODEL-BASED APPROACH

5.1. ESTIMATION OF FINANCIAL CONSTRAINTS: THE DISEQUILIBRIUM MODEL

Although dependence on trade credit has been widely used in the literature as a measure of firm financial constraints (Petersen and Rajan, 1995; de Mello, 2004; and Berger et al., 2005, Fisher, 2005), some recent research challenges the critical assumption in these papers that trade is extremely expensive. One paper finds that in the U.S. most trade credit is "cheaper than bank credit" (Giannetti, Burkart and Ellingsen, 2007). Another paper argues that it is difficult to reconcile the ubiquitous nature of trade credit with it being a relatively expensive source of credit (Miwa and Ramseyer, 2005).

In light of this new research on trade credit we also analyze the relationship between market power and firm financial constraints using an alternative approach to measuring financial constraints. Specifically, we employ a disequilibrium model based on Maddala (1983) that consists of two reduced-form equations, a loan demand equation, a loan availability (supply) equation, and a transaction equation. In this model, the realized loan outstanding will be the minimum of the desired level of bank loans and the loan ceiling imposed on the firm by the bank.

The loan demand ($Loan_{it}^{d}$), the maximum amount of credit available ($Loan_{it}^{s}$) and the transaction equation ($Loan_{it}$) of firm *i* in period *t* are determined by:

$$Loan_{it}^{d} = \beta_0^{d} + \beta_1^{d} Activity_{it}^{d} + \beta_2^{d} Size_{it} + \beta_3^{d} Substitutes_{it} + \beta_4^{d} Cost_{it} + u_{it}^{d} \quad (5)$$

$$Loan_{it}^{s} = \beta_0^{d} + \beta_1^{s} Collateral_{it} + \beta_2^{d} Default\ risk_{it} + u_{it}^{s} \quad (6)$$

$$Loan_{it} = Min(Loan_{it}^{d}, Loan_{it}^{s}) \quad (7)$$

As in Ogawa and Suzuki (2000), Atanasova and Wilson (2004) and Shikimi (2005), the demand for bank credit is modelled as a function of firm activity, firm size, other sources of capital that are substitutes for bank loans, and the cost of bank credit. The maximum amount of credit available to a firm is modelled as a function of the firm's collateral and default risk. All level variables are expressed in terms of ratios to reduce heteroscedasticity. Thus, the size effect of "total assets" in the demand function above is estimated as part of the constant term, while the constant term is estimated as a coefficient of the reciprocal of total assets. (The same logic applies to the effect of collateralized assets and the constant term in the supply function). Firm activity is defined as the level of sales over lagged total assets. Both firm production capacity (total assets) and sales activity are expected to have a positive effect on loan demand. Cash flow and trade credit (as ratios of lagged total assets) are used to control for substitute sources of funds. These variables affect firm financial constraints as they do in our previous regressions; however, here they enter just in the demand equation. The cost of bank credit, which is expected to have a negative effect, is expressed as the percentage point spread between the interest rate paid[11] by the firm and short-term prime rate.[12]

In the availability equation, the borrowing capacity of the firm, is driven in part by the firm's collateralizable assets, i.e., the maximum amount of assets that the firm could pledge as collateral. This is proxied by the ratio of tangible fixed assets to lagged total assets. This assumes that tangible assets are either pledged as collateral or, if not, are potentially attachable as collateral by the bank. Firm default risk is measured by the

[11] The "interest paid" was computed from the income statement and divide it by bank loans outstanding. We implicitly assume that the year-end loan balance is roughly equal to the weighted average balance during the year.

[12] Since interest rates are central in this model, loan prices were alternatively measured in levels instead of the spread over the short-term prime rate. The results were robust to this alternative specification.

ability to pay interest (operating profit/interest ratio) and the ability to pay short-term debt (current assets/current liabilities ratio). Both demand and availability equations contain *log(GDP)* to control for macroeconomic conditions across regional markets.

The simultaneous equations system shown in (5), (6) and (7) is estimated as a switching regression model using a full information maximum likelihood (FIML) routine (Maddala and Nelson, 1974). The FIML routine employed also incorporates fixed effects to account for unobservable firm-level differences. Based upon the estimates of this system it is possible to compute the probability that loan demand exceeds credit availability, as shown in Gersovitz (1980) and, therefore, to classify the sample into constrained and unconstrained firms. Appendix A shows the procedure used to estimate these probabilities.

The estimated parameters of the disequilibrium model are shown in Table 4. All of the exogeneous variables in both the demand and availability equations have the expected signs and the overall significance of the equation, according to the log-likelihood is high. Using the estimations of the FIML disequilibrium model we compute the probability that a given firm is financially constrained. We find that 33.90% of firms in the sample were financially constrained during the period. As shown in Appendix B, these values remain very stable over time. Interestingly, the probability of being constrained varies considerably across regions and across sectors. There were no statistically significant differences between small and medium sized firms. [13]

[13] In light of these regional and sector differences we re-ran all of the regressions in Tables 2 and 3 by sector and region and size (not shown). The results were generally consistent with the earlier regressions and are generally consistent across regions, sectors and across small and medium-sized firms, although the HHI is not statistically significant in some sectors.

Our classification of firms from the disequilibrium model provides an additional measure of firm financing constraints beyond the trade credit ratios we employed earlier. We use this classification of constrained firms to conduct two additional empirical analyses: first, we analyze the consistency between the classification from the disequilibrium model and the financing constraint ratios; and, second, we use a probit model of firm financing constraints to estimate the marginal effects of market power on the probability that a given firm is financially constrained.

5.2. CONSISTENCY WITH FINANCIAL CONSTRAINT RATIOS

Table 5 shows the correlations between disequilibrium classification and our two trade credit measures. The correlations between the two accounting ratios are high and have the expected signs. In addition, the disequilibrium model classification also appears to be consistent with the accounting measures of financing constraints. Specifically, the disequilibrium classification (i.e., the disequilibrium dummy variable) correlation with "trade credit/total liabilities" and "trade credit/tangible assets" is 0.77 and 0.82 respectively.

Our primary interest in this study is on how bank market competition affects financing constraints. We explore this further by comparing the bank market characteristics faced by both constrained and unconstrained firms. Table 6 shows the average values of the HHI of bank deposits and the Lerner index for constrained and unconstrained firms by accounting ratios and the disequilibrium model classification. In the case of the accounting ratios, constrained and unconstrained firms are classified according to the sample distribution above and below the median values of these ratios. Not only do the accounting ratios reflect conflicting results based on the HHI

concentration measure versus the Lerner index, but so does the disequilibrium model – and in the same direction. That is, constrained firms face lower levels of bank market concentration and higher values of the Lerner index across all measures.

5.4. A PROBIT MODEL OF FIRM BORROWING CONSTRAINTS

5.4.1. Estimation of the Panel Probit Model

We now incorporate our disequilibrium classification into a probit model that assesses the relative importance of market power indicators in explaining financing constraints. The marginal effect is computed as the probability that a given firm is financially constrained. The classification of firms from the disequilibrium model is a binary choice, *Y*, where *Y=1* corresponds to constrained firms and *Y=0* to unconstrained firms. We estimate the following equation:

$$Pr(Y=1) = \Phi(\beta_0 + \beta_1 X_{FC} + \beta_2 X_{BM} + \beta_3 X_{EC}) \quad (8)$$

where Φ is the cumulative normal distribution, X_{FC}, X_{BM}, X_{EC} are vectors of explanatory variables representing, respectively, firm characteristics, bank market conditions and environmental control factors, and β_i, $i = 0,1,2,3$ are vectors of coefficients[14].

5.4.2. Probit Results

The results of the probit model are shown in Table 7.[15] Both the parameter estimates and the marginal effect of each explanatory variable on the response probability

[14] Equation (7) is a binary choice probit equation. A common specification for discrete choice probit models for panel data is the error components model (Chamberlain, 1984) which splits the error into a time-invariant individual random effect, α_i, and a time-varying idiosyncratic random error, ε_{it}. Assuming that the distribution of ε is symmetric with distribution function *F*(.), we have $P(y_{it}=1) = P(\varepsilon_{it} > X_{it}'\beta + \alpha_i) = F(X_{it}'\beta + \alpha_i)$ and assuming that α and ε are normally distributed and independent of *X* gives the random effects probit model.

[15] The results correspond to a random effect model accounting for autocorrelation. An AR(1) process is added to the random effects estimator to account for autocorrelation. The autocorrelation parameter (ρ) was

are shown. Marginal effects are reported in percentage points and computed at the sample means. The model is estimated again using the HHI (specification I) and the Lerner index (specification II) as two alternative measures of competition. The overall significance of the probit estimations are high according to the log-likelihood values.

The key results are consistent with the trade credit regressions. As in the trade credit regressions, the HHI and the Lerner index show the opposite results. While a 1% increase in concentration is found to reduce the probability of being financially constrained by 35.42%, a 1% increase in the Lerner index increases this probability by 11.3%. Focusing on just the Lerner index regression (given the concern in the literature over the consistency of the HHI measure), we would conclude that higher bank market power has a negative effect on the probability that a firm is financially constrained. In general the coefficients of the other explanatory variables are consistent with those found in the dynamic panel regressions.

6. ADDITIONAL ROBUSTNESS CHECKS: THE CONSISTENCY OF BORROWING CONSTRAINTS AND BANK COMPETITION MEASURES[16]

A concern in our analysis is the consistency of our two alternative competition measures. Focusing first on concentration, we considered various alternatives to the HHI of bank deposits. Our results were not robust to the use of the one (CR1), three (CR3) and five (CR5) (largest) bank concentration ratios, respectively. Only the CR3 measure was negatively and significantly related to the financing constraint variables (as was the HHI of bank deposits). The HHI of bank loans and of bank total assets were also used as

significant in all cases and, hence, we mainly rely on the results that account for autocorrelation. The number of points employed in the Hermite quadrature was 20, although the results remain consistent to other specifications.

[16] Further results at the regional level, and additional detail on our robustness checks and estimation procedures can be found in the working paper version of the study (available upon request).

alternative concentration measures and only the former provided statistically significant results in line with those of the HHI of bank deposits. The apparent inconsistency of the concentration measures castes further doubt on the accuracy of concentration as a measure of market power.

It is also possible that the relationship between market power indicators and financing constraints is non-linear, as suggested in theoretical contributions such as Dinç (2000), Yafeh and Yosha (2001), Anand and Galetovic (2006) and in recent empirical studies such as Elsas (2005) or Degryse and Ongena (2007). As a robustness check, the linear relationships specified in equations (1) to (4) were changed to quadratic specifications and estimated using non-linear least squares with bank fixed effects. The statistical significance and sign of the HHI and the Lerner index in the equations did not vary.

Another concern in our analysis is the Lerner index. The issue here is the problem of endogeneity since there are factors that may simultaneously affect both financing constraint measures and the Lerner index (or the HHI), such as the business cycle or some bank characteristics. As a first robustness check, only the numerator of this index – the mark-up of price over marginal costs - was included as a dependent variable. The aim here was to identify common business cycle effects on both prices and marginal costs (in levels), as in Maudos and Fernández de Guevara (2004). The results were very similar to those obtained using the (full) Lerner index**.** A second alternative measure to the Lerner index was the ratio "(interest revenue-interest expense)/total assets"**.** This ratio proxies for pricing behavior exclusively in the loan and deposit markets while the Lerner index is more inclusive (including all earning assets). As in the case of the Lerner index, interest

margins over total assets were found to be positively and significantly related to borrowing constraints. A third robustness check for the Lerner index consists of including the price of total assets and marginal costs separately as explanatory variables. As expected, prices were found to be positively and significantly related to borrowing constraints while marginal costs were negatively and significantly related to the borrowing constraints variables.

An additional concern with regard to endogeneity is the possible correlation between the Lerner index and other bank market characteristics such as bank profitability. However, the correlation coefficient between both variables (0.19) is too low to impose separability in the estimation of the effects of bank market power and profitability in the regressions.

As noted by Claessens and Leaven (2004) and Zarutskie (2006), deregulation and increasing contestability may also alter the interpretation of the competition indicators[17]. The branch deregulation process in Spain started in 1989 and it was followed by both an intense branching expansion across Spanish regions and a merger process that was particularly intense from 1989 to 1995. We employed the ratio of "(new branches in year *t*)/(outstanding number of branches in year *t*)" so that our measure permits variation both across firms and over time. Thereby, we control for an important source of change in contestability of the bank market and for one of the main (theoretical) sources of the lack of correspondence between the HHI and the Lerner index. We replicated the regressions in Tables 2, 3 and 7 for these two sub-samples and the signs of the estimated coefficients

[17] In particular, Claessens and Laeven (2004, 2005) employ the Panzar-Rosse H-statistic as an indicator of competition. As with the Lerner index, the H-statistic offers a direct estimation of market power. However, unlike the Lerner index – which can be estimated yearly and compared over time - the H-statistic refers to a long period (not a particular year) and requires long-run equilibrium conditions and, therefore, it is not helpful for inter-temporal comparisons.

of the competition variables and the level of the coefficients remain statistically unchanged, suggesting that deregulation effects were not significant for the period 1994-2002[18].

Finally, we also estimate the so-called H-statistic of Panzar and Rosse (1987), defined as the elasticity of total revenues to changes in factor prices. We employed panel data (fixed effects) techniques as in De Bandt and Davis, (2000), Bikker and Haaf (2002) and Claessens and Laeven (2005). H is a structural measure of market structure. The log of total revenues is regressed against the log of the three input prices (labour, deposits and physical capital) previously employed to estimate marginal costs. Besides, the log of total assets (controlling for size), the log of loan losses over total assets (controlling for loan quality), the log of equity to total assets (controlling for solvency) and the log of deposits and other funding over total liabilities (controlling for liabilities diversification) are included in the equation as control factors. H is the sum of the elasticities of total revenues to input prices obtained from the coefficients of these three estimated parameters in the equation. H can be negative (input costs falling and revenue rising) suggesting strong monopoly power. Alternatively, if H = 1.0, then all changes in input prices are passed on to output prices, suggesting perfect competition. When H is positive but less than 1.0, monopolistic competition holds. The main results suggest that monopolistic competition holds since both H=1 and H=0 hypotheses are rejected. The overall value for the whole period was 0.46. Yearly OLS estimates of the H-statistic were

[18] An additional test was undertaken to analyze the stability of the estimated parameters - in the dynamic panel equations - over time. Separate yearly cross-section OLS regressions were estimated as a robustness check for the dynamic panel estimations. The coefficients of all of the explanatory factors remain relatively stable over time with the HHI of bank deposits being the only notable exception. This result also suggests that the econometric outcomes from concentration measures are frequently spurious and that changes in bank market structure in recent years are better captured by looking at price to marginal costs indicators such as the Lerner index.

also estimated and correlated with the Lerner and HHI. The correlation with the Lerner index was 0.81 while the correlation with the HHI was -0.48. This result shows again the apparent inconsistency of the HHI measure with other structural measures of market competition. Therefore, the conjecture about market structure (monopolistic competition) does not seem to be supported by the evolution of the HHI, which in turn suggests, once more, that the correspondence between market power and the HHI apparently does not apply in our case.

7. CONCLUSIONS

The relationship between bank competition and firm financing has been studied in the context of two main competing hypotheses. The *market power* view holds that concentrated banking markets are associated with less credit availability and a higher price for credit. An alternative view, the *information hypothesis* argues that competitive banking markets can weaken relationship-building by depriving banks of the incentive to collect soft information (Petersen and Rajan 1995). Therefore, according to the information hypothesis, higher bank market power reduces firm financing constraints.

This study offers new evidence on the relationship between bank market competition and firm financing constraints. We focus on the extent to which tests of these hypotheses may be sensitive to the choice of the measure of market power. Notably, we find evidence of this sensitivity in the Spanish economy where SMEs are heavily dependent on banks for their financing. We find that the HHI and the Lerner index produce opposite results. We also find that the Lerner index is a considerably more accurate measure of competition. The relative lack of accuracy of the HHI is in line with other findings in the banking literature that shed doubt on the strength of concentration as

a measure of market power (e.g., Berger, 1995; Rhoades, 1995; Jackson 1997; Hannan, 1997; Dick, 2007). This casts some doubt on studies that find support for the information hypothesis using the HHI as their measure of market power (e.g., Petersen and Rajan, 1995; Zarutskie, 2003; de Mello, 2004; and Fischer, 2005).

Taking the Lerner index as the more reliable measure, our results show that bank market power increases firm financing constraints. These results hold for both tests that rely on trade credit dependence as our measure of financial constraints and on tests that are based on a disequilibrium model that classifies firms into two categories - constrained and non-constrained. Thus, we argue that our results provide more support for the *market structure* hypothesis and raise serious concern about relying exclusively, or even primarily, on concentration indicators as measures of bank competitive conditions in studies of bank-firm relationships.

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

According to the results from the disequilibrium model in section V.B., 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. REGIONAL AND SECTOR BREAKDOWN

B1. SAMPLE COMPOSITION BY REGION AN SECTOR		
REGION	**FIRMS**	**OBSERVATIONS**
ANDALUSIA	1.830	16.470
ARAGON	1.810	16.290
ASTURIAS	905	8.145
BALEARIC ISLANDS	781	7.029
CANARY ISLANDS	259	2.331
CANTABRIA	173	1.557
CASTILE LA MANCHA	1.750	15.750
CASTILE AND LEÓN	963	8.667
CATALONIA	8.767	78.903
COMUNIDAD VALENCIANA	3.640	32.760
EXTREMADURA	648	5.832
GALICIA	1.800	16.200
MADRID	3.660	32.940
MURCIA	756	6.804
NAVARRA	838	7.542
BASQUE COUNTRY	1.816	16.344
RIOJA	501	4.509
SECTOR	**FIRMS**	**REGIONS**
MANUFACTURES OF FOOD PRODUCTS AND BEVERAGES	2583	23247
MANUFACTURES OF TEXTILES AND DRESSING	1917	17253
MANUFACTURES OF WOOD, PAPER, PRINTING AND RECORDED MEDIA PRODUCTS	1564	14076
MANUFACTURES OF CHEMICAL, PLASTIC, MINERAL AND METAL PRODUCTS	3296	29664
MANUFACTURES OF MACHINERY AND EQUIPMENT AND TRASNSPORT VEHICLES	1947	17523
MANUFACTURES OF FURNITURE AND RECYCLING	513	4617
ELECTRICITY, GAS AND WATER SUPPLY	78	702
CONSTRUCTION	4428	39852
SALE, MAINTENANCE AND REPAIR OF MOTOR VEHICLES	1339	12051
WHOLESALE TRADE AND COMISSION TRADE	6439	57951
HOTELS AND RESTAURANTS	2484	22356
TRANSPORT SERVICES	1272	11448
REAL STATE ACTIVITIES	2236	20124
RENTING OF MACHINERY AND EQUIPMENT	112	1008
COMPUTER AND RELATED ACTIVITIES	203	1827
OTHER RETAIL TRADE PRODUCTS AND SERVICES	471	4239
OTHER	15	135
TOTAL	**30.897**	**278.073**

B2. 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

Region	%
ANDALUSIA	39,23
ARAGON	38,41
ASTURIAS	39,78
BALEARIC ISLANDS	28,81
CANARY ISLANDS	39,00
CANTABRIA	39,88
CASTILE LA MANCHA	39,00
CASTILE AND LEÓN	39,65
CATALONIA	32,01
COMUNIDAD VALENCIANA	29,07
EXTREMADURA	39,66
GALICIA	39,23
MADRID	31,37
MURCIA	38,23
NAVARRA	29,59
BASQUE COUNTRY	31,21
RIOJA	32,39

Sector	%
MANUFACTURES OF FOOD PRODUCTS AND BEVERAGES	26,29
MANUFACTURES OF TEXTILES AND DRESSING	41,73
MANUFACTURES OF WOOD, PAPER, PRINTING AND RECORDED MEDIA PRODUCTS	39,00
MANUFACTURES OF CHEMICAL, PLASTIC, MINERAL AND METAL PRODUCTS	35,29
MANUFACTURES OF MACHINERY AND EQUIPMENT AND TRASNSPORT VEHICLES	25,22
MANUFACTURES OF FURNITURE AND RECYCLING	34,89
ELECTRICITY, GAS AND WATER SUPPLY	24,36
CONSTRUCTION	22,43
SALE, MAINTENANCE AND REPAIR OF MOTOR VEHICLES	41,75
WHOLESALE TRADE AND COMISSION TRADE	39,85
HOTELS AND RESTAURANTS	48,43
TRANSPORT SERVICES	21,31
REAL STATE ACTIVITIES	30,46
RENTING OF MACHINERY AND EQUIPMENT	32,14
COMPUTER AND RELATED ACTIVITIES	37,44
OTHER RETAIL TRADE PRODUCTS AND SERVICES	30,36
OTHER	33,33

REFERENCES

Anand, B. and A. Galetovic (2006) Relationships, competition, and the structure of investment banking markets, Journal of Industrial Economics, 54, 151-199.

Almeida, H. and M. Campello. (2004) Financial Constraints, Asset Tangibility, and Corporate Investment, Working Paper, New York University and University of Illinois.

Angelini, P. and N. Cetorelli. (1999) Bank Competition and Regulatory Reform: The Case of the Italian Banking Industry, Working Paper, Research Department, Federal Reserve Bank of Chicago, December, WP-99-32.

Arellano, M. and S. Bond. (1991) Some tests of specification for panel data: Monte Carlo evidence and an application to employment equation, Review of Economic Studies 58, 277-287.

Arellano M. and O. Bover. (1995) Another Look at the Instrumental-Variable estimation of Error-Components Models, Journal of Econometrics, 68, 29-51.

Atanasova, C.V. and N. Wilson. (2004) Disequilibrium in the UK Corporate Loan Market, Journal of Banking and Finance, 28, 595-614.

Bakker, M. H. R., Klapper, L. and G. F. Udell. (2004) Financing Small- and Medium-Size Enterprises with Factoring: Global Growth in Factoring—and Its Potential in Eastern Europe. Washington, DC: World Bank.

Becchetti, L. and J. Sierra. (2003) Bankruptcy risk and productive efficiency in manufacturing firms, Journal of Banking and Finance, 27, 2099-2120

Berg, S. A., and M. Kim.. (1994) Oligopolistic Interdependence and the Structure of Production in Banking: An Empirical Evaluation, Journal of Money, Credit, and Banking, 26, 309-22.

Berger, A. N. (1995) The Profit Structure Relationship in Banking. Tests of Market-Power and Efficient-Structure Hypotheses, Journal of Money, Credit, and Banking 27, 404-431.

Berger, A. N. and T. Hannan. (1989) The Price-Concentration Relationship in Banking. The Review of Economics and Statistics 71(2), 291-299.

Berger, A.N., N.H. Miller, M.A. Petersen, R.G. Rajan, and J.C. Stein. (2005). Does function follow organizational form? Evidence from the lending practices of large and small banks. Journal of Financial Economics, 76, 237–269.

Berger, A.N. and G. F. Udell. (1992) Some evidence on the empirical significance of credit rationing, Journal of Political Economy 100, 1047-1077.

Berger, A. N. and G. F. Udell (1995) Relationship lending and lines of credit in small firm finance, Journal of Business 68, 351-381.

Berger, A.N. and G.F. Udell (1998) The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle, Journal of Banking and Finance 22, 613-673

Berger, A. N., and G. F. Udell. (2002) Small Business Credit Availability and Relationship Lending: The Importance of Bank Organizational Structure, Economic Journal 112, 32-53.

Berger, A.N. and G.F. Udell. (2006) A More Complete Conceptual Framework for SME Finance, Journal of Banking and Finance 30, 2945-2966.

Berger, A. N., Rosen, R.J. and G. F. Udell. (2007) Does Market Size Structure Affect Competition? The Case of Small Business Lending, Journal of Banking and Finance 31, 11-33.

Berger, A. N., Demirguc-Kunt, A., Levine, R. and J. G. Haubrich. (2004) Bank Concentration and Competition: An Evolution in the Making, Journal of Money, Credit, and Banking 36, 433-451.

Bikker, J.A. and K. Haaf. (2002) Competition, concentration and their relationship. An empirical analysis of the banking industry. Journal of Banking and Finance 26, 2191-2214

Blundell, R. and S. Bond (1998) Initial conditions and Moment Restrictions in Dynamic Panel Data Models, Journal of Econometrics 87, 115-144.

Blundell, R., Bond, S. and F. Windmeijer. (2000) Estimation in dynamic panel models: Improving on the performance on the standard GMM estimator, The Institute for Fiscal Studies, WP 00/12.

Bonaccorsi Di Patti, E. and G. Dell' Ariccia (2004) Bank Competition and Firm Creation, Journal of Money, Credit & Banking, 36, 225-251.

Bond, S., and C. Meghir. (1994) Dynamic investment models and the firm's financial policy, Review of Economic Studies 61,197-222.

Boot, A. (2000) Relationship Banking: What Do We Know? Journal of Financial Intermediation 9, 7-25.

Boot, A. and A. Thakor. (2000) Can Relationship Banking Survive Competition?, Journal of Finance 55, 679-713.

Caminal, R., and C. Matutes. (2002) Market Power and Banking Failures, International Journal of Industrial Organization 20, 1341-1361.

Carter, D. A., and J. E. McNulty. (2005) Deregulation, Technological Change, and the Business Lending Performance of Large and Small Banks, mimeo.

Carey, M., M. Post, and S.A. Sharpe, (1998) Does Corporate Lending by Banks and Finance Companies Differ? Evidence on Specialization in Private Debt Contracting, Journal of Finance 53, 845-878.

Carter, D. A., McNulty, J.E. and J. A. Verbrugge. (2004) Do Small Banks have an Advantage in Lending? An Examination of Risk-adjusted Yields on Business Loans at Large and Small Banks, Journal of Financial Services Research, 25, 233-252.

Cetorelli, N. and M. Gambera. (2001) Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data, Journal of Finance 56, 617-648.

Chamberlain, G.. (1984) Panel data, in Griliches, Z. and M.D. Intrilgator, eds., Handbook of Econometrics,1247-1318 (North Holland)

Claessens, S. and L. Laeven. (2004) What drives bank competition? Some international evidence, Journal of Money, Credit, and Banking 36, 563-583.

Claessens, S. and L. Laeven (2005), Financial Dependence, Banking Sector Competition, and Economic Growth, Journal of the European Economic Association, 3, 179-207.

Cole, R. (1998) The importance of relationships to the availability of credit, Journal of Banking and Finance 22, 959-77.

Cole, R. A., Goldberg, L.G. and L. J. White. (2004) Cookie-cutter versus character: The Micro Structure of Small Business Lending by Large and Small Banks. Journal of Financial and Quantitative Analysis 39, 227-251.

Cowling, K. and M. Waterson. (1976) Price-cost margins and market structure, Economica, 43, 247-274.

De Bandt, O., and P. Davis. (2000) Competition, Contestability and Market Structure in European Banking Sectors on the Eve of EMU, Journal of Banking and Finance, 24, 1045-1066.

De Mello, J.M.P. (2004) Market Power and Availability of Credit: An Empirical Investigation of the Small Firms Credit Market, mimeo.

Degryse, H., and P. Van Cayseele. (2000) Relationship lending within a bank-based system: Evidence from European small business data, Journal of Financial Intermediation 9, 90-109.

Degryse H. and S. Ongena (2007) The impact of competition on bank orientation, Journal of Financial Intermediation, 16, 399-424.

Degryse H. and S. Ongena (2008) Competition and regulation in the banking sector: A review of the empirical evidence on the sources of bank rents, in Thakor A. and A. Boot (eds.), Handbook of Financial Intermediation and Banking (Elsevier), Forthcoming.

Dell'Arricia, G. and R. Marquez. (2004) Information and Bank Credit Allocation, Journal of Financial Economics, 72, 185-214.

Demirgüç-Kunt, A. and V. Maksimovic. (1998) Law, finance and firm growth, Journal of Finance 53, 2107-2137.

Demirgüç-Kunt, A. and V. Maksimovic. (1999) Institutions, Financial Markets and Firm Debt Maturity, Journal of Financial Economics 54, 66-97 .

Demirguc-Kunt, A., and V. Maksimovic. (2001) Firms as Financial Intermediaries: Evidence from Trade Credit Data, Working Paper, World Bank and the University of Maryland.

DeYoung, R., W.S. Frame, D. Glennon and P. Nigro. (2007) What's driving small borrower-lender distance? FDIC working paper.

Dick, A.A. (2007) Market Size, Service Quality and Competition in Banking, Journal of Money, Credit and Banking, 39, 49-81,.

Dinç, I. (2000) Bank reputation, bank commitment, and the effects of competition in credit markets, Review of Financial Studies 13, 781-812.

Elsas, R. (2005) Empirical determinants of relationship lending Journal of Financial Intermediation 14, 32-57.

Elsas, R. and J.P. Krahnen. (1998) Is relationship lending special? Evidence from credit-file data in Germany, Journal of Banking and Finance 22, 1283-1316.

Elyasiani, E. and L.G. Goldberg (2004) Relationship lending: a survey of the literature, Journal of Economics and Business 56, 315-330.

Fazzari, S. M., Hubbard, R. G. and B. C. Petersen. (2000) Financing Constraints and Corporate Investment: Response to Kaplan and Zingales, NBER Working Papers 5462.

Fischer, K.H. (2005). Acquisition of information in loan markets and bank market power: An empirical investigation. Proceedings of the 2005 Annual Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago.

Gersovitz, M. (1980) On classification probabilities for the disequilibrium model, Journal of Econometrics 14, 239–246.

Giannetti, M., M. Burkart, and T. Ellingsen. (2007) What you sell is what you lend? Explaining trade credit contracts. Stockholm School of Economics working paper.

Hannan, T.H. (1997), Market share inequality, the number of competitors, and the HHI: An examination of bank pricing, Review of Industrial Organization 12: 23-35.

Hannan, T.H. y A. Berger. (1991) The Rigidity of Prices: Evidence from the Banking Industry. American Economic Review 81, 938-945.

Harhoff, D. and T. Körting, T. (1998) Lending relationships in Germany: Empirical results from survey data, Journal of Banking and Finance 22, 1317-54.

Hines, J.R. Jr. and R. Thaler. (1995) The flypaper effect, Journal of Economic Perspectives 9, 217-226.

Houston, J.F., and C. James. (1998) Do bank internal capital markets promote lending?, Journal of Banking and Finance 22, 899-918.

Hubbard, R. G.. (1998) Capital Market Imperfections and Investment, Journal of Economic Literature 35, 193-225

Jackson, W. (1997) Market structure and the speed of adjustment: Evidence of nonmonotonicity, Review of Industrial Organization 12, 37-57.

Jayaratne, J., and J.D. Wolken. (1999) How important are small banks to small business lending? New evidence from a survey to small businesses, Journal of Banking and Finance 23, 427-458.

Karceski, J., S. Ongena, and D. Smith (2005) The impact of bank consolidation on commercial borrower welfare, Journal of Finance 60, 231-266.

Kaplan, S. and L. Zingales. (1997) Do Financing Constraints Explain why Investment is Correlated with Cash Flow?, Quarterly Journal of Economics 112, 169-215.

Lamont, O., C. Polk and J. Saá-Requejo. (2001) Financial constraints and stock returns, Review of Financial Studies 14, 529-54.

Lau, L., (1982) “On identifying the degree of competitiveness from industry, price and output data”, Economics Letters 10,. 93–99.

Maddala, G. S. (1983) Limited-Dependent and Qualitative Variables in Econometrics, (Cambridge: Cambridge University Press)

Maddala, G. S. and F.D. Nelson. (1974) Maximum likelihood methods for models of markets in disequilibrium, Econometrica 42, 1003–1030.

Maudos, J. and J. Fernandez de Guevara. (2004) Factors explaining the interest margin in the banking sectors of the European Union, Journal of Banking and Finance 28, 2259-2281.

Maudos, J., Fernández, J. and F. Pérez. (2005) Market power in European banking sectors, Journal of Financial Services Research 27,109-138.

Mester, Loretta J., Nakamura, L.I. and M. Renault (1998) Checking Accounts and Bank Monitoring, Working Paper, Federal Reserve Bank of Philadelphia.

Miwa, Y., J.M. Ramseyer. (2005) Trade Credit, Bank Loans, and Monitoring: Evidence from Japan. University of Tokyo Working Paper.

Montoriol, J. (2006) Relationship lending and small business finance: empirical analysis of cost of capital, credit rationing, and firm performance, Universitat Pompeu Fabra, Doctoral Dissertation.

Moore, R. R. (1998) Concentration, Technology, and Market Power in Banking: Is Distance Dead?, Financial Industry Studies, Federal Reserve Bank of Dallas, December, 1-24.

Ongena, S., D. Smith. (2001) The duration of bank relationships, Journal of Financial Economics 61, 449-475.

Ogawa, K., K. Suzuki. (2000) Uncertainty and investment: some evidence from the panel data of Japanese manufacturing firms, Japanese Economic Review 51, 170-192.

Panzar, J.C. and J.N. Rosse (1987) Testing for monopoly equilibrium, Journal of Industrial Economics 35, 443–456.

Petersen, M. A. and R. G. Rajan. (1994) The Benefits of Lending Relationships: Evidence from Small Business Data, Journal of Finance 49, 3-37.

Petersen, M. A. and R.G. Rajan. (1995) The effect of credit market competition on lending relationships, Quarterly Journal of Economics 110, 407-443.

Rajan, R. and L. Zingales. (1998) Financial dependence and growth, American Economic Review 88, 559-586.

Rhoades, S. A. (1995) Market Share Inequality, the HHI, and Other Measures of the Firm-Composition of A Market, Review of Industrial Organization 10, 657-674.

Ribon, S. and O. Yosha. (1999) Financial Liberalization and Competition in Banking: An Empirical Investigation, Tel Aviv University, Working Paper, 23-99.

Roberts, M. (1984) Testing oligopolistic behavior, International Journal of Industrial Organization 2, 367–383.

Saving, T.R. (1970) Concentration ratios and the degree of monopoly, International Economic Review, 11, 139-146.

Schiantarelli, F. (1995) Financial Constraints and Investment: A Critical Review of Methodological Issues and International Evidence, in J. Peek and E. Rosengren, eds.), Federal Reserve Bank of Boston Conference Series No. 39.

Schmalensee, R. (1989) Inter-industry Studies of Structure and Performance, in R. Schmalensee and R.D. Willig, (eds.), Handbook of Industrial Organisation, 2, 951-1009. North-Holland, Amsterdam.

Scott, J.A. and W.C. Dunkelberg. (2005) Bank Mergers and Small Firm Financing, Journal of Money, Credit and Banking 35, 999-1017.

Shaffer, S. (1993) A test of competition in Canadian Banking, Journal of Money, Credit and Banking 25, 49-61

Shikimi, M. (2005) Do Firms Benefit from Multiple Banking Relationships? Evidence from Small and Medium-Sized Firms in Japan, Discussion Paper Series, nº70. Hitotsubashi University Research Unit for Statistical Analysis in Social Sciences.

Stein, J. C. (2002) Information Production and Capital Allocation: Decentralized versus Hierarchical Firms, Journal of Finance 57, 1891-1921.

Udell, G.F. (2004) Asset-Based Finance, New York: The Commercial Finance Association.

Williamson, O., "The Economics of Defense Contracting: Incentives and Performance," in R. McKean, ed: Issues in Defense Economics (Columbia University Press, New York), 1967.

Williamson, O., "Corporate Finance and Corporate Governance," Journal of Finance 43 (1988), 567-591.

Yafeh, Y. and O. Yosha (2001) Industrial Organization of financial systems and strategic use of relationship banking, European Finance Review 5, 63-78.

Zarutskie, R. (2003) Does Bank Competition Affect How Much Firms Can Borrow? New Evidence from the U.S., presented at Corporate Governance: Implications for Financial Services Firms, 39th Annual Conference on Bank Structure and Competition, Chicago, May 7-9, 2003.

Zarutskie, R. (2006) Evidence on the effects of bank competition on firm borrowing and investment, Journal of Financial Economics, 81, 503-537.

Table 1. Variable Means over Time (1994-2002)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	PERIOD
Bank market power										
HHI bank deposits	0.12083	0.11733	0.11701	0.11356	0.10437	0.09645	0.08936	0.08314	0.07772	0.10220
Lerner index	0.2102	0.2304	0.2403	0.2419	0.2412	0.2517	0.2532	0.2637	0.2641	0.2488
Other bank market characteristics										
Average bank size	8.0247	8.0928	8.3265	8.4085	8.4985	8.5123	8.6985	8.7158	8.8236	8.4215
Bank credit risk	0.03352	0.02545	0.01059	0.00625	0.00232	0.00051	0.000223	0.00013	0.000114	0.00879
Number of bank branches	3348	3450	3544	3590	3664	3702	3700	3687	3657	3594
Bank profitability	0.00927	0.01125	0.01363	0.01819	0.02543	0.0182	0.0253	0.0331	0.0288	0.02035
Bank inefficiency	0.71256	0.71053	0.70552	0.70523	0.6944	0.62015	0.6253	0.61002	0.56823	0.66133
Firm characteristics										
Trade credit/total liabilities	0.34166	0.34326	0.34234	0.35104	0.3498	0.34754	0.35155	0.34383	0.34530	0.34626
Trade credit/tangible assets	0.42586	0.43988	0.42824	0.44007	0.41583	0.41055	0.44201	0.43218	0.43020	0.43322
Loans/tangible assets	0.21152	0.21337	0.20185	0.23597	0.22565	0.22219	0.23098	0.22436	0.22307	0.22688
Firm inefficiency	0.86954	0.85442	0.82546	0.85517	0.83102	0.7858	0.8337	0.8882	0.81483	0.83979
Firm profitability	0.0711	0.07656	0.07286	0.07116	0.07601	0.078	0.07135	0.06584	0.05432	0.07080
Firm size	13.73	13.78	13.84	13.93	14.03	14.12	14.23	14.29	14.33	14.03
Environmental regional control variables										
GDP	41811	43643	44964	46400	48099	54074	52520	54016	55437	48996
Taxation	0.21814	0.2152	0.2183	0.2163	0.2258	0.2352	0.1925	0.1935	0.2025	0.21305
Percentage urban population	0.51252	0.52685	0.53713	0.53208	0.5412	0.5518	0.562	0.5727	0.5834	0.54663
Number of bankruptcies/total number of SMEs in the region	0.042	0.031	0.016	0.027	0.029	0.019	0.016	0.022	0.025	0.024

Table 2. SME Financing Constraints: Trade Credit Regression (I)

p-values in parenthesis. The errors are clustered at the regional level

Dependent variable (financial constraint)	**Trade credit/(total liabilities)**			
	Instrumental Variables		***GMM-system estimator***	
	(I)	***(II)***	***(III)***	***(IV)***
Constant	-5.0163*** (0.000)	-5.3140*** (0.000)	-5.0094*** (0.000)	-5.3915*** (0.000)
Lagged dependent variable	-	-	-1.7720*** (0.000)	-1.1741*** (0.000)
Bank market power				
HHI bank deposits	-0.19483** (0.019)	-	-24.53423*** (0.000)	-
Lerner index	-	0.03800*** (0.002)	-	0.07194*** (0.000)
Other bank market characteristics				
Average bank size	-0.229655*** (0.000)	-0.08952*** (0.000)	-0.29851*** (0.000)	-0.06552*** (0.000)
Bank credit risk	-5.16237*** (0.000)	-7.6893*** (0.000)	-8.1593*** (0.000)	-27.1427*** (0.000)
Number of bank branches	-0.07033*** (0.000)	-0.07702*** (0.000)	-0.0037*** (0.000)	-0.00566*** (0.000)
Bank profitability	-0.9830*** (0.000)	-1.5456** (0.030)	-4.2174*** (0.000)	-3.0704** (0.013)
Bank inefficiency	0.00582*** (0.000)	0.01266*** (0.000)	0.04012*** (0.000)	0.04575*** (0.008)
Firm characteristics				
Firm inefficiency	-0.04569 (0.338)	-0.0426 (0.566)	-0.02599 (0.172)	0.0581** (0.041)
Firm profitability	0.01786 (0.880)	0.03086 (0.888)	0.0934 (0.326)	-0.06622* (0.050)
Firm size	0.13152*** (0.000)	0.05671*** (0.000)	0.12027*** (0.000)	0.38701*** (0.000)
Environmental regional control variables				
GDP	-0.60E-06*** (0.000)	-0.81E-06*** (0.000)	-0.35E-05*** (0.000)	-0.25E-05*** (0.000)
Taxation	-0.00021 (0.959)	0.00044* (0.069)	-0.00014 (0.681)	0.00022** (0.017)
Percentage urban population	2.4579*** (0.000)	2.54061*** (0.000)	2.8454*** (0.000)	9.9948*** (0.000)
Number of bankruptcies/total number of SMEs in the region	0.04518*** (0.000)	0.04574*** (0.000)	0.04415*** (0.000)	0.06332*** (0.000)
F-statistic	0.009	0.011	0.015	0.014
Sargan test	0.144	0.151	0.139	0.153
Observations	278.073	278.073	278.073	278.073
Number of firms	30.897	30.897	30.897	30.897

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

Table 3. SME Financing Constraints: Trade Credit Regression (II)

p-values in parenthesis. The errors are clustered at the regional level

Dependent variable (financial constraint)	**Trade credit/tangible assets**			
	Instrumental Variables		***GMM-system estimator***	
	(I)	***(II)***	***(III)***	***(IV)***
Constant	-5.0253*** (0.000)	-4.8951*** (0.000)	-5.0222*** (0.000)	-4.92271*** (0.000)
Lagged dependent variable	-	-	-0.13260** (0.049)	-0.17225* (0.060)
Bank market power				
HHI bank deposits	-13.7480*** (0.000)	-	-20.1118*** (0.000)	-
Lerner index	-	0.12466*** (0.000)	-	0.18344** (0.043)
Other bank market characteristics				
Average bank size	-0.27684*** (0.000)	-0.34195*** (0.000)	-0.26025*** (0.000)	-0.14241*** (0.000)
Bank credit risk	-4.8702*** (0.000)	-20.2040*** (0.000)	-27.5780*** (0.000)	-3.7136** (0.042)
Number of bank branches	-0.05778*** (0.000)	-0.00284*** (0.000)	-0.01163** (0.040)	-0.00197*** (0.000)
Bank profitability	-3.26679* (0.063)	-2.69694** (0.043)	-5.6328*** (0.002)	-0.45399 (0.622)
Bank inefficiency	0.01820*** (0.000)	0.07791*** (0.000)	0.07291*** (0.001)	0.0742*** (0.004)
Firm characteristics				
Firm inefficiency	0.03001*** (0.000)	0.041760*** (0.00)	0.03588*** (0.001)	0.09741*** (0.000)
Firm profitability	-0.65546 (0.425)	-0.44176 (0.618)	-0.99631 (0.129)	-0.40102 (0.548)
Firm size	0.23960*** (0.000)	0.59746*** (0.000)	0.31850*** (0.000)	0.59311*** (0.000)
Environmental regional control variables				
GDP	0.23E-05** (0.032)	0.69E-05* (0.062)	-0.74E-05* (0.085)	-0.16E-05** (0.029)
Taxation	0.00301 (0.764)	0.00632 (0.707)	0.00014 (0.913)	-0.0077 (0.240)
Percentage urban population	-15.7462** (0.011)	5.52944** (0.019)	3.3755** (0.024)	19.6507*** (0.001)
Number of bankruptcies/total number of SMEs in the region	0.06579*** (0.000)	0.04082*** (0.000)	0.03224*** (0.000)	0.02079*** (0.000)
F-statistic	0.016	0.017	0.020	0.021
Sargan test	0.201	0.193	0.179	0.171
Observations	278.073	278.073	278.073	278.073
Number of firms	30.897	30.879	30.897	30.897

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

Table 4. Disequilibrium model: Estimated Parameters

Switching regression model estimated by full information maximum likelihood (FIML) with fixed effects

p-values in parenthesis. The errors are clustered at the regional level

Desired demand for bank loans	**Coefficient**	**Std. Error**
Reciprocal of total assets	119038.0*** (0.000)	1073.10
Sales/total assets(t-1)	0.48031*** (0.000)	0.01
Cash-flow/total assets(t-1)	-1.39319*** (0.000)	0.06
Trade credit/total assets(t-1)	-0.40445*** (0.000)	0.01
Loan interest rate minus short term prime rate	-0.47646*** (0.000)	0.09
Log(GDP)	0.25973** (0.013)	0.10
Availability of bank loans		
Reciprocal of total assets	84518.2*** (0.000)	2038.85
Tangible fixed assets/total assets(t-1)	0.45201*** (0.000)	0.01
Operating profit/interest(t-1)	0.000030 (0.994)	0.01
Current assets/current liabilities	0.06925*** (0.000)	0.01
Log(GDP)	-0.02896 (0.684)	0.07
S.D. of demand equation	1.5548*** (0.000)	0.01
S.D. of availability equation	0.9045*** (0.000)	0.01
Correlation coefficient	0.6511*** (0.000)	0.09
Log likelihood	148979	
Observations	278.073	
Number of firms	30.897	

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

Table 5. Correlations: Firm Financing Constraints

Mean values

Criterion	*Trade credit/ total liabilities* [(a)]	*Trade credit/ tangible assets* [(a)]	*Disequilibrium model (constrained firms)*
Trade credit/total liabilities	1.00	0.84	0.77
Trade credit/tangible assets	0.84	1.00	0.82
Disequilibrium model (constrained firms)	0.77	0.82	1.00

Table 6. Means: Firm Financing Constraints by Concentration and Lerner Index

Mean values
(number of firms in parenthesis)

	BANK HHI (basis points)		**BANK LERNER INDEX (%)**	
Criterion	**Constrained firms**	**Unconstrained firms**	**Constrained firms**	**Unconstrained firms**
Trade credit/total liabilities [(a)]	0.1009	0.1040	22.62	16.96
Trade credit/tangible assets [(a)]	0.0928	0.1108	21.73	16.11
Disequilibrium model	0.1001	0.1156	20.01	16.04

(a): The constraint and unconstrained firms are classified considering those firms below and over the median value of this criterion

Table 7. SME Financing Constraints: Disequilibrium Probit Analysis

Dependent variable = 1 if the firm is financially constrained, 0 otherwise
number of points in Hermite quadrature (optimization procedure) = 20
p-values in parenthesis. The errors are clustered at the regional level

	(I)		***(II)***	
	Estimate	Economic significance (marginal effect[a])	Estimate	Economic significance (marginal effect [a])
Constant	3.4174*** (0.000)	-	3.3164*** (0.000)	-
Bank market power				
HHI bank deposits	-0.39593** (0.010)	-35.42	-	-
Lerner index	-	-	0.02889*** (0.000)	11.3
Other bank market characteristics				
Average bank size	-0.40918** (0.042)	-4.12	-0.62672** (0.041)	-4.26
Bank credit risk	-2.5549*** (0.000)	-4.62	-2.1420*** (0.000)	-5.83
Number of bank branches	-0.00016*** (0.000)	-0.0085	-0.000159*** (0.001)	-0.0091
Bank profitability	-0.281142** (0.032)	-9.67	-0.13310 (0.315)	-4.01
Bank inefficiency	0.08840*** (0.005)	0.56	0.01699*** (0.000)	0.98
Firm characteristics				
Firm inefficiency	0.03413*** (0.004)	2.57	0.04880** (0.011)	6.90
Firm profitability	-0.09564*** (0.000)	-3.13	-0.09535*** (0.000)	-4.04
Firm size	0.27370*** (0.000)	7.85	0.26986*** (0.000)	7.82
Environmental regional control variables				
GDP	-0.13E-05*** (0.000)	-0.067	-0.15E-05*** (0.000)	-0.10
Taxation	0.00040 (0.550)	0.00097	0.00047 (0.488)	0.00010
Percentage urban population	0.20669*** (0.000)	0.95	0.22799*** (0.005)	0.91
Number of bankruptcies	0.01165** (0.014)	0.58	0.00945*** (0.000)	0.51
ρ	0.82352*** (0.000)		0.82718*** (0.000)	
LR (zero slopes)	6286.44 (0.000)		5238.25 (0.000)	
Log likelihood	-51920.8		-44813.9	
Fraction of correct predictions (%)	69.19		68.78	
Observations	278.073		278.073	
Number of firms	30.897		30.897	

(a) marginal effects in percentage points calculated at sample means

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