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Bank competition and firm creation

by E. Bonaccorsi di Patti and G. Dell'Ariccia

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BANK COMPETITION AND FIRM CREATION

by Emilia Bonaccorsi di Patti* and Giovanni Dell'Ariccia**

Abstract

We investigate the effects of competition in the banking sector on the creation of firms in the non-financial sector, explicitly allowing for heterogeneous effects across borrowers characterized by different degrees of asymmetric information. We find evidence of a bell-shaped relationship between bank competition and firm creation. In addition, consistent with models finding that competition may reduce the availability of credit to informationally opaque firms, we find that bank competition is less favorable to the emergence of new firms in industries where information asymmetries are greater.

JEL classification: G21.

Keywords: commercial banks, competition, asymmetric information, new businesses.

Contents

*Bank of Italy, Economic Research Department; **IMF, Research Department.

1. Introduction

Competition in the banking industry affects the supply of credit and thus has important consequences for borrowers that rely on bank financing.[1] In countries where banks are the primary source of external finance to start-up enterprises, the availability of bank credit is seen as a precondition for the creation and development of firms, affecting through this channel employment and economic growth.

Conventional theories of industrial organization predict that greater bank competition benefits all borrowers by making credit more available and cheaper. Other theories, focusing on the special role of information in credit markets, show that bank competition may reduce the supply of credit to opaque borrowers by worsening adverse selection, moral hazard, and hold-up problems. Given the lack of an unequivocal prediction, the question becomes essentially empirical.

Most empirical studies have focused on the economy-wide relationship between bank competition and credit supply, implicitly assuming that the effects are homogeneous across borrowers.[2] However, if the negative "information-based" effect and the positive conventional effect coexist, bank competition will not affect all borrowers uniformly. The former effect may outweight the latter in credit market segments where asymmetric information problems are severe, yet remain negligible in others. This heterogeneity could explain the current lack of clear-cut evidence in favor of either theory.

The empirical assessment of the "information channel" is relevant from two perspectives. First, if it is supported by the data, information-based heterogeneity should be explicitly incorporated into empirical analysis. Second, from a policy perspective, it is important to determine whether and when the "information channel" is important enough to dominate the conventional effect. An economically large effect of the information channel would imply that

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[2] Recent exceptions are Petersen and Rajan (1995) and Cetorelli and Gambera (2001).

policies aimed at fostering bank competition would affect not only the overall supply of credit but also its allocation among borrowers.[3]

To address these issues, we follow a three-step strategy. First, we investigate the average effect of bank competition in local markets on credit availability to new firms by regressing the rate of firm creation on measures of bank market power and a set of control variables.[4] Second, we extend the model to industry-level data in order to allow the effect of bank competition on firm creation to vary across industries with different degrees of asymmetric information. The regression is augmented with an interaction term between a measure of bank market power in each local market and a measure of information asymmetry in each industry. Like Cetorelli and Gambera (2001), we exploit the differential effect that bank competition should have on firms operating in different industries to partly disentangle two potentially opposite effects. However, our approach differs from theirs in two ways. First, we focus explicitly on asymmetric information as the variable differentiating industries within a local credit market. Second, we analyze the effect of bank competition on firm creation and not on the growth in value added.

Finally, similarly to Rajan and Zingales (1998) and Cetorelli and Gambera (2001), we focus exclusively on the interaction term between the measures of bank market power and industry opaqueness. In order to improve the precision of our test of the existence of the information channel, industry and market control variables are replaced by fixed effects. This specification greatly reduces the concern for omitted variable bias and for the endogeneity problems common to most growth regressions.

A key point is measuring the degree of information asymmetry of industries. We consider one specific interpretation of the "opaqueness" of firms, i.e. the inability of external lenders to evaluate entrepreneurial activities. We assume that for technological reasons banks have varying degrees of difficulty in assessing the credit-worthiness of potential borrowers in different industries. As is argued below, our conjecture is that this difficulty is correlated with

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[3] To the extent that size is a proxy for firm opaqueness, this is related to the issue of how bank consolidation affects small business lending. See Berger, Demsetz and Strahan (1999) for a review of the literature.

[4] As is explained in the following sections, there are many reasons to gauge credit availability by the rate of birth of non-financial firms. Here let us just recall that it is more likely that asymmetric information problems will keep firms from starting up rather than restrict the quantity of credit to established firms. Furthermore, because of their special characteristics, such as the lack of credit history, new firms are ideal candidates to study the effect of bank competition on opaque borrowers.

the structure of firms' assets (the proportion of physical capital) and with the heterogeneity of the assessments of firms by market participants (the relative frequency of bond issues in which rating firms disagree) in each industry.

We estimate our models employing data on firms in 22 industries in the 103 Italian provinces. This data set serves our purpose for a number of reasons. First, in Italy bank credit still represents the most important source of external finance for firms, particularly new ones, because venture capital is negligible. Second, local banking structures differ substantially, which provides sufficient variation within a single institutional environment.[5] Third, information on the demographics of non-financial firms by industry is available with the geographic partition corresponding to the definition of local credit markets. Finally, the information is very rich, allowing a variety of robustness tests. In particular, the banking data are detailed enough to construct several measures of market power in local credit markets. In addition to standard measures of concentration, we compute indicators of rivalry and entry that should be more suitable for models based on asymmetric information. For the opaqueness measure, a sample of more than 60,000 balance sheets of non-financial firms is available, with information on the age and the activity of firms.

There is a trade-off between geographic coverage and the availability of high quality detailed data. Although restricting the study to a single country may limit the generality of the results, our approach has three important advantages with respect to cross-country studies. First, there is significant evidence that credit markets are subnational, particularly for small or new firms.[6] In this respect, country level indicators of competition may not adequately capture the local supply conditions faced by opaque borrowers. Second, the uniformity of the institutional framework eliminates the need to control for different regulatory systems and makes it easier to account for regime shifts.[7] Finally, the quality and the information content of the national data are likely to be more homogeneous than international statistics.

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[5] This diversity has been exploited in other studies on the effects and determinants of financial structure. For example, Guiso, Sapienza and Zingales (2001) investigate the relationship between social capital and financial development. Information on the main characteristics of Italian provinces is in section 3.6.

[6] See for example Kwast, Starr-MCluer and Wolken (1997), and Bonaccorsi di Patti and Gobbi (2001).

[7] In the last decade many countries have undergone deep changes in their financial systems, including various forms of liberalization and privatization, casting doubt on the adequacy of fixed effects models.

This paper yields three main findings. First, the evidence suggests a bell-shaped relationship between bank market power and firm creation. Second, consistently with the information-based theories, we detect a differential effect of bank competition on firm creation across industries that is related to industry opaqueness. That is, an increase in the degree of bank competition will be more beneficial (or less adverse) to more transparent firms. Third, the economic magnitude of the differential effect is relatively small.

The paper is structured as follows. The next section presents a brief summary of the theoretical and empirical literature on the relationship between bank competition and credit supply; Section 3 illustrates the empirical methodology; Section 4 describes the data; Section 5 discusses our findings; and Section 6 concludes.

2. Theoretical Issues and Empirical Literature

Theory has not yet provided a unique answer to the question of how bank competition affects the availability of credit to new entrepreneurs, hence indirectly firm creation. On the one hand, the literature based on traditional models of industrial organization holds that competition increases the supply of credit. On the other hand, more recent work points out that because of the special role played by information bank competition may be detrimental to the supply of credit to opaque borrowers.

According to the first view, which abstracts from informational issues, a more competitive banking system promotes the emergence of entrepreneurial activities.[8] A bank that has some monopoly power faces a downward sloping demand curve and sets its credit supply according to the standard conditions of equality between Lerner indices and inverse elasticities (see Freixas and Rochet, 1997). Greater competition between suppliers increases the elasticity of the demand for loans faced by each bank, narrowing the mark-up that can be charged to customers, though not necessarily in a uniform way.

On the contrary, the second view explicitly takes account of information asymmetries and suggests that a highly competitive banking system may be detrimental to the availability of credit to opaque borrowers, and hence to firm creation. According to this view, the relationship

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[8] Hannan (1991a) presents an application of the standard structure-conduct-performance paradigm to the banking industry. Besanko and Thakor (1992) and Chiappori, Perez-Castrillo, and Verdier (1995) show that in a model of spatial differentiation competition compresses intermediation margins.

between bank competition and credit supply is affected by the information structure of the market.[9] An increase in the degree of competition may worsen moral hazard[10] and adverse selection[11] on the borrower side, or hold-up problems[12] on the lender side, leading to higher interest rates and/or a reduced availability of credit to opaque firms. We will refer collectively to all of these effects as to the "informational channel".

The relative importance of the two opposite mechanisms is likely to vary with the extent to which borrowers are affected by asymmetric information problems. Therefore, the net effect of competition on credit availability is essentially an empirical issue.

The predictions of the conventional models and those of the information-based models both find some support in the empirical literature. Hannan (1991b) provides evidence that interest rates on small commercial loans tend to be higher in more concentrated banking markets. In a paper that, like ours, focuses on business creation, Black and Strahan (2002) find that in the U.S. the liberalization of branching and the introduction of interstate banking were associated with higher rates of incorporation. However, they also find that an increase in the market share of large banks due to consolidation favored the creation of firms.[13]

Jackson and Thomas (1995) report a positive effect of bank concentration on firm creation. In the same vein, Petersen and Rajan (1995) find that young firms receive more credit in more concentrated banking markets, and that the difference tends to disappear as firms get older, suggesting that the positive effect of market power diminishes when information asymmetries become less severe.

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9 In the appendix we present a simple model of a loan market that provides some useful insights on the interaction between market structure and information.

10 Hoff and Stiglitz (1997) show that moral hazard may drive interest rates up when competition increases. As the number of competitors rises, information flows worsen, weakening reputation effects and borrowers' incentives to repay their debt, and leading to higher interest rates.

11 In Broecker (1990) banks compete for loans in a Bertrand fashion over interest rates. When banks independently perform an imperfect test to screen the credit-worthiness of applicants, the equilibrium loan rate may increase with the number of banks, since the average credit-worthiness of applicant firms that pass the test with at least one bank decreases with the number of banks. See also Riordan (1992).

12 In Petersen and Rajan (l995) banks' willingness to lend to new firms increases with bank concentration, while the interest rate charged decreases. In that "Schumpeterian" perspective, banks lend to new firms with the prospect of extracting future rents from those that are successful. Thus, bank competition reduces incentives to "invest" in new projects as future rents are proportional to bank market power.

13 A large literature has studied the effects of consolidation in the banking industry on small business lending. See Berger, Demsetz and Strahan (1999) for a review.

Indirect evidence of the link between financial structure and the creation of firms is described by Rajan and Zingales (1998). Based on cross-country data, they find that financial development affects growth mainly by increasing the number of productive establishments rather than by expanding existing ones.

Finally, in a paper closely related to ours, Cetorelli and Gambera (2001) use the same data as Rajan and Zingales (1998) to study the effects of bank concentration on the rate of growth of different industries. They find that concentration, measured by the nationwide market share of the top 3 (or 5) banks, promotes growth in those industries that are more in need of external financing, and that at the same time it depresses growth overall.

3. The Empirical Methodology

The discussion in Section 2 suggests that competition in the banking industry has conflicting effects on the availability of credit to opaque borrowers: positive through the conventional channel and negative through the information channel. Consequently, regressing a measure of credit availability to opaque borrowers on a measure of competition would estimate the net effect of the two individual effects without providing any information on the empirical relevance of either. Moreover, if the relative importance of the two effects varied systematically across borrowers, restricting the relationship between competition and credit supply to be the same for all firms could introduce a composition bias.

In a theoretical model considering a continuum of borrowers with varying degrees of opaqueness and a continuum of loan markets with varying degrees of competition, one implication of the "information channel" is that the second cross partial derivative of credit supply with respect to market power and opaqueness is positive, at least in a given range of opaqueness. A simple model that shows this result can be found in the Appendix.

In the corresponding econometric model, information on this second mixed derivative can be obtained from the coefficient of an interaction term between a variable that measures opaqueness and another that measures market power in the banking industry. At the industry level, models based on asymmetric information predict that an increase in bank market power should be relatively more detrimental to the emergence of new firms in industries where informational asymmetries are irrelevant, whereas it could actually be favorable where they play a substantial role.

In what follows, we present two complementary empirical models. The first is constructed to estimate the average relationship between bank competition and firm creation, without allowing any heterogeneity across industries. The second model includes a differential effect of bank competition on firm creation to detect the information channel.

3.1 *Model I: The Average Effect*

The first model describes the rate of birth of firms in each local market j as a function of market power in the local banking industry and a set of control variables, providing information on the economy-wide relationship between bank competition and firm creation. The coefficient of the market power indicator represents the net effect resulting from the two potentially opposite effects previously discussed. The specification is

$$\begin{aligned} Birth\ Rate_j &= Constant \\ &+\gamma_1 \cdot g(Bank\ Market\ Power_j) \\ &+\Gamma_2 \cdot Market\ Characteristics_j + \varepsilon_j \end{aligned} \tag{1}$$

Given that the shape of the relationship between market power and the rate of creation of firms is not known *a priori*, we include a general function $g(.)$. In what follows we test for a linear versus a quadratic relation.

Market power is measured by several variables, including the Herfindahl index, its absolute variation, and the deposit market share of banks originally chartered in the local market. The last two variables are normalized so that higher values correspond to less competition (see Section 3.5 below). The market characteristics that should affect firm creation are similar to those employed in standard growth regressions.[14] We include variables measuring initial economic development, market size, population density, urbanization, education, bank development, a proxy for the level of infrastructures, a measure of social ties, and geographic dummy variables (see Section 3.6).

One could object that bank market structure has an endogenous component insofar as that banks move into more dynamic economies with higher rates of firm creation. For this reason, the model is estimated both with *OLS* and *2SLS*. In the *2SLS* estimation we instrument the measures of bank market power with a number of variables describing the structure of

[14] See Cetorelli and Gambera (2001) and Black and Strahan (2001).

the banking industry in the local market prior to our sample period. We employ lagged values of the concentration index, the natural log of the number of banks in the province, the natural log of the number of branches in the province, and the absolute annual variation in the concentration index.

3.2 *Model II: The Industry-Specific Effects*

Based on the arguments presented in Section 2, we modify Model I to introduce heterogeneity across industries. The birth rate of firms in industry i and market j is specified as a function of bank market power in market j, an interaction term between opaqueness in industry i and the measure of bank market power in market j, and other control variables. The existence of an "information channel" is consistent with a positive coefficient for the interaction term because bank competition is supposed to be *relatively* less favorable (or more detrimental) to more opaque firms.

The model is augmented with industry dummy variables to control for industry-specific factors that affect firm creation. In addition, we include the initial share of each industry in the local market to control for catching-up effects and for the fact that in crowded markets the entry of new firms is less likely. We expect a negative coefficient. We also add another interaction term between a proxy of wealth in market j and the average fixed cost of young firms in industry i to take into account the fact that entrepreneurs may use personal wealth to fund their activities. We expect a negative coefficient for this variable since personal wealth may be a reasonable substitute for bank credit only in industries with relatively low fixed costs. The direct effect of wealth on the rate of birth of firms should be positive, but it should also be smaller in industries requiring a large initial investment. Finally, we include a vector of market characteristics that affect the creation of firms in all industries, as in Model I.

The resulting Model II is

$$
\begin{aligned}
Birth\ Rate_{i,j} \;=\; & Constant \;+\psi_1 \cdot f(Bank\ Market\ Power_j) \\
& +\psi_2 \cdot (Opaqueness_i \cdot Bank\ Competition_j) \\
& +\psi_3 \cdot Initial\ Industry\ Share_{i,j} \\
& +\psi_4 \cdot (Startup\ Costs_i \cdot Wealthj) \\
& +\Psi_5 \cdot Market\ Characteristics_j \\
& +\Psi_6 \cdot Industry\ Fixed\ Effects_i + \varepsilon_{i,j}
\end{aligned}
\tag{2}
$$

The use of industry data rather than economy-wide rates of birth alleviates the concern over the endogeneity of bank structure variables. Nevertheless, the potential for endogeneity remains insofar as markets characterized by fast-growing opaque (and thus bank-dependent) industries attract a larger number of banks and so are likely to have a less concentrated banking markets. This endogeneity problem could bias the coefficients of the bank market power variables and the interaction term downward. Hence, we estimate this extended model too both with *OLS* and *2SLS*.

To improve the precision of the estimates of the differential effects, we also employ a simpler specification for Model II, replacing all the market level variables with dummy variables to obtain the following regression model:

$$
\begin{aligned}
Birth\ Rate_{i,j} \;=\; & Constant \;+\Phi_1 \cdot Market\ Fixed\ Effects_j \\
& +\varphi_2 \cdot (Opaqueness_i \cdot Bank\ Market\ Power_j) \\
& +\varphi_3 \cdot Initial\ industry\ share_{i,j} \\
& +\varphi_4 \cdot (Startup\ Costs_i \cdot Wealthj) \\
& +\Phi_5 \cdot Industry\ Fixed\ Effects_i \\
& +\Phi_6 \cdot Other\ Controls_{i,j} + \varepsilon_{i,j}
\end{aligned}
\tag{3}
$$

The main advantage of this setup is that the province fixed effects, together with industry dummies, absorb the effect of any variable that does not vary simultaneously across industries

and local markets. Hence, it is more robust with respect to market-specific omitted variables. Furthermore, since this specification also reduces the concern for the endogeneity of bank market power variables, we can use additional proxies based on entry and rivalry that would have been difficult to instrument effectively in our first model. Of course we have to drop any variable that does not vary across markets *and* industries.

In the following sections we first motivate why we chose the rate of birth of firms as a proxy for credit availability to informationally opaque borrowers. Then we illustrate how we measure industry opaqueness and bank market power.

3.3 *Measuring Credit Availability: Why Firm Creation*

Three main arguments motivate our choice of the rate of birth of firms as an indicator of credit availability to opaque borrowers. First, new firms are likely to be affected more severely by asymmetric information problems and have no previous history to mitigate them. Second, information-related problems are most likely to be reflected in firms being unable to start up rather than failing to get funds to grow once they have obtained some original bank credit.[15] Finally, data on the birth of firms are available with both local market and industry disaggregation, while data on growth are not.

Another advantage is that we implicitly constrain firms to be opaque in a relatively uniform way, except for industry-specific characteristics that are related to the type of business, improving the accuracy of our test. Industry growth rates of value added or other measures of production could be heavily influenced by the behavior of large listed firms - which are less opaque and have access to external financing other than local bank credit - and by the size and age distribution of firms in the industry.[16]

3.4 *Measuring the Degree of Opaqueness*

The banking literature usually relates opaqueness to firms' age or size, or to proxies of the information generated by the relationships between firms and banks (length, number of

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[15] We could have controlled for differences in size and age using microeconomic data from a sample of existing firms but there would be serious selection bias since we would have excluded firms never born because too opaque to receive any credit at all.

[16] Admittedly, we cannot control for factors like the reputation of individual entrepreneurs. However, unless such components vary both across sectors and provinces, they should be picked up by the fixed effects.

relationships). Alternatively, opaqueness is associated with the resulting "bank dependence", often measured as the ratio of bank credit to total debt.

In this paper, focusing on business creation, we cannot use firm age. Size is a proxy for transparency only for existing firms because it is correlated with age, and with auditing and disclosure requirements, usually stiffer for larger firms. Finally, measures based on credit volume would be highly endogenous.

We follow another approach. Our basic assumption is that firms in the same industry have a similar degree of information problems, which instead varies significantly across industries because of exogenous characteristics of the production and organization technology.

With regard to adverse selection, our argument is that a bank can gauge the quality of a project more easily when it is based on a simple technology, with a large predictable component. For example, a business plan should be easier to evaluate if it involves manufacturing pins or paper than if it entails supplying professional services, where the unobservable quality of human capital or the entrepreneur's effort are the main inputs.

Similarly, with regard to moral hazard, the ability of lenders to monitor the actions of the borrower depends on the activity of the firm, which determines the degree of discretion left to managers or entrepreneurs. Again, moral hazard will be more severe if the technology is complex or has a large discretionary component because it is easier for the entrepreneur to divert resources or retain inside information. We argue that such discretion is negatively correlated with the relative importance of physical capital. In addition, technologies that require a large share of tangible fixed assets naturally imply the availability of collateral, which reduces moral hazard.[17]

Finally, the severity of hold-up problems is likely to be correlated with the same factors that affect moral hazard. If the activity of the firm is such that monitoring through a standing relationship is valuable, the inside bank will be able to extract significant rents from the borrower in the future because of relationship-generated barriers to entry.

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[17] Collateralizable assets can be contracted upon to reduce moral hazard and adverse selection (see Freixas and Rochet, 1997). Agency problems between owner/manager and creditors can be mitigated by the amount of "less liquid" assets, which reduces uncertainty about risk (Myers and Rajan, 1998).

Our working assumption is that industry opaqueness is negatively correlated with the relative importance of fixed and tangible assets in each industry: the larger the share of these assets in the typical balance sheet, the more transparent the industry.[18] Since firms in different industries may have specific accounting practices and varying degrees of discretion in determining depreciation, we use the ratio of gross total assets to gross physical assets (*ASYM*) as our indicator of opaqueness.[19]

The ratio is computed for 22 industries from individual firm data contained in Italy's Company Accounts Data Service (Centrale dei Bilanci) for the years 1994-98.[20] To minimize measurement errors and the effect of outliers, first we cut off the sample at the 5th and 95th percentiles of the distribution of the indicator of opaqueness, which restricted the sample to 54,360 firms. We took the average of the annual individual firm ratios to remove the effects of temporary shocks. Then we computed the mean of these ratios for each industry.[21] To check robustness, we computed the opaqueness indicator using only the data for young firms, defined as those in being for less than 5 years (Table 1) with the same procedure.[22]

One could object that this measure of opaqueness may involve an identification problem. Firms in industries characterized by a high share of physical capital may also have high start-up costs if they require a large stock of physical capital. According to the standard competitive

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[18] Support for this view is found in the literature on bank opaqueness. Morgan (1999) finds that the disagreement between raters' valuation of banks decreases with the share of premises and tangible assets in the balance sheet.

[19] Gross physical assets are property, plant and equipment. In a previous version of this paper we also used the ratio of physical assets net of depreciation to net total assets and results were the same. We did not use intangible assets because they are often not reported or nil for most firms in several industries. Similarly, we excluded R&D expenses because reliable information was not available.

[20] Detailed information on the Service

is in Pagano, Panetta, and Zingales (1998). Industries depending on the availability of natural resources or affected by other special factors were also excluded, because deemed independent from local bank financing (these were mining, the oil industry and transportation).

[21] The opaqueness measures were computed also as industry medians rather than means. The estimation of the models yielded similar results. In addition, in a previous version of this paper, we obtained similar result using weighted averages (see the Proceedings of the 36th Annual Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, May 2000).

[22] Alternatively, we computed the indicator only for small firms, defined as those with total assets of less than 5.0 billion lire (about $2.5 million).

paradigm, bank market power restricts credit supply, so new firms in greater need of funds will suffer the most.[23]

This conjecture yields the same prediction as the "information channel" and the interpretation of the coefficient of the interaction term would not be unique. For example, a positive sign of the interaction term between bank market power and firm opaqueness could mean either that more opaque firms are relatively favored where banks have some monopoly power or that firms that have large start-up costs are relatively more constrained in these markets.[24] We take two different approaches to distinguish between the two explanations.

In the first approach we control for start-up costs directly in the regression, using the average volume of fixed tangible assets of young firms in the industry (*SIZEY*) as a proxy of start-up costs. The regression is augmented with an interaction term, the product of *SIZEY* and the same measure of bank market power employed in the opaqueness interaction term, purging the latter of the potential effect of initial fixed costs.

In the second approach we instrument the opaqueness measure with another variable that should not depend on the initial size of the investment in each industry. Morgan (1999) suggests that a measure of the opaqueness of a firm is disagreement between rating agencies (split rating). The same reasoning can be applied at the industry level: a large percentage of firms with split ratings reflects a greater difficulty of evaluation, hence greater opaqueness.

We construct a measure of the frequency of split ratings in each industry (*SPLIT*) as the percentage of bond issues on which raters disagree. The data refer to about 1200 bond issues between 1983 and 1993 in the U.S.[25] For each issue the rating was split if raters disagreed. Firms with multiple issues were counted only once if the split rating did not change across issues; the issues were counted separately if the split rating changed.

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[23] The assumption, consistent with diversification, is that banks restricting supply reduce the average size of loans rather than their number.

[24] A second potential problem is that some of these indicators may be strongly correlated with the availability of collateral. However, even if that were the case, this bias should work against our hypothesis. Indeed, we should expect that firms able to provide more collateral are also those less rationed, hence they should have a higher rate of birth in concentrated markets, everything else equal. Instead our hypothesis states that firms that are opaque (and have less collateral based on our empirical definition) should have a higher birth rate in concentrated markets.

[25] The data were collected by the staff of the Capital Market section at the Federal Reserve Board from various public sources, such as Moody's, S&P, and Bond Digest. We are very grateful to Donald Morgan for sharing the data with us. The industry classification is based on SIC which can be matched with the Italian classification ATECO91, through ISIC.

Since the rating data refer to a sample of US bond issues, we use *SPLIT* as an instrument for *ASYM* rather than employing it directly as a regressor. The working assumption is still that opaqueness is related to technological factors and that the implied industry ranking is persistent across countries.[26] With that in mind, we believe *SPLIT* is a relatively good instrument for *ASYM*. The rank correlation between the two is 0.45, the correlation is 0.35.

Table 2 reports the industry ranking according to the three opacity proxies (higher rank indicating greater opaqueness). Ranking is consistent across proxies. As expected, young firms tend to be more opaque than the average for their industry.

3.5 *Measuring Bank Competition*

The next task is to select a suitable measure of the degree of competition in the banking industry at the local market level. Most empirical studies have used the Herfindahl index or other concentration ratios. However, the ability of structural measures to capture the degree of competition in a market depends crucially on the form of strategic interaction that takes place.[27] Since we do not have information on this aspect, we use six alternative variables to describe local banking conditions.

First, given its widespread use in policy and empirical analysis, we use the Herfindahl index of concentration in the deposit market (*HERF*). Second, under the assumption that significant changes in industry structure affect banks' expectation of extracting future rents from borrowers,[28] we compute the absolute variation of the Herfindahl index in the period examined (*ABSVHERF*). Third, we consider the deposit market share of banks originally chartered in the local market as a proxy for the degree of closure with respect to entry by banks from neighboring markets (*LOCBANKS*). This measure may also reflect the importance of soft information likely precluded to banks originating in different markets.[29]

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[26] See Rajan and Zingales (1998) for a similar approach.

[27] For example, in a Salop model of competition on the circle the relationship between competition and the Herfindahl index is ambiguous. In equilibrium a more competitive market (lower transportation costs) corresponds to a fewer firms, and thus a higher Herfindahl index. However, lowering fixed costs also increases competition by increasing the number of active firms, and thus implies a lower Herfindahl index.

[28] In information-based models, not only present market power but also the expectation of future rents may affect the credit supply to opaque borrowers (see Petersen and Rajan, 1995).

[29] Hannan (1991) finds empirical evidence in support of the thesis that commercial loan markets are local in nature. Kwast, Starr-McCluer, and Wolken (1997) find that in the US local banks are by far the dominant providers of key assets and credit services to small businesses. They define local institutions as institutions

These three measures describe structural features of the local banking industry and may not adequately capture more dynamic aspects of competition. In the estimation of the fixed effects version of Model II we employ three additional measures of market power based on proxies of rivalry and entry. In particular, we construct an index of market share shifts (*SHIFT*), namely half the sum of the absolue values of the changes in market shares.[30] To capture the relative importance of entry barriers in the local market we take two measures of entry[31]: the share of branches opened in each province in year *t* by banks that were not present in that province in year *t-1* (*ENTRY*); and, given the large number of mergers and acquisitions in Italy in the years studied,[32] a variable that also counts banks entering the local market by merger or acquisition (*ENTRYM&A*).

Some of the variables are transformed into indices that should be positively correlated with market power to have uniform predicted signs for all the market power proxies. In particular, we employ (*1-ABSVHERF*), (*1-SHIFT*), (*1-ENTRY*) and (*1-ENTRYM&A*) in place of the original measures. Hence, according to information-based theories, all our market power/opaqueness interaction terms should have positive coefficients. Tables 3 and 4 report descriptive statistics and the correlation matrix of the six proxies.

3.6 *Data and Variables*

The empirical analysis is based on a data set for 22 industries in the 103 Italian provincial credit markets between 1996 and 1999.[33] In order to attenuate the effect of temporary shocks, the time dimension is removed by employing means for the period.[34] In 1996 the average province had 558,000 residents (the smallest 92,000, the largest 3.7 million). The distribution of population is highly variable: in some provinces more than 90 per cent of the municipalities had fewer than 30,000 residents, in others none did. Provinces also differ significantly in

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located within 30 miles of the headquarters office of the small business.

30 Structural measures are often criticized as static. Although this measure is not strictly dynamic, it is correlated with the extent to which shares are reshuffled among banks, partly addressing this criticism.

31 Interest spreads cannot be used because they embed large differences between markets in risk premiums.

32 See Bonaccorsi di Patti and Gobbi (2001).

33 Italy has 20 regions, divided into 103 provinces. Typically, regions are grouped into two major geographic areas: Center-North and South (“Mezzogiorno”; see Statistical Bulletin of the Bank of Italy, any year).

34 Data on banking structure are based on end-of-year statistics for the period 1996-98. Firm birth rates are based on annual flows for the period 1997-99 normalized by stocks at the end of the previous year.

economic and financial development. In 1996 the highest per capita GDP was 48 million lire (about $25,000) and the lowest 16 million ($8,000). The average ratio of households' financial wealth at banks to provincial value added was 1.3; the range was between 0.54 and 2.4. The annual weighted average of the firm creation rate ranged from 3.5 to 8.9 per cent.

The source of the data on firm creation is Movimprese, a database constructed by InfoCamere. Movimprese gathers data from local firm registries on businesses demographics by province, type of legal entity and industry, reporting gross flows of new firms and end-of-year stocks of registered firms. The industry classification is consistent over time since 1996. The banking variables are based on the Bank of Italy Supervisory Reports filed by banks. All the other market characteristics are based on data published by the Italian National Statistical Institute (ISTAT).

Firm birth rates by industry and province (*BIRTHij*) are computed as the average annual rates for 1997-99, where for each year *t* and each industry/province pair the rate is defined as the number of newly registered firms in year t divided by the number of registered at the end of year *t-1*. We measure the initial relative size of each industry in each province by the variable *INDSHAREij,* defined as the number of registered firms in industry i and province j divided by the total number of registered firms in province j at the end of 1996. In the estimation of Model I, the dependent variable (*WBIRTHj)* is the provincial weighted average of industry birth rates, the weights being industry shares in the province. For robustness purposes, we also compute the rate of cancellation of firms (*DEATHij*) in the same way as *BIRTHij*.[35]

With a few exceptions, the local market control variables are measured at the end of 1996. The per capita nominal value added of the province (*WEALTHj*) controls for the convergence effect characterizing most growth regressions.[36] Province size is the natural logarithm of population (*LNPOPj*). The natural log of the area in square kilometers (*LNAREAj*), the share of population that lives in the main city (*URBANPOPj*), and the share of municipalities with fewer than 3,000 residents (*SMALLTOWNj*) account for the geographical distribution of the population. For a given size, because of convergence effects, provinces

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[35] Our concern was that new firms might replace dead ones in markets where there is a high turnover due to exogenous factors varying both across markets and industries. In addition, this partly controls for firms that change names and would thus be counted as one death and one birth.

[36] In Model II, we interact $WEALTHj$ with a proxy of start-up costs ($SIZEYi$), computed as the average stock of physical capital of young firms (less than 5 years old) in the industry.

with lower population density should have higher firm birth rates. Also, more urbanized areas should have higher firm birth rates insofar as there are network effects or other externalities.

The ratio of households' financial assets held at banks - deposits and securities - to value added (*BANKDEVj*) is a measure of the size of the local banking sector. The number of kilometers of non-urban roads per 100 square kilometers in the region the province belongs to (*ROADSj*) is a proxy for the local infrastructural endowment. These variables should favor economic activity, and we therefore expect positive coefficients.

The percentage of the population with a high school or university degree (*EDUCATIONj*) controls for human capital. The impact of this variable is ambiguous. On the one hand, human capital may generate more entrepreneurship; on the other hand , the demand for education is greater if its opportunity cost is lower due to lower returns to business. In Italy there are very significant differences in social structure and community ties. The number of suicides normalized by population serves as an inverse proxy of the strength of community ties (*NOTIESj*). This variable should have a negative impact on firm creation. In areas where there are stronger ties, the extended family is more likely to be involved in family businesses and to support small entrepreneurial activities. In addition, the variable might capture a negative attitude towards the future, which is also likely to discourage entrepreneurship. Finally, a dummy variable (*SOUTHj*) is assigned to provinces located in the southern part of the country, which is less developed in a large number of respects.[37] Descriptive statistics are reported in Table 3.

4. Results

4.1 *The Average Effect*

Model I was first estimated with a linear specification for the market power variable, the function *g(.)* in equation (1). The dependent variable is the province weighted average of the rates of birth of firms in the industries (*WBIRTH*), the number of observations being equal to the number of provinces (103).

We regressed *WBIRTH* on one measure of competition at a time and on the set of control variables. Subsequently, we added the square of the competition measures to test for the non-monotonicity of their effect on firm creation. Finally, following the assumption that the

[37] See for example Guiso, Sapienza and Zingales (2001).

different measures capture different aspects of competition, we included all three measures of market power together. All the specifications just described were estimated with *OLS* and *2SLS*, as discussed in section 3.1. Results were qualitatively and quantitatively similar, and a Hausman specification test could not reject the unbiasedness of the *OLS* estimator.

The coefficients obtained with the linear specification (Table 5, columns 1-3), although only weakly statistically significant, suggest a negative relationship between bank market power and new business formation, consistent with the findings of other studies (Cetorelli and Gambera 2001; Black and Strahan 2002).[38] However, the quadratic functional form fits the data better. The specifications with *HERF* and *LOCBANKS* (Table 5, columns 4-6) suggest that some bank market power is beneficial to the creation of firms but too much is detrimental.[39] Based on the estimated coefficients, the turning point corresponds to values of about 0.18 for *HERF* and 0.36 for *LOCBANKS*, both close to the sample average.[40] The coefficient of the linear term of the variable (*1-ABSVERF*) has the predicted positive sign. The quadratic term is also positive. Neither is statistically significant.

In all the regressions the magnitude of the effect of bank market power on firm creation is small. At the sample mean an increase of one standard deviation in the Herfindhal index (0.08) yields a 0.1 percentage point reduction in the business birth rate. The effect is slightly larger for *LOCBANKS*. In this case an increase of one standard deviation (0.23) from the sample mean produces a reduction in the birth rate of 0.2 percentage points.

Most of the other coefficients have the expected sign, although some are not statistically significant. The results indicate that, for a given geographic dimension (*LNAREA*), more populous provinces have a lower rate of new business formation (*LNPOP*), consistent with a convergence effect across areas with different population density. The negative sign of per capita value added, although not statistically significant, points to a convergence effect because provinces that are initially less developed have higher rates of firm creation. The

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[38] The suggested effect is small. A one-standard-deviation increase of the Herfindahl index would reduce the birth rate of firms by 0.12 percentage points.

[39] These findings are confirmed by the regression with all the market power variables where, although weakly significant, the linear coefficients of both HERF and LOCBANKS are positive and those of the quadratic terms are negative (Table 5 - column 7).

[40] For HERF the value is larger, almost 0.22, if computed using the coefficients from the regression with multiple competition variables (Table 5 - column 7).

bank development variable (*BANKDEV*) has a positive coefficient, consistent with the standard view that the size of the banking system and the volume of financial wealth available, in general, favors the creation of businesses. The variable *ROADS* has the expected positive coefficient and is statistically significant. *SMALLTOWN* has the expected negative sign although it is not always significant. The variable for urbanization (*URBANPOP*), which captures network effects in economic activities, as well as a component of human capital different from formal education, has the predicted positive effect on firm creation but is not significant. The *EDUCATION* variable has a significant negative coefficient, suggesting that it may be capturing the lower opportunity cost of education due to lower returns to business, given Italy's virtually free public university system. Finally, *NOTIES* and the dummy *SOUTH* have the expected negative sign but are never significant. The results from the *2SLS* estimation were very similar and, for brevity, are not reported for this specification.

4.2 *The Industry-Specific Effects*

In Model II, we allow the relationship between bank competition and firm creation to vary across industries. The dependent variable is the firm birth rate in industry i and market j (*BIRTHij*). The regressors are measures of bank market power, the interaction term between *ASYM* for industry i and bank market power in market j, the industry fixed effects, the same set of market level control variables as in Model I, and additional industry-market control variables.

The additional industry-market control variables are the share of firms in industry i and in market j in 1996 (*INDSHAREij*), and the interaction between per capita GDP in 1996 and the average amount of fixed assets of firms in industry i (*WEALTHj*SIZEYi*).

As in the previous model, we first regress *BIRTH* on one measure of market power at a time, the associated interaction term, and the set of control variables. Subsequently, we add the square of the market power measures. Then, on the assumption that the different measures of market power are all relevant because they capture different aspects of bank structure, we estimate the model with all of them together. Finally, as a further robustness check, we remove extreme values of the market power and opaqueness measures.[41] As for Model I, the results obtained with *2SLS (*as described in section 3.1) are qualitatively and quantitatively similar

[41] We dropped provinces (industries) at the 1st percentile and 99th percentile of the bank market power (opaqueness) distribution. Results were essentially unchanged and are available upon request from the authors.

(Table 7). Again, a Hausman specification test could not reject the unbiasedness of the *OLS* estimator.

The results from Model II (reported in Table 6) reinforce those from Model I. In most of the specifications the coefficients of the market power measures have the same signs as in Model I, confirming the bell-shaped relationship between bank market power and new business formation. Furthermore, the results suggest that the relationship is heterogeneous across industries because the coefficients of the interaction terms are statistically different from zero in most of the specifications. The variability of concentration *(1-ABSVHERF)* is not statistically significant but its interaction term is significant and has the predicted sign.

The magnitude of the average effect of the bank market power measures on the creation of firms is also confirmed. At the sample mean the birth rate in an industry with an average value of *ASYM* is reduced by about 0.1 percentage points by an increase of one standard deviation in the Herfindhal index. Again, the effect is larger for *LOCBANKS,* where the exercise yields a reduction of about 0.4 points. For an industry with average *ASYM*, increases in bank market power above values of 0.19 for *HERF* and 0.38 for *LOCBANKS* become detrimental to firm creation (columns 2 and 6).[42] The relationship between bank market power and the creation of firms shifts to the right as industries become more opaque. This implies that the vertex of the estimated parabola corresponds to higher values of bank market power.[43]

The economic relevance of the differential effect can be assessed by computing the impact of an increase in bank market power on the birth rate of firms of industries with different degrees of opaqueness. At the sample mean, a one-standard-deviation increase in *HERF* reduces the birth rate by 0.13 percentage points in the industry at the 25th percentile of the *ASYM* distribution and by only 0.08 points at the 75th percentile. The same exercise applied to *LOCBANKS* yields reductions of 0.42 and 0.36 points, respectively.

Finally, the relatively low correlation among the various measures of market power suggests that they may be capturing different aspects of the competitive environment in which banks operate. Hence, we performed an additional exercise: using the coefficients reported

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[42] Also in this case the value for HERF is larger, about 0.23, when computed using the coefficients from the regression including multiple competition variables (Table 6- column 7).

[43] For example, for LOCBANKS the change is about 0.02 between the industry at the 25th and at the 75th percentile of the ASYM distribution.

in the last column of Table 6, we compared a theoretical market in which all three variables were at the 25th percentile of their distribution with another in which they were all at the 75th percentile. Obviously, the results differ according to the opaqueness of the industry: an increase of 0.3 percentage points at the 75th percentile of the *ASYM* distribution as against a negligible effect at the 25th.[44]

The results of our analysis are consistent with the existence of the "information channel" for two reasons. First, the relationship estimated is non-monotonic, with a range in which increases in bank market power are beneficial to business formation. Second, this relationship is not homogeneous across industries. For opaque industries, bank market power is *relatively* more beneficial in the range where the average effect is positive, and it is *relatively* less adverse in the range where the average effect is negative. This differential effect is consistent with the prediction of the theoretical models based on asymmetric information. However, we cannot assess the magnitude of the information channel beyond its differential effect, because the average effect is entangled with the standard effect.

Our finding of a range where concentration and other market power measures have a positive effect on firm creation does not necessarily conflict with the evidence in the literature. Qualitatively, our results are consistent with the findings of Jackson and Thomas (1995) of a positive effect of bank concentration on employment growth by new firms (likely to be more opaque) and a negative effect for mature firms (likely to be more transparent). DeYoung, Goldberg, and White (1999) found that an increase in bank concentration reduces small business lending in rural markets (typically highly concentrated), but increases it in urban markets (typically more competitive).

It should also be pointed out that our focus on firm creation implies that we are studying a highly opaque segment of firms compared to rest of the economy, regardless of industry. Thus it is not surprising that, according to some specifications, the information channel slightly dominates the standard negative effect even for the median industry in terms of our measure of opaqueness.

Concerning the other control variables, all coefficients are statistically significant, with the exception of *SOUTH*, and have the predicted sign, as in Model I. The effect of *WEALTH*

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[44] Based on the estimates in this specification, the same exercise conducted for an industry at the median of the ASY M distribution returned a small decrease in the creation of firms.

and start-up costs are as predicted. In local markets with a higher per capita GDP, firms with lower start-up costs are relatively favored, suggesting that personal wealth is a better substitute for bank credit when the initial investment is relatively small. In addition, we find that the rate of firm creation is higher in industries that were initially relatively less represented in the local market.

4.3 *Robustness: The Differential Effect*

In this section we illustrate a number of robustness tests that were performed on the differential effect of bank market power on firm creation across industries. Focusing solely on the interaction term allows us to improve the precision of our estimates, by replacing the variables describing market characteristics with province dummy variables. The market and industry fixed effects control for any variable that does not vary simultaneously across industries *and* markets. An additional advantage is that it is safer to use measures of market power based on entry and the changes in market shares since the concern for endogeneity between market power and firm creation is largely reduced. Hence, we estimated the more robust specification of Model II (equation 3) with all the bank market power variables discussed in Section 3.5.

The results, reported in Table 8 (Panel A), strengthen the findings described in the previous section. The coefficient of the interaction term maintains the positive sign predicted by the information channel, and is almost always statistically significant.[45] The magnitude of the differential effect is robust.

To provide further insight on the economic relevance of the differential effect, we perform the same comparative statics exercise as in the previous section. We compute the effect on different industries of moving from a market at the 25th percentile of the market power distribution to the 75th percentile. Based on the estimates in Table 8 (Panel A), an industry at the 75th percentile of the opaqueness distribution would experience an increase in

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[45] The coefficient of the interaction term with the Herfindhal index is not significant. However, it becomes significant when controlling for start-up costs, or when considered in conjunction with other measures of competition, and in particular with its absolute variation. The coefficients of $INDSHARE$ and the interaction term $WEALTH_j * SIZEY_i$ have the expected negative sign and are statistically significant at the 1 percent and 5 percent, respectively.

firm creation 2.5 to 3 times as great as at the 25th percentile (depending on the bank market power measure).[46]

The second robustness check was to estimate the model using the opaqueness measure computed only for young firms (*ASYMY*) in place of *ASYM*. The estimates of the interaction terms support the conclusions of our other regressions (Table 8 - Panel B).[47] Third, we tested for a potential effect of real and "administrative" turnover of firms, by adding to the regressors the rate of cancellation of firms (*DEATHij*) in industry i and market j in all the specifications. This variable is significant and has a positive coefficient, as expected (Table 9 - Panel A), suggesting that higher local rates of firm creation tend to be correlated with higher rates of exit from the industry. The coefficients of the interaction terms between *ASYM* and market power maintained the positive sign, with a slight loss in statistical significance.[48]

A third set of tests addressed the issue of observational equivalence between our hypothesis about the "information channel" and the conjecture about start-up costs discussed in Section 3.4. As explained previously, firms with a larger share of fixed assets might have also larger start-up costs. If, as in standard theories, credit supply is restricted in less competitive markets, firms with high start-up costs would suffer the most from the lack of competition. The interaction between *ASYM* and market power would have the same sign as that predicted by the "information channel", but for a different reason.

To rule out this explanation we first performed a robustness check by introducing an interaction term between the same competition measure in each specification and the inverse of the volume of fixed assets of young firms in each industry. We employed the inverse of the variable *SIZEY* because this way the sign of the coefficient predicted by the start-up costs hypothesis should be the same as that of the interaction term between *ASYM* and the competition measure. The results of the estimation show that the main interaction term retains its sign and significance (Table 9 - Panel B). However, the interaction term between

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[46] These numbers are again small, ranging between 0.07 percent and 0.14 percentage points.

[47] We also employed the measure based only on firms with total assets less than 5 billion lire. Results were consistent but less significant.

[48] The cancellation rate may be partly endogenous if banks in less competitive markets encourage the birth of lower quality firms that will have a greater mortality. However, our data refer to a short period of time, which should mitigate the problem, since cancelled firms were most likely registered before the beginning of our time frame.

competition and the inverse of *SIZEY* has the opposite sign, suggesting that competition in the banking sector is relatively more beneficial for firms that have low start-up costs, holding other characteristics of the industry constant.

The second approach was to instrument the measure of opaqueness (*ASYM*) with the variable *SPLIT*. As described in Section 3.4, *SPLIT* represents the percentage of firms with split ratings in industry i, from a sample of rating data of US firms.[49] This particular specification of our empirical model was estimated on the assumption that there is a technological reason for opaqueness and that the industry ranking therefore persists across countries. However, the only statistical condition required for this specification is correlation between the variable *SPLIT* and *ASYM*, and independence of *SPLIT* from the start-up costs in the industries.

Results for the estimation with instrumental variables are reported in Table 10. Again, they are consistent with our main findings, with four of the six interaction term coefficients having the expected sign and statistically significant. A Hausman specification test between these estimates and *OLS* estimates for a comparable sample (not reported) did not reject the null hypothesis of *OLS* consistency.[50]

As a final robustness check, we included multiple interaction terms with various market power measures. The results (not reported) broadly confirmed our previous findings. In addition, the inclusion of the static and dynamic measures of market power tended to increase the significance of the static measures, particularly the concentration index, without significantly changing their coefficients.[51]

In summary, the robustness tests confirm the differential effect of bank market power on the creation of firms across industries, consistent with information-based theories of bank competition. They also confirm that the economic magnitude of this effect is small.

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[49] In the estimation we have directly instrumented this interaction term with another interaction term constructed multiplying the split rating variable with each proxy of market power. Note that for these estimates the sample was reduced by one industrial sector for lack of data on split ratings.

[50] As a further test, we ran the model including SPLIT directly as a regressor. The results were consistent with those from the other specifications.

[51] A full acount of these results is in Bonaccorsi di Patti and Dell'Ariccia (2001).

5. Conclusions

We have investigated the relationship between competition in the banking industry and the creation of non-financial firms. Our analysis yielded three main findings. First, the evidence supports a bell-shaped relationship between bank market power and firm creation. Second, this relationship differs in industries characterized by different degrees of asymmetric information: bank competition is more favorable to relatively more transparent industries. Third, the differential effect related to opaqueness is robust in terms of statistical significance, but small in terms of economic magnitude. These results were consistent across a number of econometric specifications and a variety of robustness tests.

From these findings we can draw the following conclusions. First, the evidence presented here is consistent with the presence of an "information channel". The existence of a non-monotonic relationship between banks' market power and the creation of firms, with a range where bank market power is beneficial, cannot be explained within the conventional structure-conduct-performance paradigm. In addition, the fact that bank competition is less favorable to firms operating in more opaque industries is fully consistent with the prediction of information-based models of bank competition.

Second, with regard to policy implications, our results suggest that, while the differential effect of bank competition on firm creation across industries due to asymmetric information is small, the total effect could be significantly larger. The reason is that a component of the information effect is embedded in the net effect of market power. This component might be large, as is suggested by its dominance over the conventional paradigm in a range of relatively low bank market power. The differential effect represents an estimate of the marginal effect due to an increase in opaqueness above the average. Although it does provide evidence on the existence of the information channel, it does not provide information on the magnitude of its total effect.

Furthermore, the differential effect across industries and, more generally, across borrowers of different opaqueness, could be larger if one considered not only newborn but also established companies, and hence a sample of borrowers more widely distributed in terms of opaqueness. It should not be ruled out that reforms aimed at fostering competition in the banking industry could have repercussions not only on the aggregate supply of credit, but also on its allocation across different types of firms and segments of the economy. In this case, the

effectiveness of such reforms in promoting growth and innovation would vary depending on the sectoral composition of the economy.

Appendix: A Simple Model

In this appendix, we present a simple model of a loan market that emphasizes the interaction between competition and information in banking. This model is not meant to be realistic, general, or particularly original. Its main purpose is to provide some intuition for the results of our empirical investigation. It deals with problems of "ex-post competition". Other models, focusing on adverse selection rather than hold-up problems, would deliver the result form an ex-ante point of view.

This model describes a hold-up problem similar to that in Petersen and Rajan (1995). However, in this model banks' market power is, in part, endogenously determined by the information structure.[52] For simplicity the model concentrates on the negative effects of bank competition on credit availability and disregards the positive effects. It would be easy to modify the model to include the traditional positive effects.

Consider a market where there are N identical banks seeking projects in which to invest and a continuum of entrepreneurs seeking banks to finance their projects. Projects may succeed and pay a return y or fail and pay 0. Entrepreneurs are heterogeneous in their creditworthiness. Namely, there are "good" and "bad" entrepreneurs, with relative weights q and $1-q$. The former succeed and pay back the debt with probability θ_h, and latter with probability $\theta_l < \theta_h$. We assume that the market is viable: $\overline{\theta}y - 1 > 0$, and that "bad" entrepreneurs are expected not to repay the loan: $\theta_l = 0$

The model covers two periods. In period one, entrepreneurs are born. Their type is unknown and only their type distribution is public information. Banks compete over interest rates and entrepreneurs are financed.

At the beginning of period two, banks learn the creditworthiness of their clients by virtue of the lending relationship they established in period one. In addition, banks have access to a costless, but "imperfect", screening technology that enables them to evaluate the credit-worthiness of each other's clients. This technology consists of a test that with probability p delivers an informative signal and with probability $1-p$ delivers an uninformative signal. For

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[52] In a more complex model, information structure and market structure would be more interdependent (see Dell'Ariccia, Friedman, and Marquez, 1999).

simplicity, we assume that adverse selection problems are severe enough that banks abstain from bidding for firms on which they have not obtained positive information.

In what follows we will refer to the "incumbent" or the "inside" bank as the bank that has lent to a particular borrower in period one, and so has learned that borrower's type.

We assume that test results are public information, so that whenever at least one banks obtains an informative result from its test, all banks are informed. Thus, the incumbent bank remains a monopolist when no bank obtains a positive result. Alternatively, all banks compete for a borrower over the interest rate when at least one bank obtains a positive outcome from the test on that borrower.

The expected period-two profit for the incumbent bank (the bank who lent to that particular firm in period one) can be written as the weighted sum of competition and monopoly profits, which results in

$$\Pi_i = (\theta r_m - 1)(1-p)^{N-1}$$

In other words, the incumbent's expected period-two profit is the monopolist's profit weighted by the probability that no bank will obtain positive information about the incumbent's client.[53]

It is easy to show that the incumbent's period-two expected profit is decreasing in p and in N. The accuracy of the test is an inverse measure of asymmetric information. At one extreme, $p = 0$, the incumbent enjoys a full informational monopoly on its borrowers. At the other extreme, $p = 1$, the incumbent has no informational advantage over other banks. Thus, as p increases the incumbent's expected informational rents diminish. Similarly, when N increases the probability that at least one bank is able to compete for the incumbent's clients increases, and the expected profit for the incumbent diminishes.

We are interested mainly in the interaction between these two effects; that is, in how asymmetric information affects the relationship between the number of banks in the market and the incumbent's profits. Formally, we are interested in the derivative of the difference

[53] The monopoly interest rate, r_m, can be thought as the reservation rate at which entrepreneurs are indifferent between borrowing and not borrowing.

$\Pi_{2,i}(N-1) - \Pi_{2,i}(N)$ with respect to p. We can write

$$\Delta\Pi_2(N) = \Pi_{2,i}(N-1) - \Pi_{2,i}(N) = (\theta r_m - 1)(1-p)^{N-1} p$$

and after some calculations we can state

$$\frac{\partial \Delta\Pi_2(N)}{\partial p} < 0 \Leftrightarrow p > \frac{1}{N-1}\,.$$

This result points to a non-monotonic impact of asymmetric information on the relationship between the incumbent's profits and the number of banks in the market. The intuition for this result is straightforward. For perfectly transparent sectors ($p = 1$), where Bertrand competition always prevails, and for perfectly opaque sectors ($p = 0$) where the inside bank always retains its monopoly power, the effect of one additional competing bank is nil. It is at intermediate levels of opaqueness that changes in the degree of competition have the maximum effect on the inside bank's profits. The result of our empirical investigation support this pattern. However, the evidence also suggests that the ascending side of the curve is economically irrelevant, as it pertains to levels of opaqueness at which credit is likely not to exist at all.

Now consider period one. In period one, all banks have the same information about new firms and compete over the interest rate in Bertrand fashion. Borrowers are good or bad with probability q and $1-q$. Good borrowers repay debt with probability θ. Bad borrowers are unable to repay the loan.

As in most Bertrand games, we can solve this model by imposing a zero profit condition. In this case, we have to take account of the expected period-two profits stemming from the informational advantage on its clients that each bank has. Then, we can write

$$\Pi_1(N) + \delta E\left[\Pi_2(N)\right] = 0$$

(where δ is the discount factor) that gives an equilibrium gross interest rate

$$\mathbb{b}(N,p) = \frac{1 - \delta(\theta r_m - 1)(1-p)^{N-1}}{\theta q}$$

with

$$\Delta\mathbb{b}(N,p) = \mathbb{b}(N,p) - \mathbb{b}(N-1,p) > 0$$

and

$$\frac{\partial \Delta \mathfrak{b}(N,p)}{\partial p} < 0 \Leftrightarrow p > \frac{1}{N-1}$$

The jump from this overly simplified theoretical model to our empirical estimation only needs one more step, i.e. a definition of the rate of birth of new firms as a decreasing function of the equilibrium loan interest rate. Let us define the rate of birth of new entrepreneurial firms as

$$b = f(\mathfrak{b}, X)$$

where X is a vector of variables affecting b, and $\frac{\partial f}{\partial \mathfrak{b}} < 0$. Then, abstracting from the fact that N is in the natural domain, we can write

$$\frac{\partial b}{\partial N} = \frac{\partial f}{\partial \mathfrak{b}} \frac{\partial \mathfrak{b}}{\partial N} < 0$$

and

$$\frac{\partial^2 b}{\partial N \partial p} = \frac{\partial f}{\partial \mathfrak{b}} \frac{\partial^2 \mathfrak{b}}{\partial N \partial p} > 0 \Leftrightarrow p > \frac{1}{N-1}$$

which is negative for low values of p and positive for high values of p.

Table 1
Indicators of Asymmetric Information

Definition	Name	Mean	75° perc.	25° perc.
Gross total assets/Gross physical assets	**ASYM**	13.678	14.522	5.940
Gross total assets/Gross physical assets for firms less than 5 year old	**ASYMY**	18.233	22.001	9.975
Percentage of split ratings	**SPLIT**	55.7	59.2	53.1

Table 2
Industry Ranking and Opaqueness Measures

Industry	ASYM	ASYMY	SPLIT
Construction	53.29	67.50	64.3
Wholesale Trade	34.74	41.04	57.4
Vehicle Trade and Repair	22.82	27.82	46.1
Apparel and Finished Textile Products	18.27	22.00	69.2
Printing, Publishing and Allied Industries	17.46	23.03	55.8
Professional Equipment	15.59	19.42	60.0
Retail Trade and Repair Services	14.52	16.14	63.7
Leather and Leather Products	14.37	18.08	.
Non-electrical Machinery and Office Equipment*	13.24	18.37	57.5
Electrical and Electronic Machinery and Supplies	12.76	16.98	59.0
Textiles	11.39	23.35	54.5
Automobiles, Other Vehicles and Parts	8.96	15.19	61.1
Chemicals, Fibers and Allied Products	8.81	12.18	54.3
Furniture, Toys and Miscellaneous Manufacturing	8.78	12.18	53.1
Metal Products	6.95	8.22	53.3
Hotels, Restaurants and Bars	6.36	10.35	58.1
Food and Beverages	5.94	9.97	51.8
Basic Metal Industries	5.72	10.94	52.2
Wood and Wood Products	5.66	7.33	33.3
Rubber and Miscellaneous Plastic Products	5.18	6.61	51.3
Stone, Clay, Glass and Concrete Products	5.10	7.43	55.5
Paper and Allied Products	4.91	6.90	59.2

Note: a higher position in the ranking indicates greater opaqueness. Source: Company Accounts Data Service (Centrale dei Bilanci) 1994-98. The table reports the ranking obtained ordering industries by descending values for the indicators listed. *We have grouped Computers and Office Equipment with Non-electrical Machinery to obtain consistency with the US classification and because rates of birth in the first industry had extreme values due to the very small number of firms.

Table 3
Correlations among Bank Competition Variables
(103 observations)

	HERF	**1-ABSVHERF**	**LOCBANKS**	**1-SHIFT**	**1-ENTRY**	**1-ENTRYM&A**
HERF	1.00					
1-ABSVHERF	-0.38	1.00				
LOCBANKS	0.03	0.02	1.00			
1-SHIFT	0.24	0.45	-0.07	1.00		
1-ENTRY	0.02	0.13	0.19	0.24	1.00	
1-ENTRY_M&A	0.05	0.12	0.21	0.31	0.86	1.00

Table 4
Definitions of Variables and Descriptive Statistics

Observations are stacked as in the estimation. Stocks are averages of end of year values of the original data for the period 1996-1998, except where specified. Growth rates are annualized rates based on the flows referring to 1997, 1998 and 1999. The number of observations is 2266 (22 industries and 103 provinces) with the exception of WBIRTH.

Name	Definition	Mean	S. Dev.	Min	Max
	Dependent variables				
BIRTH	Percentage rate of birth of firms, yearly average referring to 1997-1999.	5.604	2.660	0	32.326
WBIRTH	Weighted birth rate of firms with weights given by the industry share in 1996.	6.061	0.938	3.501	8.926
	Banks' market power measures				
HERF	Herfindahl index of deposits by location of branches, average of 1996-1998.	0.182	0.080	0.053	0.538
LOCBANKS	Share of deposits held by locally chartered banks, average of 1996-1998.	0.404	0.230	0	0.939
(1-ABSVHERF)	1 minus the absolute change of the Herfindahl index, cumulated between 1995-1998.	0.979	0.022	0.865	0.999
(1-SHIFT)	Sum of absolute values of annual changes in market shares, yearly average 1995-1998.	0.922	0.028	0.824	0.986
(1-ENTRY)	Number of branches of banks not present in the market in year t-1 divided by the total number of branches in year t, cumulated 1995-1998.	0.941	0.093	0.484	1
(1-ENTRYM&A)	Same as ENTRY but includes banks that enter by acquisition or merger.	0.924	0.101	0.484	1
	Control variables				
INDSHARE	Share of registered firms in the industry in 1996.	0.031	0.051	0	0.310
DEATH	Percentage rate of cancellation of firms, yearly average of 1997-1999.	5.749	2.090	0	19.978
WEALTH	Per capita value added in 1996, million ITL.	29.098	7.889	15.707	48.056
SIZEY	Average industry value of fixed assets for firms with less than 5 years (billion ITL).	2.127	2.274	0.277	11.473
EDUCATION	Share of workforce with a high school diploma or university degree in 1997 (source: ISTAT*).	37.185	4.052	22.406	49.460
BANKDEV	Ratio of total private financial wealth held at banks (deposits and securities) to value added in 1996.	1.278	0.429	0.543	2.378

ROADS	Kilometers of non-urban roads divided by the area of the province (square Km/100; source: ISTAT).	17.966	3.578	7.8	26.3
LNPOP	Natural log of population in 1996 (source: ISTAT).	12.929	0.701	11.431	15.145
LNAREA	Natural log of the area in square Km (source: ISTAT).	7.794	0.655	5.355	8.925
MAINPOP	Share of population living in the main city in 1996 (source: ISTAT).	26.910	14.096	8.642	87.638
SMALLTOWN	Share of municipalities with less than 30,000 residents in 1996 (source: ISTAT).	49.728	25.651	0	93.333
NOTIES	Number of suicides and attempted suicides per 100,000 residents in 1998 (source: ISTAT).	14.001	8.158	0.266	38.413
SOUTH	Equal to 1 if the province is in the South, 0 otherwise.	0.597	0.490	0	1

*Italian National Statistics Institute.

Table 5
Bank market power and the rate of birth of firms: average effect (OLS)

The regressions are estimated employing 103 observations, aggregating industry birth rates. WBIRTH is the weighted birth rate of firms in the province with weights given by the industry share. Robust standard errors below coefficients.

Dependent variable:	WBIRTH	WBIRTH	WBIRTH	WBIRTH	WBIRTH	WBIRTH	WBIRTH
HERF	-1.535	-	-	4.537	-	-	5.312
	1.034	-	-	3.769	-	-	3.687
HERF SQUARED	-	-	-	-12.52 *	-	-	-12.171 **
	-	-	-	6.659	-	-	6.103
(1-ABSVHERF)	-	5.328	-	-	4.365	-	4.799
	-	3.696	-	-	168.35	-	4.462
(1-ABSVHERF) SQ.	-	-	-	-	0.505	-	-
	-	-	-	-	88.441	-	-
LOCBANKS	-	-	-0.204	-	-	2.387	1.811
	-	-	0.452	-	-	1.469	1.488
LOCBANKS SQ.	-	-	-	-	-	-3.292 *	-2.496
	-	-	-	-	-	1.700	1.755
LNAREA	0.187	0.149	0.185	0.198	0.149	0.224	0.215
	0.177	0.173	0.178	0.178	0.174	0.173	0.177
LNPOP	-0.585 ***	-0.500 **	-0.503 **	-0.535 **	-0.501 **	-0.501 **	-0.481 **
	0.212	0.199	0.200	0.205	0.214	0.197	0.212
GDPPC	-0.019	-0.020	-0.018	-0.019	-0.020	-0.016	-0.016
	0.023	0.023	0.023	0.022	0.023	0.023	0.023
BANKDEV	0.969 ***	0.906 ***	0.925 ***	0.950 ***	0.906 ***	0.912 ***	0.871 **
	0.316	0.320	0.324	0.313	0.321	0.340	0.334
SMALLTOWN	-0.008 *	-0.009 *	-0.009 *	-0.008 *	-0.009 *	-0.007	-0.007
	0.004	0.004	0.004	0.004	0.004	0.004	0.004
URBANPOP	0.116	0.011	0.011	0.010	0.011	0.011	0.011
	0.008	0.008	0.008	0.008	0.009	0.008	0.008
ROADS	0.088 ***	0.082 ***	0.096 ***	0.082 ***	0.082 ***	0.094 ***	0.074 ***
	0.027	0.028	0.029	0.028	0.027	0.027	0.027
EDUCATION	-0.072 *	-0.064 *	-0.075 **	-0.077 **	-0.064 *	-0.087 **	-0.079 *
	0.036	0.038	0.036	0.036	0.037	0.040	0.039
NOTIES	-0.017	-0.015	-0.019	-0.019	-0.015	-0.021	-0.017
	0.014	0.014	0.014	0.014	0.014	0.014	0.013
SOUTH	-0.475	-0.418	-0.564	-0.419	-0.417	-0.564	-0.364
	0.453	0.461	0.464	0.457	0.470	0.468	0.487
F-test on bank structure variables	-	-	-	5.56 ***	1.03	2.23	3.90 ***
Adj. R2	0.259	0.258	0.248	0.278	0.258	0.280	0.307
Observations	103	103	103	103	103	103	103

Table 6
Bank market power and the rate of birth of firms: average and differential effects (OLS)

The regressions are estimated employing market-industry observations. Industry fixed effects are included but the coefficients are not reported. Robust standard errors below coefficients.

Dependent variable:	BIRTH	BIRTH	BIRTH	BIRTH	BIRTH	BIRTH
HERF	-2.789 ***	6.922 ***	-	-	-	7.514 ***
	1.019	2.267	-	-	-	2.399
HERF SQUARED	-	-20.019 ***	-	-	-	-19.221 ***
	-	4.174	-	-	-	4.292
(1-ABSVHERF)	-	-	4.113	-	-	-2.102
	-	-	4.070	-	-	4.413
LOCBANKS	-	-	-	-0.523	4.000 ***	3.177 ***
	-	-	-	0.387	0.843	0.855
LOCBANKS SQ.	-	-	-	-	-5.747 ***	-4.598 ***
	-	-	-	-	0.886	0.916
HERF*ASYM	0.059	0.059	-	-	-	0.111 ***
	0.043	0.039	-	-	-	0.040
(1-ABSVH)*ASYM	-	-	0.356 **	-	-	0.510 ***
	-	-	0.164	-	-	0.169
LOCBANKS*ASYM	-	-	-	0.026 *	0.026 *	0.025
	-	-	-	0.016	0.016	0.015
INDSHARE	-8.731 ***	-8.927 ***	-9.018 ***	-9.004 ***	-9.480 ***	-9.605 *
	1.953	1.941	1.947	1.943	1.932	1.917
WEALTH*SIZEY	-10.275 **	-10.266 **	-9.666 **	-9.560 **	-9.537 **	-8.991 ***
	4.734	4.746	4.790	4.893	4.809	4.818
LNAREA	0.213 **	0.231 **	0.157 *	0.200 **	0.269 ***	0.243 **
	0.094	0.093	0.092	0.095	0.095	0.095
LNPOP	-0.546 ***	-0.465 ***	-0.435 ***	-0.440 ***	-0.436 ***	-0.369 ***
	0.111	0.111	0.103	0.104	0.103	0.111
GDPPC	-0.037 **	-0.036 **	-0.040 **	-0.038 **	0.035 **	-0.036 **
	0.016	0.016	0.016	0.016	0.016	0.016
BANKDEV	0.392 **	0.361 **	0.293 *	0.347 **	0.323 **	0.236
	0.156	0.157	0.157	0.158	0.161	0.163
SMALLTOWN	-0.005 *	-0.004	-0.005 **	-0.005 **	-0.002	-0.002
	0.002	0.002	0.002	0.002	0.002	0.002
URBANPOP	0.022 ***	0.021 ***	0.021 ***	0.022 ***	0.022 ***	0.021 ***
	0.005	0.005	0.005	0.005	0.005	0.005
ROADS	0.087 ***	0.076 ***	0.075 ***	0.096 ***	0.092 ***	0.061 ***
	0.019	0.019	0.020	0.019	0.019	0.020
EDUCATION	-0.053 ***	-0.061 ***	-0.040 **	-0.057 ***	-0.078 ***	-0.064 ***
	0.016	0.016	0.017	0.016	0.017	0.017
NOTIES	-0.028 ***	-0.031 ***	-0.023 ***	-0.030 ***	-0.033 ***	-0.027 ***
	0.008	0.008	0.008	0.008	0.008	0.008
SOUTH	-0.316	-0.226	-0.191	-0.420 *	-0.421 *	-0.100
	0.234	0.236	0.237	0.233	0.233	0.245
F-test on bank structure variables	-	15.70 ***	-	-	23.86 ***	13.51 ***
Adj. R2	0.241	0.247	0.243	0.238	0.251	0.261
Observations	2266	2266	2266	2266	2266	2266

Table 7
Bank market power and the rate of birth of firms: average and differential effect (2SLS)

The regressions include industry fixed effects. The coefficients for the constant and the industry fixed effects are not reported. Robust standard errors below coefficients. The instruments for the bank structure variables are 5 lags of the following: HERF and its square, the log of the number of banks operating in the province and its square, the log of the number of branches in the province and its square, the annual absolute variation of the Herfindahl index, interaction terms formed with 1 lag of these variables and ASYM. The Hausman test does not reject the hypothesis of systematic difference between the coefficients of the 2SLS model and the OLS model.

Dependent variable:	BIRTH	BIRTH	BIRTH	BIRTH	BIRTH	BIRTH
HERF	-2.705 ***	7.319 ***	-	-	-	4.529
	1.038	2.318	-	-	-	3.368
HERF SQUARED	-	-20.193 ***	-	-	-	-18.076 ***
	-	4.233	-	-	-	4.912
(1-ABSVHERF)	-	-	23.178 ***	-	-	-26.686
	-	-	7.977	-	-	16.630
LOCBANKS	-	-	-	-1.986 ***	5.615 ***	4.005 ***
	-	-	-	0.682	1.152	1.257
LOCBANKS SQ.	-	-	-	-	-7.906 ***	-6.326 ***
	-	-	-	-	1.143	1.229
HERF*ASYM	0.060	0.058	-	-	-	0.310 **
	0.044	0.039	-	-	-	0.132
(1-ABSVH)*ASYM	-	-	-0.467	-	-	2.554 **
	-	-	0.459	-	-	1.156
LOCBANKS*ASYM	-	-	-	0.061 *	0.042	0.074 *
	-	-	-	0.037	0.033	0.039
INDSHARE	-8.742 ***	-8.959 ***	-8.963 ***	-9.181 ***	-9.646 ***	-9.976 ***
	1.952	1.941	1.993	1.926	1.947	2.061
WEALTH*SIZEY	-10.275 **	-10.259 **	-10.850 **	-8.742 *	-9.168 *	-5.173
	4.755	4.748	4.790	5.150	4.914	5.402
LNAREA	0.212 **	0.228 **	0.133	0.296 ***	0.282 ***	0.247 **
	0.093	0.093	0.092	0.101	0.096	0.098
LNPOP	-0.541 ***	-0.451 ***	-0.429 ***	-0.434 ***	-0.436 ***	-0.358 ***
	0.111	0.111	0.104	0.105	0.102	0.114
GDPPC	-0.037 **	-0.037 **	-0.037 **	-0.027	0.037 **	-0.046 ***
	0.016	0.016	0.016	0.017	0.017	0.017
BANKDEV	0.391 **	0.358 **	0.230	0.233	0.329 **	0.249
	0.157	0.157	0.161	0.160	0.165	0.174
SMALLTOWN	-0.005 *	-0.004	-0.005 **	-0.006 **	-0.006	-0.001
	0.002	0.002	0.002	0.002	0.003	0.002
URBANPOP	0.022 ***	0.021 ***	0.021 ***	0.024 ***	0.022 ***	0.020 ***
	0.005	0.005	0.005	0.005	0.005	0.005
ROADS	0.087 ***	0.077 ***	0.057 ***	0.105 ***	0.088 ***	0.062 ***
	0.019	0.019	0.021	0.020	0.019	0.022
EDUCATION	-0.053 ***	-0.062 ***	-0.026	-0.060 ***	-0.085 ***	-0.072 ***
	0.016	0.016	0.018	0.016	0.017	0.018
NOTIES	-0.029 ***	-0.031 ***	-0.017 **	-0.029 ***	-0.034 ***	-0.029 ***
	0.008	0.008	0.008	0.008	0.008	0.008
SOUTH	-0.320	-0.237	-0.006	-0.512 **	-0.409 *	-0.124
	0.234	0.236	0.253	0.236	0.233	0.260
F-test on bank structure variables	-	14.91 ***	-	-	26.24 ***	14.68 ***
Adj. R2	0.241	0.247	0.234	0.232	0.249	0.261
Observations	2266	2266	2266	2266	2266	2266

Table 8
Bank market power and the rate of birth of firms

The regressions are estimated employing market-industry observations, including market and industry fixed effects. The variables ABSVHERF, SHIFT, ENTRY and ENTRYM&A are transformed into measures that are increasing in market power, in order to obtain predicted positive signs for the interaction terms. The coefficients for the constant terms, the industry and market fixed effects are not reported. Robust standard errors are below coefficients.

Panel A: Opaqueness computed with all firms (ASYM)

Variables	Dependent Variable: Rate of Birth of Firms in industry j and market i					
Measure of bank market power:	HERF	(1-ABSVHERF)	(1-SHIFT)	LOCBANKS	(1-ENTRY)	(1-ENTRYM&A)
INDSHAREij	-10.252 ***	-10.279 ***	-10.213 ***	-10.260 ***	-10.270 ***	-10.242 ***
	2.502	2.498	2.503	2.498	2.478	2.480
MKTPOWERi*ASYMj	0.059	0.357 **	0.200 *	0.026 *	0.118 ***	0.101 ***
	0.039	0.151	0.119	0.014	0.035	0.034
WEALTHi*SIZEYj	-10.202 **	-9.604 **	-10.017 **	-9.499 **	-8.926 *	-9.082 **
	4.498	4.538	4.491	4.596	4.568	4.539
Adjusted R^2	0.391	0.392	0.391	0.391	0.393	0.392
Observations	2266	2266	2266	2266	2266	2266

Panel B: Opaqueness for young firms (ASYMY)

Variables	Dependent Variable: Rate of Birth of Firms in industry j and market i					
Measure of bank market power:	HERF	(1-ABSVHERF)	(1-SHIFT)	LOCBANKS	(1-ENTRY)	(1-ENTRYM&A)
INDSHAREij	-10.278 ***	-10.324 ***	-10.250 ***	-10.300 ***	-10.364 ***	-10.325 ***
	2.503	2.496	2.506	2.496	2.483	2.485
MKTPOWERi*ASYMYj	0.053 *	0.252 **	0.176 *	0.019 *	0.083 ***	0.075 ***
	0.032	0.123	0.096	0.011	0.029	0.027
WEALTHi*SIZEYj	-10.195 **	-9.738 **	-10.024 **	-9.635 **	-9.240 **	-9.316 **
	4.497	4.527	4.493	4.569	4.551	4.531
Adjusted R^2	0.391	0.391	0.392	0.391	0.393	0.393
Observations	2266	2266	2266	2266	2266	2266

***Statistically significant at the 1%, **statistically significant at the 5%, *statistically significant at the 10%.

Table 9
Robustness: Banks market power and the rate of birth of firms

The regressions are estimated employing market-industry observations, including market and industry fixed effects. The variables ABSVHERF, SHIFT, ENTRY and ENTRYM&A are transformed into measures that are increasing in market power, in order to obtain predicted positive signs for the interaction terms. DEATH is the annualized ratio between the number of firms cancelled and the number of registered firms at the end of the preceding year. Annual data for the period 1997-1999 are averaged over time. The coefficients for the constant terms, the industry and market fixed effects are not reported. Robust standard errors are below coefficients.

Panel A: controlling for DEATH

Variables	Dependent Variable: Rate of Birth of Firms in industry j and market i					
Measure of bank market power:	HERF	(1-ABSVHERF)	(1-SHIFT)	LOCBANKS	(1-ENTRY)	(1-ENTRYM&A)
INDSHAREij	-8.658 ***	-8.681 ***	-8.623 ***	-8.665 ***	-8.680 ***	-8.654 ***
	2.483	2.479	2.482	2.478	2.464	2.463
MKTPOWERi*ASYMj	0.045	0.265 *	0.178 *	0.027 **	0.097 ***	0.087 ***
	0.036	0.141	0.107	0.013	0.033	0.031
WEALTHi*SIZEYj	-10.177 **	-9.732 **	-10.025 **	-9.488 **	-9.134 **	-9.225 **
	4.490	4.517	4.480	4.583	4.557	4.538
DEATHij	0.375 ***	0.374 ***	0.375 ***	0.375 ***	0.374 ***	0.374 ***
	0.053	0.052	0.053	0.052	0.053	0.052
Adjusted R^2	0.446	0.446	0.446	0.446	0.447	0.447
Observations	2266	2266	2266	2266	2266	2266

Panel B: controlling for start up costs

Variables	Dependent Variable: Rate of Birth of Firms in industry j and market i					
Measure of bank market power:	HERF	(1-ABSVHERF)	(1-SHIFT)	LOCBANKS	(1-ENTRY)	(1-ENTRYM&A)
INDSHAREij	-10.301 ***	-10.502 ***	-10.434 ***	-10.307 ***	-10.543 ***	-10.374 ***
	2.507	2.479	2.488	2.494	2.472	2.475
MKTPOWERi*ASYMj	0.074 *	0.631 ***	0.480 ***	0.042 ***	0.202 ***	0.184 ***
	0.043	0.158	0.144	0.016	0.039	0.038
WEALTHi*SIZEYj	-10.173 **	-10.094 **	-10.186 **	-10.002 **	-10.057 **	-10.188 **
	4.506	4.869	4.502	4.677	4.598	4.540
MKTPOWERj/(SIZEYj)	-0.325	-6.110 ***	- 6.178 ***	-0.373 *	-1.946 ***	-1.881 ***
	0.554	2.275	1.886	0.208	0.653	0.576
Adjusted R^2	0.391	0.393	0.393	0.392	0.395	0.395
Observations	2266	2266	2266	2266	2266	2266

***Statistically significant at the 1%, **statistically significant at the 5%, *statistically significant at the 10%.

Table 10
Robustness: Banks market power and the rate of birth of firms
Instrumental Variables Estimation with SPLIT

The regressions are estimated employing market-industry observations, including market and industry fixed effects. The variables ABSVHERF, SHIFT, ENTRY and ENTRYM&A are transformed into measures that are increasing in market power, in order to obtain predicted positive signs for the interaction terms. The coefficients for the constant terms, the industry and market fixed effects are not reported. Robust standard errors are below coefficients. MKTPOWER*ASYM is instrumented with MKTPOWER*SPLIT. The coefficients for the constant terms and industry and market indicator variables are not reported. Robust standard errors are below coefficients.

Variables	Dependent Variable: Rate of Birth of Firms in industry j and market i					
Measure of bank market power:	HERF	(1-ABSVHERF)	(1-SHIFT)	LOCBANK	(1-ENTRY)	(1-ENTRYM&A)
INDSHAREij	-11.337 ***	-11.444 ***	-11.191 ***	-11.351 ***	-11.394 ***	-11.336 ***
	2.755	2.485	2.519	2.469	2.433	2.440
MKTPOWERi*ASYMj	-0.030	1.010 **	0.885 **	0.019	0.222 *	0.190 *
	0.105	0.405	0.370	0.035	0.125	0.112
WEALTHi*SIZEYj	-10.614 ***	-9.180 **	-10.205 **	-10.198 **	-8.380 *	-8.689 *
	2.594	2.621	4.560	4.655	4.700	4.632
Adjusted R^2	0.389	0.387	0.383	0.391	0.390	0.390
Observations	2163	2163	2163	2163	2163	2163

***Statistically significant at the 1%, **statistically significant at the 5%, *statistically significant at the 10%.

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