# Bank Competition and Firm Creation*

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**Abstract**

This paper investigates the empirical relationship between competition in the financial sector and the creation of firms in the non-financial sector. It presents new empirical evidence suggesting that competition in banking is more detrimental (or less favorable) to the emergence of new firms in those industrial sector where asymmetric information is more important. Such evidence is consistent with theories of banking arguing that competition may have a negative effect on the availability of credit to informationally opaque firms.

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# 1 Introduction

Banks have been traditionally the main source of external capital for entrepreneurs starting brand new activities, and the availability of bank credit has been often identified as a precondition for the birth and the development of new firms. Although a substantial theoretical literature has investigated the relationship between the structure of the banking industry and the supply of credit to non-financial firms, little agreement has been reached on the sign of that relationship.

Two alternative groups of theories have delivered opposite results. On the one hand, conventional theories have identified perfect competition as the efficient solution for the banking industry, suggesting a negative relationship between banks' market power and credit supply. On the other hand, more recent theories have argued that adverse selection, moral hazard, and hold-up problems increase with the degree of competition among banks. These theories suggest that under asymmetric information some monopoly power in the banking industry may be beneficial to the availability of credit to non-financial firms.

The purpose of this paper is to contribute to this debate by investigating empirically the effects of banking competition on the creation of non-financial firms. We develop a strategy to test the empirical relevance of theories suggesting that under asymmetric information banks' market power may increase credit supply. We focus on the rate of birth of firms, as a specific aspect of credit availability, because we believe that the effect of informational problems may result in firms not being able to start rather than on the quantity of credit they can get. Furthermore, because of their special characteristics, namely the absence of previous credit history, new firms present themselves as perfect candidates to study the effects of banking competition in the presence of informationally challenging borrowers.

The analysis in this paper contributes also to the empirical literature on the effects of the structure of the banking industry on credit supply. In addition, it is related to the literature on financial structure and growth, since one of the main channels through which financial system development is thought of fostering growth is by reducing asymmetric information problems of innovative firms.

We address an issue that has not been studied in the existing empirical literature. We try to disentangle the two, probably coexisting, and opposite effects (traditional-positive and informational-negative) of competition on

the availability of credit to new firms, while taking a neutral stance on the sign of the total effect. We focus on the differential effect that competition in banking may have in different sectors of the economy. More precisely, we argue that, regardless of the sign of the first order relationship, competition will be less favorable (or more detrimental) to the emergence of new firms in those industries where informational asymmetries are more important.[1]

We concentrate on "opaqueness" as the defining characteristic of industrial sectors vis a vis the banking system. We assume that for technological reasons banks find it more difficult to evaluate the credit worthiness of firms in particular industries. In addition, we argue that such reasons are reflected in specific characteristics of balance sheets (such as the proportion of physical capital and other fixed assets), and in the heterogeneity of firm evaluations by market participants (such as the proportion of firms with split credit ratings in the industry).[2] Then, we are able to isolate the differential effect of competition on the availability of credit to opaque borrowers by regressing the rate of birth of new firms on an industrial sector fixed effect, a local market fixed effect, and an interaction term consisting of the product of a measure of bank market power in the local market and a measure of asymmetric information in the industry.

Evidence from a panel of Italian provinces and industrial sectors confirms our claim: we find that in more concentrated banking markets the rate of birth of firms in sectors characterized by more asymmetric information is relatively higher.

The case of Italy fits our purposes for a number of reasons. First, Italy has variety of local credit markets that differ significantly in their banking structure. Second, detailed information on the stocks and flows for the universe of non-financial firms is available. Finally, Italy is an interesting case for the characteristics of its productive and financial structure, as bank lending still represents the majority of the financial flows to the private sector; despite the recent development of financial markets, venture capital remains a negligible source of funding for start up firms.

Furthermore, our focus on local markets within a single country has several advantages with respect to cross country studies. First of all, banking markets are generally believed to be local and country level indicators of

[1] The testing strategy in this paper follows in spirit the methodology that Rajan and Zingales (1998) use to identify the relationship between financial development and growth.

[2] More on this later.

market structure may be misleading; second, the uniformity of the institutional framework eliminates the need to control for the effects of different regulatory systems; finally, the quality and information content of the data is homogeneous.

Although the contribution of this paper is mainly an empirical one, in the appendix we present a simple two-period model of a market for loans, as an example of how market power and information interact in affecting the provision of credit to new firms. The model assumes that banks learn over time about the credit-worthiness of their clients, and have access to an imperfect screening technology that enables them to evaluate the credit-worthiness of their competitors' clients. Banks make profits by virtue of the superior information they possess about their own clients vis a vis their competitors. As the number of existing banks increases, profits for each bank decrease as it become more likely that other banks obtain precise information about its clients. However, as long as market segments are heterogenous in term of asymmetric information, this effect is not uniform across segments, but varies with the degree of asymmetric information, or more precisely, with the accuracy of the testing technology.

The paper is structured as follows. The next section presents a brief summary of the theoretical and empirical literature on the relationship between the structure of the banking industry and the supply of credit; section three introduces the empirical methodology; section four describes the data; section five discusses our findings; and finally, section six concludes.

# 2 Theoretical Issues and Previous Empirical Literature

Theory has not yet provided a unambiguous answer to the question of how the degree of competition and the market structure of the banking industry affect the availability of credit to new entrepreneurs and, indirectly, the birth rate of new firms. On the one hand, literature relying on traditional models of industrial organization has stressed the role of bank competition in increasing the supply of credit to borrowers. On the other hand, more recent literature has pointed out that, because of asymmetric information, bank competition may be detrimental to the supply of credit to borrowers.

According to the first view, which abstracts from informational issues, a

more competitive banking system should promote the development of new entrepreneurial activities by decreasing interest rates and increasing the supply of credit to new firms, through the effects of the classic "mark-up channel".[3] A bank that has some monopoly power faces a downsloping demand curve and sets its volume of loans based on the standard conditions of equality between Lerner indices and inverse elasticities (see Freixas and Rochet, 1997). More competition reduces the mark-up banks are able to charge to their customers, though not necessarily in a uniform way, depending on the elasticities of different categories of borrowers.

Conversely, the second view, that explicitly takes into account information asymmetries, suggests that a more competitive banking system may be detrimental to the development of new firms. According to this view, the relationship between competition in banking and the availability of credit to new firms is likely to be affected by the informational structure of the market. Banks' ability to acquire information about their clients' creditworthiness, the degree of appropriability of that information, the presence of credit rating agencies, and the degree of heterogeneity of borrowers and their ability to signal their creditworthiness determine how informational structure and market structure interact in the provision of credit to opaque borrowers.[4] An increase in the degree of competition may worsen moral hazard[5] and adverse selection problems[6] on the borrower side, and hold-up problems[7] on

[3]Hannan (1991a) presents an application of the standard structure-conduct-performance paradigm to the banking industry.

[4]In the appendix we present a simple model of banking that provides some useful insights on the interaction between market structure and information.

[5]Hoff and Stiglitz (1997) show that moral hazard problems 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.

[6]An example is Broecker (1990), who analyzes a market for credit where banks compete in a Bertrand fashion over interest rates. He shows that when banks perform independently an imperfect test to screen the credit-worthiness of applicants, the equilibrium loan interest rate can be increasing in the number of banks in the market The intuition behind this result is that the average credit-worthiness of applicant firms that pass the test with at least one bank is decreasing with the number of banks. A similar analysis is in Riordan (1992).

[7]Petersen and Rajan (1995) show that banks' willingness to lend to new "unknown" firms increases with the banking market concentration, while the interest rate charged decreases. In that "Schumpeterian" perspective, banks would accept to lend to new firms with the prospect to extract some oligopolistic rent from those that result to be successful.

the lender side. Hence, it may lead to higher interest rates and a reduced availability of credit to opaque firms. We will refer to all these effects as to the "informational channel".

The relative importance of these two opposite mechanisms will determine the net effect of competition on credit availability to opaque borrowers and is essentially an empirical issue.

Conventional theories and information-based theories find both some support in the empirical literature. Hannan (1991b) analyzes the relationship between bank concentration and loan interest rates. He finds evidence that commercial loan interest rates tend to be higher in more concentrated banking markets. Conversely, Jackson and Thomas (1995), who examine the relationship between bank structure and the birth and growth of new manufacturing firms, suggest a negative effect of bank size and a positive effect of bank concentration on the rate of birth of new firms. On the same side, Petersen and Rajan (1995) find that young firms in concentrated markets receive more credit than do similar firms in competitive markets. Furthermore, they find that such difference tends to disappear as firms get older. A possible interpretation of that result is that as firms get older, asymmetric information problems diminish and the relative importance of what we called the informational channel decreases.

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 the effect of financial development on growth is mainly due to the increase in the number of firms rather than to the growth of existing firms. In a paper closely related to ours, Cetorelli and Gambera (1999) use the same dataset as Rajan and Zingales (1998) to study the effects of bank concentration on the rate of growth of different industrial sectors. They find that concentration promotes growth in those industries that are more in need of external financing, and that at the same time, it depresses growth overall.

Finally, some indirect empirical evidence on the relationship between banking competition and the supply of credit to new firms is in the small business lending literature. Several authors have studied the static relationship between bank size and propensity to lend to small borrowers. The main findings are that large financial organization tend to have a smaller proportion of their assets in small business loans than small institutions but that

Then, a more competitive market reduces the incentive to "invest" in new projects as the ability of extracting future rents is proportional to the bank's market power.

small business lending does not decrease in markets affected by mergers and acquisitions.[8]

Overall, this literature does not provide conclusive evidence. Small firms are typically thought of being innovative and opaque and new firms tend to be small, however size may not be necessarily a good proxy for asymmetric information problems of the type that we want to analyze. Hence, rather than focusing directly on the size of the borrower as a proxy for the degree of opaqueness, we assume that new firms are intrinsically characterized by asymmetry of information, though with varying degrees as illustrated below.

# 3 Empirical Methodology

The investigation of the theoretical literature in the previous section suggests that there exists a complex relationship between the structure of the banking industry and the availability of credit to opaque borrowers. The conventional efficiency channel is expected to determine a positive effect of competition on the quantity of credit and the informational channel a negative one. Consequently, regressing a measure of credit availability to opaque borrowers on some measure of market power would provide evidence on the total effect but it would say nothing on the existence and empirical relevance of each of the two partial effects. Moreover, to the extent that the relative importance of the two effects varied across borrowers in a systematic way, restricting the relationship between competition and credit to non-financial firms to be the same for all firms may introduce a composition bias in the estimation.

To verify the empirical relevance of the "informational channel" we start from the following intuition. A more competitive banking industry should be disproportionately detrimental to the emergence of new firms in sectors where informational asymmetries play a substantial role.

In a theoretical model considering a continuum of borrowers with varying degree of opaqueness and a continuum of loan markets with varying degree of oligopoly power, the above implication is equivalent to saying that the second cross partial derivative of availability of credit with respect to market power and opaqueness is positive, at least in a given range of opaqueness (a simple theoretical model that shows this result can be found in the Appendix). In an econometric model, this second mixed derivative can be estimated as the

[8] See Berger and Udell, (1998) and Berger, Demsetz and Strahan (1999) for a review of this literature.

coefficient of an interaction term between a variable describing the degree of opacity and one describing the degree of market power in the banking sector.

Consequently, to estimate an empirical model to test the relevance of the information channel, we need to specify the empirical counterparts of the concepts of availability of credit, degree of opaqueness of non-financial firms, and bank market power.

As far as the first is concerned, we focus on the rate of birth of firms as an indirect measure of credit availability to entrepreneurs willing to start a business. Two main considerations motivate our choice. First, new firms are likely to concentrate the highest level of asymmetric information problems and have no previous history that could mitigate them. Second, we expect that most information-related problems reflect in firms not being able to start rather than not being able to get funds to grow, so the rate of birth of new firms is where the effect of market power should be stronger.

In addition, this approach restricts ex ante our firms to be exogenously opaque in a relatively uniform way, except for characteristics that are related to technology or type of business. From an empirical point of view, if we looked at growth of all firms in a given industry we would not be able to separate the component due for example to large listed firms - that are less opaque and have access to external financing other than local bank credit - from that of new or small entities, nor control for the size and age distribution of the industry.[9] On the contrary, the use of a sample of microeconomic data on individual existing firms would allow us to control for differences in size and age but it would be intrinsically affected by selection bias since firms that do not receive credit at all and are not able to start would be excluded a priori.

Empirically, support of this view is in Rajan and Zingales (1998). In their study, the effect of financial development and growth is analyzed separately for the growth of existing establishments and the growth in the number of establishment. They find that the positive effect of financial development variables on growth is stronger for this second variable, suggesting that financial variables affect primarily the creation of new firms rather than the expansion of existing entities.

Furthermore, had we employed measures based on the quantity of credit

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

issued to specific classes of borrowers we would have had the problem of disentangling demand and supply, unless we assumed that supply be fully elastic, which would be inconsistent with the existence of some monopoly power.[10]

In conclusion, we test whether industries characterized by greater asymmetric information (i.e. where it is harder for an outside bank to evaluate the credit-worthiness of borrower firms) have relatively higher rates of birth of firms in less competitive banking markets.

The next problem that we have to address to estimate the model is the definition of a suitable measure of the degree of asymmetric information and of a measure of bank market power. We proceed to these tasks in the next sections.

## 3.1 Measures of the Degree of Opaqueness

In order to define the degree of opaqueness we refer to the two basic types of asymmetric information problems: adverse selection - that emerges when lenders cannot observe the "quality" of individual borrowers - and moral hazard - that emerges when lenders cannot monitor the actions of borrowers. In both cases the relevance of the associated problems is likely to vary across industries on the basis of some intrinsic characteristic.

The type of activity of the "perspective" firm influences the relative importance of adverse selection problems when the quality of the entrepreneur is unknown. It is likely that a bank can evaluate more easily the quality of a production plan or a project when it is based on a simple technology, with a large predictable component. For example, making nails or paper from raw materials are activities where the effect of unobservable quality of human capital or effort are less important in determining the outcome than the provision of professional services.

As far as moral hazard is concerned, lenders' ability to monitor the activities of borrowing firms again varies depending upon the complexity of the industry's technology and the degree of discretion that such technology leaves to the entrepreneur. If the activity of the firm is such that monitoring through a relationship has a large value added, the inside bank will be able to extract rents from the borrower. If instead the technology is fairly trans-

[10] In the specific case, there would have been the additional complication of a potentially backward bending supply curve, as suggested by the theoretical literature on banking.

parent, monitoring has little value added and an outside bank can step in. Furthermore, some technologies imply naturally the availability of collateral by employing a substantial share of fixed and tangible assets[11].

The existing literature on financial intermediation measures firm opaqueness with variables proxing "reputation", like firm age or size (Petersen and Rajan, 1995). Alternatively, opaqueness has been associated with one of its resultant "bank dependence", often measured as the ratio of bank credit to total debt.

In this paper, since we concentrate on the birth rate of firms, we cannot use firm age and size, as new firms have all age zero (a caveat is that information about past history of entrepreneurs does not exist) and data on the size of start up firms is not available. Furthermore, in the context of our study, bank dependence is likely to have a large endogenous component. We, then, resort to two different approaches to proxy for opaqueness.

In our first approach, the working assumption is that firm opaqueness varies across industries and depends upon the relevance of physical capital and other fixed assets in the production process, or that at least is highly negatively correlated with it. The larger the share of these assets in the balance sheet the more transparent is the firm. Support to this view can be found in the literature on bank opaqueness.[12]

Since firms in different industries may have specific accounting practices and varying degrees of discretion in determining depreciation, we consider three different balance sheet ratios: 1) the ratio between net physical assets and net total assets; 2) the ratio between gross physical assets and gross total assets, and, for robustness check; and 3) the ratio between equipment and machinery and gross total assets.

This approach may present an identification problem. Firms with a larger share of fixed assets are likely to to have large fixed start up costs. If, as from standard theories, credit supply is restricted in more concentrated markets, these same firms will be the ones to suffer the most from the lack

[11]Collateralizable assets can be contracted upon to reduce moral hazard and adverse selection problems (see Freixas and Rochet, 1997). In addition, Myers and Rajan (1998) develop a model where agency problems between owner/manager and creditors are mitigated by the amount of less liquid assets, that reduces the uncertainty about risk. Though their argument is presented for the case of a bank, it can be extended to non-financial firms.

[12]Morgan (1999) finds that the disagreement between raters' valuation of banks decreases with the share of premises and fixed assets in the balance sheet.

of competition. Hence, the interpretation of the coefficient of the interactred term cannot be unique.[13] In other words, that estimate would leave us with the following question: is it large fixed costs or a relatively more transparent structure to make market concentration relatively worse for firms with a large fixed assets share?

In our second approach, we attempt to solve this problem by looking at credit rating data, abstracting from balance sheet indicators. Morgan (1999) suggests that a measure of the degree of opacity of a firm is to what extent rating agencies disagree on their ratings for that firm. The same reasoning can be applied at the industry level; a large percentage of cases where raters disagree (splits) implies a greater difficulty in evaluating firms in that industry, and hence, more opacity. As described below, we calculate for each industry the percentage of firms with split rates and rank industries by that measure.

Credit rating data are for a sample of bond issues in the US. Our working assumption is again that there is some technological reason behind opaqueness and that the industry ranking implied by such technological difference persists across countries.[14] For robustness purposes, in our estimates we employ the credit rating measure both directly, and as an instrument for our balance sheet based proxies.

Definitions for our balance sheet based proxies are reported in Table 1. Each indicator is constructed as the inverse of standard balance sheet ratios. Data underlying our indicators has been obtained from industry level data published by Centrale dei Bilanci (1997) for the years 1990-1995. Industry definitions are reported in Table 2-A, as well as the size of the Centrale dei Bilanci sample.[15] The data include annual aggregate balance sheets and descriptive statistics on the main balance sheet ratios such as means and standard deviations for a sample of Italian companies. Each proxy for opaqueness is the average of the yearly value observed in the period 1990-1995, in or-

[13] A second potential problem was discussed above: some of these indicators may be highly correlated with the availability of collateral. However, even if that were the case, this bias should work against our hypothesis. The reason is that we should expect that firms that are able to provide more collateral are also those that are 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 rate of birth in concentrated markets.

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

[15] Detailed information on Centrale dei Bilanci can be found in Pagano, Panetta, and Zingales (1998).

der to remove the effects of temporary shocks to specific industries. The published report Centrale dei Bilanci (1997) does not include firms in the Services sector so we had to exclude them. We also excluded industries that are closely related to the availability of natural resources or to other factors that we believe are independent from local bank financing (mining and oil industry, transportation).

The split rating variable (RATING) is defined as the percentage of bond issues for each industry where raters disagree; the data refer to around 1220 issues between 1983 and 1993 in the US[16] and the industry classification is based on SIC codes. SIC industry classification can be easily matched with the Italian classification ATECO91, through ISIC classification. In constructing this variable, we first depurated the original data from repetitions. More specifically, firms with more than one bond issue were counted only once if their rating split did not change across issues; the issues were counted separately if the rating split changed.

Table 2-B reports the ranking of the industries according to their level of opacity for the different proxies. A higher rank indicates a greater degree of opacity. For example, according to balance sheet indicators, Construction is considered a highly opaque industry while Paper and Products, Auto-vehicles and Parts and Mineral Products are all characterized by less information asymmetries. Values for the balance sheet indicators are reported in Table 2-C.

## 3.2 Measures of Market Power

A second issue is to identify a suitable measure of bank market power. In the banking industry, market structure and informational structure are intrinsically related.[17] In addition to traditional sources of market power, banks enjoy some degree of monopoly power by virtue of the superior information they are able to collect about those customers with whom they have already established a lending relationship. Then, market power and the ability to extract rents from borrowers become function not only of the concentration

[16]The data were collected by the staff in the Capital Market section at the Federal Reserve Board from various public sources, such as Moody's and S&P manuals, Bond Digest. We are very grateful to Donald Morgan for providing this data.

[17]See for example Dell'Ariccia, Friedman, and Marquez (1999), who show that asymmetric information and learning by lending represent a barrier to entry in the banking industry.

of the banking industry, but also of the ability of banks to gather and retain private information about clients.[18]

As a first approximation, we employ structural proxies for the degree of monopoly power in the banking industry in each local market.[19] Though structural measures are subject to widespread criticism because they ignore potential competition, there is substantial evidence that banking is characterized by significant barriers to entry, in particular in the segments of opaque and small borrowers, who benefit the most from local diffusion of soft information.[20]

We use the degree of concentration in the deposit market measured by the Herfindahl index and the ratio of deposits held by banks that are chartered in the local market to total deposits in the local market. This second indicator is meant to capture the degree of isolation and strength of local banks with respect to competition from banks in neighboring markets.

The level of these indicators may not fully capture the dynamics of competition so we have also included the absolute variation of the above variables, calculated as the sum of the absolute value of yearly changes in the period considered. The reason is that the asymmetric information paradigm is based not only on present monopoly power but on the future possibility by the bank to extract rents hence on future monopoly power.[21] We expect that in a market where there are significant structural changes this expectation may be affected.

## 3.3 The Empirical Model

The basic empirical model that we estimate specifies the rate of birth of firms in industry $j$ and province $i$ as a function of industry-specific and province-specific control variables, and of an interaction term consisting of

[18] In the appendix, we present a simple model of banking where we briefly analyze these issues. That model suggests that market power is still related to traditional measures of competition (as for example the Herfindahl index, in the model the number of banks), but its effects are filtered by the informational structure of the industry.

[19] Hannan (1991) finds empirical evidence in support of the thesis that bank commercial loan markets are local in nature.

[20] For example, Kwast, Starr-McCluer and Wolken (1997) discuss market definition issues for antitrust in banking and 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 located within 30 miles of the headquarters office of the small business.

[21] See Petersen and Rajan (1995) for a model in that spirit.

the product of a measure of bank market power in the province and a measure of asymmetric information in the industry. Then, under the assumption that market power has a positive effect on the emergence of new firms as stated by information-based theories, the coefficient estimate for the interaction term should be positive, indicating that monopoly power has a more positive (or less negative) effect on the birth rate of firms in industries characterized by a higher degree of opaqueness.

The inclusion of industry and province specific fixed effects requires any additional variable to vary both across province and industry. Specifically, we include a variable representing the industry $j$'s share in market $i$ of the total number of registered firms in the year preceding the data on firms to capture the potential existence of a convergence effect as in standard growth models.

The model we estimate is then

$$BIRTH_{j,k} = \alpha + \beta_{1..m} + \gamma_{1..n} + \delta SHARE_{j,k} + \theta INTER_{j,k} + \varepsilon_{j,k}$$

where $BIRTH_{j,k}$ is the rate of birth of firms in industry $j$ and province $k$; The constants $\beta_{1..m}$ and $\gamma_{1..n}$ represent industry-specific and province-specific fixed effects; The variable $SHARE_{j,k}$ is industry $j$'s share of registered firms in province $k$ in year 0; and finally, $INTER_{j,k}$ is the interacted term: asymmetric information in industry $j$ times monopoly power of banks in province $k$. It is clear that the coefficient of this term captures a second order effect, i.e. the differential effect of market power on the rate of birth with respect to different degrees of opaqueness, but says nothing on the first order effect. Additional control variables that will be included in further specifications are described below, in section 5 and in the Tables.

# 4 Data and Variables Description

To implement our test we employ a panel of Italian local banking markets and industrial sectors. We consider the universe of the 103 Italian provinces as our definition of local commercial loan markets. We employ information on bank concentration at the provincial level and on the rate of birth of non-financial firms at the industry level for the period 1996-98. Yearly observations are averaged over time. We employ two sources: the Bank of Italy and InfoCamere. Specifically, data on the structure of the banking system are calculated from the Bank of Italy statistics on commercial banks; data on

the number of firms are obtained from information in the database Movimprese, collected and published yearly by InfoCamere. Documentation for the data from Bank of Italy is available in the relative publications.

Movimprese by InfoCamere is a database that collects the information from local firm registries. It reports the number of firms that register in each time period by province, type of legal entity, and by sector of activity. It also reports, for each period, the end of year stock of registered firms, of operating firms, and the variations in the firm registry, i.e. new registrations and cancellations. The information collected by Infocamere has undergone some significant changes over time and homogeneous data is available starting from 1995. Hence, we limited our investigation to the period 1996-1998.

In addition to the "opacity" measures described in the previous section, we employed three variables relative to the activity of non-financial firms. First, we calculated the dependent variable in our regressions ($BIRTHij$) as the average annual rate of birth of firms in province $i$ and industry $j$ over the years 1996-98; where for each year $t$ such rate is defined as the ratio of newly registered firms in each province in year $t$ divided by the number of total registered firms at the end of year $t-1$. We exploited the availability of information on gross flows rather than simply calculating the growth rate from beginning and end of period stocks because we wanted to exclude potential effects of banks behavior on the "death" of firms.[22]

Second, as in standard growth regressions, we controlled for the relative size of each sector since there could be a sort of convergence effect such that industries with fewer firms at the beginning of the sample period have relatively higher birth rates; we included the variable $SHAREij$ defined as the number of registered firms in province $i$ and industry $j$ divided by the total number of registered firms in province $i$ at the end of year 1995.

Third, in some of the specifications, we included as control variable the number of firms that have been canceled from the registry ($DEATHij$),

[22]One important caveat in the definitions of Movimprese is that firms may be "not active", that is they may be under liquidation or bankruptcy procedure, but not yet canceled from the registry. Conversely, firms that are registered and inactive may become active without implying any change in the number of registered firms. We have observed that there are significant differences in the ratio of active to registered firms across regions, suggesting both differences in bureaucracy efficiency and differences due to the sectorial composition of firms. As a robustness check, we have employed birth rates calculated with respect to active fims rather than registered ones and no significant difference was found in the results.

defined as the time average of the annual ratio of canceled firms in year $t$ divided by total registered firms at the end of year $t-1$. Our concern was that new firms replaced dead ones in markets where there was a high turnover due to exogenous factors varying both across markets and industries (whose effects would not be captured by the industry or the province fixed effects).

We employed a number of variables to describe the structure of the banking industry. First, we calculated the Herfindahl index ($HERFDEPi$) as the average of the yearly sum of the squares of the market shares of deposits in province $i$. Second, we defined the variable $DEPINPROi$ as the share of deposits in province $i$ held by banks chartered in province $i$, (again as the average of yearly observations). Finally, we constructed the variables $ABSVHERFi$ and $ABSVINPi$ as, respectively, the sum of the absolute values of the yearly changes in $HERFDEPi$ and $DEPINPROi$ over the three year period.

The variable $RATING_j$ represents the percentage of firms with split ratings in industry $j$.

Descriptive statistics are reported in Table 3. Figure 1 plots the distribution of local market concentration index while Figure 2 shows that of the rate of birth of firms. As in standard growth regressions we employ average data for the period. Hence the two dimensions of our panel are industries and provinces.

# 5 Results

The basic regression describes the rate of birth of firms ($BIRTHij$) in industry $i$ and local market $j$ as a function of industry and market fixed effects, of the interaction term between the degree of opaqueness of industry $i$ and the degree of market power in market $j$, and of $SHAREij$. Since all specifications include controls for industry and province effects, the only effects that are identified are those relative to variables that vary both across provinces and industries.

In the basic specification, we employed the Herfindhal concentration index for deposits as measure of competition, and the variable $ASYM1j$ defined as the inverse of the ratio of fixed assets to total assets as proxy for opacity. This basic regression (Table 4-A) shows that the coefficient of the interaction term is positive and statistically significant. The coefficient of the proportion of registered firms has the expected negative sign and is statistically significant.

We modified this basic model (table 4-A) by including a second interaction term: the product of $ASYM1j$ and the absolute variation of the Herfindhal index defined as the sum of yearly absolute variations in the period. This interaction term has a negative and significant coefficient, indicating that industries characterized by greater opacity have a lower rate of birth of firms in local markets where there has been greater variability in the concentration index. This result is consistent with the idea that significant changes in the market structure may affect negatively the expectation of banks to be able to extract future rents from their more opaque borrowers.

In table 4-B results for similar specifications but with a different measure of bank market power - the variable $DEPINPROi$, the share of deposits held by banks chartered in the province as proportion of the province's total deposits- are reported. This variable should capture the effect of the degree of isolation of the local banking system with respect to banks from outside the province. Moreover, it may capture a component of the potential for collusive behavior. The coefficient for the interaction term is again statistically significant and positive, implying that more opaque firms have a higher rate of birth in provinces where resident banks have a greater market share of deposits. In addition, as for the previous regression, we included (column 2) a specification with the second interaction term with the absolute variation of the variable. However in this case such term is not significant.

In both regressions we also tested for the relevance of the potential effect of the "administrative turnover" of firms, by introducing the rate of cancellation of firms ($DEATHij$). We found that this variable was significant and had a positive coefficient, and that, to some extent, it reduced the significance of the interaction term. Further analysis is required since the cancellation rate may be partly endogenous if banks in concentrated markets encourage the birth of lower quality firms that will have a greater mortality.[23]

In Tables 5-A and 5-B, we report the results of the specifications described above, where we substituted $ASYM1$ with $ASYM2$, defined as the inverse of the ratio of net fixed assets to net total assets. The results are similar in the signs and significance of the coefficients. Further robustness checks using $ASYM3$ produced similar results but less statistically significant (not reported).

[23]In our sample the period is short enough that we do not expect this endogeneity to be relevant, since cancelled firms were most likely registered before the beginning of our time frame.

Finally, we tested for non linearity in the interaction term both with respect to market power and the indicators of opacity, by including in the regression an additional interaction term, alternatively, of one variable with the square of the other. We did not find any statistically significant effect of this term, indicating that (in our sample) the effect is well approximated by a linear relationship.

An important assumption underlying our methodology is that new firms finance themselves largely in the local market where they are registered. In order to take into account the possibility that firms were able to find some "cross-border" financing, we included controls for competition in contiguous provinces, defined as the weighted average of the market power variable in provinces that have borders with province $i$. The interaction term between opaqueness indicators and this variable resulted not significant. Furthermore, in an alternative specification, we included banking variables calculated at the regional rather than the provincial level, and those too resulted not significant.

An identification problem may affect these estimates. As discussed in the previous section, firms with a larger share of fixed assets might have large fixed start up costs. If, as from standard theories, credit supply is restricted in more concentrated markets, these same firms will be the ones to suffer the most. Then, the interpretation of the positive coefficient for the interacted term cannot be unique. To solve this problem we resorted to the opaqueness proxy based on credit rating data.

For robustness, we employed the data both directly and in conjunction with our original interacted term. First, we constructed a new interacted term as the product between the percentage of split ratings in each industry and the Herfindahl index in each province, and we estimated our main model with this new variable. Second, we used the new interacted term as instrument for the balance sheet based interacted term in a two-stage regression. Our procedure is based on regressing our balance sheet measures of asymmetric information interacted with the measure of concentration on the interaction term formed multiplying the split rate percentage with the same measure of market power and a constant. Then, in the second stage, the predicted values of the interaction term, which should retain only the component explained by the split rate (hence exclude the component potentially due to start up costs) is employed in our main regression.

The results, reported in Table 6 are consistent with our previous estimates. The coefficient of the interacted term is still positive and significant.

This confirms the robustness of the findings in favor of theories based on asymmetric information.

The empirical evidence in this section supports the idea that bank competition is more detrimental (or less favorable) to fims operating under more severe asymmetric information conditions. However, until now we have not taken any view with regard to the total effect of competition on firm creation. We present some preliminary evidence in the next section.

## 5.1 An Attempt at Estimating Total Effect

As stated previously, we concentrated the analysis on the differential effect of competition on industries characterized by different degrees of opacity. Nevertheless, we conducted some preliminary exploration of the total effect of bank competition on the rate of birth of firms. In order to determine the sign and magnitude of the total effect of the structural proxies on the rate of birth of firms, we modified our basic regression by excluding the province fixed effects and including a measure of bank competition in the province. The main problem posed by this specification is the definition of adequate control variables to capture the other numerous factors that affect the rate of birth of new firms in each province. At this preliminary stage, we have included only per capita GDP growth and regional fixed effects. The regional fixed effects should be able to capture most of cultural and institutional factors, as well as public subsidies, since we expect a significant component of these factors to vary mostly across regions rather than across provinces.

Results are reported in Table 7-A and 7-B (for the first column, the exclusion of the interaction term has permitted to include also the birth rate data referred to firms in the services sector). Also here, we tested for several specifications of the proxies for market power. We found that both concentration and the share of deposits held by locally chartered banks have a statistically significant effect on the rate of birth of firms. This is effect is non monotonic, with the linear coefficient being positive and the second order coefficient negative, indicating that some market power has a positive effect on the rate of birth of firms but the effect becomes negative when it becomes too large. The interaction term maintains its positive sign and is statistically significant in most of the regressions, suggesting that the first order effect of market power on the rate of birth of firms becomes larger for more opaque industries. In addition, the top of the inverted U-shaped curve that describes

the relationship moves to the right as we increase opacity, indicating that the total effect of market power turns negative for larger values of the market power proxy for more opaque industries. The other variables behave in a similar way as in the regressions reported in tables 4-A and 4-B.

# 6 Conclusions

In this paper we addressed the issue of the empirical relevance of those theories that argue that a positive relationship between bank market power and the availability of credit to opaque borrowers exists. We focused on the empirical relationship between bank competition and the rate of birth of non-financial firms with different degrees of asymmetric information. The evidence we found in a panel of Italian data at the province level is consistent with the view that market power is relatively more beneficial (less detrimental) to the rate of birth of firms in industries characterized by greater opaqueness. The results appear to be robust to alternative definitions of opacity and different proxies of market power. Our analysis provides also some preliminary evidence on the dominance of these effects over traditional effects of competition in a range of relatively low market power and for very opaque industries.

# 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 provide some intuition for the results of our empirical investigation.

This model describes a hold up problem similar to that in Petersen and Rajan (1995). However, in this model banks' market power is endogenously determined by the information structure. 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 traditional positive effects.

Consider a market where there are $N$ identical banks seeking projects in which to invest their capital, and a continuum of entrepreneurs seeking banks to finance their investment projects. Projects may succeed and pay a return $y$ or fail and pay 0. Entrepreneurs are heterogeneous in their credit-worthiness. Namely, there are "good" and "bad" entrepreneurs, with relative weights $q$ and $1-q$. The former succeed and pay back the debt with probability $\theta_h$, 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: $\theta_l y - 1 < 0$

The model articulates on 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 simplicity, we assume that adverse selection problems are bad enough that banks abstain from bidding for firm on which they do not obtain 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.

In what follows, we assume that test results are public information, so that whenever at least one banks obtains an informative result from its test, each bank is informed of it. Then, the incumbent bank remains a monopolist when no bank obtain a positive result from the test. 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 period-two expected profit for the incumbent (the bank who lent to that particular firm in period one) can be written as the weighted sum of competition and monopoly profits, that results in

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

in other words, the incumbent's period-two expected profit is the monopolist's profit weighted by the probability that no bank obtains positive information about the incumbent's client.

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. To one extreme, $p = 0$, the incumbent enjoys full informational monopoly on its borrowers. To the other extreme, $p = 1$, the incumbent has no informational advantage over other banks. Then, as $p$ increases, the expected informational rents that accrue to the incumbent 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.

Primarily, we are interested 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 $\Pi_{2,i}(n-1) - \Pi_{2,i}(n)$ 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 incumbent profits and the number of banks in the market. The intuition for this result is straightforward. The effect of one additional competing bank is zero for perfectly transparent sectors ($p = 1$), where Bertrand competition always prevail, and for perfectly opaque sectors ($p = 0$) where the inside bank always retains its monopoly power. Then, it is at intermediate levels of opaqueness that changes in the degree of competition have the maximum effect on the inside bank profits. The result of our empirical investigation support such a shape for the relationship. However, that evidence 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 a Bertrand fashion. Borrowers can result

good or bad with probability $q$ and $1-q$. Good borrowers repay debt with probability $\theta$. 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 keep into account the expected period-two profits stemming from the informational advantage that each bank obtains vis a vis its clients. Then, we can write

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

(where $\delta$ is the discount factor) that gives an equilibrium gross interest rate

$$\widehat{r}(n,p) = \frac{1-\delta\left(\theta r_m - 1\right)(1-p)^{n-1}}{\theta q}$$

with

$$\Delta\widehat{r}(n,p) = \widehat{r}(n,p) - \widehat{r}(n-1,p) > 0$$

and

$$\frac{\partial \Delta\widehat{r}(n,p)}{\partial p} < 0 \Leftrightarrow p > \frac{1}{n-1}$$

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

$$b = f(\widehat{r}, X)$$

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

$$\frac{\partial b}{\partial n} = \frac{\partial f}{\partial \widehat{r}}\frac{\partial \widehat{r}}{\partial n} < 0$$

and

$$\frac{\partial^2 b}{\partial n \partial p} = \frac{\partial f}{\partial \widehat{r}}\frac{\partial^2 \widehat{r}}{\partial n \partial p} > 0 \Leftrightarrow p > \frac{1}{n-1}$$

that is negative for low values of $p$ and positive for high values of $p$.

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**Table 1**

**Definitions of the Indicators of Opacity**

| Definition | Name |
|---|---|
| gross total assets/gross physical assets (Italian data 1990-1995) | ASYM1 |
| net total assets/net physical assets (Italian data 1990-1995) | ASYM2 |
| Gross total assets/machines and equipment (Italian data 1990-1995) | ASYM3 |
| Percentage of split ratings i.e. differences in rating between S&P and Moody's for bond issues (US data 1983-1993) | RATING |

**Table 2-A**

**Industries and codes, sample size from the firm registry as in Centrale dei Bilanci (1997)**

| NAME | N. of firms in the sample | ATECO 91 CODE |
|---|---|---|
| Food and Beverages | 522 | DA15 |
| Textiles | 515 | DB17 |
| Clothing, Leather and Footwear | 328 | DB18+DC19 |
| Wood, Furniture and Other Manufacturing | 266 | DD20+DN36 |
| Paper & Products | 154 | DE21 |
| Printing & Publishing | 108 | DE22 |
| Chemicals and Artificial Fibers | 260 | DG24 |
| Rubber and Plastic Products | 306 | DH25 |
| Non-metal Mineral Products | 386 | DI26 |
| Metal Products | 550 | DJ28 |
| Non-Electrical Machinery | 659 | DK29 |
| Electrical and Electronic Machinery | 397 | DL30+DL31 |
| Professional Machines and Tools | 73 | DL32+DL33 |
| Auto-vehicles and Parts | 101 | DM34 |
| Other Vehicles | 123 | DM35 |
| Construction | 219 | F |
| Sales Intermediaries and Gross Sales | 1000 | G51 |
| Retail Sales and Repair of Consumer Goods | 347 | G52 |
| Hotels, Restaurants and Other Public Services | 34 | H |

Notes: Wood and Furniture and Other Manufacturing had to be aggregated to be matched with the classification contained in Movimprese.

**Table 2-B**

**Sectors and ranking based on opacity definitions**

| Sector | Rank 1 | Rank 2 | Rank 3 | Rank 4 |
|---|---|---|---|---|
| | Machines and Equipment/ Gross Total Assets | Gross Physical Capital/Gross Total Assets | Net Physical Capital./Net Total Assets | Split Ratings Percentage |
| Construction | 1 | 1 | 1 | 2 |
| Other Vehicles | 2 | 2 | 2 | 3 |
| Retail Sales and Repair of Consumer Goods | 3 | 8 | 8 | 1 |
| Hotels, Restaurants and Other Public Services | 4 | 20 | 20 | 11 |
| Clothing, Leather and Footwear | 5 | 3 | 4 | 8 |
| Non-Electrical Machinery | 6 | 4 | 3 | 10 |
| Electrical and Electronic Machinery | 7 | 7 | 6 | 4 |
| Printing & Publishing | 8 | 5 | 5 | 13 |
| Sales Intermediaries and Gross Sales | 9 | 6 | 7 | 9 |
| Chemicals and Artificial Fibers | 10 | 10 | 10 | 12 |
| Professional Machines and Tools | 11 | 9 | 9 | 7 |
| Other Manufacturing | 12 | 14 | 14 | . |
| Food and Beverages | 13 | 11 | 13 | 15 |
| Wood and Furniture | 14 | 15 | 17 | 19 |
| Rubber and Plastic Products | 15 | 13 | 11 | 18 |
| Textiles | 16 | 12 | 12 | 16* |
| Metal Products | 17 | 16 | 15 | 17* |
| Non-metal Mineral Products | 18 | 17 | 16 | 14 |
| Auto-vehicles and Parts | 19 | 18 | 18 | 6^ |
| Paper & Products | 20 | 19 | 19 | 5^ |

Note: a higher position in the ranking indicates greater opacity. Source: Centrale dei Bilanci (1997). The table reports the ranking obtained ordering industries by descending values for the indicators listed. *These industries have same values for split ratings. ^These industries have same value for split ratings.

**Table 2-C**

**Balance sheet proxies for opacity (percentage values)**

| Sector | Machines and Equipment/ Gross Total Assets | Gross Physical Capital/ Gross Total Assets | Net Physical Capital/ Net Total Assets | Split Ratings Percentage |
|---|---|---|---|---|
| Construction | 3.00 | 8.11 | 4.53 | 60.0 |
| Other Vehicles | 6.18 | 13.51 | 6.59 | 58.0 |
| Retail Sales and Repair of Consumer Goods | 8.25 | 28.40 | 17.22 | 61.8 |
| Hotels, Restaurants and Other Public Services | 10.14 | 57.75 | 47.02 | 55.3 |
| Clothing, Leather and Footwear | 11.83 | 25.25 | 12.29 | 56.2 |
| Non-Electrical Machinery | 14.31 | 26.62 | 12.10 | 55.3 |
| Electrical and Electronic Machinery | 14.39 | 28.19 | 13.71 | 57.5 |
| Printing & Publishing | 14.89 | 26.90 | 12.30 | 52.2 |
| Sales Intermediaries and Gross Sales | 14.95 | 27.28 | 14.84 | 55.5 |
| Chemicals and Artificial Fibers | 18.25 | 36.57 | 18.15 | 53.3 |
| Professional Machines and Tools | 18.72 | 34.98 | 17.73 | 56.7 |
| Other manufacturing | 18.74 | 39.66 | 21.84 | . |
| Food and Beverages | 19.84 | 38.18 | 21.83 | 50.6 |
| Wood and Furniture | 21.02 | 41.56 | 26.08 | 48.1 |
| Rubber and Plastic Products | 22.28 | 39.10 | 19.69 | 48.7 |
| Textiles | 22.49 | 38.41 | 19.80 | 50.0 |
| Metal Products | 26.49 | 43.77 | 21.90 | 50.0 |
| Non-metal Mineral Products | 30.48 | 49.54 | 25.17 | 51.7 |
| Auto-vehicles and Parts | 35.00 | 51.45 | 26.76 | 57.1 |
| Paper & Products | 38.48 | 53.38 | 31.65 | 57.1 |

Note: This table reports the weighted average of the indicators listed by industry, for the sample of firms that are analyzed in Centrale dei Bilanci (1997) annual report. The ratios are obtained averaging over the period 1990-1995 yearly values derived from aggregated balance sheet items at the industry level.

## Table 3

## Descriptive statistics

The statistics reported refer to the sample employed in the estimation of the basic specification. Observations are stacked as in the estimation and are averages over time for the period 1996-1998 except where specified. The number of observations is 1957.

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Ratio of Birth of Firms | 5.87 | 3.10 | 0 | 41.66 |
| Herfindahl Index of Deposits (provinces) | 18.25 | 8.02 | 5.32 | 53.86 |
| Herfindahl Index of Deposits (regions) | 4.59 | 2.87 | 2.01 | 23.38 |
| Rate of Cancellation of Firms | 5.93 | 2.45 | 0 | 33.33 |
| Proportion of Registered Firms in Industry i and Province j in 1995 | 3.61 | 5.84 | 0 | 32.29 |
| Share of Total Deposits of Resident Banks | 0.40 | 0.23 | 0 | 0.93 |
| Absolute Variation of Herfindahl Index of Deposits | 2.06 | 2.22 | 0.03 | 13.43 |
| Absolute Variation of the Share of Deposits of Resident Banks | 3.11 | 3.55 | 0 | 23.13 |
| Per Capita GDP Growth in 1995 | 6.92 | 1.64 | 1.15 | 11.15 |

## Table 4-A

## Bank market power and the rate of birth of firms

The dependent variable is the ratio between the number of newly registered firms and the number of registered firms at the end of the preceding period. Annual data for the period 1996-1998 are averaged over time. The Herfindahl index is calculated for deposits each year and averaged over the period considered. ASYM1 is the inverse of gross physical assets divided by gross total assets and is the industry weighted average reported by Centrale dei Bilanci (1997); the annual indicator is averaged over the period 1990-1995. The industry's share of the total number of registered firms is computed dividing the 1995 number of registered firms of the industry by the total number of registered firms in that year in each local market. The rate of cancellation of firms is given by the ratio between the number of firms canceled and the number of registered firms at the end of the preceding year. Annual data for the period 1996-1998 are averaged over time. The coefficients for the constant terms and indicator variables are not reported. Robust standard errors are reported below coefficients. The basic regression is specified as follows.

$$Birth_{j,k} = \alpha + \beta_{1..m} FE_j + \gamma_{1..n} FE_k + \delta\ Share_{j,k} + \theta\ (Herfindahl_{j*} Asym1_k) + \varepsilon_{j,k}$$

| Variables | Dependent Variable: Firm Rate of Birth | | | |
|---|---|---|---|---|
| Share of firms in industry j in 1995 | -0.113*** | -0.085*** | -0.113*** | -0.085*** |
| | 0.022 | 0.023 | 0.022 | 0.023 |
| Cancellation rate | - | 0.420*** | - | 0.418*** |
| | - | 0.116 | - | 0.116 |
| Herfindahl province *Asym1 | 0.672** | 0.456* | 0.975*** | 0.677** |
| | 0.291 | 0.268 | 0.310 | 0.283 |
| Abs. Variation of Herfindahl * Asym1 | - | - | -2.784*** | -2.017*** |
| | - | - | 0.903 | 0.835 |
| Adj. R2 | 0.226 | 0.308 | 0.228 | 0.308 |
| Observations | 1957 | 1957 | 1957 | 1957 |

## Table 4-B

## Bank market power and the rate of birth of firms

The dependent variable is the ratio between the number of newly registered firms and the number of registered firms at the end of the preceding period. Annual data for the period 1996-1998 are averaged over time. The variable DEPINPRO is the share of deposits held by banks chartered in the; annual indicators are averaged over the period considered. ASYM1 is the inverse of gross physical assets divided by gross total assets and is the industry weighted average reported by Centrale dei Bilanci (1997); the annual indicator is averaged over the period 1990-1995. The industry's share of the total number of registered firms is computed dividing the 1995 number of registered firms of the industry by the total number of registered firms in that year in each local market. The rate of cancellation of firms is given by the ratio between the number of firms canceled and the number of registered firms at the end of the preceding year. Annual data for the period 1996-1998 are averaged over time. The coefficients for the constant terms and indicator variables are not reported. Robust standard errors are reported below coefficients.

| Variables | Dependent Variable: Firm Rate of Birth | | | |
|---|---|---|---|---|
| Fraction of firms in industry j in 1995 | -0.105*** | -0.076*** | -0.105*** | -0.076*** |
| | 0.022 | 0.023 | 0.022 | 0.023 |
| Cancellation rate | - | 0.421*** | - | 0.421*** |
| | - | 0.115 | - | 0.115 |
| DEPINPRO *Asym1 | 33.285*** | 29.785*** | 35.127*** | 30.988*** |
| | 11.539 | 10.519 | 11.860 | 10.789 |
| Abs. Variation DEPINPRO * Asym1 | - | - | -0.535 | -0.349 |
| | - | - | 0.653 | 0.508 |
| Adj. R2 | 0.228 | 0.310 | 0.228 | 0.302 |
| Observations | 1957 | 1957 | 1957 | 1957 |

## Table 5-A

## Bank market power and the rate of birth of firms

The dependent variable is the ratio between the number of newly registered firms and the number of registered firms at the end of the preceding period. Annual data for the period 1996-1998 are averaged over time. The Herfindahl index is calculated for deposits each year and averaged over the period considered. ASYM2 is the inverse of net physical assets divided by net total assets and is the industry weighted average reported by Centrale dei Bilanci (1997); the annual indicator is averaged over the period 1990-1995. The industry's share of the total number of registered firms is computed dividing the 1995 number of registered firms of the industry by the total number of registered firms in that year in each local market. The rate of cancellation of firms is given by the ratio between the number of firms canceled and the number of registered firms at the end of the preceding year. Annual data for the period 1996-1998 are averaged over time. The coefficients for the constant terms and indicator variables are not reported. Robust standard errors are reported below coefficients.

| Variables | Dependent Variable: Firm Rate of Birth | | | |
|---|---|---|---|---|
| Fraction of firms in industry j in 1995 | -0.111*** | -0.083*** | -0.111*** | -0.084*** |
| | 0.022 | 0.023 | 0.022 | 0.022 |
| Cancellation rate | - | 0.420*** | - | 0.417*** |
| | - | 0.116 | - | 0.116 |
| Herfindahl province *Asym2 | 0.352** | 0.238* | 0.521*** | 0.359** |
| | 0.152 | 0.140 | 0.162 | 0.149 |
| Abs. variation Herfindahl * Asym2 | - | - | -1.542*** | -1.106** |
| | - | - | 0.512 | |
| Adj. R2 | 0.227 | 0.307 | 0.229 | 0.308 |
| observations | 1957 | 1957 | 1957 | 1957 |

## Table 5-B

## Bank market power and the rate of birth of firms

The dependent variable is the ratio between the number of newly registered firms and the number of registered firms at the end of the preceding period. Annual data for the period 1996-1998 are averaged over time. The variable DEPINPRO is the share of deposits held by banks chartered in the province. ASYM2 is the inverse of net physical assets divided by net total assets and is the industry weighted average reported by Centrale dei Bilanci (1997); the annual indicator is averaged over the period 1990-1995. The industry's share of the total number of registered firms is computed dividing the 1995 number of registered firms of the industry by the total number of registered firms in that year in each local market. The rate of cancellation of firms is given by the ratio between the number of firms canceled and the number of registered firms at the end of the preceding year. Annual data for the period 1996-1998 are averaged over time. The coefficients for the constant terms and indicator variables are not reported. Robust standard errors are reported below coefficients.

| Variables | Dependent Variable: Firm Rate of Birth | | | |
|---|---|---|---|---|
| Fraction of firms in industry j in 1995 | -0.106*** | -0.076*** | -0.106*** | -0.076*** |
| | 0.022 | 0.022 | 0.022 | 0.022 |
| Cancellation rate | - | 0.421*** | - | 0.421*** |
| | - | 0.115 | - | 0.114 |
| DEPINPRO *Asym2 | 17.182*** | 15.482*** | 18.524*** | 16.365*** |
| | 6.291 | 5.765 | 6.566 | 6.000 |
| Abs. Variation DEPINPRO * Asym2 | - | - | -0.355 | -0.233 |
| | - | - | 0.375 | 0.93 |
| Adj. R2 | 0.229 | 0.310 | 0.229 | 0.310 |
| observations | 1957 | 1957 | 1957 | 1957 |

## Table 6

### Bank market power and the rate of birth of firms: Rating Variable

The dependent variable is the ratio between the number of newly registered firms and the number of registered firms at the end of the preceding period. Annual data for the period 1996-1998 are averaged over time. The Herfindahl index is calculated for deposits each year and averaged over the period considered. RATING is the share in percent of bond issues in each industry for which there is disagreement between the rating assigned by S&P and Moody's. Rating data refer to issues in the US for the period 1983-1993. The industry's share of the total number of registered firms is computed dividing the 1995 number of registered firms of the industry by the total number of registered firms in that year in each local market. The rate of cancellation of firms is given by the ratio between the number of firms canceled and the number of registered firms at the end of the preceding year. Annual data for the period 1996-1998 are averaged over time. The coefficients for the constant terms and indicator (province and industry fixed effects) variables are not reported. Robust standard errors are reported below coefficients. In columns 1-3 the RATING variable is used to construct the interaction terms. In column 4-6 the predicted value of the interaction terms are obtained regressing HERF*ASYM1 on a constant term and on HERF*RATING.

| Variables | Dependent Variable: Firm Rate of Birth | | | | | |
|---|---|---|---|---|---|---|
| | OLS | OLS | OLS | IV | IV | IV |
| Share of firms in industry j in 1995 | -0.112*** | -0.083*** | -0.080*** | -0.112*** | -0.083*** | -0.080*** |
| | 0.022 | 0.022 | 0.023 | 0.022 | 0.022 | 0.023 |
| Cancellation rate | - | 0.421*** | 0.421*** | - | 0.421*** | 0.421*** |
| | - | 0.116 | 0.116 | - | 0.116 | 0.116 |
| Herfindahl * Rating | 0.406** | 0.325* | 0.417** | - | - | - |
| | 0.176 | 0.167 | 0.180 | - | - | - |
| Herfindahl * Asym1 | - | - | - | 5.664** | 4.536* | 5.817** |
| | - | - | - | 2.455 | 2.337 | 2.518 |
| Abs. Var. of Herfindahl * Rating | - | - | -0.828 | - | - | - |
| | | - | 0.662 | - | - | - |
| Abs. Var. of Herfindahl * Asym1 | - | - | - | - | - | -16.075 |
| | - | - | - | - | - | 12.857 |
| Adj. R2 | 0.226 | 0.308 | 0.325 | 0.226 | 0.308 | 0.351 |
| Observations | 1957 | 1957 | 1957 | 1957 | 1957 | 1957 |

## Table 7-A

### Bank market power and the rate of birth of firms: total effect

The dependent variable is the ratio between the number of newly registered firms and the number of registered firms at the end of the preceding period. Annual data for the period 1996-1998 are averaged over time. The Herfindahl index is calculated for deposits each year and averaged over the period considered. ASYM1 is the inverse of gross physical assets divided by gross total assets and is the industry weighted average mean reported by Centrale dei Bilanci (1997); the annual indicator is averaged over the period 1990-1995. The industry's share of the total number of registered firms is computed dividing the 1995 number of registered firms of the industry by the total number of registered firms in that year in each local market. The rate of cancellation of firms is given by the ratio between the number of firms canceled and the number of registered firms at the end of the preceding year. Annual data for the period 1996-1998 are averaged over time. The coefficients for the constant terms and industry fixed effects are not reported. Robust standard errors are reported below coefficients.

| Variables | Dependent Variable: Firm Rate of Birth | | | |
|---|---|---|---|---|
| Fraction of firms in industry j in 1995 | -0.110*** | -0.110*** | -0.074*** | -0.075*** |
| | 0.030 | 0.019 | 0.019 | 0.019 |
| Herfindahl Index of Deposits | 0.109** | 0.087*** | 0.062** | 0.071** |
| | 0.044 | 0.033 | 0.031 | 0.031 |
| Square of Herfindahl Index of Deposits | -0.002*** | -0.002*** | -0.001*** | -0.001*** |
| | 0.0008 | 0.0006 | 0.0005 | 0.0005 |
| Herfindahl Index *Asym1 | - | 0.674** | 0.442 | 0.640** |
| | - | 0.292 | 0.270 | 0.284 |
| Abs. Variation Herfindahl * Asym1 | - | - | - | -1.797** |
| | - | - | - | 0.724 |
| Cancellation rate | - | - | 0.458*** | 0.454*** |
| | - | - | 0.109 | 0.109 |
| Per Capita GDP Growth in 1995 | 0.015 | -0.035 | -0.024 | -0.015 |
| | 0.092 | 0.052 | 0.048 | 0.048 |
| Adj. R2 | 0.255 | 0.144 | 0.247 | 0.248 |
| Observations | 2678 | 1957 | 1957 | 1957 |

## Table 7-B

## Bank market power and the rate of birth of firms: total effect

The dependent variable is the ratio between the number of newly registered firms and the number of registered firms at the end of the preceding period. Annual data for the period 1996-1998 are averaged over time. The variable DEPINPRO is the share of deposits held by banks chartered in the province; annual indicators are averaged over the period considered. ASYM1 is the inverse of gross physical assets divided by gross total assets and is the industry weighted average reported by Centrale dei Bilanci (1997); the annual indicator is averaged over the period 1990-1995. The industry's share of the total number of registered firms is computed dividing the 1995 number of registered firms of the industry by the total number of registered firms in that year in each local market. The rate of cancellation of firms is given by the ratio between the number of firms canceled and the number of registered firms at the end of the preceding year. Annual data for the period 1996-1998 are averaged over time. The coefficients for the constant terms and industry fixed effects are not reported. Robust standard errors are reported below coefficients.

| Variables | Dependent Variable: Firm Rate of Birth | | | |
|---|---|---|---|---|
| Fraction of firms in industry j in 1995 | -0.111*** | -0.102*** | -0.066*** | -0.067*** |
| | 0.030 | 0.019 | 0.019 | 0.019 |
| DEPINPRO | 4.638** | 3.057** | 2.423* | 3.120** |
| | 1.894 | 1.248 | 1.284 | 1.281 |
| Square of DEPINPRO | -7.106*** | -6.675*** | -5.324*** | -6.145*** |
| | 2.519 | 1.382 | 1.413 | 1.408 |
| DEPINPRO*Asym1(inter21) | - | 33.410*** | 29.779*** | 34.089*** |
| | - | 11.953 | 10.970 | 11.078 |
| Abs. Variation of DEPINPRO * Asym1 | - | - | - | -1.242*** |
| | - | - | - | 0.443 |
| Cancellation rate | - | - | 0.457*** | 0.451*** |
| | - | - | 0.107 | 0.107 |
| Per Capita GDP Growth in 1995 | -0.019 | -0.069 | -0.052 | -0.036 |
| | 0.100 | 0.052 | 0.048 | 0.048 |
| Adj. R2 | 0.255 | 0.150 | 0.253 | 0.256 |
| Observations | 2678 | 1957 | 1957 | 1957 |