Deregulation, entry and competition in local banking markets

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ABSTRACT

By applying the empirical entry model first developed by Bresnahan and Reiss (1991) on Census data for the waves 1981 to 2011, we study the evolution of the conditions of entry in Italian local banking markets (i.e. municipalities) under a long-run perspective, in order to capture changes from before to after the removal of branching restrictions that took place at the beginning of 1990s. We do not find evidence of collusive behaviour among local banks; on the contrary, thanks to banking deregulation, competition seems to have increased both with the number of operating banks and during years, even if banks' variable profits have risen with time. This evidence portrays a situation in which banks have tried to face the growing competition by means of the adoption of non-price strategies.

KEYWORDS: Banking industry; Competition; Entry thresholds; Local markets

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1. Introduction

In this study we apply the empirical entry model of Bresnahan and Reiss (1991) to the Italian banking sector in four different years (1981, 1991, 2001, 2011) covering a wide period characterized by noteworthy structural and regulatory changes. The Bresnahan and Reiss model represents an important and consolidated tool for analyzing industries consisting of several geographically independent local markets, hence it is able to accurately portray the Italian banking sector, where banks normally compete at the local level nationwide. Through this empirical approach, it is possible to estimate entry thresholds, i.e. the minimum number of customers needed to open a new bank; therefore, we can assess whether entrants have faced entry barriers during time, and how their entrance has affected market power by incumbent banks as well as local competitive conditions. Another important feature of such methodology is that we do not need any information about banks' prices and costs.

In our opinion, this investigation appears a significant contribution for assessing the impact of deregulation in the Italian banking industry on banks' behaviour. Through the Bresnahan and Reiss methodology, we are able both to identify the yearly market size (in terms of population) that allows a given number of banks to break even, and to gauge how entry thresholds vary during such long time interval. We select a group of towns that can be regarded as geographically separated local markets, hence independent with reference to demand, so that we can evaluate the dynamics of competition among banks operating therein. Actually, in those municipalities all banks have potentially the same incentive and possibility of entry.

Our time span covers two of the three regimes identified by De Bonis et al. (2018) within the Italian banking sector: the highly restrictive regulatory system introduced in the 1930s and remained mostly unchanged until at least the end of 1970s; and the deregulation and liberalization period, beginning in the 1980s. The first regime started with the implementation of the 1936 Banking Law (a legacy of the Great Depression), for which the Bank of Italy had the power of denying the authorization of banks' creation, branch openings, and merger and acquisition (M&A) operations, and the power of revoking the license to undercapitalized banks. There were also restrictions on the areas where banks were allowed to operate. The second regime commenced when the supervisory authority began to favour competition, as a consequence of the choice of the European Economic Community to achieve a more integrated financial system. During the 1980s, barriers to bank competition were progressively eliminated, while in the 1990s a strong liberalization process was

started with the deregulation of branch openings and the transformation of state-owned banks into joint-stock companies. The new 1993 Banking Law was issued in order to reorganize all the previous regulatory changes in the light of a more competitive banking industry, an easier bank creation, and the overcoming of market segmentation (De Bonis et al., 2018).

From the estimation results, we are able to reject any evidence of collusive behaviour among banks for all the considered years, since the per bank entry thresholds gradually increase with the number of operating banks, so that the entry of another bank needs a higher per bank market size in order to achieve long-run profitability. However, such thresholds (hence, the minimum number of residents needed to have another bank in the municipality) remarkably fall from 1981 to 2001, while there is a little increase in 2011, a signal that the introduction of deregulation in the Italian banking sector has made entry in local markets easier. Besides, we find that banks' variable profits are higher in monopolistic markets, generally decreasing in the number of banks (which proves that competition reduces market power) but increasing with time (probably due to the use of non-price strategies aimed at lessening competition), while fixed costs are generally increasing with the number of incumbent banks (an evidence that seems to rule out any hypothesis of contestability in local banking markets).

The analysis is structured as follows. In Section 2 we sketch the evolution of the Italian banking sector, while in Section 3 we illustrate the Bresnahan-Reiss approach to the analysis of entry and competition in local concentrated markets, also reviewing some empirical studies that have made use of this methodology. In Section 4 we describe our empirical model, whose data and estimation technique are presented in Section 5. The econometric results are discussed in Section 6, and some conclusions are provided in Section 7.

2. The evolution of the Italian banking industry

Towards the end of the Eighties of the last century, the Italian banking industry has been characterized by important transformations. On the one side, the structural changes were attributable to factors common to the majority of European countries: the deregulation that occurred at the European level, which determined the elimination of several national barriers and the creation of a common market where banks could open branches without any restraint; the introduction of the Euro currency, which facilitated banks' establishment and business outside their own countries; the technological progress, which helped to reduce costs, increase productivity and lessen geographical barriers.

On the other side, the restructuring of the Italian banking sector has been the result of peculiarities that still produce effects on market structure. Particularly, until the beginning of the 1990s Italian

banks operated in a rather low competitive environment because of a strict regulation from the Bank of Italy on both the birth of new banks and the opening of new branches by the existing ones. These rules went back to the 1936 Banking Law, an aftereffect of the Great Depression of 1929-1933, and were aimed at guaranteeing the soundness and stability of credit intermediaries.

The spirit of the reform of 1936 was to create geographically limited credit markets where operating banks had a sort of exclusive competence. The 1936 Banking Law also introduced the principle of "banking specialization", according to which credit institutions were distinguished, according to the maturity of their liabilities, in short-term banks (less than 18 months) and medium- and long-term banks (over 18 months). In addition, the Law pursued a strong separation between banks and industrial firms. Due to the above regulation principles, competition among banks was rather limited, as it was considered as a source of instability (Siclari, 2015, p. 9).

Some deregulation began to occur in the 1980s, when the Bank of Italy authorized the opening of new branches throughout the country, even if following a "regulated" plan of expansion of banks' networks. The main reason for abandoning the previous tight control of banks' behaviour was linked to some European Directives aiming at creating a single market in which banks should have been free to open branches across States once they had obtained a license in their home country. The Bank of Italy started to establish clear rules for allowing branch openings, getting rid of its longstanding discretionary power: for example, the "branch plans" (Piani sportelli) issued in 1978, 1982, and 1986 were a first example of transparent rules regarding the possibility of opening new offices (De Bonis et al., 2018). Such plans caused the entry of many banks in local markets. Credit institutions were therefore pushed to improve their efficiency. Moreover, in 1985 there was the liberalization of bank creation, which increased bank turnover, and in 1990 the state-owned banks were transformed into joint-stock companies while the prohibition of providing long-term loans for commercial banks was relaxed.

Branching restrictions in Italy were totally removed in 1990, and in 1993 a new Banking Law was approved, which incorporated the Second Coordination Banking Directive and completely reorganized the whole sector. As a consequence of this liberalization, the number of branches quickly increased: in the period 1989-1994 their average yearly growth rate amounted to +7.6%, while in the period 1994-1999 it only somewhat slowed down to +3.9%. This expansion allowed Italy to reach about the median in European rankings of indicators of banking capacity (Ciari and De Bonis, 2011).

In the 2000s, advances in information technology represented further drivers toward a thorough transformation and reorganization of the Italian banking industry, as they forced banks to improve efficiency, cost-effectiveness and innovation (Beccalli and Girardone, 2016). Actually, distribution channels employing new technologies (like internet banking and mobile banking) are today more and

more being used: just as an example, according to Eurostat data, in 2011 the individuals using internet banking in Italy amounted to 20% of population aged 16-74 (it was 9% just five years before, while in 2016 this figure is estimated to have increased to 29%).

Toward the end of 2000s, Italy suffered the global financial crisis and the Eurozone sovereign debt crisis, which were the prime movers of a reduction of the number of banks (especially mutual banks), branches and employees, a drop of banks' margins, and an increase of non-performing loans. The average size of Italian banks increased as well, while their performance was characterized by low margins, rising regulatory costs, poor loan demand and increasing cost of credit (Beccalli and Girardone, 2016).

By means of the empirical entry model proposed by Bresnahan and Reiss (1991), we try to ascertain both the degree and the evolution of competitive conditions in Italy focusing on independent local markets (i.e. municipalities) in the years 1981, 1991, 2001 and 2011, corresponding to the last four Census waves. This aspect represents a novel contribution in the analysis of the Italian banking industry, as it offers a different perspective on the analysis of the effects produced by the significant transformation in its structure that followed both the regulatory interventions and the significant consolidation process. For the purpose, an ordered probit model identifying the probability of observing a given number of banks in each municipality is estimated, whose results allow us to calculate entry thresholds.

Although our analysis covers a wide time interval (thirty years) during which many changes, in terms of clientele characteristics and technology development, have occurred, the main activities of banks remain the gathering of deposits, the making of loans, and the provision of other financial services (the weight of the latter has notably increased in more recent years), for which the geographical proximity is normally regarded a source of utility at least for households and small firms (de Juan, 2008, p. 150), as the wide branch networks of most banks clearly indicate.

Therefore, the banking industry can be still considered as characterized by firms selling fundamentally homogeneous products that they seek to differentiate while competing in the various (local) sub-markets with the primary aim of reducing price rivalry (interest rates, service fees). At the local level, large banks may rely on their size (and the related scale economies) as well as on a solid brand recognition, while small banks may be preferred as long as they are perceived as institutions deeply rooted in the local economic life, hence with particular knowledge of resident people and special attention to their needs. All the above justifies the application of the Bresnahan and Reiss model of entry to the banking sector.

3. The Bresnahan and Reiss model: theoretical background and empirical applications

In their seminal paper, Bresnahan and Reiss (1991) propose a model of entry into small isolated markets with the aim of estimating how quickly entry appears to lower firms' profits. They consider five retail and professional service industries (doctors, dentists, druggists, plumbers, and tire dealers) and use cross-section data on the number of firms in 202 US distinct geographic markets.

They assume that the profits of each of the N firms operating in a given market are

$$\pi_N = V_N \times S - F_N , \tag{1}$$

i.e. they are the product between market size S (assumed as a linear function of population variables) and the per-customer variable profits V_N (i.e. revenues minus variable costs) less fixed costs F_N.

The impact of competition is incorporated by allowing variable profits V_N to be a function of the number of firms, considering that such profits should be lower where more firms operate because of a stronger price competition. This is done by assuming that

$$V_N = \alpha_1 + \boldsymbol{\beta}'\mathbf{X} - \sum_{n=2}^{N} \alpha_n , \tag{2}$$

where the $\alpha_2,...,\alpha_N$ parameters describe how variable profits drop as the number of entrants increases from 2 to N (and $\mathbf{X}$ is a vector of control variables affecting either revenues or variable costs). For example, α_2 quantifies the change of a monopolist's variable profits when another firm enters the market. For the V_N function to make economic sense, $\alpha_2,...,\alpha_N$ should all be higher than or equal to zero, meaning that variable profits do not increase with entry, and their absolute values should decline with more entry (Berry and Reiss, 2007, p. 1857).

Fixed costs F_N, which may include both fixed production costs and fixed entry costs, are specified in a similar way:

$$F_N = \gamma_1 + \boldsymbol{\gamma}'\mathbf{W} + \sum_{n=2}^{N} \gamma_n . \tag{3}$$

In (3), the γ_n terms capture the increase in fixed costs that later entrants should incur, while $\mathbf{W}$ is again a vector of variables that might affect F_N. As an example, in case we observe a positive and significant value of γ_2, we infer that a firm entering a monopoly market has higher fixed costs than the existing firm.

From the above framework, Bresnahan and Reiss (1991) are able to estimate the "entry thresholds" S_N, representing the smallest market size S that is able to accommodate N potential entrants, i.e. the level of overall local demand that allows variable profits just to cover fixed costs of N firms in the

market. From (1), it is evident that, by imposing $\pi_N = 0$, we get $S_N = F_N/V_N$. Since larger markets are expected to support more firms, it is useful to calculate the per-firm thresholds $s_N = S_N/N$, i.e. the fraction of the overall market that allows the N-th firm to stay in the market. Put differently, this figure quantifies how much population is needed to support each incumbent firm, and its value decreases as both variable profits grow and fixed costs drop.

A crucial indicator suggested by Bresnahan and Reiss (1991) to measure the rate at which variable profits fall with entry (hence, to assess how local competition change when the number of firms increases) is the ratio between per-firm entry thresholds s_{N+1}/s_N. When firms have the same costs, and if entry does not change competitive conduct, this ratio equals 1, which is the case of both competitive and collusive markets. For example, if in a market with homogeneous products 2,000 customers are needed to support a single firm, and 4,000 customers to support two firms, the per-firm entry thresholds are 2,000 and the entry-threshold ratio is 1. This outcome is compatible with either the competition case (actually, firms' entry does not change competitive conduct) and the collusion case (since a cartel with N firms requires N times a single monopolist's breakeven level of demand).

Instead, if 2,000 customers are needed to support a single firm, but 10,000 customers are needed to support a second firm (which means that the per-firm entry thresholds are 2,000 and 5,000, respectively, while the entry threshold ratio is 2.5), we might suppose that the first firm is able to hinder the entry of the second competitor, hence it exerts market power and competition is then low. This also means that, if entry threshold ratios fall as the number of incumbents increases, the competitive conditions are improving (which is what we would normally expect).

From the above discussion, it should be evident that this statistic does not measure the level of competition, but how the level changes with the number of firms. In other words, it is important to check what happens after several firms have entered: when the entry threshold ratio converges to one for large values of N, the market can be regarded as competitive (Bresnahan and Reiss, 1991, p. 982-983).

The likelihood to observe N firms in a market is estimated by means of an ordered probit model (assuming that the error term of the profits of the N-th firm has a normal distribution), where the categorical dependent variable is the number of firms operating in each market. The likelihood function is maximized in order to find the estimated probabilities for each category.

Essentially, the structural model by Bresnahan and Reiss (henceforth BR) builds on the strategic representation of a static, perfect information entry game, whose econometric version postulates that we observe the players' equilibrium actions in each sample market ("enter" vs. "stay out") but do not observe firms' economic profits. The logic of their model is to use a specific equilibrium solution concept to work backward from the observed equilibrium actions to statements about unobserved

profits (Reiss and Wolak, 2007, p. 4404). This also implies another advantageous characteristic of the BR model, consisting in the fact that it does not need data on firms' margin and output (which in many circumstances could not be available), given that fixed costs can be inferred by the breakeven condition that is imposed for the calculation of the entry thresholds, while the latter can be used to derive information on the extent of competition and firms' technologies (Bresnahan and Reiss, 1991, p. 983).

The BR paper has represented a significant contribution within the empirical literature on static entry models, especially for its ability to infer competition effects. Examples of studies with application of the BR model (or its variants) include: Asplund and Sandin (1999) on Swedish driving schools; Manuszak (2002) on the American brewing industry in the 19th century; Mazzeo (2002) on US local motels; Dranove et al. (2003) on US Health Maintenance Organizations; Cleeren et al. (2006) on the Belgian video-rental market; Abraham et al. (2007) on the US hospital industry; Schaumans and Verboven (2008) on Belgian pharmacies and physicians; Nishida and Gil (2014) on the Spanish local TV industry; Schaumans and Verboven (2015) on different local service sectors in Belgium; Labaj et al. (2017) on a group of retail and professional service industries in Slovakia.

However, the BR approach has not been frequently used in the banking literature, and the existing applications mainly refer to the US. Cetorelli (2002) employs the BR framework to estimate entry thresholds for a cross-section of 2,257 US local banking markets (particularly, rural counties) with reference to 1999. His estimation of an ordered probit model provides no evidence of collusive behaviour even in markets with only two or three banks in operation, and shows substantial increases in the intensity of competition as the number of banks rises. The conclusion is that, by eliminating important barriers to entry, the process of deregulation in US banking (culminated in 1994 with the passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act) has enhanced the conditions for market competition.

Cohen and Mazzeo (2007) use a variant of the BR methodology in order to assess competition among retail depository institutions in 1,884 US rural banking markets for the years 2000 and 2003. Particularly, their model endogenizes the operating decisions of three types of depository institutions: multimarket banks, single-market banks, and thrift institutions. They find robust evidence that product differentiation is able to deliver additional profits to retail depository institutions. Such gains allow markets to support many more depository institutions (including smaller banks and thrifts, even as larger banks expand their operations) than in a scenario with homogenous competitors.

Feinberg (2008) considers a cross-section of 115 geographically dispersed US rural markets (non-metropolitan labour market areas) for the year 2005 and tries to explain the impact that credit union entry has had on performance in local financial services markets by means of the BR methodology.

The results suggest that credit unions possess little market power, as it emerges a very modest pro-competitive impact of adding credit unions beyond the first in a market, and prove that they can be considered a competitive fringe sub-category of the broader local financial services market.

Feinberg and Reynolds (2010) study the change in the level of competition in 278 US rural banking markets after the deregulation following the Riegle-Neal Act of 1994. By employing the extension of the BR model suggested by Abraham et al. (2007), hence incorporating information on the quantity of deposits, they decompose the impact of the entry of new banks into resulting changes in per capita demand and the costs/profits of local banks in 1994 and 2004, and discover that local banking markets have become more competitive since the mid-1990s.

Outside US, we recall two studies. de Juan (2008) concentrates on the Spanish retail banking sector in 2003 and employs the BR methodology to examine how competitive conditions vary in 1,572 independent local banking markets when the number of depository branches grows. Her empirical evidence shows that the entry of a new branch increases competition on a local level (also through non-price instruments like advertising, location, and promotion), even if local branches seem to have some scope for changing prices that are fixed at the national and regional levels. Assuncao (2013) considers the expansion of Brazilian banking correspondents (non-banking firms that, thanks to an agreement with credit institutions, work as bank branches and provide financial and payment services) in Brazilian municipalities during the period 2002-2007, and finds that they have been able to eliminate the entry barriers for the provision of financial services and thus improve the outreach of the banking network, especially in less populated and more isolated regions.

Our analysis focuses on Italian local banking markets and takes into account four years (1981, 1991, 2001, 2011) in order to investigate the changes of market structure and firm conduct that may have occurred throughout the process of deregulation and consolidation which has characterized an undoubtedly crucial sector for the whole economy. Under this respect, our study has to be regarded as a novel contribution to this strand of literature.

4. Model specification

In our framework, the profits of the *N*-th entrant are assumed to be the following:

$$\pi_N = V_N \times S - F_N = \left(\alpha_1 + \boldsymbol{\beta}' \mathbf{X} - \sum_{n=2}^{N} \alpha_n \right) \times \left(TPOP + \boldsymbol{\lambda}' \mathbf{Y} \right) - \left(\gamma_1 + \gamma_L LAND + \sum_{n=2}^{N} \gamma_n \right), \qquad (4)$$

where $S = TPOP + \boldsymbol{\lambda}'\mathbf{Y}$ is the municipality's market size, $V_N = \alpha_1 + \boldsymbol{\beta}'\mathbf{X} - \sum_{n=2}^{N} \alpha_n$ represents banks' per capita variable profits, and $F_N = \gamma_1 + \gamma_L LAND + \sum_{n=2}^{N} \gamma_n$ denotes banks' fixed costs.

In the function *S*, besides the variable measuring the number of inhabitants (*TPOP*), the following explanatory variables (vector **Y**) are considered:

- the negative growth rate of town population during the last ten years (*NGRW*);
- the positive growth rate of town population during the last ten years (*PGRW*);
- the number of people that commute to work outside the municipality (*OCTY*);
- the population of the nearby municipalities (*NPOP*).

These variables enable us to measure possible effects on the number of banks derived from variations in the demographic characteristics of the town. The variables *NGRW* and *PGRW* capture entrants' asymmetric expectations about future market growth, as well as lags in responses to past growth (i.e. they measure how the banks entering the town expect the population to evolve, and the effects of the lags produced in response to the population decrease in the considered market). Given their characteristics, we are not able to predict the sign of their coefficient for the various years. The commuters travelling out of the municipality for work (*OCTY*) help to take into account the possibility that a portion of local population's demand is addressed to other towns, while the nearby population (*NPOP*), which includes the inhabitants of all municipalities within 10 kilometers, should capture the possible increase in demand coming from the surrounding towns. We therefore expect a negative impact of *OCTY* and a positive impact of *NPOP* on the probability of establishing a new bank. Note that we have set the coefficient of *TPOP* equal to one because V_N contains a constant term; this normalization allows to translate units of market demand into units of current town population (Bresnahan and Reiss, 1991, p. 990).

In the function measuring banks' per capita variable profits (V_N) we include a number of control variables (vector **X**) so as to capture possible differences across markets. Since we do not have municipality-specific economic information for all the years under investigation, we employ Census data for building the following regressors:

- the municipality share of employment in agriculture (*AGR*);
- the number of families per 100 inhabitants (*FAM*);
- the local employment rate (*EMPL*);
- the number of industrial local units per square kilometer (*LOCUN*).

It is likely that territories with higher agricultural vocation attract less banks because of the lower sectoral value added, while municipalities with more families, more employment and more firms

should be characterized by a higher level of demand and thus have a positive impact on the number of local operating banks.

In addition, variable profits per customer V_N include a constant, α_1, plus a set of coefficients α_n (n = 2,...,N) whose expected positive sign represents the fall of variable profits due to the entry of the n-th bank (however, we have opted for not imposing any constraint on the sign of the various α_n's). In our specification it is assumed that they do not vary across markets. Said differently, in V_N the expression $\alpha_1 + \boldsymbol{\beta}'\mathbf{X} = V_1$ represents the per capita variable profits of a monopolist.

Finally, banks' fixed costs are modelled as a function of the physical size of the municipality (*LAND*), and we expect that the coefficient of this variable is negative given that, all else equal, the cost of buying or renting brick-and-mortar spaces for establishing branches should be lower when municipalities spread over a larger area (here measured in square kilometers). Fixed costs F_N again include a constant, γ_1, as well as a set of coefficients γ_n (n = 2,...,N) for which we expect a positive sign as long as they are higher for later entrants, because of either a lower level of efficiency or the presence of entry barriers (like before, no constraint is nonetheless imposed on the sign of γ_n's). This also means that in F_N the expression $\gamma_1 + \gamma_L LAND = F_1$ equals a monopolist's fixed costs.

Table 1 reports our variables and some descriptive statistics on our four samples. Data regarding banks and their territorial distribution come from the Bank of Italy, while all information on population and local economic activity are drawn from the 1981, 1991, 2001 and 2011 editions of both the Population and Housing Census and the Industry and Services Census by Istat (the National Statistical Institute).

INSERT TABLE 1 ABOUT HERE

5. Empirical methodology and data description

As told, in our empirical comparative statics analysis we use four cross sections of Italian geographically concentrated banking markets (one for each Census wave from 1981 to 2011) where banks face different levels of demand for their products/services. We need to carefully select our sample in order to hold constant extraneous differences across markets, hence we have to focus on municipalities that are confidently separated from other towns. In our opinion, a suitable selection criterion is to consider only municipalities that are at least 25 kilometres from the nearest municipalities of 5,000 people or more. In addition, of the above towns we select only those in which the number of banks corresponds with the number of branches (i.e. where all banks have just one

branch), because in this way we are assured that there are no a priori relevant asymmetries between competitors. Finally, we classify the municipalities according to whether they have zero, one, two, three, or four or more banks.

We are left with four samples containing 2,407 towns overall: 600 for the year 1981, 595 for 1991, 607 for 2001 and 605 for 2011. However, 522 municipalities appear in all years, which ensures a good degree of homogeneity between samples. Table 2 shows the town distributions by year and number of banks. It emerges that during time, because of the deregulation, there has been a tendency for banks to enter new markets, so that, for example, the number of isolated municipalities without banks dropped by 30.3% while those with four banks or more increased by 314.3%. Table 3 portrays the geographical distribution of towns within the country, indicating that there is an adequate balance across regions.

INSERT TABLE 2 ABOUT HERE

INSERT TABLE 3 ABOUT HERE

In Table 4 we present the distribution of our sample municipalities by ranges of the local population, which can be seen as a reasonable first approximation of the size of local markets. As it is evident, all samples include a wide variety of market sizes, which reassures us on the possibility of estimating the population required to support one, two, and more banks. Finally, Table 5 reports the yearly distribution of the types of credit institutions operating in the sample towns (classified into commercial, savings, popular, and cooperative banks). Again, we note a satisfactory assortment in all samples, which should rule out any effect due to local credit preferences or peculiarities on market structure.

INSERT TABLE 4 ABOUT HERE

INSERT TABLE 5 ABOUT HERE

Following Bresnahan and Reiss (1991), we assume that all banks within a market have the same unobserved profits, which allows us to make use of an ordered probit to estimate Equation (4). The dependent variable is the number of banks in the market. The likelihood functions for the ordered probits are built by calculating probability statements for each type of market structure.

The probability of observing markets where no banks operate is

$$\Pr(\pi_1 < 0) = \Pr(\overline{\pi}_1 + \varepsilon < 0) = \Pr(\varepsilon < -\overline{\pi}_1) = \Phi(-\overline{\pi}_1) = 1 - \Phi(\overline{\pi}_1),$$

where $\Phi(\cdot)$ is the cumulative normal distribution function and π_1 represents the monopolist's profits. Assuming that $\bar{\pi}_1 \geq \bar{\pi}_2 \geq \bar{\pi}_3 \geq \bar{\pi}_4$, the probability that in equilibrium we observe N = 1,2,3 banks in the market is

$$\Pr(\pi_N \geq 0 \cap \pi_{N+1} < 0) = \Pr(\bar{\pi}_N + \varepsilon \geq 0 \cap \bar{\pi}_{N+1} + \varepsilon < 0) =$$

$$= \Pr(-\bar{\pi}_N \leq \varepsilon < -\bar{\pi}_{N+1}) = \Phi(\bar{\pi}_N) - \Phi(\bar{\pi}_{N+1}),$$

while the residual probability of observing four or more banks in the market is

$$\Pr(\pi_4 \geq 0) = \Pr(\bar{\pi}_4 + \varepsilon \geq 0) = \Pr(\varepsilon \geq -\bar{\pi}_4) = \Phi(\bar{\pi}_4).$$

Hence the log-likelihood function (to be maximized) is the following:

$$\ln L = \sum_{m=1}^{M} 1_{(N=0)} \ln\left[1 - \Phi(\bar{\pi}_1)\right] + \sum_{m=1}^{M} 1_{(N=1)} \ln\left[\Phi(\bar{\pi}_1) - \Phi(\bar{\pi}_2)\right] + \sum_{m=1}^{M} 1_{(N=2)} \ln\left[\Phi(\bar{\pi}_2) - \Phi(\bar{\pi}_3)\right] +$$

$$+ \sum_{m=1}^{M} 1_{(N=3)} \ln\left[\Phi(\bar{\pi}_3) - \Phi(\bar{\pi}_4)\right] + \sum_{m=1}^{M} 1_{(N=4)} \ln\left[\Phi(\bar{\pi}_4)\right],$$

where M is the number of observations (i.e. markets) and $1_{(\cdot)}$ is the indicator function.

6. Econometric results and discussion

The estimation results of our ordered probit regression are shown in Table 6. Regarding the market size variables, the coefficients of both *NGRW* and *PGRW* are seldom significant at least at the 5% level, and exhibit a positive coefficient in 2001 and 1981, respectively. This means that in those years the more positive *PGRW* (and the less negative *NGRW*), the higher the probability that a bank enters a municipality. The variable *OCTY* is negative and significant in three regressions over four (the only exception is 1991), which confirms that people moving out of towns for work reduce local market size. Nearby population (*NPOP*) is never significant, hence there is no evidence that the inhabitants of neighbouring towns are part of municipalities' market.

INSERT TABLE 6 ABOUT HERE

Looking at the regressors affecting specifically banks' variable profits, it emerges that (as expected) bank profitability is higher – therefore, entry is more likely – in municipalities with less agricultural workers (*AGR*), more families (*FAM*) and higher employment rates (*EMPL*). The positive coefficients of the *LOCUN* variable indicate that markets with more industrial local establishments are also more attractive for banks, however they are significant only for 1981 and 1991. Regarding fixed costs, they generally reduce as the physical market (*LAND*) increases in size, implying likely

lower rent or buy prices for land, but this evidence is significant at the 5% level in 1981 and 1991, and at the 10% level in 2011.

In spite of the fact that in Equation (4) we did not impose any constraint on the signs of both α_n's and γ_n's, they are generally positive and often significant, hence we find confirmation that the estimated variable profits of each subsequent entrant bank gradually decline while their fixed costs progressively increase. Moreover, the magnitude of both α_2 and γ_4 is much higher in 2001 and 2011, meaning that in those years the marginal impact of an entry on variable profits in monopolistic markets has been stronger while entrants in triopoly markets have had to face higher fixed costs. We therefore deduce that, after deregulation, competitive forces have notably dropped profits in less concentrated local markets, at the same time forcing incumbent banks to implement non-price competition strategies that have inevitably increased rivals' entry costs. Examples of banks' non-price instruments may include advertising, service charges, personalized loans, extra opening hours, ATM availability, branch size, branch network, development of new products, technological innovations (Scott, 1978; Heffernan, 1992; Pinho, 2000; Kim and Vale, 2001; Dick and Hannan, 2010).

Considering that the generic entry threshold for N banks (i.e. the minimum market size that can allow the presence of N banks) is equal to $S_N = F_N/V_N$, where $F_N = \gamma_1 + \gamma_L LAND + \sum_{n=2}^{N} \gamma_n$, $V_N = \alpha_1 + \boldsymbol{\beta}'\mathbf{X} - \sum_{n=2}^{N} \alpha_n$ and $N = 1,2,3,4$, we can now calculate our S_N's (at the mean value of each regressor) by simply replacing the estimated coefficients of Equation (4). As panel (a) of Table 7 displays, for each of the four years under investigation a common feature is that there is a steadily increasing path in the minimum number of inhabitants required in order to establish an additional bank in local markets, but it can be also observed that those numbers notably drop from 1981 to 1991 and 2001, while in 2011 they slightly increase. For example, in 1981 a monopoly bank required 1,340 people in town to set up business, while in 2001 the same monopoly bank needed less than 400 people (and in 2011 a bit more than 500). Hence, in twenty years the required market size that allows monopolistic banks to break even has fallen by more than two thirds, and a similar trend has characterized a duopoly, a triopoly and a quadropoly. In the latter case, in 1981 four banks could operate in the same municipality on condition that its inhabitants were over 19,400, while in 2001 this figure has dropped to about 4,000 (while it has increased to approximately 4,900 in 2011). On the whole, the continuing decrease of the entry thresholds from 1981 to 2001 indicates that entry has been more and more attractive as banking deregulation has progressively spread its effects.

INSERT TABLE 7 ABOUT HERE

In addition, by looking at the per bank entry thresholds in markets with two, three or four banks (panel (b) of Table 7), we note that in 1981 and (to a lesser extent) 1991 each bank served a growing number of residents, while in 2001 this number was nearly the same (around 1,000 inhabitants). In 2011 the entry thresholds per bank have again shown a slightly increasing trend in markets with two and three banks. However, in markets with two banks each of them has served at least 36% more consumers than those established in local monopolistic markets.

Turning to per bank entry thresholds ratios (i.e. s_{N+1}/s_N), from panel (c) of Table 7 we note that the values s_4/s_3 in 2001 and 2011 are quite close to one, while they amount to 1.25 in 1981 and to 1.16 in 1991. Besides, the ratio s_3/s_2 is also close to unity in 1991 (1.14) and 2001 (1.11). Ratios far from 1 might indicate that the level of competition in a municipality changes when another bank enters the market and/or that this additional bank faces higher barriers to entry. In order to disentangle the above effects, we have used the regression results for calculating banks' per capita variable profits and fixed costs in each local market structure and for each year, which are reported in Table 8.

INSERT TABLE 8 ABOUT HERE

We observe that variable profits (panel (a) of Table 8) are higher in monopolistic markets (especially in 2001 and 2011) and increasing with time (with a maximum in 2001) but generally decreasing in the number of banks, whereas fixed costs (panel (b) of Table 8) are increasing (and broadly comparable during years) as the number of incumbent banks rises.

The drop of variable profits seems to be a clear signal of stronger competition at the local level as a consequence of the growth in the number of competitors, which are not therefore able to exploit substantial market power. However, they show a steady increasing trend for all types of market structure during years, which can be ascribed to the use by banks of instruments other than price, like advertising or product differentiation, that could have been capable of softening competition.[1]

On the other hand, fixed costs that entrants face might be due to sunk costs of entry, which determine an asymmetry between established and entrant banks. In this case, our results do not support the hypothesis of market contestability: a contestable market is characterized by low or absent

[1] This conjecture is supported by an ad-hoc estimation of price elasticities of demand on a sample of 1,370 Italian banks for the period 1977-2013 (21,952 observations). Particularly, we have estimated the equation $\ln Q_{it} = \alpha \ln P_{it} + \lambda_t + \gamma_i$ (with Q = total loans and P = ratio between interest revenues and loans, while λ_t and γ_i are time and bank fixed effects, respectively). The parameter α represents the price elasticity of demand, whose absolute value drops from 0.68 in the period 1977-1986 (i.e. around the year 1981) to 0.56 in the period 1987-1996 and to 0.32 in the years 1997-2006. We interpret this pattern as a signal of reduced price competition. However, in the period 2007-2013 the absolute value of the price elasticity of demand rises to 0.53, an evidence that fits with the generalized decrease of V_N that we observe in 2011.

barriers to entry and exit, which means that there should not be sunk costs, so that potential competition is able to make a market perfectly competitive regardless of the level of concentration.

In order to inspect possible changes due to banking deregulation, we perform chi-squared tests in which the null hypothesis is that the estimated levels of V_i and F_i are the same across years. Since we estimate a single model for each year, we simply test whether the value of V_i's and F_i's of one year is equal to the estimated value of the following years. Table 9 reports the results of these tests.

INSERT TABLE 9 ABOUT HERE

Regarding the per capita variable profits (panel (a) of Table 9), for V_1 we detect a significant increase between the periods 1981-1991 and 2001-2011, which seems to confirm that monopolistic banks have remarkably succeeded in responding to enhanced competition through other non-price instruments. No particular difference emerges for V_2, V_3 and V_4, except for 1981 vs. 2001 (i.e. the most regulated year vs. the most competitively lively year). So as to fixed costs (panel (b) of Table 9), F_1 (characterizing monopolistic markets) is significantly lower in 2001 compared to all other years, an evidence which is consistent with a fall of sunk entrance costs due to the strong competition of that period following the deregulation wave, while F_2 shows a significant drop from 1981-1991 to 2001-2011, which we again ascribe to the enhanced competition that has been able to cut entry costs. Finally, in triopoly markets fixed costs are lower in 1981 and especially 2011, while in quadropoly markets they are broadly comparable (excluding 1991, which displays an outstanding peak).

7. Conclusions

In this paper, we have investigated the evolution of the conditions of entry in Italian local banking markets under a long-run perspective (1981-2011), in order to capture changes from before to after the removal of branching restrictions. The focus on the Italian case seemed particularly appropriate because, due to the regulatory framework introduced in the 1930s, Italian local markets were remarkably segmented and insulated, hence competitive forces could have significantly operated after the deregulation that took place at the beginning of 1990s, when the adoption of the First and the Second Coordination Banking Directives permitted European banks to freely open branches both in their own national market and in all member States, also starting a privatization wave in many countries.

In Italy, the elimination of administrative barriers to branching caused banks to increase their networks through both an expansion in their own markets and the entrance in new markets. Particularly in the latter case, entry after deregulation should have been more rewarding (profit

margins of banks operating therein were probably high) and hence should have attracted many competitors. Nonetheless, incumbent banks could have counted on a relevant (and long-lasting) market power that might have translated into significant entry barriers (especially those linked to informational asymmetries, which normally give rise to adverse selection and moral hazard). The final effect on local market structure and entry is therefore unpredictable.

All the above makes clear that studying Italian banks' growth strategies represents a noticeable research topic, especially because it could shed light on the identification and quantification of barriers to entry that might have survived after deregulation and that are known to be pervasive in the banking industry (Vives, 2001; Ciari and De Bonis, 2011). For the purpose, we have adopted the empirical model of entry by Bresnahan and Reiss (1991), which allows to estimate demand entry thresholds, i.e. a measure of the market size required to support a given number of firms, in situations where it is not possible to observe incumbents' or entrants' price-cost margins. This is done by simply relating shifts in market demand to changes in the equilibrium number of firms (Bresnahan and Reiss, 1991, pp. 978-979). We have also focused on the ratio between entry thresholds, in order to evaluate whether the level of competition has changed with the number of operating banks. Actually, when this ratio approaches one as the number of competitor increases, an entrant bank needs to serve just the same number of consumers as the incumbent banks, meaning that we are close to a nearly competitive market.

Our results do not foreshadow any collusive behaviour among local banks. Actually, municipalities with two banks seem already adequately competitive. For 1981 we have also discovered a continuous increase in per bank entry thresholds, which means that, as new banks progressively accessed local markets, their entry increased competition more and more. For that year, our empirical results suggest that the per bank entry threshold needed to accommodate a fourth bank was about twice as large as that needed for a duopolist, while for the remaining years the same ratio shows an increase ranging between 8 percent (in 2001) and 32 percent (in 1991). Therefore, we deduce that, as the number of competing banks has increased, Italian local banking markets (i.e. municipalities) have always rapidly reached a relatively high degree of competition in recent years, while before the full liberalization of banking markets more competitors were required in the market to move towards an adequate competitive environment.

In addition, we have found that estimated variable profits decrease as the number of incumbent banks rises, but their level has increased during years: this evidence could indicate that competition has succeeded in lowering banks' market power and that at the same time credit institutions have tried to reduce competition by means of non-price strategies (like product differentiation or advertising).

Finally, as we have discovered that more banks in the market imply higher fixed costs, there is no evidence that local banking markets in Italy are contestable.

Overall, we can conclude that, thanks to the removal of significant barriers to entry, banking deregulation in Italy has succeeded in favouring enhanced competition among banks.

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Table 1 – Sample descriptive statistics

	Year 1981				Year 1991			
Variable	***Mean***	***Std. Dev.***	***Min***	***Max***	***Mean***	***Std. Dev.***	***Min***	***Max***
BANKS	0.5450	0.8098	0	6	0.6420	0.8978	0	5
TPOP	1.7152	2.4983	0.08	31.96	1.6964	2.2673	0.07	30.79
NGRW	-10.1598	9.0468	-43.98	0	-8.2993	7.7892	-36.55	0
PGRW	1.4809	4.2948	0	29.90	1.0146	3.1038	0	23.62
OCTY	0.0888	0.1253	0.00	1.89	0.1376	0.1446	0.00	1.49
NPOP	3.2594	3.2903	0	15.71	3.1634	3.2846	0	15.77
AGR	24.0340	17.0161	0	90.97	16.8343	12.8479	0	80.00
FAM	36.2355	5.6075	18.01	56.25	40.8102	6.9667	21.56	72.46
EMPL	38.9244	8.6285	15.11	74.16	37.7404	8.6172	11.66	70.66
LOCUN	3.7658	31.6180	0.03	766.67	4.1975	39.7731	0.05	963.21
LAND	57.8329	55.9224	0.15	525.08	58.5518	54.1011	0.15	525.78
N. obs.	600				595			

	Year 2001				Year 2011			
Variable	***Mean***	***Std. Dev.***	***Min***	***Max***	***Mean***	***Std. Dev.***	***Min***	***Max***
BANKS	0.9671	1.1499	0	8	0.9769	1.2446	0	8
TPOP	1.5011	1.8336	0.06	18.57	1.4184	1.7549	0.05	17.91
NGRW	-8.3370	7.7270	-37.31	0	-8.7401	7.5602	-34.29	0
PGRW	1.3388	3.7059	0	28.37	1.8413	5.1002	0	61.61
OCTY	0.1457	0.1482	0.00	1.09	0.1682	0.1749	0.00	1.30
NPOP	3.0882	3.2908	0	16.57	3.0143	3.3647	0	17.91
AGR	12.3261	9.9872	0	67.19	11.4159	8.8111	0	52.50
FAM	44.5838	7.4618	25.79	79.51	48.1848	7.2617	29.89	83.00
EMPL	39.1528	8.7674	16.24	66.15	41.8893	8.2235	19.52	64.49
LOCUN	3.9829	40.7525	0.05	996.66	4.6779	47.2865	0.05	1150.50
LAND	55.5510	48.6746	0.15	282.53	54.9441	47.3297	0.15	282.53
N. obs.	607				605			

Variable	**Description**	**Source**
BANKS	Banks in the municipality (units)	Bank of Italy
TPOP	Town population (thousand units)	Istat
NGRW	Negative growth of town population (percentage)	Own calculations on Istat data
PGRW	Positive growth of town population (percentage)	Own calculations on Istat data
OCTY	Commuters out of the town for work (thousands units)	Istat
NPOP	Nearby population (thousands units)	Istat
AGR	Workers in the agricultural sector / Total workers (percentage)	Istat
FAM	Families per 100 inhabitants (units)	Istat
EMPL	Employment rate (percentage)	Istat
LOCUN	Local units of enterprises per square kilometer (units)	Own calculations on Istat data
LAND	Physical size of the municipality (square kilometers)	Istat

Table 2 – Municipalities by incumbent banks and year

	Year				
Banks	***1981***	***1991***	***2001***	***2011***	***Total***
0	357	332	232	249	*1,170*
1	185	182	260	237	*864*
2	41	54	67	65	*227*
3	10	19	21	25	*75*
4+	7	8	27	29	*71*
Total	*600*	*595*	*607*	*605*	*2,407*

Table 3 – Municipalities by incumbent banks and geographical area (whole sample)

	Geographical area					
Banks	***North-West***	***North-East***	***Center***	***South***	***Islands***	***Total***
0	476	176	65	257	196	*1,170*
1	160	263	86	139	216	*864*
2	64	71	27	35	30	*227*
3	17	23	15	14	6	*75*
4+	19	29	7	10	6	*71*
Total	*736*	*562*	*200*	*455*	*454*	*2,407*

Table 4 – Municipalities by population and year

	Year				
Population	***1981***	***1991***	***2001***	***2011***	***Total***
Up to 500	156	159	191	184	*690*
501 - 1,000	126	129	135	148	*538*
1,001 - 1,500	103	98	93	104	*398*
1,501 - 2,000	60	51	49	41	*201*
2,001 - 2,500	38	35	36	38	*147*
2,501 - 3,000	22	26	26	20	*94*
3,001 - 3,500	29	30	18	18	*95*
3,501 - 4,000	17	15	16	14	*62*
More than 4,000	49	52	43	38	*182*
Total	*600*	*595*	*607*	*605*	*2,407*

Table 5 – Sample banks by type and year

	Type of bank				
Year	***Commercial banks***	***Savings banks***	***Popular banks***	***Cooperative banks***	***Total***
1981	110	108	45	64	*327*
1991	123	111	67	81	*382*
2001	276	116	102	93	*587*
2011	277	89	120	105	*591*
Total	*786*	*424*	*334*	*343*	*1,887*

Table 6 – Ordered probit regressions results

	Year 1981			Year 1991			Year 2001			Year 2011		
	Coef.	***z***		***Coef.***	***z***		***Coef.***	***z***		***Coef.***	***z***	
Market variables (λ's)												
NGRW	0.0027	0.38		0.0119	1.52		0.0173	3.60	***	0.0034	0.68	
PGRW	0.0330	2.26	**	0.0063	0.43		-0.0123	-1.73	*	-0.0043	-0.92	
OCTY	-1.8189	-2.88	***	-0.9771	-1.62		-1.6159	-4.61	***	-1.2837	-5.16	***
NPOP	0.0052	0.32		0.0173	1.13		-0.0024	-0.23		0.0028	0.30	
Per capita variable profits variables (β's)												
AGR	-0.0074	-4.01	***	-0.0083	-3.49	***	-0.0129	-3.09	***	-0.0246	-4.98	***
FAM	0.0510	7.12	***	0.0419	6.23	***	0.0455	5.39	***	0.0211	2.48	**
EMPL	0.0362	8.08	***	0.0238	6.12	***	0.0432	7.04	***	0.0427	6.34	***
LOCUN	0.0038	2.46	**	0.0044	3.26	***	0.0021	1.47		0.0014	1.39	
Per capita variable profits parameters (α's)												
α_1	-2.1807	-7.18	***	-1.4345	-5.34	***	-1.4207	-3.52	***	-0.3680	-0.79	
α_2	0.3319	3.84	***	0.2011	2.17	**	0.9664	5.56	***	1.1017	6.31	***
α_3	0.3148	3.71	***	0.2272	2.85	***	0.1263	1.36		0.3408	3.36	***
α_4	0.0658	0.57		0.1213	1.18		0.0706	0.83		-0.0912	-1.25	
Fixed costs parameters (γ's)												
γ_1	1.5191	9.07	***	1.4524	9.19	***	0.7963	4.57	***	1.3034	7.13	***
γ_2	1.3599	7.30	***	1.4824	7.89	***	1.4303	8.46	***	1.0209	5.76	***
γ_3	0.4916	1.80	*	0.6882	2.58	***	1.0782	4.78	***	0.6010	3.19	***
γ_4	0.7864	1.37		0.8434	1.63		0.6691	2.22	**	1.1632	3.70	***
Fixed costs variable (γ_L)												
LAND	-0.0052	-3.74	***	-0.0038	-2.84	***	-0.0005	-0.34		-0.0025	-1.71	*
N. obs.	600			595			607			605		
Log likelihood	-379.24			-398.05			-436.37			-452.17		

***, **, * denote 1%, 5% and 10% significance levels, respectively.

Table 7 – Estimated entry thresholds

(a) Entry thresholds (thousand people)

Year	S_1	S_2	S_3	S_4
1981	1.340	4.455	11.620	19.429
1991	1.169	3.184	5.443	8.428
2001	0.358	1.861	3.105	4.007
2011	0.539	2.064	3.881	4.881

(b) Per firm entry thresholds (thousand people)

Year	s_1	s_2	s_3	s_4
1981	1.340	2.228	3.873	4.857
1991	1.169	1.592	1.814	2.107
2001	0.358	0.930	1.035	1.002
2011	0.539	1.032	1.294	1.220

(c) Entry threshold ratios

Year	s_2/s_1	s_3/s_2	s_4/s_3
1981	1.663	1.739	1.254
1991	1.362	1.140	1.161
2001	2.600	1.112	0.968
2011	1.915	1.254	0.943

Table 8 – Estimated fixed costs and per capita variable profits

(a) Per capita variable profits

Year	V_1	V_2	V_3	V_4
1981	0.911	0.579	0.264	0.199
1991	1.053	0.852	0.625	0.504
2001	2.148	1.182	1.055	0.985
2011	2.160	1.059	0.718	0.809

(b) Fixed costs

Year	F_1	F_2	F_3	F_4
1981	1.221	2.581	3.072	3.859
1991	1.231	2.713	3.401	4.245
2001	0.769	2.199	3.277	3.946
2011	1.164	2.185	2.786	3.949

Table 9 – Testing the equality of fixed costs and per capita variable profits across years

(a) Per capita variable profits (chi-square values)

	V_1			V_2			V_3			V_4		
Year	*1981*	*1991*	*2001*	*1981*	*1991*	*2001*	*1981*	*1991*	*2001*	*1981*	*1991*	*2001*
1991	0.17	-	-	0.65	-	-	1.13	-	-	0.81	-	-
2001	13.29[a]	11.95[a]	-	3.16[c]	1.08	-	5.43[b]	1.84	-	5.37[b]	2.31	-
2011	13.55[a]	12.21[a]	0.00	2.00	0.43	0.08	1.79	0.09	0.58	3.24[c]	0.93	0.16

[a], [b], [c] denote 1%, 5% and 10% significance levels, respectively.

(b) Fixed costs (chi-square values)

	F_1			F_2			F_3			F_4		
Year	*1981*	*1991*	*2001*	*1981*	*1991*	*2001*	*1981*	*1991*	*2001*	*1981*	*1991*	*2001*
1991	0.02	-	-	2.76[c]	-	-	16.98[a]	-	-	23.45[a]	-	-
2001	32.03[a]	35.03[a]	-	22.86[a]	43.44[a]	-	6.59[b]	2.54	-	1.20	14.67[a]	-
2011	0.50	0.73	24.47[a]	24.57[a]	45.83[a]	0.03	12.86[a]	62.22[a]	37.84[a]	1.28	14.37[a]	0.00

[a], [b], [c] denote 1%, 5% and 10% significance levels, respectively.