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Dipartimenti e Istituti di Scienze Economiche

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IEF0076 - february - 2008

UNIVERSITA' CATTOLICA DEL SACRO CUORE
- Milano -

QUADERNI DELL'ISTITUTO DI ECONOMIA E FINANZA

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n. 76 - febbraio 2008

Quaderni dell'Istituto di Economia e Finanza
numero 76 febbraio 2008

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Redazione

Istituto di Economia e Finanza
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Largo Gemelli 1
20123 Milano
tel.: 0039.02.7234.2976
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* Esemplare fuori commercio per il deposito legale agli effetti della Legge n. 106 del 15 aprile 2004.

* La Redazione ottempera agli obblighi previsti dalla Legge n. 106 del 15.04.2006, Decreto del Presidente della Repubblica del 03.05.2006 n. 252 pubblicato nella G.U. del 18.08.2006 n. 191.

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L'accesso alla collana è approvato dal Comitato Scientifico, sentito il parere di un referee.

The Role of the Local Business Environment in Banking Consolidation*

Luca Colombo† Gilberto Turati‡

October 15, 2007

Abstract

We study whether local economic conditions in different areas have an impact on the magnitude and direction of the concentration process of a banking industry. By using probit and count data (ZIP) models to study the consolidation of the Italian banking sector in the second half of the 1990s, we document a significant direct impact of the local 'business environment' on the concentration of the industry at the regional level. This effect complements the well known indirect effect of macroeconomic characteristics on the profitability and efficiency of banks. We also show that institutional and organizational variables affect the likelihood and number of M&A deals, and help explaining differences in performance. Our results appear to be robust to different specifications, and to a number of robustness checks, including alternative sets of variables defining local 'business environment conditions'.

Keywords: Banking M&As, local business environment, profitability, efficiency, credit policies, count data models.

JEL codes: G21, G34, L16

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*Earlier versions of this paper have been presented at the 59th IIPF Congress (Prague, 2004), the XII International "Tor Vergata" Conference on Banking and Finance (Rome, 2004), the XVI SIEP Conference (Pavia, 2004), and the 45th EARIE Conference (Porto, 2005). We are grateful to the audiences at these conferences, and to Fabio Bagliano, Angelo Baglioni, Michele Grillo, Giovanna Nicodano, Mario Pagliero, Massimiliano Piacenza and Alessandro Sembenelli for their helpful comments on previous versions of the paper. We also thank Maria Serena Caroppo, Miriam Perego and Susanna Riva for research assistance. The usual disclaimers apply.

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1 Introduction

In recent decades, the banking industries of many countries have undergone an unprecedented process of consolidation through M&As. As a consequence, a reduction in the total number of banks and an increase in their average size has been observed almost everywhere, starting in the Eighties in the USA and in the Nineties in most western European countries. An important question in studying industry consolidation is the impact of *local economic* conditions (i.e. the *business environment*) on the 'direction' of the M&As process. This issue seems particularly relevant when addressing banking consolidation, given the observed patterns of M&As and the significant links between the real and the financial sectors of the economy.

The available empirical evidence suggests that differences in economic and social conditions have influenced the wave of 'cross-border' M&As occurred in recent years, which in turn had a profound influence on the characteristics of several banking markets, such as those of many Central-Eastern European and Latin American countries. For instance, Gros (2004) reports that, in 2001, the share of foreign banks (from richer Western countries) in Central-Eastern European markets accounted for more than half of deposits, up to two-thirds in some of the larger countries (such as Poland, Hungary, Czech Republic). Along the same lines, focusing on a sample of East European and Baltic countries, Naaborg *et al.* (2003) show that, in 2000, foreign banks assets have been on average 64.4% of total banks assets (starting from 7.5% in 1994). In Estonia foreign banks assets represented 97% of the total (from 2% in 1995). The same ratio was 87% in Croatia (from 1% in 1996), 69% in Poland (from 3% in 1994), and 67% in Hungary (from 14% in 1994). As for Latin American banking markets, De Haas and van Lelyveld (2002) report that, in 1999, 36% of total loans in Brazil were originated by foreign banks from economically more advanced countries (like U.S. or Europe). This percentage was of 58% in Argentina.

The traditional view maintains that GDP (a standard proxy for local economic and social conditions) has mainly an *indirect* effect on banking consolidation through its impact on banks' profitability. Banks' choices on where to expand their activity are obviously guided by profit opportunities. The latter have been shown to be greater the higher the expected rate of economic growth and the lower the efficiency of the banking system (see, for instance, Focarelli and Pozzolo, 2005, focusing on patterns of expansion in foreign banking markets). At the same time, banks in richer areas tend to be more profitable and better performing (see, e.g., Goddard *et al.*, 2004a), and for this reason have more resources and a higher propensity to acquire other credit institutions (see, e.g., Focarelli *et al.*, 2002, focusing on the Italian case, or Berger *et al.*, 1999, for a survey).

A more interesting question, however, is to understand what are the incentives for a bank to acquire a competitor or, in other words, what are the determinants that are more likely to influence the probability that a bank takes an active

part in a M&A. In addressing this question, the banking literature has focused almost exclusively on the relevance of financial variables at the bank level, arguing that banking consolidation is essentially driven by the potential efficiency gains achievable through consolidation, both via the realization of scale and scope economies, and via the expected improvements in profitability and the internal efficiency of acquired banks (see, e.g., Focarelli *et al.*, 2002). Instead, we argue that the GDP, and more generally the 'quality' of the local economic and business environment have an important *direct* effect on the probability to observe a bank acquiring a competitor, complementing that of bank level variables such as profitability and efficiency. In a theoretical perspective, there are at least two reasons why macroeconomic conditions may exert a direct influence on the consolidation of the banking industry. The first builds on the empirical link between GDP and the size of non-financial firms, and on the relationship between the size of non-financial firms and that of banks. Indeed, the empirical literature has highlighted the existence of a strong *ceteris paribus* relationship between the size of a bank and that of the non-financial firms with which it trades (see, e.g., Peek and Rosengren, 1998), as well as a strong direct relationship between firm size and GDP (Kumar *et al.,* 1999, and Beck *et al.,* 2005). The second reason relates to the role of investment programs as strategic complements among rival and competing banks. Strategic complementarity strengthens the 'size' effect just discussed: to the extent to which local non-financial firms *and* competing banks in a given area are getting larger, it becomes more likely that a bank will decide to acquire a competitor to preserve or enlarge its market share.[1] Although, to the best of our knowledge, there are no results specifically focusing on the banking sector, strategic complementarity in investment has been detected in a variety of industry (e.g., Stenbacka and Tombak, 2003).

In this paper, we test for the existence of a direct impact of macroeconomic conditions on banking consolidation by means of an econometric exercise that investigates the concentration process of the Italian banking industry at the regional level in the second half of the Nineties. The Italian case provides an ideal laboratory to develop the analysis, given the marked differences in local economic conditions between the different regions of the country (with a North relatively wealthy, and a less developed South). However, the scope of the exercise stretches far beyond the Italian case on which we focus in the present paper, extending in principle to many instances of banking consolidation at the cross-country level. The evidence reported above concerning the rapidly increasing market shares of Western European banks in Central-Eastern European banking markets over the past few years, and a similar pattern in many Latin American markets, stand as two important case studies.

[1] Such a view is consistent with that of horizontal mergers having a 'preemptive' nature (i.e. mergers preventing the possibility of a partner merging with a rival), highlighted, for example, by Fridolfsson and Stennek (2005).

Our econometric exercise is based on a dataset containing information at the regional level on all the M&As observed in the Italian banking industry in the second half of the Nineties, plus variables proxying for the local business environment, banks' profitability and efficiency, and the institutional structure of the local banking markets. We first study the probability to observe an active bank (defined as a bank acquiring, or proposing a merger with, another bank) in the consolidation process using standard probit models, and then we investigate the determinants of the number of active banks involved in M&As by means of count data models. Our main finding is that per-capita GDP – a primary indicator of the local business environment in a given area – has a significant influence on the observed M&As process. As GDP may have a direct influence on bank level variables such as profitability and efficiency, we also conduct several robustness checks by considering other variables, often used in the empirical literature as indicators of the local business environment (such as indices of social participation and violent crimes), and at the same time unlikely to be directly correlated with other banking variables. Overall, our results remain strongly consistent with the view that local macroeconomic conditions have a direct impact on the observed M&As, above and beyond their indirect effect on banks' profits and efficiency. Furthermore, our results are not affected by the marked North-South divide, as they hold true even dropping Southern Regions from the sample.

The paper is structured as follows. In Section 2 we present our data and empirical methodology. In Section 3 we illustrate and discuss our main results. Section 4 concludes and briefly outlines avenues for future research.

2 Modeling strategy

In the last two decades, the ownership and executive management of several banks in the South of Italy have been taken over by banks headquartered in the North of the country. According to the Bank of Italy, during the Nineties the number of banks headquartered in the South reduced by more than one half, from 100 to 48; out of these 48 banks, 26 were owned by credit institutions located in the central-northern regions of the country.[2] A simple descriptive exercise based on the data we use in our empirical analysis (more on the point below) further reinforces this observation, revealing that most of the active banks are located in the Northern regions, while targets seem to be more uniformly distributed throughout the country (see Table 1). This scattered evidence, paired with the widespread and persistent differences in development and economic conditions of the different Italian regions (with the South lying far behind the North; e.g., Guiso *et al.*, 2004a and 2004b), suffices to reveal the likely importance of macroeconomic variables

[2]See, e.g., Panetta (2003). Notice also that, in its latest annual reports, the Bank of Italy estimated that approximately 70% of the loans originated in the South are from banks headquartered in Northern regions.

in affecting the size and direction of the concentration process, and to build the case for a careful investigation of the links between banking consolidation and macroeconomic conditions. The Italian case provides, indeed, for an ideal setting to such an investigation.

The methodology. Our empirical analysis aims at assessing whether there exists a *direct* impact of local macroeconomic conditions (and especially GDP) on the characteristics and pattern of M&As occurred in the Italian banking industry during the second half of the Nineties, over and above the *indirect* effects of macroeconomic variables on banks' profitability and performance.

One way to disentangle the direct effect of macroeconomic variables from their indirect effect passing through banks' profitability would be by means of a bank-level analysis, conceived to shed light on whether two otherwise similar banks located in regions with different economic characteristics have different propensities to acquire a competitor. However, an analysis at the bank level would suffer from an identification problem of the relevant impacts. As suggested by Fridolfsson and Stennek (2005), M&As necessarily determine a change in market conditions, influencing on the one hand the performance of the banks involved in the operations and, on the other hand, the performance of their competitors in the market. In order to measure the joint relevance of these two effects, we follow a different approach – based on variables measured at the *regional* level – which allows us to solve the identification problem indicated above. Averaging performance measures at the regional level amounts to internalize (by definition) the external effect of M&As on *all* competitors. In other words, we compare two otherwise similar regional banking industries to understand whether differences in the local economic and business environment are able to generate a different number of M&As.

The general (structural) model to be tested can be written as:

$$\begin{array}{c} AB_r = f_1(\mathbf{X}_{1r}, \mathbf{X}_{2r}, \mathbf{Z}_r) + \epsilon_1 \\ \mathbf{X}_{1r} = f_2(\Omega_i, \underline{\mathbf{X}}_{2r}) + \epsilon_2 \end{array} \tag{1}$$

where AB denotes the number of acquiring banks involved in M&As in region r, $\mathbf{X}_1$ is a vector of variables describing the (average) profitability and efficiency of regional banks, $\mathbf{X}_2$ are proxies for the local business environment and $\underline{\mathbf{X}}_2 \subset \mathbf{X}_2$ is a subset of such variables that are more likely to directly affect aggregate banks' profitability and efficiency, $\mathbf{Z}$ is a vector of controls accounting for the specific features of the regional banking industry, Ω_i are banks' specific variables influencing both profitability and efficiency, ϵ_1 and ϵ_2 are disturbance terms. Our empirical analysis focuses on the first equation that can be interpreted as a reduced form model allowing us to investigate the *direct* and *indirect* impact of local 'macroeconomic' variables on the restructuring process of the banking industry.

The choice of the relevant variables. The analysis of the reduced form model

(1) requires to identify three distinct groups of variables that are likely to be important determinants of the consolidation of the banking industry: (a) the variables proxying for banks' profitability and efficiency at the local level ($\mathbf{X}_1$); (b) those accounting for the local macroeconomic conditions ($\mathbf{X}_2$); (c) and, finally, those controlling for the institutional structure of the local banking markets, both in terms of the number and of the 'types' (e.g., cooperative and stock-owned) of producers ($\mathbf{Z}$). For all groups of variables, we follow the Italian Antitrust Authority focusing on regional data, consistently with the view that regions constitute the relevant geographic dimension in banking, at least for the loans market. To simplify notation, we denote with $\mathbf{X}$ the vector obtained as the union of the three sets of variables indicated above, a precise definition of which will be introduced in Section 3.1. We further specify year and quarter dummies, together with three macro-area dummies (North, Centre, South and Islands) to provide a rough control for fixed effects of time and geographical location.

The choice of the econometric models. We first study the determinants of the *probability* to observe an acquiring bank; second, we investigate the factors affecting the *number* of acquiring banks. As for the probability to observe an active bank (AB), we consider a standard probit model

$$\Pr(AB_{it} > 0) = \Phi\left[ka_{it}\left(\boldsymbol{\beta}'\mathbf{X}_{it} + \boldsymbol{\gamma}'\mathbf{Y}_{it} + \boldsymbol{\delta}'\mathbf{Q}_{it} + \boldsymbol{\lambda}'\mathbf{R}_{it}\right)\right], \tag{2}$$

where $i = 1, \ldots, 20$ is an index for regions, $t = 1, \ldots, 24$ is an index for quarters, the dependent variable AB is a dummy variable assuming value one when at least one acquiring bank in region i at time t is observed and zero otherwise, $ka = 2AB - 1$, $\mathbf{X}$ is the vector of territorial determinants, and $\mathbf{Y}$, $\mathbf{Q}$, and $\mathbf{R}$ denote year, quarter, and regional dummies respectively. The estimates of Equation (2), by controlling for the bank-level determinants of banking consolidation, provide a first test of the direct effect of macroeconomic variables on the M&As wave.

As a second step in the empirical specification of the problem — knowing that in some regions (e.g., Valle d'Aosta, the smallest Italian region) there have been no M&As, and that the vast majority of acquiring banks have been concentrated in a relatively small subset of regions — we further refine our analysis by means of count data models aimed at explaining the *number* of acquiring banks observed in a given region; an approach that, to the best of our knowledge, has not previously been applied to study M&As in the banking industry. The theoretical econometric literature has proposed different classes of count data models. Given the presence of overdispersion in the data (as we will discuss more precisely in Section 3.1), we restrict our attention to three such models, that are often used in applications (see Cameron and Trivedi, 1998): the Zero Inflated Poisson model (ZIP), the Hurdle model (HP), and the Negative Binomial model (NB). In order to choose the best performing one, we compare the three models by means of the Akaike Information Criterion (AIC). Furthermore, we compute the Vuong statistics to evaluate the choice of a model that accounts for overdispersion.

The ZIP model. Following the AIC, we will show that the ZIP model — i.e., a sequential model in which a regime choice model is combined with a count data model — is the most adequate of the three given the information contained in our sample. It is therefore worth discussing its characteristics in some more details. The regime choice model splits observations between two alternative groups, one in which the phenomenon cannot be observed and one in which it can be observed and the outcome is an integer number, ranging from zero to n. Given the choice of the latter regime, the count data model explains the number of occurrences by means of a Poisson distribution. Formally, a zero outcome can be the result of one of two alternative regimes indexed by z: one in which the outcome is always zero ($z = 0$), and one in which the outcome $AB = 0$ obtains as a random draw from a Poisson distribution ($z = 1$). In the former case, the outcome zero describes a structural phenomenon; in the latter, it is a result of the sampling distribution**.** The probability of regime $z = 0$ to occur is modeled as a standard probit. Given regime $z = 1$, the probability of $AB_{it} = n$ follows a Poisson distribution with parameter λ. The general model can thus be written as:

$$\Pr[z_{it} = 0] = f(\mathbf{w}, \boldsymbol{\gamma}) \tag{3}$$

$$\Pr[AB_{it} = n > 0 | z_{it} = 1] = \frac{e^{-\lambda_{it}} \lambda_{it}^{n}}{n!} \tag{4}$$

where the splitting model (Equation 3) is defined by the set of covariates $\mathbf{w}$ and the vector of parameters $\boldsymbol{\gamma}$. The parameter λ characterizing the Poisson regression (Equation 4) is a linear combination of a vector of regressors $\mathbf{x}$ (including time and macro area fixed effects), and parameters $\boldsymbol{\beta}$ to be estimated. Note that the variables in $\mathbf{w}$ help by definition to reinforce the conclusions obtained with probit models. At the same time, the variables in $\mathbf{x}$ add to the results of probit models, by explaining the number of observed acquiring banks. There are no easy solutions as to the inclusion of variables in $\mathbf{w}$ or $\mathbf{x}$. We will assume that local economic variables affect regime choice, and then validate such an assumption by experimenting with different combinations of variables.

3 The empirical analysis

3.1 Data and variables definitions

Our analysis uses a unique dataset on the consolidation of the Italian banking industry, based on the information on mergers and acquisitions reported by the Italian Antitrust Authority (AGCM).[3] Our sample covers the period 1996-2000,

[3]For the period covered by our study, the Italian Competition Law required the AGCM to support the Central Bank in the evaluation of *all* M&As occurring in the banking sector. Being built on the AGCM records our dataset is therefore a comprehensive one.

when the most relevant part of the consolidation of the Italian banking industry took place. The total number of M&As peaked in 1995, and remained at a high level until 1999, to start dropping from 2000 onwards. The sample includes all banks that have been active in M&As among Italian banks occurred in the period, classified on a regional basis, with each bank assigned to the region were it is headquartered.[4] Appendix Table 1 displays the distribution of the dependent variable AB, controlling for geographical location. The main features of the M&As process outlined in Table 1 are replicated fairly well: the (conditional) probability of observing an active bank decreases significantly moving from northern to southern regions.

The set of covariates $\mathbf{X}$ includes proxy variables for each of the three groups of determinants that have been discussed in the previous section. The list of variables and the corresponding data sources are summarized in Appendix Table 2. To evaluate the *profitability and the efficiency of the regional banking industry*, we consider different proxy measures (capturing market power and the quality of credit and financial intermediation policies) that are commonly adopted in the (applied) industrial organization literature. The Herfindhal index ($HERF$), measuring the level of concentration in a market, provides for a first indicator.[5] According to the standard Structure-Conduct-Performance paradigm, higher concentration implies a lower level of competition and, in turn, a higher level of profits (and a lower level of economic efficiency); which explains why the Herfindhal index is traditionally regarded by Antitrust Authorities also as a (rough) indicator of the degree of competition in a market. We also experiment with three additional standard (and interconnected) measures of market power: $SPREAD$, $MKUP$, and $MKDWN$. $SPREAD$ is defined as the difference between the average market rate on loans and the average market rate on deposits, and it is therefore a measure of the average profits for the 'traditional' intermediation activity of banks. As far as an increase in the level of competition reduces the level of profits in a given market, a reduction in $SPREAD$ denotes an improved competitive environment. The variable $SPREAD$ can be further divided in a measure of the average profits on the market for loans ($MKUP$) and a measure of the average profits on the market for deposits ($MKDWN$), giving more precise information on the degree of competition on the loans and deposits markets, respectively. More specifically, $MKUP$ is defined as the difference between the average market rate applied on loans and a risk free rate (the average monthly

[4] We exclude from the analysis all intra-group operations and all operations involving banks whose activity (before the merger, or the acquisition) had a national extent, as our focus is on the role of local economic conditions in banking consolidation. This last limitation concerns however very few operations (only 13) over the sample period, and it has no impact on our results, even though it is certainly relevant in terms of intermediated resources.

[5] We compute the Hefindhal index with respect to the number of bank branches. Unfortunately, in fact, data on loans and deposits to calculate more informative Herfindhal indices are not publicly available.

market rate on the Italian government bonds, or *Buoni Ordinari del Tesoro*); and, correspondingly, $MKDWN$ as the difference between the risk free rate and the average market rate applied on deposits. Furthermore, we consider the percentage of bad loans out of total loans (the variable BAD) as a measure of the 'efficiency' of *credit policies* at the local level. *Ceteris paribus*, the higher the efficiency in discriminating among potential borrowers, the lower the percentage of bad loans that should be observed. Since the quality of credit policies could be better measured by the flow of *new* bad loans rather than by the stock of bad loans, we also consider the growth rate of the share of bad loans out of total loans ($dBAD$) as an indicator of banks intermediation policies. Finally, we measure the difference between loans and deposits within a region in per capita terms, $DIFF$, as a synthetic indicator of banks' intermediation policies, and as a proxy of the financial depth – and hence of the level of development – of the local banking market. When $DIFF > 0$, regional banks are not able to raise (through deposits) enough funds to fulfill the demand of loans by (local) entrepreneurs. On the contrary, when $DIFF < 0$, regional banks raise funds in excess of the demand for loans, so that a share of deposits can be reallocated through the interbank market or the investment in other financial assets. We further split the variable $DIFF$ in its components, namely loans ($LOANS$) and deposits (DEP) measured in per capita terms, to explicitly account for the (potentially) different roles of loans and deposits as determinants of banking consolidation.[6]

In order to describe the conditions of the *local business environment*, we focus on the level of GDP (in per capita terms), which is a standard measure of residents' personal income, and a proxy for their wealth.[7] A higher level of GDP per capita is an indicator of a stronger *real* economy (and of a higher level of physical capital), which – in turn – is often implying a more efficient and 'healthy' banking industry. According to this interpretation, GDP would simply capture the indirect role of macroeconomic variables on the M&As process, and their influence on the profitability of banks (see, e.g., Goddard *et al.*, 2004a), an information for which we included in our regressions specific controls (i.e., $HERF$, $SPREAD$, $MKUP$, $MKDWN$). However, a large strand of literature has shown that GDP is strongly correlated with other variables like the human capital, as well as the financial and institutional development of an area (e.g., Guiso *et al.*, 2004a, 2004b, for Italian regions). All these variables, in turn, are

[6] For instance, in regions where the demand for loans exceeds available funds, banks must find alternative ways to raise additional funds. This could be achieved, among other options, by acquiring a bank located in a region where the share of savings allocated to deposits is higher relative to the demand for loans. A similar argument is developed, among others, by De Vincenzo *et al.* (2005).

[7] In order to further proxy residents' personal wealth, we also retrieved data on the volume of financial assets managed by banks on behalf of their customers. However, as these data are available at the regional level only starting from 1998 (third quarter), we obtained only imprecise estimates of the parameters, and decided to drop them from the empirical analysis.

usually recognized as positively affecting the size of non-financial firms. Unfortunately, the only publicly available Italian *regional* data on the size distribution of firms are Census data, that are collected every 10 years only, so that there are no specific information for all the years considered in our sample. To provide some evidence on the relationships between per capita GDP, the average size of firms, and the average size of banks we focus on the 2001 Census data. In particular, we measure the average size of firms by the ratio of total employment and the number of plants (in this sense, see e.g. Cetorelli, 2004). Figure 1 plots GDP per capita with respect to the average size of firms in Italian regions, and Figure 2 the average size of all firms in the economy with respect to the average size of firms in the financial sector. In both cases, there emerges a clear positive relationship between the plotted variables, suggesting that the GDP can be regarded as a proxy of the (average) size of firms in general, and of the (average) size of financial firms in particular. While this 'size' effect can *indirectly* influence the M&As process through the profitability of banks (see e.g. the discussion in Goddard *et al.*, 2004b), it can also exert a *direct* effect as argued in the Introduction. To recall our argument, consider two banks, A and B, characterized by the same level of profits and efficiency. Suppose that, bank A is located in a region where both non-financial firms are larger and competitors are getting larger with respect to the region where bank B is located. *Ceteris paribus*, bank A has more incentives than bank B to take an active role in M&As because it has both to trade (on average) with larger firms, and it has to compete with larger banks. To ensure that the GDP proxies for the average size of non-financial firms and not for changes in the number of firms, we also control for the growth rate of the number of firms ($FIRMS$).

To further investigate the direct role of the business environment, we also experiment with other variables commonly regarded as proxies of the business environment in a given area. In particular, we measure unemployment rates at the regional level, focusing both on the long-duration unemployment rate (LUR) and on the youth unemployment rate (YUR). LUR is the percentage of people looking for a job from at least 12 months on the total number of unemployed, while YUR is defined as the percentage of people aged 15-24 that are unemployed on the total number of people aged 15-24. Higher unemployment rates indicate a deterioration of local macroeconomic conditions, which most likely reduces the growth rate of firms and, indirectly, the probability of observing an active bank in the consolidation process.

Finally, we look at two additional variables that – differently from per capita GDP or unemployment rates, which can affect banks' profitability and efficiency directly – are unlikely to be directly correlated with bank-specific determinants.[8] The first is the index of social participation (SPI), defined by measuring the

[8] In terms of the general structural model (1) these would be the variables belonging to the set $\mathbf{X}_{2r}$, but not to the subset $\underline{\mathbf{X}}_{2r}$.

percentage of people aged at least 14 and volunteering in nonprofit organizations. This indicator is considered in the literature as a proxy of 'social capital' (e.g., Paldam, 2000; Durlauf and Fafchamps, 2005; but also the discussion in Guiso *et al.*, 2004b), which in turn is often found to have a positive impact on economic growth (e.g., Knack and Keefer, 1997). The second variable, also a proxy of (the absence of) social capital, is the index of violent crimes (VCI), defined as the number of violent crimes (such as murders, robberies, or kidnappings) every 10,000 inhabitants.[9]

We complete our econometric specification by adding controls for the *size* and the *institutional structure* of local banking markets. As for the size, there are large differences across regions, for instance in terms of resident population, that need to be taken into account.[10] Such differences influence the number of banks operating in a given area; a fact that we account for by including the number of banks among our regressors (NB). As for the institutional structure of local banking markets, we weight the different categories of banks in each regional industry in terms of their ownership structure and of the extent of their relevant markets. More precisely, we first account for the share of bank branches owned by cooperative institutions (the so called *Banche di Credito Cooperativo*), by defining the variable $COOP$. These banks, often located in rural areas, specialize on lending to small firms (e.g. Angelini *et al.*, 1998), and are characterized by specific institutional features constraining the probability that they can become involved in a merger or acquisition. Second, by focusing on geographical market size, we consider the share of regional branches owned by different categories of banks defined with respect to the geographical extension of their activity. In particular, using the classification adopted by the Bank of Italy, we let the variables LOC and REG to denote the percentage of regional branches owned by banks with a local and a regional network respectively.

3.2 Results

Probit models. Estimates of the probit model (2) are shown in Table 2: column I reports our baseline specification, while all other columns contain additional models perturbing the baseline specification to check the robustness of our main findings.

According to our estimates, the probability to observe an acquiring bank in

[9] See Paldam (2000). Garmaise and Moskovitz (2006) have shown that a real effect of M&As in banking is the increase in the crime rate at the local level. They argue that a higher concentration rate in local banking markets determines a reduction in loan provision, and a general impoverishment of local neighborhoods, that – in turn – is causing an increase in crimes. By including VCI among our regressors we are testing a reverse causality argument: namely, that more crime is unlikely to be associated with a higher number of active banks in M&As.

[10] Valle d'Aosta – the smallest Italian region – has about 120,000 inhabitants, while Lombardia – the largest one – has more than 9 million citizens, about 15% of the overall Italian population.

a typical M&A operation in a given region is primarily driven by two groups of variables: those characterizing local business environment conditions, and those representing institutional characteristics of the local banking markets. As reported in Table 2, col. I, the probability to observe at least one active bank is increasing in the level of per-capita GDP and in the growth rate of the number of firms ($FIRMS$), in the number of banks located in the region (NB) and in the share of the regional market accruing to cooperative banks ($COOP$); while it is decreasing in the share of the regional market of local banks (LOC).[11] All coefficients associated to the variables measuring the (average) profitability and efficiency of banks are not statistically significant. These results hold for all other regressions. In col. II, the variable $DIFF$ have been split in its components, which allows us to show a negative impact of per-capita deposits (DEP) on AB.[12] Note also that, in this model, the coefficients of $COOP$ and LOC become statistically insignificant, suggesting that local (and cooperative) banks are rich in deposits. In col. III, we split the variable $SPREAD$ into the two margins: only the coefficient on $MKDWN$ is statistically significant (and negative), confirming the role of the deposit market in influencing the probability to observe an active bank in a given region. Again, the coefficients of $COOP$ and LOC are insignificant, suggesting a relationship between deposits and local banks. In col. IV we substitute BAD with $dBAD$, and our main results remain unchanged: the local business environment and the institutional variables still are the main drivers of the observed probabilities. In col. V and VI, we further investigate the relationship between the institutional variables and the proxies for the profitability and efficiency of banks. Quite interestingly, when excluding the institutional variables from the regressions (col. V), the coefficients on $HERF$, $SPREAD$, and $DIFF$ become significant. On the contrary, the coefficients on institutional variables remain significant (and their magnitude does not change) when removing from the model the proxies for banks' profitability and efficiency (col. VI), suggesting that these variables and banks' institutional characteristics capture to some extent the same information. In other words, as shown for instance by Rasmusen (1988) and Altunbas *et al.* (2001), institutional variables – like the ownership structure or the geographic extent of a bank activity – are affecting both the profitability and the efficiency of banks.

Table 3 provides additional robustness checks of our main findings to account for some possible criticisms to our modeling strategy. First, it is often noted that the typical M&A deal is the result of a long (decisional and regulatory) process. For the entire period spanned by our sample, the decision of a bank's board to

[11] We also split the variable $FIRMS$ for economic sectors (manufacturing, building, commercial and services) and ownership structures (individual firms, corporations and partnerships), obtaining qualitatively analogous results.

[12] This is consistent with the idea that a potential motivation for takeovers in banking is to raise financial resources to sustain lending. Indeed, in Colombo and Turati (2004), we show that target banks are rich in deposits.

acquire (or to merge with) another credit institution, was subjected to a formal authorization by the Bank of Italy. Such authorization was in turn subordinated to the receipt of a written (although not binding) report issued by the Italian Antitrust Authority, concerning the implications of the proposed deal for competition. The entire process typically required several months to be completed.[13] Since our dependent variables count active banks when an authorization request is submitted to the Bank of Italy, considering explanatory variables *contemporaneous* to the request — and not to the actual decision — may be misleading. To overcome this difficulty, we rerun our baseline model by lagging all the regressors one year. Our main findings continue to hold when considering lagged regressors (as shown in Table 3, Col. I).

Second, one could argue that our results are driven by the wide differences in terms of local economic development between Northern and Southern regions in Italy. Even if our original specification included a rough control for the unobserved factors characterizing local markets by using area dummy variables, we replicate our baseline model by dropping Southern regions from the sample. Again, our main results remain unchanged (col. II): a better local business environment continues to exert a positive impact on the probability to observe an acquiring bank in a given region; furthermore, institutional variables still matter.

We also test the robustness of our results by experimenting with a different proxy of local business environment conditions, namely the long-term unemployment rate (LUR). As can be seen in col. III, the effect of LUR mirrors that of GDP.[14]

Finally, the last four columns in Table 3 control for the robustness of our baseline results to another critique, i.e. that the role of local macroeconomic variables summarized by GDP (or LUR) may stem only from the *indirect* influence on banks' profits. In particular, we rerun all models in Table 2, col. I-IV, by considering variables describing local business environment conditions that are less likely to have an immediate impact on banks' profitability, namely an index of social participation (SPI), proxying for social capital at the local level, and an index of violent crimes (VCI).[15] Our findings are robust also to these additional checks: a better business environment (characterized by higher GDP per-capita, or lower unemployment rates, more social participation and lower criminality) is conducive to a higher probability of observing an active bank in a typical M&A. Quite interestingly, the inclusion of SPI causes the coefficient of $COOP$ to become insignificant, suggesting that a higher level of participation is linked with

[13] A recent reform (passed in 2005) attributed directly to the Antitrust Authority the power to authorize or reject a M&A in the banking sector, based on its implications for competition.

[14] We also experimented by substituting LUR with the youth unemployment rate (YUR). As the set of results is substantially overlapping to those reported in Table 3, we omit these estimates. Regressions are available upon request from the authors.

[15] Note that also in these regressions we keep controlling for the growth rate of the number of firms ($FIRMS$).

a higher share of local banking markets accruing to cooperative banks. Moreover, the coefficient on VCI is not statistically significant, both because it can be considered as an additional proxy for local social capital, and because there is a possible reverse causality problem, with M&As influencing crime rates through their impact on loans supply (as shown, e.g., in Garmaise and Moskovitz, 2006).

Overall, the picture emerging from the probit model estimates is one in which the business environment has a direct impact on the M&As process, above and beyond its well known indirect influence on banks' profitability. Furthermore, the profitability and efficiency of banks appear to be influenced by the institutional structure of local banking markets.

Count data models. Probit models study how the probability to observe an active bank is correlated with a set of variables. However, as the phenomenon under study is highly concentrated in a subset of regions, it is worth to further investigate the robustness of our conclusions by testing the relationship between our regressors and the *number* of banks involved in M&As by using count data models. As already discussed in Section 2, these models require to identify and separate the set of regressors playing a role as determinants of a *regime* where M&As will *never* be observed, and those accounting for the *number* of banks eventually observed given a regime where M&As can take place. A natural strategy to do so is to assume that the 'regime choice' component of the model is affected by the macroeconomic characteristics of local economies, for the absence (or presence) of active banks in a given region is likely to be related to the characteristics of the regional 'business environment'. Furthermore, this specification strategy turns out to be fully consistent with a more 'agnostic' view (i.e. not based on *a priori* conjectures) aimed at determining empirically the best model specification by experimenting with different combinations of variables in each subset of covariates as determinants of regime choice, and using the remaining (groups of) regressors to investigate the number of banks given the regime. Finally, in order to select among the three different types of count data models (ZIP, negative binomial and Hurdle-Poisson) most often encountered in the literature, we estimate our baseline model for all of them, comparing empirically their relative performance by means of the AIC. The result of such comparison — reported in Appendix Table 3 — indicates the use of ZIP models as the most adequate choice given our sample.[16]

Estimates of the ZIP models are reported in Table 4, replicating the same sequence of regressions in Table 2. Overall, the estimates confirm the main findings obtained with probit models. The probability to observe regime $z = 0$ (i.e., a regime where the phenomenon cannot be observed) is negatively correlated with GDP and $FIRMS$ (col. I), indicating — as expected — that active banks are observed in regions characterized by good macroeconomic conditions (i.e., a fa-

[16] On the use of the AIC for (count data) model choice, see Cameron and Trivedi (1998). Refer to the Technical Appendix for a brief discussion of the HP and NB models.

vorable business environment). Although our results on the determinants of the number of active banks are far less precise, given regime $z = 1$ (i.e., a regime in which the phenomenon can be observed), this number is positively affected by the share of local markets of cooperative banks ($COOP$), and negatively affected by the share of local banks (LOC), with coefficients statistically significant in the majority of regressions, confirming the results obtained in probit models. Quite surprisingly, the total number of banks (NB) does not seem to affect the number of active banks. Moreover, the result of the probit analysis on the role of the deposits market does no longer hold (col. II and III), while the coefficient on $dBAD$ remains statistically insignificant (col. IV). Finally, the regressions in col. V and VI show that the proxies for the efficiency and profitability of banks and the institutional variables captures the same type of information, as in the probit estimates.

Table 5 replicates the robustness checks conducted for probit models in Table 3. Estimates in col. I show that lagging all regressors by one year causes almost all coefficients to lose some of their significance: in particular, GDP seems now to play no role in influencing the regime choice, whereas the institutional variables (like $COOP$ and LOC) are only marginally insignificant but maintain their sign. Dropping Southern regions from the sample leaves our main findings unchanged (col. II): GDP affects significantly regime choice, and the institutional variables drive the number of observed active banks. Results remain unchanged also when the long-run unemployment rate (rather than GDP per-capita) is considered (col. III). As for the set of robustness checks considering SPI and VCI as proxies for the local business environment, the models in col. IV-VII show that regime choice is essentially explained by the social participation index, confirming the role of the business environment in explaining the process of M&As, besides their indirect impact on banks' profitability and efficiency. Similarly to our baseline specification, we obtain more disappointing results in explaining the number of banks. According to our estimates, the number of observed active banks remains largely unexplained by the variables considered in our exercise. However, the main claim of the paper, namely that the business environment matters, remains valid. In particular, the use of count data models suggests that bad local economic and social conditions matter for regime choice, discouraging M&As.

4 Concluding remarks

In this paper we study the direct impact of local business environment conditions on banking consolidation. We focus on the Italian banking industry that provides an ideal setting for an analysis of the effects of local economic conditions on consolidation, given both the wide economic differences between Italian regions and the marked geographical characterization of the concentration process occurred in Italian banking (with banks from the well developed Northern regions taking

over banks from the less developed Southern areas). Using probit and count data (ZIP) models, we estimate the direct effect of local economic and social indicators at the regional level on the probability to observe an active bank in a M&A operation (and on the number of acquiring banks), controlling at the same time for the profitability and the efficiency of local banking markets. Our results appear to be robust to different perturbations of the baseline model, and to a number of additional checks, accounting for the timing of the proposed M&A, the inclusion in the sample of Southern regions, the use of per-capita GDP as the main indicator of the local macroeconomic environment.

Our empirical exercise highlights three findings. The first and main one is that, after controlling for the (average) profitability and efficiency of banks, the local business environment has a statistically significant impact on M&As. Local economic conditions play a direct role in the explanation of the M&As wave, above and beyond the indirect effect on profits traditionally emphasized in the literature. The presence of a direct effect is consistent with the view of a consolidation process driven by a 'size' effect: a 'better' economic environment is typically characterized by the presence of larger firms, which tend to do business with larger banks. This 'size' effect is further reinforced by a 'strategic' effect: when competitors are getting larger, a bank has more incentives to engage in a preemptive M&A, which may help explaining the 'wave-like' structure typically observed in M&As processes (see, e.g., Barkoulas *et al.*, 2001).

Second, the indicators of the (average) profitability and efficiency of banks appear to be strictly correlated with the institutional features of local banking markets. In particular, the presence of cooperative (and local) banks influences the performance of the banking industry evaluated at the regional level. This is consistent with the well known result that mutual institutions are important determinants of banks' performance.[17]

Finally, per-capita deposits seem to be important in explaining M&As, as they influence negatively the probability of observing an active bank in probit models, a result consistent with similar findings reported in the literature. According to practitioners, the price of target banks depends positively on deposits (see, e.g., De Vincenzo *et al.,* 2005), as they represent both an opportunity to enlarge the customers base and to sell new products, as well as a source of funds at a possibly low marginal cost.[18] To the extent to which these observations hold true and have an influence on the pattern of M&As, one should look carefully, in a policy

[17] See, e.g., Rasmusen (1988) and Altunbas *et al.* (2001). It is also worth stressing that the quality of the business environment can be as important in explaining profits and efficiency, as it is in explaining endogenously the emergence of specific types of banks. For instance, as far as a 'good' economic environment is associated with the presence of larger firms, the banking sector is likely to be characterized by a smaller share of cooperative banks, less capable to trade with large firms.

[18] Colombo and Turati (2004) have shown that the probability of a bank being a target of a M&A is positively affected by per-capita deposits.

perspective, at the possibility of deposit drain practices driven by differentials in the profitability of deposit-taking activities and lending opportunities between different areas of a country, and potentially resulting in credit rationing at the local level. A systematic investigation of these issues in our framework is a goal for future research.

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A Technical Appendix

Consider a random variable $Y = y_i$ measuring the number of banks, that assumes non-negative values only. Assuming that $Y \sim Poisson(\mu)$ implies that $E(Y) = Var(Y) = \mu$. The high occurrence of the zero outcome in a sample indicates that $E(Y) \neq Var(Y)$, signalling the presence of overdispersion. There are different ways to deal with this issue. One possibility is to use a mixed Poisson distribution such that $Y \sim Poisson(\mu V)$, where V is a random variable (e.g. following the negative binomial distribution, NB). In this way, $E(Y) = \mu$ and $Var(Y) = \mu + \alpha\mu^2$, with α denoting the overdispersion parameter. Other possibilities are to assume that there are two random processes at work, one that generates the zero outcome only (i.e. a process for 'structural' zeros), and the other that generates the positive counts. An 'hurdle' Poisson (HP) model — in the case positive counts are modeled using a truncated Poisson distribution — is one in which

$$\Pr(Y = y_i) = \begin{cases} \pi_0 & y = 0 \\ \frac{(1-\pi_0)e^{-\lambda}\lambda^y}{(1-e^{-\lambda})y!} & y > 0 \end{cases}$$

Note that — by using a simple probit model — only 'structural' zero outcomes are originated with probability π_0.

When the zero outcome can be originated also as a random draw from a Poisson distribution we have a Zero Inflated Poisson (ZIP) model in which

$$\Pr(Y = y_i) = \begin{cases} \omega + (1-\omega)\, e^{-\lambda} & y = 0 \\ (1-\omega)\, \frac{e^{-\lambda}\lambda^y}{y!} & y > 0 \end{cases}$$

Note that in this case, differently from the HP model, 'structural' zero outcomes are originated with probability ω, while 'sampling' zero outcomes follow a Poisson distribution. Clearly, when $\omega + (1-\omega)\, e^{-\lambda} = \pi_0$, ZIP and HP models provide the same results.

Table 1. Mergers and acquisitions by area (1996-2000)

		Active Bank			
		North	Center	South	Total
Passive Bank	North	46	1	0	47
	Center	10	7	0	17
	South	49	2	3	54
	Total	105	10	3	118

Note: excluded all operations involving banks whose activity (before M&A) had a national extent; excluded all intragroup operations.

Definitions (ISTAT):

North: Valle d'Aosta, Piemonte, Lombardia, Trentino A. A., Friuli Venezia Giulia, Veneto, Liguria, Emilia Romagna

Center: Toscana, Umbria, Marche, Lazio

South: Abruzzo, Campania, Molise, Puglia, Calabria, Basilicata, Sicilia, Sardegna

Figure 1. Average size of firms and GDP per capita (ISTAT, 2001)

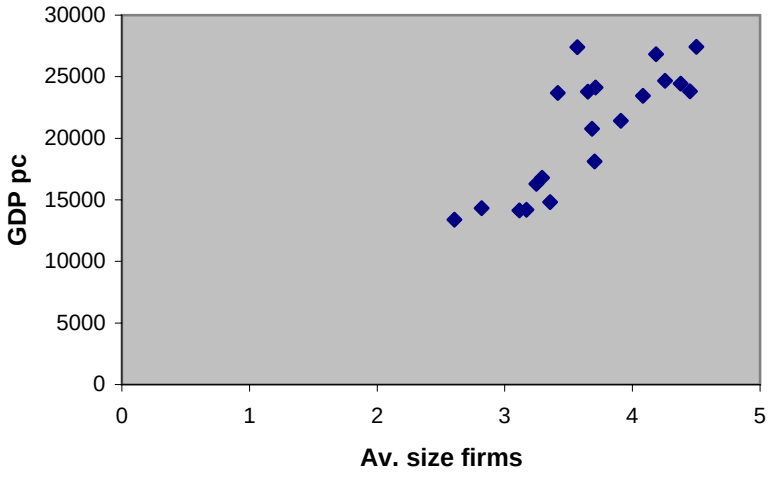

Figure 2. Average size of firms and average size of firms in the financial sector (ISTAT, 2001)

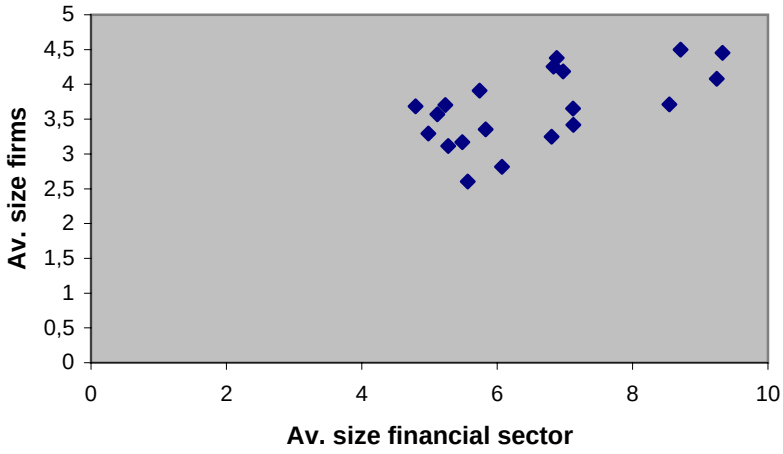

Table 2. Probit models

	I	II	III	IV	V	VI
GDP	0.11*	0.29***	0.29***	0.10*	-0.003	0.07
	(1.691)	(3.516)	(3.495)	(1.695)	(-0.058)	(1.285)
FIRMS	0.05**	0.05**	0.04*	0.05**	0.04*	0.05**
	(2.066)	(2.181)	(1.694)	(2.127)	(1.799)	(2.134)
HERF	-1.88	-0.19	-0.59	-2.31	3.54*	
	(-0.676)	(-0.060)	(-0.184)	(-0.818)	(1.734)	
SPREAD	0.13	-0.39		0.27	-1.05***	
	(0.409)	(-1.032)		(0.833)	(-4.691)	
MKUP			-0.28			
			(-0.707)			
MKDWN			-0.91*			
			(-1.715)			
BAD	0.01	-0.02	-0.03		0.06	
	(0.214)	(-0.344)	(-0.705)		(1.494)	
dBAD				-1.93		
				(-1.343)		
DIFF	-0.03			-0.02	0.05***	
	(-1.052)			(-0.854)	(2.851)	
LOANS		-0.01	-0.004			
		(-0.372)	(-0.125)			
DEP		-0.53***	-0.55***			
		(-3.898)	(-3.961)			
COOP	0.11**	-0.04	-0.05	0.11**		0.12**
	(2.125)	(-0.710)	(-0.833)	(2.106)		(2.571)
LOC	-0.123***	-0.03	-0.02	-0.12***		-0.12***
	(-3.244)	(-0.684)	(-0.540)	(-3.267)		(-3.836)
REG	0.01	0.02	0.02	0.02		0.01
	(1.067)	(1.240)	(1.501)	(1.314)		(1.231)
NB	0.01***	0.03***	0.03***	0.01***	0.005	0.01***
	(2.921)	(4.857)	(4.833)	(3.276)	(1.406)	(3.439)
Constant	-6.35*	-0.27	0.92	-6.62**	3.30	-4.06**
	(-1.898)	(-0.068)	(0.224)	(-2.013)	(1.342)	(-1.962)
Area dummies	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes
Quarter dummies	yes	yes	yes	yes	yes	yes
Nr. Obs.	400	400	400	400	400	400
Time period	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)
Pseudo R-sq. (a)	0.47	0.54	0.54	0.48	0.36	0.47
% correctly predicted	92.25	93.25	92.75	92.25	88.00	92.00
Model Chi-sq.	166.73	189.23	191.29	168.40	128.29	164.87
[p-value]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Log-L	-92.50	-81.25	-80.22	-91.67	-111.72	-93.44

MLE; asymptotic t-ratios in parentheses

(a) McFadden pseudo R-sq.

Table 3. Probit models: robustness analysis

	I (a)	II (b)	III	V	VI	VII	VIII
GDP	0.20**	0.22***		0.04	0.17*	0.18*	-0.001
	(2.332)	(2.638)		(0.461)	(1.744)	(1.831)	(-0.016)
FIRMS	0.002	0.05*	0.05**	0.05**	0.05**	0.05*	0.05**
	(0.164)	(1.752)	(2.017)	(2.010)	(2.094)	(1.803)	(1.968)
SPI				0.32***	0.25**	0.25**	0.30***
				(3.382)	(2.567)	(2.467)	(3.278)
LUR			-0.09***				
			(-4.228)				
VCI				-0.11	-0.05	-0.04	-0.06
				(-1.409)	(-0.628)	(-0.482)	(-0.857)
HERF	0.39	-5.50	-1.19	-7.88**	-6.13	-6.06	-9.14**
	(0.140)	(-0.844)	(-0.419)	(-1.960)	(-1.473)	(-1.468)	(-2.256)
SPREAD	-0.04	0.37	0.27	-0.05	-0.32		0.23
	(-0.095)	(0.857)	(0.764)	(-0.124)	(-0.729)		(0.555)
MKUP						-0.24	
						(-0.527)	
MKDWN						-0.63	
						(-1.102)	
BAD	0.05	0.01	0.03	0.09	0.04	0.02	
	(0.922)	(0.109)	(0.583)	(1.571)	(0.656)	(0.403)	
dBAD							-1.07
							(-0.596)
DIFF	-0.02	-0.07*	-0.01	0.06			0.05
	(-0.649)	(-1.689)	(-0.323)	(1.585)			(1.216)
LOANS					0.05	0.05	
					(1.176)	(1.193)	
DEP					-0.44***	-0.46***	
					(-3.105)	(-3.152)	
COOP	0.17**	0.18**	0.02	0.03	-0.06	-0.06	0.03
	(2.375)	(2.557)	0.405	(0.496)	(-0.902)	(-0.945)	(0.579)
LOC	-0.16***	-0.18***	-0.15***	-0.11***	-0.05	-0.05	-0.11***
	(-3.033)	(-3.420)	(-2.936)	(-2.742)	(-1.112)	(-1.007)	(-2.822)
REG	0.01	-0.002	-0.009	0.02	0.02	0.02	0.02
	(0.816)	(-0.122)	(-0.550)	(1.401)	(1.460)	(1.582)	(1.459)
NB	0.008	0.01**	0.02***	0.004	0.02***	0.02***	0.01
	(1.563)	(2.088)	(3.688)	(0.822)	(2.602)	(2.653)	(1.544)
Constant	-8.74**	-11.10***	1.90	-5.02	-1.14	-0.70	-4.27
	(-2.051)	(-2.670)	(1.066)	(-1.048)	(-0.218)	(-0.133)	(-0.873)
Area dummies	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes
Quarter dummies	yes	yes	yes	yes	yes	yes	yes
Nr. Obs.	320	240	240	400	400	400	400
Time period	97(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)
Pseudo R-sq. (c)	0.47	0.43	0.54	0.54	0.57	0.57	0.53
% correctly predicted	91.87	89.58	92.50	93.00	93.50	93.50	93.25
Model Chi-sq.	131.91	116.38	190.55	189.96	198.81	199.54	187.89
[p-value]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Log-L	-74.41	-77.86	-80.59	-80.89	-76.46	-76.10	-81.92

MLE; asymptotic t-ratios in parentheses

(a) All variables lagged 1 yr.

(b) Southern regions dropped from the sample

(c) McFadden R-Sq.

Table 4. ZIP model

	I	II	III	IV	V	VI
ZIP Model						
GDP	-0.17***	-0.17***	-0.17***	-0.17***	-0.15***	-0.18***
	(-3.492)	(-3.746)	(-3.657)	(-3.468)	(-3.890)	(-3.905)
FIRMS	-0.74	-0.73	-0.73	-0.72	-0.66*	-0.75
	(-1.529)	(-1.534)	(-1.493)	(-1.495)	(-1.813)	(-1.634)
Constant	6.74***	6.59***	6.55***	6.77***	6.07***	7.05***
	(3.389)	(3.525)	(3.398)	(3.458)	(3.801)	(3.921)
Poisson model						
HERF	-7.99	-8.64	-8.94	-8.01	1.26	
	(-1.221)	(-1.284)	(-1.328)	(-1.170)	(0.262)	
SPREAD	-0.35	-0.52		-0.09	-1.30***	
	(-0.871)	(-1.197)		(-0.234)	(-4.195)	
MKUP			-0.48			
			(-0.906)			
MKDOWN			-0.58			
			(-1.099)			
BAD	0.01	-0.01	-0.02		0.13	
	(0.080)	(-0.097)	(-0.151)		(1.642)	
dBAD				-3.71		
				(-1.346)		
DIFF	0.03			0.03	0.08**	
	(0.712)			(0.749)	(1.973)	
LOANS		0.04	0.04			
		(0.867)	(0.885)			
DEP		-0.17	-0.18			
		(-1.350)	(-1.377)			
COOP	0.16**	0.08	0.08	0.15*		0.17**
	(2.081)	(0.807)	(0.784)	(1.926)		(2.372)
LOC	-0.14**	-0.09	-0.09	-0.14**		-0.16**
	(-2.038)	(-1.133)	(-1.122)	(-2.025)		(-2.410)
REG	0.04	0.04	0.04	0.04		0.02
	(1.246)	(1.202)	(1.231)	(1.346)		(0.775)
NB	0.002	0.01	0.009	0.003	0.001	0.007***
	(0.529)	(1.462)	(1.407)	(0.744)	(0.189)	(2.803)
Constant	1.28	4.82	4.94	0.11	4.81***	-0.85
	(0.635)	(1.237)	(1.270)	(0.051)	(3.047)	(-1.145)
Area dummies	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes
Quarter dummies	yes	yes	yes	yes	yes	yes
Nr. Obs.	400	400	400	400	400	400
Time period	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)
Vuong stat.	1.68	1.79	1.84	1.67	2.26	1.74
Pseudo R-sq. (a)	0.59	0.59	0.59	0.60	0.51	0.58
Log-L	-167.36	-166.72	-166.69	-165.88	-183.26	-169.81

MLE; asymptotic t-ratios in parentheses

(a) From the Poisson unaltered regression model

Table 5. ZIP model: robustness analysis

	I (a)	II (b)	III	IV	V	VI	VII
ZIP Model							
GDP	-0.08	-0.27***		-0.006	-0.006	-0.004	-0.005
	(-0.567)	(-2.971)		(-0.086)	(-0.085)	(-0.048)	(-0.086)
FIRMS	0.08	-0.59	-0.10	-0.04	-0.04	-0.04	-0.04
	(1.494)	(-1.429)	(-1.053)	(-0.551)	(-0.546)	(-0.494)	(-0.497)
SPI				-0.33***	-0.33***	-0.34***	0.32***
				(-2.995)	(-2.975)	(-2.969)	(-2.865)
LUR			-0.12***				
			(5.059)				
VCI				0.05	0.05	0.04	0.04
				(0.454)	(0.454)	(0.348)	(0.464)
Constant	2.14	10.47***	-5.55***	3.42	3.42	3.39	3.24*
	(0.362)	(3.141)	(-4.343)	(1.608)	(1.584)	(1.563)	(1.677)
Poisson model							
HERF	-2.44	-20.02*	-3.02	-9.84	-9.84	-10.58	-10.03
	(-0.320)	(-1.854)	(-0.387)	(-1.129)	(-1.073)	(-1.089)	(-1.125)
SPREAD	-1.03*	-0.19	-0.23	-0.27	-0.27		-0.11
	(-1.880)	(-0.411)	(-0.467)	(-0.513)	(-0.442)		(-0.209)
MKUP						-0.15	
						(-0.203)	
MKDOWN						-0.45	
						(-0.627)	
BAD	0.03	0.07	0.14	0.05	0.05	0.03	
	(0.295)	(0.316)	(0.547)	(0.241)	(0.241)	(0.134)	
dBAD							-2.71
							(-0.660)
DIFF	0.06	0.004	0.06	0.06			0.06
	(1.172)	(0.088)	(0.489)	(0.632)			(0.568)
LOANS					0.06	0.06	
					(0.631)	(0.646)	
DEP					-0.06	-0.06	
					(-0.378)	(-0.396)	
COOP	0.15	0.17**	0.04	0.12	0.12	0.11	0.12
	(1.453)	(1.993)	(0.347)	(1.299)	(1.002)	(0.956)	(1.283)
LOC	-0.13	-0.16**	-0.14	-0.13	-0.14	-0.13	-0.14
	(-1.370)	(-1.991)	(-1.258)	(-1.202)	(-1.139)	(-1.095)	(-1.314)
REG	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	(0.806)	(0.796)	(0.678)	(0.654)	(0.653)	(0.639)	(0.649)
NB	0.003	0.001	-0.0004	-0.0004	-0.0005	-0.0001	0.0001
	(0.654)	(0.337)	(-0.059)	(-0.071)	(-0.056)	(-0.014)	(0.021)
Constant	4.08	1.09	1.16	1.42	1.41	1.73	1.11
	(1.619)	(0.498)	(0.349)	(0.459)	0.256	(0.313)	(0.360)
Area dummies	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes
Quarter dummies	yes	yes	yes	yes	yes	yes	yes
Nr. Obs.	400	400	400	400	400	400	400
Time period	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)
Vuong stat.	1.15	1.24	2.62	2.11	2.06	2.06	1.95
Pseudo R-sq. (c)	0.60	0.52	0.59	0.59	0.59	0.59	0.60
Log-L	-132.46	-154.33	-159.07	-162.79	-162.79	-162.57	-162.32

MLE; asymptotic t-ratios in parentheses

(a) All variables lagged 1 yr.

(b) Southern regions dropped from the sample

(c) From the Poisson unaltered regression model

Appendix Table 1

Distribution of dependent variables

Vbs.	*0*	*1*	*2*	*3*	*more than 3*
Active Banks	336 (84%)	36 (9%)	14 (3.5%)	7 (1.75%)	7 (1.75%)
AB|North	109 (68.13%)	23 (14.37%)	14 (8.75%)	7 (4.37%)	7 (4.37%)
AB|Center	70 (87.5%)	10 (12.50%)	0 (0%)	0 (0%)	0 (0%)
AB|South	157 (98%)	3 (1.87%)	0 (0%)	0 (0%)	0 (0%)

Definitions (ISTAT):

North: Valle d'Aosta, Piemonte, Lombardia, Trentino A. A., Friuli Venezia Giulia, Veneto, Liguria

Center: Emilia Romagna, Toscana, Umbria, Marche, Abruzzo, Lazio

South: Campania, Molise, Puglia, Calabria, Basilicata, Sicilia, Sardegna

Appendix Table 2

Variables definition and descriptive statistics

Vbs.	*Mean*	*Std. Dev.*	*Min*	*Max*	*Description*
Local business environment					
GDP	35.19	9.11	18.81	51.15	GDP per capita (mln ITL lire) *Yearly data. Source: ISTAT*
FIRMS	1.43	8.67	-105.97	104.97	Growth rate total nr. firms x 1000 pop. *Quarterly data. Source: Unioncamere - Movimprese*
SPI	10.58	4.67	4.69	26.46	Social participation index (% aged >14 volunteering in nonprofits)
VCI	10.37	3.73	3.14	23.07	Violent crimes index (crimes x 10,000 pop.)
LUR	49.49	15.89	12.37	74.46	Long-term unemployment rate (% people looking for a job from at least 12 months on total nr. unemployed)
YUR	33.09	18.38	6.04	66.25	Youth unemployment rate (% people aged 15-24 unemployed on total nr. people aged 15-24) *Yearly data. Source: ISTAT*
Profitability and efficiency of local banks					
HERF	0.12	0.08	0.03	0.48	Herfindhal index defined considering the number of bank branches *Yearly data. Source: Bank of Italy*
SPREAD	5.22	1.32	2.67	8.92	Difference between average rate on loans and average rate on deposits
MKUP	3.58	1.25	1.31	7.34	Difference between average rate on loans and average rate on 1-month Govt. Bond
MKDWN	1.64	0.52	0.46	3.41	Difference between average rate on 1-month Govt. Bond and average rate on dep *Quarterly data. Source: Bank of Italy*
BAD	12.17	7.81	1.99	33.73	% bad loans out of total loans *Quarterly data. Source: Bank of Italy*
DIFF	4.62	7.02	-6.09	28.04	Difference between loans and deposits per capita (mln ITL lire)
LOANS	20.60	10.54	7.15	55.66	Loans per capita (mln ITL lire)
DEP	15.97	5.34	7.68	27.62	Deposits per capita (mln ITL lire) *Quarterly data. Source: Bank of Italy*
Institutional structure					
NB	44.33	40.74	3	174	Nr. Banks *Yearly data. Source: Bank of Italy*
COOP	11.72	11.72	0.16	59.52	% regional bank branches owned by cooperative banks *Yearly data. Source: ISTAT*
LOC	18.37	17.58	0.63	88.00	% regional bank branches owned by local banks
REG	16.88	14.97	0.22	68.72	% regional bank branches owned by banks with regional diffusion *Quarterly data. Source: Bank of Italy*

Appendix Table 3: Model choice

	ZIP	NB	HP
Nr. of banks			
SPREAD	-0.35	-0.51	-0.29
	(-0.871)	(-1.112)	(-0.861)
DIFF	0.03	0.05	0.03
	(0.712)	(1.141)	(0.739)
HERF	-7.99	-6.66	-1.48
	(-1.221)	(-1.118)	(-0.263)
BAD	0.01	0.005	-0.06
	(0.080)	(0.053)	(0.636)
COOP	0.16**	0.19***	-0.06
	(2.081)	(2.641)	(-1.133)
LOC	-0.14**	-0.16**	0.04
	(-2.038)	(-2.404)	(0.788)
REG	0.04	0.04	0.007
	(1.246)	(1.339)	(0.319)
NB	0.002	0.003	0.003
	(0.529)	(0.713)	(0.855)
Constant	1.28	1.53	-1.30
	(0.635)	(0.731)	(-0.723)
Overdispersion parameter	-	0.18	-
	-	(0.962)	-
Mills ratio	-	-	2.79***
	-	-	(6.855)
Splitting model			
GDP	-0.17***	-	0.07***
	(-3.492)	-	(6.619)
FIRMS	-0.74	-	0.03**
	(-1.529)	-	(1.921)
Constant	6.74***	-	-3.91***
	(3.389)	-	(-8.384)
Area dummies	yes	yes	yes
Year dummies	yes	yes	yes
Quarter dummies	yes	yes	yes
Nr. Obs.	400	400	400
Time period	96(1) - 00(4)	96(1) - 00(4)	96(1) - 00(4)
Vuong stat.	1.68	-	-
Pseudo R-sq. (a)	0.59	0.59	0.91
Log-L	-167.36	-172.91	-98.70
Log-L Probit	-	-	-145.01
AIC(b)	372.72	381.82	525.42

MLE; asymptotic t-ratios in parentheses

(a) Pseudo R-sq. from the Poisson model

(b) AIC = - 2 logL + 2k

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