DISCUSSION PAPER SERIES

No. 7618

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Available online at: **www.cepr.org/pubs/dps/DP7618.asp**

ISSN 0265-8003

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Discussion Paper No. 7618
January 2010

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CEPR Discussion Paper No. 7618

January 2010

ABSTRACT

The Impact of Mergers on the Degree of Competition in the Banking Industry

This paper analyses the relation between competition and concentration in the banking sector. The empirical answer is given by testing a monopolistic competition model of bank branching behaviour on individual bank data at county level (départements and provinces) in France and Italy. We propose a measure of the degree of competiveness in each local market that is function also of market structure indicators. We then use the econometric model to evaluate the impact of horizontal mergers among incumbent banks on competition and discuss when, depending on the pre-merger structure of the market and geographic distribution of branches, the merger is anti-competitive. The paper has implications for competition policy as it suggests an applied tool to evaluate the potential anti-competitive impact of mergers.

JEL Classification: G21, L13 and L59
Keywords: banking industry, competition and market structure and merger policy

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This Paper is produced as part of the CEPR project 'SCience, Innovation, FIrms and markets in a GLObalized World' funded by the European Commission under its Seventh Framework Programme for Research (Collaborative Project).

Chizzolini acknowledges V. Chiorazzo and C. Milani of ABI for useful comments and for providing the data on Italian banking groups and Ente L. Einaudi for financial support.

Submitted 16 December 2009

Introduction

The structure of European banking industries has swiftly changed since the Second European Directive, implemented in 1992, gave a strong impulse to liberalisation within and across national borders in a sector characterized by tight regulatory constraints. These constraints varied across countries affecting banks' decisions on prices, quantities (through credit ceilings) and branching networks. While deregulation has certainly reduced barriers to competition for banks, it has also indirectly prompted a wave of mergers and acquisitions within and across national borders: as a result the degree of concentration in market shares has increased in almost all European countries.

Since deregulation was aimed at promoting competition, we ask whether this increase in concentration following mergers and acquisitions has reversed the initial objective. In general there are contrasting results on the impact of mergers on the degree of competitiveness of the banking system[3]: have banks gained in terms of scale and scope efficiency and thus passed on the benefit to consumers by reducing prices of banking products (as for instance in Sapienza, 2002) or has competition fallen as a consequence of increased market power of merged banks?

From the perspective of the structure-conduct-performance approach (Bain, 1956) competition depends directly upon market structure and in particular the greater the degree of concentration in the market structure, the lower the degree of competition, since firms can collude more easily in concentrated industries. However, when explaining the shape of the market structure we should account for the feedback of price competition, as firms tend to exit very competitive industries when they anticipate that they cannot recover their entry costs. This explains why a tougher price competition may be accompanied by an increase in the degree of concentration, delivering a positive relation between competition and concentration. When analysing the impact of a merger among incumbent banks it is therefore important to rely on a model where competition steams from considerations about market structure.

In general, how do we measure the degree of competition in a market? What is the relation between concentration and competition in a market? This paper presents a measure of

[3] See for instance the discussion in Degryse and Ongena (2008) and Carletti and Vives (2009).

competition for the banking industry originated from a model where market structure is explained together with the degree of competition. We then use this measure to evaluate the impact of mergers on banking competition.

The measure of competition proposed in this paper is derived within an econometric test of a model of monopolistic competition for the banking industry. Based on a theoretical model, where banks compete in retail markets both through interest rates and location of branches, the index of competition summarizes information on the market power of banks for given demand and cost conditions in the local market. In particular the index captures the ability of banks to transfer an increase in their branching network size into larger profits.

Using the econometric model, we estimate the competitive effect of a merger exploiting the information about the structure of the local market, as for instance the dispersion of market shares or the number of large rivals in the market. We find that these factors are important in explaining our measure of competition together with measures of concentration. Summarizing our findings, a merger may have a pro-competitive effect, regardless of its effect on concentration, when it reduces the asymmetry between market shares or when it increases the number of large banks competing at the top of the industry.

Our index of competition is parsimonious in terms of information required as it basically uses only data on branching market shares of individual banks in local markets. These are the same requirements to compute an index of concentration, such as for instance the Herfindahl index, widely used in antitrust cases when evaluating the impact of mergers.

The relation between concentration and market structure is even more interesting in the light of the recent financial crisis and public intervention to rescue fragile banks by regulators. Many researchers question the relation between financial stability and competition in the banking system.[4] More concentrated banking systems seems to have better resisted the recent crisis, as for instance the Canadian banking industry compared to the more fragmented US banking industry. Again this rises the question of how do we measure competition? Is it the

[4] See the recent surveys by Schaeck et al. (2006) and Beck (2008) on evidence about the relation between competitiveness and fragility of the banking system.

Canadian banking system really less competitive[5] than the US banking industry? Furthermore, if regulators were to promote greater fragmentation in the banking industry in order to avoid to rescue the "too big to fail" institutions, what would be the impact on competition?

Relation with the literature. This paper is related to the empirical literature based on models of industrial organization with endogenous market structure (inspired by Sutton, 1991); we depart from the Structure-Conduct-Paradigm, where it is theorized an inverse relation between concentration and competition, to investigate empirically the relation following the approach in Bresnahan (1991a, 1991b) and more recently in Berry and Tamer (2006). Our results are in line with Cetorelli (1999) according to whom the impact of mergers cannot be fully captured by measuring the change in market structure concentration: when for instance the market structure is too fragmented with a single dominant firm, an horizontal merger between medium players in the market might restore competitive conditions, by generating a rival for the dominant firm in the market. In this case, greater concentration in market shares is accompanied by greater competition, breaking down the inverse relation between concentration and competition.

The paper is also related to two previous papers of ours, Cerasi et al. (2002) where we estimate a similar model on aggregate data for several European countries and Cerasi et al. (2000) where we apply the same test to individual bank data in local markets in Italy between 1989 and 1995. Here we apply the same methodology for a cross-section sample of individual banks for France and Italy with the objective of measuring and comparing local market power of banks at county level ("département" for France and "provincia" for Italy). The novelty in this paper is an experiment to predict the effect of a merger in the industry. We simulate a merger between two banks by summing up their branching networks and estimate the impact on competition. In particular we study the effect of several mergers in France among which that of Crédit Agricole with Crédit Lyonnais and of the two most important mergers in the latest years for Italy, namely Intesa with San Paolo IMI and Unicredito with Capitalia. We find evidence that these mergers affect competition; however their impact is different,

[5] Recently the Canadian antitrust authority banned two mergers among four of the five large institutions to preserve some degree of competition in the banking system. The argument being that five large banks were enough to preserve competition in the Canadian banking industry.

depending upon the pre-merger structure of local markets, in particular upon the dispersion of market shares and the number of large banks in the market.

In Section 1 we explain how to construct the econometric test from a theoretical model of bank branching behaviour and propose a measure of competition in local markets. The results of the econometric test applied to individual bank data in local markets in France and Italy are presented in Section 2, while in Section 3 we comment the results of the test, based on the econometric model, to evaluate the impact of horizontal mergers on the degree of competition and discuss the relation between our estimated measure of competition and indicators of market structure. Finally Section 4 concludes the paper.

1. From the theoretical to the econometric model

The first step is to derive an empirical measure of interest rate competition in the banking industry. We do this starting from a reduced-form model of monopolistic competition where banks compete in each local market by setting their interest rates and the size of their branching networks.[6] In this section we explain how to derive the econometric test of the model to be estimated.

1.1 The theoretical model

The underlying assumption is that banks behave according to a monopolistic competition model where they compete on interest rates and branching network size given their choice of entry in a specific local market. Each bank enters a local market whenever it expects its profits to be large enough to recover entry costs and it expands the branching network up to the point where marginal benefits equate marginal costs. It is assumed that in each period and market banks adjust instantaneously their branching networks to the optimal size. In Table 1 the details of the functional form of profits, entry and branching costs are given for each bank *i* operating in market *j*.

[6] The model presented in this paper is a reduced form of a two stage model where in the first stage banks decide entry and the size of their branching network, while in the second stage compete in interest rates. See Cerasi (1996) for the characterization of the model.

Table 1 – Brief description of the theoretical model

Profit of bank *i* in local market *j*:	$\pi_{ij} \equiv \pi(k_{ij}; S_j, cci_j, N_j) = S_j \frac{k_{ij}^{cci_j}}{\sqrt{N_j}}$	(1)
Marginal benefit of branching:	$MB_{ij} = \frac{d\pi(k_{ij})}{dk_{ij}} = \frac{S_j k_{ij}^{cci_j - 1}}{\sqrt{N_j}} \left(cci_j - \frac{k_{ij}}{2N_j} \right)$	(2)
Branching costs:	$s_{ij} = a_{ij} + \varepsilon_{ij} \left(k_{ij} - 1 \right)$	(3)
Marginal cost of branching:	$MC_{ij} = \frac{ds_{ij}}{dk_{ij}} = \varepsilon_{ij}$	(4)
Branching size decision:	$MB_{ij} = MC_{ij} \Rightarrow k_{ij}^* > 1$	(5a)
	$MB_{ij} < MC_{ij} \Rightarrow k_{ij}^* = 1$	(5b)
Entry decision:	$\pi_{ij} \geq s_{ij}$	(6)

with

k_{ij} = number of branches of bank *i* in local market *j*

S_j = size of market *j* (total deposits)

cci_j = inverse of the degree of competition in market *j*

$N_j = k_{ij} + \sum_{i \neq o} k_{oj}$ = total number of branches in local market *j*

s_{ij} = total cost of branching network of size k_{ij}

a_{ij} = cost of entering market *j* with the first branch for bank *i*

ε_{ij} = non-observable branching cost for bank *i* in market *j*

The main objective of the paper is to measure the degree of competition in a market: we introduce the parameter "*cci*" which measures the ability of banks to translate an increase in their branching network into larger profits. This parameter captures an inverse measure of competitiveness of a market. Let us explain this point.

Equation (1) describes bank *i*'s profits in market j. Basically disaggregate profits of a specific bank in each local market are approximated by a proportion of total market size – *S*, in our case total deposits in that market - where the proportionality constant is given by a function of the branching market share of the bank, measured as own branches over total branches in that

specific market, $\frac{k_{ij}^{cci_j}}{\sqrt{N_j}}$. Note that the only observable bank specific variable is k_{ij}, that is the number of branches of bank *i* in local market *j*. We don't need to use any accounting data in this set up, since both S_j and N_j , the other variables that enter the profit function, are publicly available market data.

The profits in (1) exhibit some properties. First, profits are increasing in total market size S_j as a market of greater size allow all banks in that market to share greater gains. Second, profits are decreasing in total branches N_j since as the market becomes more crowded with branches, the gains to be divided between banks become smaller and thus per-capita profits shrink; third, profits are increasing in own branches k_{ij} although the rate at which profits increase depends upon the parameter *cci* as shown by equation (2). The more intense is competition among banks on interest rates the smaller bank's profits and therefore the less convenient it is to open new branches, in other words an additional branch has a reduced impact on profits. Therefore we claim that our parameter *cci* captures the inverse measure of competition in interest rates in a market, although indirectly, through its effect on elasticity of profits to branching. [7]

The optimal branching network size is set by comparing marginal benefits to costs of branching. From equation (3) bank's branching costs are assumed to be linear function of k_{ij} and marginal costs are constant and equal to ε_{ij}, as shown in (4). The profit maximising bank sets its branching network size at $k_{ij}^* > 1$ such that the marginal benefit of an additional branch is equal to the marginal cost, according to condition (5a), otherwise it sets its branching at $k_{ij}^* = 1$ according to condition (5b).

Dropping the subscripts, for given *S* and *N*, k^* increases with *cci* and decreases with marginal branching cost. For a given market size, number of competitors and cost conditions, *cci* will be lower the fiercer is competition among banks. If competition in the market becomes tougher (lower *cci*) the bank may end up closing branches (k^* will decrease) since the expected gains from a larger branching network shrink.

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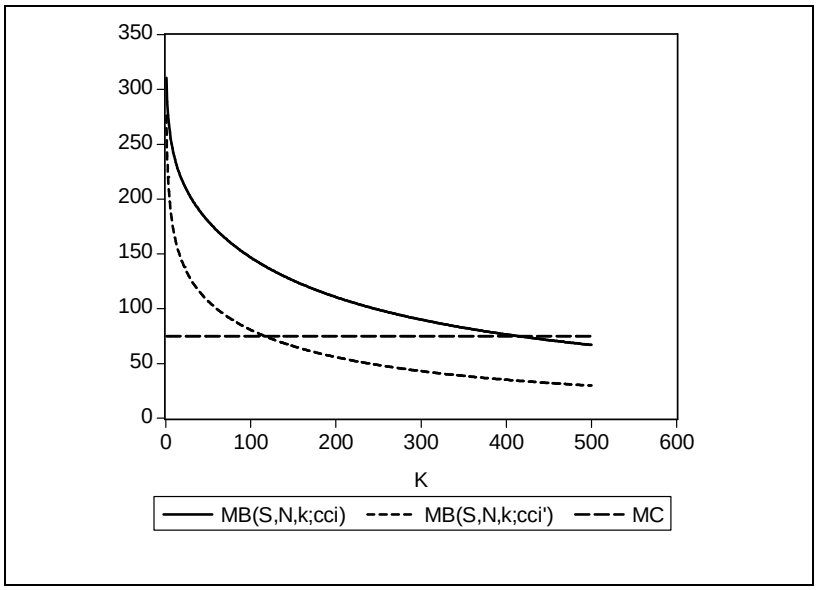
[7] The mathematical definition of the parameter measuring the inverse degree of competition is $cci = \frac{d \ln \pi(k)}{d \ln k} + \frac{k}{2N}$ and it is the elasticity of profits when opening of a new branch if $k/2N$ becomes negligible.

In Figure 1 we represent one specific example of optimal branching size by drawing marginal costs and marginal benefits for the functions in (2) and (4) and parameters *S=6000*, *N-k=300*, *ε=75*. The dashed line represents the marginal cost MC, while the continuous line is the marginal benefit MB for *cci*=0.9. The optimal branching size is derived from the intersection between MB and MC, and it is approximately *k*=400*. If competition becomes tougher, that is when the index measuring the elasticity of profits to branching falls for instance from 0.9 to *cci'*=0.8, then MB shrinks as indicated by the dotted line and the optimal branching size of each bank becomes *k*'=100*.

Figure 1 – Optimal branching size: comparing marginal benefits and costs



Finally, banks enter a market only if the expected profits are greater than entry costs for a given branching size as indicated by condition (6).

1.2 The econometric specification

The theoretical model is the starting point for the specification of the econometric model, a slightly modified version of the econometric test in Cerasi et al. (2002). In the model the first order branching conditions (5a) and (5b) hold strictly and banks adjust immediately their branching networks to the optimal size. When we move to the empirical analysis, however, we must allow for a slower adjustment to equilibrium to emerge from the data. We classify each observation, given by bank *i* in market j and period *t*, into either of two groups: in the first, all the banks that have expanded their branching network with more than one single branch, namely those fulfilling the conditions $\Delta k_{ijt} = (k_{ijt} - k_{ijt-1}) \geq 0$ and $k_{ijt} > 1$; in the other

group all the banks that have shrunk their network and the unitary banks, namely those characterized by $\Delta k_{ijt} = (k_{ijt} - k_{ijt-1}) < 0$ with $k_{ijt} > 1$ or $k_{ijt} = 1$.

Define further:

$$A_{ijt} = \frac{S_{jt} k_{ijt}^{cci_{jt}}}{\sqrt{N_{jt}}} \left(cci_{jt} - \frac{k_{ijt}-1}{2N_{jt}} \right) \tag{7}$$

where it has to be noticed that $A_{ijt} \geq MB_{ijt}$ when bank i is expanding its network in market j while $A_{ijt} < MB_{ijt}$ when bank i is shrinking its network in market j. Definition (7), together with branching conditions (5a) and (5b), leads to the following partition of the sample into two sub-sets:

$$\begin{aligned} A_{ijt} \geq MC_{ijt} &\Leftrightarrow \text{bank is in } E_{1t} \\ A_{ijt} < MC_{ijt} &\Leftrightarrow \text{bank is in } E_{2t} \end{aligned} \tag{8}$$

To get to the full specification of the econometric model, assume that $\varepsilon_{ijt} \equiv MC_{ijt}$ is a lognormal random variable such that $\ln(\varepsilon_{ijt}) = mc_{it} + v_{ijt}$, where mc_{it} is the logarithm of the mean of the marginal cost, constant for bank i at time t, and v_{ijt} is a purely stochastic component of the marginal cost with a standard normal distribution.

From (8) and given the stochastic assumptions above, bank i operating in market j at time t will belong to group E_{1t} (expanding) or to group E_{2t} (shrinking) according to the following probabilities:

$$\Pr\{(ij) \in E_{1t}\} = \Pr(\varepsilon_{ijt} \leq A_{ijt}) = \Pr(\ln \varepsilon_{ijt} \leq \ln A_{ijt}) = \Pr(v_{ijt} \leq \ln A_{ijt} - mc_{ijt}) = \Phi(\ln A_{ijt} - mc_{ijt})$$

$$\Pr\{(ij) \in E_{2t}\} = \Pr(\varepsilon_{ijt} > A_{ijt}) = \Pr(\ln \varepsilon_{ijt} > \ln A_{ijt}) = \Pr(v_{ijt} > \ln A_{ijt} - mc_{ijt}) = 1 - \Phi(\ln A_{ijt} - mc_{ijt}),$$

where $\Phi(.)$ is the standard normal distribution function.

The econometric test of the branching model consists in estimating these probabilities, at time t, by maximizing the likelihood:

$$\ln L = \sum_{ij \in E_{1t}} \ln \Phi(\ln A_{ijt} - mc_{ijt}) + \sum_{ij \in E_{2t}} \ln\left[1 - \Phi(\ln A_{ijt} - mc_{ijt})\right] \tag{9}$$

with respect to the parameter vector $\theta = [\theta_{MB}, \theta_{MC}]$ that includes measures of the effects of all variables in A_{ijt}, in particular cci_j, and those that characterize the average marginal costs mc_{it}.

2. Measuring the degree of competition

In this section we put forward a measure of the degree of competition in local markets based on the estimated value of the parameter *cci* from the econometric specification of the previous section. After briefly describing the data, we present the results for each local market and we use them to rank the different local markets in terms of competitiveness.

2.1 The data

In the empirical test we don't need accounting data. As a matter of fact there aren't any disaggregate accounting measures of profits nor of costs for each bank in each local market as required by the model; instead, the theoretical model provides us with a simple proxy of bank disaggregate profits, that is the reduced form in (1) function of the branching market share of each bank in each local market.

Notice that in the econometric model, the reduced form of profits, and the formulas derived from it, that is the marginal benefits of branching MB_{ijt} and the threshold value A_{ijt} are all functions of observable variables either market specific variables such as market size (measured by total deposits) S_{jt}, and total branches in the market N_{jt} or bank specific variables as branches of bank i in market j at time t, k_{ijt}, and their lagged value k_{ijt-1}. To improve the explanatory power of the model, we add a set of market variables such as per-capita loans (LPC), the proportion of rural areas in each county (SHRUR) and a dummy indicating densely populated urban areas (DBIGPRO). For these data we rely on the Central Statistical Offices, INSEE for France and ISTAT for Italy.

For what concerns data on individual banks, we have information on the number of branches in each local market for 2007 and 2005 in France, and for 2006 and 2004 in Italy. We can therefore construct a cross-section sample for both countries and compute Δk_{ijt} , i.e. the change in branching size for each bank in each local market, taking respectively 2005 as the initial year for France and 2004 for Italy.

For Italy, data on bank branches by "provincia" are available from the public site of Bank of Italy.[8] For France instead data on bank branches by "départements" were kindly provided by Crédit Agricole and Caisses d'Epargne. There are 95 départements in France and 103

[8] See the site www.bancaditalia.it

provinces in Italy. We use the definition of banking groups[9] instead of banks; smaller groups and independent banks have been discarded from the sample of banking groups in each local market, while still taken into account when computing the denominator N_j that represents the total number of branches in the market, since small groups exert competitive pressure on branches of the main groups in each local market. Each observation in the sample is therefore given by the branching network size of a bank i operating in local market j at time t. Further, to capture the coordination effect when taking decisions across local markets for banks belonging to the same group we define a dummy for each specific banking group.

In France all banks have branches in each of the 95 departments, except C.I.C. that does not operate in Corse. In Italy there are 103 provinces, and six national banks have branches in almost all of them, while the others have their branching networks geographically concentrated in few local markets. Descriptive statistics, reported in Table 2, show that the two industries are similar for what concerns distribution of branches across markets in terms of standard deviations. However for Italy we observe a lower median for branching size.

[Insert Table 2 here]

As already mentioned, although our definition of bank's profits in each local market is not directly comparable with banking accounting profits (not available from accounting sources at this level of disaggregation), our measure must be strongly correlated with accounting profits since accounting profits are proportional to market shares on total deposits and these are strongly correlated to branching market shares.

2.2 Econometric results

The model is estimated on a cross-section for the year 2006 in Italy and 2007 in France. In the econometric specification the inverse degree of competition *cci* is affected only by market specific variables, while marginal costs are affected by either market and bank specific variables. The econometric specification includes a series of dummies for each banking group in France and for a relevant sub-set in Italy. The parameter *cci* is estimated conditional on per-capita loans and it differs across provinces due to socio-geographical characteristics: in

[9] For Italy we followed the ABI guidelines in defining banking groups. With regard to strategic interaction on pricing and branching, banking groups are indeed more appropriate units to be considered rather than single banks as banks belonging to the same group tend to coordinate their decisions.

particular in Italy we distinguish between rural and urban areas, while in France for the proportion of rural surface within departments. We expect an increase in competition when per-capita loans and population density are higher as banks have greater incentive to compete for the marginal client in these circumstances.

[Insert Table 3 here]

All coefficients in Table 3 are significant and have the expected sign. The coefficient explaining *cci* are very similar for France and Italy: in France in those Départments where there is a greater share of rural areas (SHRUR) banks face softer competition and, similarly, for Italy competition is tougher in areas where there is a big city (DBIGPRO). In addition, as expected, for both countries the degree of competition increases with loans per-capita (LPC).

The average value of the index *cci*, is higher in Italy, 1.24, compared to France, 0.66 (recall that lower values of *cci* imply tougher competition) indicating that French local banking markets are on average more competitive than Italian local markets.[10]

The goodness of the model in fitting the data is measured by comparing the predicted partitioning of observations between the two subset E_1 (all observations for which the bank has increased its branching network) and E_2 (all observations for which the bank has shrunk its branching network or it has chosen a unitary size) in the previous section with the partitioning on the actual data.

[Insert Table 4 here]

As shown in Table 4 the percentage of observations of banks whose behavior in terms of branching is correctly predicted by the model is 84% for France and 75% for Italy.

Table 5 provides evidence that the two industries differ in terms of costs and profitability of branching networks.

[Insert Table 5 here]

For what concerns heterogeneity of banks in terms of net profitability of branching networks Table 6 shows that marginal branching costs are significantly higher for instance in France

[10] Notice that La Poste is included among banking groups in France, while it is excluded in Italy. We estimated the model excluding La Poste without a significant change in terms of results.

for Crédit Agricole and especially La Poste, while marginal benefits are lower, resulting in considerably low per-branch profits. The two groups are characterized by large branching networks with branches distributed all over the country, even in less densely populated areas.

[Insert Table 6 here]

In Italy instead per-branch profits are quite homogeneous across banks, with higher marginal costs for Unicredito Italiano. The range of values for MB/MC across banks is in fact smaller in Italy compared to France.

In Table 11 in the Appendix we report the ranking of the estimated index of competition by local markets. The parameter *cci* varies across counties. Very low values of the parameter in counties where big cities are located, that is densely populated areas, indicate tougher competition. Low values of *cci* can be found for instance in Hauts de Seine in France, where *cci* varies in a range between 0.32 and 0.71. In Italy the overall variability of *cci* is greater, ranging from 0.64 to 1.23. Notice that the index takes lower values in several northern provinces compared to southern provinces. The result that Italian banks in northern regions face greater competition than banks in southern regions confirms similar empirical evidence (see Cerasi et al., 2000, Guiso et al., 2006, and Chizzolini, 2007, among others).

3. Measuring the impact of mergers on competition

In the last two decades the structure of both French and Italian banking industries has changed due to M&As between existing banks, within and across borders: what has been the effect of on the degree of competition?

We use the model to attempt to answer empirically to this question. We will conduct few experiments about “virtual” mergers, although many of them really occurred in the period captured in our sample, with the objective of measuring their impact on the degree of competition.

Based on individual bank data in each local market, we conduct the following experiment: we sum the branches of the merging banks for each local market and re-estimate the model assuming that these new entities are replacing the old ones conditional on the pre-merger distribution of branches across local markets. We then look at the change in the competition index relatively to the base model. Although we are simplifying the reality, as we know that

following the merger banks tend to re-design their branching networks, still we think that the results we obtain are informative of the real impact of the merger.

3.1 The French mergers

The most relevant mergers in France in the recent years have been the merger between Crédit Agricole (CA) with Crédit Lyonnais (CL) occurred in 2004 and Credit Mutuel (CM) with Credit Industriel Commercial (CIC) occurred in 1998. Given that our French dataset includes the number of branches for each merger as separate entities in the banking group even after the year in which the merger occurred, we can evaluate its impact ex-post.[11]

The table below summarizes the mean of the relevant indicators for the base model and for the estimated model on 2007 data where we simulate contemporaneously the two mergers by adding together the branching networks of the merging banks, namely the branches of CA with CL and those of CM with CIC.

Table 7- Changes in the estimated parameters as a result of mergers in France, 2007

	cci	MB	MC	MB/MC
Base model	0.68	104.41	42.67	3.22
CA+CL and CM+CIC	0.54	45.30	18.45	3.23
CA+CL and CM+CIC and CE+BP	0.55	43.08	19.08	3.01

CA=Credit Agricole, CL=Credit Lyonnais, CM=Credit Mutuel, CIC= Crédit Industriel Commercial, CE=Caisses d'Epargne, BP=Banques Populaires

The result of the experiment shows that these two mergers have a large pro-competitive effect for the banking industry. All indicators move in the direction of an increase in toughness of competition.

When further adding to the previous two mergers also the "virtual" merger between Banques Populaires (BP) and Caisses d'Epargne (CE), approved after 2007, the main result on the

[11] This "ex-post" exercise of evaluation of the impact of the merger is not possible for Italy where the only information available after the merger occurred is the total number of branches of the new group; thus it is impossible to disentangle the single contribution in terms of branches of each separate bank.

impact on competition is not affected.[12] The inverse index of competition *cci* increases slightly compared to the previous two mergers, although the ratio between marginal benefits and costs decreases, indicating a loss in branching profitability. It is not easy to interpret these results without looking at the changes in the local market structure, as it will be done in the last part of this section.

3.2 The Italian mergers

We conduct the same type of experiment for the two most relevant mergers occurred in the Italian banking industry in the recent years, namely the merger between Intesa (IN) and San Paolo (SP) and the merger between Unicredito (UN) and Capitalia (CP). Notice that for the 2006 data the experiment of a merger between the two banks is "virtual" as it occurred only later in 2007. In the Table below we summarize the changes of the main indicators as concentration increases in the industry.

Table 8 – Changes in the estimated parameters as a result of mergers in Italy, 2006

	cci	MB	MC	MB/MC
Base model	1.17	551.38	242.51	2.57
IN and SP	1.19	601.88	269.20	2.52
UN and CP	1.23	685.08	290.92	2.66
IN+SP and UN+CP	1.27	781.57	335.54	2.63

IN=Intesa, SP=San Paolo IMI, UN=Unicredito, CP= Capitalia,

The merger between Intesa and Sanpaolo has an anti-competitive effect as shown by the effect on the *cci* index, while it reduces the efficiency as MC increases more than MB, decreasing the net gain of opening a new branch. No change relative to the base model seems however very significant. If we estimate the model by adding also the merger between Unicredito and Capitalia, as shown in the last row of Table 8, competition tends to decrease (*cci* increases) while the net gain of opening a branch increases. It is interesting to note the different impact of the two mergers with respect to the index of competition: Intesa and San

[12] See Ivaldi (2006) for a detailed analysis of this merger.

Paolo have branches overlapping in the local markets, while Unicredito and Capitalia have complementary networks. Therefore one would expect the first of the two mergers to have a greater anti-competitive effect. In our model however branching costs affect entry and branching decisions, together with market structure conditions. In particular with the merger between Unicredito and Capitalia there is a loss in efficiency due to the large increase in marginal costs. To recover these larger branching costs banks have to be more profitable, as shown by the increase in MB/MC. In the case of the merger between Intesa and San Paolo instead, the inefficiency is limited and considerations about the change in market structure prevails.

3.3 Relation between market structure and competition

In commenting the impact of a merger on competition we based our discussion on two effects: the first is the "efficiency" effect of the merger through the change in marginal costs of branching, the second is the "market power" effect due to the change in the market structure. However, we would like to understand better the relation between our index of competition and the various measures of market structure.

Among the measures of market structure we selected the index of Hirschman-Herfindahl (HHI), the GINI index and the number of large banks. The HHI is the sum of the square of branching market shares and it captures the degree of concentration in the market: given that large banks have greater market shares, the index HHI weights more changes in market shares of large banks. The GINI index is a measure of dispersion of market shares comparing the true market shares to the situation in which all banks have equal market shares: it increases the greater the inequality of market shares. Finally the number of large banks in the market counts the number of banks with a market share greater than the average share in that specific market.

First of all we compute the correlation between our index of competition and various measures of market structure at county level.

Table 9- Correlation between the index of competition and measures of market structure

FRANCE

	cci	HHI	GINI	N. Large banks
cci	1.00	0.54	0.59	-0.49
HHI	0.54	1.00	0.93	-0.72
GINI	0.59	0.93	1.00	-0.70
N. Large banks	-0.49	-0.72	-0.70	1.00

ITALY

	cci	HHI	GINI	N. Large banks
cci	1	0.11	-0.07	-0.21
HHI	0.11	1.00	0.53	-0.01
GINI	-0.07	0.53	1.00	-0.20
N. Large banks	-0.21	-0.01	-0.20	1.00

The results in Table 9 show that the degree of competition is affected by the type of market structure. In both countries the index of concentration HHI affects negatively the degree of competition indicating that higher concentration reduces competitiveness. A greater number of large banks in the market increases the degree of competitiveness, providing support to the argument in Cetorelli (1999) that a market with several large banks may be more competitive than a market where one dominant firm face a large fringe of small firms. The GINI index has instead opposite signs in the two countries: a greater equality in market shares increases competitiveness in France, while the opposite occurs in Italy.

Notice that the HHI may not be the best index to capture the degree of competition as the correlation with our measure of competition is about 50% in France, while only 11% in Italy. Other measures especially the number of large banks contribute to explain the degree of competition in a market and are closer to our measure of competition. However none of these measures in isolation captures the information contained in the index *cci*.

To better understand the impact of mergers on the competition index we analyze its change in relation with the measures of market structure: the idea is to understand how the market structure changes, due to the merger, affect competition.

[Insert Table 10 here]

Our model shows a pro-competitive effect of the two mergers of Credit Agricole with Credit Lyonnais and Credit Mutuel with CIC in France, since the average index *cci* across Departments falls from 0.68 to 0.54. Although the two mergers creates two large banking groups in France, we see from the change in the Gini index from 0.57 to 0.53 that branching market shares become more equally distributed at local level and that the number of large banks, relatively to the average share, increases from a mean value of 2.71 to 3.06. Although the HHI index rises, since the sum of market shares of the top largest banks increases, the two

mergers have a positive effect on competition. This positive impact on competition depends on the effect on the local market structure and in particular on the fact that they reduce the asymmetry in the distribution of market shares across banks. The merger between Credit Agricole and Credit Lyonnais, two large players with complementary branching networks, and the merger between two medium players such as Credit Mutuel and CIC, contribute to increase the number of largest banks with branches widespread in all Departments.

In Italy instead the two mergers of Intesa with San Paolo and Unicredito with Capitalia have a negative impact on competition, measured by the increase in the index *cci* across provinces from 1.17 to 1.27. In contrast with the French case, the asymmetry in branching market shares increases following the mergers, as shown by the increase in the Gini index from 0.58 to 0.63; further the number of large banks decreases slightly from 3.59 to 3.16 and finally the HHI index rises from an average value of 1900 to 2400. The effect of the two mergers on the Italian local market structures is anti-competitive: the two mergers in fact occur among the top players in the market and the overall effect is to reinforce their previous local market power.

Our econometric test shows how it would be misleading to base the assessment about the competitive effect of a merger only on the degree of concentration: the use of Merger guidelines based on HHI, as for instance the 1800/200 rule[13], leaves in fact outside other important considerations on the impact of the merger on competition. However it is important to stress that the informational requirement in terms of data to perform these experiments is the same as that needed in the antitrust analysis of mergers to compute local market concentration indexes such as the HHI.

4. Conclusion

This paper addresses from an empirical point of view the question of measuring the impact of mergers on competition in the banking sector. The question is relevant both from a positive and a normative perspective. European banking industries are rapidly changing following a wave of mergers and it is important to understand how the degree of competition is affected.

[13] The 1800/200 rule implies that a merger in a local market where HHI is greater than 1800 and that causes an increase in HHI by more than 200 points should be rejected.

In the paper we provide an estimated index of competition in retail banking markets, derived from a model where branching decisions are modelled together with the market structure. The result is an estimated parameter that measures the toughness of competition among banks, based on the elasticity of banks' profits with respect to branching network size in any given market: the lower the elasticity the higher the degree of competition. By using this index we rank local markets by degree of competition in Italy and France. We provide evidence that the retail banking industry in France is more competitive compared to Italy.

Further, in this paper we measure the impact of mergers on banking competitiveness. In our experiment on virtual mergers we show results of a merger enhancing competition. The reason is that when a merger creates a bank capable of competing with incumbent banks in all local markets, it might erase some of the local niches of market power and enhance competition.

The findings in this paper are based on a static model of bank behaviour. It is part of our future research agenda to take into account a more dynamic version of the branching competition game. Still we think that this model can provide insightful information about the competitive behaviour of banks in local markets and we suggest an index of competition that can be used as a tool in evaluating antitrust cases.

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Appendix – Tables

Table 2- Descriptive statistics

FRANCE	Total deposits (S)	Total branches (N)	Individual branches (k)	market share (k/N)
Mean	12406.1	441	46	10.61
Median	8091.4	373	23	5.36
Maximum	171591.3	1485	389	69.13
Minimum	1691.1	91	0	0.00
Std. Dev.	18837.0	253	55	12.61

ITALY	Total deposits (S)	Total branches (N)	Individual branches (k)	market share (k/N)
Mean	7064.2	237	19	7.89
Median	3647.6	163	7	4.10
Maximum	128132.5	2050	435	83.04
Minimum	442.8	25	1	0.13
Std. Dev.	15323.6	273	34	10.02

Table 3 – Estimated base model

FRANCE		Coefficient	P-value
cci	Constant	0.662	0.000
	SHRUR	0.082	0.192
	LPC	-0.003	0.000
mc	Bank dummies		
	Log likelihood	-346.0	
	# obs	862	
	% correct predictions*	84.1	
	Cramer's V	0.49	

ITALY		Coefficient	P-value
cci	Constant	1.243	0.000
	DBIGPRO	-0.340	0.000
	LPC	-0.003	0.000
mc	Bank dummies		
	Log likelihood	-649.284	
	# obs	1226	
	% correct predictions*	75.4	
	Cramer's V	0.20	

Note: SHRUR=share of rural areas within a county; DBIGPRO= dummy indicating densely populated urban areas; LPC=loans per-capita.

* % correct predictions is derived by summing diagonal cells in Table 4.

Table 4 – Goodness of fit (comparison of predicted vs. actual observations in % terms)

FRANCE	Predicted		
Actual	0	1	
dk<0,k=1	9.74	12.99	22.74
dk≥0,k>1	2.9	74.36	77.26
	12.65	87.35	100

ITALY	Predicted		
Actual	0	1	
dk<0,k=1	5.22	19.58	24.8
dk≥0,k>1	5.06	70.15	75.2
	10.28	89.72	100

Table 5 – Estimated values at county level

FRANCE	cci	MB	MC	MB/MC	PROFITS	Per-branch profit
Mean	0.68	104.41	42.67	3.22	7212.60	149.49
Median	0.69	107.33	39.20	3.23	2494.30	115.99
Maximum	0.71	258.99	99.38	7.85	297480.60	2240.58
Minimum	0.32	17.83	22.45	0.18	155.68	18.20
Std. Dev.	0.04	39.19	22.71	1.81	23792.30	208.34

ITALY	cci	MB	MC	MB/MC	PROFITS	Per-branch profit
Mean	1.17	551.38	242.51	2.57	14140.80	400.06
Median	1.19	486.05	216.90	2.22	2128.08	297.03
Maximum	1.23	1804.11	502.23	11.04	1231039.00	2829.97
Minimum	0.64	106.92	132.89	0.30	88.55	88.55
Std. Dev.	0.10	273.62	100.22	1.56	63479.60	393.54

Table 6 – Estimated values at bank level

FRANCE

Name	MC	MB	MB/MC	PROFITS	Per-branch profit	N. branches
BNP	28.83	121.06	4.20	7232.74	166.15	2154
BP	22.45	109.26	4.87	6231.00	150.95	2475
CA	51.62	74.46	1.44	7375.60	112.67	6238
CE	44.78	87.34	1.95	6836.15	125.46	4312
CIC	39.20	132.15	3.37	4914.24	186.97	1692
CL	25.75	126.35	4.91	7220.18	173.11	1947
CM	48.96	124.77	2.55	4485.55	182.56	3111
La Poste	99.38	44.05	0.44	13343.50	81.86	15581
SG	23.02	120.81	5.25	7226.57	166.43	2204

ITALY

Name	MC	MB	MB/MC	PROFITS	Per-branch profit	N. branches
BANCA NAZIONALE DEL LAVORO	132.89	482.43	3.63	6608.75	366.86	731
SANPAOLO IMI	178.57	590.34	3.31	22796.17	371.02	3171
MONTE DEI PASCHI DI SIENA	168.11	544.27	3.24	11823.78	369.94	1908
BANCA INTESA	150.99	583.84	3.87	26076.94	369.59	3029
BANCA LOMBARDA E PIEMONTESE	254.50	557.81	2.19	12837.27	474.63	787
UNICREDITO ITALIANO	502.23	583.54	1.16	22165.95	373.24	3028
CAPITALIA	200.53	544.52	2.72	17521.79	371.07	2013
BANCHE POPOLARI UNITE (IN FORMAZIONE)	216.90	571.19	2.63	16175.94	427.57	1205
BANCA ANTONIANA - POPOLARE	254.50	526.42	2.07	8402.67	387.52	1007
BPL	194.68	526.96	2.71	7626.60	400.37	901
BANCO POPOLARE DI VERONA	254.50	602.98	2.37	13232.54	450.27	1221
BANCA POPOLARE EMILIA ROMAGNA	254.50	548.75	2.16	9818.45	410.12	1175
BIPIEMME	446.58	590.97	1.32	30228.08	540.84	713
BANCA POPOLARE DI VICENZA	254.50	569.16	2.24	5550.81	446.76	524
CARIGE	254.50	511.63	2.01	4850.35	422.80	508
CREDITO EMILIANO - CREDEM	319.15	515.92	1.62	4172.66	417.31	470

Table 10 – Impact of mergers on the inverse index of competition and measures of market structure

FRANCE	cci	Gini	HHI	N. large banks	ITALY	cci	Gini	HHI	N. large banks
Base model	0.68	0.57	2400	2.71	Base model	1.17	0.58	1900	3.59
	(0.04)	(0.12)	(0.08)	(0.90)		(0.09)	(0.09)	(0.11)	(1.51)
CA+CL and CM+CIC	0.54	0.53	2600	3.06					
	(0.03)	(0.12)	(0.08)	(0.82)					
CA+CL and CM+CIC and CE+BP	0.55	0.50	2700	3.48	IN+SP and UN+CP	1.27	0.63	2400	3.16
	(0.03)	(0.14)	(0.08)	(0.71)		(0.09)	(0.09)	(0.14)	(1.17)

Note: standard deviations are in brackets.

CA=Credit Agricole, CL=Credit Lyonnais, CM=Credit Mutuel, CIC= Crédit Industriel Commercial, CE=Caisses d'Epargne, BP=Banques Populaires;

IN=Intesa, SP=San Paolo IMI, UN=Unicredito, CP= Capitalia.

Table 11 – Statistics by county, base model

FRANCE

Departement	cci	MC	MB	MB/MC	Gini	HHI	N. large banks
Paris	0.32	42.67	57.93	1.53	0.29	746	5
Hauts-de-Seine	0.51	42.67	163.06	4.42	0.29	969	5
Val-de-Marne	0.63	42.67	133.89	3.76	0.29	1044	6
Bouches-du-Rhône	0.64	42.67	128.55	3.87	0.37	1160	4
Seine-Saint-Denis	0.64	42.67	129.21	3.63	0.34	1146	5
Bas-Rhin	0.64	42.67	102.48	3.26	0.53	2025	2
Haute-Savoie	0.65	42.67	107.93	3.33	0.47	1567	2
Rhône	0.65	42.67	131.86	4.01	0.34	1320	3
Marne	0.66	42.67	123.90	3.84	0.54	2211	3
Haut-Rhin	0.66	42.67	95.75	3.05	0.56	2219	2
Essonne	0.66	42.67	132.09	3.84	0.31	1360	4
Nord	0.66	42.67	130.73	4.09	0.41	1413	4
Loire-Atlantique	0.66	42.67	108.79	3.40	0.43	1586	3
Yvelines	0.66	42.67	140.28	3.99	0.34	1304	4
Ille-et-Vilaine	0.67	42.67	117.89	3.73	0.51	1815	3
Territoire de Belfort	0.67	42.67	77.49	2.48	0.49	1829	3
Seine-et-Marne	0.67	42.67	130.05	3.87	0.42	1772	3
Finistère	0.67	42.67	108.57	3.49	0.55	1910	3
Loiret	0.67	42.67	117.03	3.62	0.45	1744	3
Gironde	0.67	42.67	108.85	3.34	0.45	1756	4
Val-d'Oise	0.67	42.67	125.15	3.63	0.39	1519	5
Vendée	0.67	42.67	110.34	3.59	0.62	2278	3
Var	0.67	42.67	117.39	3.48	0.45	1553	3
Hérault	0.68	42.67	120.78	3.62	0.56	1778	4
Haute-Garonne	0.68	42.67	134.20	4.05	0.40	1454	3
Morbihan	0.68	42.67	113.44	3.61	0.55	1998	3
Moselle	0.68	42.67	111.91	3.54	0.51	1968	3
Maine-et-Loire	0.68	42.67	101.09	3.29	0.60	2339	3
Isère	0.68	42.67	127.80	3.92	0.50	2006	3

ITALY

Province	cci	MC	MB	MB/MC	Gini	HHI	N. large banks
MILANO	0.64	252.35	398.69	1.75	0.50	1020	5
ROMA	0.76	252.48	640.48	2.75	0.53	950	6
TORINO	0.84	252.21	598.38	2.64	0.70	2828	4
NAPOLI	0.88	252.04	581.97	2.55	0.57	2727	6
FIRENZE	1.11	252.21	865.19	3.93	0.64	1390	2
SIENA	1.12	226.33	417.08	2.10	0.77	4155	2
BERGAMO	1.13	252.04	1040.17	4.73	0.60	1794	5
BOLZANO	1.13	222.22	762.23	4.14	0.65	355	1
BOLOGNA	1.13	252.48	1158.77	5.15	0.59	1380	4
BRESCIA	1.14	252.04	1079.18	4.94	0.59	1649	4
PADOVA	1.14	252.21	931.40	4.22	0.70	2962	6
MODENA	1.15	252.21	712.08	3.20	0.61	1383	4
TRENTO	1.15	235.13	784.26	3.76	0.74	2078	3
RIMINI	1.15	233.91	474.99	2.28	0.54	715	2
MANTOVA	1.15	240.35	420.30	1.92	0.56	1690	4
PARMA	1.15	252.48	613.91	2.74	0.59	1666	7
PRATO	1.15	254.71	417.49	1.88	0.61	1340	5
REGGIO EMILIA	1.15	252.21	582.69	2.63	0.58	1303	6
FORLI'-CESENA	1.15	251.86	516.42	2.36	0.61	801	2
VICENZA	1.16	254.73	767.47	3.47	0.64	1711	6
VERONA	1.16	252.48	813.55	3.63	0.68	1832	5
ANCONA	1.16	237.84	596.75	2.89	0.46	661	2
TREVISO	1.16	254.73	801.69	3.63	0.62	1256	5
UDINE	1.16	254.35	668.54	3.06	0.60	2302	5
RAVENNA	1.16	251.86	451.84	2.06	0.62	794	4
BIELLA	1.16	228.80	290.86	1.46	0.66	1889	2
SONDRIO	1.17	241.69	349.18	1.72	0.57	147	0
LODI	1.17	251.86	561.50	2.60	0.58	2968	3
LUCCA	1.17	235.00	459.80	2.19	0.61	1571	4

Doubs	0.68	42.67	98.78	3.11	0.54	2287	2	MACERATA	1.17	235.98	471.21	2.33	0.38	439	1
Vaucluse	0.68	42.67	113.18	3.45	0.55	1688	4	PESARO E URBINO	1.17	246.88	478.15	2.27	0.59	882	5
Côte-d'Or	0.68	42.67	103.85	3.26	0.54	2189	4	PIACENZA	1.17	239.40	491.11	2.29	0.57	2089	3
Alpes-Maritimes	0.68	42.67	152.77	4.47	0.38	1288	4	LECCO	1.17	251.86	476.52	2.18	0.54	651	3
Pyrénées-Orientales	0.68	42.67	103.83	3.04	0.62	2441	3	CREMONA	1.18	252.04	467.09	2.17	0.62	2209	3
Mayenne	0.68	42.67	91.58	2.99	0.67	2714	3	VARESE	1.18	252.21	934.86	4.21	0.61	1432	4
Gard	0.68	42.67	111.57	3.38	0.63	2497	3	COMO	1.18	252.21	703.22	3.19	0.63	1564	4
Meurthe-et-Moselle	0.68	42.67	106.52	3.32	0.44	2008	3	PORDENONE	1.18	242.77	425.70	1.99	0.61	2511	4
Indre-et-Loire	0.68	42.67	102.28	3.17	0.58	2625	3	AREZZO	1.18	237.33	408.49	1.96	0.70	1380	2
Savoie	0.68	42.67	109.73	3.42	0.63	2172	3	PISTOIA	1.18	239.97	377.82	1.76	0.62	1881	2
Côtes d'Armor	0.68	42.67	117.28	3.76	0.66	2557	3	VENEZIA	1.18	254.73	915.35	4.21	0.62	3053	7
Pyrénées-Atlantiques	0.68	42.67	122.91	3.71	0.48	1532	4	PESCARA	1.18	251.86	458.84	2.16	0.55	1504	2
Aveyron	0.68	42.67	99.47	3.07	0.69	3370	3	PERUGIA	1.18	233.91	650.06	3.19	0.63	1598	3
Deux-Sèvres	0.69	42.67	106.20	3.38	0.58	2242	4	ALESSANDRIA	1.18	252.04	539.05	2.40	0.54	1523	6
Loire	0.69	42.67	119.38	3.70	0.48	1935	3	CUNEO	1.18	256.46	664.04	2.96	0.70	2038	4
Charente-Maritime	0.69	42.67	98.76	3.10	0.58	2367	2	GENOVA	1.19	252.35	1067.13	4.85	0.56	1442	6
Vosges	0.69	42.67	89.22	2.82	0.51	2155	3	PISA	1.19	241.01	476.91	2.24	0.62	1189	2
Calvados	0.69	42.67	106.15	3.30	0.48	2003	2	NOVARA	1.19	256.46	513.25	2.30	0.58	1431	4
Seine-Maritime	0.69	42.67	121.48	3.72	0.43	1555	3	LIVORNO	1.19	231.45	392.76	1.92	0.65	1944	2
Oise	0.69	42.67	105.86	3.27	0.54	2101	3	ASCOLI PICENO	1.19	233.91	476.67	2.37	0.53	1168	4
Sarthe	0.69	42.67	92.14	2.98	0.57	2404	4	ASTI	1.19	252.04	266.19	1.18	0.65	580	3
Ain	0.69	42.67	106.02	3.34	0.58	2534	2	ROVIGO	1.19	231.45	443.78	2.13	0.68	6082	4
Aube	0.69	42.67	97.69	3.01	0.57	2512	2	SAVONA	1.19	254.75	381.54	1.73	0.60	2515	4
Pas-de-Calais	0.69	42.67	128.71	4.11	0.54	1925	3	VERBANO-CUSIO-OSSOLA	1.20	231.37	235.53	1.15	0.60	1183	2
Tarn	0.69	42.67	116.48	3.52	0.58	2206	4	BELLUNO	1.20	229.15	250.87	1.20	0.68	2137	3
Haute-Vienne	0.69	42.67	108.88	3.43	0.66	2797	3	GROSSETO	1.20	236.74	307.20	1.48	0.67	2801	2
Landes	0.69	42.67	90.21	2.74	0.62	2556	2	FERRARA	1.20	251.86	446.49	2.01	0.58	473	2
Drôme	0.69	42.67	107.17	3.34	0.57	2366	3	PAVIA	1.20	252.21	684.45	3.10	0.53	1730	4
Lot-et-Garonne	0.69	42.67	92.74	2.80	0.66	2818	2	VERCELLI	1.20	251.23	247.98	1.14	0.68	2565	4
Tarn-et-Garonne	0.69	42.67	86.04	2.65	0.67	3123	2	GORIZIA	1.20	230.29	288.84	1.44	0.51	3869	4
Manche	0.69	42.67	98.55	3.13	0.53	1989	4	TRIESTE	1.20	232.98	953.95	4.65	0.48	2066	4
Puy-de-Dôme	0.69	42.67	127.32	3.96	0.64	2642	2	MASSA	1.20	229.15	288.93	1.42	0.56	1680	4
Eure-et-Loir	0.69	42.67	112.18	3.57	0.54	1982	4	TERAMO	1.20	225.39	430.58	2.18	0.53	1111	1
Loir-et-Cher	0.69	42.67	99.00	3.14	0.63	2890	2	TERNI	1.20	231.37	292.83	1.44	0.69	2349	4
Vienne	0.69	42.67	94.50	3.00	0.65	2929	3	AOSTA	1.20	232.98	315.90	1.55	0.65	3384	2

Charente	0.69	42.67	83.27	2.62	0.64	3120	2
Jura	0.70	42.67	81.22	2.56	0.61	2802	3
Somme	0.70	42.67	116.60	3.74	0.65	2538	3
Aude	0.70	42.67	85.66	2.65	0.76	4075	2
Orne	0.70	42.67	101.03	3.27	0.58	2182	3
Hautes-Alpes	0.70	42.67	82.60	2.60	0.73	3377	2
Gers	0.70	42.67	93.98	2.82	0.70	3018	2
Cantal	0.70	42.67	91.40	2.85	0.77	3842	2
Aisne	0.70	42.67	100.71	3.19	0.62	2714	3
Corrèze	0.70	42.67	98.99	3.00	0.73	3368	2
Saône-et-Loire	0.70	42.67	105.46	3.26	0.57	2630	3
Eure	0.70	42.67	103.65	3.20	0.52	2059	3
Haute-Loire	0.70	42.67	98.80	3.17	0.69	2911	3
Indre	0.70	42.67	93.40	2.89	0.70	3138	3
Cher	0.70	42.67	92.29	2.84	0.67	2772	2
Yonne	0.70	42.67	85.88	2.63	0.65	2968	3
Haute-Saône	0.70	42.67	74.49	2.37	0.66	3507	2
Allier	0.70	42.67	103.41	3.19	0.65	3023	3
Lozère	0.70	42.67	71.61	2.20	0.76	4007	2
Ardennes	0.70	42.67	89.71	2.85	0.62	2684	2
Lot	0.70	42.67	95.65	2.90	0.69	3115	3
Corse A	0.70	43.10	83.62	2.52	0.74	4488	1
Nièvre	0.70	42.67	82.26	2.54	0.69	3156	3
Hautes-Pyrénées	0.70	42.67	89.11	2.67	0.62	2800	2
Dordogne	0.71	42.67	96.39	3.00	0.75	3756	2
Meuse	0.71	42.67	82.81	2.65	0.72	3805	2
Ariège	0.71	42.67	76.43	2.31	0.72	3869	2
Ardèche	0.71	42.67	100.55	3.19	0.69	3341	3
Corse B	0.71	43.10	84.89	2.64	0.78	4953	1
Haute-Marne	0.71	42.67	74.56	2.36	0.72	4011	2
Alpes-haute-Provence	0.71	42.67	78.28	2.43	0.71	3281	2
Creuse	0.71	42.67	73.23	2.33	0.74	3899	2
LA SPEZIA	1.20	231.45	309.55	1.49	0.58	2318	3
SASSARI	1.20	226.33	468.29	2.37	0.76	4637	2
IMPERIA	1.21	233.37	303.72	1.44	0.56	1804	5
VITERBO	1.21	235.13	354.36	1.74	0.57	1858	4
CAGLIARI	1.21	241.60	740.96	3.60	0.72	3514	4
CHIETI	1.21	225.39	491.65	2.46	0.48	1018	2
RAGUSA	1.21	237.33	327.17	1.57	0.48	836	1
BARI	1.21	256.32	1387.40	6.35	0.49	1124	7
L'AQUILA	1.21	237.33	369.18	1.80	0.68	2126	3
CATANIA	1.21	238.76	804.02	3.81	0.48	959	3
PALERMO	1.22	235.63	1111.61	5.36	0.54	1830	1
CAMPOBASSO	1.22	251.63	307.42	1.43	0.50	1606	4
RIETI	1.22	241.42	181.94	0.87	0.69	1908	3
TRAPANI	1.22	237.33	398.70	1.89	0.41	1140	4
LATINA	1.22	238.76	623.86	2.97	0.54	1847	3
SALERNO	1.22	237.08	974.21	4.64	0.57	1838	6
SIRACUSA	1.22	237.33	369.10	1.77	0.52	1204	2
MATERA	1.22	228.80	293.94	1.48	0.60	2475	3
LECCE	1.22	239.35	629.18	3.00	0.50	796	3
FOGGIA	1.22	256.32	580.60	2.56	0.47	1136	6
MESSINA	1.22	237.33	515.14	2.50	0.46	1231	3
CATANZARO	1.22	239.35	432.93	2.06	0.29	1297	6
FROSINONE	1.22	230.24	447.47	2.20	0.63	2185	3
CALTANISSETTA	1.22	205.99	355.91	1.86	0.56	1956	3
TARANTO	1.22	239.35	586.23	2.81	0.39	1428	5
COSENZA	1.23	235.63	555.94	2.66	0.52	2068	4
POTENZA	1.23	233.91	325.29	1.59	0.54	1028	3
ORISTANO	1.23	230.29	163.01	0.81	0.83	6288	1
AGRIGENTO	1.23	237.33	417.77	2.00	0.52	1989	4
NUORO	1.23	245.61	269.58	1.34	0.85	7003	1
AVELLINO	1.23	235.63	464.93	2.22	0.65	2742	3
CASERTA	1.23	233.91	742.85	3.67	0.63	5207	5
ISERNIA	1.23	231.05	130.39	0.64	0.41	2384	4
CROTONE	1.23	240.42	223.20	1.09	0.47	2620	4
ENNA	1.23	210.84	180.03	0.91	0.50	2370	4

BENEVENTO	1.23	233.91	306.45	1.48	0.51	1747	3
BRINDISI	1.23	235.98	416.60	2.06	0.44	1262	3
REGGIO CALABRIA	1.23	235.63	460.27	2.21	0.47	1967	5
VIBO VALENTIA	1.23	213.06	185.46	0.92	0.51	2832	5