The impact of mergers on the degree of competition in the banking industry

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ABSTRACT.

This paper addresses the empirical question of measuring competition in the banking sector. The question is relevant both from a positive and a normative perspective. Banking industries in Europe, specifically in France and Italy, are quickly changing their structure after deregulation, and it is interesting to find out which direction competition among banks has been following in the past few years. It is also interesting to be able to measure and forecast the change in degree of competition due to mergers among banks in an antitrust perspective.

The analysis is not however entirely data based. The quantitative results are derived from a well founded theoretical model that allows to infer information about benefits and costs by bank and by market from banks' entry and branching decisions. The estimated benefits and costs are then used to compute measures of degree of competition.

It results that the structures of the French and Italian banking industries differ, with a strong evidence that the Italian banking sector is still far from an equilibrium state, mostly because economies of scale in branching have still to be exploited and local market power niches are still allowed to exist. The measures of competitive behaviour presented in the paper indicate, on average, tougher competition in France than in Italy.

There is also some evidence that mergers do not induce lesser competition. Rather the opposite, in some cases.

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Introduction

The structure of European banking industries has been swiftly changing since the 1990's and the Second European Directive, that gave a strong impulse to liberalisation within and across national borders in a sector traditionally characterized by regulatory constraints. These constraints varied among countries and affected firms decisions on prices (interest rates), quantities (credit ceilings), and/or location (branching). While deregulation certainly lowered barriers to competition among banks, it also caused waves of M&A within, and later on, across national borders so that the structure of European banking industries has drastically changed in the last 10-15 years and is now characterized by high concentration levels.

It is still not entirely clear what the consequences on competition of this ever changing situation are: strategic decisions are no longer regulated by law and banks have gained some scale and scope efficiency but, at the same time, they have increased their market power through M&A operations[2].

More in general, how do we define and measure the degree of competitiveness in a market? Does an increase in concentration necessarily imply less competition? Is it possible to predict the marginal effect of an additional merger on overall competition within the industry?

A previous paper, Chizzolini 2007, presents measures of "competition" in the Italian and French banking industries, whose use as tools for antitrust purposes is now refined and further clarified.

The main indicator of competition discussed in this paper, *cci* from now on, is an estimated parameter within an econometric model that is in turn derived from a static model of bank behaviour that rests on the main assumption that banks compete in retail markets both through prices (interest rates) and branching network sizes and location. It summarizes information on the type and strength of market power wielded by the banks <u>given</u> demand and cost conditions in a market. In particular it increases with the power of banks to transfer into higher profits an increase in their (network) size. Such power is obviously challenged whenever the toughness of competition among banks is high, and *cci* decreases accordingly.

For each market, a "monopoly" *cci* can be computed, i.e. the value of *cci* that would obtain, given average market costs, if only one profit maximising bank or a cartel operated in that market.

[2] See Sapienza P., 2002; Altunbas et al. 2001; Gual ,1999.

If banks abide by profit maximising rules, *cci* takes on values in the 0 – 1 interval. Actual data may however reflect disequilibrium situations where banks in a market are temporarily operating away from non-collusive profit maximising conditions. In these cases *cci* may be larger than one.

In order to gain more insight into *cci*, as well as into some other measures of competitive behaviour based on the estimated bank benefits and costs , they will be compared later on with other measures of competition such as the Herfindahl and Lerner indexes: it must however be understood that each indicator is based on different sets of assumptions and different models and it cannot be expected that *cci* reproduce exactly the same information as the other indexes.

Section 1 summarizes the theoretical underpinnings of the estimated model of bank branching behaviour together with the technical definition of *cci* and of the other measures of bank performance produced by the model . Some results for both France and Italy are shown in section 2, while section 3 deals more in depth with the results on *cci*, and compares it with other widely known measures of industry concentration. Section 4 presents alternative scenarios and the use of the estimated indicator as a tool to measure changes in degree of competition in presence of mergers and other structural changes in the banking industry. Conclusions will close the paper.

1. The model and cci

1.1 The static model

The assumptions of the reference model [3] are that banks behave as non-cooperative monopolistic competitors and that they compete on both interest rates and branching network size and location. Each profit maximising bank will enter a market if its profits are at least equal to entry costs and it will expand its branching network up to the point where marginal benefits equate marginal costs, given its "expected" profit function. The profit, entry and branching cost functions are specified, in the theoretical model, as simple functions of observable and unobservable variables, and it is assumed that at each period in time each bank in a market takes its decision and (immediately) adjusts its branching network to its optimal size.

For each bank *i* operating in market *j*, Table 1 summarizes the relevant profit, entry and branching cost functions:

[3] See Cerasi et al. 2000

Table 1.1 – The functions in the theoretical model

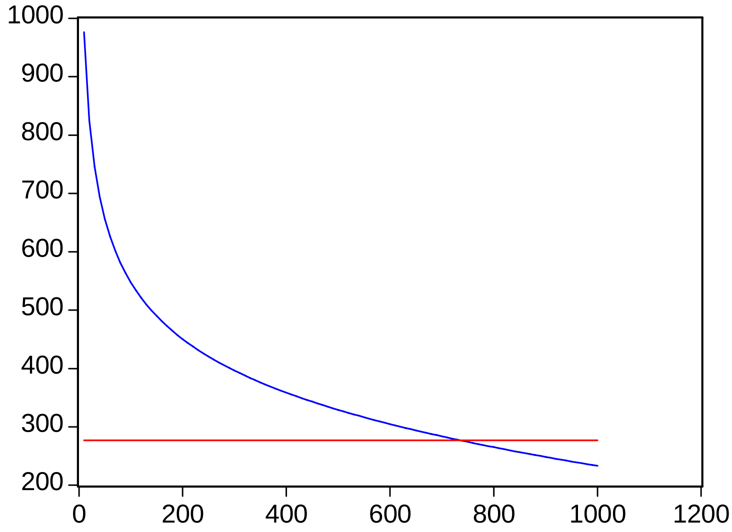
Profit function:	$\pi_{ij} \equiv \pi(k_{ij}; S_j, cci_j, N_j) = S_j \frac{k_{ij}^{cci_j}}{\sqrt{N_j}}$	[1]
Cost function, linear:	$s_{ij} = a_{ij} + \varepsilon_{ij}(k_{ij} - 1)$	[2]
Marginal branching benefits:	$MB_{ij} = \frac{d\pi(k_{ij})}{dk_{ij}} = \frac{S_j k_{ij}^{cci_j - 1}}{\sqrt{N_j}}\left(cci_j - \frac{k_{ij}}{2N_j}\right)$	[3]
Marginal branching costs:	$MC_{ij} = \frac{ds_{ij}}{dk_{ij}} = \varepsilon_{ij}$	[4]
Entry condition:	$\pi_{ij} \geq s_{ij}$	[5]
Profit maximizing condition:	$a) k_{ij} = 1 \rightarrow MB_{ij} < MC_{ij}$ $b) k_{ij} > 1 \rightarrow MB_{ij} = MC_{ij}$	[6]

Where:
k_{ij} =Number of branches of bank *i* operating in market *j*
S_j = Market size (Deposits in the empirical version)
$N_j = k_{ij} + \sum_{i \neq o} k_{oj}$ = Total number of bank branches operating in market *j*
cci_j = competition parameter
s_{ij} = Entry and branching costs
a_{ij} = Fixed entry costs for a unit branch bank, non observable variable
ε_{ij} = Constant marginal branching cost for bank *i* in market *j*, non observable variable

Note that the only observable bank specific variable is k_{ij}, the number of branches of bank *i* in market *j*. No accounting data will be needed in this set up, where the bank specific profit is approximated by a reduced form function of market *j* size , S_j, and number of competitors as measured by total branches in market j, N_j, as well as k_{ij}.

In any given market, for *cci*<1, profits are a concave function of *k* and marginal branching benefits are downward sloping as *k* increases. In the model in table 1, the bank specific entry and branching costs are specified as a linear function of *k* so that marginal costs are constant and equal to ε: The profit maximising branching network size for a bank operating in that market will be *k** such that MB = MC, as shown in figure 1.

Figure 1 – Marginal branching benefits and costs



Numbers used to draw figure 1 (they refer to Milano 2004)

S_j = 108368 (mil euro)
N_j = 2342
cci_j = 0.76

$$MB_{ij} = \frac{S_j k_{ij}^{cci_j - 1}}{\sqrt{N_j}} \left(cci_j - \frac{k_{ij}}{2N_j} \right)$$

(the blue curve)

Mc_{ij} = 277 (the red straight line)

Dropping the subscripts, for given S and N, k^* will increase with cci and decrease with the branching cost the bank faces: in this model cci is market specific and it approximately measures the elasticity of profits to branching[4]; MC, instead, is bank specific.

For given market size, number of competitors and cost conditions, cci will be lower when competition among banks is fierce. Note that each bank branch needs to compete against branches of other banks but also against other branches of its own bank so that increasing the network size has two effects on the bank's profits: an <u>expansionary</u> effect, when the new branch attracts customers away from other banks, and a <u>cannibalisation</u> effect when customers are attracted away from other branches of the same bank. If, for whatever reason, competition in the market gets stronger, cci decreases, the probability of having to resort to cannibalism increases, and the profit maximising bank may end up closing branches (k^* will decrease).

1.2 The empirical specification and estimation procedure

When turning to the data and the empirical testing of the model, time becomes an issue and the static model is transformed into a partially dynamic one.

In the way the empirical test is designed, there exists a time 0 when a bank takes its entry and branching decisions, based on the existing branching network size and on "expected" profits and branching costs at time 1, and the econometrician observes ex post (at time 1) if the bank is in the market and if it has expanded or shrunk its branching size. From theory, if the number of branches has increased or remained the same from t=0 to t=1 then it must be that the bank faced additional

[4] $cci = \frac{d \ln \pi(k)}{d \ln k} + \frac{k}{2N}$ ~ elasticity of bank's profit to branching ($k/2N$ is negligible)

branching costs equal or lower than additional branching benefits, viceversa costs must have been larger than benefits if the bank closed down branches or decided to keep just one branch open in that market. (See the empirical specification in T.1.1 and T.1.2). Given the assumptions made on the functional form of both the profit and the cost functions and assumptions on the stochastic properties of the unobservable (latent) variables in those functions, it is possible to estimate all the relevant variables: profits, marginal branching benefits and marginal branching costs.

Define:

$$
\begin{aligned}
&1) A_{ijt}^{e} = \frac{S_{jt} k_{ijt}^{cci_j - 1}}{\sqrt{N_{jt}}} \left(cci_{jt} - \frac{k_{ijt-1}}{2N_{jt}} \right) > \varepsilon_{ijt} \Leftrightarrow \Delta k_{ijt} \geq 0 \\
&2) A_{ijt}^{s} = \frac{S_{jt} k_{ijt}^{cci_j - 1}}{\sqrt{N_{jt}}} \left(cci_{jt} - \frac{k_{ijt-1}}{2N_{jt}} \right) < \varepsilon_{ijt} \Leftrightarrow \Delta k_{ijt} < 0 \text{ or } k_{ijt} = k_{ijt-1} = 1
\end{aligned}
\qquad [T.1]
$$

Assume ε_{ijt} is a random variable with a known distribution function, F_{ε}, and the following statements hold:

$$
\begin{aligned}
&1 \quad Pr(k_{ijt} > 1, \Delta k_{ijt} \geq 0) = \Pr(\varepsilon_{ijt} \leq A_{ijt}) \\
&2.1 \quad Pr(k_{ijt} > 1, \Delta k_{ijt} < 0) = \Pr(\varepsilon_{ijt} > A_{ijt}) \\
&2.2 \quad Pr(k_{ijt} = 1) = \Pr(\varepsilon_{ijt} > A_{ijt})
\end{aligned}
\qquad [T.2]
$$

The sample of banks operating at time t may be divided into the two groups:

$$
\begin{aligned}
&E_1 : Pr(k_{ijt} > 1, \Delta k_{ijt} \geq 0) = \Pr(\varepsilon_{ijt} \leq A_{ijt}) = F_{\varepsilon}(A_{ijt}) \\
&E_2 : Pr(k_{ijt} > 1, \Delta k_{ijt} < 0) \bigcup Pr(k_{ijt} = 1) = \Pr(\varepsilon_{ijt} > A_{ijt}) = 1 - F_{\varepsilon}(A_{ijt})
\end{aligned}
\qquad [T.3]
$$

Assume that ε_{ijt} is a stochastic lognormal variable :

$$
\varepsilon_{ijt} = MC_{ijt} \upsilon_{ijt} \therefore \ln(\varepsilon_{ijt}) = \ln(MC_{ijt}) + \ln(\upsilon_{ijt}) = mc_{ijt} + v_{ijt}, \text{and } v_{ijt} = \ln(\varepsilon_{ijt}) - mc_{ijt} \approx N(0,1) \quad [T.4]
$$

Then:

$$
\begin{aligned}
\Pr(A_{ijt} \geq \varepsilon_{ijt}) &= \Pr(\ln(A_{ijt}) \geq \ln(\varepsilon_{ijt})) = \Pr(\ln(A_{ijt}) - mc_{ijt} \geq \ln(\varepsilon_{ijt}) - mc_{ijt}) \\
&= \Pr(v_{ijt} \leq \ln(A_{ijt}) - mc_{ijt}) = \Phi(\ln(A_{ijt}) - mc_{ijt})
\end{aligned}
\qquad [T.5]
$$

and:

$$
\Pr(A_{ijt} < \varepsilon_{ijt}) = 1 - \Pr(v_{ijt} \leq \ln(A_{ijt}) - mc_{ijt}) = 1 - \Phi(\ln(A_{ijt}) - mc_{ijt})
$$

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

This reduces to a (binary) probit model of entry/branching in banking markets, where the parameters to be estimated conditional on a set of explanatory variables $W_{ijt} = [W^{c}_{jt} \mid W^{mc}_{it}]$ are $cci(W^{c}_{jt})$, the degree of competition index that depends on the characteristics of the market and enters A_{ijt}, (and MB_{ijt} obviously), and $mc(W^{mc}_{ijt})$, the mean of the logarithm of marginal branching costs that bank *i* faces in market *j* at time *t*, that mainly depends on the bank's characteristics. The likelihood function takes on the form:

$$\ln L = \sum_{ijt \in E_1} \ln \Phi\left(\ln(A_{ijt}) - mc_{ijt}\right) + \sum_{ijt \in E_2} \ln\left(1 - \Phi\left(\ln\left(A_{ijt}\right) - mc_{ijt}\right)\right) \qquad \text{[T.6]}$$

Once the estimates of cci_{jt} and mc_{jt} are obtained, MC_{jt} the average marginal cost by bank and MB_{ijt}, the estimated marginal branching benefit by bank by market can be computed together with the measures of bank specific market power: the *MB/MC* ratio and *(MB-MC)/MB* a pseudo-lerner index.

It is also possible to compute a benchmark value for cci_{jt}. It is the value that cci_{jt} would take on under monopoly in market *j*, for $k_{1jt} = N_{jt}$. This monopoly value, cci^{m}_{jt} , is the solution for cci_{jt} of the equation:

$$\frac{d\pi(k_{ij})}{dk_{ij}} = \frac{S_j N^{cci_j - 1}}{\sqrt{N_j}}\left(cci_j - \frac{1}{2}\right) = MC_{jt} \qquad \text{[T.7]}$$

2. Estimation results

2.1 The data.

The profit , the marginal branching benefits, and the threshold value A_{ijt} are functions of the market specific variables S_{jt}, and N_{jt}, and of the bank and market specific number of branches at time t, k_{ijt}, and at time t-1, k_{ijt-1}, as well as of the parameter *cci*.

S_{jt} is a measure of the size of the banking market and Deposits are taken to be a good indicator of market size, mainly because both loans and services, the outputs of banks, are a function of deposits. It is less straightforward to justify the choice of counties (provinces in Italy, departments in France), as local banking markets: from a strictly economic point of view other definitions of local markets might be more appropriate, such as those defined by industrial districts for example. Data, however are very easily available disaggregated according to the administrative definitions of counties, while almost non existent according to other geographical classifications.

Data were collected for 2003 and 2004 for France, and for 2002 and 2004 for Italy. For France, this allows to set up a cross-section sample of the relevant variables for all banks and all markets for 2004, where k_{ijt-1} are bank branches by département in 2003 and Δk_{ijt} is the variation of each bank's branches between 2003 and 2004. For Italy, in the 2004 cross-section k_{ijt-1} refers to bank branches by province in 2002.

For Italy, Deposits, Loans and total number of bank branches, N_{jt}, by province are collected and made publicly available by Bank of Italy.[5] On the Bank of Italy site the number of branches by bank, k_{ij}, are also available by province (actually by "comune", a more refined administrative classification). For France data on these variables were collected and made available by Crédit Agricole and Caisses d'Epargne. For each country, the major established groups[6] have been defined as banks, while smaller groups and local banks that do not belong to any group have been aggregated into one bank called "Others". There are 95 départements in France and 103 provinces in Italy.

While in France all banks have branches in all départements, apart from C.I.C. that does not operate in one departement in Corse, in Italy there are six national banks that have branches almost everywhere, but the remaining do not. They only operate in some areas of Italy, and have not attempted as yet to enter the rest of them. (See table 2.1.1).

The set of conditioning variables W_{ijt}, at this stage, consists mainly of market data, such as population and geographical surface, as well as the already mentioned loans by county: for both France and Italy the sources are the Central Statistical Offices, INSEE and ISTAT. There are as yet no bank specific variables in the dataset: bank dummies are used to capture banks' unobserved characteristics, especially insofar as they affect their costs. Descriptive statistics of the main variables are in Table 2.1.2.

Note that profits as defined in this paper are not directly comparable with accounting profits by bank by market (that are impossible to obtain): the two measures are however strongly correlated. Both are shares of total deposits in a market: in the model the shares are (nonlinearly) related to market share in terms of the branches. In reality, bank profits are, roughly, interests on outstanding loans (whose total amount must be a percentage of deposits) minus interests on deposits, plus services revenues (that depend on the amount of clients and deposits the bank is able to capure), minus operating costs that mostly depend on the bank's branching network size.

[5] See www.bancaditalia.it

[6] For Italy, the grouping procedure was performed according to ABI guidelines.

Table 2.1.1 - Banks and their frequency in the sample.

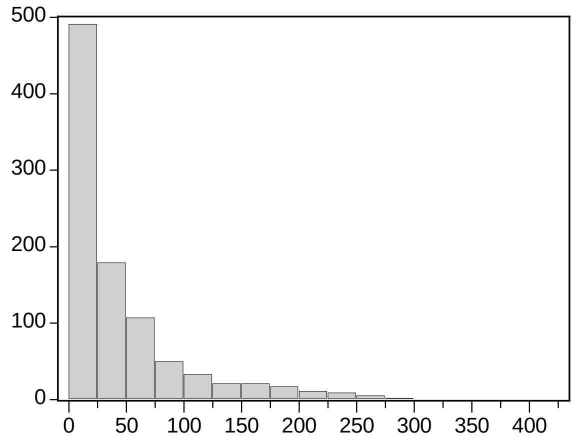
France			*Italy*		
Name	Code	Frequency	Code	Name	Freq.
Cr. Agricole	1	95	1005	BANCA NAZIONALE DEL LAVORO	103
B.N.P.	2	95	1025	SANPAOLO IMI	101
Cr.Lyonnais	3	95	1030	MONTE DEI PASCHI DI SIENA	98
B. POP.	4	95	3069	BANCA INTESA	102
S.G. + C.	5	95	3111	BANCA LOMBARDA E PIEMONTESE	51
CREDIT M.	6	95	3135	UNICREDITO ITALIANO	100
C.I.C.	7	94	3207	CAPITALIA	101
CAISSES	8	95	5026	BANCHE POPOLARI UNITE	61
OTHERS	9	95	5040	BANCA ANTONVENETA	84
LA POSTE	10	95	5164	BIPIELLE	75
			5188	BANCO POPOLARE DI VERONA	67
			5387	BANCA POPOLARE DELL'EMILIA ROMAGNA	48
			5584	BIPIEMME - BANCA POPOLARE DI MILANO	35
			5728	BANCA POPOLARE DI VICENZA	43
			6175	CARIGE	56
			20010	CREDITO EMILIANO - CREDEM	71
J^F = Départements : 95			J^I = Province : 103		
T^F = 2004 (Δk on 2003)			T^I = 2004 (Δk on 2002)		
k_{ijt} = source: Crédit Agricole , Caisses d'Epargne			k_{ijt} = source: Banca d'Italia and ABI		

Table 2.1.2 – Descriptive statistics

	France 2004			Italy 2004		
	S	N	S/SQRT(N)	S	N	S/SQRT(N)
Mean	12399.04	450.8526	502.8885	6257.066	257.9320	316.0830
Median	7810.290	385.0000	392.8610	3369.667	165.0000	252.8846
Maximum	234868.7	1512.000	6040.172	108368.2	2144.000	2340.397
Minimum	1642.868	93.00000	143.5380	422.0600	29.00000	78.37457
Std. Dev.	24452.99	248.2242	626.9556	12852.63	292.2839	282.2772
Skewness	8.101720	1.539312	7.483344	6.326470	4.135454	4.993545
Kurtosis	73.74807	6.337096	65.70910	46.46776	24.04850	32.94230
Observations	95	95	95	103	103	103

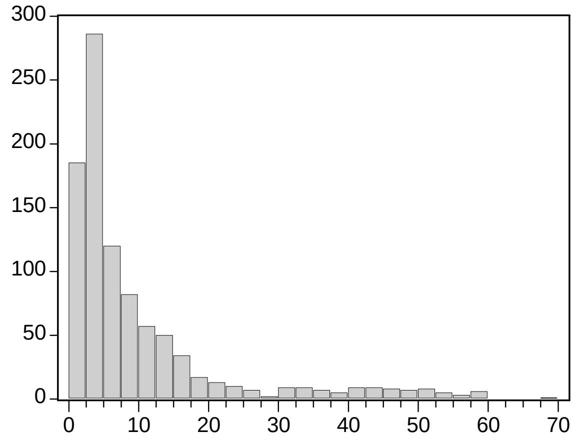
Table 2.1.2 – Descriptive statistics (continue)

France 2004



Series: K
Sample 1 949
Observations 949

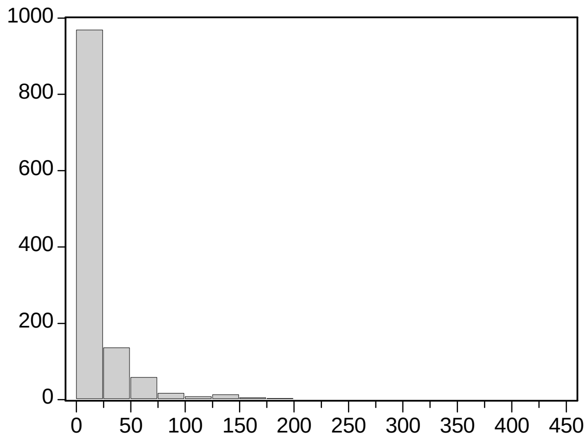
Mean	45.13277
Median	23.00000
Maximum	420.0000
Minimum	1.000000
Std. Dev.	56.69060
Skewness	2.405806
Kurtosis	10.15176
Jarque-Bera	2937.920
Probability	0.000000



Series: (K/BN)*100
Sample 1 949
Observations 949

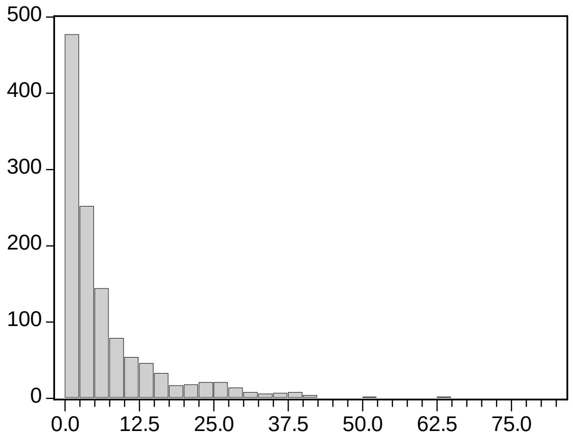
Mean	10.01054
Median	5.056180
Maximum	67.76557
Minimum	0.322581
Std. Dev.	12.20168
Skewness	2.265225
Kurtosis	7.738745
Jarque-Bera	1699.528
Probability	0.000000

Italy2004



Series: K
Sample 1 2758 IF K>0 AND
AGGBANK >99
Observations 1216

Mean	18.45559
Median	7.000000
Maximum	440.0000
Minimum	1.000000
Std. Dev.	34.46367
Skewness	5.318216
Kurtosis	44.39700
Jarque-Bera	92560.16
Probability	0.000000



Series: (K/BN)*100
Sample 1 2758 IF K>0 AND
AGGBANK >99
Observations 1216

Mean	7.071775
Median	3.647450
Maximum	80.83333
Minimum	0.099701
Std. Dev.	9.147066
Skewness	2.749493
Kurtosis	13.91703
Jarque-Bera	7570.629
Probability	0.000000

Table 2.2.1 – Comparison of the estimates of the base model: France 2004 vs Italy 2004

		Coefficient	Std. Error	z-Statistic	Prob.		Coefficient	Std. Error	z-Statistic	Prob.
	CREDIT AGR.	3.424	0.306	11.196	0.000	Const	5.833334	0.104276	55.9411	0
	CREDIT LYON.	2.920	0.249	11.708	0.000	BNL	-0.626531	0.167859	-3.732486	0.0002
	B.N.P.	2.992	0.274	10.927	0.000	SANPAOLO	-1.277594	0.246782	-5.177005	0
	B. POP.	2.103	0.390	5.387	0.000	MPS	-0.618509	0.18273	-3.384823	0.0007
	S.G. + C.	3.089	0.248	12.475	0.000	INTESA	0.833	0.133	6.278	0.000
	CREDIT M.	3.436	0.240	14.290	0.000	LOMBARDA E PIEMONT	0.102	0.207	0.496	0.620
MC	C.I.C.	3.084	0.202	15.268	0.000	UNICREDITO	-0.505	0.171	-2.960	0.003
	CAISSES	3.358	0.283	11.877	0.000	CAPITALIA	0.773	0.137	5.655	0.000
	OTHERS	4.624	0.227	20.373	0.000	BPU	-1.029	0.257	-4.009	0.000
	LA POSTE	4.003	0.361	11.097	0.000	ANTONVENETA	-0.222	0.166	-1.338	0.181
						BIPIELLE	-0.510	0.187	-2.723	0.007
						POP VR	-0.435	0.196	-2.219	0.027
	_cons	0.603	0.047	12.712	0.000	Const	1.382	0.036	38.008	0.000
C	shrur **	0.082	0.041	2.023	0.043	dbigpro	-0.185	0.051	-3.630	0.000
	lpc	-0.004	0.001	-4.526	0.000	Lpc	-0.008	0.001	-7.681	0.000
	Log likelihood	-396.302				Log likelihood	-648.91			
	Avg. log likelihood	-0.418				Avg. log likelihood	-0.53			
	Number of Coefs.	13				Number of Coefs.	15			

Table 2.2.2 – Descriptive statistics,estimated base model: France 2004 vs Italy 2004

	France 2004 – overall statistics						Italy 2004 – overall statistics					
	MC	cci	MB/MC	MB	LERNER	PROFIT	MC	cci	MB/MC	MB	LERNER	PROFIT
Mean	33.768	0.595	3.154	67.586	0.253	24956.410	324.847	1.241	2.707	607.590	0.289	11648.790
Median	28.725	0.606	2.901	68.417	0.655	5587.367	273.591	1.259	1.923	520.172	0.480	1841.888
Maximum	101.862	0.645	14.927	188.073	0.933	2536872.000	785.562	1.359	27.558	2622.884	0.964	#########
Minimum	8.190	0.260	0.082	8.368	-11.173	143.538	95.177	0.607	0.137	104.221	-6.278	78.375
Std. Dev.	25.478	0.046	2.453	29.537	0.960	116091.900	211.851	0.112	2.539	341.060	0.669	52005.330

France 2004 – Statistics by bank

	MC	cci	MB/MC	MB	LERNER	PROFIT	TOT_BR
CREDIT AGR.	30.68	0.59	1.34	41.21	0.18	23554.03	6428
CREDIT LYON.	18.53	0.59	4.48	83.00	0.76	22119.87	1907
B.N.P.	19.93	0.59	3.94	78.50	0.73	21984.55	2093
B. POP.	8.19	0.59	8.50	69.57	0.88	16657.98	2323
S.G. + C.	21.96	0.59	3.61	79.39	0.71	21215.07	2122
CREDIT M.	31.06	0.59	2.68	83.37	0.53	13929.26	3057
C.I.C.	21.84	0.59	4.06	88.59	0.73	13246.26	1611
CAISSES	28.73	0.59	1.76	50.70	0.41	21624.46	4364
OTHERS	101.86	0.59	0.79	80.33	-0.49	39569.83	2910
LA POSTE	54.76	0.59	0.39	21.43	-1.91	55539.55	16016

Italy 2004 – Statistics by bank

	MC	cci	MB/MC	MB	LERNER	PROFIT	TOT_BR
BNL	182.51	1.25	2.80	511.12	0.52	5420	729.00
SANPAOLO	95.18	1.25	7.37	701.70	0.82	18356	3127.00
MPS	183.98	1.25	3.35	615.72	0.60	9844	1812.00
INTESA	785.56	1.25	0.85	667.62	-0.58	21517	2931.00
LOMB. E PIEM.	378.35	1.22	1.48	559.05	0.11	10405	779.00
UNICREDITO	206.12	1.25	3.22	663.03	0.59	18922	3151.00
CAPITALIA	739.48	1.25	0.84	620.36	-0.64	13590	1926.00
BPU	122.09	1.24	5.48	669.32	0.75	13893	1223.00
ANTONVENETA	273.59	1.24	2.15	588.87	0.38	7383	1050.00
BIPIELLE	205.01	1.24	2.74	562.02	0.53	6428	904.00
POP VR	221.14	1.23	2.74	606.49	0.54	9403	1167.00
POPER	341.50	1.25	1.86	635.79	0.30	8426	1106.00
BPM	341.50	1.18	1.75	598.86	0.23	26765	608.00
POP VC	341.50	1.23	1.65	563.01	0.15	4464.68	465.00
CARIGE	341.50	1.24	1.57	537.16	0.17	3934.87	489.00
CREDEM	341.50	1.25	1.59	543.60	0.19	3595.74	470.00

Figure 2.1

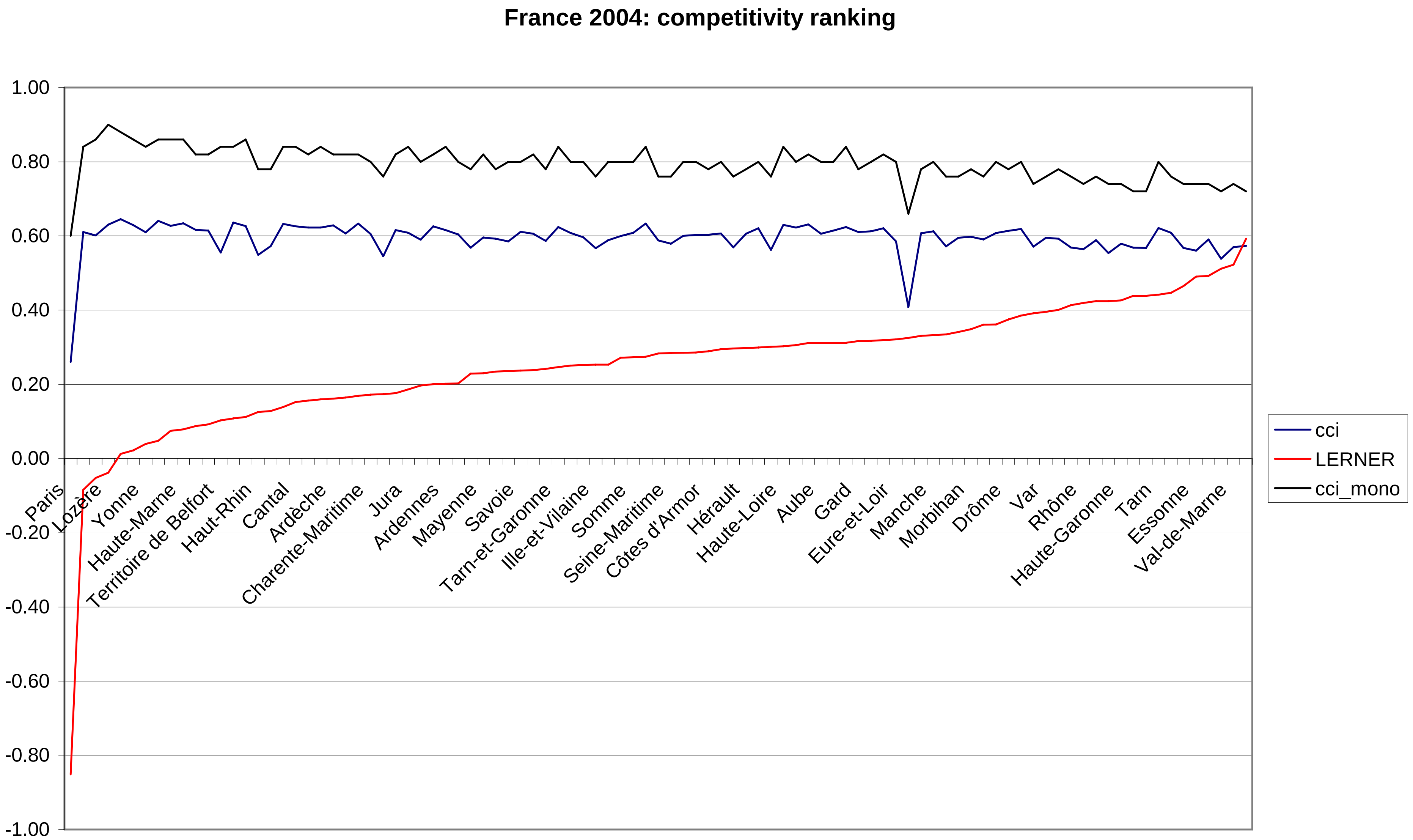

France 2004: competitivity ranking
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
Paris
Lozère
Yonne
Haute-Marne
Territoire de Belfort
Haut-Rhin
Cantal
Ardèche
Charente-Maritime
Jura
Ardennes
Mayenne
Savoie
Tarn-et-Garonne
Ille-et-Vilaine
Somme
Seine-Maritime
Côtes d'Armor
Hérault
Haute-Loire
Aube
Gard
Eure-et-Loir
Manche
Morbihan
Drôme
Var
Rhône
Haute-Garonne
Tarn
Essonne
Val-de-Marne
cci
LERNER
cci_mono

Figure 2.2

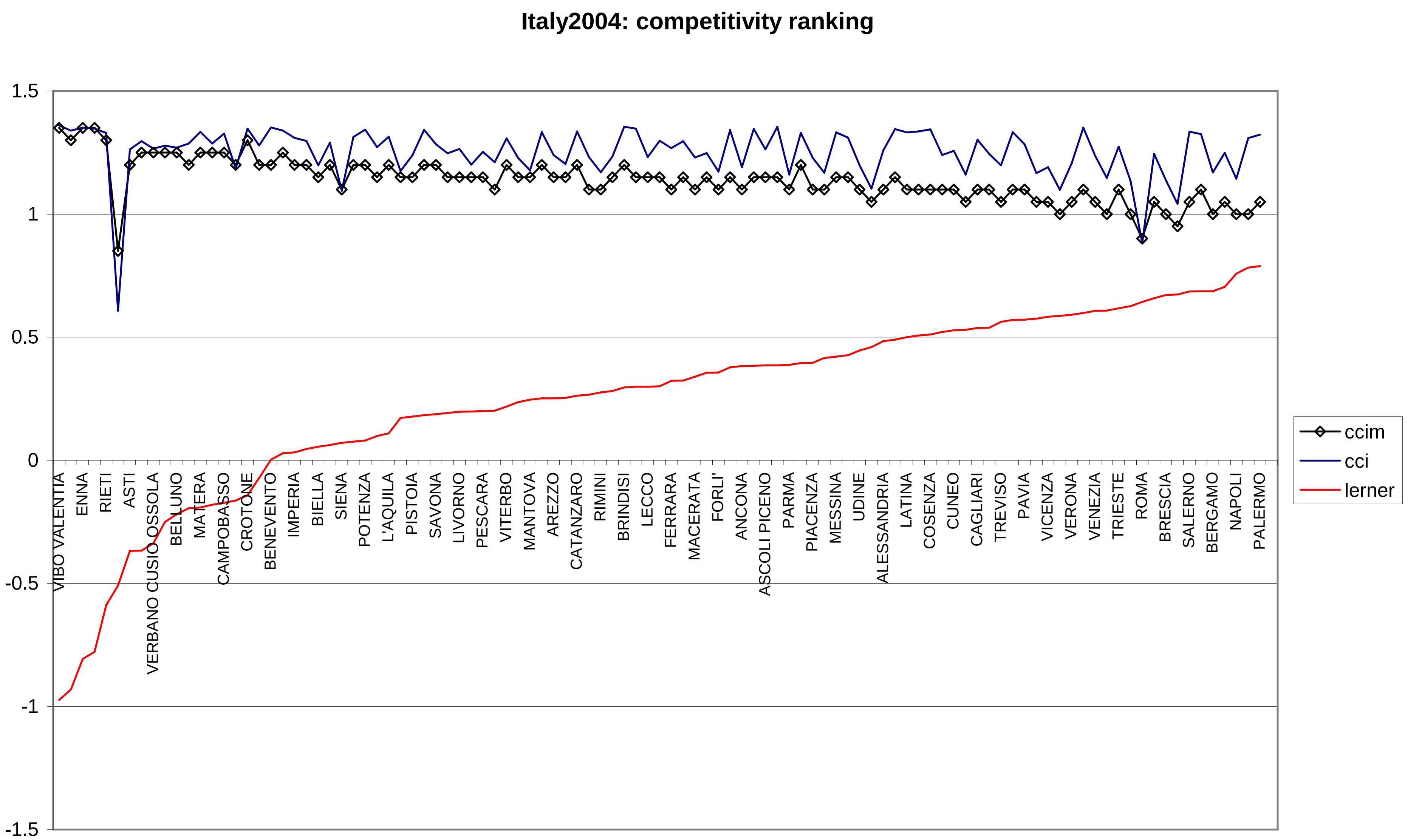

Italy2004: competitivity ranking
1.5
1
0.5
0
-0.5
-1
-1.5
VIBO VALENTIA
ENNA
RIETI
ASTI
VERBANO CUSIO OSSOLA
BELLUNO
MATERA
CAMPOBASSO
CROTONE
BENEVENTO
IMPERIA
BIELLA
SIENA
POTENZA
L'AQUILA
PISTOIA
SAVONA
LIVORNO
PESCARA
VITERBO
MANTOVA
AREZZO
CATANZARO
RIMINI
BRINDISI
LECCO
FERRARA
MACERATA
FORLI'
ANCONA
ASCOLI PICENO
PARMA
PIACENZA
MESSINA
UDINE
ALESSANDRIA
LATINA
COSENZA
CUNEO
CAGLIARI
TREVISO
PAVIA
VICENZA
VERONA
VENEZIA
TRIESTE
ROMA
BRESCIA
SALERNO
BERGAMO
NAPOLI
PALERMO
ccim
cci
lerner

Figure 2.3 - France 2004

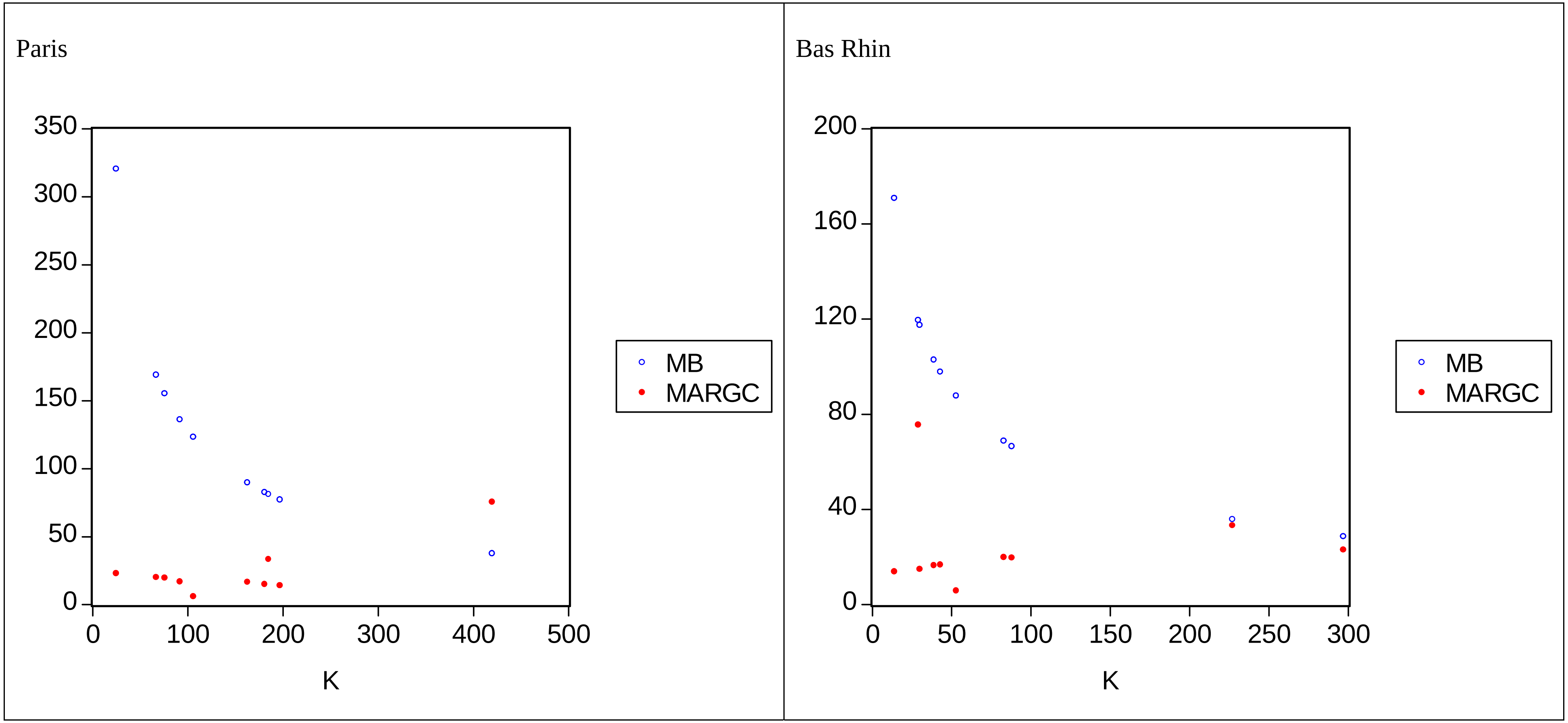
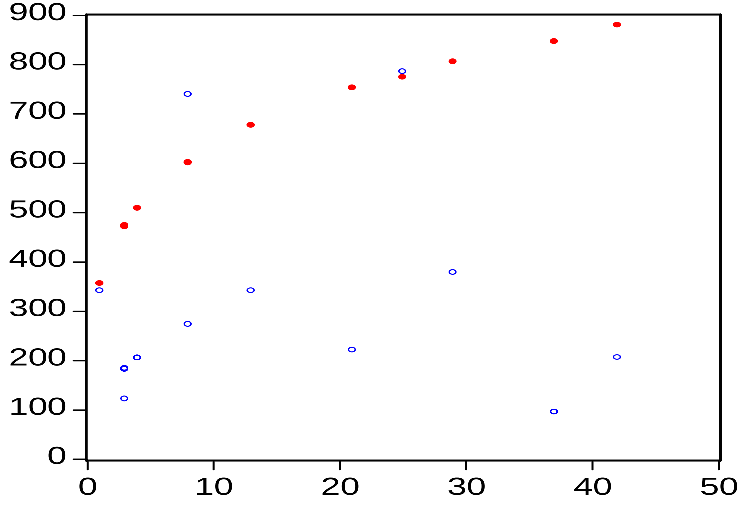


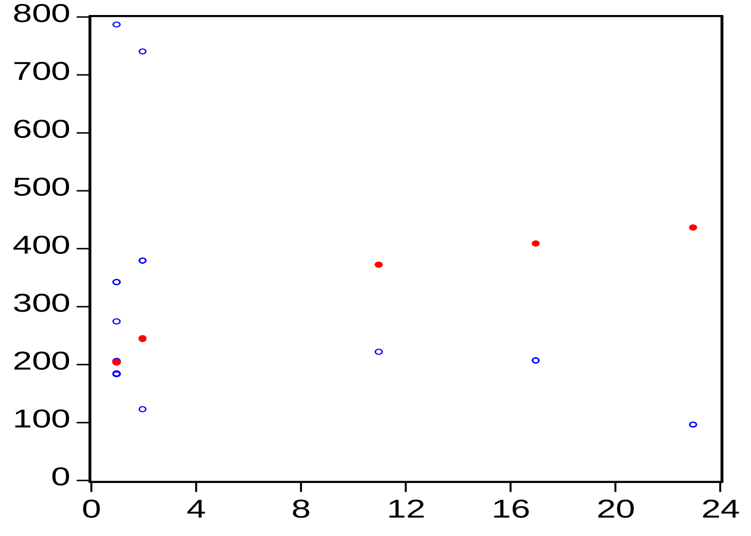
Figure 2.4 - Italy 2004

MB (red) and MC (blue) vs k

Alessandria: HHI=0.12, gini=23.6, cci=1.26



Asti: HHI=0.30, gini=-41.9, cci=1.26



2.2 Estimation results –base model

Tables 2.2.1, 2.2.2 and figures 2.1, 2.2, 2.3 and 2.4 show the results of estimates done on data for France and Italy in 2004. The specification process was subject to data availability constraints and the need to estimate similar base models for France and Italy. The main specification assumption, however, is that both market and bank specific variables may affect costs[7], while the competition parameter, *cci*, only depends on market variables.

The specified model allows for marginal costs to be different across banks (thanks to bank dummies for all banks including "Others" in France, for a relevant subset in Italy, where the "Others" group has been excluded from the sample). In turn, *cci*, the competition parameter, depends on loans per capita and is different across provinces because of socio-geographical characteristics: in Italy between very urban areas an the others, in France according to the share of rural surface in the department. Loans per capita are assumed to affect competition in each local market: banks will compete more fiercely to get the marginal client where activity levels and potential demand for loans are high.

There is room for improvement in the specification, but all estimated coefficients are significant and of the expected sign.

The results for France and Italy are very similar for the estimated coefficients of the variables that determine *cci*: rural areas in France are characterized by lower competition among branches while, symmetrically, *cci* is lower in urban areas in Italy, which indicates a tougher competition among banks in those provinces. In both countries banks compete fiercely where loans per capita are larger.

However, the constants in the specification of *cci* are very different between France and Italy (lower for France): this becomes even more evident when the average values of *cci* for Italy and France are compared. The average *cci* for Italy is 1.24 while it is 0.6 for France: the French banking markets seem to be more competitive than Italian local markets.

However, the other indicators of market power, the MB/MC ratio and the pseudo-lerner index are very similar for the two countries: lerner is 0.25 for France against 0.29 for Italy. The medians of this index is actually lower for Italy: 0.48 against 0.65.

The structure of the two industries is different enough to be puzzling and unexpected. The main result is the very high marginal profitability of branching in Italy: a *cci* lager than 1

[7] In the model presented in this paper, *mc* only depends on bank specific variables.

implies that the banks' profit function is not concave or, in other terms that there exist economies of scale to branching still to be exploited. Branching networks by bank are underdeveloped in most provinces, with the exceptions given by the most financially active provinces such as Rome, Milan, Naples, Turin. Guiso et al., 2006, argue that this situation is a consequence of historical bank regulations starting from the beginning of 1900. In France, regulation took the form of constraints on loans both through imposed ceilings and centrally managed loans, while branching decisions were not regulated . The alternative interpretation of such a difference in *cci*, suggested by the theoretical model in this paper, is of course a higher degree of collusion among banks in Italy than in France that takes on the form of very segmented and unchallenged local markets.

Looking at table 2.2.2 “Statistics by bank” , see that in France MC, marginal branching costs, are significantly higher for Crédit Agricole, La Poste and Other banks. The first two are characterized by big branching networks and their branches are located all over the territory, even the less densely populated areas. Banks in “Others” are county level banks that probably defy competition by keeping their local market niches.

In Italy, Banca Intesa, and Capitalia are characterized by high MC. In 2004, Banca Intesa was emerging from the restructuring period following its creation from the merger of Banca Commerciale Italiana and INTESA (issued from the merger of CARIPLO and Ambroveneta), both of them national banks. Many branches had been closed (some because of an antitrust ruling) in the previous years so that the branching network of Banca Intesa was actually smaller than the sum of those of the merging banks . Moreover there is some evidence that the two original networks were very similar in terms of geographical location. Capitalia, the other bank with high MC was experiencing a similar situation as it was the outcome of the merger between Banco di Roma and Banco di Santo Spirito.

A few comments on figures 2.1 and 2.2, graphical representations of the relevant results by county (and table A.1 in the Appendix). The parameter *cci* varies across counties, and the results strongly support the interpretation of *cci* as a measure of competition. Very low values of the parameter mean tougher competition: see Paris, Hauts-de-Seine, Bas-Rhin in France; Milano, Roma, in Italy. High values of c mean sluggish competition: in France see Creuse, Alpes Haute Provence, but *c* stays between 0.57 and 0.61 for all other provinces, not a large range of values. In Italy the variability of *cci* is more pronounced and it shows a definite pattern: it varies between 1.25 in most northern provinces to the high value of 1.3 in most southern provinces. These results confirm both anecdotic and empirical evidence, especially for Italy (Cerasi et al. 2000, Guiso et al. 2006 among others).

The main result is that in France *cci* stays well below the benchmark monopoly value, cci^m (see T.7), for all counties. In Italy, *cci* is larger than cci^m (although not significantly so) for almost all counties (there are very few notable exceptions). Note that the spread increases with the lerner index, i.e. with a measure of monopoly power in the market, or from another viewpoint, where *MB* are significantly larger, on average, than *MC*. Take two provinces with cci^m larger or equal to *cci*: Milano with cci^m =0.85 and *cci*=0.6 and Isernia with cci^m =1.35 and *cci*=1.347. The competition parameters are very different, but the lerner indexes are very similar between the two counties, and the motivation of this result is that Milano is characterised by fierce competition among banks, while Isernia is characterized by very high branching costs that do not leave any space for the banks to maneuver. (See tables A.1 and A.2 in the Appendix)

Another interesting information in the results by département or province: in some markets, four cases in France, many more in Italy, the average estimated marginal costs, *MC*, are larger than the estimated marginal benefits, *MB*. The one explanation that comes to mind is that banks are willing to cross-subsidize their branching operations or, in other words, are willing to locate in costly markets for strategic reasons and as long as they are able to shift funds from one market to another.

Comparisons between the estimated competition indicators and other measures of market concentration are left to the next section, where experiments with mergers will be performed.

3. Experiments on Mergers

3.1 The French mergers

Since 2004 the structure in both French and Italian banking industries has been changing further, thanks to new merger and acquisition operations involving existing banks, within and across borders.

Most relevant in France the merger between Crédit Agricole, (CA), and Crédit Lyonnais, (CL). To further check the effect of mergers on competition, assume also that Banques Populaires, (B.Pop), were to merge with Caisses d'Epargne, (Caisses). In Italy, the acquisition of BNL (Banca Nazionale del Lavoro) by the Group BNP Paribas, of Antonveneta by ABN-AMRO (and later on by MPS), the merger between Banca Intesa and Sanpaolo, most recently, between Unicredito and Capitalia, and between Banca Popolare di Lodi, (BPL), and Popolare di Novara e Verona, (NO.VR.).

What can the model presented in this paper say about within borders mergers and their consequences on the degree of competitions in each industry?

Let's take the 2004 data and conduct the following experiment: sum the branching networks by county of the banks involved in the mergers and reestimate the model. Check if and in which direction the competition indicators produced by the model change relative to the base model. It is a very rough experiment, and we know that in general a merged bank is "smaller" than the sum of the merging banks. Still this trick allows to embed in the model the changed market shares following a merger and compute the effects of such changes.

Table 3.1.1 The French mergers.

	MC	*cci*	MB/MC	MB	LERNER	hhi	gini
Mean – Base	33.77	0.59	3.15	67.59	0.25	0.25	-26.57
Mean – C.A. + C.L.	30.32	0.57	3.01	57.26	0.19	0.26	-24.35

The table above summarizes the mean of the relevant indicators of MC, MB and of competition, c, MB/MC and Lerner for the base model and for the estimated model on 2004 data where the branching networks of CA and CL have been added together.

The result of the experiment is quite clear: the merger does not cause a loss in competitiveness within the French banking industry. Rather the opposite. All indicators change, even if little, in the direction of an increase in toughness of competition

Table 3.1.2 The French mergers, (continue).

	MC	*cci*	MB/MC	MB	LERNER	hhi	gini
C.A.-C.L.+B.Pop-Caisses	38.07	0.60	2.36	64.63	0.13	0.27	-21.55

The result obtained by adding the hypothetic Banques Populaires-Caisses d'Epargne merger to the first one is more ambiguous. *cci* increases slightly but the lerner index decreases quite a lot thanks to an increase in marginal costs that is larger than the increase in marginal benefits induced by *cci*. It is not easy to interpret these results. The Caisses-B.Pop merger would create a new bank with a distribution of branches across départements both more profitable and more costly, that is with a larger concentration of branches in counties characterized by less competition, but more difficult and costly to enter.

3.2. The Italian mergers.

The same type of experiments were done for Italy using the 2004 data, and the Intesa-Sanpaolo and the Unicredito-Capitalia mergers. Table 3.2.1 summarizes the evolution of the main indicators as concentration increases in the industry.

Table 3.2.1 – Evolution of the estimated indicators as concentration increases in Italy 2004

	MC	*cci*	*MB/MC*	*MB*	*LERNER*	*hhi*	*gini*
Base model	324.85	1.24	2.71	607.59	0.29	0.185	13.944
INTESA-SANPAOLO	342.31	1.24	2.31	614.71	0.28	0.179	15.373
INTESA-SANPAOLO + UNICREDITO-CAPITALIA	369.92	1.28	2.41	713.72	0.32	0.188	16.469

The experiment with the merger between Intesa and Sanpaolo indicates that the competition degree does not change on average, while MC tend to increase slightly more than MB which leads to a slight decrease in the pseudo lerner index. No change relative to the base models seems however very significant. If we add the merger between Unicredito and Capitalia, competition tends to decrease (*cci* gets larger) and the lerner index jumps up, thus pointing towards an increase in market power linked to the further increase in concentration. But is there really an increase in concentration rather than a change in equilibria among banks in local markets? The two indexes, hhi and gini, were computed using the data in the available data set: hhi is an indicator of market concentration and is computed as the sum of the squared market shares in term of branches by group by county, $hhi_j = \sum_{i=1}^{n_j} \left(\frac{k_{ij}}{N_j} \right)^2$ (n_j is the number of banks operating in market *j*). Gini is a inequality indicator based on the difference between actual market shares and equal market shares, given the number of operating banks in market *j*: $gini_j = \sum_{i=1}^{n_j} \left(\frac{k_{ij}}{N_j} - \frac{1}{n_j} \right)$. As mergers occur, both indicators may change, but in the experiments above it is gini that changes more thus pointing to a shift in the balance of powers among banks in each local market, rather than a straightforward increase in market concentration. More information and some statistics and correlation coefficients between hhi, gini, and *cci*, lerner are given in the appendix, table A.3.

In the previous paper, Chizzolini 2007, the experiment involving an hypothetical merger between two banks that now operate in different mostly non overlapping areas of the country, and whose outcome would be a national bank, resulted in an overall increase in competition as measured by both the *cci* and pseudo-lerner indicators. The interpretation was that the new national bank would have challenged with more strength the incumbents in several local markets that are now characterized by some form of reduced competition.

4. Conclusions

This paper addresses the empirical question of measuring competition in the banking sector. The question is relevant both from a positive and a normative perspective. Banking industries in Europe, specifically in France and Italy, are quickly changing their structure after deregulation, and it is interesting to find out which direction competition among banks has been following in the past few years. It is also interesting to be able to measure and forecast the change in degree of competition due to mergers among banks in an antitrust perspective.

This paper suggests and gives some examples of basically two indicators of competition in retail banking markets, derived from a well founded theoretical model that allows to infer information about benefits and costs by bank and by market from banks' entry and branching decisions. The first is a parameter, *cci*, that directly measures toughness of competition among banks by quantifying the elasticity of a bank's profits to its size in any given market: the lower the elasticity the higher the degree of competition. The second indicator, *pseudo-lerner*, quantifies marginal cost benefit margins by bank by market: marginal benefits much larger than marginal costs point towards non competitive behaviour by banks. By combining the two indicators it is possible to rank markets by degree of competition and banks by observed degree of market power.

It results that the structures of the French and Italian retail banking industries in the first years of the twenty first century differ, with a strong evidence that the Italian banking sector is still far from an equilibrium state, mostly because economies of scale have still to be exploited and local market power niches are still allowed to exist. In France all major banks compete among each other on all markets in the country, although the strength of competition varies widely among départements. Overall, however both measures of competitive behaviour presented in the paper indicate, on average, tougher competition in France than in Italy.

The results for Italy confirm some already published findings, that stress how the present situation derives from historical banking regulation policies.

This paper, however, goes one step further by performing experiments to analyse the effects of mergers in both countries. It results that the SCP (structure conduct performance) statement that higher market concentration and larger market power for some firm will induce a reduction of competition in the industry does not necessarily hold true. There is some evidence that, on the contrary, mergers may enhance competition rather than the opposite, certainly in France but also in Italy especially if the merger creates a bank that is able to compete with incumbent banks in all local markets, hence erase some of the local niches of market power.

Comparisons between *cci* and *pseudo-lerner* and other acknowledged measure of market concentration, the Herfindhal index and a gini-type inequality index, close the paper.

The findings in this paper are based on a static model of bank behaviour: they must be considered as still pictures of the structure of the banking industries and may be used to perform comparative static analyses. Given these limitations, however, they are able to provide extremely insightful information about banks' competitive behaviour in local markets and the suggested indicators can be (and have been) used as tools in antitrust cases.

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Appendix

Table A.1 – Statistics by county, base model

DEPARTEMENT	HHI	GINI	cci	ccim	%cci/ccim	MC	MB	LERNER	MB/MC	PROVINCE	hhi	gini	cci	ccim	%cci/ccim	MC	MB	lerner	MB/MC
Ain	0.26	-28.03	0.59	0.80	73.22	33.76	63.40	0.24	2.89	Alessandria	0.12	23.64	1.26	1.10	114.41	313.54	631.19	0.48	2.85
Aisne	0.28	-31.78	0.60	0.80	75.53	33.76	63.18	0.20	3.26	Asti	0.30	-41.91	1.26	1.20	105.23	313.54	259.20	-0.37	1.28
Allier	0.30	-32.25	0.62	0.80	77.85	33.76	71.04	0.31	3.20	Cuneo	0.19	19.54	1.26	1.10	114.19	322.58	751.20	0.53	3.41
Alpes-haute-Provence	0.33	-36.25	0.64	0.86	74.46	33.76	56.97	0.05	2.70	Novara	0.15	9.69	1.25	1.15	108.52	322.58	530.77	0.36	2.42
Hautes-Alpes	0.34	-34.44	0.63	0.86	72.95	33.76	62.69	0.08	2.84	Torino	0.18	46.80	1.04	0.95	109.60	317.27	966.59	0.67	4.16
Alpes-Maritimes	0.14	-19.07	0.59	0.74	79.84	33.76	82.80	0.49	3.83	Vercelli	0.21	0.00	1.29	1.20	107.18	322.58	291.00	-0.19	1.31
Ardèche	0.34	-39.74	0.63	0.82	76.66	33.76	64.26	0.16	3.18	Biella	0.24	2.64	1.20	1.15	104.12	312.18	335.16	0.06	1.68
Ardennes	0.28	-29.32	0.62	0.84	73.30	33.76	61.60	0.20	3.07	Verbano Cusio Ossola	0.21	-14.73	1.27	1.25	101.26	319.73	259.23	-0.34	1.30
Ariège	0.37	-39.28	0.63	0.86	73.19	33.76	56.11	0.02	2.52	Aosta	0.19	-3.80	1.30	1.25	103.64	340.66	301.69	-0.37	1.51
Aube	0.25	-26.26	0.61	0.80	75.73	33.76	65.60	0.31	2.92	Lecco	0.11	-4.25	1.23	1.15	107.06	313.54	460.68	0.30	2.11
Aude	0.39	-43.56	0.61	0.84	72.65	33.76	58.33	-0.08	2.69	Lodi	0.19	6.08	1.20	1.15	104.63	322.80	439.91	0.25	1.99
Aveyron	0.34	-34.70	0.61	0.82	73.92	33.76	72.03	0.24	3.05	Bergamo	0.14	33.15	1.17	1.00	116.90	315.54	1048.92	0.69	4.81
Bouches-du-Rhône	0.14	-17.40	0.57	0.72	78.82	33.76	76.38	0.44	3.75	Brescia	0.16	45.01	1.14	1.00	113.76	315.54	961.85	0.67	4.25
Calvados	0.21	-25.96	0.59	0.78	75.23	33.76	58.93	0.24	3.00	Como	0.12	-0.05	1.24	1.1	112.73	317.27	698.39	0.52	3.18
Cantal	0.40	-38.71	0.63	0.84	74.55	33.76	74.64	0.15	3.25	Cremona	0.18	15.75	1.23	1.15	107.29	320.39	462.98	0.28	2.06
Charente	0.32	-35.07	0.61	0.82	74.93	33.76	56.10	0.09	2.70	Mantova	0.16	21.33	1.18	1.15	102.43	318.78	432.86	0.25	1.86
Charente-Maritime	0.26	-31.76	0.61	0.80	75.64	33.76	59.05	0.17	2.86	Milano	0.09	56.98	0.61	0.85	71.41	318.78	276.59	-0.51	1.09
Cher	0.29	-36.73	0.62	0.82	75.17	33.76	57.81	0.09	2.81	Pavia	0.13	20.22	1.28	1.1	116.68	317.27	781.43	0.57	3.45
Corrèze	0.34	-36.71	0.62	0.84	74.13	33.76	70.73	0.16	3.25	Sondrio	0.31	-56.47	1.19	1.2	98.80	366.71	316.10	-0.16	1.34
Corse	0.48	-39.60	0.64	0.84	75.71	35.08	69.05	0.11	3.13	Varese	0.13	27.70	1.24	1.05	118.52	317.27	1035.34	0.66	4.72
Côte-d'Or	0.22	-24.93	0.60	0.80	74.52	33.76	60.59	0.25	2.89	Genova	0.13	34.06	1.25	1.05	118.90	318.78	1185.82	0.70	5.08
Côtes d'Armor	0.25	-28.04	0.60	0.78	77.34	33.76	75.46	0.29	3.73	Imperia	0.15	15.49	1.31	1.2	109.09	342.72	369.62	0.03	1.52
Creuse	0.38	-39.89	0.65	0.88	73.33	33.76	56.86	0.01	2.61	La Spezia	0.21	13.02	1.30	1.2	108.11	334.57	372.38	0.05	1.54
Dordogne	0.38	-42.72	0.63	0.82	77.28	33.76	69.85	0.17	3.34	Savona	0.18	24.62	1.28	1.2	106.95	329.49	434.52	0.19	1.88
Doubs	0.23	-26.01	0.59	0.80	73.57	33.76	61.45	0.25	2.82	Bolzano	0.26	-21.56	1.10	1.05	105.10	365.47	657.53	0.46	3.09
Drôme	0.24	-28.37	0.61	0.78	78.69	33.76	74.90	0.38	3.59	Trento	0.26	18.16	1.17	1.05	111.02	327.09	762.23	0.58	3.30
Eure	0.22	-25.07	0.59	0.80	73.78	33.76	56.65	0.20	2.84	Belluno	0.22	11.58	1.27	1.25	101.56	338.90	293.99	-0.22	1.28
Eure-et-Loir	0.20	-16.27	0.59	0.80	73.15	33.76	66.76	0.32	3.08	Padova	0.18	40.10	1.15	1	114.72	317.27	824.59	0.61	3.59
Finistère	0.20	-21.16	0.59	0.76	77.45	33.76	82.61	0.42	4.14	Rovigo	0.24	6.97	1.27	1.15	110.57	326.42	401.77	0.10	1.84
Gard	0.25	-32.05	0.61	0.78	78.29	33.76	74.92	0.32	3.50	Treviso	0.14	26.38	1.20	1.05	114.12	331.21	802.34	0.56	3.32
Haute-Garonne	0.16	-19.41	0.58	0.74	78.27	33.76	72.19	0.43	3.32	Venezia	0.16	31.88	1.24	1.05	117.75	330.42	934.37	0.61	4.07
Gers	0.30	-26.74	0.63	0.84	75.47	33.76	74.68	0.27	3.22	Verona	0.18	33.93	1.21	1.05	114.93	320.12	845.75	0.59	3.61

Gironde	0.20	-29.03	0.59	0.76	77.39	33.76	63.16	0.28	3.07
Hérault	0.20	-30.28	0.61	0.78	77.66	33.76	72.79	0.30	3.47
Ille-et-Vilaine	0.20	-22.97	0.57	0.76	74.62	33.76	62.91	0.25	3.04
Indre	0.31	-38.26	0.62	0.82	75.94	33.76	64.10	0.16	3.11
Indre-et-Loire	0.28	-30.69	0.60	0.80	75.38	33.76	66.45	0.29	3.00
Isère	0.21	-26.23	0.59	0.76	77.75	33.76	69.66	0.36	3.33
Jura	0.28	-28.96	0.61	0.84	72.48	33.76	59.88	0.19	2.52
Landes	0.26	-33.43	0.63	0.82	76.30	33.76	61.25	0.20	2.91
Loir-et-Cher	0.30	-31.34	0.61	0.80	76.83	33.76	72.52	0.31	3.30
Loire	0.20	-17.02	0.59	0.78	75.94	33.76	69.97	0.40	3.23
Haute-Loire	0.29	-23.90	0.63	0.84	74.99	33.76	76.89	0.30	3.44
Loire-Atlantique	0.17	-14.90	0.57	0.74	77.20	33.76	68.44	0.39	3.20
Loiret	0.18	-19.96	0.57	0.76	75.27	33.76	64.40	0.33	3.10
Lot	0.33	-32.02	0.62	0.84	74.32	33.76	83.68	0.31	3.39
Lot-et-Garonne	0.27	-29.37	0.62	0.82	75.07	33.76	61.20	0.18	2.73
Lozère	0.36	-34.96	0.63	0.90	70.01	33.76	58.17	-0.04	2.61
Maine-et-Loire	0.24	-22.65	0.61	0.80	75.83	33.76	69.69	0.29	3.30
Manche	0.20	-16.91	0.61	0.80	76.59	33.76	65.54	0.33	3.09
Marne	0.23	-25.81	0.57	0.74	76.68	33.76	88.49	0.46	4.21
Haute-Marne	0.39	-40.22	0.63	0.86	73.78	33.76	60.36	0.08	2.66
Mayenne	0.28	-22.26	0.60	0.82	72.68	33.76	77.18	0.23	3.38
Meurthe-et-Moselle	0.20	-23.48	0.57	0.78	72.86	33.76	55.89	0.23	2.67
Meuse	0.39	-39.55	0.63	0.86	72.89	33.76	64.62	0.11	2.81
Morbihan	0.21	-21.59	0.60	0.78	76.67	33.76	71.98	0.35	3.53
Moselle	0.20	-12.63	0.57	0.76	74.93	33.76	63.20	0.30	2.88
Nièvre	0.32	-33.78	0.63	0.84	75.30	33.76	59.96	0.14	2.72
Nord	0.16	-21.58	0.57	0.72	78.90	33.76	77.34	0.44	3.91
Oise	0.23	-27.68	0.57	0.78	73.44	33.76	56.30	0.13	2.83
Orne	0.23	-18.64	0.62	0.82	75.67	33.76	68.08	0.32	3.27
Pas-de-Calais	0.20	-23.63	0.59	0.76	78.28	33.76	70.98	0.34	3.68
Puy-de-Dôme	0.28	-31.60	0.61	0.78	77.86	33.76	75.75	0.33	3.61
Pyrénées-Atlantiques	0.18	-25.34	0.61	0.76	80.11	33.76	80.62	0.45	3.85
Hautes-Pyrénées	0.28	-30.26	0.63	0.82	76.98	33.76	67.26	0.31	2.92
Pyrénées-Orientales	0.25	-27.67	0.62	0.80	77.35	33.76	83.57	0.39	3.64
Bas-Rhin	0.20	-8.35	0.54	0.72	74.86	33.76	93.60	0.51	4.42
Haut-Rhin	0.22	-9.73	0.55	0.78	70.42	33.76	54.93	0.13	2.52

Vicenza	0.17	24.53	1.19	1.05	113.37	317.27	795.17	0.58	3.40
Gorizia	0.20	1.69	1.28	1.25	102.25	374.85	314.38	-0.25	1.44
Trieste	0.17	26.77	1.27	1.1	115.84	336.56	880.32	0.62	3.89
Udine	0.16	24.64	1.20	1.1	108.91	340.81	649.71	0.45	2.76
Pordenone	0.17	18.76	1.25	1.15	108.46	340.81	447.57	0.19	1.93
Bologna	0.12	37.90	1.13	1	113.34	320.12	889.39	0.63	3.80
Ferrara	0.19	-18.16	1.27	1.1	115.27	310.70	484.43	0.32	2.19
Forli'	0.15	-1.83	1.17	1.1	106.65	308.14	496.63	0.36	2.33
Modena	0.14	32.52	1.16	1.05	110.52	314.81	689.33	0.53	2.99
Parma	0.14	11.93	1.16	1.1	105.51	320.12	523.73	0.39	2.15
Piacenza	0.18	14.00	1.23	1.1	111.72	317.27	516.21	0.40	2.17
Ravenna	0.14	-6.67	1.20	1.15	104.37	326.42	438.85	0.20	1.92
Reggio Emilia	0.13	28.43	1.17	1.1	106.18	312.90	543.66	0.42	2.36
Rimini	0.18	-10.82	1.17	1.1	106.34	316.05	444.26	0.28	2.10
Arezzo	0.20	4.77	1.24	1.15	107.73	325.05	454.44	0.25	1.94
Firenze	0.15	41.34	1.10	1	109.88	314.81	763.20	0.59	3.29
Grosseto	0.29	13.82	1.28	1.2	106.55	351.72	358.29	-0.07	1.37
Livorno	0.21	18.59	1.26	1.15	109.92	331.22	448.44	0.20	1.94
Lucca	0.16	21.74	1.23	1.15	106.74	331.21	467.25	0.24	1.89
Massa Carrara	0.18	11.34	1.29	1.25	102.89	334.57	309.55	-0.18	1.26
Pisa	0.15	9.36	1.23	1.1	111.93	335.64	504.79	0.27	2.14
Pistoia	0.21	16.12	1.24	1.15	107.64	327.58	425.44	0.18	1.75
Siena	0.43	14.33	1.09	1.1	99.42	334.77	362.92	0.07	1.63
Prato	0.13	23.40	1.17	1.15	102.15	331.89	411.88	0.17	1.64
Perugia	0.16	34.73	1.24	1.1	113.18	322.22	756.10	0.54	3.51
Terni	0.23	13.50	1.29	1.2	107.48	320.86	353.74	0.06	1.51
Ancona	0.14	17.63	1.19	1.1	108.18	317.51	544.75	0.38	2.66
Ascoli Piceno	0.14	10.52	1.26	1.15	109.80	316.05	551.76	0.39	2.66
Macerata	0.23	-15.76	1.23	1.1	111.77	315.11	498.03	0.34	2.47
Pesaro E Urbino	0.17	-5.54	1.21	1.1	110.02	313.54	445.85	0.20	2.23
Frosinone	0.20	15.87	1.34	1.15	116.65	328.40	544.94	0.38	2.30
Latina	0.17	25.77	1.33	1.1	121.09	330.42	694.87	0.50	2.88
Rieti	0.22	-0.55	1.33	1.3	102.29	381.78	236.34	-0.59	0.75
Roma	0.09	53.22	0.88	0.9	97.97	320.12	949.86	0.64	3.88
Viterbo	0.17	22.08	1.31	1.2	109.00	352.78	443.89	0.22	1.62
Chieti	0.17	1.42	1.31	1.15	113.98	313.50	577.08	0.43	2.89

Rhône	0.14	-16.37	0.56	0.74	76.24	33.76	69.37	0.42	3.34
Haute-Saône	0.35	-36.68	0.60	0.86	69.92	33.76	51.91	-0.05	2.27
Saône-et-Loire	0.27	-28.61	0.61	0.80	76.58	33.76	67.33	0.32	3.12
Sarthe	0.25	-24.59	0.60	0.80	75.02	33.76	68.40	0.29	3.17
Savoie	0.23	-32.80	0.61	0.80	76.38	33.76	67.61	0.24	3.26
Haute-Savoie	0.17	-21.07	0.55	0.76	71.76	33.76	54.71	0.17	2.56
Paris	0.15	-20.01	0.26	0.60	43.32	33.76	46.53	-0.85	2.05
Seine-Maritime	0.17	-21.94	0.58	0.76	76.23	33.76	60.91	0.28	3.09
Seine-et-Marne	0.18	-18.74	0.56	0.76	74.02	33.76	60.44	0.30	2.70
Yvelines	0.14	-12.64	0.55	0.74	74.84	33.76	69.98	0.42	3.11
Deux-Sèvres	0.23	-20.43	0.61	0.80	75.97	33.76	72.84	0.36	3.33
Somme	0.26	-32.60	0.61	0.80	76.09	33.76	73.05	0.27	3.92
Tarn	0.22	-20.77	0.62	0.80	77.67	33.76	81.07	0.44	3.61
Tarn-et-Garonne	0.33	-32.58	0.62	0.84	74.30	33.76	70.07	0.25	3.07
Var	0.17	-19.58	0.60	0.76	78.32	33.76	72.07	0.40	3.40
Vaucluse	0.19	-25.97	0.59	0.78	75.93	33.76	65.74	0.23	3.27
Vendée	0.23	-17.52	0.60	0.80	74.95	33.76	71.57	0.27	3.57
Vienne	0.29	-31.10	0.61	0.82	74.02	33.76	60.54	0.16	2.92
Haute-Vienne	0.28	-34.66	0.61	0.80	76.02	33.76	70.38	0.25	3.39
Vosges	0.22	-25.98	0.62	0.80	77.57	33.76	61.96	0.30	2.94
Yonne	0.30	-34.12	0.61	0.84	72.57	33.76	53.70	0.04	2.48
Territoire de Belfort	0.19	-17.63	0.56	0.84	66.10	33.76	52.00	0.10	2.42
Essonne	0.14	-10.67	0.56	0.74	75.72	33.76	73.74	0.49	3.26
Hauts-de-Seine	0.12	-10.13	0.41	0.66	61.89	33.76	65.70	0.33	2.88
Seine-Saint-Denis	0.13	-14.76	0.57	0.72	79.63	33.76	99.22	0.59	4.44
Val-de-Marne	0.12	-12.16	0.57	0.74	77.04	33.76	81.54	0.52	3.61
Val-d'Oise	0.16	-16.91	0.57	0.76	74.81	33.76	70.01	0.41	3.19

L'aquila	0.19	12.90	1.31	1.2	109.50	345.92	450.21	0.11	2.03
Pescara	0.13	28.06	1.25	1.15	108.90	322.80	441.78	0.20	2.07
Teramo	0.26	-16.50	1.30	1.15	112.86	313.50	465.44	0.30	2.41
Campobasso	0.11	17.71	1.33	1.25	106.12	318.17	305.69	-0.17	1.46
Isernia	0.18	0.00	1.35	1.35	99.78	259.48	147.82	-0.78	0.81
Avellino	0.18	14.27	1.35	1.15	117.11	311.28	500.58	0.30	2.50
Benevento	0.15	9.49	1.35	1.2	112.66	311.28	349.97	0.00	1.71
Caserta	0.21	30.15	1.35	1.1	122.84	311.28	833.46	0.60	4.26
Napoli	0.14	39.99	1.14	1	114.34	315.54	1352.35	0.76	6.14
Salerno	0.12	27.38	1.33	1.05	127.13	313.54	1165.87	0.69	5.76
Bari	0.09	32.46	1.31	1	130.85	325.28	1736.15	0.78	8.12
Brindisi	0.11	11.30	1.35	1.2	112.91	325.56	525.25	0.30	2.80
Foggia	0.10	2.54	1.34	1.1	121.44	325.28	765.71	0.51	3.51
Lecce	0.12	2.93	1.33	1.1	121.10	317.51	844.33	0.57	4.14
Taranto	0.11	25.59	1.34	1.15	116.94	328.45	738.82	0.49	3.65
Matera	0.19	6.59	1.33	1.25	106.65	325.56	340.86	-0.19	1.84
Potenza	0.14	-12.92	1.34	1.2	111.93	316.05	398.41	0.08	2.08
Catanzaro	0.10	17.90	1.34	1.2	111.30	328.45	513.41	0.26	2.44
Cosenza	0.19	17.62	1.34	1.1	122.22	318.17	735.58	0.51	3.56
Reggio Calabria	0.14	6.92	1.35	1.15	117.79	318.17	598.03	0.39	2.97
Crotone	0.19	0.00	1.35	1.3	103.61	282.30	262.31	-0.14	1.39
Vibo Valentia	0.19	0.00	1.36	1.35	100.67	340.69	202.98	-0.97	1.01
Agrigento	0.18	16.59	1.35	1.15	117.03	335.99	565.04	0.38	2.32
Caltanissetta	0.20	-4.49	1.34	1.2	111.87	349.81	443.29	0.18	1.83
Catania	0.13	20.28	1.32	1.1	120.41	326.42	1080.02	0.69	4.42
Enna	0.18	3.43	1.35	1.35	100.03	348.98	202.95	-0.81	0.85
Messina	0.14	17.82	1.33	1.15	115.77	335.99	663.17	0.42	2.81
Palermo	0.18	26.31	1.32	1.05	126.01	318.17	1458.82	0.79	6.06
Ragusa	0.18	-15.27	1.31	1.2	109.47	335.99	362.28	0.08	1.45
Siracusa	0.16	0.00	1.33	1.2	111.03	325.05	448.44	0.25	1.88
Trapani	0.11	21.82	1.33	1.2	110.80	335.99	530.27	0.39	2.05
Cagliari	0.30	37.43	1.30	1.1	118.38	359.57	913.78	0.54	3.83
Nuoro	0.66	23.33	1.34	1.25	107.16	325.39	356.65	0.03	1.53
Sassari	0.44	32.74	1.30	1.15	112.70	342.32	545.63	0.32	2.33
Oristano	0.61	8.58	1.34	1.3	103.00	359.48	205.59	-0.93	0.84

Table A.2 – Descriptive statistics for *cci* and *ccim*. Base vs 1 merger vs 2 mergers models.

	France				Italy			
Model	*E(ccim)*	*E(cci/ccim)*	*max(cci/ccim)*	*min(cci/ccim)*	*E(ccim)*	*E(cci/ccim)*	*max(cci/ccim)*	*min(cci/ccim)*
Base	0.79	74.91	80.11	43.32	1.14	110.28	130.85	71.41
1 Merger	0.78	72.21	76.55	42.97	1.14	109.80	126.13	77.15
2 Mergers	0.81	74.27	78.53	46.99	1.16	111.80	129.40	79.39

Table A.3 – Correlations between *cci*, *pseudo-lerner* and *hhi*, *gini*. Base vs 1 merger vs 2 mergers models.

	France				Italy			
Model	ρ *hhi_cci*	ρ *hhi_lerner*	ρ *gini_cci*	ρ *gini_lerner*	ρ *hhi_cci*	ρ *hhi_lerner*	ρ *gini_cci*	ρ *gini_lerner*
Base	0.57	-0.47	-0.54	0.48	0.13	-0.37	-0.35	0.46
1 Merger	0.56	-0.52	-0.52	0.55	0.13	-0.24	-0.38	0.52
2 Mergers	0.58	-0.55	-0.54	0.57	0.10	-0.23	-0.39	0.58