

MARKET POWER IN EUROPEAN BANKING SECTORS*

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ABSTRACT

This study analyses the evolution of market power in the banking sectors of the European Union based on the estimation of Lerner indices. Using a panel of 18,810 observations of the banking industries of Germany, France, Italy, Spain and the United Kingdom during the period 1992-99, the results show substantial differences between countries. The evolution of the Lerner index does not show an increase in the degree of competition within the EU, despite the liberalisation measures implemented in order to create a single banking market. The study discusses the limitations to the interpretation of the Lerner index as an indicator of the degree of competition, and analyses its determining factors.

Key words: market power, competition, European banking sectors.

JEL: D40, G21, L10

RESUMEN

Este trabajo analiza la evolución del poder de mercado en los sectores bancarios de la Unión Europea a partir de la estimación de índices de Lerner. Utilizando un panel de 18,810 observaciones de los sectores bancarios de Alemania, Francia, Italia, España y Reino Unido durante el periodo 1992-99, los resultados muestran importantes diferencias por países, siendo los sectores bancarios del Reino Unido e Italia los que presentan mayores valores del índice. La evolución del índice de Lerner en el periodo analizado no muestra un aumento en el grado de competencia en el seno de la UE, a pesar de las medidas liberalizadoras implementadas con objeto de crear un mercado único bancario. El trabajo discute las limitaciones a la interpretación del índice de Lerner como indicador del grado de competencia y analiza sus factores determinantes. A este respecto, la concentración del mercado, el tamaño de las empresas y el riesgo aparecen como variables significativas. En el caso de la concentración, la influencia negativa en el mercado de depósitos y no siendo significativa en el mercado de préstamos permiten rechazar la hipótesis de colusión.

Palabras clave: poder de mercado, competencia, sectores bancarios europeos.

1. Introduction

The banking industries of the European Union have been subjected during the last decade to continual transformations deriving from the implantation of new technologies, deregulation, the globalisation of the economy, economic integration, etc., which have altered the conditions in which banking firms compete. At the same time, European banks have taken part in a wave of mergers and acquisitions that have produced a reduction in the number of firms and an increase in the concentration of markets¹. These years saw increased consolidation at both national and European levels as Europe moved towards a single banking and capital market as a result of the Single Market Programme, Monetary Union, and the Second Banking Directive.

Although the transformations described may have increased the levels of competition in banking industries, the increase in market concentration poses a question about the final result of the degree of competition. Indeed, the recent studies by De Bandt and Davis (2000) and Corvoisier and Gropp (2001) show that in the principal European countries and in some banking products there existed situations of monopolistic competition in the 1990s, and the monopoly situation was even accepted in banks that acted in small markets².

The aim of this study is to evaluate whether the set of circumstances that have accompanied the liberalisation measures tending to the creation of a single market have caused variations in the differences in the degree of competition among the different banking industries of the European Union, and for this purpose Lerner indices were calculated from the estimation of marginal costs and prices and their determinants were analysed. The period analysed covers the years from 1992 to 1999.

The assumptions used in the modelling of banking markets when calculating relative margins are important for the interpretation of the margins. Also important are the hypotheses used in the empirical estimation, because the simplifications introduced to overcome the insufficiencies of the data may affect the meaning of the results. In the case of the analyses based on the Lerner index both aspects are relevant for discussing

¹ See European Central Bank (2000a)

² In the case of De Bandt and Davis (2000), by applying the Panzar and Rosse test on the basis of estimations of revenue functions, and in the case of Corvoisier and Gropp (2001), by estimating the determinants of banking margins.

the causes of the evolution of the indices (such as market concentration, specialisation of firms, size, risk, the growth of the economy) and their relationship to market power.

The rest of the paper is structured as follows. Section 2 describes the theoretical foundations of the Lerner index in the specific case of banking firms, as well as its estimation, meaning and determining factors. Section 3 presents the sample and variables used and the methodology and empirical approach used in estimating the Lerner index. Section 4 shows the empirical results obtained. Finally, section 5 contains the conclusions.

2. The Lerner index

The Lerner index in banking firms

In the case of banking firms, the model most often used as a reference from which a Lerner index expression is obtained is the Monti-Klein imperfect competition model³. This model examines the behaviour of a monopolistic bank faced with a loan demand curve of negative slope $L(r_L)$ and a deposit supply of positive slope $D(r_D)$. The decision variables of the bank are L (volume of loans) and D (volume of deposits), as for simplicity's sake the level of capital is assumed to be given. The bank is assumed to be price taker in the inter-bank market (r), so that the objective function of profits to be maximised is as follows⁴:

$$\Pi = \Pi(L, D) = (r_L(L) - r)L + (r - r_D(D))D - C(L, D) \quad (1)$$

so that profit is the net interest income between loans and deposits, after deduction of the transformation costs $C(L, D)$. The first order conditions with respect to loans and deposits are as follows:

³ Monti (1972) and Klein (1971).

⁴ See an exposition of the models in Freixas and Rochet (1997).

$$\begin{aligned}
\frac{\partial \Pi}{\partial L} &= \frac{\partial r_L}{\partial L} + r_L - r - \frac{\partial C}{\partial L} = 0 \\
\frac{\partial \Pi}{\partial D} &= -\frac{\partial r_D}{\partial D} D + r - r_D - \frac{\partial C}{\partial D} = 0
\end{aligned} \tag{2}$$

or,

$$\begin{aligned}
\frac{\left[r_L^* - r - \frac{\partial C}{\partial L} \right]}{r_L^*} &= \frac{1}{e_L} \\
\frac{\left[r - r_D^* - \frac{\partial C}{\partial D} \right]}{r_D^*} &= \frac{1}{e_D}
\end{aligned} \tag{3}$$

e_L and e_D being the elasticities of demand for loans and deposits, respectively.

The Lerner index for expression (3) represents the extent to which the monopolist's market power allows it to fix a price above marginal cost, expressed as proportional to the price. In the case of perfect competition, the value of the index is zero, there being no monopoly power. Starting from this extreme case, the lower the elasticity of demand the greater the monopoly power to fix a price above the marginal cost.

The extension of the model to the case of an oligopoly (N banks), provides the following expressions of the first order conditions:

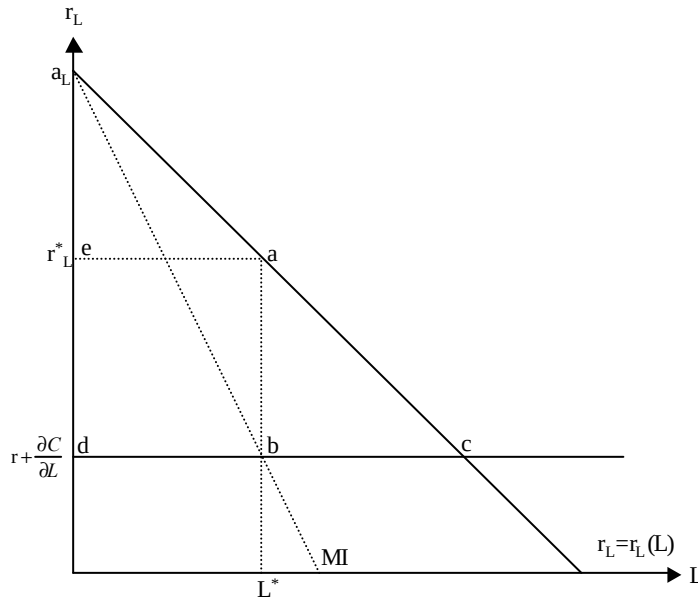
$$\begin{aligned}
\frac{\left[r_L^* - r - \frac{\partial C}{\partial L} \right]}{r_L^*} &= \frac{1}{Ne_L} \\
\frac{\left[r - r_D^* - \frac{\partial C}{\partial D} \right]}{r_D^*} &= \frac{1}{Ne_D}
\end{aligned} \tag{4}$$

which differs from the case of monopoly only in that the elasticities appear multiplied by the number of firms (N). With this simple adaptation, the Monti-Klein model can be re-interpreted as a model of imperfect competition with two extreme cases: monopoly ($N=1$) and perfect competition ($N=\text{infinity}$). Observe that the number of firms will affect the degree of market concentration, this being an explanatory variable of market power.

The relative margin (Lerner index) informs of the level of efficiency reached in the market and is therefore a suitable candidate for diagnosing the effects of the evolution of competition. As affirmed by Salas and Oroz (2001), the relative margin rather than the absolute one is the most appropriate for evaluating the evolution of competition for two reasons: 1) because, as we have seen, oligopoly competition models determine a relation of equilibrium between the relative margin (price minus marginal cost divided by the price) and the structural and competitive conditions of the market; and 2) because the relative margin offers a proxy of the loss of social welfare due to the existence of market power. As graph 1 shows, assuming a linear loan demand function and constant marginal cost, the loss of welfare (inefficiency) associated with imperfect competition (Harberger triangle) by unit of revenue ($r_L L$) is proportional to the Lerner index⁵:

$$\frac{\Delta abc}{r_L^* L^*} = \frac{\frac{L^* (r_L^* - r - \frac{\partial C}{\partial L})}{2}}{r_L^* L^*} = \frac{1}{2} \frac{r_L^* - r - \frac{\partial C}{\partial L}}{r_L^*}$$

Graph 1. Loss of welfare (inefficiency) associated with imperfect competition



⁵ The same applies for the supply deposit case.

It is interesting to consider the possibility of incorporating into the model three other elements of relevance to banking competition: the existence of insolvency costs associated with the possibility of default risk, the existence of monopolistic competition associated with the differentiation of products, and the existence of competition in prices instead of quantities. This more realistic scenario is that contemplated by the model of Corvoisier and Gropp (2001) which supposes that banks fix prices in the loans market⁶, while they face a given deposit rate (r_D) on their liabilities⁷. For the sake of simplicity, in the latter study the authors consider fixed operating costs and assume that banks offer a single but differentiated type of loan k , whose demand function is as follows:

$$L_k = \frac{L_o}{N} - \frac{b}{N-1} \sum_{j \neq k}^N (r_k - r_j) - \frac{r_L B}{N} \quad (5)$$

where:

b is the derivative of the demand for loans from bank k with respect to the differential of interest against its competitors, enabling the effects of the differentiation of products to be captured.

B is the derivative of the total demand for loans (L) with respect to the average rate of interest on loans ($r_L = \sum_{k=1}^N r_k / N$).

Only if banks face the same demand schedule will the loan rate in equilibrium be equal for all banks. The equilibrium condition then becomes,

$$L = L_o - r_L B \quad \text{where} \quad L = \sum_{k=1}^N L_k \quad (6)$$

⁶ The empirical evidence on market power in the loans and/or deposit market is ambiguous. Studies such as Nathan and Neave (1989), Neave and Nathan (1991) and Shaffer (1993) have found an absence of market power even for the concentrated banking industry in Canada. However, other studies (Berger and Hannan, 1989 and 1997; Hannan, 1991; among others) show the existence of market power for banks in the U.S. Thus, whether market power exists in a country's loan or deposit market is an empirical question.

⁷ The model could be extended by allowing the existence of market power in the pricing of deposits, obtaining in this case a Lerner index for deposits analogous to that obtained in the Corvoisier and Gropp (2001) model for loans.

Deriving equation (5) with respect to the interest rate on loans, we obtain:

$$\frac{\partial L_k}{\partial r_k} = -(b + \frac{B}{N^2}) \quad (7)$$

If we assume a reserve requirement (R) proportional to deposits, $L_k = D_k(1-a)$, the objective function of firm k is as follows:

$$Max \Pi_k = (1 - b_k)(1 - a)r_k L_k - \frac{r_D L_k}{1 - a} - C_k(L_k, D_k) \quad (8)$$

where b_k represents the risk of insolvency, which acts as an added cost ($b_k L_k r_k$).

On this basis, the first order condition of the problem of maximisation of profits, when we consider that banks compete with the rate of interest on their loans, is:

$$\frac{\partial \Pi_k}{\partial r_k} = (1 - b_k)(1 - a)L_k + (1 - b_k)(1 - a)r_k \frac{\partial L_k}{\partial r_k} - \frac{r_D}{1 - a} \frac{\partial L_k}{\partial r_k} - \frac{\partial C_k}{\partial L_k} \frac{\partial L_k}{\partial r_k} = 0 \quad (9)$$

or, equivalently,

$$\left[(1 - b_k)(1 - a)r_k - \frac{r_D}{1 - a} - \frac{\partial C_k}{\partial L_k} \right] \frac{\partial L_k}{\partial r_k} = -(1 - b_k)(1 - a)L_k \quad (10)$$

Dividing both sides of the equation by r_k and taking (7) into account,

$$\frac{(1 - b_k)(1 - a)r_k - \frac{r_D}{1 - a} - \frac{\partial C_k}{\partial L_k}}{r_k} = (1 - b_k)(1 - a) \frac{L_k}{r_k} \frac{1}{(b + \frac{B}{N^2})} = \frac{(1 - b_k)(1 - a)}{e_k} \quad (11)$$

where $e_k = -\frac{\partial L_k}{\partial r_k} \frac{r_k}{L_k}$ is the elasticity of the demand for loans from bank k . Finally, given

that in (6) $L_k = (L_0 - r_k B)/N$ we obtain

$$\frac{r_k(1 - b_k)(1 - a) - r_D - \frac{\partial C_k}{\partial L_k}}{r_k} = (1 - b_k)(1 - a) \frac{\frac{L_0}{N} + \frac{r_k B}{N}}{r_k} \frac{1}{(b + \frac{B}{N^2})} \quad (12)$$

Observe that the left side of equation (12) is the expression of the Lerner index corrected for risk of insolvency (default risk). Its determinants, appearing on the right side, are the cost of risk (b_k), average size of firm (L_0/N), the number of firms (N), the sensitivity of the demand for loans of type k to the differential of their rate of interest against their competitors (b) and the sensitivity of total demand of loan to the average interest rate (B).

Estimation, significance and determinants of the Lerner index

The interpretation of the Lerner index as market power is often made too mechanically, as it is necessary to take into account several problems that are posed in the empirical estimation when valuing its significance:

- a) Firstly, the value of the Lerner index is influenced by the criteria followed when more or fewer concepts are included in the calculation of revenue and costs. Thus it is not infrequent to consider only financial revenue and costs and to omit other revenue and trading costs (so that the margin varies and the value of the index changes). When only the traditional intermediation activity of loans-deposits is considered, the model does not consider the banking activity of providing services. The substantial growth in this type of activity in recent years has led to a change in the revenue structure of banking firms; the relative importance of net financial revenue has decreased, and revenue from items other than interest (mainly commissions) has increased⁸.
- b) Secondly, it is general practice not to consider the cost of risk, even though its effect on the profit and loss account of banking systems is on average very important, representing about 25% of the net income. There are various reasons for the continuance of these practices: the lack of sufficient data, the difficulties of calculation, and in the case of the cost of risk, the problem of its posting in time, as banking risk often appears only at a certain moment of the life of the investments made.

It is well known that the cost of risk behaves in an anti-cyclical manner. In graph 2 it can be seen that in the banking systems considered in this study the provisions increase when the economy is growing slowly and are

⁸ The European Central Bank (2000b) notes the growing importance of non-interest income in the European banking system.

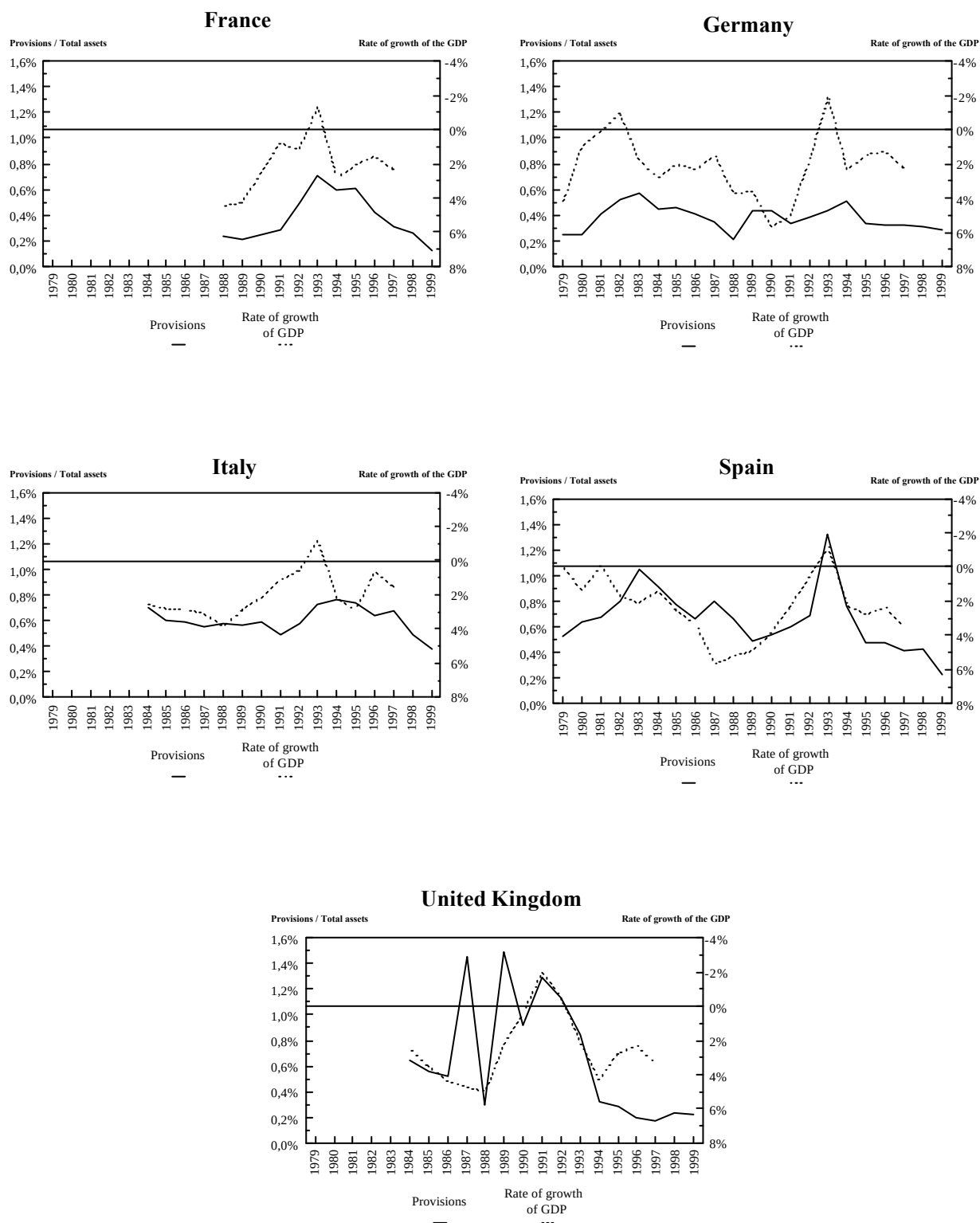
reduced when real growth is strong; this occurred in all the countries without exception from 1994 to 1999. Indeed, the correlation between GDP growth rates and provisions per unit of assets is systematically negative.

It is, then, important to point out that, although the cost of risk is not included in the estimation of the cost function, this problem is present in two ways: 1) if the cost of risk is not taken into account, the interpretation of the Lerner index as market power may be wrong because it overestimates the margin; and 2) if the cost of risk is only computed when the corresponding provisions are made, its time profile will be skewed, as it can be said that these are costs that were latent in other periods but whose recognition has been delayed. In this last case, the Lerner index is likely to increase in an expanding phase of the cycle - in which there are few problems of bad debt and insolvency - and decrease in a low phase of the cycle - in which bad debt and provisions increase - without affecting market power.

- c) Thirdly, the empirical estimation of separate prices or rates for loans and deposits is not without problems. Thus, in the case of loans the profit and loss account does not give separately the financial income associated with them, as it appears jointly with other financial products (fixed income investments, for example). In the case of deposits, the financial costs are included with those of other liability products.

Taking into account all these aspects, in the empirical model of this study we use a single indicator of banking activity and, as in Shaffer (1993) and Berg and Kim (1994), banking output is proxied by the total assets of each firm. The starting assumption is that the flow of banking goods and services produced by a bank is proportional to its total assets. With this approximation, we construct an average price that includes financial and service income and both financial and operating costs are computed, though not the cost of risk due to the problems of identification and periodification indicated above.

Graph 2. Evolution of the provisions and rate of growth of the GDP



Source: OECD and own elaboration.

Although the expression of the Lerner index is the same for different market situations and different types of competition, when we observe on which variables its value depends (considering the right-hand side of the equation) we find that its meaning is not always the same. Thus, in the last model developed in this section we find that if imperfect competition and differentiation of products are considered, the Lerner index depends not only on the elasticity of demand for loans (the element associated with market power in the derivation of the Lerner index in the Monti-Klein model), but also on the sensitivity of each producer's demand to the differences in price with his competitors, on the size of the market, on the level of interest rates and on the cost of risk. Indeed, for a given value of elasticity, the level and the evolution of the index will depend on the behaviour of all the other variables.

In the next section we make an estimation of the Lerner index and an analysis of its determinants, taking these considerations into account. Given that the computation of the costs of risk cannot be included with guarantees in the cost function, they must be taken very much into account in interpreting the index, as the period analysed is characterised mainly by strong growth of the economy and of banking activity, and in general by low provisions for write-offs and insolvencies.

Having estimated the index, its determinants will be analysed from the following angles:

- a) Variables indicative of market power, such as indices of concentration (related to the number of firms) or market shares.
- b) Variables indicative of the elasticity of loan demand.
- c) Variables indicative of scale, which may imply advantages in cost, or in operational efficiency.
- d) Variables indicative of the size and growth of markets and of the risk undertaken, related with the above-mentioned question of cost of risk.
- e) Variables related to productive specialisation, institutional and country differences, which may be proxies for the type of competition, the differentiation of products and the intensity of the rivalry among firms.

3. Empirical approximation to the Lerner index

Data were obtained in a standardised fashion from IBCA and their Bankscope database. The sample consists of a total of 18,810 observations of non-consolidated banking firms during the period 1992-1999. Given the low representativity of the sample from some countries, the banking sectors analysed are the five biggest of the European Union: France (2,433 observations), Germany (12,641) Italy (2,307), Spain (985) and United Kingdom (444). Table 1 shows the number of firms analysed each year in each country.

Table 1. Number of firms by country

	Number of firms					
	France	Germany	Italy	Spain	United Kingdom	Total
1992	272	516	173	110	34	1,105
1993	320	1,375	272	114	52	2,133
1994	326	1,864	271	109	55	2,625
1995	338	1,978	327	122	61	2,826
1996	316	1,795	338	138	67	2,654
1997	301	1,765	338	140	58	2,602
1998	299	1,892	332	129	65	2,717
1999	261	1,456	256	123	52	2,148
Total	2,433	12,641	2,307	985	444	18,810

Source: IBCA and own elaboration.

The calculation of marginal costs is based on the specification of a translogarithmic cost function:

$$\begin{aligned}
\ln C_i = & a_0 + \ln TA_i + \frac{1}{2} a_k (\ln TA_i)^2 + \sum_{j=1}^3 b_j \ln w_{ji} + \\
& + \frac{1}{2} \sum_{j=1}^3 \sum_{k=1}^3 b_{jk} \ln w_{ji} \ln w_{ki} + \frac{1}{2} \sum_{j=1}^3 g_j \ln TA_i \ln w_{ji} + m_1 Trend + m_2 \frac{1}{2} Trend^2 + \\
& + m_3 Trend \ln TA_i + \sum_{j=1}^3 l_j trend \ln w_{ji} + \ln u_i
\end{aligned} \tag{14}$$

where C_i is the firm's total costs including financial costs and operating costs. As a measure of production we use total assets (TA_i). The prices of the factors of production are here defined as follows:

w1. Price of labour: Personnel costs / total assets⁹

w2. Price of capital: Operating costs (except personnel costs) / Fixed assets

w3. Price of deposits: Financial Costs / Customer and short term funding.

The estimation of the costs function (and hence of the marginal costs) is done separately for each country, allowing the parameters of the cost function to vary from one country to another to reflect different technologies. Fixed effects are also introduced, in order to capture the influence of variables specific to each firm. Finally, a trend is included (*Trend*) to reflect the effect of technical change, which translates into movements of the cost function over time. As usual, the estimation is done under the imposition of restrictions of symmetry and of grade one homogeneity in input prices.

Observe that the estimated marginal cost approximates the sum of marginal financial costs (interest rate in the expressions of the Lerner index) and marginal operating costs, but does not capture the cost of risk.

Regarding the measurement of the explanatory variables of the Lerner index estimated, they have been proxied as follows, on the basis of the information contained in the IBCA and other sources:

- a) *Concentration*, proxied by means of the Hirschman-Herfindahl index (HERF) in terms of total assets calculated for each country¹⁰. Taking into account the evidence offered by Corvoisier and Gropp (2001) in which the effect of concentration may be different in different banking products, the Herfindhal index is used alternatively in terms of credits and deposits.

⁹ Since the number of employees was not available in the original data source, the ratio of labour costs to total assets is used as the price of labour.

¹⁰ Concentration and market share refer to national markets, as only in a few exceptional cases (very big banks) can the relevant market be Europe (the Financial Services Action Plan of the European Commission (may, 1999) affirms that the European banking markets are still fragmented, specially the retail markets). It is also possible that for a large number of firms, the relevant market is of smaller than national dimensions, though the lack of disaggregated information prevents the construction of measures of concentration of less than national scale.

- b) *Market share (MS)*, i.e. the firm's total assets expressed as a percentage of those of the national banking industry. Alternatively market shares in terms of credits and deposits are used.
- c) *Elasticity of aggregate loan demand (B)*. Following Corvoisier and Groopp (2001), the elasticity of aggregate loan demand has been proxied for by the ratio of the total assets of the banking system to GDP (TA/GDP) and by the ratio of stock market capitalisation to GDP (MK/GDP).
- d) *Size*: measured by total assets (LTA log of total assets). This variable is introduced for two reasons: a) to capture the possible cost advantages associated with size (economies of scale) and b) to be able to capture the possible market power associated with size¹¹.
- e) *Efficiency*: proxied through the cost to income ratio (EFFC), defined as the quotient between operating costs and the gross income.
- f) *Risk*: measured by the loans / total assets (L/TA)¹² ratio as a proxy for the default risk and equity/ total assets (E/TA) ratio as a proxy for the risk of insolvency, since in the empirical approximation of the Lerner index the role of risk is not considered.
- g) *Market expansion*: proxied by the real growth rate of GDP (GDPGROWTH) in each of the national markets.
- h) *Productive specialisation*. Using a cluster analysis¹³, groups of firms with similar productive specialisation are identified, calculating the percentage structure of the balance sheet in its main items (loans, other earning assets, fixed assets, deposits, other sources of funding and equity). Table 2 shows, for the year 1999, the percentage structure of the balance sheet and the most

¹¹ Although the latest model with product differentiation considers banks of equal size, in reality it is very difficult to accept this assumption, so we introduce the size of firm as an explanatory variable of the Lerner index.

¹² Bearing in mind that the default risk depends on the asset quality, it would be better to use variables such as net charges-offs/loans, non-performing assets/total assets or loan loss provisions/loans. However, the database used (BankScope) contains data on loan loss provisions only for a few banks. With respect to the net charges-offs and non-performing assets, the database does not provide information.

¹³ To form the clusters the non-hierarchical k-means technique was used.

important economical and financial ratios of the four clusters identified, whose main characteristics are described in the annex.

- i) *Institutional dummy*: bank (BANK), savings bank (SAVINGS), co-operative banks (COOP) and others (OTHERS)¹⁴.
- j) *Country dummy* (GERMANY, SPAIN, FRANCE, ITALY, UK).

Table 2. Specialization in the European banking system. 1999
Percentages over total assets

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total firms
Percentage over Total Assets					
Loans	69.58	24.45	47.63	47.89	44.90
Other earining assets	25.45	68.45	45.17	42.53	47.46
Fixed assets	1.49	0.31	1.34	0.73	0.85
Non earning assets	3.47	6.80	5.87	8.85	6.79
Total assets	100.00	100.00	100.00	100.00	100.00
Total deposits	84.51	67.29	81.08	54.83	68.19
Total money market funding	1.48	5.62	2.84	13.12	7.12
Other funding	5.89	15.30	6.64	21.55	14.41
Other non interest bearing	2.96	8.23	5.02	10.07	7.41
Loan loss reserves	0.02	0.09	0.01	0.16	0.09
Other reserves	0.20	0.04	0.38	0.77	0.39
Equity	5.30	3.51	5.15	5.69	4.90
Operating expenses / Total assets	2.27	0.78	1.85	1.44	1.47
Operating expenses / Gross income	65.48	65.66	64.33	62.61	64.21
Interest expenses / Total assets	3.03	4.35	2.95	3.52	3.57
Interest expenses / Interest income	55.00	88.03	60.22	71.91	71.25
ROA	0.74	0.45	0.73	0.57	0.59
ROE	14.04	12.76	14.26	10.02	12.12
Number of firms	1,170	210	504	264	2,148
Percentage over the institutional group					
Banks	10.09	52.86	19.44	30.68	18.99
Saving Banks	27.78	12.86	31.55	15.15	25.65
Cooperative Banks	58.03	15.71	45.63	39.02	48.65
Other	4.10	18.57	3.37	15.15	6.70
Share in Total assets	17.66	28.91	17.22	36.21	100.00

Source: IBCA and own elaboration.

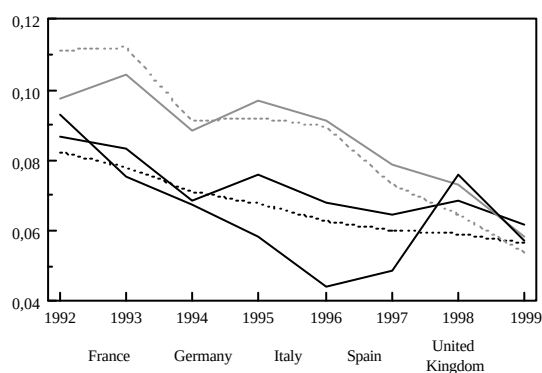
¹⁴ The category of Others includes the following types of institutions: Bank holding and holding companies, Investment banks/securities houses, Medium and long term credit banks, Non-banking credit institutions, Real state / mortgage banks, Specialised Government credit institutions.

4. The Lerner index and its determinants: results

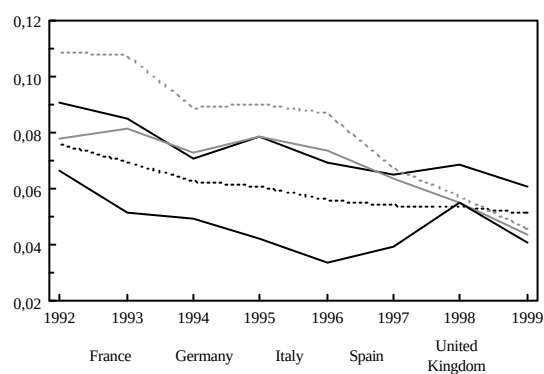
Graph 3 shows the evolution of prices, marginal costs and Lerner index in the five banking sectors analysed. In all cases there is a reduction of the average price of banking output as a consequence, in part, of the reduction of interest rates that has taken place in Europe in recent years. Parallel to this, there has also been a reduction of marginal costs in all banking sectors as a consequence of the reduction of both financial costs and operating costs.

Graph 3. Price, marginal cost and Lerner Index

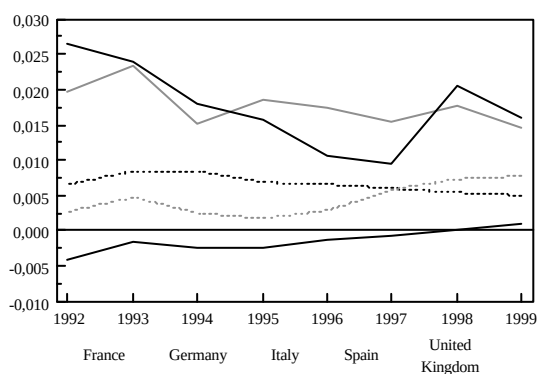
a) Price



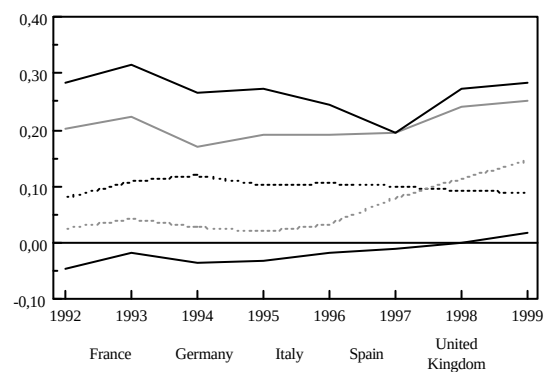
b) Marginal cost



c) Price - Marginal cost



d) Lerner index



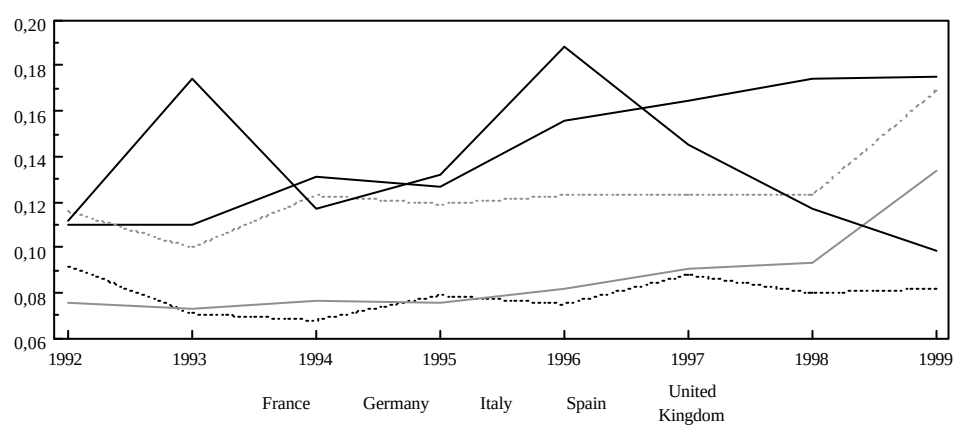
Source: IBCA and own elaboration.

The net effect of the evolution of marginal costs and prices is not always a reduction of the absolute margin. And with regard to the relative margin, the Lerner index increased in recent years in all the countries except Germany and the UK, as the reduction of marginal costs was greater than that of the average price of assets. If we take into account the lower representativity of the sample in 1992 and take 1993 as the initial year of reference, the Lerner index increased in France, Italy and Spain, and diminished in Germany and the UK. Its average value stood at 15% in 1999.

Computed Lerner indices show substantial differences across countries. Thus the banking sector of the United Kingdom enjoys the greatest relative margin in the setting of prices, followed by Italy, France being at the opposite extreme¹⁵.

Comparing the initial situation (1992) with the final one (1999) allows us to see the persistence of important differences among the countries considered. Also, graph 4, which represents the standard deviation of the Lerner index, indicates that the inequalities among firms in the banking industries analysed have not decreased either, with a notable increase of inequalities in France and Spain. Despite this, there seems to have been a slight convergence in the average of the Lerner index of the various countries, though around a higher level of it.

Graph 4. Standard deviation of the Lerner Index



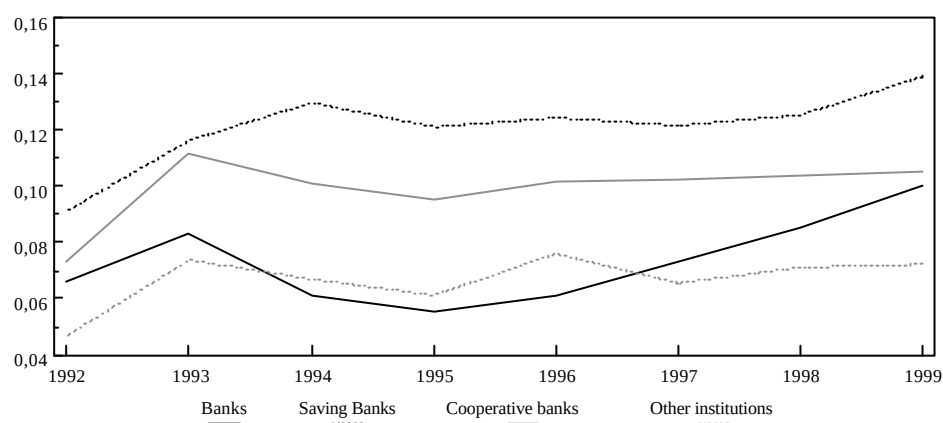
Source: IBCA and own elaboration.

¹⁵ This result is coherent with the latest information available from the OECD (“Bank Profitability”) referring to 1999 in which, of the five countries considered, it is the UK that presents the highest return on equity (ROE), France being the least profitable.

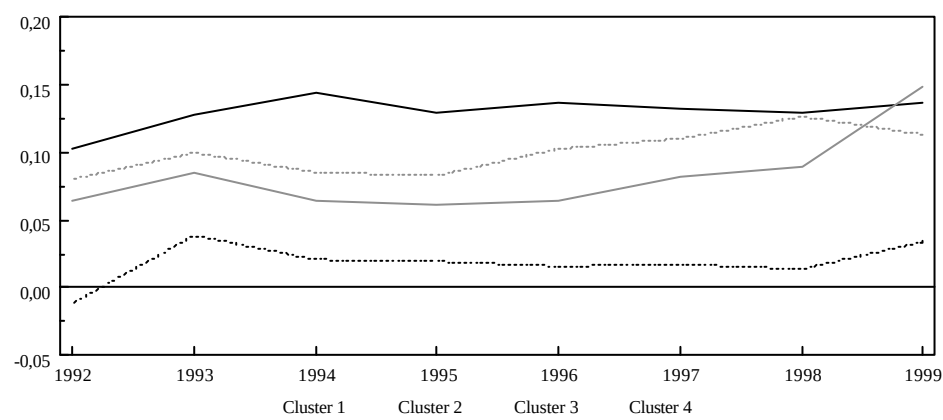
Graph 5 shows the differences observed by type of institution (banks, savings banks, co-operatives and others) and by productive specialisation group. The savings banks enjoy greater monopoly power, with a growth of the Lerner index over the period analysed. The banks stand clearly below the savings banks, with a growing trend from 1995 onwards. Credit co-operatives stand in a position between these two, the behaviour of their Lerner index being stable in recent years.

Graph 5. Lerner index by type of institution and specialization

a) By type of institution



b) By group of specialization



Source: IBCA and own elaboration.

Differences are also observed by specialisation groups. Cluster 2, which carry out typical investment banking, enjoy the lowest margin with a value of the Lerner index so low that we can describe their situation as being close to perfect competition. At the opposite extreme, cluster 1 - intermediation banking - enjoys the greatest monopoly power practically every year, though in 1999 cluster 3 presents a higher value of the index.

Table 3 presents the results of the estimation of the determinants of the Lerner index ¹⁶, introducing fixed effects and time effects. The main results are as follows:

- a) According to expression (12) the effect of the number of firms on the Lerner index is ambiguous. The empirical model indicates that the concentration of national banking markets in terms of total assets on the basis of the Hirschman-Herfindahl index (HERF) is not significant. Following Corvoisier and Gropp (2001), the evolution of concentration and its effect on market power may differ depending on the banking product considered. For this reason, in column (2) of the table we offer the results introducing at the same time two indices of concentration: one referring to the loans market and the other to deposits¹⁷. The results show that only the effect of the concentration of the deposits market is significant, its influence being negative¹⁸. Consequently, the results show the importance of distinguishing the effect of concentration by type of product, rejecting the traditional hypothesis of collusion in the deposits market.
- b) The market share of each firm in its national market (MS) does not have a significant effect in any of the cases, irrespective of the reference market (total assets, loans or deposits). However, firm size (LTA) is revealed as a variable with a positive and very significant effect on market power.

¹⁶ Given that in the estimation of cost functions it is necessary to have information on several variables in order to estimate input prices, we have had to exclude from the initial sample the firms for which we did not have complete information, 18,771 being the final number of firms considered in the estimations of the determinants of the Lerner index.

¹⁷ Although Klein's model considers deposits as an input, "several authors implement models in which both input and output characteristics of deposits are simultaneously represented, rather than just one or the other as is common in the existing literature" (see Humphrey, 1992).

¹⁸ This result agrees with the evidence recently obtained by Corvoisier and Gropp (2001). Specifically, their results for a sample of European countries from 1993 to 1999 show that concentration affects bank margins positively in the loans market and negatively in the deposits market.

Table 3. Determinants of the Lerner Index

Method of estimation: Fixed effects model

		Coefficient	t-ratio	Coefficient	t-ratio
HERF	Total assets	-0.180	-1.532		
	Loans			0.007	0.089
	Deposits			-0.247	-3.099
MS	Total assets	0.414	1.774		
	Loans			0.061	0.149
	Deposits			-0.031	-0.075
	LTA	0.047	12.338	0.048	12.692
	EFFC	-0.022	-22.155	-0.022	-22.149
	L / TA	0.147	12.508	0.148	12.399
	E / TA	0.387	13.803	0.390	13.889
	GDPGROWTH	0.208	2.781	0.239	3.146
	MK / GDP	0.000	4.382	0.001	4.817
	TA / GDP	-0.035	-5.649	-0.031	-4.957
	CLUSTER1	-0.001	-0.491	-0.001	-0.511
	CLUSTER2	-0.005	-1.530	-0.005	-1.502
	CLUSTER3	-0.002	-0.817	-0.002	-0.823
	BANK	-0.029	-0.479	-0.030	-0.485
	SAVINGS	0.000	0.004	-0.004	-0.054
	COOP	-0.006	-0.095	-0.008	-0.125
	FRANCE	-0.050	-0.775	-0.053	-0.816
	GERMANY	0.017	0.291	0.018	0.292
	ITALY	0.018	0.270	0.011	0.170
	UK	0.173	2.462	0.105	1.051
	1993	0.030	6.579	0.029	6.041
	1994	0.018	4.850	0.015	3.848
	1995	0.009	2.388	0.007	1.594
	1996	0.014	3.185	0.011	2.340
	1997	0.019	3.750	0.016	3.019
	1998	0.002	0.348	-0.003	-0.399
	1999	0.002	0.226	-0.006	-0.598
	Adjusted R²	0.862		0.862	
	Number of obs.	18,771		18,771	

- c) The operating efficiency achieved in management is one of the most important factors in explaining the differences in market power observed among banking firms. The results show that the most efficient firms (lower value of the variable EFFC) enjoy higher margins, as a consequence, almost certainly, of their lower marginal costs. Taking into account that we

introduce in the estimation a direct measure of efficiency, the lack of significance of the market share supports the pure efficient structure hypothesis¹⁹.

- d) With respect to risk, the firms that in relative terms devote a greater part of their resources to granting credits (L/TA) enjoy higher margins. In the case of capitalisation (E/TA), its influence is positive and significant. This last result may be because the most highly capitalised firms bear lower explicit financial costs²⁰. At this point it is important to bear in mind that the cost of risk has not been taken into account in the estimation of the index and the result obtained can therefore be interpreted as showing that market power includes a risk premium.
- e) The proxy variables for the elasticity of aggregate loan demand (TA/GDP and MK/GDP) are both statistically significant. The results show that the bigger the importance of the banking system in the economy (bank based financing), the smaller the market power of the banking firms.
- f) Economic growth, proxied by the rate of growth of GDP (GDPGROWTH) of each country, has a positive and significant effect on the value of the Lerner index, showing that in times of economic expansion (and therefore of increased demand for bank financing) firms may enjoy greater relative margins, and this may explain the increase of the Lerner indices observed in all the countries considered in the last years of the period analysed.
- g) Although earlier we have seen differences in the average values of the Lerner index for different institutional types of banking firms (banks, savings banks, co-operatives and others), these differences are not important in explaining the Lerner index once the effect of other variables is considered.

¹⁹ See Berger (1995a).

²⁰ But since equity is a more expensive funding source, an increase in equity capital may increase the average cost of capital. Therefore, a higher margin could be required ex ante. Alternatively, the positive coefficient on E/TA may reflect a reverse causality: profitable banks retain more earnings, thereby building up a higher ratio of equity to assets. See Berger (1995b) for a summary of other plausible and theoretic explanations for the positive capital-earnings relationship.

Thus, as the results in table 3 show, none of the dummies that characterise the institutional group is significant²¹.

- h) Regarding the possible existence of a country effect, a statistically significant result is obtained only in the case of the UK, Spain being the country of reference. This result is coherent with the view of the level of the Lerner index in graph 3.
- i) Finally, we observe no differences in market power as a consequence of belonging to a particular banking specialisation group (CLUSTER). A result, of very little significance, is obtained only in the case of cluster 2 (investment banks), compatible with graph 3 in which it can be clearly appreciated that this group is the one with the lowest value for the Lerner index.

5. Conclusions

The objective of this study has been to offer empirical evidence on the evolution of competition in the banking industries of five big European countries, through the estimation of Lerner indices and the analysis of their determinants. The sample used contains 18,810 observations of the banking sectors of Germany, France, Italy, Spain and the United Kingdom for the period 1992-1999.

The results show an average level of the Lerner index of 0.15 in 1999, with substantial differences in the index among countries and a growing trend during the latter years in four of the five cases considered. This behaviour of the relative margins is often interpreted as indicating that, despite the process of de-regulation of the European banking systems and the increasing integration of markets, the existing market power may be persisting, and even - surprisingly - increasing. This interpretation is based on the fact that the many changes that have occurred have been accompanied by an intense process of concentration, driven by numerous mergers and acquisitions.

However, this thesis cannot be accepted just like that, given the limitations imposed by the information on a complete estimation of costs when calculating the Lerner indices (in particular, to include the cost of risk) and, also in the light of the

²¹ The group of reference is that of "other" institutional types.

results obtained in the study of the determinants of the index. The values of the Lerner index in the late 1990s stood on average around 0.15 and a correction for risk could reduce them by 25%, the relative margins standing at little more than 10%.

The explanatory factors of the index most directly related to market power are in general not significant (market share) or even have negative influence (concentration in the deposits market). Likewise the variables representing specialisation, the institutional form of the firm, or the country. On the other hand, the size of firms and the operating efficiency of each one, risk and the economic cycle have a notable capacity to explain the behaviour of the Lerner index.

The negative effect of concentration (proxied by the Hirschman-Herfindhal index) in the deposits market together with the non-significance in the case of loans, allow us to reject the traditional hypothesis of collusion. This effect, together with the importance of operating efficiency, constitute evidence in favour of the efficient structure hypothesis, this being similar to that obtained recently by Corvoisier and Gropp. (2001).

Consequently, if the variables that in general do not turn out to be significant are those that describe the evolution of the structure of markets and specialisation, which could be determinants of competitive rivalry, the latter would not seem to be able to explain the evolution of the Lerner index during these years. For this reason, contrary to the thesis that affirms the above, the results allow us to formulate another: macroeconomic stability, accompanied by low interest rates and strong economic growth rates, have favoured the growth of size of firms and their efficiency, and limited for the time being the impact of the cost of risk on the banks' costs. All this is behind the evolution of the Lerner index during these years, but it is debatable whether this evolution can be interpreted as an increase of market power. In particular, to verify whether the relative margin achieved in these years is stable, it will be necessary to observe what happens when, as habitually occurs in recessive phases, the cost of risk increases rapidly and places pressure on absolute margins that are already substantially narrower than those of earlier years.

APPENDIX

Cluster 1. This is the group with the largest number of firms (1,170), representing 18% of the sample in terms of total assets. It is characterised by carrying out typical intermediation activity, deposits and credits representing 84.5% and 70% of the balance sheet, respectively. It is also the group of firms with highest fixed assets due to its extensive branch network. Despite being the cluster that bears highest operating costs (2.27% of assets), it manages to be the most profitable in all margins of the profit and loss account. The cluster is formed mostly by credit co-operatives and to a lesser extent by savings banks.

Cluster 2. This group consists of 210 firms representing 29% of the total of the banking system of the countries analysed. These firms capture their resources basically through deposits (67%), and invest them mostly in other earning assets (68%) so we could call this the group of the investment banks. Of all the groups it is the least profitable given the high average costs it bears, due not to its operating costs (which are the lowest) but to its high average financial costs. More than half the cluster consists of banks (53% of the total), and other types of firms have in this group their largest presence.

Cluster 3. In 1999 this consisted of 504 firms representing 17% of the total assets of the firms of the sample. Like cluster 1, the firms of this group are funded mostly by deposits (81%), though they diversify their asset portfolio to a greater extent between loans (48%) and other earning assets (45%). They present a return on assets similar to that of cluster 1 and higher in terms of returns on equity (ROE). As in cluster 1, the largest group is that of credit co-operatives (47%) followed by savings banks (32%).

Cluster 4. This is the largest group in relation to the total assets of the sample (35%), but relies the least on the capture of deposits (55%), preferring other sources of funding. On the asset side, it presents a percentage structure very similar to that of cluster 3, with a very balanced distribution between loans (48%) and other earning assets (43%). This is the group with lowest ROE, though it presents the best indicator of operating efficiency (62.6%).

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