Market Power in European Banking Sectors

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Abstract

We analyze the evolution of market power in the main banking sectors of the European Union. The evolution of the relative margins does not show an increase in the degree of competition within the EU. The explanatory factors of the relative margins most directly related to market power are not significant, and even have a negative influence (concentration in the deposits market). The size and efficiency of banks, default risk, and the economic cycle have a notable capacity to explain the behavior of the market power. The results show the inadequacy of using concentration measures as proxy for the competition environment in banking markets.

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

During the 1990s the banking industries of the European Union experienced continual transformations due to new technologies, deregulation, the globalization of the economy, economic integration, etc., all of 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 reduced the number of banks and increased the market concentration. As a result of measures such as the Single European Act, the Second Banking Directive, the Monetary Union, and the Financial Services Action Plan, these years also saw increased consolidation at both national and European levels as Europe moved towards a single banking and capital market.

The different measures aimed at increasing the degree of integration and competition of Europe's financial markets have had limited effects. Various recent reports made for the European Commission (Heinemann and Jopp, 2002; and European Commission, 2002a, b) and by the European Central Bank (Cabral, Dierick and Vesala, 2002; and Manna, 2004), show that the degree of integration and competition of wholesale banking activities has increased. However, in retail banking services, where banks' customers are mainly households or small firms, the markets are more fragmented. This lack of integration is due to the existence of (mainly regulatory and institutional) obstacles or barriers that protect national markets from outside competition. Thus, the empirical evidence supplied by various indicators of financial integration shows a low, and even decreasing, degree of cross-border penetration in banking markets.

The European banking industry has also undergone a process of consolidation as a consequence of the wave of mergers and acquisitions (M&As) that took place in the 1990s. Although M&As between banks of different countries (cross-border M&As) may increase the degree of integration and competition in the banking markets, the evidence shows that the majority of the M&As (about 77% in the 1990s) are between banks of the same country (domestic M&As). Domestic M&As increase the degree of concentration of national markets and, possibly, the market power of the resulting larger banks.

Although the transformations we describe were aimed at increasing the level of integration and competition in banking industries, the increase in market concentration calls into question the resulting degree of competition. The recent studies by De Bandt and Davis (2000) and Corvoisier and Gropp (2002) show that in the principal European countries and in some banking products, there was monopolistic competition in the 1990s, and that the hypothesis of monopoly can not be rejected in banks that acted in small markets.

Bikker and Haaf (2002) present empirical evidence of the existence of monopolistic competition in a broad sample of countries (both European and non-European), although the results differ depending on the geographical scope of the markets (local, national, or international). Their study also analyses the relation

between competition and concentration. Their results show that competition decreases with increasing market concentration.

In this context, the hypothesis we put forward in this paper is that the low degree of integration of the European banking system, together with the increased concentration of national markets, may have increased the market power of the banks, thus decreasing the degree of competition. Therefore, the aim of this study is twofold:

(1) We wish to evaluate whether the set of circumstances that accompanied the measures intended to create a single market increased the level of competition in European banking sectors during the 1990s. For this purpose we calculate Lerner Indexes of market power from the estimation of marginal costs and prices. The Lerner Index of market power defines the disparity between price and marginal cost expressed as a percent of price, given the fact that the divergence between product price and marginal cost of production is the essence of monopoly power. Thus, the Lerner Index measures the relative markup of price over marginal cost.

(2) We wish to analyze the factors that explain banks' market power.

Our main results show an increase in market power during the latter 1990s in four of the five European banking sectors considered. The results also show that the growth in the market power that we observe in the majority of the European sectors is not caused by a growth in the concentration of banking markets. This finding proves the inadequacy of using concentration measures as proxies for the competition environment in banking markets.

However, the size of banks, the operating efficiency, the default risk, and the economic cycle have a notable capacity to explain the behavior of the market power. More precisely, the results show that: a) bank size is a variable with a positive and significant effect on market power. Hence, larger banks enjoy greater market power due to either cost advantages or to their capacity to impose higher prices; b) the more efficient banks enjoy higher margins as a consequence of their lower marginal costs; c) market expansion has a positive effect on the Lerner Index, showing that in times of economic expansion banks may enjoy greater relative margins; and d) with respect to default risk, the banks that in relative terms spend more of their resources granting credits enjoy higher margins. Thus, the period of economic growth and financial stability has favored the growth of size of banks and their efficiency, leading to greater relative margins.

The paper is structured as follows. Section 1 reviews the legal progress towards a single European banking market and the evolution of the degree of integration. In Section 2, based on the model used in Corvoisier and Gropp (2002), we derive the Lerner Index of market power specifically for banks and its determining factors. Section 3 presents our sample and variables and discusses the method and empirical approach we use to estimate the Lerner Index. Section 4 shows the empirical results. Section 5 concludes.

1. Deregulation, integration, and consolidation in European banking

The Treaty of Rome, signed in 1957, created the European Economic Community. Since then, Europe has adopted a series of initiatives. Notable among these initiatives was the Single European Act (1986), the purpose of which was to complete the single market by the end of 1992.

Integrating the European financial markets made it necessary to harmonize the regulatory framework of financial institutions. Doing so was accomplished by means of various Directives. In the specific case of banks, the First (1977) and Second (1988) Banking Directives stand out. The latter was the key component of the liberalization process, because it radically altered the regulatory framework of banking institutions in the EU, and carried implications for the structure of the sector, the behavior of institutions, and supervision.

The Second Banking Directive was implemented between 1991 and 1994 by the different European banking sectors. Some of the most important modifications introduced in this Directive were the establishment of the single license and mutual recognition. The "single license" means that under certain general circumstances, the Directive enables credit institutions to provide banking services along the EU countries, either through a branch office or directly by providing banking services, without a banking license from the host country. "Mutual recognition" means that the Directive introduced the principle of home country control, which means that a bank that operates in other member states will only be supervised by the authorities in its country of origin; i.e., the country that issued the banking license and in which its head office is located.

Despite the progress of the integration of European financial markets, the situation at the end of the 1990s was far from a single integrated market. For this reason, in June 1998 the Council of Europe at Cardiff invited the European Commission to present a framework of action designed to improve the single market in financial services. In response to this request, the European Commission, which clearly recognized the existence of a low level of integration and competition in the financial markets in the late 1990s, approved the Financial Services Action Plan (European Commission, 1999). This plan contains a wide range of measures or actions aimed at establishing the broad conditions for an optimal single financial market in 2005.

The empirical evidence available on the degree of integration of European banking markets shows an unequal situation in the different market segments. The evidence in Cabral et al. (2002) and Manna (2004) points to a fully integrated market in wholesale banking services. However, the integration process has clearly been slower in the retail area, due both to the traditional strongly local nature of these activities and to obstacles to integration.

Analysis of cross-border banking penetration is one of the tools most widely used to analyze the evolution of the degree of integration of banking markets. Table 1 shows the evolution of the market penetration of foreign banks in European

countries. The table uses two indicators of integration, the share of assets held by foreign banks in domestic markets and the share of foreign banks in the total number of banks operating in individual EU countries. In the share-of-assets case, the asset share varies considerably across the EU. From 1990 to 1997 the asset share decreases in all countries, except Ireland, Greece, and Portugal. In the share-of-foreign-banks case, the ratio also varies from country to country. However, it decreases in a smaller number of countries.

In view of these two indicators we conclude that the cross-border penetration of banks is limited and even decreasing in most countries in terms of asset share, and relatively stable in terms of the proportion of foreign banks.

Unfortunately, there is a lack of statistical information covering the first half of the 1990s with which to construct other indicators of cross-border banking penetration. However, the recent study by Cabral et al. (2002), which analyzes banking integration in the European Monetary Union (euro area), offers some indicators from 1997. Cabral et al. (2002), using quantity-based indicators of integration, show that cross-border flows are still negligible (although with a slightly increasing trend) in retail loans and deposits. In March 2002, banks in the euro area still worked with their domestic customers in 89% of their non-bank loans, compared with 91% in 1997, and 84% of their non-bank deposits, compared with 88% in 1997.

Another indicator of cross-border penetration is the number of foreign-owned branches relative to total bank branches. To obtain this data we use the information provided by the OECD for eight European countries. In Table 2, this ratio presents a significant increase only for Sweden and Finland, and remains practically unchanged in Germany, Italy and the UK. It decreases in Greece, Spain, and Portugal. Therefore, in the context of the liberalization of branch opening restrictions, we find no increase in foreign bank penetration in terms of branches.

In this context of low cross-border banking penetration, the European banking system has experienced a process of consolidation as a consequence of the wave of M&As that took place. Table 3 shows that banking market concentration has increased. The market share of the five largest credit institutions (CR5) in the EU increased from 51% in 1990 to 57% in 1999, with significant differences across countries. In this same period, the consolidation process reduced the number of credit institutions in the European Union: from 12,582 in 1990 to 8,809 in 1999.

Another important indicator of financial integration is cross-border M&A activity. Table 4 shows that of the 1,877 M&As involving banks that took place in the EU between 1990 and 1999, only a small percentage (23% of the EU mean) were between banks belonging to different countries. Thus, although there appears to be a trend towards increased cross-border consolidation that may result in further market integration, domestic M&As predominate over cross-border deals. As a result, this evolution has led to increased concentration within individual European countries, implying that consolidation is taking place on a national rather than international level.

Although the concepts of integration and competition are different, the integration of markets favors competition, considering that elimination of obstacles to integration is likely to generate more competition. Thus, the removal of entry barriers facilitates both greater cross-border activity and increased penetration by foreign banks. An increased number of foreign banks is expected to boost the level of competition, thus benefiting consumers.

The empirical approach to the measurement of competition is more problematic, as it is usually based on the use of methods of empirical industrial organization that require information at the firm level. At aggregate level, the usual proxy for competition is the estimate of the price - marginal cost margin, obtained by using aggregated interest rate information.

The appropriate margins for evaluating competition are relative margins, which we construct as a quotient between the price-marginal cost margin and the price, i.e., the Lerner Index. In Figure 1 we use interest-rate information supplied by the European Central Bank to show the evolution of the relative margins of four banking products. These products comprise three on the asset side of the balance sheet (consumer loans to households, mortgage loans to households, medium and long-term loans to enterprises) and one on the liabilities side (time deposits). We note that in Figure 1 we use the three-month interbank interest rate as a proxy for the marginal cost. However, since we have not harmonized national interest rates, our results must be interpreted with caution. We calculate margins as the difference between average interest rates and a reference market rate. For time deposits, we calculate margins as the difference between a reference market rate and the time-deposit interest rate. The figure shows that for numerous countries of the EU and fundamentally in asset products, relative margins in 1999 were at higher levels than those of 1990, without any appreciable reduction of inequalities among countries.

2. The measurement of market power in the banking sector

We classify the indicators of competition and market power in banking into two groups.

First, we find the indicators of competition with solid theoretical foundations. This group includes instruments based on the new empirical industrial organization literature such as the Lerner Index (Prescott and McCall, 1975; Maudos and Fernández de Guevara, 2004), conjectural variation models (Shaffer, 1989 and 1993; Shaffer and Disalvo, 1994; Suominem, 1994; Neven and Röller, 1999), Panzar and Rosse's model (Molyneux, Loyd-Williams and Thornton, 1994; De Bandt and Davis, 2000; Nathan and Neave, 1989; Bikker and Haaf, 2002) and those that use Tobin´s q (defined as the market value of assets divided by the book value of assets) as a measure of market power (Keeley, 1990; Saurina, 1997).

To the second group belong the indicators that are not based on any model of industrial organization, such as the so-called structure-conduct-performance

paradigm compared to the efficient structure hypothesis (Berger, 1995), and using measures of concentration as proxies for market power.

In this paper, we base the model of bank behavior on the empirical analysis of the evolution of the degree of competition in the European banking system in Corvoisier and Gropp (2002). The model supposes that banks set the prices in the loan market, and that they face a given deposit rate (r_D) on their liabilities. Corvoisier and Gropp consider fixed operating costs. They assume that banks offer a single but differentiated type of loan k, whose demand function is as follows:

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

where:

- b is the derivative of the demand for loans from bank k for the differential of interest against its competitors, enabling b to capture the effects of the differentiation of products.

- B is the derivative of the total demand for loans (L) for the average interest rate 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

$$L = L_0 - r_L B \qquad where \quad L = \sum_{k=1}^{N} L_k \qquad (2)$$

Deriving equation (1) for the interest rate on loans, we obtain:

$$\frac{\partial L_k}{\partial r_k} = -(b + \frac{B}{N^2}) \qquad (3)$$

If we assume a reserve requirement coefficient (α) proportional to deposits (D), the balance sheet restriction imposes that $L_k=D_k(1-\alpha)$ and the objective function of bank k is as follows:

$$Max_{\ r_k} \quad \Pi_k = (1-\beta_k) r_k L_k - \frac{r_D L_k}{1-\alpha} - C_k(L_k, D_k) \qquad (4)$$

where β_k represents the risk of insolvency, which acts as an added cost ($\beta_k L_k r_k$). $C_k(L_k,D_k)$ represents the operating costs.

If we consider that banks decide on the loans interest rate, the first-order condition of the problem of maximization of profits is:

$$\frac{\partial \Pi_k}{\partial r_k} = (1-\beta_k)L_k + (1-\beta_k)r_k \frac{\partial L_k}{\partial r_k} - \frac{r_D}{1-\alpha}\frac{\partial L_k}{\partial r_k} - \frac{\partial C_k}{\partial L_k}\frac{\partial L_k}{\partial r_k} = 0 \tag{5}$$

or, equivalently,

$$\left[(1-\beta_k)r_k - \frac{r_D}{1-\alpha} - \frac{\partial C_k}{\partial L_k}\right]\frac{\partial L_k}{\partial r_k} = -(1-\beta_k)L_k \tag{6}$$

Dividing both sides of the equation by r_k and taking (3) into account,

$$\frac{(1-\beta_k)r_k - \frac{r_D}{1-\alpha} - \frac{\partial C_k}{\partial L_k}}{r_k} = (1-\beta_k)\frac{L_k}{r_k}\frac{1}{(b+\frac{B}{N^2})} = \frac{(1-\beta_k)}{e_k} \tag{7}$$

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 (2) $L_k=(L_0-r_kB)/N$, we obtain

$$\frac{r_k(1-\beta_K)(1-\alpha) - r_D - \frac{\partial C_k}{\partial L_k}}{r_k} = (1-\beta_k)(1-\alpha)\frac{\frac{L_0}{N}+\frac{r_k B}{N}}{r_k}\frac{1}{(b+\frac{B}{N^2})} \tag{8}$$

We note that the left side of equation (8) is the expression of the Lerner Index corrected for risk of insolvency (default risk). [1] Its determinants, which appear on the right side, are the number of banks (N), the sensitivity of the demand for loans of type k to the differential of their rate of interest against their competitors (b), the sensitivity of total demand of loans to the average interest rate (B), the risk of insolvency (β_k), and the average size of bank (L_0/N).

According to the theoretical model, the effect of the number of banks on the Lerner Index is ambiguous, because the partial derivative of the Lerner Index for N depends on the difference between the values of aggregate elasticity (B) and the elasticity of the demand for each type of loan (b). Second, the less elastic the demand for loans, the greater the Lerner Index is. Third, an increase in the probability of default of borrowers (β_k) reduces the market power as a result of the decrease in the difference between loan rate net of loan losses and marginal cost. And finally, an increase in the average size of banks increases the market power, probably due to the better, more dominant position of larger banks relative to their peers.

As mentioned before, the model used by Corvosier and Gropp (2002) assumes perfect competition in the deposit market. We can relax this assumption to allow the existence of market power in setting the deposit rate. The result obtained from the Lerner Index for deposits would then be analogous to the one obtained by loans[2]. Thus, we could analyze the evolution and the determinants of market power in the deposit market separately from the loan market. However, the statistical information available in the database does not permit us to construct separate prices or rates for loans and deposits. Consequently, in the empirical approach we use a single indicator of banking activity. Doing so makes it possible to construct the Lerner Index based on the estimation of a price and a marginal cost for the total banking activity.[3]

The relative margin (Lerner Index) shows the level of social efficiency reached in the market and is therefore suitable for diagnosing the effects of the evolution of competition. As affirmed by Salas and Oroz (2003), the relative margin, rather than the absolute margin, is the most appropriate for evaluating the evolution of competition for two reasons. First, 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 second, because the relative margin offers a proxy for the loss of social welfare that is due to the existence of market power.

As figure 2 shows, assuming a linear loan demand function ($r_L=r_L(L)$) and constant marginal cost ($MC=r+\partial C/\partial L$), banks maximize profits when marginal income (MI) is equal to marginal cost (MC). L^* and r^*_L are the volume of loans and the optimum interest rate, respectively. The loss of welfare (inefficiency) associated with imperfect competition, the so called Harberger triangle (area "abc" in figure 2) per unit of revenue ($r_L L$) is proportional to the Lerner Index.

$$\frac{\Delta abc}{r_L^* L^*} = \frac{\frac{L^*(r_L^* - r - \frac{\partial C}{\partial L})}{2}}{r_L^* L^*} = \frac{1}{2}\frac{r_L^* - r - \frac{\partial C}{\partial L}}{r_L^*} \qquad (9)$$

We note that a similar expression applies for the supply deposit case.

3. Empirical approximation to the Lerner Index

The measurement of market power by estimating the left-hand side of expression (8) requires information on the average prices (or the interest rates) of banking output and of marginal costs of production.

When we examine the prices of banking output, we note that the empirical estimation of separate prices or interest rates for loans and deposits is not without problems. Thus, for loans, the profit and loss account does not separate out the

financial income associated with them, because it appears jointly with other financial products (fixed income investments, for example). For deposits, the financial costs are included with those of other liability products. For this reason, in the empirical approach we use a single indicator of banking activity. More precisely, as in Shaffer (1993) and Berg and Kim (1994), we use the total assets of each bank as our proxy for banking output.

Our beginning 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 both interest income and non-interest income, given the increasing importance of the latter in banks' income structure (see European Central Bank, 2000).

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

$$\ln C_i = \alpha_0 + \ln TA_i + \frac{1}{2}\alpha_k \left(\ln TA_i\right)^2 + \sum_{j=1}^{3} \beta_j \ln w_{ji} +$$
$$+\frac{1}{2}\sum_{j=1}^{3}\sum_{k=1}^{3} \beta_{jk} \ln w_{ji} \ln w_{ki} + \frac{1}{2}\sum_{j=1}^{3} \gamma_j \ln TA_i \ln w_{ji} + \mu_1 Trend + \mu_2 \frac{1}{2} Trend^2 + \quad (10)$$
$$+\mu_3 Trend \ln TAi + \sum_{j=1}^{3} \lambda_j trend \ln w_{ji} + \ln u_i$$

where C_i is the bank's total costs, including financial costs and operating costs. As a measure of production we use total assets (TA_i). We define the prices of the production factors as follows:

w1. Price of labor: Personnel costs / total assets. Since the number of employees was not available in the original data source, we use the ratio of labor costs to total assets as the price of labor.

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

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

We estimate the costs function (and hence of the marginal costs) separately for each country. We allow the parameters of the cost function to vary from one country to another to reflect different technologies. We also introduce fixed effects, which we use to capture the influence of variables specific to each bank. And we include a trend (*Trend*) to reflect the effect of technical change, which translates into movements of the cost function over time. We perform our estimations under the imposition of restrictions of symmetry and of degree one homogeneity in input prices.

We note that the estimated marginal cost approximates the sum of marginal financial costs (interest rate in the expression of the Lerner Index) and marginal operating costs, but does not capture the cost of risk.

To measure the explanatory variables of the Lerner Index, we use the following proxies. We construct these proxies on the basis of the information contained in the BankScope database and other sources:

Concentration reflects the number of banks operating in the markets. Thus, *Concentration* acts as a proxy for *N* in the theoretical model. We use the Hirschman-Herfindahl index in terms of total assets calculated for each country to create this proxy. Taking into account the evidence offered by Corvoisier and Gropp (2002), in which the effect of concentration may be different in different banking products, we check the robustness of the results using the Hirschman-Herfindahl index in terms of loans and deposits. As mentioned previously, the limitations imposed by the available statistical information do not permit us to analyze the market power and its determinants separately for loans and deposits. Therefore, we analyze the importance of the concentration in loans and deposit markets on a synthetic index of market power, using total assets as proxy for banking output.

> Concentration (and market share) refer to national markets, because only in a few exceptional cases (very big banks) can the relevant market be Europe. As we noted earlier, the Financial Services Action Plan of the European Commission explicitly recognizes that the European banking markets are still fragmented, specially the retail markets. It is also possible that for a large number of banks, the relevant market is even smaller than national dimensions. However, the lack of disaggregated information prevents us from constructing measures of concentration of less than national scale (i.e., regional or local).

Elasticity of aggregate loan demand (B). Following Corvoisier and Gropp (2002), as a proxy for the elasticity of aggregate loan demand we use the ratio of the total assets of the banking system to GDP and the ratio of stock market capitalization to GDP. These variables are proxies for countries' financial structure (bank-oriented compared to market-based financial structure), and thus for the degree of dependence on bank financing compared to direct financing in the markets. We can assume that the greater elasticity in the demand for banking products, the greater the importance of other sources of non-banking financing.

Risk is measured by the loans / total assets ratio as a proxy for the default risk. We note that the default risk depends on the asset quality. Therefore, we find it better to use variables such as net charges-offs/loans, non-performing loans/total loans, or loan loss provisions/total loans. However, the BankScope database contains data on non-performing loans for only a few banks. For net charges-offs, the database does not provide any information. For loan loss provisions, BankScope has information for a greater number of banks, although for Germany and the UK there is almost no information for the period 1997-99. With these limitations, the empirical

application analyzes the robustness of the results using the variable *loan loss provisions/total loans* as our proxy for risk.

> An alternative method would be to use a banking sector health variable as a proxy for the default risk. For this approach the OECD ("Bank Profitability") offers information on variables such as loan loss provisions or solvency ratios. However, in the first case (loan loss provisions) the OECD does not have information for the UK, and in the second case (solvency ratio) there is no information for Germany, France, and the UK.

Size is measured by total assets (log of total assets). Although our model considers banks of equal size, in reality it is very difficult to accept this assumption. Therefore, we introduce the size of bank as an explanatory variable of the Lerner Index. We introduce this variable for two reasons. We wish to capture the possible cost advantages associated with size (economies of scale) and we want to be able to capture the possible market power associated with size. To allow for a possible non-linear relation between size and market power, we also introduce the square of the variable.

We also include the following control variables in the estimation:

Efficiency. We use the cost to income ratio, defined as the quotient between operating costs and the gross income, as our proxy for *Efficiency*. Introducing a direct measure of efficiency as explanatory variable of the relative margin (Lerner Index) allows us to test the so-called efficient structure hypothesis against the traditional structure-conduct-performance hypothesis. Under the efficient structure hypothesis, firms with superior management or production technologies have lower costs and therefore higher profits. The hypothesis also assumes that these firms gain large market shares that might result in high levels of concentration. Following Berger (1995), the way of testing the efficient structure hypothesis and the collusion hypothesis is by introducing concentration, efficiency, and market share as explanatory variables of relative margin.

Market share is the bank's total assets expressed as a percentage of those of the national banking industry. Alternatively, we use market shares in terms of credits and deposits. As stated earlier, introducing market share is justified on the grounds of testing the efficient hypothesis or, alternatively, the hypothesis of collusion.

Market expansion. We use the real growth rate of GDP in each of the national markets as a proxy for this variable. The pattern in the Lerner Index could be affected by the response of banks to business cycle dynamics. The expected sign of the relation is ambiguous. Thus, Rotemberg and Saloner´s (1986) model of collusion markups are countercyclical, but Green and Porter´s (1984) model markups are cyclical.

Productive specialization. As we mention in the introduction to this paper, recent reports show that the level of competition (and integration) is higher in the wholesale banking activities relative to the retails banking services. This higher

level of competition is due to the barriers that protect national markets from outside competition. To test the importance of specialization on market power, we use a cluster analysis. Based on this analysis, we identify groups of banks with similar productive specialization. We calculate the percentage structure of the balance sheet in its main items (loans, other earning assets, fixed assets, deposits, other sources of funding and equity). To form the clusters, we use the non-hierarchical *k*-means technique. (The same approach has been used in Maudos, Pastor and Pérez, 2002.) Table 5 shows, for the year 1999, the percentage structure of the balance sheet and the most important economical and financial ratios of the four clusters whose main characteristics are described in the appendix.

Institutional dummy. Agency issues associated with different types of firm ownership are an area of concern in many banking systems in which state-owned banks operate alongside mutual and private-sector institutions. For that reason, we introduce institutional dummy variables for bank, savings banks, co-operative banks, and others. The "Others" category includes bank holding and holding companies, investment banks/securities houses, medium and long term credit banks, non-banking credit institutions, real estate / mortgage banks, and specialized government credit institutions.

Country dummy. To control for other factors specific of each country (regulatory restrictions on competition, legal impediments to bank competition, etc.), we introduce country dummy variables.

4. The Lerner Index and its determinants: results

We obtain our data from the Bankscope database (Bureau Van Dijk). The sample consists of a total of 18,810 observations of non-consolidated banking firms during the period 1992-1999. (For the years before 1992, BankScope offers information on only a very small number of banks, so such samples are not representative). Given the low degree of representation of some countries in the sample, the banking sectors we analyze are the five biggest in the European Union: France (2,433 observations), Germany (12,641), Italy (2,307), Spain (985), and the United Kingdom (444).

Table 6 shows the number of banks analyzed in each country. The table also shows the representation of the sample in terms of banks' total assets in relation to the information contained in the BankScope database. We also compare the aggregate information on each country provided by the OECD in its publication "Bank Profitability". The table shows that the number of banks in the sample represents most of the assets included in the BankScope database. The sample also represents, in general, high percentages of the total offered by Bank Profitability in each of the countries. The exception is the UK, where the sample of banks is smaller.

Figure 3 shows the evolution of prices, marginal costs, and Lerner Index in the five banking sectors. In all cases we find a reduction of the average price of banking output, partly as a result 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 because of the reduction of both financial costs and operating costs.

The net effect of the reduction of marginal costs and prices is not always a reduction of the absolute margin, depending on which one decreases faster. For relative margin, the Lerner Index increases in all the countries. The exceptions are Germany and the UK, where the reduction of marginal costs is greater than that of the average price of assets. If we take into account that the sample in 1992 was less representative and take 1993 as the initial year of reference, then we find that the Lerner Index increases in France, Italy, and Spain, and diminishes in Germany and the UK. Its average value is 10% in 1999.

The Lerner Indexes show substantial differences across countries. Thus, the banking sector in the UK enjoys the greatest relative margin in setting prices, followed by Italy. France is at the opposite extreme. This result supports the latest information available from the OECD ("Bank Profitability") for 1999, in which, of the five countries considered, it is the UK that presents the highest return on equity (ROE). France is the least profitable.

In table 7 we calculate tests of equal means. We find them statistically different between countries.

Comparing the initial situation (1992) with the final one (1999), we see the persistence of the differences among the countries considered. Also, figure 4, which represents the standard deviation of the Lerner Index, indicates that the inequalities among banks in the banking industries have not decreased, but that there is a notable increase of inequalities in France and Spain. Despite this persistence of the differences, there seems to have been a slight convergence in the average of the Lerner Index of the various countries, although at a higher level.

Figure 5 shows the differences observed by type of institution (banks, savings banks, co-operatives, and others), by productive specialization group and by size. The savings banks enjoy greater market power, with a growth of the Lerner Index over the 1992-1999 period. Banks stand clearly below savings banks, with a growing trend from 1995 onwards. Credit co-operatives hold a position between these two, showing a relatively stable Lerner Index**.** Testing the differences of means lets us reject the null hypothesis of equality of means among the different institutional types with the exception of banks and "others".

We also find differences among specialization groups. These differences are statistically significant, except between cluster 1 and cluster 4. The banks in cluster 2, which carry out typical investment banking, enjoy the lowest margin, with a Lerner Index value 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 almost every year. However, in 1999 cluster 3 shows a higher value of the index. Thus, the results show that market power is higher in the retail banking activities.

Figure 5 shows the evolution of the Lerner Index for three subsamples, small, medium-sized, and large banks, based on the total assets of the banks. Following Bikker and Haaf (2002) the smallest 50% of all banks of the sample constitute the small-banks sample, and the largest 10% of all banks of the sample constitute the large-bank sample. The remaining 40% constitutes the medium-sized sample. The results indicate that the group of the largest banks enjoys the least market power because these banks compete more than other banks in wider markets (national and international), which are more open to competition. This result supports the evidence obtained by Bikker and Haaf (2002), who show that competition is stronger in international markets and weaker in local markets.

In Table 7, the test of means shows that the differences between the medium and small banks are not statistically significant.

Table 8 presents the results of the estimation of the determinants of the Lerner Index. We introduce fixed effects and time effects. Given that in the estimation of cost functions we must have information on several variables to estimate input prices, we exclude from the sample those banks for which we do not have complete information. Our final sample comprises 18,776 banks considered in these estimations. The Hausman test rejects in all cases the null hypothesis of non-correlation between the individual effects and the regressors. The GLS estimator of the random effects model is not consistent. Consequently, we report only the results of the estimation of the fixed effects model (least square dummy variable model).

The empirical results indicate that in terms of total assets and based on the Hirschman-Herfindahl index, the concentration of national banking markets is not significant. Following Corvoisier and Gropp (2002), 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 table 8 we show the results when we introduce two indexes of concentration. One refers to the loans market and the other to deposits. The results show that only the effect of the concentration of the deposits market is significant, and that its influence is negative. This result agrees with the evidence recently obtained by Corvoisier and Gropp (2002).[4] Thus, the results show the importance of distinguishing the effect of concentration by type of product. The results reject the traditional hypothesis of collusion in the deposits market.

In relation to the negative significance of the market concentration on market power, one of the most important implications of the results that we obtain is the inadequacy of using the concentration as an indicator of competition. In line with Berger, Demirgüç-Kunt, Levine and Haubrich (2003), "… these results suggest skepticism regarding the use of bank concentration measures to proxy for the competition environment in banking markets". Besides, this lack of significance goes against the hypothesis formulated at the beginning of the paper on the relation

between competition and the increasing levels of concentration seen in the banking sectors of the EU.

The market share of each bank in its national market does not have a significant effect in any of the cases, regardless of the bank product of reference (total assets, loans or deposits). However, the results show that bank size is a variable with a positive and significant effect on market power, as predicted by the theoretic model. Hence, larger banks enjoy greater market power in their markets due to either cost advantages or to their capacity to impose higher prices. However, the relation between market power and size is non-linear. Consequently, one of the strategies used by banks to respond to the liberalization and the integration of financial markets has been to increase the size of the firm trying to reap the benefits of the higher levels of market power associated to it.

We test the sensitivity of our results by replacing the variable "total assets" by dummy variables for size strata (Size 1: dummy variable for the smallest 50% of all banks of the sample; Size 2: dummy variable for the largest 10% of all banks of the sample; Size 3: dummy variable for the remaining banks).[5] The results are robust to the variables we use. We find an increasing relation between size and market power.

The operating efficiency achieved in management is one of the most important factors in explaining the differences in market power among banking firms. The results show that the more efficient banks (lower value of the cost to income ratio) enjoy higher margins, almost certainly as a consequence of their lower marginal costs. Taking into account that we introduce a direct measure of efficiency into the estimation, the nonsignificance of the market share supports the pure efficient structure hypothesis (firms with superior management or production technologies have lower costs and therefore higher margins). Efficiency gains may be another response of banks to the opening of European financial markets. Facing the threat of potential entrants, established banks may have increased their levels of efficiency to prevent the competition of new entrants[6].

With respect to risk, the banks that in relative terms spend more of their resources granting credits enjoy higher margins. This positive influence is opposite to the negative sign predicted by the theoretical model. In addition to the limitations of the variable loans/total assets proxy for the default risk, this result may be due to the fact that, because of lack of statistical information, the Lerner Index (dependent variable in the estimations) does not take into account the risk of insolvency -loan losses- (The variable loans/total assets may be gathering the effect of the specialization in retail banking markets where lower levels of competition exist in relation to wholesale markets). The use of the loan loss provisions/total loans ratio as a proxy for default risk (columns (3) and (4) of table 8) does not show a statistically significant effect on the Lerner Index. However, we note that in the specific cases of the UK, and especially of Germany, the database gives information for only few banks. (Thirty banks for the UK in 1992. For Germany there is information for four banks over the period 1997-1999.) These limitations suggest a very cautious interpretation of our results.

Economic growth, for which we use the rate of growth of GDP of each country as a proxy, has a positive and significant effect on the value of the Lerner Index. The proxy shows that in times of economic expansion (and therefore of increased demand for bank financing) banks may enjoy greater relative margins. This finding may explain the increase of the Lerner Indexes observed during the 1992-99 period. Both the proxy variables for the elasticity of aggregate loan demand are statistically significant.

Although we have noted differences in the average values of the Lerner Index for different institutional types of banking firms, these differences are not important in explaining the Lerner Index once we consider the effect of other variables. The results in table 8 show that none of the dummies that characterize the institutional group is significant (the group of reference is that of "other" institutional types).

Using Spain as the country of reference, when we examine the possible existence of a country effect, we obtain a statistically significant result only for the UK. This result supports the level of the Lerner Index in figure 3, in which the UK is the country with the highest level of market power.

We find no differences in market power as a consequence of belonging to a particular banking specialization group, except in the case of cluster 2 (investment banks). This result is compatible with figure 5, in which we see that this group is the one with the lowest value for the Lerner Index.

5. Conclusion

Our objective in this study has been to offer empirical evidence on the evolution of competition in the banking industries of five big European countries. We obtain this evidence by estimating Lerner Indexes of market power and analyzing their determinants. Our sample comprises 18,810 observations of the banking sectors of Germany, France, Italy, Spain, and the United Kingdom. Our sample period is 1992-1999.

Our results show an average level of the Lerner Index of 10% in 1999. We find substantial differences in the index among countries, and a growing trend during the 1992-1999 period in four of the five cases considered. This behavior of the relative margins shows that despite the process of deregulation of the European banking systems, the existing market power may be persisting, which may be a consequence of the low level of cross-border banking penetration (and therefore of integration). Surprisingly, market power may even be increasing.

The explanatory factors of the index most commonly related to market power are in general not significant (market share) and even have a negative influence (concentration in the deposits market). However, the size of banks and

their operating efficiency, default risk, and the economic cycle are all notable explanatory variables for the behavior of the Lerner Index. Thus, the period of macroeconomic stability (economic growth and financial stability) has favored the growth of size of banks and their efficiency, leading to greater relative margins.

The negative effect of concentration (for which we use the Hirschman-Herfindhal Index as a proxy) in the deposits market, together with the nonsignificance in the case of loans, allow us to reject the traditional hypothesis of collusion. This effect, together with the importance of operating efficiency, constitutes evidence in favor of the efficient structure hypothesis. The nonsignificance (or the negative influence obtained in the deposits market) of the concentration in explaining the differences in market power shows us how inadequate it is to use concentration measures as proxy of the market power.

These results also show that political and economic decisions of accepting or denying a bank merger based on its effects on the market concentration lack solid ground. However, we note that we derive these implications from the data on the five European banking sectors, so it is necessary to obtain additional evidence for other countries. We can conclude that more research is needed on the topic of bank concentration and competition.

We believe it is important to verify whether the relative margin achieved in these years is stable, in the sense that the risk of insolvency may increase rapidly during recessions, pressing absolute margins downwards. Unfortunately, the lack of sufficient data on the risk of insolvency and in the timeliness of its posting prevents us from estimating the Lerner Index of market power net of the risk of insolvency.

The low level of integration that exists in the European banking markets as a consequence of various types of obstacles (natural and policy-induced barriers) protects national markets from outside competition. Nevertheless, it is possible that the introduction of the single currency together with the progressive implementation of the measures of the Financial Services Action Plan over the period 1999-2005 will be an important factor in boosting the levels of competition and financial integration. Further, it will be necessary to monitor the advance towards a single and competitive European banking market.

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APPENDIX

Cluster 1 is the group with the largest number of banks (1,170). This group represents 17.7% of the sample in terms of total assets. It is characterized by carrying out intermediation activity. Deposits and credits represent 84.5% and 70% of the balance sheet, respectively. It is also the group of banks with the highest fixed assets, which are attributable to its extensive branch network. Despite being the cluster that has the highest operating costs (2.27% of assets), Cluster 1 manages to be the most profitable in all margins of the profit and loss account. The cluster comprises mostly credit co-operatives and to a lesser extent savings banks.

Cluster 2 consists of 210 banks that represent 28.9% of the total of all banking system of the countries in our sample. These banks capture their resources basically through deposits (67%), and invest them mostly in other earning assets (68%). We can think of this group as investment banks. Of all the groups Cluster 2 is the least profitable, given its high average costs. These costs are 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 institutions ("others" category).

Cluster 3. In 1999 this group consisted of 504 banks representing 17.2% of the total assets of all banks of the sample. Like Cluster 1, the banks in this group are funded mostly by deposits (81%). However, they diversify their asset portfolio to a greater extent between loans (48%) and other earning assets (45%). They show a return on assets similar to that of Cluster 1, but 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 is the largest group in relation to the total assets of the sample (36.2%), but it relies the least on the capture of deposits (55%), preferring other sources of funding. On the asset side, Cluster 4 presents a percentage structure similar to that of Cluster 3, with a balanced distribution between loans (48%) and other earning assets (43%). Cluster 4 is the group with lowest ROE, although it presents the best indicator of operating efficiency (62.6%).

NOTES

[1] Expression (8) is similar to that obtained in the Monti-Klein imperfect competition model (Monti, 1972; and Klein, 1971) corrected for the possibility of default risk. See a survey of these models in Freixas and Rochet (1997).

[2] Freixas and Rochet (1997) discuss a similar model, deriving an expression for the Lerner Index in the loan and deposit markets.

[3] As far as we know, there is only one paper that estimates a model of banking competition where banks display some degree of non-competitive behaviour in both the loan and the deposit markets (Adams, Roller and Sickles, 2002). The aim of the paper is to understand to what extent the measurement of market power in the output market is affected by the assumption of perfectly competitive input (deposits) market. The authors find that the measurement of market power on one side of the market is not affected by assuming that the other side of the market is perfectly competitive. The model is estimated using data for U.S. commercial banks taken from the report of Condition and Income (Call report) and the FDIC Summary of Deposits. Unfortunately, for the European banks, the available databases do not contain information disaggregated enough to estimate Lerner Indexes separate from loans and deposits.

[4] 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. Angelini and Cetorelli (2003) also find a negative relationship between concentration and market power in the Italian banking industry.

[5] Results are available upon request to the authors.

[6] In the case of the U.S., DeYoung and Hasan (1998) show that de novo banks only achieve the levels of efficiency of established banks after 9 years on average. Consequently, efficiency of established banks may be used as an entry barrier.

References

Adams, R.A., Roller, L-H. and R. C. Sickle. "Market Power in Outputs and Inputs: An Empirical Application to Banking.", Finance and Economics Discussion Series (2002) 52. Washington: Board of Governors of the Federal Reserve System.

Angelini, P. and Cetorelli, N. "The effects of regulatory reform on competition in the banking industry.", *Journal of Money, Credit and Banking*. 35 (2003), 663-684.

Berg, S.A. and Kim, M. "Oligopolistic interdependence and the structure of production in banking: an empirical evaluation.", *Journal of Money Credit and Banking* 26 (1994), 309-322.

Berger. Allen N. "The profit-relationship in banking –test of market-power and efficient-structure hypothesis,", *Journal of Money, Credit and Ban*king 27 (1995), 405-431.

Berger, Allen N., Demirgüç-Kunt, A., Levine, Ross. and Haubrich, J.. "Bank concentration and competition: an evolution in the Making", *Journal of Money, Credit and Banking*. 35 (2003), in press.

Bikker, J.A. and Haaf, K. "Competition, concentration and their relationship: an empirical analysis of the banking industry,", *Journal of Banking and Finance* 26 (2002), 2191-2214.

Cabral, I., Dierick, F. and Vesala, J. *Banking integration in the Euro area*, Occasional Paper Series, December (2002), European Central Bank.

Corvoisier, S. and Gropp, R. "Bank concentration and retail interest rates.", *Journal of Banking and Finance* 26 (2002), 2155-2189.

De Bandt, O. and Davis, E. P. "Competition, contestability and market structure in European banking sectors on the eve of EMU,", *Journal of Banking and Finance* 24 (2000), 1045-2066.

De Young, R. and Hasan, I. (1998): "The performance of the novo commercial banks: a profit efficiency approach.", *Journal of Banking and Finance* 22, 565-587.

European Commission: Financial Services. *Implementing the Framework for Financial Markets: Action Plan*, Communication of the Commission, COM(1999)232, 11.05.99.

European Commission. *Report by the Economic and Financial Committee (EFC) on EU financial integration*, Directorate-General for Economic and Financial Affairs, Economic Papers No. 171, ECFIN/194/02-EN, (2002a) May.

European Commission. *Study to Analyse, Compare, and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union, report for the European Commission*, CSEF (Adam, K., Jappelli, T., Menichini, A., Padula, M. and Pagano, M.), (2002b).

European Central Bank: "EU banks´ income structure", April (2000).

Freixas, X and Rochet, J.C. *Microeconomics of Banking*, Massachusetss Institute of Technology, MIT Press (1997).

Green, E. and Porter, R. "Non-cooperative collusion under imperfect price information.", *Econometrica* 52 (1984), 87-100.

Heinemann, F. and Jopp, M. *The benefits of working European retail market for financial services: report to the European Financial Services Round Table,* ZEW&IEP (2002).

Keeley, M.C.. "Deposit insurance, risk, and market power in banking.", *American Economic Review* 80(5), (1990) 1183-1200

Klein, M. "A theory of the banking firm.", *Journal of Money, Credit and Banking* 3 (1971), 205-18.

Manna, M. “Developing statistical indicators of the integration of the Euro area banking system.”, Working Paper Series No. 300 (2004), European Central Bank.

Maudos, J., Pastor, J.M. and Pérez, F. “Competition and Efficiency in the Spanish Banking Sector: the Importance of Specialisation.”, *Applied Financial Economics* 2 (2002), 505-516.

Maudos, J. and Fernández de Guevara, J. “Factors explaining the interest margin in the banking sectors of the European Union.”, *Journal of Banking and Finance*, (2004), forthcoming.

Molyneux, P., Lloyd-Williams and Thornton, J. “Competitive conditions in European banking.”, *Journal of Banking and Finance* 18 (1994), 445-459.

Monti, M. “Deposit, credit, and interest rate determination under alternative bank objetives”, in G.P. Szego and K. Shell (eds.), *Mathematical methods in investment and finance*, Amsterdam, North-Holland (1972).

Nathan, A. and Neave, E. “Competition and contestability in Canada´s financial system: Empirical results.”, *Canadian Journal of Economics* 22 (1989), 576-594.

Neven, D. and Röller, L-H. “An aggregate structural model of competition in the European banking industry.”, *International Journal of Industrial Organization* 17 (1999), 1059-1074.

Prescott, H. and McCall, A. “Market power and structure and commercial bank instalment lending.”, *Journal of Money, Credit and Banking* 7(4) (1975), 449-467.

Rotemberg, J. and Saloner, G.: “A supergame-theoretic model of prices wars during booms.”, *American Economic Review* 76 (1986), 390-407

Saurina, J. “Deregulación, poder de mercado y solvencia en la banca española”, *Investigaciones Economicas 31*, (1997) 3-27.

Salas, V. and Oroz, M. “Competencia y eficiencia en la intermediación financiera en España: 1977-2001.”, *Moneda y Credito* 217 (2003), 73-99.

Shaffer, S. “Competition in the US banking industry.”, *Economics Letters* 29 (1989), 321-323.

Shaffer, S. “A test of competition in Canadian banking.”, *Journal of Money, Credit and Banking*, 25 (1993), 49-61.

Shaffer, S. and Disalvo, J. “Conduct in banking duopoly.”, *Journal of Banking and Finance* 18 (1994), 1063-1082.

Suominem, M. “Measuring competition in banking: a two product model.”, *Scandinavian Journal of Economics* 96 (1994), 95-110.

Table 1 . Share of foreign banks in national markets (Percentage)

The table reports the share of foreign banks in 1990 and 1997 or the closet year for which data was available. *Source* : European Commission (2002).

	Asset share of foreign banks		Number of foreign banks as a fraction of total banks	
	1990	**1997**	**1990**	**1997**
Austria	2.72	1.42	28.00	22.58
Belgium	2.71	1.55	26.66	38.89
Denmark	0.22	0.18	5.41	5.77
France	15.24	2.39	25.00	17.39
Germany	3.22	2.56	25.58	25.17
Greece	0.67	3.29	9.09	23.07
Ireland	12.36	65.85	33.33	64.70
Italy	0.08	0.05	3.70	5.26
Luxembourg	65.66	58.09	86.88	88.30
Netherlands	18.06	1.78	40.00	32.14
Portugal	3.07	3.27	11.11	21.43
Spain	13.82	10.03	22.53	27.37
Sweden	5.02	1.12	33.33	18.18
United Kingdom	28.09	21.67	47.22	48.48
Non-weighted average	7.74	4.11	23.14	23.81

Table 2. **Foreign-owned bank branches / Total branches in national markets**

Percentage over total branches. *Source* : Bank Profitability (OECD).

	1995	1996	1997	1998	1999
Austria	-	-	-	-	-
Belgium	-	-	-	-	-
Germany	1.70	1.72	1.79	1.68	1.71
Denmark	-	-	-	-	-
Spain	0.36	0.36	0.34	0.32	0.32
Finland	0.31	0.64	0.92	1.10	-
France	-	-	-	-	-
Greece	5.92	5.88	5.76	5.62	4.40
Ireland	-	-	-	-	-
Italy	0.37	0.35	0.37	0.38	0.37
Luxembourg	-	-	-	-	-
Netherlands	-	-	-	-	-
Portugal	3.08	2.52	2.38	2.37	2.15
Sweden	0.50	0.84	2.19	2.52	2.59
United Kingdom	-	8.29	8.43	8.67	8.77
Weighted average	1.06	1.76	1.80	1.76	1.76

Table 3 **. Bank concentration**

CR5-share of the 5 largest credit institutions in total assets (as a % of total assets). *Source* : European Central Bank

	1990	1995	1996	1997	1998	1999
Austria	34.67	39.19	38.96	48.25	50.07	50.39
Belgium	48.00	51.20	52.20	53.90	72.50	77.39
Germany	13.91	16.67	16.08	16.68	19.15	18.95
Denmark	76.00	72.00	72.00	72.00	76.00	77.00
Spain	34.91	47.30	46.00	45.20	44.60	51.90
Finland	41.00	70.62	71.74	72.72	73.51	74.33
France	42.50	41.30	41.20	38.00	39.20	42.70
Greece	83.70	75.66	74.49	71.77	72.77	76.62
Ireland	44.20	44.40	42.20	40.70	40.10	40.79
Italy	29.19	32.36	32.11	30.71	38.73	48.33
Luxembourg	-	21.23	21.81	22.43	24.58	26.09
Netherlands	73.39	76.14	75.36	79.42	81.69	82.25
Portugal	58.00	74.00	80.00	76.00	75.22	72.60
Sweden	82.68	86.53	86.52	86.80	85.65	88.21
United Kingdom	-	28.27	29.14	28.28	27.75	29.07
Non-weighted average	50.93	51.79	51.99	52.19	54.77	57.11

***Table 4*. Number of domestic and cross-border M&A involving credit institutions in the European Union**
Source: Thomson Mergers and own elaboration

a) Number of Domestic M&A

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Belgium	0	8	1	4	7	1	5	3	6	2
Denmark	0	9	5	3	10	3	3	1	0	4
Germany	5	15	17	25	22	30	36	24	16	31
Greece	0	0	0	0	1	0	0	1	10	5
Spain	3	12	21	18	10	8	7	14	27	17
France	13	58	41	31	22	16	19	27	13	13
Ireland	0	2	1	0	4	0	1	0	1	1
Italy	10	49	42	27	46	50	31	26	20	33
Luxembourg	2	0	1	0	0	0	0	0	1	0
Netherlands	2	7	4	4	5	2	5	3	5	1
Austria	0	3	11	5	3	5	4	8	2	6
Portugal	0	4	6	3	4	2	3	1	1	1
Finland	1	38	18	8	5	7	7	2	2	1
Sweden	1	6	8	4	5	4	2	3	3	2
United Kingdom	19	17	13	9	15	21	24	15	11	10
European Union	56	228	189	141	159	149	147	128	118	127

b) Number of Cross-border M&A

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Belgium	1	6	3	1	0	4	2	5	2	9
Denmark	1	1	0	0	1	0	2	2	2	1
Germany	3	7	4	3	12	7	10	7	16	19
Greece	0	0	0	0	1	0	1	1	0	0
Spain	2	6	2	2	2	3	2	0	4	5
France	8	14	8	5	9	7	4	8	11	7
Ireland	1	2	0	2	2	1	2	1	0	1
Italy	4	6	4	3	8	2	2	2	1	5
Luxembourg	0	0	2	2	1	2	0	3	4	4
Netherlands	3	3	3	0	3	8	4	4	2	4
Austria	1	0	1	1	4	0	0	0	0	1
Portugal	0	2	1	0	0	1	0	2	0	0
Finland	1	0	0	0	0	0	0	0	1	0
Sweden	0	2	0	1	2	1	1	1	1	4
United Kingdom	10	6	6	3	5	6	8	5	5	8
European Union	35	55	34	23	50	42	38	41	49	68

c) Cross-border M&A over Total M&A (%)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Belgium	100	43	75	20	0	80	29	63	25	82
Denmark	100	10	0	0	9	0	40	67	100	20
Germany	38	32	19	11	35	19	22	23	50	38
Greece					50		100	50	0	0
Spain	40	33	9	10	17	27	22	0	13	23
France	38	19	16	14	29	30	17	23	46	35
Ireland	100	50	0	100	33	100	67	100	0	50
Italy	29	11	9	10	15	4	6	7	5	13
Luxembourg	0		67	100	100	100		100	80	100
Netherlands	60	30	43	0	38	80	44	57	29	80
Austria	100	0	8	17	57	0	0	0	0	14
Portugal		33	14	0	0	33	0	67	0	0
Finland	50	0	0	0	0	0	0	0	33	0
Sweden	0	25	0	20	29	20	33	25	25	67
United Kingdom	34	26	32	25	25	22	25	25	31	44
European Union	38	19	15	14	24	22	21	24	29	35

Table 5 **. Specialization in the European banking system. 1999**

Using a cluster analysis, groups (clusters) of banks with similar productive specialization 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). To form the clusters the non-hierarchical k-means technique was used. *Source* : BankScope (Bureau Van Dijk) and own elaboration.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total banks
Percentage over Total Assets					
Loans (%)	69.58	24.45	47.63	47.89	44.90
Other earning 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
ROA (return on assets) (%)	0.74	0.45	0.73	0.57	0.59
ROE (return on equity) (%)	14.04	12.76	14.26	10.02	12.12
Number of banks	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
"Others" (%)	4.10	18.57	3.37	15.15	6.70
Share in Total Assets (%)	17.66	28.91	17.22	36.21	100.00

***Table 6*. Number of banks and representation of the sample used**

Source: BankScope (Bureau Van Dijk), Bank Profitability (OECD) and own elaboration.

Number of banks in the sample used						
	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
Representation of the sample in terms of total assets. Percentage of total assets included in the sample compared with:						
	a) Bank Profitability (OECD) database					
	France	**Germany**	**Italy**	**Spain**	**United Kingdom**	**Total**
1992	50.30%	82.46%	64.53%	82.70%	7.26%	60.37%
1999	68.70%	77.52%	84.88%	91.81%	12.11%	67.11%
	b) BankScope (Bureau Van Dijk) database					
	France	**Germany**	**Italy**	**Spain**	**United Kingdom**	**Total**
1992	99.92%	95.45%	98.69%	99.82%	100.00%	97.80%
1999	94.55%	88.67%	86.80%	99.75%	97.76%	91.19%

***Table 7*. t-test for equal means of the Lerner Index**

P-values of the t-test with different variances under the null hypothesis of equal means. If the p-value for the test of equal means is less than 0.05, the null hypothesis of equal means cannot be accepted. *Source* : BankScope (Bureau Van Dijk) and own elaboration

a) by country

	France	Germany	Italy	Spain	United Kingdom
France	1.000				
Germany	0.000	1.000			
Italy	0.000	0.008	1.000		
Spain	0.000	0.000	0.000	1.000	
United Kingdom	0.000	0.000	0.013	0.000	1.000

b) by institutional form

	Banks	Saving banks	Co-operative banks	"Others"
Banks	1.000			
Saving banks	0.000	1.000		
Co-operative banks	0.000	0.000	1.000	
"Others"	0.524	0.000	0.000	1.000

c) by specialization group

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Cluster 1	1.000			
Cluster 2	0.000	1.000		
Cluster 3	0.000	0.000	1.000	
Cluster 4	0.157	0.000	0.004	1.000

d) by size

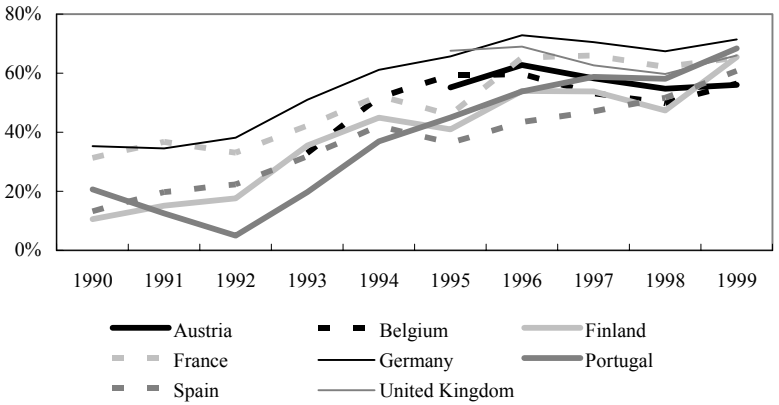
	Large	Medium	Small
Large	1.000		
Medium	0.000	1.000	
Small	0.000	0.900	1.000

***Table 8*. Determinants of the Lerner Index (1992-1999). Estimation results**

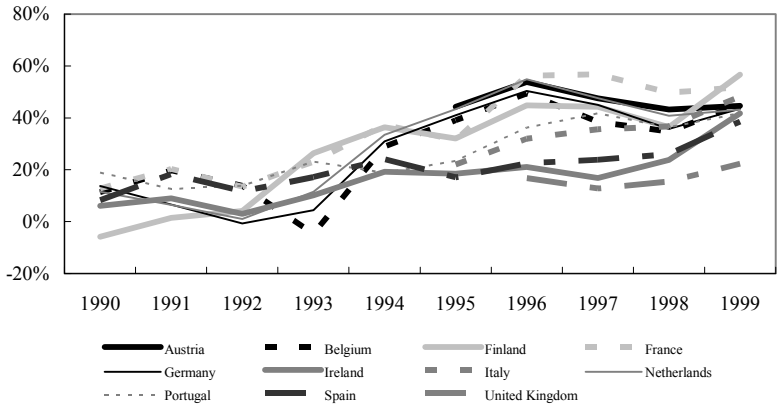
All models were estimated using fixed effects and time effects (the Hausman test suggests that a fixed effects model is more appropiate). The dependent variable is the Lerner Index. TE refers to time effects. The excluded dummy categories are Cluster 4 (dummy variable indicating group of specialization), Spain (dummy variable indicating operation in a national banking sector), "others" (dummy variable indicating institutional type of bank) and TE(1992) (time effects). *Source* : BankScope (Bureau Van Dijk) and own elaboration.

	(1)		(2)		(3)		(4)	
	Parameter	***t*-stat**	**Paremeter**	***t*-stat**	**Parameter**	***t*-stat**	**Parameter**	***t*-stat**
Herfindahl index: total assets	-0.187	-1.582			-0.306	-2.005		
Herfindahl index: loans			-0.008	-0.102			-0.036	-0.364
Herfindahl index: deposits			-0.247	-3.085			-0.303	-3.015
Market share: total assets	0.477	2.060			0.299	1.125		
Market share: loans			0.197	0.523			0.731	1.555
Market share: deposits			-0.031	-0.092			-0.485	-1.028
Log (Total assets)	0.079	3.031	0.076	2.899	0.148	4.526	0.150	4.542
Log (Total assets)^2	-0.002	-2.108	-0.002	-1.924	-0.004	-3.375	-0.004	-3.357
Cost to income ratio	-0.022	-22.033	-0.022	-22.034	-0.020	-13.950	-0.020	-13.948
Loans/Total assets	0.135	9.733	0.135	9.663				
Loan loss provisions/total loans					0.000	0.097	0.000	0.095
Growth rate of GDP	0.205	2.699	0.230	2.993	0.192	2.075	0.209	2.277
Stock market capitalisation/GDP	0.001	4.815	0.001	5.184	0.000	0.601	0.000	0.737
Total assets/GDP	-0.034	-5.528	-0.031	-4.884	0.033	2.730	0.036	2.975
Cluster1	0.002	0.353	0.001	0.288	0.022	3.874	0.022	3.847
Cluster2	-0.005	-1.041	-0.006	-1.092	-0.024	-4.390	-0.024	-4.242
Cluster3	0.002	0.585	0.002	0.513	0.008	1.574	0.008	1.571
Banks	-0.011	-0.264	-0.012	-0.279	0.013	0.198	0.011	0.175
Savings banks	-0.003	-0.062	-0.005	-0.090	-0.009	-0.103	-0.006	-0.074
Cooperative banks	-0.026	-0.559	-0.026	-0.576	-0.036	-0.481	-0.037	-0.492
France	-0.049	-0.745	-0.052	-0.798	-0.033	-0.469	-0.035	-0.499
Germany	0.015	0.253	0.015	0.253	0.011	0.166	0.011	0.165
Italy	0.014	0.215	0.011	0.166	-0.007	-0.106	0.004	0.062
UK	0.123	2.319	0.081	1.296	0.048	0.556	0.048	0.555
TE(1993)	0.029	6.367	0.028	5.794	0.017	3.085	0.016	2.868
TE(1994)	0.022	5.710	0.019	4.686	0.007	1.403	0.005	0.948
TE(1995)	0.016	4.081	0.013	3.185	-0.005	-1.008	-0.007	-1.321
TE(1996)	0.021	4.723	0.018	3.853	-0.005	-0.814	-0.007	-1.164
TE(1997)	0.024	4.704	0.021	3.964	0.006	1.091	0.005	0.744
TE(1998)	0.010	1.529	0.005	0.802	0.022	2.653	0.018	2.197
TE(1999)	0.007	0.757	0.000	-0.025	0.016	1.428	0.011	0.938
Adjusted R²	0.859		0.859		0.819		0.819	
Hausman Test (p-value)	141.500	0.000	145.850	0.000	230.690	0.000	237.190	0.000
LM Heterokedasticity (p-value)	161.971	0.000	161.578	0.000	674.107	0.000	672.752	0.000
Number of observations	18,776		18,776		13,357		13,357	

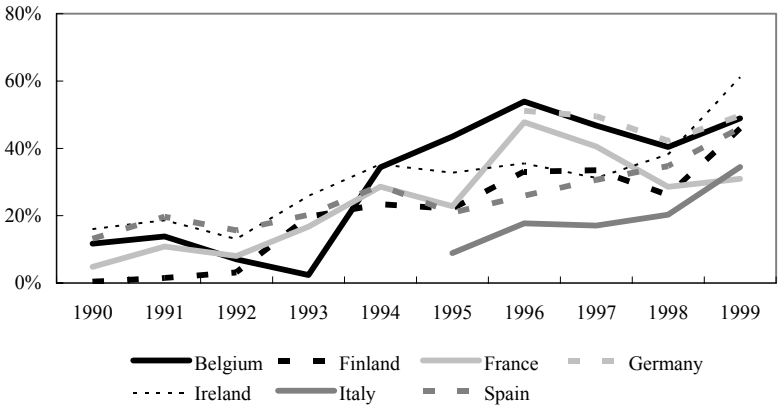
a) Consumer loans to households



b) Mortgage loans to households



c) Medium and long-term loans to enterprises



d) Time deposits

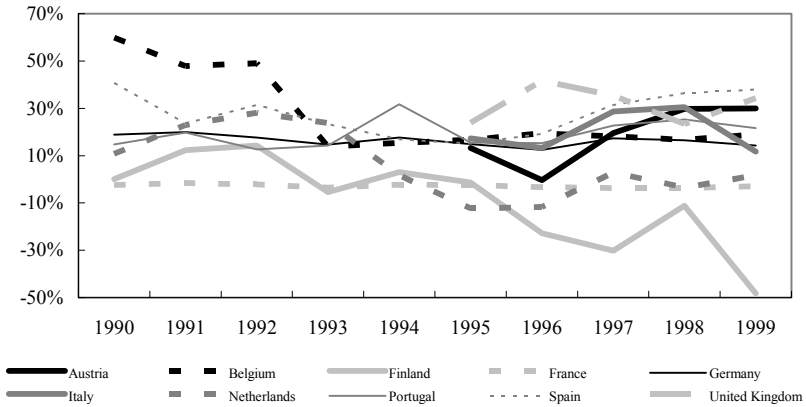


***Figure 1*. Relative margins in the European retail banking markets.** Relative margins are calculated as the difference between average retail interest rates and a reference market rate (using the three-month interbank interest rate) over the retail interest rate. In the case of time deposits, relative margins are calculated as the difference between a reference market rate and the time deposit interest rate over the time deposit interest rate. *Source* : European Central Bank and own elaboration.

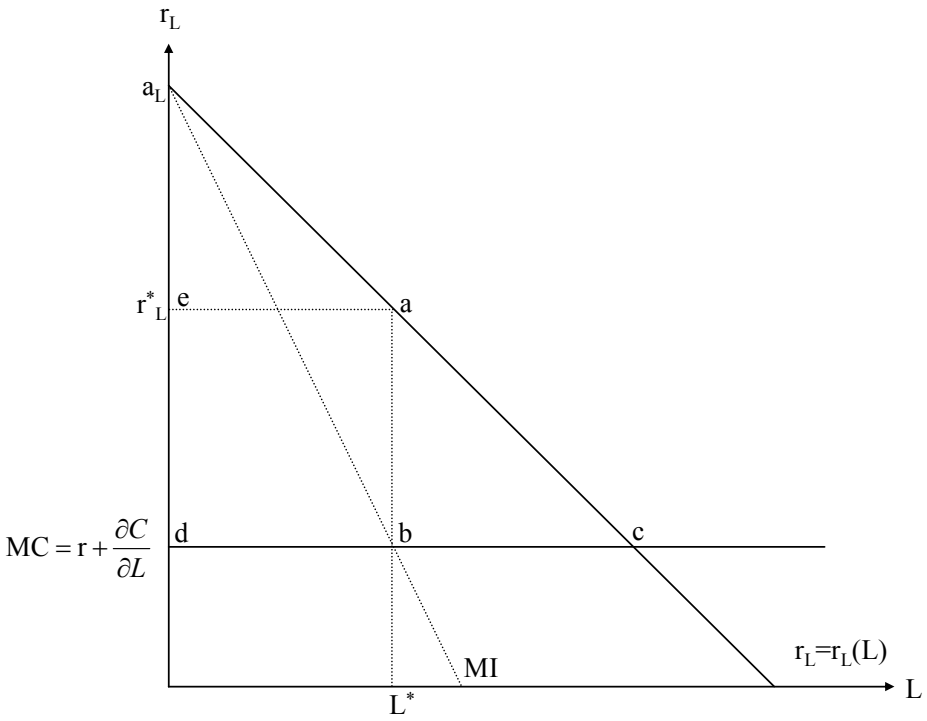
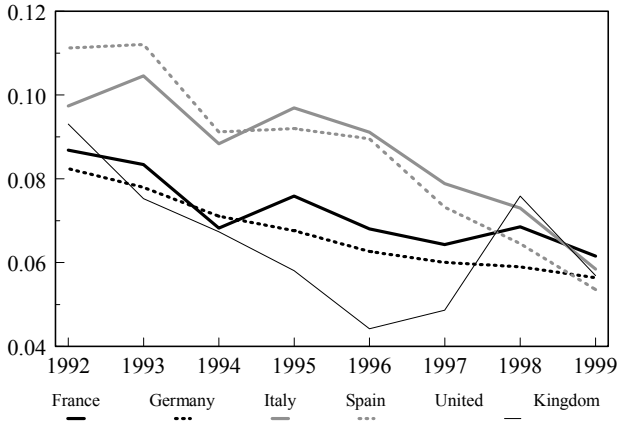
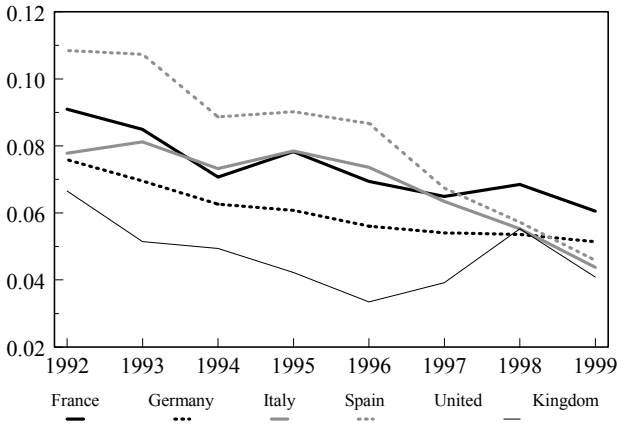


***Figure 2*. Loss of welfare (inefficiency) associated with imperfect competition.** If we assume a linear loan demand function (rL=rL(L)) and constant marginal costs (MC), the loss of welfare (social inefficiency) associated with imperfect competition is the area of the triangle "abc".

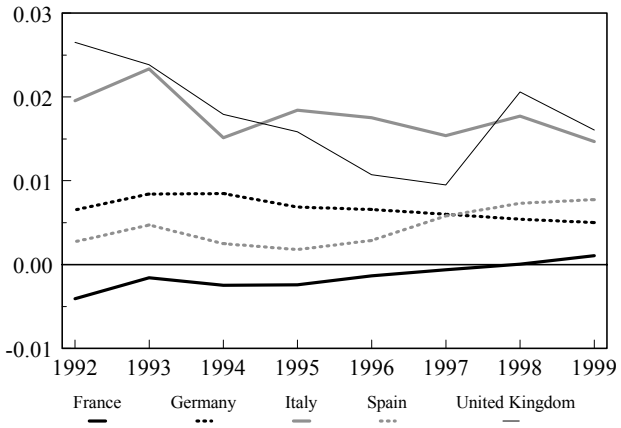
a) Prices



b) Marginal cost



c) Price - Marginal cost



c) Lerner Index

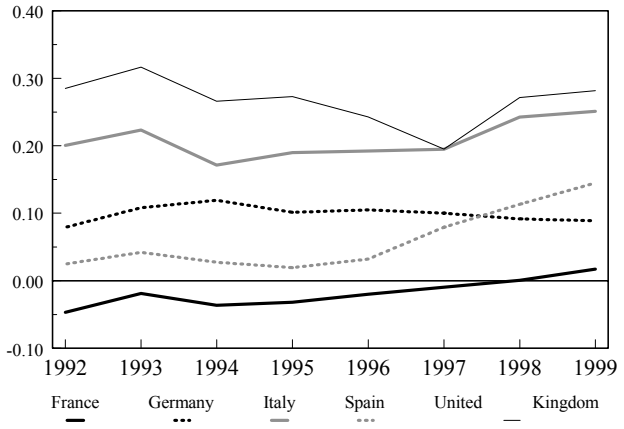


Figure 3. **Prices, marginal cost and Lerner Index.** Prices are calculated by estimating the average price of bank production (proxied by total assets) as a quotient between total revenue and total assets. Marginal cost is estimated on the basis of a translog cost function. The disparity between price and marginal cost expressed as a percent of price is defined as the Lerner Index of monopoly power. *Source:* BankScope (Bureau Van Dijk) and own elaboration.

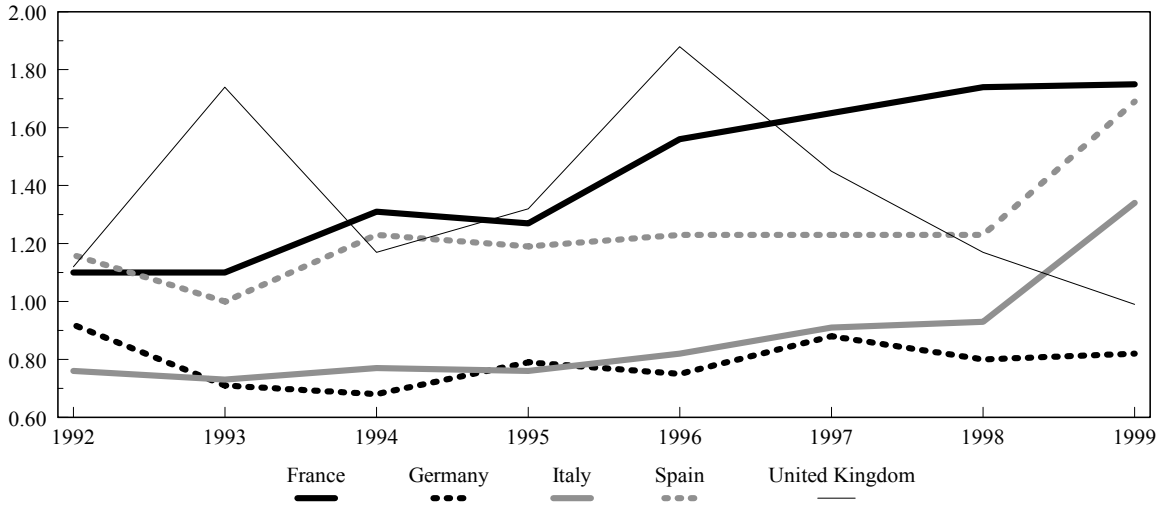
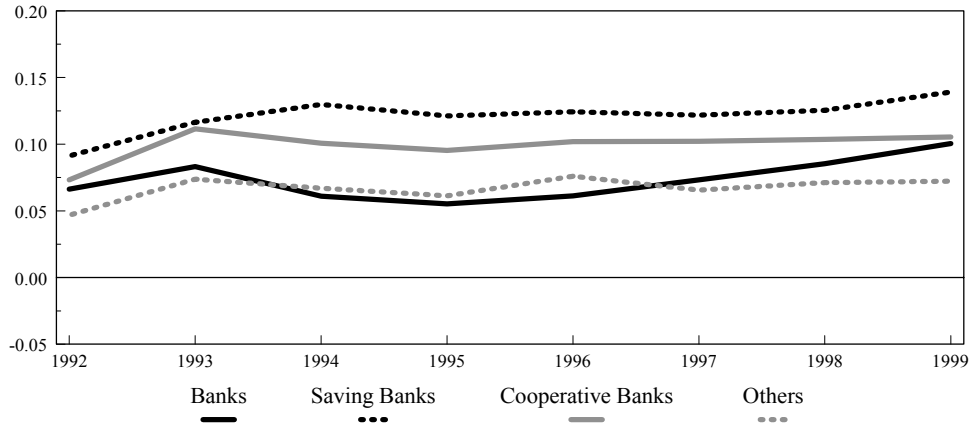
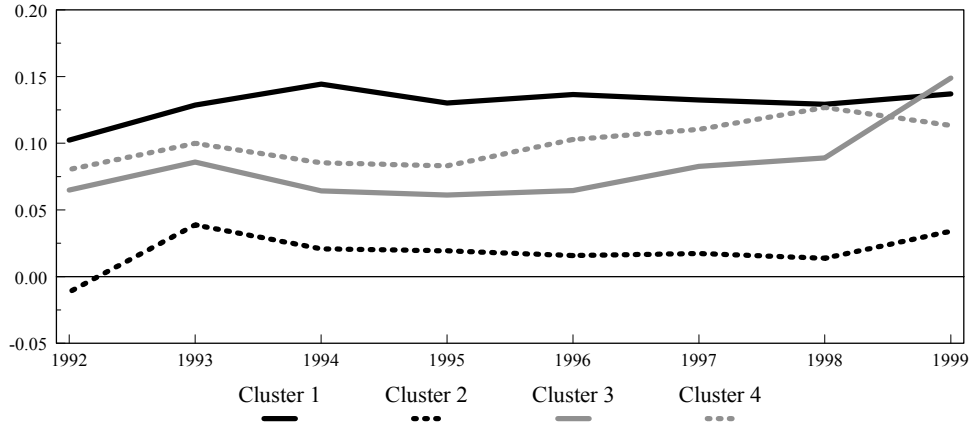


Figure 4. Standard deviation of the Lerner Index. *Source:* BankScope (Bureau Van Dijk) and own elaboration.

a) By type of institution



b) By group of specialization



c) By size

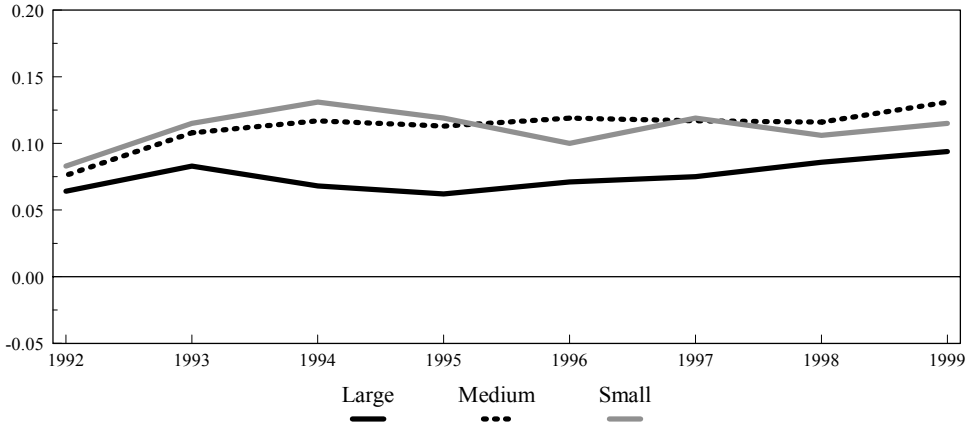


***Figure 5*. Lerner index by type of institution, specialization and size.** The "others"category includes the following types of institutions: bank holding and holding companies, investment banks/securities houses, medium and long term credit bank, non-banking credit institutions, real state/mortgage banks, and specialised governmenmt credit institutions. *Source*: BankScope (Bureau Van Dijk) and own elaboration.