EUROPEAN CENTRAL BANK

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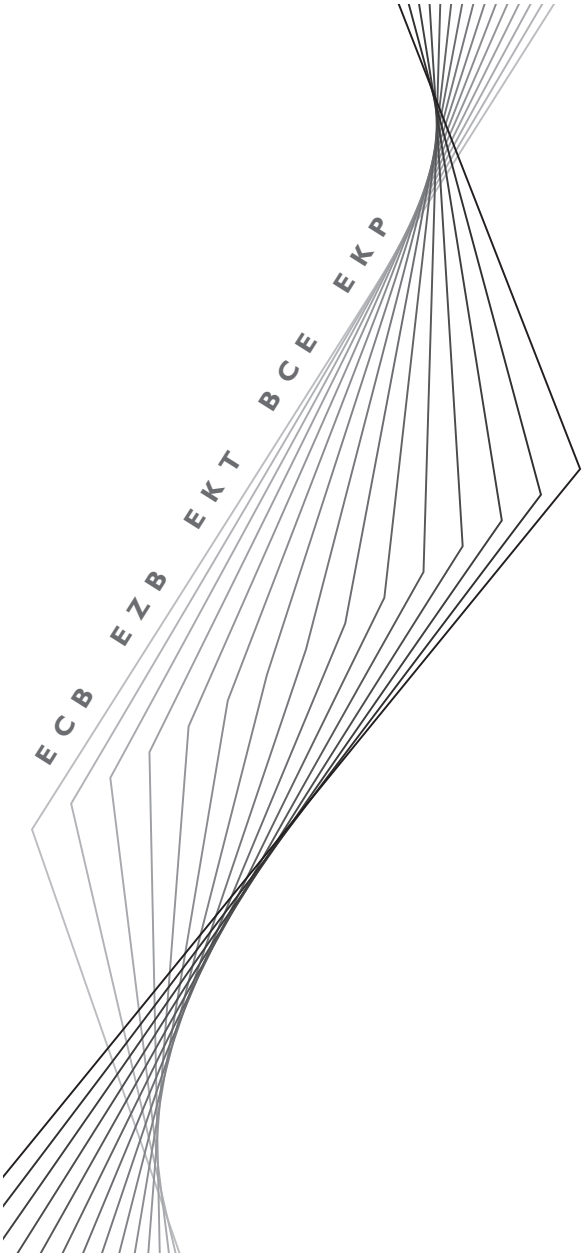

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Abstract

In order to assess the effect of EMU on market conditions for banks based in countries which adopt the Single Currency, we use the H indicator suggested by Panzar and Rosse (1987). Our contribution is to assess results separately for large and small banks, and for interest income and total income as a dependent variable. From a panel of banks over the period 1992-1996, we provide evidence that European banking markets for large banks in the mid-1990s were still characterised by monopolistic competition, as compared to the United States. Regarding small banks, the level of competition appears to be even lower, especially in France and Germany. EMU would therefore imply a notable rise in competition for small banks in France and Germany, as well as an increase in competition for large banks, especially in Italy.

JEL Classification: G21, L12

Introduction

It is widely agreed that EMU will significantly affect the degree of competition in the banking sectors of countries adopting the Single Currency, due inter alia to heightened disintermediation and increased actual and potential cross-border competition. These tendencies are expected to put banks' profitability under significant downward pressure and enhance forces leading to restructuring and consolidation. In this context, we estimate equations which cast light on recent levels in banking market competition, so as, first, to provide a benchmark against which the effect of EMU may be assessed. Corresponding results for a deregulated and continental banking system – potentially akin to EMU - are also derived for the United States. The methodology involves the estimation of revenue functions and consideration of the so-called H statistic, which is the sum of elasticities of revenue to the components of expenditure. One innovation of the paper is that competitive conditions are estimated both in terms of interest income and total income. This is considered to be highly relevant given that banks are seeking non-interest revenue as a supplement to declining interest income as deregulation and structural change proceeds. For example, OECD data show that non-interest income has accounted in recent years for 20-40% of total net income in the countries studied. Moreover, we assess results separately for large and small banks, which may face different competitive conditions.

The paper is structured as follows: in the first section we seek briefly to motivate the analysis by consideration of how structural changes in the past and the future impact of EMU is considered to affect banks. In the second we provide details of the methodology of the paper. The third describes the data sources employed, and the fourth gives the main results. The final section draws conclusions.

1 Underlying trends and the consequences of EMU

In many OECD countries, the banking industry has for some time been in a state of change, with banks facing heightened competition both within and outside the industry. This has in turn had an impact on banking behaviour and banking market structure. Deregulation, advances in technology and the growth of institutional investors and securities markets are among the most important causes of this pattern. Whereas these tendencies were observed most acutely at an early stage in the Anglo-Saxon countries, and later in Japan and the Nordic countries, they have increasingly made themselves felt in Continental Europe, not least as a consequence of the Single Market programme. This section briefly recalls in

general terms the main developments seen in the past, before outlining how EMU may amplify these effects in the future.

Both in Europe and elsewhere, the growth of domestic and international capital markets (linked partly to the rise of institutional investors) encouraged highly-rated corporate borrowers to shift much of their demand for debt finance from banks to markets, leaving the former with higher-risk credits. Securitised assets also met with strong demand from institutional investors. Abolition of exchange controls meant that demand for securities and securitised assets became global and was not limited to institutional investors from the country concerned.

In addition, the scope of public as opposed to private information and the efficiency of its use by markets was increased by the development of information technology and the related growth in influence of rating agencies, investment banks and credit assessors covering a wider range of firms. The traditional comparative advantages of banks in this area resulting from economies of scale in information gathering, screening and monitoring (Diamond, 1984) were thus eroded, even abstracting from price considerations. Meanwhile on the liabilities side of banks' balance sheets, wholesale depositors such as corporate treasurers and institutional investors tended to be ready customers for repos, commercial paper and other money market instruments rather than bank deposits - and individuals had attractive opportunities to hold money market funds[1] - in each case undermining banks' comparative advantage in liquidity provision (Dermine, 1991). Both of these trends are leading to a decline in banks' traditional on-balance sheet business.

Such disintermediation was combined with financial liberalisation – and in particular for Europe the Single Market Programme - innovations and technical developments that enhanced competition also for traditional banking products such as mortgages, consumer credit and deposits (Vives, 1991), between domestic and foreign banks, vis-à-vis non-bank financial institutions (notably insurance companies) and with non financial players such as department stores and car companies. Together with capital market disintermediation, these impacted strongly on banks' margins and made it difficult for banks to operate with their traditional mix of business alone. In effect, banks were left with a problem of "excess capacity" owing to the shift towards a more competitive market (Davis and Salo, 1998).

[1] The public also had the option of holding public debt which offered high yields relative to bank deposits.

Banks responded partly by increasing their focus on non-interest income – including asset management income per se, mutual funds and insurance – and reducing excess capacity by merger or branch closure. Note in this context that EU banks are freer to engage in a broad range of activities than has traditionally been the case in the US or Japan; and the Single Market Directives such as the Second Bank Co-ordination Directive (2BCD) increased this scope further. For example, since 2BCD, banks have been allowed to enter the capital markets in a number of EU countries. Increased focus on competitive strengths and improved services were another response; in effect, some banks sought to specialise in activities where they have a comparative advantage, including traditional retail banking per se. However, disintermediation historically also led at times to increased risk-taking via aggressive balance sheet expansion (e.g. by lending to Latin America, property developers, and more recently Asian borrowers, Russia and hedge funds) with risk premia which in retrospect proved to be inadequate[2]. Ill-advised cross border ventures, which often proved unprofitable, were often a part of this pattern.

Turning to EMU, in respect of banks, the bulk of commentaries on the financial market consequences of EMU (see for example, Dermine (1996), IMF (1997) and McCauley and White (1997), De Bandt (1999), ECB (1999)) are that it will have the following effects on banks and banking competition:

From a structural point of view, *disintermediation* may increase after EMU via the following channels:

- increased attractiveness of commercial paper, bond and equity finance to companies relative to bank loans (owing inter alia to integration – at varying speeds - of money, bond and equity markets and the reduction in crowding out of private bond issuance by government bonds);
- an increased supply of equity and high yield bond finance as a consequence of corporate restructuring; if firms fear a greater incidence of asymmetric shocks to individual euro economies , this may also stimulate firms to issue shares to increase the robustness of their balance sheets;
- reflecting integration and greater liquidity, EMU will increase the attractiveness of securitised products (repos, bonds) as an asset for the non-financial sector relative to bank deposits, so banks may need to attract a greater proportion of more costly wholesale finance (CDs, interbank deposits, bonds);

[2] It may be added that rapid economic growth and at times inappropriate monetary policy also played a role in this typical late 1980s pattern (Davis, 1995)

- it may stimulate over the long term the funding of pensions, which may amplify the above effects of EMU (Davis, 1998);

Disintermediation will therefore affect banks' comparative advantage in the longer term; EMU may more tentatively reduce domestic banks' comparative advantage in information gathering, since credit characteristics of corporate borrowers in a given industrial sector will become more comparable across countries;

Interbank competition is also likely to increase :

- competition for deposits may increase owing to the scope for cross border banking; competition for loans to smaller borrowers may remain weaker owing to the importance of idiosyncratic information. However, the technological developments in respect of remote and internet banking may be particularly important, and will also affect small banks having hitherto some local monopoly power;
- there could be increased competition across border and from outside the Union for other types of non interest income, notably correspondent banking, underwriting, trading and asset management; multi-national enterprises may rationalise their banking relationships;

At the same time, one can anticipate changes in financial-market and macroeconomic conditions some of which may be partly adverse to banks:

- lower inflation in some EU countries may tend to put banks' interest margins under downward pressure;
- EMU will reduce directly some sources of non interest income such as foreign exchange transactions and income from trading in some related derivatives contracts;
- EMU may reduce overall day-to-day financial market volatility in integrated euro markets relative to their domestic forerunners, although peaks in volatility cannot be ruled out;
- there should also be some favourable effects; EMU may also bring about faster economic growth, which should benefit banks and borrowers.
- whereas legal, fiscal and regulatory barriers as well as differences in consumer preferences may still imply some degree of segmentation among banking sectors, the incidence of 'regulatory capture' will be reduced further by EMU, as idiosyncratic national regulations should be eliminated progressively by the scope for cross border banking. Cartels and oligopolies among banks that regulated competition and minimised "customer poaching" will also break down.

One relevant question is how competition will be affected by the macroeconomic environment. Low profitability, in particular due to the transitional costs of the changeover may stimulate price wars and challenge established banking alliances. It may lead to cycles in the competitive structure. Recent market reports suggest such a pattern of heightened competition could be present in France, where market commentators reported that spreads fell in Autumn 1998 despite the impact of the Russian default and failure of LTCM on market confidence.

On balance, these EMU effects seem likely to increase the scope of disintermediation as well as intensifying competition for traditional banking products from within the sector. Cost cutting will likely come to the fore. According to analysts, it is no longer a question of "cost plus profits equals price" but "price minus cost equals profits", as banks become price takers, close to a situation of perfect competition. There may also be intensified competition for non-interest income, where competitors include not only other EU banks, but also US investment banks, which are highly skilled in asset management, credit risk evaluation and securitisation.[3] In connection with the existing decline in profitability, there would seem to be grounds for heightened vigilance on the part of regulators, and a heightened willingness to allow mergers in order to reduce potential spare capacity (a merger wave is already underway, see Salomon Smith Barney, 1998).

In the context of these ongoing and anticipated developments, this paper seeks to assess the extent to which the past changes outlined above have impinged in a measurable way on the degree of competition in the banking sectors of three continental European countries – France, Germany and Italy – as well as in the United States. The results will then provide a background for assessing expected changes due to EMU.

2 Methodology

In the light of the above discussion, it is clearly of interest to assess recent patterns of banking competition and the current situation. How far are banking sectors from the paradigm of perfect competition to which EMU may drive them?

[3] In the remaining of the paper we assume that the changes described in this section will be sufficient to reduce the local nature of banking markets and therefore substantially affect the competitive environment for small banks.

In order to assess the contestability of banking markets in Europe, we implement tests derived from the New Industrial Organisation literature, in particular Panzar-Rosse (1987), based on reduced form revenue functions. Market power is measured by the extent to which changes in factor prices are reflected in revenues. With perfect competition, and when banks operate at their long run equilibrium, a proportional increase in factor prices (including the interest rate on liabilities) induces an equiproportional change in gross revenues; output does not change in volume terms, while the output price rises to the same extent as the input price (i.e. demand is perfectly elastic). On the other hand, under monopolistic competition or where potential entry leads to a contestable markets equilibrium, revenues will increase less than proportionally, as the demand for banking products facing individual banks is inelastic (see Tirole, 1987). In the limiting case of monopoly there may be no response or even a negative response of gross revenues to changes in input costs.[4] To assess the degree of competition in banking markets, the empirical strategy implies therefore to compute an index defined as the sum of the elasticities of gross revenues to unit factor cost in a reduced form revenue equation (the H-Statistic). This index is negative in the case of monopoly, positive but smaller than one with monopolistic competition, or equal to one if perfect competition prevails (it is an increasing function of the absolute price elasticity of demand). One limitation of the approach should be noted, namely that the increasing relationship between H and competition may not hold in certain oligopoly equilibria. Amongst the underlying assumptions are that there is profit maximisation, that there is equilibrium in the industry and that there are normally shaped revenue and cost functions. In effect the model is a joint test of the underlying theory and competitive behaviour.

The extension of the Panzar-Rosse (1987) methodology to banking requires to assume that banks are treated as single product firms. This is the assumption made in the paper, consistently with the so-called intermediation approach to banking where banks are viewed mainly as forms of financial intermediary,[5] and where the level and nature of competition in the loan market and that in the deposit market are entirely independent. The inputs are in each case "personnel", "deposits and other funding", and "other inputs". We have bank

[4] In the monopoly case, H is always negative, even in the short run. In addition, if the elasticity of demand is constant, there is a one-to-one relationship between H and the Lerner index measuring the mark-up between price and marginal cost. Hence, the more negative H is, the larger is the monopoly mark-up (see also Tirole, 1987).

[5] As discussed in Colwell and Davis (1991) there are two principal approaches to bank output measurement. In the "production approach" banks are treated as firms that use capital and labour to produce different categories of loan and deposit account. Output is measured by number of accounts or of related transactions, and total costs are all operating costs used to produce these outputs. In the "intermediation" approach, banks are viewed as intermediators of financial services rather than producers of loans and deposit account services, and the value of loans and investments are used as output measures; labour and capital are inputs to this process and hence operating costs plus interest costs are the relevant cost measure.

specific input prices, which indicates that banks are not necessarily price takers in factor markets, or may face local factor markets. Whereas traditional approaches to this question have used gross interest income alone as a dependent variable, in the current exercise we consider it also valid to look at total income, given that for banks in a competitive struggle for survival, the distinction of interest and non interest income becomes less relevant, competition being equally vigorous for both. There may also be important complementarities, with both loans and other non-interest services provided in the context of a customer relationship. In particular, banking regulations may lead to cross-subsidisation (Chiappori et al., 1995). In other words, in our approach banks are either seen as firms producing loans and investments (in the interest revenue approach) or loans, investments and other services (in the total revenue approach). From a comparative perspective, the existence of accounting differences across countries --a usual weakness of this kind of approach-- is an additional argument in favour of having a comprehensive view of bank revenues.

Different specifications of the tests are presented in the banking literature. In particular, Molyneux et al. (1994) as well as Bikker and Groeneveld (1998), both of which focus on EU banks, use the ratio of interest revenue to total balance sheet as endogenous variable, while Nathan and Neave (1989) on Canada and Vesala (1995) on Finnish banks use the logarithms of interest revenues. The latter choice appears to us as the most appropriate for economic reasons - as noted by Vesala (1995), a ratio of interest revenues to assets provides a price equation. It may also reduce possible simultaneity bias.

The following equation is thus estimated to run on a panel data set (time series and cross section) of banks:

$$\text{Log } R_{it} = \Sigma^{J}_{j=1} \alpha_j \text{Log } w^{j}_{it} + \Sigma^{K}_{k=1} \beta_k \text{Log } S^{k}_{it} + \Sigma^{N}_{n=1} \gamma_n X^{n}_{it} + \varepsilon_{it} \qquad (1)$$

for t=1,…T, where T is the number of periods observed and i=1,…I, where I is the total number of banks. Subscripts i and t refer therefore to bank i at time t. R_{it} is gross interest revenues or total gross revenues. In our case, we have J=3 inputs so that w_{it} is a 3-dimensional vector of factor prices (unit wage cost per employee, interest rate on liabilities, other costs as a proportion of assets[6]), consistently with the intermediation approach. S_{it} are

[6] It may be noted that banks purchase increasingly many services needed in the production of services from other firms, notably EDP services from dedicated firms (outsourcing) and thus the balance sheet figures on materials and equipment do not necessarily correspond to the use of these inputs. Rents and leases entail the same problem. We feel to use costs as a proportion to assets to circumvent the measurement problems (differences across banks in outsourcing etc) and control for the scale effect is a reasonable compromise.

scale variables measuring the capacity at which level the bank operates (assumed to be fixed in the short run), including equity and fixed assets. Finally, X_{it} is a vector of exogenous and bank-specific variables that may shift the cost and revenue schedule (business mix). In this context, we employ loans as a proportion of assets and deposits as a proportion of deposits plus money market liabilities. Annex 1 provides a complete list of variables. While the scale variables are expected to have a positive effect on revenues, the sign of the coefficient on the last set of variables is ambiguous. On the one hand, a higher share of deposits in total liabilities and loans in assets are indicators of the share of retail activities where competition may be less pronounced. On the other hand, end-of-year balance sheet variables may only provide a noisy proxy for actual interbank transactions.[7] In the general case, ε_{it} includes a systematic (time-varying) and a bank-specific components.[8]

The test for "Monopolistic Competition" is then:

$$0<H=\Sigma^{J}_{j=1}\,\alpha_j<1 \qquad (2)$$

while $H\leq 0$ is "Monopoly" and $H=1$ is "Perfect Competition".

The empirical implementation of equation (1) on a panel of banks with a time-series and cross sectional dimension requires some care. Various forms of estimation were employed in the main set of tests. In the empirical literature on banking competition, cross-sectional results are usually reported. The implicit assumption is that all banks have access to the same factor markets but only differ in terms of scale of operations, although it is reasonable to believe that, depending on their specialisation, banks rely on different factor markets. Here, we argue that the time-series dimension is equally important. In addition, as it is well known, running an OLS regression on equation (1), year by year (t=1,…T), may provide irregular results, and we therefore decide to concentrate on pooled sample regressions.

First, we estimate equation (1) by OLS with a constant term on the pooled sample of banks and years, implicitly assuming that all observations are independent.[9] Then, as it is important to test whether omitted bank-specific variables or time-varying factors (e.g. aggregate supply and demand shocks) may not affect inference, we report the "fixed

[7] The inclusion of indicators of risk (provisions for loan loss reserves/total loans) is reserved for future work.

[8] Formally, $\varepsilon_{it} = \alpha^{i} + \mu_t + \eta_{it}$ with η_{it} a residual noise.

[9] We assume in that case that $\varepsilon_{it} = \alpha + \eta_{it}$ with η_{it} identically and independently distributed across individauls as well as over time.

effects" estimator. We introduce therefore different intercepts ($\alpha=\alpha^i$, i = 1,… I,) as well as time dummies (DU_t , t=1, …T-1) in equation (1). These constitute our core results. However, as factor costs may, to some extent, be time-dependent and generate multicollinearity, we report results both with or without time-dummies. This is particularly relevant since our sample includes the year 1993 which was characterised by a major recession in continental Europe. Finally, we indicate, as memorandum, the "between" estimators which summarises the cross sectional dimension (i.e. OLS on "group means" or time average for each bank over the sample period).[10]

Although we use a short sample period, it is also reasonable to further assess changes in competitive conditions over the period. Consequently, we estimate a constrained version of equation (1), by assuming that the H indicator follows a quadratic time-trend , namely that $H_t = H_o + \beta t + \gamma t^2$, t=1,…T-1. We implement such a constraint by imposing that all factor costs follow the same trend, allowing for different factor elasticities in the basis year ($\alpha_{it} - \alpha_{i0} = \alpha_{jt} - \alpha_{j0}$, i ,j=1,3, i.e. $H_o = \alpha_{10} + \alpha_{20} + \alpha_{30}$) but we use a functional form which is flexible enough to allow for short term reversion to less/more competitive conditions.[11] In that case, the presence of time-dummies in the regression controls for shocks to the overall equation and not to factor costs only.

Finally, in order to confirm that the Panzar-Rosse statistics provide useful results we need to determine that the banking systems that we consider are in equilibrium. This is especially important for the cases of perfect competition and monopolistic competition (H>0), while H $\leq$0 is a long run condition for monopoly. As suggested by different authors (see in particular Molyneux et al., 1994), one should verify that input prices are not correlated with industry returns. To implement such a test, we compute a "modified" version of the Panzar-Rosse statistics by running the same equation as (1) with the ratio "net income/total assets" as endogenous variable. In that framework, H=0 implies that the data are in equilibrium. It should be noticed that equilibrium does not mean that competitive conditions are not allowed to change --an assumption which would be contradicted by the period that we consider, characterised by a process of structural changes. It only implies that changes in banking are taken as gradual.

[10] Heteroscedasticity consistent standard errors of the fixed effect estimators were also computed, using White's (1980) estimator applied to the data in group mean deviation form. In most cases they turn out to be quite similar to the OLS estimates that are reported in the tables.

[11] In comparison, the logistic trend used by Bikker and Groeneveld (1998) implies that the trend is either always increasing or always decreasing over time (the sign of $\partial f/\partial t$ does not depend on t).

3 Data Sources

To implement the above methodology, data from the Fitch-IBCA Ltd Bankscope CD-Rom (hereafter, IBCA) for France, Germany, Italy and the US are used. Since revenue equation are reduced form equations that express equilibrium conditions, we need to assume that banks have reached their steady states. The test is therefore only valid as an exercise of comparative statics. In order to meet this condition, we choose to restrict the analysis to a balanced sample on the period 1992-1996, and to exclude newly created banks, which may have a very different behaviour. We focus on the spreadsheet format provided by IBCA which offers annual data that are reasonably comparable across countries. Unconsolidated data are used for commercial, savings and co-operative banks (only commercial banks are used for the US).

It is necessary to stress that the sample is not exhaustive for any of the countries under review, in particular because the coverage of banks by IBCA has expanded over time. The question is therefore in which direction this may bias the results. On the one hand, late entrants in the market, which are likely to be more aggressive, are excluded due to the absence of observations for the first years, while, on the other hand, the more monopolistic banks may be driven out of the market through merger or restucturing, hence do not appear in the sample due to the absence of observations for the final years. This may imply that the sample may, to some extent, underestimate effective changes in competition over time. Another selection bias may come from the fact that only prominent banks are recorded by IBCA, so that the most X-inefficient banks, in particular the smaller ones that have market power in local markets, may not be taken into account. The latter bias is more pronounced for small banks since the coverage of medium and large banks (with total assets above $1 billion) is relatively satisfactory in the IBCA database. It is not very likely that in the category of the small banks we exclude more X-efficient institutions than X-inefficient ones since most of the countries recorded very few creations of small banks during the last few years (the set of small banks remained quite stable). In addition, among them, only the most X-efficient banks would request rating services from IBCA, hence appear in the sample. Finally, some of the banks that are recorded by IBCA only report partial information. Starting from a large dataset of banks, we arrive, after removal of outliers[12] and exclusion of banks that do not report all relevant items, at a "balanced" sample of 109 banks in France, 313 banks in Germany, 84 banks in Italy and 251 in the United States.

[12] When looking for possible outliers, we impose two simple criteria: (i) equity is always positive, (ii) all variables should not increase or decrease between t and t+1 by more than a factor of 3 (i.e. $0.33 < x_t / x_{t-1} < 3$). Banks that fail to meet these two criteria for one given year are excluded for the all sample period. The initial "unbalanced" sample includes 1814, 391, 300 and 501 banks in DE, FR, IT and US, respectively.

The variables chosen are shown as they appear in the harmonised balance sheets of banks in the IBCA database. The data hence remains vulnerable to any differences in accounting conventions. Whereas most of the variables are straightforwardly defined, it is important to note that total income is defined not to include capital gains but only commissions in respect of non-interest income. Moreover, the interest income concept used is gross interest receipts rather than the more familiar net interest income (gross interest payments appear on the right hand side of the equation). A further important data issue relates to the definition of unit labour costs. Existing studies tend to use personnel expenses divided by some measure of assets, where the latter indicates the "intermediation" that the bank undertakes. Meanwhile, in this study we also employ the measure personnel expenses as a proportion of staff numbers, which is a "cleaner" measure of unit labour costs. Nevertheless, we complement our result by introducing a second indicator of labour costs as measured by "personnel expenses/ (deposits +loans)", implicitly assuming that deposit collection and loan distribution are the most labour intensive and provide a reasonable proxy for staff numbers. Molyneux et al. (1994) as well as Bikker and Groeneveld (1998) measure unit labour costs by the ratio "personnel expenses to total balance sheet" on the sample period 1986-1989 and 1989-1996 respectively.[13] In order to compare the results from taking different indicators we select the banks for which employment data are available. Such information is only available in France for a reasonable sample of banks for the period 1992-1995 and in 1996 for Germany, while it is available for all banks in Italy and the United States. Finally, the sample was split to distinguish between small and large banks, with the cut-off point being $3 billions (Ecu 2.5 billions). This attempts to capture the possibly differing nature of competition for banks of different sizes. Summary statistics on the different samples appear in Table 1 (see lines 1 and 2 in Tables 2 to 5 for details about sample size). Interest charges appear to be comparable across countries. The median of unit labor cost, as measured by "personnel charges/ staff", is also of similar magnitude. Notice, however, that due to the non-availability of the indicator "staff number" in some of the largest German institutions, our sample of large banks in Germany excludes those institutions. As a result the remaining banks are, in average, smaller than in other countries. We do not expect that this feature may affect the results for Germany, since the median of total assets is in the same range as the other countries.

[13] Bikker and Groeneveld (1998) consider a smaller set of explanatory variables than in the present study and come up with a sample of 89, 88 and 92 banks in France, Germany and Italy, respectively, over the period 1989-1996.

4 Empirical Results

Empirical results appear in Tables 2- 5 for Germany, France, Italy and the US, respectively. As regards the overall pattern of signs, results indicate that notably for France, Germany and Italy the unit cost of labour is typically negative or zero either when measured as a ratio of personnel expenses to end of year staff or as the ratio of personnel expenses to total assets, as already indicated by Molyneux at al. (1994) for the mid 1980s. In the US, the number tends to be consistently zero or positive for all factor prices.[14] The elasticity of revenues to the cost of financial resources is everywhere significantly positive. The scale variables are consistently positive and significant, and the ratio of deposits to total funding is negative; the loans to assets variable is positive in some cases and negative in others. According to the F-test, fixed effects (i.e. the introduction of different intercepts for each banks to account for heterogeneity) are also very significant, pointing to a possible omitted variable describing the business mix.[15] Meanwhile, the standard errors are quite high for some of the yearly estimates, notably for France and Italy thus suggesting a greater focus should be put on the entire panel.[16] As indicated above we only comment the pooled regression results.[17]

Going through the H-tests country by country, we may start with Germany (Table 2). Looking at the results for the full sample, the mean levels of H for large banks tends to be significantly above zero but also well below one, implying forms of monopolistic competition rather than either monopoly or perfect competition. In particular, using total income as endogenous variable and personnel expenses relative to deposits and loans as measure of unit labor costs H is equal to 0.628 (see line 1.1.1). As indicated in section 3, the results for the other indicator of unit labour cost (line 1.1.2.) are not strictly comparable in the case of Germany. Since they are derived for the year 1996 only, they offer only cross-sectional on the elasticity of revenues to factor costs without correcting for possible fixed effects. They are just reported here as a memorandum item. Results are in general highly consistent between the estimates for total income and interest income. Meanwhile for small banks the H statistics are much lower and for the OLS and between estimators not significantly different from zero. This is also the case for the fixed effect estimator without time dummies for which one would reject both monopoly and monopolistic competition.

[14] This may link not merely to product market developments but also labour market structure, with greater flexibility in the use and redeployment of staff in the US, as well as greater scope to vary staff numbers over time.

[15] The detailed results of the F-tests for fixed effects are available from the authors upon request.

[16] Cross sectional results show values of H close to one in DE, IT and FR, but, as indicated above, cross-sectional results provide a wrong picture of competitive conditions. We concentrate therefore on fixed effects results.

[17] We verified for our sample the common observation that year-to-year results are somewhat volatile.

However, H equals 0.153 for the fixed effect and time dummies estimator on total income, so that one would rather conclude that small banks also evolve in an environment characterised by monopolistic competition.

For France (Table 3), as in Germany, the small banks show H statistics not generally significantly different from zero, or even in some cases significantly negative. In most cases, one rejects both the hypothesis of monopoly and monopolistic competition (in the case of interest income with the indicator "staff expenses/staff number", monopoly cannot be rejected at the 10% level, although it is rejected at the 5% level- see line 2.2.2). Small banks seem therefore to enjoy some monopoly power. Large banks' results for the whole sample show rather lower figures than for Germany, but the results suggest forms of monopolistic competition. Due to the availability of data on staff number, we can, unlike in the case of Germany, really compare the two measures of unit labour costs. There appears to be significant differences depending on the measure chosen, with the staff numbers figure generally being higher than that using balance sheet data for a denominator (this may relate to the scope of wholesale and interbank claims, which increase the size of the balance sheet without a corresponding need for staff resources). H is equal to 0.574 using staff number (line 1.1.2.), while it is only 0.063 for the other indicator (line 1.1.1). In addition, when interest income only appears as endogenous variable, perfect competition is not rejected (with H equal to 0.746 with a standard deviation of 0.173, so that H=1 is not rejected at the standard confidence level), indicating that, for large institutions, the loan market may be much more competitive than fee-generating activities.

In Italy (Table 4), the results for the average regressions are consistently in line with monopolistic competition both for large banks and small ones. In other words, H is significantly above zero but significantly below one. As in France, the results differ between the different denominators of the unit labour costs variable, but in the case of Italy, this is verified for both small and large banks. In particular, when using the indicator "personnel expenses /staff number", the H statistics for small banks is significantly higher than in France (H is equal to 0.435 to be compared to -0.096 in France). Conversely, H for large banks is lower in Italy than in France, but not very significantly so. The similarity between the H statistics for small and large banks may appear as a surprising result, in comparison to the other countries where banking markets are always more competitive for large than for small banks. This may call into question the representativeness of the sample of small Italian banks, given the low coverage of small banks by IBCA. However, other

results indicate that there is no obvious sample selection bias for Italian banks.[18] It is also worthwhile noticing that the fixed effect estimator is, more than in Germany and in France, significantly affected by the introduction of time dummies. For example, for large banks, H is equal to 0.823 without time dummies but 0.413 when time dummies are included. The question is therefore whether this reflects cyclical changes in factor costs or supply and demand shocks.

It is not possible to compare our results to the earlier literature, and in particular to Molyneux et al. (1994) who concluded that, during the period 1986 to 1989, the Italian banking system was characterised by monopoly power ($H \leq 0$), while monopolistic competition prevailed in Germany and France ($0<H<1$). Of course, the "between" estimator, which measures the time average of the year-to-year estimator, appears to be close to one, albeit with a substantial standard deviation. This would tend to lead to the conclusion, in particular, that the competition in the Italian banking system has increased from the mid 1980s to the mid 1990s. However, as indicated above, such a conclusion is not strictly warranted, since one should rely, as we do, on the fixed effects estimator, not provided by Molyneux et al. (1994). It remains that, in the case of Italy, our results clearly reject the monopoly case ($H\leq0$) for our sample period.

The United States is included largely as a "benchmark" to show how a relatively liberalised and competitive financial system behaves (Table 5). Of course, it may be borne in mind that the US itself has some peculiarities which are not shared by other systems, notably the restrictions on interstate banking and the separation of investment banking from commercial banking. The US results are in general efficiently measured (i.e. with low standard errors) and also consistent between the differing measures of unit labour costs. The large banks have slightly higher average H statistics than small ones, consistent with a higher level of competition; but perfect competition ($H=1$) is rejected at the usual confidence level. Moreover, the average levels of H for large banks are generally higher than for the other countries which are examined. There are also consistently higher H-statistics for total income than interest income for large banks. This is a more intriguing result, as it implies that markets for non-interest revenue are possibly more competitive than those for loans. It does not tend to come through for the EU countries, where the H statistics are much more comparable between income sources (with the exception of France, where the reverse is

[18] Using a different sample of banks, Coccorese (1998) indicates that a dummy variable for large Italian banks in the revenue equation is not significant and concludes these banks do not have a particular oligopoly power associated with their larger size.

true, as indicated above). Small banks appear to be in a situation of monopolistic competition, with an average level for H similar to Italy, and to a lesser extent to Germany.

Although our sample period is small, we also investigated trends in our H statistics. However, due to the high year-to-year variability of the indicator no significant trend could be uncovered. When one constrains the H statistics to follow a quadratic trend (see above Section 2), the coefficients β of the linear trend and γ of the quadratic trend are not significantly different from zero in most cases (see Table in ANNEX B). The only exceptions are for banks in France (see top right panel). Large banks experienced a small increase for the regression using "personnel expenses/ deposits+loans". For small French banks, the trend coefficients are significant but of opposite sign so that H is hump-shaped for the sample period.

The results are confirmed by the equilibrium tests (Table in ANNEX C): due to a relatively high standard deviation in almost all countries, there is no evidence against the hypothesis that the "modified" H statistics is equal to zero. The data appear therefore to be in equilibrium. This supports the conclusions drawn previously regarding competition and monopolistic competition. Only large banks in Italy seem to be characterised by disequilibrium.

5 Sensitivity analysis

To assess the robustness of our results, we undertook various sensitivity analyses. We studied whether our results might be biased by sample selection, by comparing our balance sample to the unbalanced sample of all banks that are recorded by IBCA but may not report information for every years. The unbalanced sample is also cleaned up by removing outliers, using the same procedure as for the balanced sample.[19] This new sample includes the creation of new banks as well as the extension of coverage by IBCA. More precisely, using a method suggested by Verbeek and Nijman (1996), we extract for the unbalanced sample the set of banks that do not report for every years, [20] and compare it to the balanced sample. The results of the regressions with fixed effects and time dummies indicate that the H statistics are not very different from the balanced sample (ANNEX D), leading to the conclusion that there is no significant sample selection bias. The only exception is for small

[19] Banks that only report information for only one year are also excluded since they do not allow to compute variables in mean deviation.

[20] The second subsample includes therefore banks that report information between two and four years (either two or three years in France).

banks in France when the indicator personnel expenses/staff number is used (compare column “unbalanced panel” with “memo”). This is not true for the other indicator. It is difficult, though, to conclude from such findings that there are potential competitive pressures in the French banking system, since the H statistics is designed to test equilibrium conditions. This assumption may not be fulfilled in the subset of banks that do not report for the whole sample period.

We also run another variant where we excluded a small number of institutions recorded by IBCA as universal banks but which are, actually, either specialised public or private institutions in France and Germany, or central institutions or holding institutions. The initial results were almost unchanged.

Finally, we run equation (1) in first difference on the balance sample in order to check that the results are similar to the fixed-effect estimator (see equation (1')). It turns out that the differences are quite small (ANNEX E).

$$\Delta \text{Log } R_{it} = \Sigma^{J}_{j=1} \alpha_j \Delta \text{Log } w^{j}_{it} + \Sigma^{K}_{k=1} \beta_k \Delta \text{Log } S^{k}_{it} + \Sigma^{N}_{n=1} \gamma_n \Delta X^{n}_{it} + DU_t - DU_{t-1} + \eta_{it} \quad (1')$$

6 Implications of the results: EMU effects and excess banking capacity

Summarising the empirical results, they are consistent with differing market conditions in Europe vis-à-vis the United States on the one hand, and between the differing EU countries on the other. The United States exhibits a higher level of competition than EU banking markets, as might be anticipated, although we do not conclude that US banking markets are characterised by perfect competition. Within the EU, whereas Germany and France tend to show monopolistic competition for large banks and monopoly for small ones; in Italy there is evidence of monopolistic competition for both small and large banks. In addition, due to the fact that we consider a very short sample period, the empirical analysis is not able to uncover any significant trend in competition.

It is particularly striking that small banks appear to retain a great deal of local monopoly power in EU countries (the results for small banks e.g. in Germany hold with notably small standard errors). The comparison with results for US small banks (which may show an “equilibrium level” of local monopoly power) is particularly striking.

Overall, the implications of these results for EMU are that there is room for an increase in competition in European banking sectors in the context of EMU. As was noted in Section 1, there is ample reason to anticipate such an extra impulse to competition in the future euro area. Competition could then tend towards levels typical of a liberalised and continental market like the United States. This implies that large banks might become more competitive while small banks, in particular in France and Germany, might evolve from monopolistic power to monopolistic competition. In the case of Italy, competitive conditions are more homogenous across class sizes and large banks will, in relative terms, face more significant competitive pressures. Of course, exact convergence with the US is unlikely, given the differing regulatory structure in that country as well as the continuing barriers to EU integration such as lack of a common legal framework and tax system. We now go on to explore some of the implications of the current and anticipated patterns for banking structure of the countries concerned; and in particular excess capacity, and to draw further conclusions about EMU effects in the light of this.

As discussed in Davis and Salo (1998), excess capacity in banking may be manifested in various ways depending on the market structure. In principle, it is only in cases of free entry that inadequate profitability will be the only appropriate indicator of excess capacity. When entry is restricted, excess capacity may be indicated by costs, as well as structural aspects such as the level of installed capacity. This reflects the fact that under imperfect competition with restricted entry there is no need to maximise profits in order to make a "satisfactory" return. Thus, there may be widespread X-inefficiency, lack of economies of scale etc. which manifest themselves in high costs. Moreover, forms of competition are typically in terms of services (e.g. provision of branches) rather than directly in terms of price. There may build up a considerable overcapacity in these respects which does not become apparent till markets are liberalised. Then, given sizable adjustment costs, these structural factors may continue to characterise the banking sector for some time after entry is liberalised, burdening banks and possibly leading to a desire to increase risk on the balance sheet in order to maintain profitability.

Indicators of excess capacity can in principle use either macro or micro data on banking sectors. On balance, a superior indication is likely to be given by micro data at the level of individual banks, since average levels e.g. of profitability may mask quite different conditions in sub sectors. Nonetheless, we consider it useful to first provide details of developments in key ratios for the banking sectors at a macro level in the four countries studied over the early 1990s, to offer clues regarding competition and excess capacity. These have the additional benefit of showing precisely how overall market conditions

developed during the individual years of the sample. A note of caution is that a number of these variables are also affected by the cycle.

A first economy-wide indicator of market conditions is net interest margins (net interest income as a proportion of assets). As noted, these are likely to narrow as competitive pressures on the banking system intensify. Whereas it is shown in Table 6 that German margins have tended to remain at around 2% since 1990, sharp falls are observable in French and Italian margins, while those in the United States have tended to strengthen. In the case of Italy, this may link to the progressive shift to a more liberalised financial system in recent years. The fact the US saw widening margins despite increasing competition shows that margins per se are not perfect indicators. One underlying element is that the levels of margins are strongly influenced by balance sheet structure, with a high proportion of interbank and wholesale assets reducing margins regardless of the scope of competition for retail assets, while more higher risk lending may raise margins, if correctly priced. Total net income (net interest income plus non interest income) as a proportion of assets, as shown in Table 7 shows a broadly similar pattern, except that a fall is seen in Germany at the end of the period.

Net income is not the target of profit maximising banks; returns to shareholders are in principal the most relevant objective, and low or declining returns may be one index of excess capacity. Table 8 shows sharp falls in returns on equity both in France and Italy, a broadly flat pattern in Germany and a sharp rise in the United States. A number of French banks were afflicted by bad loans which required considerable provisioning over this period and hence further reduced the return on equity. Another key missing element which helps to explain the difference between income ratios and returns on equity, is of course the cost income ratio (Table 9) which fell sharply in the United States but rose in Italy. Ratios in France and Italy are markedly higher than in the US and Germany.

As noted, micro data may give a better indication of potential excess capacity than the macro data above. Accordingly, Table 10 illustrates some of the indicators that Davis and Salo (1998) highlight. The first two indices are profit based, and show the proportion of banks which earned returns on their equity below that which could be obtained in the money market, averaged over the period 1989-95.[21] It is apparent that of the three European countries the greatest problems of excess capacity over this periods were in France, followed by Germany and with Italy the least. The French results for provisions/interest are

[21] A proxy for equity can be computed using 5% of total assets.

also consistent with the French banking sector having increased the riskiness of the balance sheet owing to financial liberalisation.

Note however that the results from the H-statistics, showing imperfect competition, suggest that structural elements should also be taken into account. One aspect is in terms of the exploitation of economies of scale. It is shown that well over 80% of German and Italian banks have assets of under $1 billion, suggesting widespread inefficient scale. The fact that, notably in Germany, the small bank sector has been characterised by monopoly, may help explain the continuing viability of many small banks, while freer entry following EMU may call it into doubt.

The population per institution is low in Germany – albeit not as low as in the United States. However, perhaps more telling is that population per branch, which shows all three EU countries – and especially Germany – having many more branches per head than in the US. This suggests considerable excess capacity, which the profitability data suggest may be latent in Germany but more overt in Italy and France. Finally the cost to income ratio is high in France and Italy, suggesting that there may be a prevalence of X-inefficiency to accompany imperfect competition.

The implication of the indicators of excess capacity, in combination with the results of the H-statistics, is that a great deal of adjustment may occur in the EU banking sector, assuming that EMU will reduce the local nature of banking markets and generate a level of competition comparable to that in the United States. Notably, the number of branches in the EU and the cost income ratios in Italy and France are consistent with potential excess capacity.

Is there any sign of response to excess capacity so far? Table 11 illustrates the contrasting patterns of restructuring and consolidation of the banking sector in the countries concerned over the early 1990s (for a more detailed account of banking structure and excess capacity in Europe see Davis and Salo (1998), and in the US see Berger et al (1995)). There have in all cases been quite marked falls in the number of institutions, with the decline in France being 25%, while the other cases it was 10-20%. Even in 1995, the number of institutions differs markedly, with almost 24000 in the US, and 3500 in Germany, while the figures for France and Italy are below 1000. The contrast with the number of branches is quite stark, with rises in both Italy and the United States despite mergers and closures. In Italy, branches have risen by 35%, and even in the United States by 3%. It is notable, however, that consistent with the population per branch data, there are well over twice as many

branches in the EU as the United States, despite the population being only 40% higher (the corresponding figures for the euro area are twice and 9%). See ECB (1999) for detailed figures.

Again, trends in the five firm concentration ratio may give indications regarding consolidation (Table 12). The results are diverse. In Germany, Italy and France there is rather little change detectable. If anything, in France and Germany concentration appears to have declined over the period shown, despite the above mentioned decline in the number of institutions. In the United States there appears to be a marked increase in banking market concentration at a national level, as a consequence of the ongoing consolidation of the banking industry. On the other hand, levels in the US are somewhat lower than in individual EU countries[22].

Conclusion

We have seen from the econometric estimates that the United States exhibits a higher level of competition than EU banking markets. Within the EU, whereas Germany and France tend to show monopolistic competition for large banks and monopoly for small ones, in Italy there is evidence of monopolistic competition for small and large banks. However, our short sample period as well as the substantial year-to-year variations of the results prevent from drawing conclusions regarding trends in banking competition. Our findings are therefore limited to the assessment of the level of competition in banking market at the start of EMU. The implications of these results are that there is room for an increase in competition in European banking sectors in the context of EMU, which could then reach levels typical of a liberalised and continental market like the United States. As was noted in Section 1, there is ample reason to anticipate such an extra impulse to competition in the future euro area. The implications of this may of course reach further than behaviour alone, and may influence also the banking structure of the countries concerned; as is indeed confirmed by the indicators of excess capacity in Davis and Salo (1998). These imply that there may be considerable structural adjustment of the banking sector before a steady state situation is achieved.

[22] The euro area as a whole shows a lower level of concentration than the US, however, indicating potential scope for future consolidation (see De Bandt (1999)).

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Table 1: Sample Descriptive statistics (millions of national currency, unless otherwise indicated).

Germany (1992-1996)	**Range of Group means (min/ max)**	**Pooled sample**		
1/ Large banks		***Mean***	***Std dev***	***Median***
Total assets (Ecu millions)	1,653 / 23,100	5,540	4,460	4,051
Total revenues	218 / 3,398	825	652	593
Personnel/staff number (DM thousands per capita, 1996)	28 / 221	90	31	81
Personnel / (deposits +loans) (*)	4 / 52	12	9	10
Interest cost (*)	33 / 83	51	12	49
Other costs (*)	1 / 34	8	4	7
Equity	160 / 2,268	433.8	357	316.8
Fixed capital	25 / 4,949	482	754	315
Loans / Assets (%)	7.8 / 94.6	55.5	18.3	60.8
Deposits / Short liabilities (%)	0.5 / 96.4	67.7	25.7	75.4
2/ Small banks		***Mean***	***Std dev***	***Median***
Total assets (Ecu millions)	43 / 2,276	704	553	523
Total revenues	6 / 369	109	85	79
Personnel/staff number (DM thousands per capita, 1996)	56 / 700	86	39	79
Personnel / (deposits +loans) (*)	5 / 35	12	4	11
Interest cost (*)	34 / 97	49	11	47
Other costs (*)	3 / 47	9	4	8
Equity	4 / 576	63	56	47
Fixed capital	1 / 247	60	50	43
Loans/assets (%)	8.6 / 98.5	60.6	13.6	63.3
Deposits/ Short liabilities (%)	0.4 / 98.9	80	17.7	84.8

(*) DM per DM thousands of assets

France (1992-1995)	**Range of Group means (min/ max)**	**Pooled sample**		
1/ Large banks		***Mean***	***Std dev***	***Median***
Total assets (Ecu millions)	2,189 / 210,165	13,544	36,660	3,439
Total revenues	1,173 / 97,465	7,089	17,067	2,238
Personnel/staff number (FF thousands per capita)	247 / 2,515	422	394	324
Personnel / (deposits +loans) (*)	1/ 27	16	8	16
Interest cost (*)	46 / 183	73	36	61
Other costs (*)	1 / 19	10	6	9
Equity	263 / 37,991	3,296	6,834	1,196
Fixed capital	250 / 139,826	7,398	24,756	1,360
Loans / Assets (%)	10 / 70.25	45.4	23	44.9
Deposits / Short liabilities (%)	12.7 / 84.5	41.3	20.3	37.8
2/ Small banks		***mean***	***Std dev***	***Median***
Total assets (Ecu millions)	53 / 2,242	748	613	519
Total revenues	35 / 1,990	494	450	355
Personnel/staff number (FF thousands per capita)	178 / 1,632	375	199	325
Personnel / (deposits +loans) (*)	3 / 59	21	11	20
Interest cost (*)	30 / 135	61	29	54
Other costs (*)	3 / 56	17	12	15
Equity	30 / 1,538	306	304	188
Fixed capital	13 / 1,980	370	437	231
Loans/assets (%)	2.1 / 75	51.7	21.7	52.6
Deposits/ Short liabilities (%)	3.6 / 100	61.2	24.2	66.5

(*) FF per FF thousands of assets

Table 1 (continued)

Italy (1992-1996) (billions of ITL)	**Range of Group means (min/ max)**	**Pooled sample**		
1/ Large banks		***Mean***	***Std dev***	***Median***
Total assets (Ecu millions)	2,047 / 105,281	18,133	26,084	4,888
Total revenues	400 / 18,463	3,297	4,517	999
Personnel/staff number (ITL millions per capita)	78 / 131	106	16	104
Personnel / (deposits +loans) (*)	9/ 41	20	5	19
Interest cost (*)	56 / 82	66	9	65
Other costs (*)	7 / 26	14	4	14
Equity	232 / 10,359	2,047	2,709	943
Fixed capital	295 / 24,545	3,756	5,963	957
Loans / Assets (%)	13.5 / 57.8	44.8	8.8	46
Deposits / Short liabilities (%)	45.5 / 86.6	66.2	11.9	65.7
2/ Small banks		***mean***	***Std dev***	***Median***
Total assets (Ecu millions)	206 / 2,185	1,109	517	1,057
Total revenues	49 / 477	238	112	234
Personnel/staff number (ITL millions per capita)	86 / 115	99	11	97.7
Personnel / (deposits +loans) (*)	15 / 37	21	4	20
Interest cost (*)	55 / 86	64	9	63
Other costs (*)	10 / 22	17	3	17
Equity	40 / 478	210	109	208
Fixed capital	47 / 555	203	126	179
Loans/assets (%)	22 / 71	46	8.5	46.5
Deposits/ Short liabilities (%)	16.5 / 96.1	80.6	13	82.3

(*) ITL per ITL thousands of assets

USA (1992-1996) (millions of USD)	**Range of Group means (min/ max)**	**Pooled sample**		
1/ Large banks		***Mean***	***Std dev***	***Median***
Total assets (USD millions)	2,044 / 202,232	15,093	29,545	6,649
Total revenues	151 / 24,507	1,342	2,830	579
Personnel/staff number (USD thousands per capita)	22 / 139	41	16	38
Personnel / (deposits +loans) (*)	3/ 29	11	4	11
Interest cost (*)	17 / 71	33	9	32
Other costs (*)	6 / 130	23	17	19
Equity	143 / 12,995	1,072	1,924	515
Fixed capital	100 / 22,575	1,837	3,671	770
Loans / Assets (%)	14.8 / 97.5	62.5	14.1	64.3
Deposits / Short liabilities (%)	23.2 / 100	66.2	11.9	65.7
2/ Small banks		***mean***	***Std dev***	***Median***
Total assets (USD millions)	37 / 2,703	1,237	628	1,077
Total revenues	3 / 540	105	71	86
Personnel/staff number (USD thousands per capita)	25 / 78	37	11	35
Personnel / (deposits +loans) (*)	1 / 22	10	4	10
Interest cost (*)	10 / 61	32	8	32
Other costs (*)	6 / 113	19	11	17
Equity	5 / 304	101	55	88
Fixed capital	2 / 392	112	75	94
Loans/assets (%)	8.2 / 92.8	59.7	15.2	61.5
Deposits/ Short liabilities (%)	27 / 100	89.6	10	91.5

(*)USD per USD thousands of assets.

Table 2: H Statistics For the German Sample (Standard Errors In Parentheses)

1992-1996	Full period OLS	Fixed effects without time dummies	Fixed effects with time dummies	"Between" estimator
1. Large banks : number of observations	**360**	**360**	**360**	**360**
1.1. Total Income				
1.1.1. Staff costs/deposits and loans	0.594^{MC} (0.085)	0.297^{MC} (0.075)	0.628^{MC} (0.084)	1.125^{C} (0.304)
1.1.2. Staff costs/staff numbers	NA	[1.130^{C} (0.220)]	NA	NA
1.2. Interest Income				
1.2.1. Staff costs/deposits and loans	0.570^{MC} (0.091)	0.248^{MC} (0.069)	0.540^{MC} (0.080)	0.971^{C} (0.326)
1.2.2. Staff costs/staff numbers	NA	[0.983^{C} (0.245)]	NA	NA
2. Small banks : number of observations	**1265**	**1265**	**1265**	**1265**
2.1. Total Income				
2.1.1. Staff costs/deposits and loans	-0.023 (0.037)	0.113^{MC} (0.033)	0.153^{MC} (0.038)	-0.163 (0.138)
2.1.2. Staff costs/staff numbers	NA	[0.051 (0.131)]	NA	NA
2.2. Interest Income				
2.2.1. Staff costs/deposits and loans	-0.070^{M} (0.037)	0.058 (0.029)	0.181^{MC} (0.033)	-0.354^{M} (0.139)
2.2.2. Staff costs/staff numbers	NA	[0.010 (0.121)]	NA	NA

NB: Least-squares regressions. The LHS is log of either Total Income, or Interest Income (see equation (1)). Two indicators are used for unit labor costs (staff costs divided either by "deposits and loans" or by "staff numbers"). The other factor prices remain the same for all equations. "NA" is "non available". Square brackets for the indicator of staff cost/ staff number are introduced for Germany since, due to the lack of data for the whole sample period, the H statistics is only based on the year 1996 and is not a fixed effect estimator. The number of observations is T (nb of years) × I (nb of banks). Superscript "C" (for "Perfect Competition") indicates that H=1 is not rejected at the 5% level (we also impose that H>0 is not rejected at the 5% level, in order to eliminate cases where the standard deviation of H is high, thereby reducing the power of the test). Superscript "M" (for "Monopoly") indicates that H≤0 is not rejected at the 5% level. "MC" (Monopolistic Competition) corresponds to the non rejection of H>0 and H<1, both at the 2.5% level.

Table 3: H Statistics For the French Sample (Standard Errors In Parentheses)

1992-1995	Full period OLS	Fixed effects Without time dummies	Fixed effects with time dummies	"Between" estimator
1. Large banks : number of observations	**148**	**148**	**148**	**148**
1.1. Total Income				
1.1.1. Staff costs/deposits and loans	0.388 (0.135)	0.104 (0.087)	0.063 (0.090)	0.360 (0.270)
1.1.2. Staff costs/staff numbers	0.727 (0.207)	0.691 (0.173)	0.574^{MC} (0.173)	0.620 (0.426)
1.2. Interest Income				
1.2.1. Staff costs/deposits and loans	-0.009 (0.132)	0.358^{MC} (0.100)	0.307^{MC} (0.108)	-0.176 (0.259)
1.2.2. Staff costs/staff numbers	0.490 (0.203)	0.834^{C} (0.170)	0.746 ^{C} (0.173)	0.417^{MC} (0.205)
2. Small banks : number of observations	**288**	**288**	**288**	**288**
2.1. Total Income				
2.1.1. Staff costs/deposits and loans	0.421^{MC} (0.103)	0.048 (0.048)	0.018 (0.052)	0.464 (0.316)
2.1.2. Staff costs/staff numbers	-0.281^{M} (0.141)	-0.055 (0.097)	-0.096 (0.099)	-0.276 (0.299)
2.2. Interest Income				
2.2.1. Staff costs/deposits and loans	0.320^{MC} (0.109)	0.019 (0.042)	-0.032 (0.046)	0.327 (0.263)
2.2.2. Staff costs/staff numbers	-0.530^{M} (0.145)	-0.125 (0.090)	-.148^{M}* (0.091)	-0.563^{M} (0.309)

NB: See Table "H statistics for the German sample". "M*" : H≤0 is not rejected at the 10% level.

Table 4: H Statistics For the Italian Sample (Standard Errors In Parentheses)

1992-1996	Full period OLS	Fixed effects without time dummies	Fixed effects with time dummies	"Between" estimator
1. Large banks : number of observations	**185**	**185**	**185**	**185**
1.1. Total Income				
1.1.1. Staff costs/deposits and loans	0.442^{MC} (0.199)	0.110 (0.115)	0.135 (0.084)	0.991 (0.512)
1.1.2. Staff costs/staff numbers	0.809^{C} (0.240)	0.823^{C} (0.133)	0.413^{MC} (0.102)	1.180^{C} (0.570)
1.2. Interest Income				
1.2.1. Staff costs/deposits and loans	0.370^{MC} (0.190)	0.044 (0.094)	0.115 (0.079)	0.903 (0.542)
1.2.2. Staff costs/staff numbers	0.691^{MC} (0.239)	0.650^{MC} (0.111)	0.398^{MC} (0.099)	1.087 ^{C} (0.595)
2. Small banks : number of observations	**235**	**235**	**235**	**235**
2.1. Total Income				
2.1.1. Staff costs/deposits and loans	0.260 (0.167)	0.534^{MC} (0.120)	0.136 (0.085)	-0.201 (0.394)
2.1.2. Staff costs/staff numbers	0.772^{MC} (0.065)	1.287^{C} (0.110)	0.435^{MC} (0.105)	-0.468 (0.482)
2.2. Interest Income				
2.2.1. Staff costs/deposits and loans	0.117 (0.160)	0.341^{MC} (0.099)	0.136 (0.076)	-0.230 (0.401)
2.2.2. Staff costs/staff numbers	0.591^{MC} (0.209)	1.027^{C} (0.091)	0.448^{MC} (0.096)	-0.494 (0.494)

NB: See Table "H statistics for the German sample".

Table 5: H Statistics For the US Sample (Standard Errors In Parentheses)

1992-1996 (commercial banks only)	Full period OLS	Fixed effects without time dummies	Fixed effects with time dummies	"Between" estimator
1. Large banks : number of observations	**620**	**620**	**620**	**620**
1.1. Total Income				
1.1.1. Staff costs/deposits and loans	0.831 (0.049)	0.520 (0.035)	0.560 (0.036)	1.058 (0.127)
1.1.2. Staff costs/staff numbers	0.871 (0.058)	0.718 (0.043)	0.729 (0.049)	1.125 (0.153)
1.2. Interest Income				
1.2.1. Staff costs/deposits and loans	0.486 (0.058)	0.283 (0.040)	0.327 (0.042)	0.666 (0.156)
1.2.2. Staff costs/staff numbers	0.589 (0.070)	0.537 (0.051)	0.546 (0.058)	0.805 (0.189)
2. Small banks : number of observations	**635**	**635**	**635**	**635**
2.1. Total Income				
2.1.1. Staff costs/deposits and loans	0.335 (0.047)	0.205 (0.038)	0.207 (0.043)	0.403 (0.131)
2.1.2. Staff costs/staff numbers	0.570 (0.050)	0.323 (0.043)	0.243 (0.051)	0.784 (0.129)
2.2. Interest Income				
2.2.1. Staff costs/deposits and loans	0.273 (0.047)	0.166 (0.038)	0.171 (0.043)	0.387 (0.130)
2.2.2. Staff costs/staff numbers	0.468 (0.050)	0.294 (0.043)	0.225 (0.052)	0.704 (0.128)

NB: See Table "H statistics for the German sample". For none of the cells, is the null hypothesis "0<H<1" rejected at the 5% level ("Monopolistic Competition").

Table 6: Net interest margins

Percent	1990	1991	1992	1993	1994	1995
Germany	2.0	2.0	2.1	2.1	2.2	2.0
France	1.7	1.6	1.6	1.3	1.3	1.2
Italy	3.4	3.3	3.3	3.0	2.7	2.9
USA	3.5	3.6	3.9	3.9	3.8	3.7
Memo items:						
EU	2.3	2.4	2.3	2.2	2.1	2.1
Euro	2.2	2.3	2.2	2.1	2.0	2.0
UK	3.0	3.0	2.6	2.5	2.3	2.3

Source: OECD, Bank profitability, Financial statements of banks, 1997

Table 7: Total net income/assets (%)

Percent	1990	1991	1992	1993	1994	1995
Germany	2.68	2.69	2.72	2.78	2.70	2.55
France	2.25	2.22	2.37	2.28	2.04	2.15
Italy	4.34	4.24	3.93	4.09	3.47	3.58
USA	5.16	5.53	5.97	6.16	5.77	5.76
Memo items:						
EU	3.23	3.35	3.18	3.34	2.99	2.99
Euro	2.97	3.04	2.91	3.02	2.73	2.71
UK	4.83	5.00	4.55	4.41	4.12	4.07

Source: See Table “Net interest margins”.

Table 8: Returns on equity

Percent	1990	1991	1992	1993	1994	1995
Germany	12	14	13	14	12	13
France	10	10	7	3	0	4
Italy	12	10	8	9	3	4
USA	11	11	17	21	22	22
Memo items:						
EU	12	13	8	10	09	11
Euro	12	12	9	9	6	8
UK	14	09	07	19	27	29

Source: See Table “Net interest margins”.

Table 9: Cost / income ratios

Percent	1990	1991	1992	1993	1994	1995
Germany	65	65	65	62	61	64
France	72	70	67	65	71	66
Italy	62	65	66	61	69	68
USA	68	67	65	64	65	63
Memo items:						
EU	66	66	69	65	67	66
Euro	66	66	67	64	66	67
UK	66	66	66	63	64	64

Source: See Table “Net interest margins”.

Table 10: Indicators of excess capacity

Percent of banks having:	Return on assets below real money market rate * 0.05 (1)	Returns on equity below real money market rate	Loan loss provisions/i interest of above 50%	Assets of under $1 billion	Memo: Population per institution (thousands)	Memo: Population per branch (thousands)	Memo: Cost to income ratio
Germany	22	20	2.5	87	23.4	1.7	64
France	38	38	18	65	97.8	2.3	71
Italy	11	12	7.5	87	60.8	2.3	76
USA	N/a	N/a	N/a	N/a	11.0	3.8	64

Source: Davis and Salo (1998)
(1): 0.05*total assets is a proxy for equity.

Table 11: Restructuring: number of banks and branches

Banks:	1990	1995	% change	**Branches (thousand)**	1990	1995	% change
Germany	4180	3487	-17		40	38	-5
France	786	593	-25		26	26	-1
Italy	1067	941	-12		18	24	35
USA	27864	23854	-14		68	70	3
Memo items:							
EU	9540	7728	-19		165	165	0
Euro	8377	7056	-16		143	145	2
UK	665	560	-16		19	17	-13

Source: BIS

Table 12: 5-firm concentration ratio (%)

		Total assets		**Total loans**	
		1992	1996	1992	1996
Germany	Universal banks*	39.6	35.3	43.8	36.6
	All banks	26.1	22.2	26.4	20.5
France	Universal banks*	56.8	48.4	54.4	48.3
	All banks	47.1	37.3	48.3	40.7
Italy	Universal banks*	38.4	39.0	39.6	41.0
	All banks	33.3	33.1	33.0	32.6
USA	Commer-cial banks	24.9	27.0	23.6	30.1

Source: Fitch-IBCA, authors' calculations.
*: commercial + savings + mutual banks.

Annex A- Definition of Variables (in logarithms, unless otherwise indicated)

1/ Endogenous variables

- Interest Revenues=Interest Received
- Total Revenues= Interest Received + Other Operating Income + Other Income (exceptional items excluded)
- 100×Net income /Total Assets in %.

2/ Factor unit prices

- Personnel Expenses / End of Year Staff Number or Personnel Expenses / (Deposits + Loans)
- Interest Paid / (Deposits + Other Liabilities), where Other Liabilities=Interbank Time and Demand Deposits + Long Term Borrowing + Subordinated Debt + Participating Debt + Hybrid Capital
- Other Non-Interest Expenses / Total Assets

3/ Capacity indicators

- Equity
- Fixed Assets + Cash and Due from Banks + Other Non Earning Assets

4/ Exogenous variables (= indicator of business mix)

- Loans / Total Assets
- Deposits / Deposits and Money Market Funding

ANNEX B: Constrained H Statistics (Standard Errors In Parentheses)

	Germany				**France**			
	H1992	H1996	β	γ	H1992	H1996	β	γ
1. Large banks 1.1. Staff costs/deposits and loans	0.719 (0.113)	0.674	-0.048 (0.062)	0.009 (0.015)	-0.067 (0.130)	0.056	0.127* (0.076)	-0.041 (0.025)
1.2. Staff costs/staff numbers	NA	NA	NA	NA	0.030 (0.273)	0.394	0.193 (0.138)	-0.029 (0.046)
2. Small banks 2.1. Staff costs/deposits and loans	0.186 (0.052)	0.148	0.012 (0.026)	-0.006 (0.007)	-0.065 (0.083)	-0.004	0.075 (0.057)	-0.021 (0.019)
2..2. Staff costs/staff numbers	NA	NA	NA	NA	-0.224 (0.145)	-0.223	0.167** (0.081)	-.056** (0.027)

	Italy				**USA**			
	H1992	H1996	β	γ	H1992	H1996	β	γ
1. Large banks *1.1. Staff costs/deposits and loans*	0.102 (0.149)	0.132	0.004 (0.062)	0.001 (0.015)	0.448 (0.069)	0.516	0.024 (0.029)	-0.002 (0.007)
1.2. Staff costs/staff numbers	0.352 (0.202)	0.411	0.004 (0.081)	-0.003 (0.020)	0.620 (0.088)	0.690	0.227 (0.334)	-0.001 (0.007)
2. Small banks *2.1. Staff costs/deposits and loans*	0.08 (0.121)	0.03	0.092 (0.060)	-0.026* (0.016)	0.183 (0.080)	0.162	0.035 (0.032)	-0.010 (0.008)
2.2. Staff costs/staff numbers	0.347 (0.153)	0.336	0.086 (0.073)	-0.022 (0.018)	0.276 (0.101)	0.237	0.017 (0.038)	-0.007 (0.008)

NB: Equation (1) with fixed effects and time dummies (see Tables 2-5),

with the constraint $H_t = H_o + \beta t + \gamma t^2$. Non-Linear Least Squares. **: significantly different from zero at the 5% level, * : significantly different from zero at the 10% level

ANNEX C: Equilibrium tests

1992-1996	H statistics	standard deviation of H	Adjusted R2
1. Germany			
1.1.Large banks	-0.14	0.10	0.10
1.2.Small banks	0.00	0.10	0.08
2. France (1992-1995)			
2.1. Large banks	0.70	0.70	0.15
2.2. Small banks	-0.15	0.60	0.09
3. Italy			
3.1.Large banks	-1.20	0.40**	0.21
3.2.Small banks	-0.46	0.70	0.14
4. USA			
4.1.Large banks	-0.32	0.19	0.29
4.2. Small banks	-0.26	0.18	0.74

NB : Least squares regressions on equation (1) with fixed effects and time dummies. The LHS is "net income/total assets" (in percentage points). The H statistics is defined, as previously, as the sum of the elasticities to the factor costs. H<0 is disequilibrium while H=0 is equilibrium. Labour costs are measured as "personnel expenses/staff number", except in the case of Germany where personnel expenses/(deposits+loans) is used. With the indicator "personnel expenses/staff number" in 1996 the hypothesis H=0 is also confirmed in Germany (H=0.26 and σ_H=0.26 for large banks; H=-1.2 and σ_H=0.20 for small banks). **:H is significantly different from zero at 5% level

ANNEX D: H statistics for the Unbalanced sample

Country	Bank size (number of observations)	Indicator of labor costs			
		Personnel expenses /staff number		Personnel expenses/ deposits+loans	
		Unbalanced panel	Memo: Balanced panel	Unbalanced panel	Memo: Balanced panel
Germany	Large banks (NA/94)	NA	NA	0.367 (0.102)	0.628 (0.084)
	Small banks (NA/4158)	NA	NA	0.280 (0.019)	0.153 (0.038)
France	Large banks (78/103)	0.979 (0.192)	0.574 (0.173)	0.385 (0.098)	0.063 (0.090)
	Small banks (110/136)	0.764 (0.189)	-0.096 (0.099)	-0.026 (0.099)	0.018 (0.052)
Italy	Large banks (71/84)	0.734 (0.266)	0.413 (0.102)	0.349 (0.214)	0.135 (0.084)
	Small banks (361/451)	0.389 (0.069)	0.435 (0.105)	0.127 (0.051)	0.136 (0.085)
USA	Large banks (202/202)	0.585 (0.069)	0.729 (0.049)	0.621 (0.062)	0.560 (0.036)
	Small banks (397/397)	0.780 (0.049)	0.243 (0.051)	0.680 (0.041)	0.207 (0.043)

NB: The H statistics is computed on the sample of banks that report only between 2 and 4 years (below 3 years in the case of France), using fixed effects and time dummies. See column “unbalanced panel”. These results have to be compared to the results on the balanced sample in Tables 2-5 (reported here in column “memo: balanced panel”). The second column indicates the number of observations (number of banks x number of time periods) Since the variable “staff number” is not systematically reported, the sample size may be smaller when the indicator chosen for unit labor costs is “personnel expenses/staff number” (the latter appear as the first number in parentheses in the second column). Outliers are excluded using the same procedure as for the balanced sample (i.e. annual changes for all variables are included in the range]1/3,3[).

ANNEX E: H statistics for the Unbalanced sample: Model in first difference

$\Delta \text{Log } R_{it} = \Sigma^{J}_{j=1} \alpha_j \Delta \text{Log } w^{j}_{it} + \Sigma^{K}_{k=1} \beta_k \Delta \text{Log } S^{k}_{it} + \Sigma^{N}_{n=1} \gamma_n \Delta X^{n}_{it} + DU_t - DU_{t-1} + \eta_{it}$

Country	**Bank size (number of observations)**	**Personnel expenses /staff number**	
		First differnces	**Memo: Balanced panel**
Germany	Large banks	0.681 (0.094)	0.628 (0.084)
	Small banks	0.180 (0.044)	0.155 (0.038)
France	Large banks	0.751 (0.151)	0.574 (0.173)
	Small banks	-0.062 (0.099)	-0.096 (0.099)
Italy	Large banks	0.361 (0.094)	0.413 (0.102)
	Small banks	0.488 (0.103)	0.435 (0.105)

NB: In Germany, unit labor costs are measured by personnel expenses/ deposits+loans.

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