The Efficiency of French Banking Industry

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Abstract

Major structural changes have affected the French banking industry during the second half of the 1980s, what suggests that the French banks were operating with a significant level of inefficiencies before this period. The purpose of this study is to present estimates of X-Efficiencies and Scale-Efficiencies in French banks for the 1988-1992 period which followed this wave of changes. The data are annual accounting data for corporate, mutual and savings banks. The sample contains 375 depository banks. By using the "distribution free" method of efficiency estimation, our estimations show that average X-efficiencies of the French banks are in the range of 70% to 90%. Our results confirm also the existence of scale economies in French banking industry. Scale efficiency estimates show clearly that French banks could reduce average costs by about 15% on average by increasing size in order to reach the efficient size. Note that this result is also in conformity with the hypothesis that some excess capacity could exist in French banking industry.

1. Introduction

Major structural changes have affected the French banking industry during the 1980s. Technological innovations, deregulation of interest rates and financial markets, and changes of demand preferences have increased the role of financial markets compared with that of banks' financial intermediation and have forced banks to compete more intensively on their traditional markets, lowering banks' profits. French banks have responded to these changes by trading securities on financial markets and developing fee-based activities, such as investment services, sales of derivatives, cash management, therefore substituing non-interest income for interest income. As a result of these changes, a growing proportion of bank income has come from fee-based services. Moreover, banks have introduced technical progress in the industry, suffering new costs while the increasing competition reduced margins.

The nature of these responses to structural changes suggests that the French banking industry was operating with a significant level of inefficiencies before the mid-eighties. So, one important question for the future of the banks is to know if such inefficiencies are still present in the industry. If there are significant efficiency differences between banks, we may expect new significant changes of the banking system organization for the next future, to a more consolidated banking industry. And

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this evolution could be stimulated by the removal of geographic barriers of banks services markets across Europe, and the achievement of monetary union.

This paper presents estimates of efficiency in the French banking industry over the 1988-1992 period, using the "distribution free" method of efficiency estimation. In section 2, we present data showing the large dispersion of operating and financial costs across banks in the French banking industry. Section 3 shows the results of the estimations of X-efficiency and scale-efficiency in the French banking industry.

2. Cost efficiency in French banking industry: a first illustration

There are three main categories of depository banks in France: commercial banks (like the Banque Nationale de Paris, Crédit Lyonnais, Société Générale or the CIC network), mutual banks (the "Crédit Agricole" and the "Crédit Mutuel" networks) and savings banks (the "Caisses d'Epargne" network). These depository banks are competing in similar markets. Data on costs dispersion in French depository banks give a first illustration of cost inefficiencies (table 1). The data are taken from French banks accounts over the period 1988-1992. The first part of the table shows the distribution of the operating costs. It illustrates the importance of inefficiencies related to the use of real resources. Indeed, the variation of average operating costs appears to be very important for banks of the same size classes. The dispersion of average operating costs inside each size class is of the same order of magnitude as the dispersion of average operating costs between size classes. Moreover, the average interquartile difference of costs appears to be higher than the difference of costs between lower and greater size classes. However, in each quartile, the average operating costs median decreases with size, suggesting the existence of scale economies. The second part of the table shows that there is substantial variations in average financial costs for bank of similar size. But, the average interquartile difference is not higher than the difference related to the scale of operations. Finally, costs differences between banks of similar size persists if we sum operating costs and financial costs, as shown in the third part of the table. Note that, on average, financial costs tend to increase with scale. The size of these operating and financial cost differentials suggests that banks are not equally efficient and that these differences in efficiency come from the financial structure choices as well as from the real resources organization.

Table 2 shows the mean of average financial costs and the mean of average loan losses within four operating costs classes. Approximately, the lower class includes the banks which have average operating costs lower than the 25% quartile of average operating costs, the upper class includes the banks which have average operating costs higher than the 75% quartile. The banks with the greatest average operating costs tend to have lower average financial costs. This result is consistent with the hypothesis that there is a trade-off between purchasing more deposits with lower financial costs and purchasing more borrowed funds with lower operating costs. In order to reduce total costs, banks can either reduce financial costs by acting on the financial structure of the bank or reduce operating costs by reducing the supply of real services. Generally, the results of such strategies are not immediate. In particular, it could take a long time before a substantial reduction of operating costs appears, because the shrinking of overcapacities generally takes a long time.

3. Data and econometric model

The data are annual accounting data for commercial, mutual and savings banks.[1] The sample used in this study contains 375 depository banks. It is important to emphasize that the banks in the sample are competing in the same markets and for the same customers. They have quite similar access to the capital markets and they use a similar technology. The sample contains French banks as well as foreign bank affiliates.[2] In France, financial innovation and deregulation that generated an increase of competition in the banking sector appeared principally in 1986-1987.[3] Therefore, the period of this study (1988-1992) covers years during which the banks had to make strategic decisions to adjust to the new environment and the new competition. These decisions

Table 1:
Dispersion of average operating, financial and total costs in French banks over the period 1988-1992

a) average operating costs

asset size (billion of francs)	number of banks	minimum	lower quartile	median	upper quartile	maximum
lower than .5	27	0.93	3.16	4.02	5.91	8.56
.5 to 1	21	0.93	3.04	3.08	4.95	7.23
1 to 2.5	42	0.72	1.60	3.04	4.32	7.39
2.5 to 5	48	0.44	1.69	3.38	4.65	5.82
5 to 10	79	0.61	2.40	3.14	4.11	5.82
10 to 25	84	0.61	1.95	2.80	3.28	4.94
25 to 50	20	0.69	1.78	2.32	3.42	4.94
50 to 500	10	0.54	1.62	1.79	2.30	3.68
greater than 500	5	0.54	1.62	1.79	2.20	2.20

b) average financial costs

asset size (billion of francs)	number of banks	minimum	lower quartile	median	upper quartile	maximum
lower than .5	27	2.67	3.49	5.09	6.06	7.92
.5 to 1	21	2.81	4.06	4.93	6.24	8.11
1 to 2.5	42	2.84	4.37	5.85	6.80	8.65
2.5 to 5	48	3.44	4.07	5.69	6.84	8.68
5 to 10	79	3.51	4.74	6.04	6.67	8.17
10 to 25	84	3.20	5.71	6.51	6.97	8.65
25 to 50	20	3.97	5.25	5.99	6.95	8.65
50 to 500	10	2.94	4.89	5.10	5.90	8.10
greater than 500	5	5.19	5.19	5.27	5.32	5.32

c) average total (operating and financial) costs						
asset size (billion of francs)	number of banks	minimum	lower quartile	median	upper quartile	maximum
lower than .5	27	4.66	8.45	9.77	10.66	12.28
.5 to 1	21	6.40	8.13	8.77	10.11	12.60
1 to 2.5	42	6.40	7.88	8.72	9.49	12.80
2.5 to 5	48	5.89	7.95	8.61	9.11	13.91
5 to 10	79	5.89	8.17	8.87	9.83	13.91
10 to 25	84	6.40	8.00	8.87	9.86	12.13
25 to 50	20	6.77	7.90	8.31	9.57	12.13
50 to 500	10	3.48	6.73	7.35	7.80	9.72
greater than 500	5	7.32	7.32	7.39	7.47	7.47

could have resulted in overcapacities and inefficiencies. Indeed, to gain market shares in the context of a decline of the traditionnal activities, banks could have overinvest in branches, and in computer systems and overdevelop the supply of loans to new customers

Table 2:
Relationships between average operating costs, average financial costs, loans losses and average total costs in French banks over the period 1988-1992

a) average financial costs						
average operating costs per franc of assets (in cts)	number of banks	minimum	lower quartile	median	upper quartile	maximum
lower than 2	70	2.67	5.92	6.38	7.00	8.68
2 to 3	92	2.67	5.55	6.38	7.09	8.65
3 to 4	87	3.08	4.70	6.21	6.75	8.65
greater than 4	85	2.73	3.64	4.04	5.02	8.65

b) average total costs						
average operating costs per franc of assets (in cts)	number of banks	minimum	lower quartile	median	upper quartile	maximum
lower than 2	70	3.48	7.25	7.68	8.43	11.44
2 to 3	92	4.66	7.88	8.87	9.79	11.44
3 to 4	87	7.07	8.26	9.54	9.98	13.91
greater than 4	85	7.07	8.58	8.99	10.02	13.91

To resume, the time period chosen was a period of rapid technological changes in the production of financial and banking services. To react to these changes, banks could have had the temptation of increasing investments in capacity. It is precisely during this period that the problem of overcapacity became to be considered by French bankers as a major problem. In particular, is is during that period that the banks began to reduce the number of employees and tried to adjust to the new environment in substituing capital for labor. Consequently, this five year period appears appropriate for estimating technical and allocative inefficiencies in French banking industry.

In this study, estimates of X-efficiency and scale-efficiency for French banking industry were generated using a "distribution free" method of estimation.[4] Using a translog specification, the estimated cost function includes five outputs and three inputs prices. For some estimations, we retain the factor share equations in the model, invoking Shephard's lemma. Thus, the complete model is the following:

$$\ln TC = \alpha + \sum_j \beta_j \ln Y_j + \tfrac{1}{2} \sum_j \sum_k \beta_{jk} \ln Y_j \ln Y_k + \sum_m \gamma \ln p_m$$

$$+ \tfrac{1}{2} \sum_m \sum_n \gamma_{mn} \ln p_m \ln p_m + \sum_j \sum_m \rho_{jm} \ln Y_j \ln p_m + \ln x + \ln \omega \qquad (1)$$

$$S_m = \gamma_m + \sum_j \rho_{jm} \ln Y_j + \sum_m \gamma_{mn} \ln p_m + \ln \upsilon_m \qquad (2)$$

In this model, TC represents the total of operating and financial (interests) costs. The Y_j (i = 1...5) represent the five main products of an "universal" bank: (1) transaction and liquidity products, measured by the franc amounts of demand and savings deposits, (2) loans to business, (3) loans to households, (4) fee-based activities measured by the franc amount of fee-based income, and (5) interbank activities, measured by the franc amount of interbank loans income. The p_m (m = 1...3) represent the input prices:[5] (1) the price of labor, measured by the average wage by bank (salaries and labor taxes divided by the number of employees), (2) the price of borrowed funds, measured by the average financial cost of the sum of interbank market borrowed funds, certificates of deposits and other short term securities, and long term bonds, (3) the average financial cost of deposits (interests on demand deposits, time deposits and savings deposits). In these estimations, we assume that the price of physical capital is constant across banks.[6] We introduce the usual cross restrictions on the technology.

To compute inefficiencies, we used the average residual method.[7] Therefore, the average of the five annual residuals for each bank i is computed and it served as an estimate of ln x for that bank, given that the annual random error terms ln ω tend to average to zero over the period. The average residual of each bank i is used in the computation of X-efficiency. Here, X-efficiency is measured by the ratio of the average residual of each bank i to the minimum average residual across the banks of the sample, assumed to be the average residual of the most efficient bank. Therefore, it is just like measuring X-efficiency by the ratio of predicted costs for the most efficient bank to predicted costs for each bank.

Nevertheless, this measure of efficiency is not completly correct if the random error terms ln ω do not fully cancel out each other during the period.[8] To treat this problem, we have computed truncated measures of X-efficiency, where the value of average residual of the qth ((1-q)th) quantile was given to each observation for which the value of the average residual is below (above) the qth ((1-q)th) quantile value. We have used three values of q: 1%, 5% and 25%.

Scale efficiencies have also been calculated. Scale efficiencies measure the efficiency losses which come from the fact that the bank is not at its optimal size. Therefore, scale efficiencies differ from X-efficiencies. For this purpose, first, we computed the ray scale economies, that is the elasticity of costs with respect to output, in order to find the scale-efficient output for each bank's output composition and input prices. The efficient scale for each bank occurs when the value of the ray scale economy is equal to 1. Then, scale efficiencies are measured by the ratio of estimated costs for the efficient scale output to the estimated costs for the effective output, weighted by the ratio of these two outputs to take account of differences of size.

Finally, total X-efficiencies and scale-efficiencies were computed simply by multiplying the two types of inefficiencies: T-EFF = X-Efficiency x Scale-efficiency.

4. Efficiency estimates and concluding comments

The cost model was estimated using different regression techniques: OLS, iterative SUR with all share equations restrictions and iterative SUR without restrictions on the constant terms of the costs shares equations. The estimations gave very similar results. X-efficiency is defined as the ratio of the minimum costs that could have been expended to produce a given output mix to the actual costs. This ratio varies between 0 and 100 percent. Table 3 presents the results of mean X-efficiency and scale-efficiency estimates for French banks over the 1988-1992 period.

Table 3:
X-Efficiency and Scale-Efficiency Estimates 1988-1992

X-Efficiency	
X-Eff (no truncation)	0.406 (0.097)
X-Eff (truncation at 0.01)	0.561 (0.122)
X-Eff (truncation at 0.05)	0.707 (0.123)
X-Eff (truncation at 0.25)	0.901 (0.079)
Scale-Efficiency	
Ray Scale Economies	0.849 (0.358)
Ray Sc-Efficiency (S-Eff)	0.922 (0.062)
Total Efficiency	
X-Eff(0.25) . S-Eff	0.830

The results show that the mean efficiency estimates are very sensitive to the value of the truncation used in the estimation. Average X-efficiencies varies from 40%, when no truncation is used, to about 90%, when the value of the extremes are those

of the upper and lower quartile. Such large differences suggest that the truncation is a necessary procedure. Finally, we can estimate X-efficiencies of the French banks to be in the range of 70% (5% and 95% truncation) to 90% (25% and 75% truncation). These results are very similar to the results founded for the U.S. banks (Ferrier and Lovell, 1990, Bauer and al. 1993, Berger, 1993).

There seems clearly to be scale economies in French banking industry, a result that conforts the result of our previous study (Dietsch, 1992, 1993). The conventional ray-scale economies indicator is well below 1, which shows economies of scale. However, scale economies can be poor indicators of scale efficiency. Nevertheless, scale efficiency estimates show clearly that French banks could reduce average costs by 8% on average by increasing size in order to reach the efficient size. Results of estimations show also that X-inefficiency seems to dominate scale-inefficiency in the French banking industry. However, if we retain the 25/75% truncated value, the two kinds of inefficiencies appear to be of the same magnitude.

End Notes

1. By the 1984 French banking Law, these three categories of banks are also submitted to the same regulation.

2. The sample quite covers a wide size range. But the regressions, the smallest banks with assets less than 500 millions francs are omitted, as their numbers would distort the estimations.

3. During these two years, new short-term securities were introduced, money market was modernized and it was leaved open to non-financial firms, new derivatives markets were created (Matif, Monep), interest rate controls were abolished and, finally, capital controls were suppressed.

4. Rather than imposing predetermined distributions on the X-efficiencies and random error terms, the "distribution free" approach assumes that cost differences owing to X-efficiencies are stable over time (that is, X-efficiencies persist over time), while random errors are unstable and tend to average over time (see Bauer and al., 1993, Berger, 1993). In other terms, although costs may vary because of (good or bad) luck or measurement error, good management is able to maintain costs at relative low level over time.

5. The price of outputs were computed by using the data of the banks. For instance, the price of labor was estimated by using the information relative to the wages and taxes associated to the use of labor as they appeared in the banks accounts. Consequently, because we used the prices the bank pay itself for each factor of production, inefficiences associated with overpayments to real or financial factors cannot be evaluated by our approach. That could be a source of underestimation of the inefficiencies for banks that pay factors at prices higher than the market prices.

6. This assumption is based on two reasons: first, we do not have sufficiently reliable information on physical inputs prices, so that using an endogenously calculated approximate measure from the accounts data, such as the ratio of total expenses related to the use of physical per unit of assets, could add noise in the estimation procedure, second, many banks compete on the same nationwide markets and face quite similar prices for their computers, buildings and other physical inputs needs. S_m are the share of costs paid to input m.

7. See Berger (1993) for details.

8. As noted by Berger (1993), this error is likely to be larger for banks near the extremes of the average residual. These banks may have experienced good (bad) luck over the entire period. Consequently, the minimum average residual, which serves here as a benchmark for the calculus of the X-efficiency, could be overestimated.

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