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The Effect of Financial Liberalization on the Efficiency of Turkish Commercial Banks

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Introduction

The financial markets of developing countries are undergoing a period of rapid transition, and Turkey is no exception. Structural changes in the Turkish economy, technological breakthroughs, the competitive structure of the financial services industry, and changing borrower demands have all had a significant impact on the delivery of credit to industry, agriculture, and households. A fundamental concern among borrowers and depositors is the impact of such changes on the cost and availability of credit and banking services. The ability of commercial banks to continue to deliver credit efficiently in the future will play a major role in determining the efficiency of Turkey's industrial and agricultural production.

The topic of efficiencies in commercial banking can be subdivided into issues regarding the scale of production (economies of scale), the cost complementarities of joint production (economies of scope), and deviations from an efficient frontier (X-efficiency). Greater degrees of efficiency among banks could result in greater accessibility of loanable funds, higher bank profitability, more preferable rates for borrowers and depositors, increased services for customers, and greater profitability for long-term viability by using savings-generated efficiencies as a capital cushion.

Since policies regarding the regulation and/or deregulation of commercial banks and their competitors could be guided by inferences based on empirical results of studies of bank efficiency, it is crucial to apply to the banking sector the methodologies developed for measuring efficiencies.

In this brief introduction, the setting for efficiency measurement of commercial banks is established, and potential benefits of efficiency analysis are reviewed. The objective of this work is to investigate the effect of financial liberalization policies on the economic efficiency of Turkish commercial banks at the micro level.

Before the introduction of the 1980 stabilization program, the banking sector in Turkey was characterized both by restricted entry of domestic and foreign banks and by regulated interest rates. The lack of interest rate competition in the sector forced banks to compete for deposits by establishing a network of branches across the country. This led to overbranching and overstaffing in commercial banking. The main goal of the financial policies embodied in the 1980 stabilization program was to create a competitive environment and thereby enhance the efficiency of the sector. The first steps taken in this direction were to pursue liberal policies such as allowing new entries (both domestic and foreign) into the sector and liberalizing interest rates, commissions and fees. The sector was quick to respond to the program. The liberalization of interest rates and increased competition in the market forced banks to decrease their costs. As a result, unprofitable branches were closed and the number of staff was reduced in many banks.

To investigate the effect of financial liberalization policies on the economic efficiency of Turkish commercial banks at the micro level, a nonparametric frontier methodology is applied to commercial banks for representative years in both pre- and post-liberalization eras. The method of analysis relies on estimates of multi-output production and cost frontiers using linear programming techniques.

Estimating production frontiers by imposing different scale assumptions on the technology and by measuring each unit's distance from the frontier will not only yield information on the technical inefficiency of the unit under investigation, but will also determine at which scale it operates. In other words, the methodology allows the exploration of whether a particular bank is experiencing decreasing, increasing, or constant returns to scale. Thus, a comparison of the scale economies of each bank in the pre- and post-liberalization eras will shed light on whether the liberalization policies succeeded in forcing banks to operate at the optimum scale. Similarly, from the comparison of bank level cost efficiency measures, one can obtain information on whether the liberalization policies succeeded in forcing banks to allocate resources more optimally. This paper will review the structure of the Turkish banking sector, followed by a model that will be used for efficiency comparisons. Subsequently, the paper will present data sources as well as a discussion of results, followed by a conclusion.

Structure of the banking system

The Turkish financial system includes the Central Bank, commercial banks, as well as investment and development banks. Commercial banks are the dominant institutions of the system. Investment banks were established with the purpose of underwriting securities; however, they are also engaged in commercial banking without depending on deposits as a source of funds. Development banks, on the other hand, are primarily engaged in extending medium and long-term loans to selected industries. Their funding comes either from the government or from international organizations like the World Bank. The total share of investment and development banks in the system is limited; in fact, in 1990 only nine percent of the consolidated total assets of all banks belonged to these institutions. Thus, given the rather different structure of development and investment banks as well as their limited scope in the financial system as a whole, the focus of this work will be on commercial banks so as to maintain the comparability and uniformity between the units under investigation.

As in most other countries, banking is a heavily regulated industry in Turkey. Restrictions on entry and exit, capital adequacy, reserve and liquidity requirements, asset portfolio restrictions, number of branches, deposit insurance, and interest rates on deposits and loans are all regulated by the government. The financial reforms in Turkey starting in 1980 were designed to reduce state intervention and increase the role of market forces in the operation of the financial system. The reforms included both the abolition of interest rate ceilings and reductions in reserve and liquidity requirements as well as in financial taxes. In addition, together with recently-established Turkish banks, foreign banks were permitted to operate in Turkey, and restrictions on foreign exchange operations were significantly relaxed during that period.[1]

The role of government in the banking system is not limited to its regulatory authority. As of the end of 1990, the state is the owner-manager of eight commercial banks from a total of 56 banks in the country. In terms of size, banks owned by the state control 49.7 percent of total assets in the commercial banking system.

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[1] For a more comprehensive review of policies during the financial liberalization era, see Akkurt et al. (1991).

With regard to ownership, private banks in Turkey can be grouped as domestic and foreign banks. Table 1 presents the distribution of total assets, deposits and loans among commercial banks owned by the state, Turkish residents, and foreigners for years 1981 and 1990.

Close inspection of Table 1 indicates that the sector was quick to respond to the measures which foster competition. During the 1981-1990 period the number of commercial banks in the sector increased from 42 in 1981 to 56 in 1990. Out of 42 banks in 1981, 13 banks were either liquidated or merged with others, implying that 27 new banks entered the sector between 1981 and 1990. Of these new entrants, 18 were foreign-owned, either as branches or as subsidiaries.

Together with the new entries in the market, the liberalization of interest rates forced banks to decrease their costs by closing unprofitable branches and reducing the number of staff. Although the number of banks in the 1981-1990 period increased significantly, the number of branches rose by only 4.5 percent (from 6,259 to 6,543), whereas it had risen by 70 percent in the 1972-1981 period. As for the number of staff, the rate of increase was 14.9 percent between 1981 and 1990 (from 132,313 to 151,982), which was much lower than the rate of 64 percent during the 1972-1981 period. Together with these developments, the profitability of the banking system gained enormous momentum during the financial liberalization era. As exhibited in Table 3, real profits for private commercial banks have increased as much as five times over the 1981-1990 period, surpassing the real profitability index of manufacturing firms by as much as 2.25 times as of 1989. Moreover, neither a modest real increase in deposits (34 percent) and loans (58 percent) nor the developments in the nominal and effective spreads can explain the sharp profit increase entirely. Hence, taking the cost-saving measures described above into consideration, one must rely on increased efficiency in the banking sector as a whole when trying to explain the success of the sector.

Table 1. Structure of the Turkish commercial banking industry

Bank Group	Number		Total Assets Billion TL		% Share Total Assets		Deposits Billion TL		% Share Deposits		Loans Billion TL		%Share Loans	
	1981	1990	1981	1990	1981	1990	1981	1990	1981	1990	1981	1990	1981	1990
Commercial Banks	42	56	2845	158670	100	100	1648	95328	100	100	1420	70595	100	100
State Banks	12	8	1338	78880	47	49.7	528	46250	32	48.5	739	36121	52	51.2
Private Banks	24	25	1419	73831	50	46.5	1081	46805	66	49.1	654	31639	46	44.8
Foreign Banks	6	23	88	5959	3	3.8	39	2273	2	2.4	26	2835	2	4

Source: Banks' Association of Turkey.

Table 2. Distribution of branches and employees in 1981 and 1990

	Number of Employees		Number of Branches	
Bank Groups	1981	1990	1981	1990
Commercial Banks	132313	151982	6259	6543
State Banks	68127	80825	2591	2975
Private Banks	62152	68145	3545	3455
Foreign Banks	2034	3012	123	113

Source: Banks' Association of Turkey.

Table 3. Indicators of profitability

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. Index of real profits of banking sector (a)	100.00	82.70	147.89	259.55	247.00	421.30	586.20	626.98	429.40	536.81
2. Index of real profits of manufacturing industry (b)	100.00	99.27	113.66	158.90	222.77	181.78	237.37	209.63	191.82	
3. Index of real deposits (a)	100.00	128.12	127.67	138.85	153.92	165.06	169.20	148.08	145.15	134.64
4. Index of real lending (a)	100.00	112.02	114.50	100.49	122.64	164.40	188.88	152.94	146.70	158.89
5. Nominal spread	16.80	12.20	13.00	16.50	15.50	20.50	23.10	28.10		
6. Effective spread	47.10	33.00	26.80	34.80	33.90	33.30	49.60	39.20		

Notes: a: Deflated by Consumer Price Index
b: Total profits of 500 largest firms deflated by Producer Price Index

Sources:
Rows: 1,3,4: Various publications of Banks Association of Turkey;
2: Petrol Is Almanac (1990);
5,6: Capoglu Gokhan (1990).

The section below summarizes the methodology used to investigate the effects of liberalization policies on the economic efficiency of commercial banks.

Model

To investigate the effects of liberalization policies on the economic efficiency of Turkish banks at the micro level, a nonparametric frontier methodology is applied to commercial banks for both pre- and post-liberalization eras. This method of analysis has been used in most previous bank efficiency studies. For example, Sherman and Gold (1985), Parkan (1987), and Vassiloglu and Giokas (1990) have analyzed efficiency differences between bank branches, whereas Charnes et al. (1990), Ferrier and Lovell (1990) and Berg, Forsund and Jansen (1991) have focused on efficiency differences between banking firms.

The method used has been introduced by Farrell (1957). In his influential work Farrell (1957) showed how one can measure productive inefficiency and its components (allocative and technical inefficiencies) within a theoretically meaningful framework. His initial approach has been adopted and extended by Farrell and Fieldhouse (1962), Seitz (1970), Afriat (1972), and Meller (1976). In more recent studies, Fare, Grabowski and Grosskopf (1985), Fare, Grosskopf and Lovell (1982), and Banker, Charnes, and Cooper (1984) showed how one can decompose Farrell's measure of technical inefficiency and thus extract information on the scale of the unit under investigation.

The approach utilizes a sequence of linear programs to construct a transformation frontier so as to compute efficiency measures relative to said frontier. In order to describe the theoretical underpinnings of the model employed, suppose we observe a sample of K production units, each of which uses inputs $x \in R_+^N$ available at prices $w \in R_+^N$ to produce outputs $y \in R_+^M$ in an environment characterized by variables $\mu \in R_+^S$ and $\alpha \in R_+^T$. As a matter of notation, let x_i^k be the quantity of input i used by unit k, and let y_i^k be the quantity of output i produced by unit k. These data can be placed into data matrixes M, a K x M matrix of output levels whose k,i th element is y_i^k and N a K x N matrix of input levels whose k,i th element is x_i^k.

Environmental variables μ and α are exogenously-fixed inputs and outputs that a decision-making unit cannot control, at least in the short run. The decision-making units would like to limit the elements of μ as much as possible,

given outputs. For the exogenously-fixed outputs, the decision-making units would like to expand the elements of α as much as possible, given inputs. Again, for notational convenience, let the data on these be placed into data matrixes P, a K x S matrix of exogenously-fixed inputs (or categorical variables) whose k,i th element μ_i^k and R , a K x T matrix of exogenously-fixed outputs whose k,i th element is α_i^k.

Using the notation at hand for any $y^k \in R_+^M$, production possibilities can be characterized in terms of input requirement set $L(y)$, which can be constructed from observed input-output data by means of

$$L(y^k) = \{ x^k : z \in R_+^K , z^T M \geq y^k , x^k \geq z^T N , z^T R \geq \alpha^k ,$$

$$\mu^k \geq z^T P, \sum_{i=1}^{k} z_k = 1 \} \quad k = 1,2...,k \tag{1}$$

where z is a k x 1 intensity vector. Intuitively, this equation constructs a reference technology from observed inputs and outputs. Relative to this bounding technology, the technical efficiency of each observation is calculated by solving K linear programming problems of the form:

$$\begin{aligned} &F(x^k , y^k) = \min \lambda \\ &\quad \text{Subject to} \\ &\quad z^T M \geq y^k \\ &\quad z^T N \leq \lambda x^k \\ &\quad z^T R \geq \alpha^k \\ &\quad z^T P \leq \mu^k \\ &\quad \sum z^T = 1 \end{aligned} \tag{2}$$

The solution vector λ in the above problem measures the fraction by which a firm can multiply its input vector and still produce no less of any output. If it is not possible to produce the existing outputs with a radially smaller input vector, then λ takes the value of 1, expressing that the unit under investigation is technically efficient. The choice of this input-saving efficiency measure is in coherence with the expressed interest of the banking sector in reducing costs. In the above formulation, technical efficiency is calculated relative to a production frontier that satisfies strong disposability of both inputs and outputs as well as variable returns to scale (VRS). However, by altering the constraint on the intensity vector z, one can also construct production frontiers that satisfy different scale assumptions, such as constant returns to scale

(CRS) (by deleting the last constraint) and non-increasing returns to scale (NIRS) (by changing the last constraint as $\sum z^T \leq 1$).

By comparing the efficiency scores obtained from production frontiers with different scale assumptions, one can also find out at which scale the unit operates. Since the VRS production frontier envelopes the data more closely than the NIRS production frontier, the comparison efficiency scores from these two frontiers will reveal information on whether a particular unit is operating under IRS or NIRS. While equality between the two scores indicates NIRS technology, inequality means that the unit operates under IRS. Furthermore, since a production frontier with the CRS assumption envelopes the data least closely of all, the resulting efficiency scores will be less than or equal to those calculated with NIRS technology. Thus, for any observation operating under NIRS, equality between the efficiency scores from CRS and NIRS technologies implies CRS, whereas inequality implies DRS.

If input price vectors are known, the cost efficiency of each unit may be calculated by solving K additional linear programs of the form:

$$
\begin{aligned}
Q(y^k ; w^k) = \min\ & wx^k \\
\text{Subject to}\ & \\
& z^T M \geq y^k \\
& z^T N \leq x^k \\
& z^T R \geq \alpha^k \\
& z^T P \leq \mu^k \\
& \sum z^T = 1
\end{aligned}
\tag{3}
$$

The solution vector x_*^k is the cost minimizer for the input price vector w^k and the output vector y^k. The measures of cost efficiency $C(x^k; y^k; w^k)$ and allocative efficiency $A(x^k; y^k; w^k)$ are given by

$$
C(x^k; y^k; w^k) = \frac{Q(y^k; w^k)}{wx} = \frac{w^k x_*^k}{w^k x^k}
\tag{4}
$$

$$
A(x^k; y^k; w^k) = \frac{C(x^k; y^k; w^k)}{F(x^k; y^k)}
$$

These measures can easily be modified if interest centers on the percentage by

which cost is increased due to production inefficiency and its components (technical and allocative inefficiencies). For example, C^{-1} -1 measures the percentage by which cost is increased due to both types of inefficiencies, while A^{-1} -1 measures the percentage by which cost is increased due to allocative inefficiency alone. Finally, C^{-1} - A^{-1} shows the percentage by which cost is increased due to technical inefficiency.

Data and empirical results

The literature which models bank production and behavior is divided into two distinct categories with respect to the measurement of banks' inputs and outputs. Humprey (1985) made a useful distinction between the production approach and the intermediation approach to bank behavior. Under the production approach banks are considered as producing deposits and loans using capital, labor, and materials. The proponents of this approach use the number of accounts and loans outstanding as banks' outputs. Their measure of total costs include all operating costs incurred in the production of outputs. The intermediation approach, by contrast, treats banks as collector of funds which are then intermediated to loans and other assets. The dollar volume of deposits and loans is the appropriate measure of bank output in this case, and the combination of operating and interest costs provides the appropriate measure of total costs. In spite of this behavioral distinction, the work by Berg, Forsund and Jansen (1991) implies that the production frontier is invariant as to how the output is measured. In their own words:

> "...We found that important characteristics of the efficiency frontier for Norwegian banking are about the same whether we choose to measure output by the number of accounts and their average size or by the total balances of the accounts. This applies to the size of efficiency gains as well as to our results on economies of scale."

In this study the intermediation approach to banking behavior is adopted. The data are compiled from the publications of the Banks Association of Turkey, which publishes yearly income statements and balance sheets for each bank. The representative years for pre- and post-liberalization eras are chosen as 1981 and 1990, respectively. The year 1981 was chosen instead of 1980 in order to establish conformity with the data used for the post-liberalization era.[2] The sample for the 1990 data set consists of all 56 commercial banks that

[2] The format of balance sheets and income statements have been redesigned after 1980.

operated at that time. The sample for the pre-liberalization era, which originally consisted of 42 commercial banks, excludes three state banks whose income statements reflect some of their non-banking activities as well. The variables used for the models described above are the following:

Outputs:

y_1 = dollar volume of demand deposits

y_2 = dollar volume of time deposits

y_3 = dollar volume of short-term loans

y_4 = dollar volume of long-term loans

Inputs:

x_1 = total number of employees

x_2 = total interest expenditures

x_3 = depreciation expenditures

x_4 = expenditures on materials

Input price:

w_1 = total expenditures on salaries and fringe benefits

Total costs:

$C = w_1x_1 + x_2 + x_3 + x_4$

Environmental variables:

α_1 = average size of demand deposit accounts

α_2 = average size of time deposit accounts

μ_1 = number of branches

μ_2 = institutional type (1 for national; 0 for foreigner)

Production frontier results

For each bank in the sample of 56 for the year 1990 and 39 for the year 1981, linear programming problem 2 is solved for all scale assumptions. Table 4 and Table 5 below give summary statistics of the efficiency scores and returns to scale for pre- and post-liberalization eras.

Table 4. Average technical efficiency scores under different scale assumptions

	1981			1990		
	CRS	VRS	NIRS	CRS	VRS	NIRS
State	0.893	0.932	0.932	0.959	0.982	0.982
Std. Dev.	0.174	0.165	0.165	0.066	0.048	0.048
Private	0.755	0.773	0.776	0.863	0.891	0.889
Std. Dev.	0.243	0.240	0.246	0.203	0.200	0.203
Foreign	0.915	0.926	0.926	0.955	0.969	0.954
Std. Dev.	0.189	0.164	0.164	0.117	0.077	0.117
Average	0.811	0.833	0.828	0.914	0.936	0.929
Std. Dev.	0.233	0.227	0.232	0.163	0.149	0.160

These tables point to some striking facts on how liberalization policies have fostered competition. First, the level of technical efficiency has increased by 10 percent on average from 1981 to 1990. Note that all entries for technical efficiency scores in 1981 are smaller than those in 1990. Secondly, technical efficiency differences between banks have decreased over time. This evidence is due to the fact that standard deviations of technical efficiency scores for each group in 1981 are greater than those in 1990. Thirdly, banks have undergone considerable scale adjustment and were successful in achieving optimal scale. An examination of Table 5 shows that the proportion of banks operating at the optimal scale has increased from 59 per cent in 1981 to 68 per cent in 1990.

Another important fact is that the rate of change of technical efficiency has been greater in private banks compared to state and foreign banks. This finding, while closing the efficiency gap between banks, is also an indication of who benefits the most from the liberalization policies that foster competition.

Table 5. Developments in returns to scale

	1981		1990	
Number of banks with CRS	23	59%	38	68%
Number of banks with DRS	6	15%	13	23%
Number of banks with IRS	10	26%	5	9%
Total	39	100%	56	100%

Cost frontier results

In the cost version to be used presently, the method of inefficiency measurement takes on a rather simple and intuitively appealing form. In a word, a bank is said to be cost inefficient if it is dominated by one or more banks in the following sense:

(a) Other banks have lower expenses than its own expenses; and

(b) All output indicators of other banks are either greater than or equal to its own indicators.

To determine cost inefficiency and its components, the procedure described in Problem 3 is repeated for each bank in the samples representing pre- and post-liberalization eras. Table 6 gives the summary results for the indexes that show the average amount by which cost is increased due to production inefficiency and its components (allocative and technical inefficiencies) for each owner class.

Evidence on cost efficiency indicates that, on average, costs were 75 percent above the minimum in 1981, and that this figure drops to 38 percent (almost a 50 percent reduction) in 1990. The results indicate that the effect of allocative and technical inefficiencies on cost increases differs for pre- and post-liberalization eras. While in 1981 banks were more vulnerable to technical inefficiency, the effect of allocative inefficiency was more dominant in 1990. Also, close inspection of Table 6 shows that in both eras private and state banks differ with respect to the relative effects of allocative and technical inefficiencies on cost increases. While in state banks a large portion of cost inefficiency is due to allocative inefficiency, the same is not true for private banks, where the main determinant of cost inefficiency seems to be technical inefficiency.

Table 6. The effect of technical and allocative inefficiencies on cost increases

	1981			1990		
	C^{-1} -I	A^{-1} -	C^{-1} -A^{-1}	C^{-1} -I	A^{-1} -	C^{-1} -A^{-1}
State	0.6450	0.4822	0.1628	0.3866	0.3438	0.0428
Std. Dev.	1.0293	0.9830	0.4208	0.5457	0.4771	0.1131
Private	0.8303	0.2278	0.6025	0.4953	0.1701	0.3252
Std. Dev.	0.8836	0.2680	0.7917	0.9280	0.2769	0.8426
Foreign	0.6138	0.4658	0.1480	0.2560	0.2126	0.0434
Std. Dev.	0.0667	0.6589	0.3310	0.6883	0.6809	0.1213
Average	0.7542	0.3231	0.4311	0.3831	0.2142	0.1707
Std. Dev.	0.8960	0.5913	0.7004	0.7959	0.3438	0.5865

A comparison of rates of improvement for different ownership classes through the years indicates that a relatively higher rate of improvement of cost inefficiency in private banks closed the efficiency gap between the latter and state banks. Table 7 was designed to complement the analysis of the effect of liberalization policies on economic efficiency. It classifies banks into three categories, namely: banks which are economically efficient; those which are only technically efficient; and those which are economically inefficient; in addition, it shows their respective weights in the financial system for both eras.

A comparison of pre- and post-liberalization eras in Table 7 offers enough evidence that liberalization policies have encouraged more efficient use of resources in the Turkish banking industry. As a result, the proportion of fully-efficient banks has increased from 38 percent in 1981 to 55 percent in 1990. A high relative share of deposits and loans accruing to efficient banks in both eras is an indication of the soundness of the financial system in Turkey.

Table 7. Developments in economic efficiency

Bank Classes	1981 Number of Banks	1981 % Share of demand deposits	1981 % Share of time deposits	1981 % Share of short-term loans	1981 % Share of long-term loans	1990 Number of Banks	1990 % Share of demand deposits	1990 % Share of time deposits	1990 % Share of short-term loans	1990 % Share of long-term loans
Technically and allocatively efficient banks	15 (38%)	81	80	81	81	31 (55%)	79	81	75	86
Only technically efficient banks	8 (21%)	6	5	3	13	10 (18%)	15	14	16	12
Technically and allocatively inefficient banks	16 (41%)	13	15	16	6	15 (27%)	6	5	9	2
Total	39 (100%)	100	100	100	100	56 (100%)	100	100	100	100

Source: Author's computations.

Conclusion

Turkey's financial reform seems to have succeeded in stimulating commercial banks to take measures aimed at enhancing both technical and allocative efficiency. As a result, the number of efficient banks has increased over time. The following are the main findings of this study:

i) A comparison of efficiency scores indicates that state banks are more efficient than their private counterparts. This contradicts the thesis which asserts that public ownership is inherently less efficient, at least as far as the Turkish banking industry is concerned.

ii) Banks have undergone considerable scale adjustment and have thus succeeded in achieving optimal scale.

iii) The effect of allocative and technical inefficiencies on cost increases is different for private and state banks. While state banks are more vulnerable to allocative inefficiency, the effect of technical inefficiency on cost increases is more noticeable in the case of private banks.

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Comments

Pierre Abou Ezze

The main point argued in Osman Zaim's paper is that the 1980 liberalization of Turkey's financial markets has increased the efficiency of Turkish commercial banks.

In order to assess the effect of liberalization on efficiency, a linear program technique was used to estimate production and cost functions for representative years. Since the results show an improvement in both functions, the paper argues that financial liberalization seems to have succeeded in increasing the efficiency of commercial banks. A few comments need to be made in connection with these findings.

Initially, the methodology used is very appropriate for measuring efficiency at a given point in time. However, the use of depreciation expenditure as a measure of the cost of physical capital is somewhat problematic. Indeed, depreciation based on historical or book values actually distorts the true cost of capital in the case of banks that bought their buildings and equipment at different points in time.

In addition, using this methodology to compare production and cost at two different points in time simply indicates whether production units have become more or less efficient and nothing else. Linking this change in efficiency to factors such as market liberalization is a different matter. Osman Zaim argues that the liberalization of interest rates and new entries into the market forced banks to decrease their costs. However, the number of branches increased by only five percent and employment by only 14.9 percent over the 1981-90 period as compared with a 70 percent increase in branches and a 64 percent rise in employment during the 1972-81 period. The question that arises here is whether the slow increase is the result of financial reforms or simply the end of an overexpansion that took place in the 1970s and which led to an overbanked industry.

Also, the data show that the number of employees per branch increased for the entire banking sector as well as for private banks between 1981 and 1990. As for the number of branches per bank, while the ratio has decreased on average by about nine branches per bank in the case of private banks, it is not clear

whether this decrease has been the outcome of the closure of unprofitable branches or simply the liquidation of some banks at a time when newly-founded ones have not yet opened many branches. As for state banks, the average number of branches increased from 215 to 371 during the 1980s. Hence, it is not quite clear in Zaim's paper just how much of the increased efficiency has been the outcome of financial reforms and how much of it has resulted simply from the consolidation of the banking sector which would have taken place anyway.

Moreover, it would have been helpful to discuss the relationship between the changes in the returns to scale to an average cost curve and to indicate whether there is compatibility between returns to scale and the size of Turkish banks.

Lastly, it seems that private banks have fared better on the production side than on the cost side. While the gap between private and state banks is being narrowed in this regard, the state-to-private ratio of inefficiencies did not change between 1981 and 1990, and this is an issue that the author failed to address in his paper.

Marcel Cassard

Osman Zaim's paper is quite thought-provoking, but some remarks seem in order regarding the choice of model used to analyze the efficiency of Turkish banks. Generally, input/output models tend to measure the efficiency of banks in terms of the ratio of the volume of deposits and loans to a set of inputs, without giving weight to the quality of the loans portfolio of banks, or the concentration of loans to sectors or individuals. These models also fail to address the cost efficiency of banks, which is the spread between lending and borrowing rates; indeed, cost efficiency is an important determinant of the competitiveness of the banking system. Omitting these variables from the analysis does not provide a complete picture of the efficiency of the banking sector in Turkey.

In light of the above remarks, it is hardly surprising that the author should have reached the conclusion that state banks in Turkey are more efficient than their private counterparts. Such a conclusion is not generally supported by the experience of state banks in most countries. However, since the volume of

deposits and loans is an important determinant of efficiency, the conclusion is not surprising; indeed, it can be explained by the fact that state banks have an implicit guarantee from the government which allows them to attract more deposits as well as to make more loans, since they lend to the captive market of state enterprises. Exporters borrow heavily from state banks in Turkey because the government provides subsidies for loans targeted to exports, which again explains the higher volume of loans.

However, a closer examination of the data in Tables 1 and 2 will yield a different picture of the efficiency of state banks in Turkey. For instance, the number of branches per state bank increased from 216 in 1981 to 372 in 1990, while the number of branches per private bank has declined from 148 in 1981 to 138 in 1990. Similarly, the number of employees per state bank increased from 5,677 in 1981 to 10,103 in 1990, while the number of employees per private bank barely increased from 2,590 in 1981 to 2,726 in 1990. Nonetheless, during this period the total assets held by private and state banks remained very close. These measures hardly point to an increase in efficiency on the part of Turkish state banks.

Another conclusion of the paper is that Turkish banks have improved their allocative and technical efficiency. Although this may be true, it remains to be seen why intermediation costs are still so high in Turkey. When one examines the spread between after-tax returns on deposits and effective lending rates, which are a measure of intermediation costs, it is not clear whether or not they have declined substantially during the period under consideration. In fact, the spreads are so high that large corporations bypass local banks and borrow directly on international capital markets. Large effective spreads generally show low operational efficiency. In addition, they lead to an oversupply of banking services as well as to low productivity in making such services available on the market. It would have been interesting to see these differences in efficiency in the Turkish banking system effectively reconciled in Zaim's paper.