

# **The efficiency of the private commercial banking sector in Turkey: a managerial approach**

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## **ABSTRACT**

Turkey achieved important progress in terms of liberalization in the 1980s. During the liberalization process, various Turkish sectors opened up to international business, and the Turkish economy grew. One such sector is the banking sector in Turkey, which is considered in this article. More specifically, this article examines private sector commercial banks in Turkey in the period from 1990–2000 in which (1) the effects of the 1980s heavy liberalization process were first revealed; (2) most of the major foreign banks had entered the Turkish banking sector; (3) many national and global economic crises occurred; and (4) the economic crisis occurred at the end of the year 2000, which affected Turkey severely. This paper first explores the relative efficiency levels of the mentioned banks using conventional methods. Then, working from a managerial viewpoint, the author concludes that bank general managers are expected to raise or at least protect profitability and thus includes data for these individuals in a second analysis of the relative bank efficiency levels. The results indicate that annually, the relative efficiency of the sector has decreased overall irrespective of the inclusion of the data for general managers; foreign banks have displayed greater efficiency compared to domestic banks when financial efficiency is considered alone; domestic and foreign banks have the same efficiency level when the data for general managers are considered; and the annual relative efficiency figures for the sector demonstrate vast amounts of fluctuation during periods of economic crisis, again with or without the data for general managers.

Keywords: Commercial banks, relative efficiency, liberalization, Turkey

## **INTRODUCTION**

The word “global” means “encompassing and including the entire world”, and globalization is the process by which this occurs (Ongun, 1993). Therefore, globalization may be thought of as “the circulation of ideas, information, human beings, goods, services, and capital around the world.” However, because globalization includes a variety of different elements, including culture, art, sports and politics, among others, distinctive definitions including these different elements can also be developed. The idea of globalization has thus given rise to new concepts: the global market, global companies, global products, global managers, global culture, global politics, global workforce and global capital, among others (Turan, 1994).

In economic terms in particular, globalization can be viewed as an increased integration of economies around the world due to international trade and the movement of financial assets in the international arena. In other words, people, groups and companies in different countries are collaborating to conduct economic activities internationally. An important element of the expanded economic globalization is the process of opening national economies to the flow of international capital, which is also known as “liberalization” (Akçay & Ogretmen, 1995; Ongun, 1993). Examples of liberalization include the passage of SEC 144 A, a law that opened the bond markets in the US to foreigners in the early 1990s; the nearly simultaneous revocation of Law 65, which restricted the free access of foreigners to Japanese financial markets; and the actions taken by the European Union countries to eliminate all of the borders between them, a process that extended to the financial markets (Parasiz, 1995).

This article focuses on the liberalization processes initiated in the early 1980s in Turkey. As indicated in the next section, Turkey implemented practices that were aimed to liberalize both the financial sector and the real sector throughout the 1980s. These practices gave rise to various consequences, especially in the 1990s. Among such consequences is an increased vulnerability to economic crises that arise from both domestic and foreign sources (which in turn have a significant impact on the banking sector, the primary financial sector in Turkey). Another consequence of liberalization efforts is that foreign banks introduce more competition in Turkey. Based on all of these considerations, this article addresses the efficiency of the Turkish commercial banking sector in relation to such issues as the presence of foreign banks and the economic crises that occurred during the period investigated.

Previous studies have examined the issue of bank efficiency in Turkey and in foreign countries, as will be discussed later. However, this article differs from similar studies in three significant ways. To measure the banking efficiency, a variety of inputs and outputs must be analyzed. A review of the literature shows that three different approaches have been used to specify these inputs and outputs. This article employs an approach unlike those utilized previously in the literature, using different combinations of inputs and outputs. A review of the literature demonstrates that inputs and outputs are entirely financial and are usually based on the assets and liabilities of banks. However, this article takes into account an administrative consideration: the frequency with which banks replace their general managers. Many similar studies have assessed the performance of banks in these countries following the liberalization process, but none has examined how the relative efficiency levels of banks fluctuate during times of economic crisis. The present article also explores this fluctuation.

## **LIBERALIZATION AND BANKING EFFICIENCIES**

It is noteworthy that countries have liberalized their financial markets in recent years to achieve economic globalization. The international interactions between institutions in the financial markets have started to increase due to liberalization. One consequence of the

increased interaction is fiercer competition. This phenomenon has been observed in the banking sector, which is an important part of the financial markets. Some studies have shown that the competitiveness of banks is more important than the diversity or focus of banking activity (Berger & Humprey, 1991; Berger, Hancock, & Humprey, 1993).

Increased competition has forced banks to operate more efficiently or at least to maintain their competitive position. Studies conducted in countries undergoing the liberalization process have shown that the efficiency of banks in these countries has generally increased. For example, in the study reported by Bhattacharyya and Kumbhakar (1997), the consequence of liberalization in India was an increased banking efficiency. The study performed by Berg, Forsund, and Johnson (1991) proved that even though the efficiency of Norway's banking sector decreased due to liberalization in the short term, it increased in the long term. When Gilbert and Wilson (1998) examined the South Korean banking sector, they found that the efficiency of the sector increased until the mid-1990s because of the country's financial liberalization program.

In addition, some studies have shown that the efficiency of the banking sector has decreased following liberalization, which directly contradicts the findings of the studies mentioned in the preceding paragraph that examined countries other than Turkey. Examples of these studies include Humprey and Pulley's (1997) study of the American banking system and Griefel-Tatje and Lovell's (1996) study of the Spanish banking system.

The liberalization process in Turkey began in the 1980s following the problems of the 1970s when Turkey was unable to pay its foreign debts. This process involved numerous different steps. The Stability Resolutions passed on 24 January 1980 implemented practices that were intended to remove the restrictions on foreign trade and the flow of capital. Within the framework of these resolutions, a devaluation rate of 32.7% was established on 24 January 1980, and foreign exchange rates began to be set daily. Purchases to support agricultural products were restricted, and all of the subsidies for products other than fertilizer, energy and transportation were eliminated. Foreign capital investments were encouraged, the transfer of profits abroad was facilitated and the use of foreign contractor services was supported. Import restrictions were gradually removed and exports were encouraged via a customized system of incentives that were established by sector and tax rebates, special loans, and custom duty exemptions for import inputs for exporters that were engaged in manufacturing (Undersecretariat of the Prime Ministry for Foreign Trade, 1998).

The globalization efforts continued after the Stability Resolutions. The limits on interest rates were lifted in 1981, and trade in foreign currencies was allowed in 1984. The Istanbul Stock Exchange was founded in 1986, and in 1987, the Central Bank began to conduct open-market transactions. One of the most important steps was the complete elimination of restrictions on the flow of capital with Resolution 32 regarding the Protection of the Value of Turkish Currency, which went into effect in 1989 (Undersecretariat of the Prime Ministry for Foreign Trade, 1998).

Competition increased in Turkey's banking sector due to the liberalization policies of the 1980s. This increased competition was evidenced by the closing of low-efficiency departments at both foreign and domestic banks, the liquidation of banks that were unable to adapt to the competition, a reduction in costs and the development of a wide variety of banking services. The next paragraph begins to examine studies that have addressed the efficiency of the Turkish banking sector.

Zaim (1995) examines how the liberalization policies of the 1980s affected the efficiency of commercial banks in Turkey. Zaim (1995) uses the "intermediation approach" for this purpose. As required by the approach, amortization expenses, total interest outlays and the total number of personnel are used as the inputs, whereas the outputs are the amount

of time deposits, demand deposits and short and long-term loans. Based on these data, efficiency increased after liberalization.

Jackson, Fethi, and Inal (1998) use the Malmquist index to study the efficiency of Turkish commercial banks. The study data span the years from 1992 to 1996 and employ the “production approach”. The inputs used are the number of personnel and operational expenses, whereas the outputs are the total loans and the total amount of time deposits and demand deposits. Private commercial banks are shown to have been more efficient compared to public commercial banks during the 1994 crisis.

In their studies, Jackson and Fethi (2000) calculate the efficiency of Turkish banks using the “data envelopment analysis” method and then examine the types of variation in the calculated efficiency values that are caused by variables such as the size of the bank and the profitability. The authors conclude that relatively larger and more profitable banks have higher efficiency levels.

Denizer, Dinc, and Tarimcilar (2000) examine bank efficiency before and after liberalization. Both the “intermediation” and the “production” approaches are used with data from 1970 to 1994. Three inputs are used in the production approach: the banks’ own funds, interest expenses and personnel outlays. The outputs are commission revenue and total deposits. Later, the intermediation approach is employed, and the outputs obtained from the production approach are used as the inputs. At the same time, operational expenses are added as inputs. The outputs, in contrast, are total loans and revenues from banking activities. In the entire body of literature reviewed herein, the study of Denizer et al. (2000) is the only one to indicate that bank efficiency decreased following liberalization in Turkey.

Yildirim (1999) measures the efficiency of Turkish commercial banks in the years 1988-1996 subsequent to liberalization. Four inputs are used: time deposits, demand deposits, interest expenses and non-interest expenses. There are three outputs: interest revenues, loans and non-interest revenues. The author concluded that bank efficiency levels did not increase during the period studied.

Cingi and Tarim (2000) examine the efficiency of Turkish commercial banks using “data envelopment analysis” by combining the inputs and outputs of the intermediation and production approaches. This application is called the “mixed approach.” The inputs are total assets and total expenses, whereas the outputs include total revenues, total deposits, total loans and the ratio of non-accruing loans to total loans. The data, which encompass the years 1989-1996, reveal that private commercial banks have higher efficiency levels.

Yolalan (1996) analyzes the efficiency of the Turkish commercial banking sector using financial ratios in a study that includes the years 1988-1995. Two ratios are used as the inputs: non-interest expenses/total assets and non-accruing loans/total assets. Three ratios are used as outputs: commission revenues/total assets, current assets/total assets and (equity + net profit)/total assets. The results indicate that foreign banks are more efficient than their domestic competitors.

Sen (2006) takes government intervention into account in measuring the efficiency of the banking sector. Data envelopment analysis is used to analyze data from the years 1960-2004. Total deposits and total expenses are used as the inputs, and total profit, total revenues and total loans are used as the outputs. The efficiency of the Turkish banking sector during the selected period is found to fluctuate greatly, and a negative correlation is detected between the bank efficiency and the election periods.

Karacabey (2002) examines the efficiency of Turkish commercial banks and changes in productivity from 1997 to 2000. The study utilizes the “production” approach and selects as inputs the number of banking personnel and branches and the amount of paid capital. The outputs are total deposits and loan amounts. In this study using data envelopment analysis,

the efficiency levels of the banks are low, but during that year, the economic program that began in 2000 is found to slightly raise the efficiency levels.

In most of the studies conducted in Turkey and other countries, results have been found indicating that the efficiency of the banking sector increased after liberalization. However, one noteworthy consideration is that a significant number of studies examine only the pre-liberalization and/or post-liberalization periods. Very few studies have examined the basis of the efficiency fluctuations.

Caminal and Matutes (2002) conduct this type of study and find that when there is less competition in the banking sector, developments that create uncertainty regarding loans (political upheaval, economic crises, etc.) can inflict serious damage on the sector. As a result, the presence of a large number of banks in the sector and significant competition between banks causes the sector to become more resilient. Banks are forced to take steps to improve efficiency to survive.

Similarly, Beck, Demirguc-Kunt, and Levine (2006) claim that in countries in which the banking sector is more competitive and there are more players in the field, economic crises inflict less damage on the banking efficiency.

In studies other than those mentioned, it is seen that fluctuations in bank efficiency are generally based on competition, the number of banks and the share of foreign banks in the sector (Gonzales-Hermosillo, Pazarbasioglu, & Billings, 1996; De Nicolo, Batholomew, Zaman & Zephirin, 2003).

Some studies have argued that most of the factors that influence bank efficiency are administrative issues. An important recent study of this type is that reported by Chatterjee, Apoorva, Manoj, and Naval (2009). According to their study, the primary factor that affects bank efficiency is strategic management. Studies conducted in Turkey emphasize the importance of a bank's internal management philosophy and risk management as related to the banking efficiency (Atan, 2002; Coskun and Tarim, 2000; Ozker, 2003). From this perspective, bank efficiency is associated with administrative science.

### **Measurement of Bank Efficiencies**

A review of the studies mentioned in the previous section demonstrates that approaches with different names, including "production" and "intermediation", are used to measure the efficiency of banks. The fundamental characteristic of these approaches is which components of the banks are used by the studies to identify inputs and outputs.

In the production approach, banks are assumed to produce deposits and provide loans based on their workforce and capital. The workforce is calculated as the total number of employees and workforce costs, whereas the capital is generally viewed as fixed assets. Deposits and loans, which constitute outputs, are generally considered the total deposits and loan amounts on the balance sheet, but the total number of deposits and loan accounts can also be used (Drake, Hall, & Simper, 2005).

In the intermediation approach, banks are considered to serve as intermediaries between those who deposit and those who withdraw money. In other words, it is the function of banks to convert the deposits that they collect and other funds into loans, and this conversion process requires capital and labor. Inputs are generally composed of funds and the cost of collecting funds. Outputs, on the other hand, include loans, interest revenue and investments (Drake et al., 2005).

The third method is the "profitability" approach, in which it is assumed that the primary goal of a bank is to make a profit or to increase its profitability. Based on the need to reduce costs and boost revenues, the bank uses interest and non-interest expenses as inputs, whereas the outputs are net interest revenue and non-interest revenue (Drake et al., 2005).

The numerical measurement of efficiency begins after identifying the inputs and outputs. A review of the studies that have measured banking efficiency generally reveals that the efficiency is calculated relatively. In other words, the calculations are based on comparisons among banks or groups of banks. First, an “efficiency limit” is identified, and the author calculates the relative efficiency levels and the degree to which each business (or group of businesses) deviates from this efficiency limit (or, if a model has been established, from the model values). The amount of deviation from the efficiency limit indicates the level of inefficiency (Stavarek, 2003). The relative efficiency can be calculated using parametric or non-parametric methods.

In general, regression is the most frequently used parametric method, and models are created using regression methods such as “least squares.” These models are used to estimate the efficiency limits. Another parametric method is called the “stochastic limit” method. Because this method is parametric, a model is established using the stochastic limit method, similarly to the procedure used for the regression method. However, when the stochastic limit method is used, not only are the inputs and outputs of the business taken into consideration, but also environmental variables (such as economic data, information about competition in the sector, etc.) are added to the model (Berger & Humprey, 1997). The original model of the stochastic limit takes the following general form (Aigner, Lovell, & Schmidt, 1997):

$$Y_i = X_i\beta + (V_i - U_i) ; \quad i = 1,2,3,\dots,N \quad (1)$$

$$V_i \sim N(0, \sigma_v) \quad U_i \sim |N(0, \sigma_u)|$$

In (1), “Y” is a matrix that contains the logarithm of the production amount, whereas “X” is a matrix that contains a logarithm of the variables that affect the production amount. As will be seen in (1), “V” and “U” are random variables, but “U” cannot take a negative value. “V” stands for environmental variables. “U”, on the other hand, indicates technical inefficiency (the deviation of the technical efficiency from “1” and inability of the business to convert input to output). “β” is a vector that consists of the coefficients used to estimate the efficiency limit.

In this article, relative efficiency levels will be distributed over years and measured using data envelopment analysis, which will be explained in a later section. At this point, it is appropriate to mention a technique that utilizes the stochastic limit method but operates with panel data and creates an alternative to data envelopment analysis. For example, Battese and Coelli (1992) suggested the following model:

$$Y_{it} = X_{it}\beta + (V_{it} - U_{it}) ; i = 1,2,3,\dots,N \text{ and } t = 1,2,3,\dots,T \quad (2)$$

$$V_{it} \sim N(0, \sigma_v) \quad U_{it} = [U_i \exp(\eta(t-T))]$$

The “Y<sub>it</sub>”, “X<sub>it</sub>” and “β” are the same as in (1). The random variable “V<sub>it</sub>” symbolizes the value of environmental factors but now covers a specific period and has an average value of “zero”. The random variable “U<sub>it</sub>”, on the other hand, is different from that in (1). According to (2), the random variable “U<sub>it</sub>” is a function of the variable “U<sub>i</sub>”. Finally, “η” is a parameter used for prediction.

As shown, various parametric methods are used to determine the efficiency limit. On the other hand, the literature review has revealed that the non-parametric data envelopment analysis (DEA) method is generally superior in handling the relative efficiency. The fundamental DEA model is as follows (Charnes, Cooper, & Rhodes, 1978):

$$\text{highest } h_o = \frac{\sum_{r=1}^s u_r y_{r0}}{\sum_{i=1}^m v_i x_{i0}} \quad (3)$$

$$\frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1 \quad i = 1, 2, \dots, m; \quad j = 1, 2, \dots, n; \quad r = 1, 2, \dots, s; \quad u_r, v_i \geq 0$$

In (3), “ $y_{rj}$ ” and “ $x_{ij}$ ” indicate the outputs and inputs of  $j$  decision-making unit (for example, the business). On the other hand, “ $u_r$ ” and “ $v_i$ ”, represent the weight that will be assigned to the output and input and cannot be negative values. Finally, “ $h_o$ ” indicates the efficiency of the relevant decision-making unit. In (3), there are a total of “ $n$ ” decision-making units, and the totals of the weighted output and input ratios are used. As a result, efficiency is considered in a relative fashion. In summary, in considering the total ratio of outputs and inputs calculated for all of the decision-making units in a weighted fashion, the research focuses on the highest level of efficiency (whereas when inputs are considered alone, the focus is the highest output).

Thus, the model in (3) is aimed at maximizing the output. However, efficiency is related to both outputs and inputs, and there is a popular model in the literature that aims to maintain inputs at the lowest level (input minimization) (Banker, Charnes, & Cooper, 1984). In addition, a variety of customized DEA models are specific to this issue (Emrouznejad, 2001).

Studies that deal with bank efficiency often measure the relative efficiency. However, another method, “ratio analysis,” can be used to calculate efficiency and to draw comparisons between banks. In the ratio analysis, a ratio is calculated based on an input and an output. The ratios that are calculated can be used to perform the following comparisons: among different periods for the same bank, among several banks during the same period and among several banks during different periods. The ratios that can be used for the ratio analysis are divided into four groups (Akdogan & Tenker, 2005):

- Liquidity ratios: Ratios that indicate the ability of the business to pay short-term debt and therefore its ability to convert assets to cash and similar instruments in the short term.
- Leverage ratios: Ratios that indicate the degree to which a business is financed by debt and therefore the degree of risk posed by the business due to debt.
- Operational ratios: Ratios that indicate the efficient usage of business assets.
- Profitability ratios: Ratios that indicate the ability of a business to generate profit.

## METHODOLOGY

### Purpose of the Research

Only private commercial banks are considered in the present research. The reason for this strategy is the assumption that there is intense competition in the private commercial banking sector and that the relationship of each bank with the government is equivalent. In other words, it is thought that private commercial banks were influenced less by politics during this period and, even more importantly, that their actions exhibit a commercial logic. In view of this consideration, one might claim that the examined group was homogenous.

If Turkey is becoming more economically liberal, this phenomenon should be evident in the banking sector, which is one of the leading financial sectors. To understand the liberal nature of the banking sector, one must examine the number of foreign institutions that enter the sector and the amount of foreign capital that enters or exits the sector. Another indicator could be the degree to which the sector efficiency is influenced by domestic and global economic developments.

It is assumed that an economic crisis will impact the sector strongly and quickly, and as a result, it will be very relevant to the sector. Economic crises in Turkey are expected to affect the efficiency of the sector. If Turkey has become more liberal economically, the efficiency of the sector should fluctuate significantly during periods of global economic crisis. Therefore, one issue that we will examine is how the efficiency of the sector varies during periods of domestic and global economic crisis. Therefore, this study will seek to answer the following question:

1. How has the efficiency of private commercial banks in Turkey changed during periods of economic crisis, both domestic and foreign?

Foreign banks are present in the sector and most of them entered Turkey in the early 1990s. If it is assumed that these banks have more international banking experience than do their domestic rivals and that the economic crises that have occurred in different countries have provided them with experience in handling such crises, one will expect private foreign commercial banks to be more efficient compared to their domestic rivals during the examined period. The second question arises naturally from this expectation:

2. Are foreign banks in Turkey's private commercial banking sector more efficient compared to domestic banks?

A significant number of studies on the Turkish banking sector have demonstrated that bank efficiency increased after the liberalization process in the 1980s. In the present study, this same issue is of interest:

3. Did the efficiency of the Turkish private commercial banking sector increase following the process of liberalization in the 1980s?

Therefore, the purpose of this research is to answer the three aforementioned questions.

### Measuring Instruments and Variables

To address the abovementioned questions, it is necessary to indicate the inputs and outputs that will be used to evaluate efficiency. As previously mentioned, there are three

approaches to identifying inputs and outputs in the literature: production, intermediation and profitability.

This study considers primarily the costs incurred by banks to survive. For a bank to survive in the sector, it must collect funds and put these funds to use, thus generating a certain amount of profit. In the intermediation approach, the issues that must be taken into consideration are the monetary value of the funds collected and the cost of collecting these funds. Therefore, it seems appropriate to use interest expenses as one of the inputs. On the other hand, even if a bank collects no funds, it will still incur costs that are associated with its continuing operations. For this reason, non-interest expenses are also used as an input. Consequently, in this study, it is not the funds collected and the assets owned that are important but rather the cost of obtaining these funds and preserving and using the assets.

This study uses net profit as an output. There are costs associated with maintaining an operational bank, and therefore, the bank must receive some benefit for incurring this cost. This benefit is viewed as the net profit.

In summary, this study first considers the efficiency of banks in creating a net profit given the costs that they have incurred to remain operational. In other words, it examines the minimization of expenses in comparison with the net profit. Banks that are able to generate more or the same amount of profit with fewer total costs are more efficient.

As previously expressed, the literature features three primary combinations of input-output to calculate the relative efficiency of banks. The input-output combinations used in the present study, however, differ from those described in the literature.

Another issue addressed in the present study is related to the general managers of banks. It is expected that general managers influence almost all of the decisions related to their banks. Therefore, general managers influence the decisions that determine the net profit and the bank expenses. Essentially, this study examines the efficiencies of banks in generating a net profit from the costs that they incur to maintain operations, and these efficiency levels are expected to be linked with the activity of the bank's general manager.

Based on the idea set forth in the preceding paragraph, it has been deemed appropriate to include the general managers of the banks in this study. No study in the literature addressing the relative bank efficiency using DEA has ever included managers in the analysis, and therefore, no other study can serve as a template for this research. Therefore, the issue of how general managers will be included in the present research must be addressed.

The most logical approach in terms of both data collection and putting the data in a form that is suitable for DEA is to consider whether the general manager has been replaced. General managers are hired to ensure that banks function more efficiently and productively, and therefore, it is reasonable to view general managers as individual inputs for banks.

The author of this article has acted in accordance with this reasoning and included general managers in the analysis according to the steps indicated below:

- The private commercial banks included herein were divided into two groups: domestic and foreign.
- For each year included in the research, the author determined the number of banks in these two groups that replaced their general managers.
- The numbers calculated in the previous step were included into the research.

This study covered the years 1990-2000 for several reasons as explained below:

- The study includes foreign commercial deposit banks, and the vast majority of these banks entered the Turkish market in the early 1990s.
- Much of the data for the 1980s was unavailable.

- The crisis that occurred in Turkey in 2001 resulted in extreme data points that would render the results of the bank data analysis meaningless. The inclusion of extreme values in the DEA can cause significant deviations in the relative efficiency.
- Since 2002, the financial data for banks have been prepared in a manner that adjusts for inflation; they were not prepared on a historical basis as observed in previous years. Therefore, the data obtained prior to 2002 were generated in a different manner compared to those after 2002.

A portion of the data for the period addressed in this study were ready to use. However, the author had to calculate the number of banks that had replaced their general managers. Table 1 (Appendix) was created by the author and shows the number of banks that replaced their general managers in any given year based on the historical data (Turkish Banks Association, 2010b), provided by the Turkish Banks Association.

A number of issues were taken into consideration in formulating Table 1:

- The status of some of the banks during the period in question changed. (For example, a bank that was domestic during one year was sold to foreigners in the following year). The website for the Banks Association of Turkey was used to research these changes (Turkish Banks Association, 2010a) and each bank was individually checked to determine whether it was foreign or domestic during the period assessed.
- This evaluation was also performed to determine whether the considered banks had become a part of the Savings Deposit Insurance Fund.
- There are no participation banks (banks that operate according to Islamic rules) in Table 1 because participation banks don't have accounts such as interest expenses and non-interest expenses.

Of course, one of the variables that will be used in this study is “the number of banks that have replaced their general managers.” The other variables that will be used in this study and their variables are provided in Table 2 (Appendix) (Turkish Banks Association, 2009).

There are a number of reasons for using US dollars in Table 2:

- Foreign banks are included in the analysis. Therefore, it seems logical to employ a currency that is used commonly in the international arena.
- In the 1990s, inflation and interest rates in Turkey fluctuated greatly. In addition, the economic crises resulted in sudden devaluations. For these reasons, it would have been difficult to use the domestic currency.

Data envelopment analysis was used as the measurement instrument. The calculations were performed using the “Frontier Analyst Professional” program downloaded from <http://www.banxia.com>.

## **Findings**

The findings are explained in two different ways. First, only inputs and net profit (and consequently, relative efficiency levels that include only financial data) are presented. Next, the administrative perspective is added to the financial data so that the number of banks that have replaced their general managers can be added as a variable.

### **Findings that Result from Considering Financial Data Alone**

First, the data were combined so that domestic and foreign private commercial banks were considered together. These banks, with the exception of the participation banks,

constitute the private Turkish commercial banking sector. This study is interested in the efficiency of the sector in the years 1990-2000. Data envelopment analysis was conducted, and the resulting data are provided in Table 3 (Appendix).

When the efficiency percentages are graphed based on the years indicated in Table 3, it is concluded that the efficiency of the sector does not increase when all of the years are taken into consideration, as indicated in Figure 1 (Appendix).

As shown in Figure 1, the relative efficiency of the sector fell significantly in 2000 with the onset of the economic crisis, which brought the sector to its lowest level of relative efficiency for the 10-year period. When the entire period is considered, the efficiency level of the sector did not increase.

As indicated earlier, this study is trying to answer the question of whether the efficiency of the private Turkish commercial banking sector increased after the liberalization process during the 1980s. We found that the efficiency of the private Turkish commercial banking sector did not increase annually during the period in question after the liberalization process of the 1980s.

When the data that were influenced by the economic crisis that occurred in Turkey in 2000 are removed from the calculations, the results shown in Figure 2 (Appendix) are obtained.

Based on Figure 2, the relative efficiency of the sector appears to have increased from 1990 to 1999. The reasons for the significant decline in efficiency in 2000 with the onset of the economic crisis may include increased costs associated with high interest rates and the inability of banks to obtain funds even at these high costs.

These data show that the relative efficiency of the private Turkish commercial banking sector did not increase in the years 1990-2000. Another issue of interest was the efficiency of the sector during periods of domestic and foreign economic crises. Table 4 (Appendix) details the economic crises that occurred during the years 1990-2000 and indicates the percent by which the relative efficiency of the sector changed compared with the previous year.

According to Table 4, significant changes occurred in the efficiency levels of the sector during the years marked by global economic crisis. During the 1992 crisis, the efficiency fell by approximately 10% compared to the previous year. During the Asian crisis of 1997, the efficiency also fell by approximately 10%. The efficiency of the sector during the Russian crisis (1998) and the Brazilian crisis (1999) increased by approximately 3.5% and 7%, respectively, as compared to the previous year. The efficiency ratios in 1994, which included both a domestic crisis and the Mexican crisis, fell by approximately 21%. These figures demonstrate that the efficiency of the sector fluctuated not only during domestic economic crises but also during global economic crises.

One question that the present study attempted to answer is related to how the efficiency of private commercial banks in Turkey changed during periods of domestic and foreign economic crisis. According to the results obtained, the relative efficiency of the sector generally declined during these crises.

One interesting point is that during the Russian and Brazilian crises, the relative efficiency of the sector increased. There may be a variety of explanations for this increase, and although this study does not examine those possibilities, it is worth noting that whereas the sector experienced an efficiency loss of almost 10% during the Asian crisis, the efficiency levels increased 10% during the Russian and Brazilian crises.

Finally, the relative efficiency levels for the entire 1990-2000 period were calculated for domestic and foreign private commercial banks. In previous calculations, each year has comprised a decision unit. In other words, the relative efficiency levels were measured according to years. On the other hand, a comparison between domestic and foreign banks

required that the relative efficiency measurements had to be made according to the distinction of banks, and thus, the decision units were not years but rather domestic and foreign private commercial banks. Consequently, the efficiency levels were calculated not according to years but instead according to whether the bank was foreign or domestic.

The purpose of this calculation is to answer another question that was addressed by the study: are foreign banks in the private Turkish commercial banking sector more efficient than domestic banks? The results relevant to this question are indicated in Table 5 (Appendix).

According to the results shown in Table 5, when all of the years from 1990-2000 are taken into consideration, private foreign commercial banks emerge as more efficient than domestic banks.

When the results are considered together, one can see that during the 1990-1999 period, the relative efficiency of the Turkish private commercial banking sector demonstrated an upward trend. However, it also experienced a very significant decline in 2000, and the efficiency in fact declined during the entire 1990-2000 period. Additionally, the efficiency of the sector fluctuated significantly during the years that were affected by domestic or foreign economic crises, and foreign private commercial banks were more efficient as a whole compared to their domestic rivals during the 1990-2000 period.

### **Findings that Consider not only Financial Data but also the Number of Banks that Replaced their General Managers**

The previous section presented an analysis of the relative efficiency based solely on interest expenses, non-interest expenses and net profit. This section, however, details the results obtained by adding the number of banks that replaced their general managers each year.

The underlying logic, as partially explained earlier, is as follows. This study has only one output: the net profit. Therefore, the other considered criteria are assumed to affect net profit. Just as a bank expects a profit in return for incurred costs, the general managers of banks can be expected to be effective with respect to either increasing the profitability or at least maintaining it. Therefore, general managers who are not viewed as making a sufficient contribution to the bank profitability will be replaced. In short, banks assume a number of expenses for a new general manager (in terms of salary, benefits, etc.) when they choose to hire him/her. In return for incurring the costs associated with this hire, the bank expects that the general manager will contribute to profitability. When all of these factors are combined, the number of times a bank has replaced its general manager or the number of banks that have replaced general managers during a certain period can be considered to correlate with the efficiency and perceived as an input in the form of the newly hired general manager.

The relative efficiency levels throughout the entire sector were calculated based on this logic, the results are presented in Table 6 (Appendix).

The data presented in Table 6 must be compared with those in Table 3. There was no significant difference between the results obtained using only financial data and those determined by combining these data with the number of banks that replaced their general managers each year. The issues of interest are indicated in Table 7 (Appendix):

- When the replacement of general managers is taken into consideration, the relative performance of the sector appears to be better for almost every year assessed.
- According to the data set, including general manager replacements, in 1997 (the year of the Asian crisis), the sector operated at full efficiency. In contrast, the relative efficiency

during this same year was lower than the “full efficiency” according to the calculations that were generated using solely financial data.

Figure 1 shows a graphic that demonstrates the relative efficiency levels within the sector calculated solely based on financial data. Figure 3 (Appendix) provides a similar graphic but includes data regarding general manager replacements.

One question that this study sought to answer was whether the efficiency of the private Turkish commercial banking sector increased following the liberalization process of the 1980s. Even when general manager replacements are taken into consideration, the relative efficiency of the private Turkish commercial banking sector did not increase during the period based on the trend shown in Figure 3.

As previously expressed, the present study sought to answer three questions. One of these questions is related to the general trends in efficiency in the private Turkish commercial banking sector in the years 1990-2000. Regardless of whether only financial data were used or whether these data were combined with information concerning the number of banks that replaced their general managers, the relative efficiency within the sector declined in the years 1990-2000.

The general trend is shown in Figure 2, in which the year 2000 is excluded. The same trend is evident in Figure 4 (Appendix), in which the calculations accounted for the number of banks that replaced their general managers. The impact of the economic crisis that occurred in November 2000 is not included in Figure 4.

When Figures 2 and 4 are compared, two similar increasing trends emerge. In other words, when only financial data are taken into account or when the number of banks that replaced their general managers is added to the equation, the efficiency of the sector appears to increase from 1990 to 1999.

Another question that this study sought to answer concerns the fluctuation in the efficiency of the sector during the years of economic crises. The fluctuations shown in Table 4 were demonstrated with relative efficiency levels that were calculated using only expenses and net profit. Table 8 (Appendix), however, provides results that address the same issue using relative efficiency levels based on calculations that account for the data related to the replacement of general managers.

Table 8 shows that the relative efficiency levels within the sector fluctuated significantly during years with economic crises. In general, one could conclude that the relative efficiency levels declined annually during years of economic crisis and that the efficiency levels increased or at least remained constant during years without an economic crisis.

Table 9 (Appendix) shows a comparison of the approach employed to consider only financial data on efficiency fluctuations and the approach that also includes the general manager replacement data.

According to Table 9, when the number of banks that have replaced their general managers is taken into account, there appears to be less fluctuation in the efficiency of the sector during economic crises. When the number of banks that replaced their general managers is considered, the sector generally displays less inefficiency during the years in which an economic crisis occurred. (A comparison of the negative values in Table 9 was performed by year). On the other hand, when the relative efficiency levels are calculated solely using financial data, it is observed that the sector recovered more rapidly during the years following an economic crisis. (A comparison of the positive values in Table 9 was performed by year).

The third and final question to be answered concerns the group of banks (domestic or foreign) that was more efficient. To address this question, the number of banks that replaced

their general managers was taken into consideration. According to Table 10 (Appendix), both foreign and domestic banks were completely efficient.

In Table 5, the same issue is addressed using the relative efficiency figures, which were calculated by considering only financial data. A comparison of Tables 5 and 10 demonstrates that if one follows the logic stating that “the number of banks that replaces their general managers is related to the efficiency of the banks” and if these numbers are added to the analysis, private domestic commercial banks are as efficient as foreign banks. However, viewed purely from a financial standpoint, foreign banks are more efficient than are their domestic counterparts.

## CONCLUSION

At present, one important business performance indicator is “efficiency”. The ability to operate more efficiently is important to achieve competitiveness, profitability and growth. However, efficiency may not be solely related to management. A number of different components, such as the sector in which the business operates, the economy and the political environment, are related in various ways to the business efficiency.

In the present study, it was assumed that such a relationship could be identified. The efficiency of the banks considered herein is considered to be related to the liberalization process that occurred in Turkey. Liberalization allowed foreign banks to enter the sector, and therefore, the efficiency of the sector could be expected to increase. Unfortunately, however, in the considered period, the sector demonstrated a downward trend. Moreover, when only financial data were used and even when the number of banks that had replaced their general managers was added to the data set, the declining trend was maintained.

Liberalization has opened Turkish financial markets to the outside world. The present study considered this issue as well by examining how the efficiency of the sector fluctuated in years of both domestic and foreign economic crises. The efficiency of the sector generally declined during years of economic crises and rose in years without a crisis. One important point is that when the data related to administrative considerations were added to the financial data, the efficiency of the sector showed a less severe decrease during years of economic crisis and a greater increase in efficiency during the years without a crisis. In short, when the administrative component is added to the efficiency analysis, crises appear to have a diminished impact on the sector, which demonstrates a more rapid ability to regain efficiency.

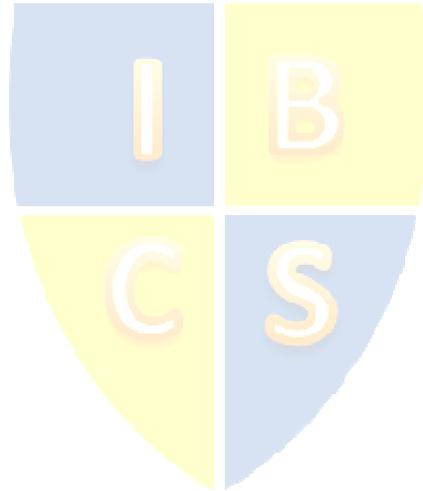
Another important facet of the present study was the comparison between foreign and domestic banks in terms of efficiency. With respect to only financial data, foreign banks were found to be more effective than domestic banks. However, when the administrative variable was taken into consideration, the efficiency of foreign and domestic banks was equivalent; both operated at “full” efficiency.

A number of suggestions can be proposed for similar, future studies based on the conclusions determined thus far. It has been previously noted that three primary approaches have been used in the literature to combine input-output factors to calculate the relative efficiency. A different logic filter could be used in future studies, similarly to that used in the present study, and different input-output combinations could be evaluated. In calculations of the relative efficiency, a variety of administrative data points could be used (as performed in the present study) in addition to financial data.

The best approach for a more advanced analysis would consider the numerous factors that impact efficiency. Future studies could examine the internal and external environmental factors that are associated with business efficiency by conducting a variety of preliminary

analyses. A “customized” data envelopment analysis formula could then be generated that would contain numerous variables and account for these connections.

As previously demonstrated, there is a need for perspectives that extend the general understanding to assess the efficiency of banks in the literature and that consider different factors, which may be related to the relative efficiency. Future studies should attempt to meet this need.

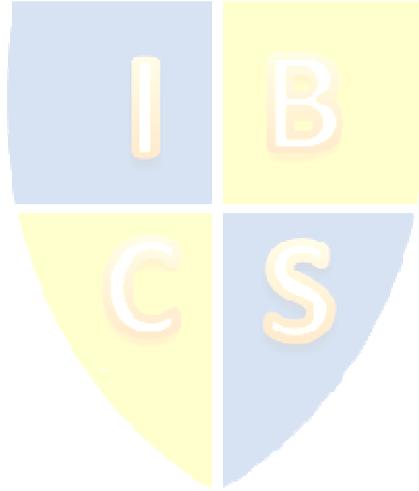


## REFERENCES

- Aigner, D.J., Lovell, C.A.K. and Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6, 21–37.
- Akcay, B., & Ogretmen, E. (1995). Finansal liberalizasyon ve Türkiye'de mali piyasalar [Financial liberalization and financial markets in turkey]. *Banka ve Ekonomik Yorumlar Dergisi*, 32, 43–57.
- Akdogan, N., & Tenker, N. (2005). *Finansal Tablolar ve Mali Analiz Teknikleri [Financial Tables and Financial Analysis Techniques]*. Ankara: Gazi Publications, pp. 610-646.
- Atan, M. (2002). Risk yönetimi ve Türk bankacılık sektöründe bir uygulama [Risk management and an application in Turkish banking sector]. PhD. Dissertation, Gazi University, Turkey, Retrieved from The Council of Higher Education National Theses Database, <http://tez2.yok.gov.tr>. (Access 2010, February 12).
- Banker, R.D., Charnes, A., & Cooper, W.W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science*, 30(9), 1078–1092.
- Battese, G.E., & Coelli, T.J. (1992). Frontier production functions, technical efficiency and panel data: With application to paddy farmers in India. *Journal of Productivity Analysis*, 3, 153–169.
- Beck, T., Demirguc-Kunt, A., & Levine, R. (2006). Bank concentration, competition and crises: First results. *Journal of Banking and Finance*, 30(5), 1581–1603.
- Berg, S.A., Forsund, F., & Johnson, E. (1991). Technical efficiency of Norwegian banks: A nonparametric approach to efficiency measurement. *Journal of Productivity Analysis*, 2, 127–142.
- Berger, A.N., & Humphrey, D.B. (1991). The dominance of inefficiencies over scale and product mix economies in banking. *Journal of Monetary Economics*, 28, 117–148.
- Berger, A.N., Hancock, D., & Humphrey, D.B. (1993). Bank efficiency derived from the profit function. *Journal of Banking and Finance*, 17, 317–347.
- Berger, A.N., & Humphrey, D. (1997). Efficiency of financial institutions: International survey and directions for future research. *Wharton School, Financial Institutions Center, Working Paper*, no. 97–105.
- Bhattacharyya, A., & Kumbhakar, S.C. (1997). Changes in economic regime and productivity growth: A study of Indian public sector banks source. *Journal of Comparative Economics*. 25(2), 196–201.
- Caminal, R., & Matutes, C. (2002). Market power and banking failures. *International Journal of Industrial Organization*, 20, 1341–1361.
- Charnes, A., Cooper, W.W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2, 429–444.
- Chatterjee, R.N., Apoorva, S., Manoj, P., & Naval, B. (2009). Strategic management and its impact on organizational effectiveness: A study in banks. *Advances in Management*. 2(9), 34–47.
- Cingi, S., & Tarim, A. (2000). Türk banka sisteminde performans ölçümü: DEA malmquist TFP endeksi uygulaması [Performance measurement in Turkish banking system: DEA malmquist TFP index application]. *Turkish Banks Association Research Proceedings Series*, Turkey, no. 2000–2.
- Coskun, Y.S., & Balatan, Z. (2009). Küresel mali krizin bankacılık sektörüne etkileri ve Türk bankacılık sektörünün veri zarflama analizi ile bilançoya dayalı mali etkinlik analizi [The effects of global financial crisis on banking sector and the financial efficiency analysis of the Turkish banking sector based on balance sheet by data

- envelopment analysis]. In *Proceedings of the 12<sup>th</sup> Economics Students Congress. 7–8 May 2009, Izmir-Turkey*.
- De Nicolo, G., Batholomew, P., Zaman, J., & Zephirin, M. (2003). Bank consolidation, conglomeration and internationalization: Trends and implications for financial risk. *IMF Working Paper Series*, no. 03/158.
- Denizer, C.A., Dinc, M., & Tarimcilar, M.(2000). The impact of financial liberalisation on the efficiency of the Turkish banking system: A two-stage DEA application. *Turkish Banks Association Research Proceedings Series, Turkey*, no. 2000–2.
- Drake, L., Hall, M.J.B., & Simper, R. (2005). Bank modelling methodologies: A comparative non-parametric analysis of efficiency in the Japanese banking sector. *Journal of International Financial Markets, Institutions and Money*, 19(1), 1–15.
- Emrouznejad, A. (2001). Encyclopedia of DEA Models. <http://www.deazone.com/models/index.htm>. (Accessed 2010, April 19).
- Gilbert, R.A., & Wilson, P.W. (1998). Effects of deregulation on the productivity of Korean banks. *Journal of Economics and Business*, 50, 133–166.
- Gonzales-Hermosillo, B., Pazarbasioglu, C., & Billings, R. (1996). Banking system fragility: Likelihood versus timing of failure – an application to the Mexican financial crisis. *IMF Working Paper Series*, no. 96/142.
- Griefel-Tatje, E., & Lovell, C.A.K. (1996). Deregulation and productivity decline: The case of Spanish savings banks. *European Economic Review*, 40(6), 1281–1303.
- Humprey, D.B., & Pulley, L.B. (1997). Banks' responses to deregulation: Profits, technology and efficiency. *Journal of Money, Credit and Banking*, 29(1), 73–93.
- Jackson, P.M., Fethi, M.D., & Inal, G. (1998). Efficiency and Productivity Growth in Turkish Commercial Banking Sector: A Non-parametric Approach. <http://www.le.ac.uk/ulmc/epu/dpno1.html>. (Accessed 2010, April 23).
- Jackson, P.M., & Fethi, M.D. (2000). Evaluating the Technical Efficiency of Turkish Commercial Banks: An application of DEA and Tobit Analysis. <http://www.le.ac.uk/ulmc/epu/dpno5.html>. (Accessed 2010, April 25).
- Karacabey, A.A. (2002). Türk bankalarındaki üretim değişiklikleri ve nedenleri [The changes in the production of Turkish banks and the reasons]. *Ankara University Social Research Center Publications, Turkey*, Research paper no. 42.
- Ongun, M.T. (1993). Finansal globalleşme [Financial globalisation]. *Ekonomik Yaklaşım Dergisi*, 4, 34–44.
- Ozker, A.N. (2003). Türk mali sisteminde 1990 sonrası finansal kontrol araçlarının yeri ve etkinliği [The use and efficiency of financial control instruments after 1990 in Turkish financial system]. *Journal of Balikesir University Social Sciences Institute*, 6(9), 111–141.
- Parasiz, I. (1995). *Kriz Ekonomisi [Crisis Economy]*. Bursa: Ezgi Publications.
- Stavarek, D. (2003). Banking efficiency in visegrad countries before joining the European union. *European Review of Economics and Finance*, 3(3), 26–38.
- Sen, S.A. (2006). Bankacılık sektörü ve devlet müdahaleleri: politik devresel dalgalanmalar çerçevesinde Türk bankacılık sektörü etkinlik analizi [Banking sector and government interventions: Efficiency analysis of Turkish banking sector within the frame of political seasonal fluctuations]. *Sosyo-Ekonomi*, 2, 11–30.
- Turan, K. (1994). Küreselleşen çağımız ve çalışma hayatı [Our globalising era and work life]. *Kamu-İş Dergisi*, 3(3), 1–10.
- Turkish Banks Association, Data Query System (2009). [http://www.tbb.org.tr/tr/Banka\\_ve\\_Sektor\\_Bilgileri/bbts.aspx](http://www.tbb.org.tr/tr/Banka_ve_Sektor_Bilgileri/bbts.aspx). (Access 2010, January 18).

- Turkish Banks Association (2010a). Bank and Sector Data: Banks' Data. [http://www.tbb.org.tr/tr/Banka\\_ve\\_Sektor\\_Bilgileri/Banka\\_Listesi.aspx](http://www.tbb.org.tr/tr/Banka_ve_Sektor_Bilgileri/Banka_Listesi.aspx). (Accessed 2010, January 24).
- Turkish Banks Association (2010b). Bank and Sector Data: Historical Data. [http://www.tbb.org.tr/tr/Banka\\_ve\\_Sektor\\_Bilgileri/Tarihsel\\_Bilgiler.aspx](http://www.tbb.org.tr/tr/Banka_ve_Sektor_Bilgileri/Tarihsel_Bilgiler.aspx). (Accessed 2010, January 24).
- Undersecretariat of the Prime Ministry for Foreign Trade (1998). 1980 Sonrası Ekonomik Politikalar ve Dış Ticaret Politikası [Economic Policies and Foreign Trade Policy after 1980]. <http://www.dtm.gov.tr/Ekonomi/75yilbk/1980so.htm>. (Accessed 2010, June 20).
- Yildirim, C. (1999). Liberalisation Before Stabilisation: Policy and Performance In Turkish Banking. Ph.D. Dissertation, University of Lancaster.
- Yolalan, R. (1996). Türk bankacılık sektörü için görel mali performans ölçümü [Relative financial performance measurement for Turkish banking sector]. *Turkish Banks Association Bankers Journal*, 19, 35–40.
- Zaim, O. (1995). The effect of financial liberalization on the efficiency of Turkish commercial banks. *Applied Financial Economics*, 5, 275–294.



**APPENDIX**

Table 1. Number of Domestic and Foreign Private Commercial Banks that Replaced Their General Managers from 1990 to 2000 by Year

Year	Number of Domestic Private Commercial Banks that have Replaced the General Managers	Number of Foreign Private Commercial Banks that have Replaced the General Managers	Total
1990	6	10	16
1991	5	4	9
1992	6	2	8
1993	7	3	10
1994	4	2	6
1995	6	1	7
1996	3	8	11
1997	5	1	6
1998	9	5	14
1999	7	4	11
2000	6	3	9

Table 2. Data on Interest and Profit for Domestic and Foreign Private Commercial Banks from 1990 to 2000

Years	(Million \$)	Private Domestic Capital Commercial Banks	Private Foreign Capital Commercial Banks	Total
2000	Interest Expenses	7353	1165	8518
	Non-Interest Expenses	4505	657	5162
	Net Profit	787	51	838
1999	Interest Expenses	9371	947	10318
	Non-Interest Expenses	3161	356	3517
	Net Profit	2853	410	3263
1998	Interest Expenses	8914	746	9660
	Non-Interest Expenses	3237	298	3535
	Net Profit	2708	288	2996
1997	Interest Expenses	7006	500	7506
	Non-Interest Expenses	2218	186	2404
	Net Profit	1818	196	2014
1996	Interest Expenses	5657	305	5962
	Non-Interest Expenses	2021	140	2161

	Net Profit	1846	124	1970
1995	Interest Expenses	4318	209	4527
	Non-Interest Expenses	1777	123	1900
	Net Profit	1496	113	1609
1994	Interest Expenses	3897	168	4065
	Non-Interest Expenses	1336	124	1460
	Net Profit	758	156	914
1993	Interest Expenses	3717	154	3871
	Non-Interest Expenses	1774	118	1892
	Net Profit	1083	108	1191
1992	Interest Expenses	3890	196	4086
	Non-Interest Expenses	1655	136	1791
	Net Profit	714	138	852
1991	Interest Expenses	3679	234	3913
	Non-Interest Expenses	1511	121	1632
	Net Profit	804	98	902
1990	Interest Expenses	3501	189	3690
	Non-Interest Expenses	1544	103	1647
	Net Profit	714	44	758

Table 3. Levels of Relative Efficiency in the Private Turkish Commercial Banking Sector from 1990 to 2000

Years	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Degree of Efficiency	57.80	65.07	58.67	86.57	68.50	100	100	90.30	93.43	100	27.68

Table 4. Changes in Relative Efficiency of the Private Turkish Commercial Banking Sector from 1990 to 2000

Years	Global Economic Crises	Domestic Economic Crises	Degree of Efficiency	Percentage of Change in the Level of Efficiency Compared with the Previous Year (%)
1990	-	-	57.8	-
1991	-	-	65.07	12.58

1992	European Exchange Rate Mechanism (ERM) Crisis	-	58.67	-9.84
1993	-	-	86.57	47.55
1994	Mexican Crisis	'94 Crisis	68.5	-20.87
1995	-	-	100	45.99
1996	-	-	100	0.00
1997	Asian Crisis	-	90.3	-9.70
1998	Russian Crisis	-	93.43	3.47
1999	Brazilian Crisis	-	100	7.03
2000	-	November 2000 Crisis	27.68	-72.32

Table 5. Relative Efficiencies of Domestic and Foreign Private Commercial Banks from 1990 to 2000

	Level of Efficiency
Private foreign commercial banks	100
Private domestic commercial banks	86.19

Table 6. The Relative Levels of Efficiency in the Private Turkish Commercial Banking Sector Considering the Number of Banks that Replaced their General Managers from 1990 to 2000

Years	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Degree of Efficiency	57.80	65.10	58.70	86.60	68.80	100	100	100	94	100	31.30

Table 7. Relative Efficiency Levels in the Private Turkish Commercial Banking Sector Calculated on an Annual Basis with and without Data Related to the Replacement of General Managers

Years	Relative Efficiency when General Manager Replacements are Considered	Relative Efficiency when General Manager Replacements are not Considered
1990	57.80	57.80
1991	65.10	65.07
1992	58.70	58.67
1993	86.60	86.57
1994	68.80	68.50
1995	100	100
1996	100	100
1997	100	90.30
1998	94	93.43
1999	100	100
2000	31.30	27.68

Table 8. Changes in Relative Efficiency in the Private Turkish Commercial Banking Sector from 1990 to 2000 (Including Data for General Manager Replacements)

Years	Global Economic Crises	Domestic Economic Crises	Degree of Efficiency	Percentage of Change in the Level of Efficiency Compared with the Previous Year (%)
1990	-	-	57.80	-
1991	-	-	65.10	12.63
1992	European Exchange Rate Mechanism (ERM) Crisis	-	58.70	-9.83
1993	-	-	86.60	47.53
1994	Mexican Crisis	'94 Crisis	68.80	-20.55
1995	-	-	100	45.35
1996	-	-	100	0.00
1997	Asian Crisis	-	100	0.00
1998	Russian Crisis	-	94	-6.00
1999	Brazilian Crisis	-	100	6.38
2000	-	November 2000 Crisis	31.30	-68.70

Table 9. Fluctuations in Relative Efficiency Levels for the Sector Calculated on an Annual Basis With and Without Data Related to the Replacement of General Managers

Years	Global Economic Crises	Domestic Economic Crises	Annual Percentage (%) Change in the Level of Efficiency Using an Approach that does not Include General Manager Replacement Data	Annual Percentage (%) Change in the Level of Efficiency Using an Approach that Includes General Manager Replacement Data
1990	-	-	-	-
1991	-	-	12.58	12.63
1992	European Exchange Rate Mechanism (ERM) Crisis	-	-9.84	-9.83
1993	-	-	47.55	47.53
1994	Mexican Crisis	'94 Crisis	-20.87	-20.55
1995	-	-	45.99	45.35
1996	-	-	0.00	0.00
1997	Asian Crisis	-	-9.70	0.00
1998	Russian Crisis	-	3.47	-6.00
1999	Brazilian Crisis	-	7.03	6.38
2000	-	November 2000 Crisis	-72.32	-68.70

Table 10. Relative Efficiency Levels of Domestic and Foreign Private Commercial Banks from 1990 to 2000 (Including the Number of Banks that Replaced Their General Managers)

	Level of Efficiency
Private foreign commercial banks	100
Private domestic commercial banks	100

Figure 1. Levels of Relative Efficiency of the Private Turkish Commercial Banking Sector from 1990 to 2000

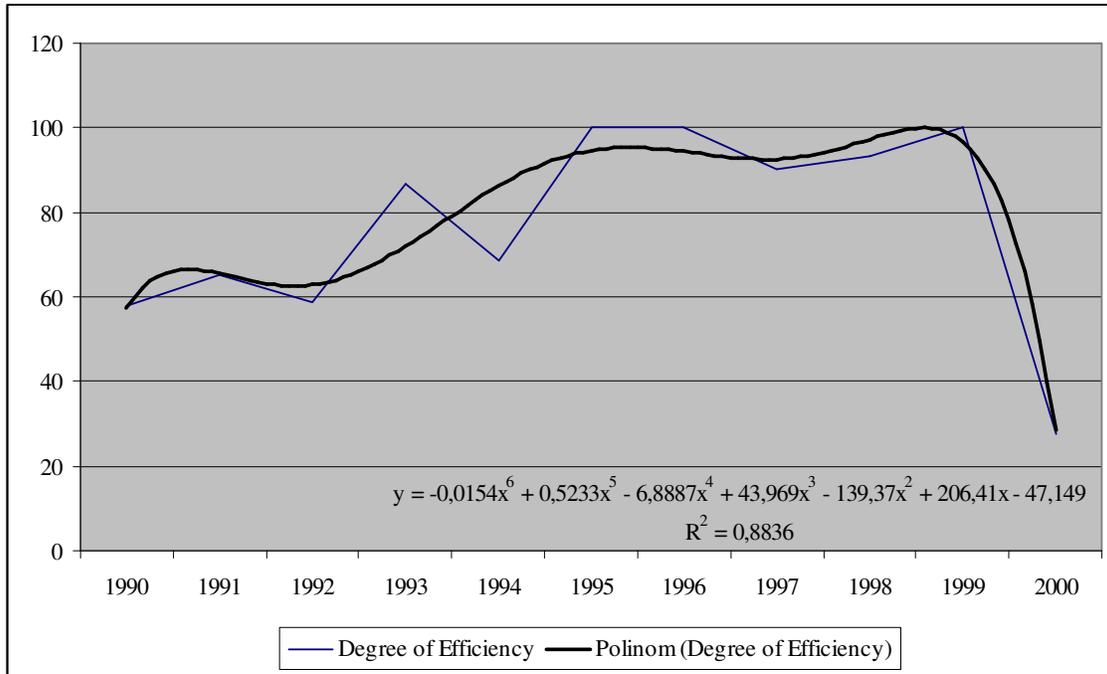


Figure 2. Levels of Relative Efficiency in Private Turkish Commercial Banking Sector from 1990 to 1999

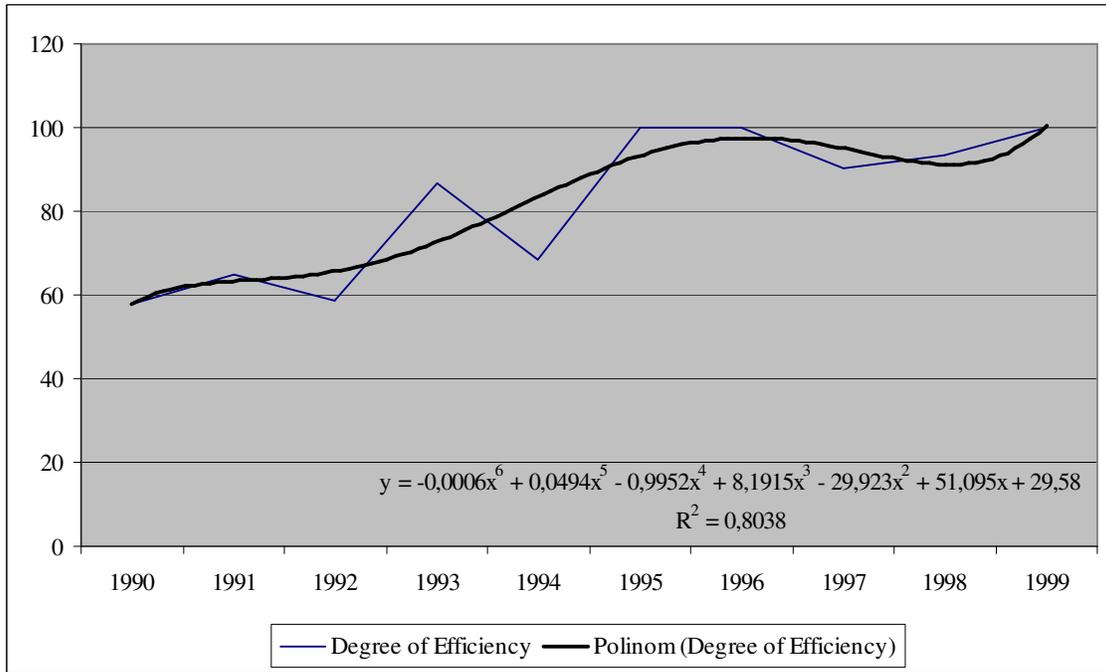


Figure 3. Levels of Relative Efficiency in the Private Turkish Commercial Banking Sector from 1990 to 2000 (Including Data for General Manager Replacements)

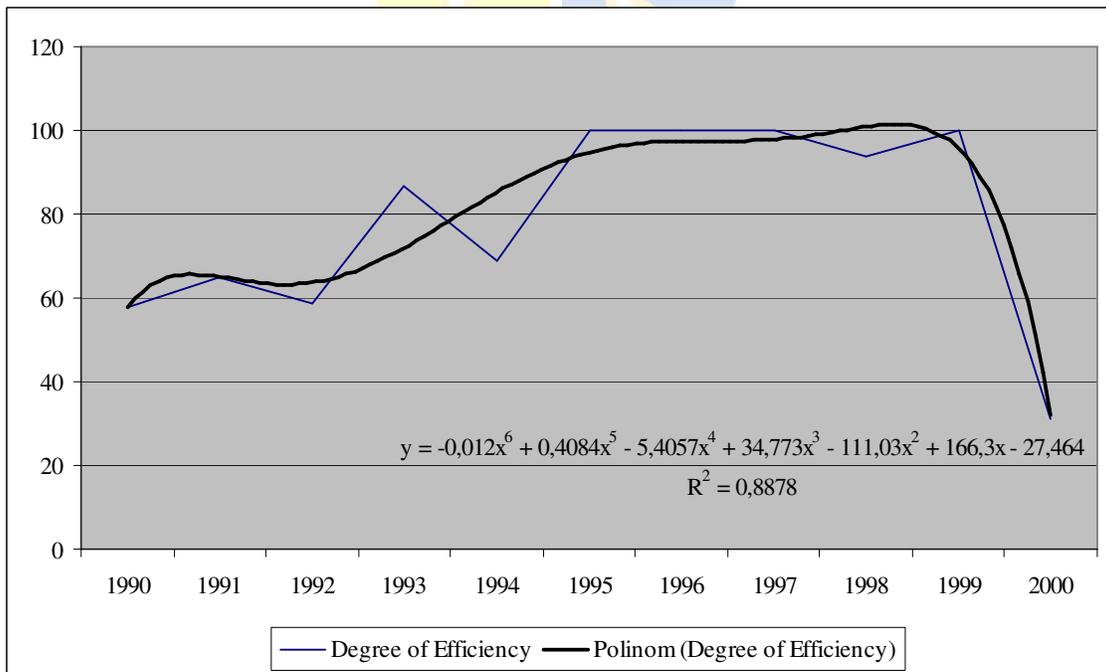


Figure 4. Levels of Relative Efficiency in the Private Turkish Commercial Banking Sector from 1990 to 1999 (Including Data for General Manager Replacements)

