BOĞAZİÇİ ÜNİVERSİTESİ

ISS/EC-2007-21

What Determines the Banking Sector Performance in Globalized

Financial Markets: The Case of Turkey?

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ARAŞTIRMA RAPORU

RESEARCH PAPERS

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Abstract

This study attempts to give an insight about the trend in the performance of the Turkish banking sector by conducting a panel data fixed effects regression analysis. The results reveal that efficiency change is negatively related to the number of branches. We find a positive relationship between loan ratio and the performance indices efficiency and efficiency change. Furthermore, bank capitalization is positively related to efficiency change. Interestingly however, return on equity is not statistically significant in explaining any of the efficiency measures. There is also no robust relationship between foreign ownership and efficiency. Finally, restructuring attempts in post-crises epoch robustly account for the improvement in efficiency scores in recent years.

What Determines the Performance of the Banking Sector Performance in Globalized Financial Markets: The Case of Turkey?

1. Introduction

1990s, characterized by unstable macroeconomic performance, was the lost decade for Turkey. The financial sector and specifically the banking industry, which makes up around three fourths of the financial system, experienced a period of high and volatile inflation and interest rates. Political pressures were felt considerably in the banking sector throughout the 1990s. The motivation behind the banking sector activities and behind opening up new banks were to increase profits without giving much importance to such issues as management quality and efficiency. As a result of these, many weak banks finally declared bankruptcy. Loose monetary policy and flexible exchange rate regime were seen as a solution to these problems which was in fact giving way to the severe economic crises of 2000 and 2001 (Aysan and Ceyhan, 2007a).

Following the crises, the May 2001 Rehabilitation Program was launched by the Turkish Banking Regulation and Supervisory Agency (BRSA) (Al and Aysan, 2006). With the help of this program state and private banks were restructured. Moreover, the profitability and stability of the Turkish banking system increased (Steinherr et.al., 2004; Aysan and Ceyhan, 2006) Although the sample period in this study covers the period 1990-2006, we are mainly concerned with determinants of the bank performance during the post-crisis era.

Grigorian and Manole (2002) is one of the studies that estimate the efficiency of the banking sector in transition countries. Utilizing the DEA method, they run

the regression of the efficiency scores on variables related to macroeconomic environment, regulatory environment and bank specific variables. Aysan and Ceyhan (2007b), Isık and Hassan (2002), Isık and Hassan (2003a), Ozkan-Gunay and Tektas (2006), among others, examine the performance of the Turkish banking sector. These studies focus on how the efficiency and productivity of the Turkish banking sector evolved over time, but not focus on the underlying reasons. Isık and Hassan (2002) finds the correlation of the efficiency values with such indicators of financial performance as "total cost/ total assets, total assets/ number of employees, net income/ total assets and net income/ total equity". However, the study covers the period between 1988 and 1996. Yıldırım (2002) investigates the relationship between efficiency and variables such as asset quality, profitability and bank size during the period 1988-1999. Hence, there exists no study covering the most recent period, and this study aims to fill this gap in the literature by identifying the determinants of the performance of the Turkish banking sector between 1990 and 2006.

In this study, we regress some performance indices (technical input efficiency, Malmquist Total Factor Productivity Change (TFPC) Index and its mutually inclusive and exhaustive components of efficiency change and technological change) on the foreign-domestic dummy, number of branches, bank capitalization, loan ratio, return on equity (ROE), dummies for the 1994 and 2001 crises and dummy for the reform period. We include all the banks in the Turkish banking industry except for the state banks, development banks, investment banks, and the banks with insufficient report of data.

This study suggests that number of branches is negatively related to efficiency change. Moreover, bank capitalization is positively related to

efficiency change. Furthermore, loan ratio is positively related to efficiency and efficiency change. Interestingly however, return on equity is not statistically significant in explaining any of the efficiency measures. There is also no robust relationship between foreign ownership and efficiency. Finally, restructuring attempts in post-crises epoch robustly account for the improvement in efficiency scores in recent years.

This paper is organized as follows. The next section explains the performance indices used in this study and describes the dependent and independent variables as well as the data used. The third section describes the model and provides the intuition about the regression results. The last section concludes.

2. Measures of Efficiency and Data

One facet of performance measurement is to conduct ratio analysis utilizing financial performance measures. However, while measuring performance, this method becomes insufficient if there are multiple inputs and multiple outputs. For the banking industry, therefore, techniques other than the ratio analysis are needed. In the literature for performance evaluation, there exist two main approaches to be used when there are multiple inputs and multiple outputs: Parametric and nonparametric techniques. Parametric techniques are preferred when the structural relationship between the dependent and independent variables are known. Nonparametric techniques are preferred when the structural relationship is not known. Aysan and Ceyhan (2007b) utilize a nonparametric method called Data

Envelopment Analysis (DEA) in order to find how the performance of the Turkish banking sector evolved over time.

The DEA method calculates the "relative" efficiency measures of the Decision Making Units (DMUs) included in the sample. The most efficient units make up the efficiency frontier as shown in the graph below for the two-input one-output case. The frontier is constructed such that no other unit is left below or to the left of the frontier[1].

Graph 1: The Efficiency Frontier Curve
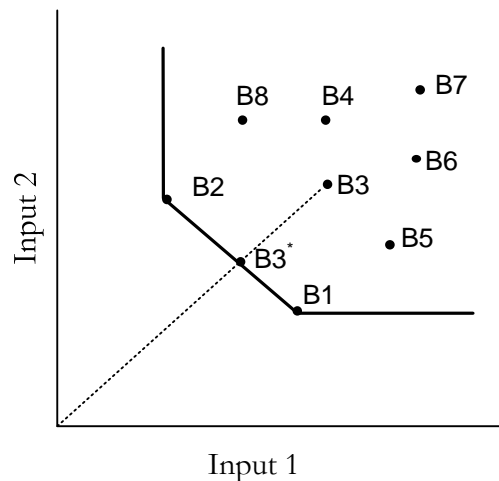
In the graph above, B1 and B2 are the most efficient units since there is no other DMU that uses less of either of the inputs to produce the output. Consequently, these two points lie on the efficient frontier. As decision making units approach to this frontier, they become more and more efficient. In the graph, for instance, B3* is more efficient than B3. In DEA, efficiency is measured by the radial distance from the production point of a DMU to the efficient frontier. Hence, the efficiency levels of B1 and B2 are 1 while that of B3 is 0B3*/0B3.

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[1] For the parametric efficiency estimation of Turkish banking industry, see Abbasoglu et al. (2007).

In addition to finding the technical input efficiency and scale efficiency of the sector for each year between 1990 and 2006, Aysan and Ceyhan (2007b) analyze the TFPC index, efficiency change, and technological change using DEA. Malmquist TFPC index shows the change in productivity over time. Efficiency change tells how much closer a bank gets to the efficient frontier. Technological change shows how much the efficient frontier shifts from one period to another.

The values of the dependent variables (technical input efficiency, efficiency change, technological change, TFPCH) used in the regression analysis are taken from Aysan and Ceyhan (2007b). The trend in these variables is depicted in Graphs 1-4 below. The correlation matrix in Table A-1 shows that the following independent variables can be used in the same regression analysis without bothering about the multi-collinearity issue: the foreign-domestic dummy, number of branches, bank capitalization, loan ratio, return on equity (ROE), dummies for the 1994 and 2001 crises and dummy for the reform period. Bank capitalization is defined as equity over total assets. Loan ratio shows the percentage of total assets given out as loans. ROE is defined as net income over equity. These independent variables are taken from the balance sheets published by the Banks Association of Turkey (BAT).

The 1994 and 2001 crises are two events in the history of Turkish Economy that has left considerable impacts on the financial system. Hence, this study attempts to find out how the performance of the Turkish economy responded to these crises by using dummy variables for each of these crises.

After May 2001, a rehabilitation program for the post-crisis period was launched by the BRSA. The aim of the program was to restructure the banking system and improve the supervision. This study also aims to find out the effects of

the program on the performance of the Turkish banking sector. Hence, one dummy variable has been defined for the period after 2000 as the reform dummy.

As part of the analysis of performance, this study looks at the determinants of four performance indices: technical input efficiency, TFPC Index and its mutually inclusive and exhaustive components of efficiency change and technological change. The data spans the time period from 1990 to 2006; and all the banks in the Turkish banking industry, except for the state, development, investment banks, and the banks with insufficient report of data, are included in the study.
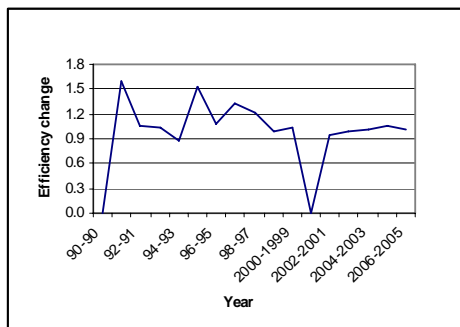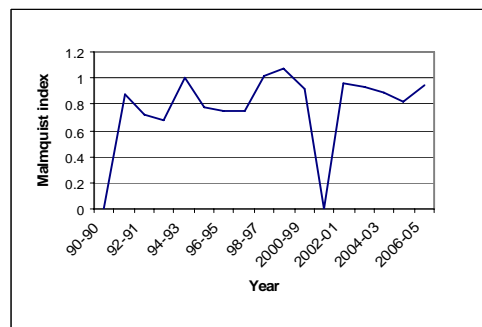
Graph 2: Technical Efficiency over time
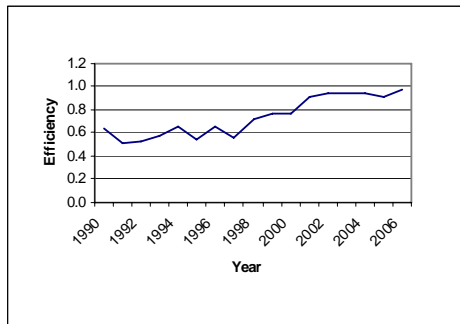
Graph 4: Technological change over time
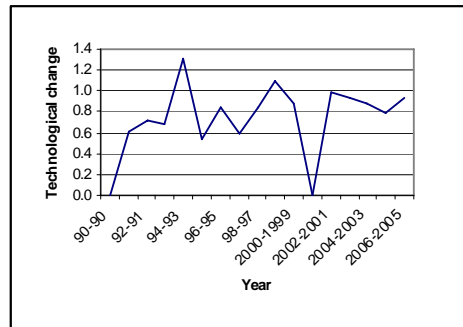
Graph 3: Efficiency change over time

Graph 5: Malmquist TFP change index

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3. Empirical Model and Results

In this study we attempt to find the determinants of bank performance by regressing the dependent variable of the performance indices on the independent variables mentioned above. Due to the structure of our data, we conduct a panel data analysis. Time invariant bank specific part of the error term below is correlated with the explanatory variables. Moreover, Hausman test suggests that fixed effects regression should be chosen rather than random effects. Hence, we run fixed effects regression in our study.[2] The model is depicted in equations 1 ad 2 below:

$$y_{it} = X_{it}\beta + Z_i\delta + \varepsilon_{it} \qquad (1)$$

$$\varepsilon_{it} = \alpha_i + \eta_{it} \qquad (2)$$

where α_i is the individual-specific effect that is constant over time and y_{it} is one of the performance indices (efficiency, efficiency change, TFPC index or technological change) mentioned above. Descriptive statistics and the regression results are depicted in Table 1 and Table 2, respectively.

Bank capitalization, loan ratio and ROE are variables that can change quite rapidly over time as well as across individuals due to reasons such as changing macroeconomic environment and accounting practices. Hence, these independent variables are included among the explanatory variables to control for the dynamic factors. On the contrary, number of branches and status of banks as foreign vs.

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[2] If random effects regression model was used in this case, the results would be biased and inconsistent.

domestic are bank-specific variables that do not easily change for an individual

bank over time. Consequently, these explanatory variables are included in the

matrix Z. We also include dummy variables to find the effects of 1994 and 2001

crises and the restructuring process as well as dummies for each bank and each

year.

Table 1: Descriptive Statistics

Variable	Observation	Mean	Std. Deviation	Min	Max
Efficiency	466	0.84	0.21	0.21	1
Total Factor Productivity Change	466	0.48	0.37	-0.84	0.98
Efficiency Change	466	0.04	0.37	-2.46	0.71
Technological Change	466	0.46	0.35	-0.73	0.98
Foreign-domestic	465	0.27	0.44	0	1
Number of branches	466	123.28	198.17	1	940
Small-large	466	0.13	0.34	0	1
Profitability	466	0.02	0.13	-1.22	0.36
Bank capitalization	466	0.13	0.14	-1.20	0.83
Loan ratio	466	0.35	0.16	0.00	0.73
Return on Equity	466	0.45	1.74	-25.35	6.83

Source: Authors' calculation.

One finding of Aysan and Ceyhan (2007b) is that foreign banks were more

efficient than domestic banks and efficiencies converged afterwards. However,

unlike our expectations, the regression analysis revealed no significant relationship

between the performance indices and ownership (foreign vs. domestic).

The number of branches turns out to be significantly and negatively affecting

all the dependent variables except for technological change. This result is in line

with Jackson and Fethi (2001) suggesting that the negative relationship may result

from increasing costs due to opening new branches in both rural and urban areas.

Our result also reiterates the results in Aysan and Ceyhan (2007b). This study

suggests that medium sized banks are the most efficient banking group while large

banks are the least efficient. The negative relationship between size and efficiency

could further be explained by the fact that the large banks in Turkey are

predominantly domestic while the small and medium size bank groups contain many of the foreign and efficient banks in Turkey.

Bank capital represents the ownership interest at the bank and absorbs unexpected operating losses. Better capitalized banks collect deposits more easily than less capitalized banks since capital acts like deposit insurance and hence increases the amount of deposits. This is also in line with the theory of moral hazard which suggests that bank managers that are close to bankruptcy tend to think of their own interests as opposed to those of the owner's. Our results reveal that bank capitalization has a significantly positive relation to efficiency and efficiency change while no significant relationship exists with the other dependent variables. This positive relationship is also supported by other studies such as Grigorian and Manole (2002) and Berger and Mester (1997).

In the regression analysis, loan ratio is significantly positively related to the efficiency and efficiency change variables. A justification comes from the fact that a bank which gives higher percentage of its assets as loans is more likely to have a higher, although more volatile, return on assets than other banks.[3] Hence, these banks also have higher performance indices. Our findings are supported by Demir et al. (2005). Using a translog stochastic production frontier method, this study estimates the positive relationship between the technical efficiencies of the Turkish commercial banks and the variable of loan ratio.

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[3] While a high loan ratio means that the banking sector is not sound in the case of developed countries, the implication is the reverse when a developing country is concerned. In the latter case, a high loan ratio implies that the banking sector is supporting the customers so that they stay liquid (Battilossi, 2004).

Table 2: Panel Data Fixed Effects Regression Results

Explanatory variables	Dependent variable	Dependent variable	Dependent variable	Dependent variable
	Efficiency	*TFPCH*	*EFFCH*	*TECCH*
	Coefficient	*Coefficient*	*Coefficient*	*Coefficient*
Foreign-domestic	0.043089 (0.39)	-0.010494 (-0.09)	-0.080054 (-0.41)	-0.013547 (-0.12)
Number of branches	-0.000586 (-3.08)***	-0.000549 (-2.80)***	-0.001567 (-4.63)***	0.000111 (0.55)
Bank capitalization	0.114059 (1.95)*	0.026551 (0.44)	0.264804 (2.54)**	0.033889 (0.55)
Loan ratio	0.449945 (7.28)***	0.055436 (0.87)	0.526371 (4.78)***	-0.148310 (-2.27)**
Return on Equity	-0.002359 (-0.55)	-0.000133 (-0.03)	-0.001549 (-0.20)	0.000506 (0.11)
Reform	0.473521 (9.80)***	0.027727 (0.56)	0.218043 (2.53)**	-0.059272 (-1.16)
Crisis 1994	0.204446 (5.59)***	0.559187 (14.79)***	0.213016 (3.27)***	0.419771 (10.83)***
Constant	0.536624 (4.34)***	-0.005611 (-0.04)	-0.464141 (-2.11)**	0.202372 (1.55)
R-square	0.6009	0.8648	0.5960	0.8383
Prob > Ft	0.0000	0.0000	0.0000	0.0000
Number of obst	466	466	466	466

*, **, *** indicate significance at the 10 %, 5% ad 1% level, respectively. TFPCH, EFFCH and TECCH stand for Total Factor Productivity Change, Efficiency Change and Technological Change, respectively. The figures in parentheses stand for the t-values.

Another independent variable we have utilized is ROE. Equation 3 describes how ROE is related to efficiency by decomposing the simplest version of the formula *ROE = Profit after taxes / Equity*.

ROE = (After-tax profits/ Sales)*(Sales/ Fixed Assets)*(Fixed Assets/ Equity) (3)

This definition of ROE gives information about how well a firm is managed. The first term in the formula is equal to profit margin. Profitability is a measure of how efficiently a bank utilizes its capital and assets in order to sell its products and services. The second term stands for fixed asset turnover, i.e., asset management. The higher the amount of sales generated from investing in a unit of fixed assets, the better the asset management. The reason is that generating higher volumes of sales from lower amount of assets implies that the bank is tying up less of the capital that it generates in the form of fixed assets. Better asset management in turn results in higher profit margins which increase ROE further. The last term equals financial leverage. High levels of financial leverage imply that the bank receives more debt and less equity to finance its operations. This is reflected in higher levels of ROE (since debt is deducted from assets to find the amount of equity). In the long run, however, the bank has to pay interest on its debts. In case the debt is not productively employed, this reduces the profit margins, lowering ROE.[4] Moreover, a bank with a relatively small capital base may have relatively higher return on equity. However, they are also more subject to business cycles and higher probability of losing big customers. The common belief is ROE is positively related with efficiency. However, this last perspective explains the possibility that ROE can be negatively related to efficiency in Turkey where the less efficient banks rely on debt financing. Due to these conflicting expectations, we have not found any statistically significant relationship between ROE and efficiency measures for the Turkish banks.

One other independent variable is the crisis94 dummy which gives a significantly positive coefficient for all the dependent variables in our analysis.

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[4] A better indicator of efficiency therefore could be "Return on Invested Capital" rather than ROE.

This could result from the fact that the restructuring program worked well improving the macroeconomic performance after the 1994 crisis. In fact, 125 bank branches operating inefficiently were closed down in 1994 right after the crisis. This is also in line with the traditional theory of banking that crisis eliminates weak banks from the banking sector and improves efficiency.

Finally, the reform dummy produces a significantly positive relationship to the efficiency and efficiency change. This is in line with our expectations since it shows that the restructuring of the sector worked in the desired direction bringing the sector to higher performance levels through the May 2001 Rehabilitation program. Moreover, Banking Regulation and Supervision Agency help monitoring and regulating the financial sector more successfully than the earlier periods (Al and Aysan, 2006; Aysan and Yildiz, 2007). Central Bank Law was altered and price stability became the main objective of the monetary policy to deal with the problem of high inflation. The number of branches and personnel decreased as a result of the mergers and acquisitions in the sector. Moreover, following the Basel II Agreement, the lower cost of capital attracted more banks with high quality customers. This, in turn, resulted in higher performance levels (Aysan and Ceyhan, 2006).

4. Conclusion

The Turkish banking sector experienced a performance improvement after the restructuring process following the 2001 crisis. Many banks that were operating inefficiently closed down or merged with stronger banks. As a result, average performance indices of the sector increased. This study attempts to find out how

different performance indicators are affected by bank specific characteristics with the help of fixed effects panel data regression analysis.

The dependent variables are technical input efficiency, Malmquist Total Factor Productivity Change (TFPC) Index, efficiency change and technological change. The independent variables are number of branches, bank capitalization, loan ratio, return on equity, foreign-domestic dummy, dummies for the 1994 and 2001 crises and dummy for the reform period. The sample period is 1990-2006 while special emphasis is given to the period after 2000. The sample consists of all banks in the Turkish banking industry except for the state, development and investment banks.

The regression results reveal that number of branches is negatively related to efficiency. We explain this with the fact that opening up new branches increases costs and results in lower efficiency levels.

One other result from the regression analysis is that there is a positive relationship between bank capitalization and efficiency. The justification for this result is that bank capital is like a deposit insurance that increases the amount of deposits at a bank.

Loan ratio is positively related to efficiency and efficiency change. This finding explains the fact that a bank which gives higher percentage of its assets as loans is more likely to have a higher return on assets than other banks. Hence, these banks also have higher performance indices. Interestingly however, return on equity is not statistically significant in explaining any of the efficiency measures. There is also no robust relationship between foreign ownership and efficiency. Finally, restructuring attempts in post-crises epoch robustly account for the improvement in efficiency scores in recent years.

5. Appendix

Table A.1: The Correlation Matrix

	Efficiency	Total Factor Productivity Change	Efficiency Change	Technological Change	Foreign-domestic	Number of branches	Bank capitalization	Loan ratio	Return on Equity	Reform	Crisis 1994
Efficiency	1.00										
Total Factor Productivity Change	0.22	1.00									
Efficiency Change	0.50	0.41	1.00								
Technological Change	0.02	0.88	0.01	1.00							
Foreign-domestic	0.13	0.05	-0.23	0.15	1.00						
Number of branches	-0.10	-0.04	0.18	-0.11	-0.31	1.00					
Bank capitalization	0.08	-0.18	-0.09	-0.14	0.17	-0.09	1.00				
Loan ratio	0.04	-0.14	0.26	-0.26	-0.23	0.12	-0.02	1.00			
Return on Equity	0.01	0.12	-0.04	0.14	0.12	-0.08	0.01	-0.03	1.00		
Reform	0.37	-0.44	-0.05	-0.45	-0.19	0.17	0.08	0.02	-0.17	1.00	
Crisis 1994	0.01	0.06	0.09	-0.01	0.03	-0.04	0.07	-0.05	0.08	-0.15	1.00

Source: Authors' calculation.

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