

**AN INVESTIGATION OF PERFORMANCE  
AND OPERATIONAL EFFICIENCY  
IN TURKISH BANKING INDUSTRY**

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## Abstract

Turkish Banking System has gone through some major developments during the 80's. As a part of the overall efforts towards liberalization in the economy, the banking system experienced new regulatory practices, faced new concepts and underwent significant changes in the last decade. The primary objective of this movement was enhancing the "efficiency" of the financial system by increasing competition among the banks, the dominant institutions of the financial system. The expectation was that, more competition among the banks would lower costs in the system, eliminate monopolistic profits, hence the system would attract more deposits at favorable rates and give out loans on a competitive basis. In addition, the quality of banking services was also expected to increase. Existing products would proliferate, and new products would be introduced into the system. Together with higher automation, the financial system would be more "efficient".

This study undertakes an extensive statistical analysis of Turkish Banking System in order to highlight its financial characteristics, efficiency and financial structure. The results of a previous study is summarized at the beginning for the purpose of completeness. Then an attempt is made to model bank profitability through the use of financial ratios and some risk variables. Capital adequacy, provisions for nonperforming loans and equity participations and fixed assets turn out to be the significant explanatory variables. Several risk measures are computed to find out the risk characteristics of banks. In addition to risk measures concentrating on the variability of profits, market risk, interest rate risk and foreign exchange exposure risk are also measured. Comparisons of these risk dimensions among bank groups and between years 1988 and 1989 are undertaken. Significant differences between bank groups and between years are found.

In the last section of the analysis, competitive structure of Turkish Banking industry is assessed through the analysis and testing of its operational efficiency. To this end, a simple model of interest margin, i.e, the spread is developed. The model explains the spread through exogenous factors such as reserve and liquidity requirements, credit demand and inflation. In the model, the later two factors are related to the competitive structure of the industry. Using quarterly data for the period 1986-1989, the model is econometrically tested. The results indicate that both inflation and credit demand positively affect the spread, pointing out the presence of market power in the industry. Liquidity requirement has no binding effect on bank portfolio behavior due to high yields offered by the liquid assets (mostly government securities) during 1986-1989 period. Contrary to expectations, reserve requirement carries a negative sign. This finding is also attributed to the presence of market power in the system.

## I. Introduction

Turkish Banking System has gone through some major developments during the 80's. As a part of the overall efforts towards liberalization in the economy, the banking system experienced new regulatory practices, faced new concepts and underwent significant changes in the last decade. The primary objective of this movement was enhancing the "efficiency" of the financial system by increasing competition among the banks, the dominant institutions of the financial system. The expectation was that, more competition among the banks would lower costs in the system, eliminate monopolistic profits, hence the system would attract more deposits at favorable rates and give out loans on a competitive basis. In addition, the quality of banking services was also expected to increase. Existing products would proliferate, and new products would be introduced into the system. Together with higher automation, the financial system would be more "efficient".

The term "efficiency", in the context of financial markets may denote different concepts. In the literature<sup>1</sup> various forms of efficiency are defined. Allocational efficiency refers to the ability of the system to allocate resources to their best use. A functionally efficient system, on the other hand, is able to successfully channel savings into investments. Finally, operational efficiency can be defined as the margin between borrowing and lending rates in the system. Also known as cost efficiency, operational efficiency requires a narrow spread between deposit and loan interest rates. Although the three definitions are not mutually exclusive, satisfaction of one, does not necessarily guarantee the satisfaction of the others. Perfect competition can be regarded as a sufficient, but not necessary, condition for efficiency in its three forms.

In a credit based financial system, where indirect financing through banks provides most of the funds needed in the economy, operational efficiency becomes the most relevant efficiency concept. The spread between interest rates on loans and deposits can be attributed to (a) reserve requirement ratio, (b) liquidity requirement ratio, (c) profitability of the bank, and (d) operating costs of the bank. Section IV.3 of this paper, explains the derivation of this result within the context of a simple model. Reserve and liquidity requirements can be seen as a tax on banking services, whereas profits and operating costs are related to the competitive structure and effectiveness of the system. Perfect competition assures that firm profits are at their "normal" level, and firms (banks) operate effectively so as to minimize costs. However, banking is a highly regulated industry, which makes perfect competition assumption unattainable. Therefore

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<sup>1</sup> For a more extensive discussion of financial efficiency, see Aydogan and Çapoglu (1989a), (1989b) and Broker (1989).

assessing the competitiveness of Turkish banking industry is equivalent to evaluating its operational efficiency.

Traditionally, competitive structure of the banking industry is measured in terms of concentration of total assets or deposits in the market. To check the impact of market concentration, profitability of banks operating in different banking markets is related with the concentration in that market. The hypothesis in this class of models, which also include control variables to isolate concentration effect, is that higher concentration would lead to higher profits. The results of the empirical studies are mixed<sup>2</sup>. In general, the effect of concentration in banking on profits is not as strong as the relationship in manufacturing industries. Moreover, it has been argued that, observed relationship between structure and performance may be a proxy for the impact of effective management of larger banks. When effectiveness is controlled for, structure-performance relationship turns out to be insignificant<sup>3</sup>.

The traditional tests of competitive structure require similar banking markets operating within a homogeneous regulatory framework. If there is only one national market, it is impossible to employ these cross sectional tests. In this case, one may be inclined to utilize time series data, which brings in two additional problems to deal with. First, there are other factors to control for, yet it may be difficult to identify and measure them. Second, concentration in the market may not change over time, making the test meaningless altogether. In an attempt to test structure-performance hypothesis in the Turkish banking market by pooling time series-cross sectional data, Denizler and Cilli (1989) face these problems, but fail to acknowledge their significance. Hence, their conclusions are seriously flawed.

The main objective of this study is to assess how competitive the structure of the Turkish banking industry, and evaluate its operational efficiency. However, given the difficulties in employing the traditional tests, a different approach is adopted here. First, due to the concerns for the heterogeneity of the Turkish banking system as a factor inhibiting comparisons among banks, the results of a previous study<sup>4</sup> on clustering them with respect to financial statement data is summarized. Also included in this summary is the dimensions across which bank groups differ from each other. This is based on the findings of factor analyzing financial data. Secondly, profitability of the banks are modelled using financial statement information. To this end various factors measuring effectiveness, cost and revenue structure and risks undertaken by banks are extracted.

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<sup>2</sup> For a survey of literature on structure-performance studies, see Gilbert (1984)

<sup>3</sup> Smirlock (1985)

<sup>4</sup> Aydođan and Çilli (1989)

Then they are used in model building. Finally, operational efficiency of Turkish banking system is investigated with the help of a simple model of bank interest margin.

The organization of the report is as follows. In Section II, a summary of clustering and factor analyzing the financial data is given. The data and variables are described in section III. Section IV contains the statistical model for bank profitability, interest rate and foreign exchange exposure risk, and tests of operational efficiency. Conclusions are stated in Section V.

## II. Financial Structure of Turkish Banking System-A Summary

In this section, results of a previous study using 1988 3rd quarter financial statement data on Turkish banking system is presented. The interested reader should refer to Aydogan and Cilli (1989).

Most studies on the performance of Turkish banks classify banks in one way or the other, e.g. Abaç (1988), Payar (1983). The classifying scheme can be ownership structure, total asset or deposit size, type of activity or a combination of those aspects. It is true that banks display large variation in terms of size and type of activity, and state-owned, private and foreign banks operate side by side. Nevertheless, there are similarities across such classifications. For example, a state owned bank may be quite similar in many aspects to a private bank, rather than another bank of same ownership structure. Therefore, classifying the banks based on several financial characteristics simultaneously may yield groups that cut across other grouping schemes. This way, comparisons among banks may be more meaningful.

In order to reclassify the banks, a statistical technique known as cluster analysis is employed. A total of 29 financial ratios are selected from 62 ratios obtained from 1988 end of third quarter financial statements<sup>5</sup>. Investment banks are excluded from the analysis. The results of the cluster analysis are presented in Table 2.1. According to the table, when number of groups is prespecified as 4, Sumerbank forms a group by itself. Large, multi-branch Turkish banks, both private and state owned, make up another group. All foreign banks, together with most small-size Turkish banks are combined in a big cluster. Finally, five small banks form a cluster of their own. When the analysis is repeated with different parameters, similar results are obtained: Depending on the clustering method, variable set employed, banks like Sumerbank, Bank of Bahrain and Qwait, Tobank behave as outliers and form a group of their own. Remaining banks are distributed into two clusters. One smaller cluster contains large public and private banks, whereas small private Turkish banks and foreign banks make up the larger cluster.

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<sup>5</sup> Similar results were obtained when the analysis was repeated with 1988 end of year data later on, so they are not reported.

Table 2.1. Clusters

<u>Cluster 1</u>	<u>Cluster 2</u>
Ziraat, Vakiflar, Tobank,	Eti, Halk, Uluslar, Milli Aydin,
T. Ticaret, Is Bankasi, Y. Kredi,	Esbank, Ekonomi, Disbank, Ith-Ihrc, Ada,
Garanti, Akbank, Sekerbank,	Koc-American BNP-Ak, Tekstil, Finans,
Pamukbank	Net, Osmanli, Roma, Hollantse, Citibank
<u>Cluster 3</u>	Mellat, Credit, Turk, Habib.
Tutunculer, Iktisat, Ege,	Chase, Boston, Manhattan, Mitsui
	Saudi, Indosuez, Standard, Bahrain
Demirbank, Arap-Turk	Lyonnais, Korfez
<u>Cluster 4</u>	
Sumerbank	

In order to reduce the number of variables, and find out common factors, the data is factor analyzed. The method of principal components analysis was able to extract 9 factors with eigenvalues greater than 1. These factors explain 82% of total variation. The first five factors are then rotated with varimax method. An analysis of the rotated factor matrix reveals that the first factor can be regarded as the safety dimension, with capital adequacy ratios loading to it. The second factor is interpreted as the effectiveness dimension. As such, some profitability and liquidity ratios are loaded to this factor. The remaining three factors are related with asset quality, specialization and liquidity respectively.

The safety factor, basically represented by several capital adequacy ratios, deserve further attention. In general, equity figures in the balance sheets vary considerably across banks. Some state-owned banks have very low, even negative equity values, whereas equity is a significant item on the right hand side of the balance sheets of the recently established banks. For other banks, the weight of paid-in capital in total equity has been declining rapidly due to persistent inflation. As a consequence, retained earnings emerge as the dominant component of total equity. Loss in one year may significantly reduce equity, even reverse its sign. Therefore, older banks and/or banks with losses turn out to be seriously undercapitalized in terms of net book value. Whether this should indicate undercapitalization in economic terms is not straightforward. The correct answer can be

inferred by a careful analysis of the asset side of the banks' balance sheet. Two aspects of assets should be examined. These are the quality of loans, and value of fixed assets and equity participations. Poor loan quality may be a reason for losses. In this case, lower book values of equity have an economic meaning. However, when fixed assets and equity participations are undervalued, net worth of the bank is also understated. During periods of high inflation, these assets are typically undervalued, as opposed to other asset categories, most of which are monetary assets. Historically, universal banking practices have led some Turkish banks to invest in industrial corporations and accumulate fixed assets. For them, correct valuation of equity participations and fixed assets is vital. Yet, their valuation is no easy task, especially in the absence of well functioning secondary equity markets. In short, extreme care should be exercised when capital adequacy is assessed through the use of financial ratios.

### III. The Data

The statistical analysis in this study employs 1988 end-of-year financial statements data. All the figures are obtained from the Directorate of Banking Supervision (BGM) of the Central Bank of Turkey (TCMB). The variables mostly consist of financial ratios, computed from the financial statements of banks. In addition, other variables are constructed to find alternative risk measures for Turkish banks.

Financial ratios can be classified as (a) capital adequacy ratios, (b) asset quality ratios, (c) profitability ratios and (d) other ratios reflecting liquidity, effectiveness and safety. Table 3.1 lists the financial ratios utilized in the statistical analysis. Summary statistics on these financial ratios are given in Table 3.2. These are the mean, standard deviation, minimum, maximum, skewness and kurtosis values for those variables. The last column of Table 3.2 list the Kolmogorov-Smirnov (K-S) test statistic for normality. A star above the K-S value indicates that normality hypothesis can be rejected at 5 % level.

**Table 3.1. Financial Ratios**

BGM Code	Name	Definition
K111	CAP/TA	Total Equity/Total Assets
K120	LLAB/CAP	Total Liabilities/Total Equity
K130	NPL/CAP	Non Performing Loans/Total Equity
K140	PFA/CAP	Equity Participations + Fixed Assets/Total Equity
K150	FX/CAP	Foreign Exchange Positions/Total Equity
K161	LCC/CAP	Loans + Contingencies + Commitments/Total Equity
K210	NPL/TL	Non Performing Loans/Total loans
K220	RA/TA	Risky Assets/Average Total Assets
K222	PFA/TA	Equity Participations + Fixed Assets/Av.Total Assets
K223	FXA/TA	FX Earning Assets/Av.Total Assets
K230	PBD/LC	Provisions for Bad Debt/Total Loans + Contingencies
K310	INC/TA	Income before Extraordinary Items and Taxes/Av. Total Assets
K311	NI/CAP	Net Income/Total Equity
K321	II/TA	Net Interest Income/Av. Total Assets

K340	OE/TA	Non Interest Expenses/Av.Total Assets
K411	CB/SD	Cash + Banks/Sight Deposits
K413	LIQ/TA	Liquid and Quasi Liquid Assets/Av.Total Assets
K430	TL/LIAB	Total Loans/Total Liabilities
-	DEP/TL	Total Deposits/Total Loans
-	FXD/DEP	FX Deposits/Total Deposits
-	DEP/CAP	Total Deposits/Total Equity
-	MAJ/LC	Loans and Contingencies Extended to Major Customers/Total Loans and Contingencies
-	XM/TL	Export Loans + Import Loans/Total Loans
-	PUB/TL	Loans Extended to State Enterprises/Total Loans

**Table 3.2. Summary Statistics on Financial Ratios**

Variable	Mean	Std Dev	Kurtosis	Skewness	Minimum	Maximum	N	K-S
TLEXP	1.82	3.60	.77	.24	-7.58	11.82	44	.12468
FXEXP	-1.23	3.15	1.28	-.62	11.35	4.29	44	.09013
TLRISK	1.31	2.52	39.59	6.16	.1189	17.2735	44	.35985*
FXRISK	1.59	2.10	16.27	4.04	.3849	11.487	44	.36696*
TFXRISK	1.62	2.09	16.31	4.05	.2877	11.4987	44	.40004*
LOANRT	.49	.20	4.71	1.23	.1494	1.3028	48	.10641
iDEPRT	.27	.24	19.57	3.90	.0605	1.6028	47	.23928
INTMAR	.24	.28	6.82	-1.65	-.9204	.9487	47	.15833
STD	.01	.01	4.82	1.93	.00350	.04850	43	.16923
BETA	.22	1.69	.40	.18	-3	4	43	.10348
VARCO	1.16	1.25	8.21	2.70	0	6	43	.22961*
CAP/TA	.16	.13	14.90	3.25	-.0073	.8283	48	.20756*
LIAB/CAP	5.58	20.03	32.67	-4.88	-118.051	52.407	48	.37374*
NPL/CAP	.06	.63	28.42	-4.27	-3.6882	1.4552	48	.44282*

PFA/CAP	.43	1.43	18.69	-1.94	-6.9967	5.5860	48	.36327*
FX/CAP	.62	1.05	9.31	1.85	-2.0336	5.4548	48	.22780*
LCC/CAP	6.65	21.79	39.66	-5.99	-134.704	31.676	48	.36570*
NPL/TL	.04	.05	2.09	1.62	0.0	.1994	48	.26236*
RA/TA	.77	.13	-.00	.55	-.5397	1.0911	48	.11097
PFA/TA	.06	.08	14.59	3.33	.0013	.4550	48	.22816*
FXA/TA	.45	.17	-.63	.12	.1378	.8169	48	.07654
PDC/LC	.02	.03	6.71	2.43	-.0146	.1212	48	.23476*
INC/TA	.06	.08	5.65	-.65	-.2756	.2796	48	.15545
NI/CAP	.55	1.60	38.73	5.78	-2.3361	10.8901	48	.37867*
II/TA	.06	.06	5.12	.97	-.0920	.2911	48	.14188
OE/TA	.12	.08	.23	.99	.0202	.3513	48	.18481
CB/SD	2.32	2.40	7.36	2.66	.6048	12.3313	48	.26438*
LIQ/TA	.44	.18	1.81	1.23	.1694	.9751	48	.15400
TL/LIAB	.48	.17	1.59	.12	.0573	1.0376	48	.22627*
DEP/TL	1.82	1.62	22.82	4.25	.1694	11.0715	48	.2267*
FXD/DEP	.33	.21	.49	.89	.0109	.9316	48	.13994
DEP/CAP	.73	.25	.06	-.68	.0769	1.1043	48	.08640
MA/LC	.19	.12	-.22	.38	0.0	.5089	48	.10568
XM/TL	.29	.26	-.42	.69	0.0	.9743	48	.14214
PUB/TL	.08	.18	13.07	3.38	0.0	.9698	48	.32525
ATLEXP	3.02	2.65	1.35	1.23	0.02	11.82	44	.17996
AFXEXP	2.57	2.17	5.09	1.77	0.0	11.35	44	.13073
TASHR	.02	.04	11.57	3.21	.00	.22	47	.34761
DEPSHR	.02	.04	11.28	3.20	.0000	.2815	50	.35306
LNSHR	.02	.05	16.30	3.82	.0000	.2618	50	.35113

For N=48, standard error of Kurtosis is 0.67, str error of skewness is, 0.34.

A \* on K-S. statistic indicates rejection of normality hypothesis at  $\alpha = 0.05$ .

Although financial ratios contain information on various aspects of risk, they fail to capture some important risk dimensions. In order to assess the overall riskiness of a bank, variability of total returns is computed to reflect total risk. Total return is generally defined as the rate of return on investing in the common stock of a firm. However, with few exceptions, stocks of Turkish banks are not traded in the stock market. The usual practice in this case is to employ accounting rate of return on equity instead. Yet, as mentioned earlier, equity figures of Turkish banks are not very reliable. So, accounting return on total assets (INC/TA) is utilized. To measure variability of return on assets, standard deviation of quarterly return on total assets is calculated for the 12 quarters between 1986 and 1988. This variable is referred to as STD in statistical analysis. Additionally, STD is divided by the average rate of return on total assets to obtain another risk variable, namely the coefficient of variation, abbreviated as VARCO.

Total risk, measured by the standard deviation of returns<sup>6</sup>, can be diversified away in a portfolio. To the extent that some part of this risk may be eliminated, that portion will not be priced in the market. The relevant risk is, then, the component of total risk that cannot be diversified. This "market risk", as it is sometimes called, is given by the covariance between the returns on an individual asset and the returns on the portfolio of all the assets in the market. To estimate market risk, the rate of return on the stock of a firm is regressed against the rate of return on a market index:

$$r_{it} = a_i + b_i I_t + e_{it} \quad (1)$$

where  $r_{it}$  = rate of return on the common stock of firm  $i$  in period  $t$

$I_t$  = rate of return on an index in period  $t$

$a_i$  and  $b_i$  are parameters,  $e_{it}$  is the error term

Equation (1) is known as the market model. The regression coefficient,  $b_i$ , is the measure of market risk, since it shows the sensitivity of asset  $i$  to the changes in the market index<sup>7</sup>. It is widely referred to as the beta coefficient.

As market data is not available for banks, accounting data is used instead. Accounting rate of return on total assets (INC/TA) for bank  $i$  is regressed against weighted average rate of return (INC/TA) of all banks. In other words, the independent variable of the market model,  $I_t$ , is approximated by the average accounting rate of return. The weighting factor is the total assets of each bank as of the end of 1988.

<sup>6</sup> Actually, total risk is given by the standard deviation of the probability distribution of expected returns.

Standard deviation of past returns are used as an estimator.

<sup>7</sup> In this model  $b = \text{Cov}(r, I) / \sigma_I^2$ , where  $\sigma_I^2$  denotes the variance.

Quarterly data, spanning 1986-1988 is utilized, since quarterly accounting data before 1986 is not available. The regression coefficient in equation (1) is taken as another risk variable, with the name BETA.

An important risk dimension for banking firms is the interest rate risk. When maturities (or durations) of assets and liabilities do not match, a change in market rates of interest affects the values of asset and liabilities disproportionately. If banks borrow short and lend long, as traditional commercial banking practices would suggest, a fall (rise) in interest rates causes an increase (decrease) in net worth. However, to calculate durations for assets and liabilities with available data is impossible.

However, an approximation to average maturities can be obtained. For this purpose, the statement, filed with BGM, classifying assets and liabilities with respect to maturities was utilized<sup>8</sup>. Assets and liabilities are categorized under maturities of 0-1 month, 1-3 months, 3-6 months, 6-9 months, 9-12 months and more than 12 months, respectively. The mid-point of each category was averaged by weighting them with the amount in each category. For maturities greater than 12 months, a mid-point value of 24 months was arbitrarily assigned. The difference between average maturity of Turkish lira and FX assets and liabilities, expressed in months, was taken as the measure of interest rate risk. Since interest rates may move two ways, up and down, absolute value of the differences were also computed. Interest risk variables can be summarized as follows:

<u>Name</u>	<u>Definition</u>
TLEXP	Av.Maturity of TL assets-Av.maturity of TL liabilities.
FXEXP	Av.Maturity of FX assets-Av.maturity of TL liabilities.
ATLEX	Absolute value of TLEXP
AFXEXP	Absolute value of FXEXP

Finally, foreign exchange exposure, as a significant source of risk, should also be considered. To this end, the ratio of foreign exchange denominated assets to FX denominated liabilities was obtained. As the ratio diverges from unity in both directions, the risk that a bank faces would increase. FX exposure risk variable is named as FXRISK.

An alternative measure for the effectiveness of the banking firm is the difference between interest rates changed on loans and rates paid to depositors. However, reliable figures for loan rates are hard to obtain due to several reasons. First, banks do not quote

<sup>8</sup> Maturity information is submitted to BGM on form number GE310,

their prime rate. What they actually quote to the public can be regarded as a "deterrence" rate, as it is the maximum rate they charge for their loans. In addition, practices like compensating balance requirements, charging fees and commissions, and offering loans as a part of a package deal, further complicate reaching a meaningful lending rate. Therefore, lending rate is approximated by the ratio of interest and commissions earned on loans to average total loans. For consistency, average deposit rates are computed in a similar manner by dividing interest paid to deposits by average deposits<sup>9</sup>. They are named LOANRT and DEPRT, respectively. The difference between lending and borrowing rates is obtained, with the variable name INTMAR.

The last four variables that are of interest aim at displaying market power. First of these is the total assets, abbreviated as TA. Others represent market share of the individual bank in total assets, deposits and loans. They are named TASHR, DEPSHR and LNSHR respectively.

The list of the variables which are not financial ratios are given in Table 3.3. The values of these variables are provided in the Appendix for the interested reader. Summary statistics are computed and presented in Table 3.2. They include mean, standard deviation, minimum, maximum, kurtosis, skewness and Kolmogorov-Smirnov statistic for normality. Including financial ratios, there are a total of 40 variables. Number of observations (banks) vary between 43 and 50, depending on data availability. Investment and development banks were excluded from the analysis. Banks like, TOBANK, EMLAK and IMAR have missing values on many variables, hence they are left out in some part of the analysis.

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<sup>9</sup> Average total loans and deposits are calculated as the geometric average of totals at the beginning and at the end of the year. In periods of high inflation geometric, rather than arithmetic averages are more meaningful.

Table 3.3 List of Variables

Name	Definition
STD	Standard deviation of average profits (INC/TA) over 12 quarters
VARCO	Coefficient of variation
BETA	Market risk
TLEXP	Av.maturity of TL assets-Av.maturity of TL liab
FXEXP	Av.maturity of TL assets-Av.maturity of TL liab
ATLEXP	Absolute value of TLEXP
AFXEXP	Absolute value of FXEXP
FRISK	FX assets/FX liabilities
LOANRT	Interest and commissions received from loans/AV. Total Loans
DEPTR	Interest paid to depositors/Av.deposits
INTMAR	LOANRT-DEPTR
TA	Total Assets
TASHR	Total Assets/Total Assets of all banks
DEPSHR	Total deposits/Total deposits of all banks
LNSHR	Total loans/Total loans of all banks

#### IV. Statistical Analysis

Statistical analysis of data consists of three steps. In the first step an attempt is made to model bank profitability. Risk-return relationships and intergroup risk comparisons are undertaken in the second step. Third step involves a test of operational efficiency, thus an indirect attack for investigating competition.

##### 1. A Model of Bank Profitability

Profitability measures include three variables. These are (1) the ratio of before tax profits to total assets (INC/TA), (2) the ratio of net income to total equity (NI/CAP), and (3) the ratio of net interest income to total assets (II/TA). Although one would expect three variables to be close substitutes for each other, they refer to different aspects of profitability. Conceptually, the ratio of net income to total equity is the ultimate measure of profitability. Because, it shows what the owners of the banks earn on their investment. However, the return on equity, as a measure of profitability, has two shortcomings. First, the numerator of the ratio, net income, includes extraordinary items, as well as tax effects. For some banks, it is known that extraordinary income may be used for window dressing purposes. Purchase and sale of fixed assets and equity participations are the means by which extraordinary profits are monitored. In addition, total equity figures are not very reliable for the reasons discussed in Section II. Consequently, a measure of profitability with total assets in the denominator is more desirable. Among the two ratios of asset profitability, profits before extraordinary items and taxes is suitable for the purpose of this study. The alternative, net interest income, ignores revenues from banking services. Operating expenses are also excluded from net interest income. Exclusion of two important elements of profitability eliminates net interest income.

Although the main profitability variable of interest is INC/TA, other variables, NI/CAP and II/TA are also modeled. In order to find out the best explanatory variables for profitability, a stepwise approach is employed in the following multiple regression model:

$$\text{INC/TA}_i = B_0 + B_1X_{1i} + B_2X_{2i} + \dots + B_pX_{pi} + e_i \quad (2)$$

where  $X_1, \dots, X_p$  are explanatory variables,  $B_0, B_1, \dots, B_p$  are parameters and  $e_i$  is the error term.

Equation (2) is estimated 10 times by including different groups of banks with alternative variable sets. The first variable set consists of the financial ratios of Table 2.1. Results of this step are summarized in Table 4.1. The first estimation employs all the

banks as observations. The stepwise method identifies three explanatory variables. They are: (1) Provision for bad debts (PBD/LC), (2) equity ratio (CAP/TA), and (3) participations and fixed assets (PFA/TA).

Bank Set	N	Dependent Variable	Variables in the Model				R2
All Banks	48	INC/TA	CAP/TA .3550 (6.93)	PFA/TA -.5658 (-5.71)	PBD/LC -.7239 (-2.32)		.76
Private banks	38	INC/TA	CAP/TA .3558 (6.69)	PFA/TA -.4829 (-3.66)			.61
Turkish banks	29	INC/TA	CAP/TA .3322 (-4.34)	PFA/TA -.6243 (-7.45)	PBD/LC -.5793 (-2.39)		.84
Banks with TA < 1 bil	36	INC/TA	CAP/TA .3569 (5.95)	PFA/TA -.5658 (-4.64)	PBD/LC -.7586 (-1.92)		.75
Foreign banks	16	INC/TA	LIAB/CAP .0194 (-11.05)	LIQ/TA .1166 (3.20)	TL/LIAB .1571 (5.01)	FXD/DEP -.0545 (-2.35)	.94
Banks with TA > 100 bil	29	INC/TA	CAP/TA .7435 (5.52)	PFA/TA -.7792 (-9.98)			.80

Note: The number below the variable name is the estimated regression coefficient.  
The number in parentheses is the t statistic for the estimated coefficient.  
The variable set includes financial ratios in Table 2.1.

#### Table 4.1. Multiple Regression Results

The ranking of banks with respect to these three variables and profitability are given in Table 4.2. Signs of (1) and (3) are negative, the coefficient of the equity ratio is positive. It is interesting to note that almost the same three dimensions appeared to have explanatory power no matter which subset of banks are considered. Provision for bad debts can be regarded as an indicator of overall asset quality. Banks with low asset quality have lower profits. Equity ratio (CAP/TA), on the other hand, shows up with a positive sign in every estimation with this variable set. It is possible that this ratio not

INC/TA	BANK NAME	CAP/TA	BANK NAME	PFA/TA	BANK NAME	PBD/LC	BANK NAM
0.2796	BOSTON	0.8283	BAHRAIN	0.4550	DENIZ	0.1212	DENIZ
0.2729	BAHRAIN	0.4121	ADA	0.2393	ADA	0.0894	ETI
0.1779	TURK	0.3565	MELLAT	0.1758	TURK	0.0657	IMAR
0.1761	MELLAT	0.3285	TURK	0.1481	IKTISAT	0.0640	ZIRAAT
0.1359	CHASE	0.2601	BOSTON	0.1359	PAMUK	0.0514	SEKER
0.1340	BNP	0.2585	AYDIN	0.1208	ULUS	0.0445	EGE
0.1260	HOLANTSE	0.2543	BNP	0.1166	EGE	0.0372	VAKIF
0.1234	CREDIT	0.2312	HABIB	0.1032	GARANTI	0.0301	CREDIT
0.1146	HABIB	0.2213	TEKSTIL	0.0920	IS	0.0260	IS
0.1142	TEKSTIL	0.2080	HOLANTSE	0.0871	YKREDI	0.0235	EMLAK
0.1103	ROMA	0.1842	AKBANK	0.0850	ESBANK	0.0229	TICARE
0.0979	MANHAN	0.1797	ITHAL	0.0685	SEKER	0.0209	HABIB
0.0923	SAUDI	0.1766	DENIZ	0.0685	AYDIN	0.0208	HALK
0.0889	FINANS	0.1716	EKONOMI	0.0666	VAKIF	0.0163	ADA
0.0887	EKONOMI	0.1694	ULUS	0.0631	TOBANK	0.0160	TUTUN
0.0835	CITIBANK	0.1630	ROMA	0.0619	DEMIR	0.0139	ULUS
0.0798	KOC	0.1618	CREDIT	0.0606	AKBANK	0.0124	TOBANK
0.0755	AKBANK	0.1511	SAUDI	0.0562	HALK	0.0122	AYDIN
0.0718	OSMANLI	0.1374	CHASE	0.0553	ITHAL	0.0112	ARAP
0.0672	DISBANK	0.1354	DISBANK	0.0513	IMAR	0.0107	PAMUK
0.0664	ULUS	0.1306	KOC	0.0509	DISBANK	0.0106	TURK
0.0650	VAKIF	0.1292	FINANS	0.0470	EMLAK	0.0097	ITHAL
0.0633	AYDIN	0.1281	MANHAN	0.0414	TICARET	0.0089	YKREDI
0.0629	INDO	0.1229	VAKIF	0.0301	OSMANLI	0.0083	MELLAT
0.0625	STAND	0.1219	TICARET	0.0280	FINANS	0.0077	OSMANL
0.0572	IKTISAT	0.1202	ESBANK	0.0272	TUTUN	0.0070	AKBANK
0.0486	MITSUMI	0.1197	IKTISAT	0.0272	ROMA	0.0068	GARANT
0.0474	ESBANK	0.1196	CITIBANK	0.0264	KOC	0.0066	ESBANK
0.0428	TICARET	0.1193	PAMUK	0.0253	ETI	0.0062	DISBAN
0.0357	ITHAL	0.1148	SEKER	0.0249	ZIRAAT	0.0053	INDO
0.0317	SEKER	0.1100	INDO	0.0241	EKONOMI	0.0050	DEMIR
0.0300	HALK	0.1087	MITSUMI	0.0226	ARAP	0.0044	KOC
0.0278	YKREDI	0.1086	OSMANLI	0.0215	MELLAT	0.0043	SUMER
0.0233	GARANTI	0.1014	STAND	0.0153	BNP	0.0030	IKTISA
0.0190	ETI	0.1008	HALK	0.0144	TEKSTIL	0.0018	MANHAN
0.0189	IS	0.0998	EGE	0.0125	MANHAN	0.0013	CITIBA
0.0146	ZIRAAT	0.0978	GARANTI	0.0122	MITSUMI	0.0002	ROMA
0.0129	EGE	0.0955	TUTUN	0.0100	HOLANTSE	0.0001	EKONOM
0.0122	DEMIR	0.0829	IS	0.0088	SAUDI	0.0000	MITSUMI
0.0116	PAMUK	0.0719	DEMIR	0.0084	BOSTON	0.0000	TEKSTI
0.0091	TUTUN	0.0679	ARAP	0.0079	BAHRAIN	0.0000	SAUDI
0.0038	EMLAK	0.0587	YKREDI	0.0075	CREDIT	0.0000	CHASE
0.0025	SUMER	0.0574	ETI	0.0068	CITIBANK	0.0000	FINANS
0.0005	ADA	0.0567	EMLAK	0.0044	HABIB	0.0000	BNP
-0.0273	IMAR	0.0447	ZIRAAT	0.0031	CHASE	0.0000	BOSTON
-0.0455	TOBANK	0.0276	TOBANK	0.0024	SUMER	0.0000	BAHRAI
-0.0554	ARAP	0.0185	SUMER	0.0020	INDO	0.0000	STAND
-0.2756	DENIZ	-0.0073	IMAR	0.0013	STAND	-0.0146	HOLANT

Table 4.2. Rankings

only reflects capital adequacy, but also behaves as a proxy for other aspects of banks, such as ownership structure, size, nature of banking operations and age. The banks with high equity ratios are foreign banks and recently established small private Turkish banks. Large state owned banks have small values for capital adequacy. Participations and fixed assets consistently appear to be a significant factor in the estimations. Negative sign implies that, the higher the amount of participations and fixed assets, the lower the profitability. The direct conclusion one can draw from this is that the banks do not invest in profitable ventures. However, caution should be exercised when PFA/TA variable is interpreted. First of all, capital gains in fixed assets may not be accounted for in profitability. Moreover, purchases and sales of these assets, as well as equity participations may not be carried on at arm's length prices. The nature of equity participations is quite complex in Turkish banks. Some banks are a part of a group of companies, whereas some others own substantial interest in industrial firms themselves. Still others have minority interest in other companies. For all these reasons it is hard to declare participations and fixed assets as poor investments. Yet statistical results indicate that these investments inversely affect banking profits. When banks with high participations and fixed assets are examined, it is seen that both state and private Turkish banks, regardless of size and holding company affiliation, are in the list. Foreign banks have very low values for this ratio. Therefore, one can conclude that, despite the potential for substantial benefits, equity participations and fixed assets have an inverse effect on profitability.

The model for foreign banks turns out to be dissimilar to the rest of the models estimated. Four variables appear as significant in the estimation. These are (1) the ratio of total liabilities to capital (LIAB/CAP), (2) liquidity ratio (LIQ/TA), (3) the ratio of total loans to total liabilities (TL/LIAB), and (4) the share of foreign exchange deposits in total deposits (FXD/DEP). Liquidity ratio and the ratio of total loans to liabilities have positive sign. The positive sign of LIQ/TA is counterintuitive. Banks are expected to give up profitability for higher liquidity. The unusual finding may be due to the presence of several recently established foreign banks. Another interesting result is the negative sign for FX deposits. In 1988, the period under examination, the higher cost of FX deposits may have adversely affected profits. The signs of LIAB/CAP and TL/LIAB are as expected.

When total risk variables STD, VARCO and BETA are added to the variable set, the non performing loan variable is replaced by STD or VARCO. The results are summarized in Table 4.3. Equity ratio and participations appear in every model as before. BETA does not enter any model at all. The risk variable, contrary to the expectations, carry a negative sign. Thus banks with lower "risk" are more profitable. A

ranking of banks with respect to risk variables are presented in Table 4.4. Risk measures such as STD and VARCO, derived from variability in quarterly profits, do not properly reflect the riskiness of the banks. It is possible that, the sample period covered is too short to reflect the true variability in profits. If standard deviation of annual profits were computed for a longer time period, a more reasonable relationship between risk and return could be found. Meriç (1980), for example, has shown that the variance of the annual before tax profits is positively related to average profits in the same time period. However this relationship is observed only within banks of similar size.

Bank Set	N	Dependent Variable	Variables in the Model				R2
All Banks	48	INC/TA	STD -1.819 (2.32)	CAP/TA .5904 (7.89)	PFA/TA -.6688 (-7.65)		.77
Private banks	40	INC/TA	CAP/TA .4581 (5.47)	PFA/TA -.4462 (-3.35)	VARCO -.0187 (-2.53)		.64
Turkish banks	31	INC/TA	CAP/TA .3808 (6.98)	PFA/TA -.5375 (-8.49)	STD -2.70 (-5.26)	PBD/LC .0756 (2.91)	.92
Banks with TA > 100 b.	30	INC/TA	CAP/TA .6237 (4.38)	PFA/TA -.6601 (-7.30)	STD -1.728 (-2.25)		.83
Foreign banks	15	INC/TA	CAP/TA .4503 (4.50)	PFA/CAP -.1187 (-3.21)	LIAB/CAP -.0103 (-4.22)		.97
			TL/LIAB .0972 (5.33)	FXD/DEP -.0936 (-5.03)			
Private banks TA < 1 bil	34	INC/TA	CAP/TA .4570 (4.48)	PFA/TA -.4416 (-2.67)	VARCO -.02 (-2.37)		.61
All Banks	48	NI/CAP	RA/TA -3.674 (-2.53)	CB/SD .4906 (6.07)			.53
All Banks	48	II/TA	CAP/TA .3134 (6.92)	PFA/TA -.2743 (-3.71)			.59

Note: The number below the variable name is the estimated regression coefficient.  
The number in parentheses is the t statistic for the estimated coefficient.  
The variable set includes financial ratios in Table 2.1, and STD, BETA and VARCO.

**Table 4.3. Multiple Regression Results**

STD	BANK NAME	BETA	BANK NAME	VARCO	BANK NAME
0.0485	DENIZ	4.28	ADA	6.3027	ZIRAAT
0.0387	ADA	3.81	INDO	5.2891	DEMIR
0.0310	IMAR	3.13	ZIRAAT	2.8119	ADA
0.0289	ETI	3.08	TURK	2.8083	SUMER
0.0240	INDO	2.62	ETI	2.4961	TUTUN
0.0203	SAUDI	1.77	IMAR	2.2977	ITHAL
0.0197	HABIB	1.67	BOSTON	2.1009	EGE
0.0186	OSMANLI	1.58	SAUDI	1.6846	ARAP
0.0178	CITIBANK	1.48	CREDIT	1.5211	ETI
0.0173	TUTUN	1.29	YKREDI	1.3489	PAMUK
0.0172	BOSTON	1.17	DEMIR	1.2943	DENIZ
0.0169	ITHAL	1.09	OSMANLI	1.2806	YKREDI
0.0161	STAND	0.95	ESBANK	1.2020	INDO
0.0160	CHASE	0.64	SEKER	1.1818	SEKER
0.0158	BNP	0.56	VAKIF	1.1152	IMAR
0.0153	EKONOMI	0.42	AKBANK	1.1086	IKTISAT
0.0150	TURK	0.32	GARANTI	1.1055	OSMANLI
0.0148	CREDIT	0.31	PAMUK	0.9274	IS
0.0145	MELLAT	0.23	CHASE	0.7920	HALK
0.0144	DEMIR	0.21	MANHAN	0.7880	MITSUI
0.0137	EGE	0.20	TICARET	0.6624	SAUDI
0.0134	ZIRAAT	0.10	IS	0.6152	ULUS
0.0122	SEKER	0.05	DISBANK	0.5828	CITIBAN
0.0117	MITSUI	0.03	MITSUI	0.5637	DISBANK
0.0113	ROMA	0.03	ROMA	0.5627	CREDIT
0.0113	IKTISAT	-0.01	DENIZ	0.5576	STAND
0.0110	KOC	-0.04	KOC	0.5426	HABIB
0.0106	SUMER	-0.07	HALK	0.5376	EKONOMI
0.0102	ULUS	-0.16	HOLANTSE	0.5338	GARANTI
0.0098	DISBANK	-0.21	AYDIN	0.5320	ESBANK
0.0091	MANHAN	-0.52	HABIB	0.4558	TURK
0.0086	ARAP	-0.54	ITHAL	0.4363	MANHAN
0.0084	HALK	-0.67	ULUS	0.4317	VAKIF
0.0074	AYDIN	-0.82	ARAP	0.4039	AYDIN
0.0072	VAKIF	-0.91	SUMER	0.3875	CHASE
0.0071	HOLANTSE	-1.07	IKTISAT	0.3747	AKBANK
0.0067	AKBANK	-1.21	STAND	0.3557	BNP
0.0065	YKREDI	-1.74	MELLAT	0.3517	TICARET
0.0061	PAMUK	-2.05	EGE	0.3429	KOC
0.0058	ESBANK	-2.50	EKONOMI	0.3230	BOSTON
0.0053	TICARET	-2.80	TUTUN	0.2673	ROMA
0.0050	GARANTI	-2.95	BNP	0.2581	MELLAT
0.0035	IS	-3.38	CITIBANK	0.1954	HOLANTS

Table 4.4 Rankings

When net interest income instead of before tax profits is employed as the profitability variable, the model does not change. CAP/TA and PFA/TA are the significant explanatory variables. On the other hand, the model for return on equity (NI/CAP) is different. Risky assets (RA/TA) and liquidity (CB/SD) turn out to be the explanatory variables with unexpected negative and positive signs respectively. The ratio of risky assets to total assets (RA/TA) is a financial ratio utilized by BGM, and is in fact a measure of asset quality. Therefore its negative sign is not very surprising. The positive sign of liquidity variable is much harder to explain. Because, in a banking firm there is a trade off between liquidity and profitability. The more liquid the assets of a bank, the greater its ability to fulfill short term obligations. Yet liquid assets have lower returns than assets with longer maturity. If banks with higher liquidity report lower profits, one possible explanation is that their investments are not profitable. Considering the discussion on the profitability of equity participations and fixed assets, that proposition sounds acceptable. Another possible explanation is the attractive yields offered by government securities, most of which are classified as liquid assets. Liquidity variables do not appear in models where other profitability measures are used as independent variables.

## 2. Modelling Other Risk Measures

Interest rate risk and foreign exchange exposure risk undertaken by banks are evaluated in three steps. First, the question of whether these risks vary between banks of different size is examined. Then a comparison of interest rate risk and FX exposure of the banking system in the years 1988 and 1989 is presented. Finally, their relationship with profitability is estimated.

To answer the first question, several grouping schemes based on total asset size and ownership structure are utilized. Significant differences between groups with respect to TLEXP, ATLEXP, FXRISK, AFXRISK, FXEXP and STD are found. Absolute value of TL denominated asset exposure (ATLEXP) gets smaller with bank size, indicating that maturity mismatch in TL assets is greater in larger banks. A closer examination of mean values for TL asset exposure reveals that larger banks have a longer position, i.e. asset maturities exceed liability maturities. This is more in line with traditional banking practice of borrowing short and lending long. Foreign exchange risk exposure, on the other hand, displays significant difference between very small banks (TA less than TL 100 billion) and larger banks. Absolute value of FX risk (AFXRISK), measured as the ratio of FX assets to FX liabilities, is higher in very small banks, most of which are foreign banks. Maturities of FX denominated assets and liabilities differ more in Turkish banks, with liabilities longer than assets, compared to foreign banks, whose group mean indicates a match between asset and liability maturities. Finally, standard deviation of

quarterly profits, STD, is greater in the very large banks (TA > TL 1 trillion) compared to the rest of the population. A pairwise comparison of interest rate risk and foreign exchange exposure risk in years 1988 and 1989 is undertaken to see if a change in risk profile has taken place in the banking system. Table 4.5 gives a summary of the paired t-tests employed for this purpose. In the table, the mean value of the variable of interest in a year is given under the heading, mean. Calculated t-statistics and associated probabilities are shown in subsequent columns. Only FXEXP shows a statistically significant difference at  $\alpha=0.05$ . The attained significance is quite high for the case of TLEXP among private banks. It is clear that despite shorter maturities for both assets and liabilities, banks have a longer position in 1989 than they had in 1988. Foreign exchange position has also changed in 1989, as evidenced by a lower ratio of FX assets to FX liabilities. The FX risk measured by the absolute value of this ratio minus unity, indicates that the risk actually declined in 1989. The increase in FX liabilities compared to FX assets, helped this ratio converge to one.

Results of the t-tests seem to agree with the findings of the survey conducted in Istanbul, during late 1989. In the survey, bankers indicated that, since October 1988 shock, maturities of bank assets and liabilities became shorter. Smaller banks which are not dependent on expensive deposit funding, found that funding from interbank market as well as FX funding was much cheaper in 1989. Thus very short term interbank funding, together with higher reliance on FX sources was regarded as a way to overcome high costs of funding. Higher values of TLEXP (asset maturity - liability maturity) in 1989 shows that a shift towards nondeposit, short term sources of funding did actually take place. Obviously, this means higher risk for the system, as portrayed by larger absolute value of TLEXP in the same year. Another piece of evidence for reliance on nondeposit funds can be seen in lower FXRISK values in 1989. As the level of FX liabilities increased, the ratio of FX assets to liabilities declined. In terms of foreign exchange risk, AFXRISK, 1989 turns out to be less risky than the previous year. The change in funding behavior is more obvious in smaller banks. Interest rate risk and FX risk vary a great deal across individual banks.

If a bank can reduce cost of funding by taking higher interest rate risk and foreign exchange risk, then it should attain higher profitability. This hypothesis is tested by modelling bank profitability as a function of interest rate risk and FX risk variables. The equation to be tested is specified as follows:

$$INC/TA_i = B_0 + B_1(AFXRISK)_i + B_2(ATLEXP)_i + B_3(TLEXP)_i + e_i \quad (3)$$

where  $B_0, \dots, B_3$  are parameters,  $e_i$  is the error term. Other terms are the same as before. The model is estimated with three sets of banks, using 1988 and 1989 data. The results

are shown in Table 4.6. According to Table 4.6, foreign exchange risk (AFXRISK) is positively related with profitability. With the exception of the last equation, the coefficient of AFXRISK is significant at  $\alpha=0.05$ . Interest rate risk variables do not appear to be significantly related with profitability. Only in the first equation, the coefficient of ATLEXP is different from zero, with a negative sign. It is interesting to note that, despite lack of statistical significance, interest rate risk variables carry mostly negative signs. A final point to be derived from Table 4.6 is that the regression relationships in 1989 are weaker than those in 1988.

**Table 4.5. Paired t-tests**

Bank Set	Variable	1988 Mean	1989 Mean	t-value	Probability
Private	FXRISK	1.8129	1.2793	1.83	0.077
Private	AFXRISK	0.8901	0.3583	1.83	0.077
All Banks	TLEXP	2.6347	1.8462	1.35	0.185
All Banks	FXEXP	1.1642	-0.1211	2.10	0.042
Private	TLEXP	1.2531	2.4800	1.96	0.058
All Banks	ATLEXP	3.0956	3.3463	0.56	0.579
All Banks	AFXEXP	2.5565	2.3984	0.40	0.690
Private	ATLEXP	2.6443	3.2579	1.41	0.169
All Banks	FXRISK	1.6586	1.2333	1.77	0.084
All Banks	AFXRISK	0.7681	0.3177	1.90	0.065

**Table 4.6. Multiple Regression Results with Risk Variables**

Bank Set	Year	AFXRISK	ATLEXP	TLEXP	N	R2
All Banks	1988	.0166 (3.26)	-.0119 (-2.37)	-.0032 (-.88)	44	.44
Private	1988	.0165 (3.73)	-.0065 (-1.30)	-.0024 (-.70)	36	.40
Turkish	1988	.0207 (0.26)	-.0079 (-1.66)	-.0054 (-1.57)	29	.34
All Banks	1989	.0309 (2.49)	-.0065 (-1.13)	-.0049 (-1.04)	50	.16
Private	1989	.0285 (2.59)	-.0061 (-1.18)	-.0039 (-0.94)	42	.20
Turkish	1989	-.0860 (-1.95)	-.0085 (-1.49)	.0065 (1.56)	32	.16

Note: The dependent variable in all equations is INC/TA

### 3. A Test of Operational Efficiency

Operational efficiency was defined as the difference between borrowing and lending rates in the financial system. In an operationally efficient market, the spread between cost of borrowing and lending should be low. So that high costs of financial intermediation do not inhibit investments in the economy. In the banking system, operational efficiency refers to the interest margin, i.e. spread, between loan rates and deposits rates. The objective of this section is to investigate the determinants of the spread. For this purpose, a simple model of bank interest margin is obtained from the accounting identities. The model is then tested by using quarterly data from 1986 to the end of the third quarter of 1989.

In the model, the two sources of funding for the banks are deposits and capital. The bank invests its funds in reserves, government bonds and loans. Investment in reserves, and government bonds are imposed on the bank as legal requirements, expressed as a fraction of total deposits. Thus the bank is constrained in its portfolio decisions. Mathematically, the balance sheet identity can be shown as follows:

$$R + G + L = D + C \quad (4)$$

where R, G, L, D and C represent reserves, government bonds, loans, deposits and capital, respectively. In addition,

$$R = rD \quad (5)$$

$$G = gD \quad (6)$$

where  $r$  is the reserve requirement ratio and  $g$  is the liquidity ratio determined exogenously by the government.

On the other hand, from the income statement, total receipts of the banks should be equal to total costs and profits:

$$i_l L + i_g G + i_r R = i_d D + pC + F \quad (7)$$

where  $i_l$  = interest received from loans,

$i_g$  = interest rate on government bonds

$i_r$  = interest rate on reserves

$i_d$  = interest paid to deposits

$p$  = return on capital.

$F$  = fixed expenses

When equations (4), (5) and (6) are substituted into (7), and after some algebraic manipulations, the following expression is obtained for the spread between lending and borrowing rates:

$$i_l - i_d = (pC + F)/D + r(i_l - i_r) + g(i_l - i_g) \quad (8)$$

Thus the interest margin (spread) between lending and borrowing rates is a function of reserve and liquidity requirement ratios, profit rate and fixed costs of the bank. The direction of relationship with reserve and liquidity ratios depends on the interest rate differential between lending rate and interest on those assets. If, for example, the interest on government bonds is greater than lending rate, i.e.  $i_g > i_l$ , then an increase in  $g$  will reduce the spread. In other words, liquidity requirement will have no binding effect. A similar statement can be made with respect to reserve requirements. Profit rate, on the other hand, can be regarded as a function of credit demand, and inflationary uncertainty:

$$p = f(\text{loan demand, inflation})$$

Banks are assumed to have a market power through which they can raise the spread, thus their profits, when they are faced with higher demand for loans and with

higher inflationary environment. Obviously in a competitive financial system, higher demand for loans will push up cost of bank funds (i.e. deposits) as well as loan rates, leaving the spread intact. It is the market power of the banks in the financial system which can control cost of deposits while increasing lending rates as a response to higher demand. An increase in expected inflation has a similar effect on the spread. Again, with market power, lending rates are adjusted immediately, whereas the inflation premium may be held back on deposit rates. If this is the case, bank profits and the spread, will be positively related with loan demand and the level of inflation. For measurement purposes, loan demand is proxied by industrial production index compiled at the Central Bank. Quarterly inflation rate is measured as the annualized rate of change in the wholesale price index (WPI) for that quarter.

The model to be tested is specified as follows:

$$SPR_t = B_0 + B_1 INF_t + B_2 PIND_t + B_3 RES_t + B_4 LIQ_t + e_t \quad (9)$$

where  $SPR_t$  = Lending rate - Borrowing rate in quarter t

$$= [1 + (\text{Interest Received on Loans}) / (\text{Av. Loans})]^4 - [1 + (\text{Interest Paid to Deposits}) / (\text{Av. Deposits})]^4$$

$PIND_t$  = Change in Industrial Production Index (IPI)

$$= (IPI_t - IPI_{t-1}) / IPI_{t-1}$$

$RES_t$  = Reserve requirement ratio in quarter t

$LIQ_t$  = Liquidity ratio in period t

$$INF_t = (WPI_t - WPI_{t-1}) / WPI_{t-1}$$

$B_0, B_1, B_2, B_3, B_4$  are parameters and  $e_t$  is the error term.

The data covers the period between the first quarter of 1986 and the third quarter of 1989, inclusive. Only private banks are included in the analysis in order to exclude the impact of preferential loans. The figures required to compute the dependent variable, spread, are obtained from BGM of the Central Bank. Wholesale Price Index, compiled by the State Institute of Statistics, and Industrial Production Index are both obtained from the Department of Statistics of the Central Bank. Reserve and liquidity ratios are extracted from Çelebican (1988) and various issues of TCMB annual reports. Table 4.7 lists the data on the variables in equation (9), as well as the lending and borrowing rates in the banking system.

Table 4.7. Variables

Quarter	Reserve Ratio	Liquidity Ratio	Inflation	Indust. Prod. Index	Loan Rate	Deposit Rate	Spr
86:1	17.7	15.0	38.8	-7.49	43.6	31.7	11.9
86:2	15.0	15.0	33.0	-3.24	48.6	31.6	17.0
86:3	15.0	15.0	35.5	17.03	49.5	31.3	18.2
86:4	15.0	15.0	30.6	0.67	50.6	26.5	24.0
87:1	15.0	15.0	31.6	-5.63	44.8	23.5	21.3
87:2	15.0	15.0	41.1	3.07	44.7	23.3	21.4
87:3	10.0	23.0	38.9	13.14	44.0	22.9	21.2
87:4	12.0	23.0	41.7	3.56	44.7	18.7	25.9
88:1	15.3	25.7	63.8	-8.29	47.8	24.2	23.6
88:2	16.0	27.0	70.2	-3.09	52.4	29.8	22.5
88:3	16.8	27.0	78.4	8.45	51.3	28.5	22.8
88:4	17.7	29.0	87.5	1.24	59.0	27.5	31.5
89:1	17.3	30.0	72.6	-2.30	53.3	35.1	18.3
89:2	15.8	30.0	62.8	-3.22	51.7	36.2	15.5
89:3	15.1	30.0	73.3	9.79	51.4	32.9	18.4

As it can be seen from the definition of the variables, financial statement figures are utilized to arrive at lending and borrowing rates. During the period under examination, interest rates on nonpreferential loans have been freely determined. Banks in Turkey do not quote a "base" or "prime" rate that they charge from their customers. Instead, they announce to the public what may be termed as a "deterrence" rate. This maximum rate does not reflect the true lending rate for a number of reasons. First, many bank customers borrow at rates lower than the maximum. Second, a package deal with a customer, which includes other banking services, may make the computation of a lending rate impossible altogether. Finally, practices like compensating balance requirements and quarterly compounding would push up the effective lending rate. Calculation of rates via financial statement data overcomes these problems, despite inherent shortcomings due to the necessity of combining stock and flow values.

An examination of Table 4.7 reveals that the reserve requirement ratio has varied during the period under examination. After a decline in 1987, the ratio increased to its previous levels later on. Liquidity requirement ratio, on the other hand, displays a steady increase over time. The lending rate increases in this period, but the deposit rate is more erratic. The spread seems fairly constant until the end of 1988, then shoots up next year. In 1989, however, it falls down, possibly due to higher cost of deposits.

The results of the estimation of equation (9) are given in Table 4.8. According to the table, all four explanatory variables are significant at  $\bar{\alpha}=0.05$ . As predicted by the model, the signs of the coefficients for inflation and industrial production index are positive. Coefficients for liquidity and reserve requirement ratios carry a negative sign. The fact that government securities had attractive yields in this period explains the negative sign for the liquidity ratio. As it was discussed earlier, when the yield on liquid assets exceed the return on the loan portfolio, the spread could be reduced. The share of government securities in banks' portfolio is known to be in excess of the liquidity requirement. Hence, liquidity requirement has not been a binding constraint in the period under examination. Negative sign for the reserve ratio needs to be studied further. Interest payments on reserves were abolished since 1986, so an argument similar to the case for liquidity requirement cannot be raised. Banks' reaction to a change in reserve ratio can only be explained through the presence of market power. To demonstrate this argument, let's consider the case when the reserve ratio is reduced. Instead of decreasing the spread, i.e. the profit margin, and selling more loans to new customers who are considered to be "high risk", banks prefer not to respond and keep the lending rate unchanged. This can only be achieved if banks possess the necessary market power.

Table 4.8. Regression Results

Variable	Coefficient	t-statistic	Significance
INF	0.5731	3.64	0.0046
PIND	0.2911	2.49	0.0322
RES	-2.2833	-3.30	0.0080
LIQ	-1.2082	-2.90	0.0158
Constant	51.6267	10.99	0.0008

R<sup>2</sup> = 0.66                      DW = 1.75

Statistical findings based on the tests of the model in equation (9) have some serious implications for the market structure in Turkish banking system. If banks had no market power, the coefficients for inflation and loan demand variables would not be significant. On the contrary, significant positive coefficients for these variables point out the presence of "monopolistic" profits in the industry. Negative coefficient of the reserve requirement ratio reinforces this conclusion. It may sound too strong in a time when bankers complain about "cutthroat" competition after the entry of several smaller banks into the market. In the survey conducted in İstanbul in late 1989, bank officials indicated that the level of competition was fierce, especially during that recessionary period. Smaller banks, foreign and Turkish, enjoyed the benefits of less expensive non-deposit funds, and used this advantage by reducing the prices of their products. Such statements were often supported by figures on rates charged on some recent loans. However, it was observed that such fierce competition was confined to a very small segment of the banking market. In other words, banks identified a group of financially sound, strong companies, and regarded them as potential customers. For the rest of the market, there was no significant change in terms of banking services. They do not have any bargaining power against the banks. Those firms which satisfy certain conditions with respect to their overall risk, can obtain loans from the system as price takers. It is highly probable that many smaller companies do not even qualify for high priced loans.

Direct statistical testing of the above proposition is not possible due to lack of data on loan and deposit distributions by customers. Instead, a simpler approach is adopted to see if there exists differences in competitiveness between different groups of customers. To this end, it is assumed that financially sound firms for which banks compete to attract as customers are located in developed regions of the country, whereas firms in less developed regions are not among the desirable customer set. The developed regions are taken to be Marmara, Aegean and Mid-North; the rest of the country is regarded as "less developed" regions. Based on the figures obtained from Banks' Association of Turkey, concentration ratios of loans and deposits are computed for both regions. Three and five bank concentration ratios are given in Table 4.9. According to the table, loan concentrations display considerable difference between two regions. As predicted, concentration of loans in developed regions is lower. Deposit concentration, however, does not show much difference between developed and less developed regions, and is quite high in absolute terms. The overall 5 bank deposit concentration ratio is around 70%. Thus, the two aspects of traditional banking, deposit collecting and extending loans, should be evaluated separately. On the deposit side, a handful of large banks dominate the market. Smaller banks do not attempt to challenge banks with large branch networks. Their challenge is more in the area of loans and especially other banking services. Hence

it will not be wrong to claim that the overall impact of new entrants into the banking market has been rather limited.

**Table 4.9 Concentration Ratios**

	Developed <sup>(*)</sup> Regions	Less Developed Regions
3-Bank Loan Concentration	38.84%	54.55%
5-Bank Loan Concentration	51.45%	75.50%
3-Bank Deposit Concentration	55.94%	56.20%
5-Bank Deposit Concentration	73.06%	69.62%

(\*) Developed regions: Aeagean, Marmara, and Mid-North  
Less developed regions: Mediterranean, Black Sea, Eastern Turkey.

## V. Summary and Conclusions

This study undertakes an extensive statistical analysis of Turkish banking system in order to highlight its financial characteristics, efficiency and competitive structure. The results of a previous study is summarized at the beginning for the purpose of completeness. Then an attempt is made to model bank profitability through the use of financial ratios and some risk variables. Capital adequacy, provisions for nonperforming loans and equity participations and fixed assets turn out to be the significant explanatory variables. Capital adequacy, as a sign of financial strength, is positively related with profitability. Provisions for nonperforming loans represents asset quality, hence its negative impact on profitability is justified. Equity participations and fixed assets, on the other hand, carry a negative sign, which makes it hard to explain. Several problems in interpreting this finding are discussed in the text, and the reader is advised to exercise caution before throwing away participations and fixed assets as unprofitable.

Several risk measures are computed to find out the risk characteristics of banks. In addition to traditional risk measures concentrating on the variability of returns (profits), a market risk coefficient, namely BETA, is estimated using accounting figures. However, "accounting beta" does not perform well, possibly due to the short time period utilized for its computation. Traditional risk measures are inversely related with profitability.

Using the data available at the Central Bank, interest rate risk and foreign exchange exposure risk are also measured. Comparison of these risk dimensions among bank groups and between years 1988 and 1989 are undertaken. Significant differences between bank groups and between years are found. Findings indicate that large banks have a longer position than smaller banks. In terms of foreign exchange exposure risk, very small banks emerge as the riskier group. Both asset and liability maturities became shorter in 1989 compared to a year before. Foreign exchange risk, on the other hand, declined in 1989. In order to see the relationship between these risk variables and bank profitability, multiple regression models are set up and tested. Foreign exchange risk is found to be positively related to profitability. Interest rate risk variables carry negative signs, but they were not statistically significant.

In the last section of analysis, the competitive structure of Turkish banking industry is assessed through the analysis and testing of its operational efficiency. To this end, a simple model of interest margin, i.e. the spread, is developed. The model explains the spread through exogenous factors such as reserve and liquidity requirements, credit demand and inflation. In the model the latter two factors are related to the competitive structure of the industry. Using quarterly data for the period 1986-1989, the model is econometrically tested. The results indicate that both inflation and credit demand

positively affect the spread, pointing out the presence of market power in the industry. Liquidity requirement has no binding effect on bank portfolio behavior due to high yields offered by the liquid assets (mostly government securities) during 1986-89 period. Contrary to expectations, reserve requirement ratio carries a negative sign. As no interest payment is made on reserves since 1986, a statement similar to the case of liquidity requirement cannot be made. The negative sign of reserve requirement can be explained by the presence of market power in the industry. In this case, banks may not respond to a fall in reserve ratio, especially when demand for loans is strong. Thus the spread will widen, despite a lower tax on deposits.

Statistical findings on competitive structure of the Turkish banking industry indicate that the entry of foreign and Turkish banks into the system did not improve competition remarkably. The share of new entrants in the banking market has been limited both in absolute TL amounts and in scope of activity. Thus, their impact on competition is seen only in some segments of the industry. Entry of foreign banks may have many side effects on the system, most of which could be seen gradually. Even for a casual observer, the changes in professional attitude, new products in banking are highly visible. Part of those changes can be attributed to new technology, but this too can be a consequence of foreign entry. These improvements internal to the banks themselves will definitely enhance the effectiveness of individual banks. Whether more effective firms in the industry would translate itself into a more efficient banking system is yet to be seen.

## References

- Abaç, S. and IBAR Group, (1986,1987,1988) **Turkey's Banks and Banking System** IBAR Group.
- Aydoğan, K., and G. Çapoğlu, (1989a) *Securitization and the Efficiency of the Financial System, Proceedings of the OECD/CMB Conference, Antalya.*
- Aydoğan, K., and G. Çapoğlu, (1989b), **Efficiency and Productivity in Banking Systems: An International Comparison.** National Productivity Center Publications, No. 397, Ankara. (in Turkish)
- Aydoğan, K., and H. Çilli, (1989) *Financial Structure of Turkish Banks,* CBRT Research Department, Discussion Paper (in Turkish).
- Broker, G.(1989), **Competition in Banking,** OECD Publications, Paris.
- Çelebican, G. (1987), *Recent Regulatory Changes in Liquidity and Reserve Requirements as Instruments of Monetary Policy, Proceedings of the Seminar on Recent Developments in Turkish Banking,* Vakıflar Bankası, pp 43-60. (in Turkish)
- Denizer, C., and H. Çilli, (1989) *Market Structure - Performance Relationship in Turkish Banking System,* CBRT-Research Department, Discussion Paper .
- Gilbert, A., R., (1984) *Bank Market Structure and Competition,* **Journal of Money Credit and Banking,** Vol.16, November, pp.617-656.
- Flannery, Mark J. (1981) Market Interest rates and Commercial Bank Profitability: An Empirical Investigation **Journal of Finance,** Vol 36, December, pp.1085-1101.
- Ho, Thomas S.Y. and A. Saunders (1981) *The determinants of Bank Interest Margin: Theory and Empirical Evidence,* **Journal of Financial and Quantitative Analysis,** Vol 4, November, pp.581-599.
- Meriç, İlhan,(1980), **Business Risk and Profitability in Turkish Commercial Banks,** METU Publications, Ankara. (in Turkish)
- PAYAR Research Group (1983), *An Analysis of Bank Performance,* **Ekonomide Diyalog,** June, pp.47-52.
- Smirlock, M., (1985), *Evidence on the (Non) Relationship Between Concentration and Profitability in Banking,* **Journal of Money Credit and Banking,** Vol. 17, No. 1, pp.69-83.

APPENDIX

## APPENDIX

NAME	NPL/TL	RA/TA	PFA/TA	FXA/TA	PBD/LC	INC/TA
ZIRAAT	0.0000	0.7283	0.0249	0.1924	0.0640	0.0146
SUMER	0.0194	0.9517	0.0024	0.3151	0.0043	0.0025
ETI	0.1646	0.6350	0.0253	0.3261	0.0894	0.0190
HALK	0.0000	0.7204	0.0562	0.1953	0.0208	0.0300
DENIZ	0.0197	1.0911	0.4550	0.3118	0.1212	-0.2756
VAKIF	0.0379	0.7544	0.0666	0.2223	0.0372	0.0650
TOBANK	0.0807	0.8079	0.0631	0.3738	0.0124	-0.0455
EMLAK	0.0330	0.8875	0.0470	0.1471	0.0235	0.0038
ULUS	0.0417	0.9259	0.1208	0.7094	0.0139	0.0664
AYDIN	0.0680	0.7488	0.0685	0.2311	0.0122	0.0633
TICARET	0.0000	0.5885	0.0414	0.1378	0.0229	0.0428
IS	0.0070	0.7249	0.0920	0.3615	0.0260	0.0189
TUTUN	0.0780	0.5397	0.0272	0.4345	0.0160	0.0091
ESBANK	0.0000	0.7345	0.0850	0.3562	0.0066	0.0474
EKONOMI	0.0000	1.0606	0.0241	0.6273	0.0001	0.0887
IKTISAT	0.0695	0.9364	0.1481	0.5395	0.0030	0.0572
EGE	0.0000	0.6495	0.1166	0.4269	0.0445	0.0129
IMAR	0.0977	0.6297	0.0513	0.6519	0.0657	-0.0273
YKREDI	0.0393	0.7865	0.0871	0.3567	0.0089	0.0278
GARANTI	0.0016	0.7709	0.1032	0.4266	0.0068	0.0233
AKBANK	0.0018	0.6897	0.0606	0.3105	0.0070	0.0755
DEMIR	0.0670	0.7047	0.0619	0.3773	0.0050	0.0122
SEKER	0.0018	0.7318	0.0685	0.1753	0.0514	0.0317
PAMUK	0.0123	0.9185	0.1359	0.2453	0.0107	0.0116
DISBANK	0.0214	0.7016	0.0509	0.4785	0.0062	0.0672
ITHAL	0.0614	0.7031	0.0553	0.6000	0.0097	0.0357
ADA	0.1097	0.7616	0.2393	0.4527	0.0163	0.0005
KOC	0.0000	0.7967	0.0264	0.7751	0.0044	0.0798
BNP	0.0000	0.8596	0.0153	0.4655	0.0000	0.1340
TEKSTIL	0.0000	0.8048	0.0144	0.5764	0.0000	0.1142
FINANS	0.0000	0.5653	0.0280	0.5234	0.0000	0.0889
OSMANLI	0.0000	0.6776	0.0301	0.3239	0.0077	0.0718
ROMA	0.0000	0.6813	0.0272	0.5144	0.0002	0.1103
HOLANTSE	0.1850	0.7844	0.0100	0.5599	-0.0146	0.1260
ARAP	0.1046	1.0029	0.0226	0.8169	0.0112	-0.0554
CITIBANK	0.0000	0.5835	0.0068	0.5318	0.0013	0.0835
MELLAT	0.0842	0.9264	0.0215	0.5255	0.0083	0.1761
CREDIT	0.1093	0.7619	0.0075	0.6328	0.0301	0.1234
TURK	0.0000	0.8748	0.1758	0.3032	0.0106	0.1779
HABIB	0.1994	0.7432	0.0044	0.6204	0.0209	0.1146
CHASE	0.0000	0.8185	0.0031	0.3570	0.0000	0.1359
BOSTON	0.0000	0.7058	0.0084	0.4993	0.0000	0.2796
MANHAN	0.0000	0.9389	0.0125	0.4957	0.0018	0.0979
MITSUI	0.0000	0.6846	0.0122	0.7288	0.0000	0.0486
SAUDI	0.0000	0.6634	0.0088	0.5109	0.0000	0.0923
INDO	0.0000	0.7600	0.0020	0.5691	0.0053	0.0629
STAND	0.0000	0.8520	0.0013	0.7479	0.0000	0.0625
BAHRAIN	0.0000	0.6234	0.0079	0.4741	0.0000	0.2729

## APPENDIX

NAME	DEP/TL	FXD/DEP	DEP/CAP	MAJ/LC	XM/TL	PUB/TL
ZIRAAT	1.2859	0.2187	0.8158	0.1444	0.0317	0.1678
SUMER	11.0715	0.3103	0.6409	0.2822	0.0000	0.9698
ETI	1.2000	0.2809	0.8197	0.2445	0.0624	0.1998
HALK	1.4964	0.2037	0.8520	0.1375	0.0294	0.0247
DENIZ	1.0566	0.2646	0.6022	0.2310	0.0723	0.0044
VAKIF	1.7616	0.1465	0.9894	0.3913	0.2044	0.2527
TOBANK	1.4747	0.2181	0.7395	0.3252	0.1228	0.0000
EMLAK	0.8190	0.1537	0.5429	0.1599	0.0254	0.1073
ULUS	0.8198	0.5706	0.4292	0.1517	0.5643	0.0013
AYDIN	1.7302	0.2612	1.0224	0.0816	0.2720	0.0000
TICARET	2.5044	0.1186	1.0465	0.5089	0.0130	0.1269
IS	1.6577	0.3222	0.9995	0.4397	0.2181	0.1106
TUTUN	1.8301	0.3033	0.9425	0.1014	0.3774	0.0000
ESBANK	1.5273	0.3234	0.7469	0.0774	0.6433	0.0724
EKONOMI	1.4642	0.5463	0.5553	0.1694	0.7837	0.0465
IKTISAT	0.6010	0.3871	0.3235	0.0477	0.5672	0.0021
EGE	1.7943	0.3824	0.9167	0.1658	0.4213	0.0000
IMAR	2.5366	0.9316	0.8115	0.1677	0.0107	0.0309
YKREDI	2.5769	0.2642	0.9356	0.2898	0.3520	0.0343
GARANTI	2.5491	0.3250	0.9565	0.1375	0.4189	0.0125
AKBANK	2.8374	0.2466	1.1043	0.3580	0.1381	0.2090
DEMIR	1.3080	0.4305	0.7089	0.0719	0.4426	0.0097
SEKER	0.8795	0.2201	0.6568	0.2400	0.0361	0.5888
PAMUK	1.9619	0.1417	0.8051	0.2249	0.0802	0.0000
DISBANK	0.8110	0.3697	0.5291	0.2873	0.5258	0.0269
ITHAL	1.1936	0.3960	0.6694	0.1334	0.7241	0.0000
ADA	1.0629	0.5157	0.7893	0.0133	0.0617	0.0000
KOC	1.4989	0.1933	0.6750	0.1470	0.5219	0.3110
BNP	1.0401	0.0109	0.6326	0.1394	0.2859	0.0000
TEKSTIL	0.9544	0.0894	0.5143	0.1631	0.0000	0.0000
FINANS	2.7437	0.1268	0.7610	0.0130	0.3564	0.0000
OSMANLI	2.1841	0.2190	0.9881	0.2823	0.4045	0.0238
ROMA	1.6635	0.3765	0.9972	0.0968	0.4497	0.0000
HOLANTSE	0.9618	0.7464	0.3916	0.0777	0.3109	0.0000
ARAP	1.7164	0.2790	1.0044	0.2622	0.0619	0.1149
CITIBANK	2.2774	0.2740	0.6183	0.3157	0.1754	0.0000
MELLAT	5.2294	0.6096	0.7380	0.0000	0.6169	0.0000
CREDIT	1.2759	0.5458	1.0515	0.2110	0.7283	0.0000
TURK	3.1628	0.1059	0.7984	0.0000	0.2316	0.0000
HABIB	0.8353	0.6600	0.1524	0.0000	0.0000	0.0000
CHASE	1.3360	0.1879	0.7503	0.2992	0.0144	0.0000
BOSTON	0.9592	0.1578	0.9952	0.3434	0.0000	0.0000
MANHAN	1.0986	0.0298	0.3531	0.2297	0.0982	0.0000
MITSUI	1.7050	0.5068	1.0612	0.3201	0.3556	0.4834
SAUDI	3.2308	0.0589	0.7040	0.1750	0.0000	0.0000
INDO	0.1694	0.4853	0.0769	0.1060	0.3061	0.0000
STAND	1.0104	0.8092	0.6056	0.2726	0.7347	0.0000
BAHRAIN	0.4126	0.6507	0.2619	0.0000	0.9743	0.0000

## APPENDIX

NAME	INTMAR	ASSETS	ATLEXP	AFXEXP	TASHR
ZIRAAT	0.1644	10,306,767.00	7.81	3.99	0.22
SUMER	0.9267	586,325.00	1.52	11.35	0.01
ETI	0.2501	776,209.00	0.04	4.21	0.02
HALK	0.1294	2,407,452.00	6.93	4.92	0.05
DENIZ	-0.0539	264,769.00	11.82	5.54	0.01
VAKIF	0.3294	2,393,917.00	5.24	0.74	0.05
TOBANK	-0.0054	556,022.00	2.59	1.43	0.01
EMLAK	-0.5603	4,913,059.00	4.17	4.29	0.11
ULUS	0.1177	565,849.00	3.66	0.63	0.01
AYDIN	0.4121	47,120.00	0.24	2.40	0.00
TICARET	0.4305	1,327,606.00	0.81	2.27	0.03
IS	0.1762	6,784,838.00	5.37	2.06	0.15
TUTUN	0.2183	207,476.00	0.99	2.65	0.00
ESBANK	0.3852	334,135.00	2.62	3.91	0.01
EKONOMI	0.2803	175,622.00	0.49	1.82	0.00
IKTISAT	0.2096	578,879.00	1.24	2.03	0.01
EGE	0.3658	202,753.00	3.58	0.74	0.00
IMAR	0.4458	258,512.00	6.65	4.42	0.01
YKREDI	0.3387	3,469,636.00	1.47	1.72	0.07
GARANTI	0.3451	1,796,316.00	1.45	0.11	0.04
AKBANK	0.3577	3,778,532.00	6.32	0.31	0.08
DEMIR	0.4144	109,113.00	NA	NA	0.00
SEKER	0.3406	546,977.00	4.07	3.54	0.01
PAMUK	0.2751	1,569,861.00	0.94	2.73	0.03
DISBANK	0.2331	568,637.00	1.28	2.69	0.01
ITHAL	0.2287	54,185.00	4.32	1.40	0.00
ADA	0.3954	12,763.00	1.29	7.22	0.00
KOC	0.0339	177,474.00	1.78	2.59	0.00
BNP	-0.0163	91,937.00	NA	NA	0.00
TEKSTIL	0.2988	40,552.00	0.73	1.57	0.00
FINANS	NA	NA	7.58	3.06	NA
OSMANLI	0.1430	558,164.00	0.83	1.55	0.01
ROMA	0.1379	49,217.00	1.99	0.55	0.00
HOLANTSE	0.1430	66,710.00	1.23	5.53	0.00
ARAP	0.1379	309,881.00	5.96	4.13	0.01
CITIBANK	0.3585	131,743.00	7.11	1.07	0.00
MELLAT	0.0898	16,344.00	0.02	2.27	0.00
CREDIT	0.2521	107,837.00	1.45	0.30	0.00
TURK	0.2722	26,320.00	1.08	0.31	0.00
HABIB	0.1519	10,386.00	1.64	0.00	0.00
CHASE	0.4738	39,894.00	0.29	0.97	0.00
BOSTON	0.3677	30,126.00	2.18	3.38	0.00
MANHAN	0.1745	116,172.00	4.71	1.48	0.00
MITSUMI	0.0542	71,948.00	3.40	3.64	0.00
SAUDI	-0.9204	52,179.00	NA	NA	0.00
INDO	0.0399	70,937.00	2.75	1.55	0.00
STAND	0.4194	87,826.00	NA	NA	0.00
BAHRAIN	0.4265	8,310.00	1.06	0.13	0.00

## APPENDIX

NAME	CAP/TA	LIAB/CAP	NPL/CAP	PFA/CAP	FX/CAP	LCC/CAP
ZIRAAT	0.0447	19.822	0.0000	0.5579	-0.6056	17.561
SUMER	0.0185	52.407	0.0592	0.1280	1.9878	7.605
ETI	0.0574	12.872	1.4552	0.4406	0.6889	16.554
HALK	0.1008	7.638	0.0000	0.5578	0.4672	5.673
DENIZ	0.1766	5.683	0.0664	2.5759	0.1454	8.176
VAKIF	0.1229	6.652	0.1416	0.5416	0.5051	6.466
TOBANK	0.0276	29.861	1.2092	5.5860	2.1848	31.676
EMLAK	0.0567	16.013	0.3505	2.1484	0.4299	13.869
ULUS	0.1694	5.497	0.1200	0.7132	0.3923	13.057
AYDIN	0.2585	2.913	0.1171	0.2651	0.0664	3.202
TICARET	0.1219	5.845	0.0009	0.3400	0.1487	3.283
IS	0.0829	9.491	0.0410	1.1092	0.3598	10.539
TUTUN	0.0955	7.540	0.3038	0.2852	1.1630	13.812
ESBANK	0.1202	7.163	0.0000	0.7070	0.6123	15.027
EKONOMI	0.1716	5.415	0.0000	0.1403	0.6237	6.444
IKTISAT	0.1197	7.904	0.2956	1.2377	-1.1911	18.031
EGE	0.0998	7.279	0.0000	1.1675	-0.3620	8.402
IMAR	-0.0073	-118.051	-3.6882	-6.9967	5.4548	-134.704
YKREDI	0.0587	15.750	0.2429	1.4820	0.2474	13.236
GARANTI	0.0978	9.119	0.0054	1.0556	0.4510	10.880
AKBANK	0.1842	4.043	0.0032	0.3289	0.3993	2.761
DEMIR	0.0719	10.582	0.3841	0.8615	-2.0336	23.081
SEKER	0.1148	6.853	0.0090	0.5969	0.3736	13.656
PAMUK	0.1193	8.069	0.0408	1.1384	0.0152	7.851
DISBANK	0.1354	5.333	0.0744	0.3759	0.1011	7.861
ITHAL	0.1797	3.967	0.1366	0.3078	0.2608	8.951
ADA	0.4121	1.276	0.1039	0.5806	0.2579	16.531
KOC	0.1306	6.249	0.0000	0.2020	1.4667	12.611
BNP	0.2543	2.708	0.0000	0.0602	0.1345	5.692
TEKSTIL	0.2213	3.953	0.0000	0.0649	0.4544	4.951
FINANS	0.1292	6.254	0.0000	0.2169	0.5183	13.024
OSMANLI	0.1086	6.874	0.0000	0.2776	0.5347	7.738
ROMA	0.1630	4.304	0.0000	0.1667	1.1464	6.095
HOLANTSE	0.2080	3.320	0.0275	0.0481	0.5225	7.733
ARAP	0.0679	15.278	0.9099	0.3323	1.1060	25.627
CITIBANK	0.1196	6.731	0.0142	0.0568	0.5636	4.476
MELLAT	0.3565	1.977	0.0235	0.0604	0.2979	1.325
CREDIT	0.1618	4.163	0.2168	0.0463	-0.6239	6.824
TURK	0.3285	2.142	0.0000	0.5353	0.5013	1.348
HABIB	0.2312	2.306	0.0839	0.0189	2.2475	2.351
CHASE	0.1374	5.542	0.0000	0.0227	1.3751	5.932
BOSTON	0.2601	2.187	0.0000	0.0324	1.3777	4.425
MANHAN	0.1281	6.647	0.0000	0.0973	0.3932	5.948
MITSUI	0.1087	6.957	0.0000	0.1124	0.5149	10.325
SAUDI	0.1511	6.966	0.0000	0.0583	1.6481	3.940
INDO	0.1100	7.601	0.0000	0.0178	1.5702	10.014
STAND	0.1014	8.347	0.0000	0.0132	0.4539	8.934
BAHRAIN	0.8283	0.220	0.0000	0.0095	0.4155	0.365

## APPENDIX

NAME	NI/CAP	II/TA	OE/TA	CB/SD	LIQ/TA	TL/LIAB
ZIRAAT	1.1627	0.0637	0.0576	0.6048	0.3333	0.5779
SUMER	-0.0763	-0.0037	0.0202	1.7195	0.2430	0.0573
ETI	0.1553	0.0924	0.0366	1.1625	0.3768	0.5624
HALK	0.2699	0.0518	0.0733	0.8273	0.3271	0.5536
DENIZ	-2.3361	-0.0920	0.2229	1.0611	0.2973	0.4435
VAKIF	0.5612	0.0956	0.2615	0.6679	0.4022	0.5256
TOBANK	-0.0849	-0.0520	0.0731	0.9143	0.2119	0.4884
EMLAK	0.2061	-0.0079	0.0332	0.6791	0.1694	0.6435
ULUS	0.4148	0.0363	0.1338	2.0337	0.4599	0.4901
AYDIN	0.2883	0.1111	0.1604	1.4490	0.4952	0.5781
TICARET	0.3321	0.0875	0.0881	0.8011	0.4108	0.4059
IS	0.2248	0.0346	0.0737	0.8282	0.3484	0.5734
TUTUN	0.1257	0.0152	0.2328	1.1313	0.3954	0.4903
ESBANK	0.5212	0.0582	0.1603	1.3379	0.4756	0.4752
EKONOMI	0.3571	0.0347	0.1646	2.2519	0.7105	0.3792
IKTISAT	0.7264	0.1167	0.3513	1.4338	0.3208	0.5316
EGE	0.2368	0.1046	0.2525	0.9287	0.3239	0.4571
IMAR	10.8901	0.0679	0.2806	12.3313	0.4234	0.2920
YKREDI	0.4990	0.0075	0.0713	1.1691	0.4985	0.3555
GARANTI	0.2765	0.0576	0.1226	1.1110	0.5306	0.3671
AKBANK	0.4109	0.0690	0.1223	1.0238	0.4972	0.3846
DEMIR	0.1931	0.0431	0.2081	0.6161	0.2344	0.5310
SEKER	0.2400	0.0763	0.0709	0.9770	0.3120	0.6389
PAMUK	0.1260	0.0061	0.0766	0.9386	0.4572	0.3999
DISBANK	0.4315	0.0748	0.0851	1.6881	0.2861	0.6444
ITHAL	0.2285	0.0444	0.1800	1.1148	0.4062	0.5387
ADA	0.0131	0.0516	0.2357	2.7359	0.2275	0.7155
KOC	0.5326	0.0519	0.0489	3.5143	0.4712	0.4426
BNP	0.4835	0.1122	0.0387	2.1194	0.2738	0.6082
TEKSTIL	0.5348	0.0716	0.1022	1.2316	0.5034	0.5389
FINANS	0.6817	0.0538	0.1996	4.2516	0.6855	0.2774
OSMANLI	0.6754	0.0417	0.0802	1.2718	0.4595	0.4437
ROMA	0.5320	0.0418	0.0502	1.0763	0.4322	0.5992
HOLANTSE	0.5504	0.0932	0.0459	2.3065	0.4431	0.4406
ARAP	-0.9462	0.0161	0.1177	2.6741	0.4903	0.5511
CITIBANK	0.8762	0.0942	0.0727	2.5377	0.6748	0.2706
MELLAT	0.4085	0.0884	0.0621	2.5209	0.9751	0.1352
CREDIT	0.8052	0.0539	0.0392	1.8709	0.2631	0.7732
TURK	0.4457	0.1871	0.0921	1.3310	0.5486	0.2457
HABIB	0.2427	0.1581	0.1961	7.9557	0.6722	0.1607
CHASE	0.4987	0.1001	0.0586	8.5218	0.5331	0.5616
BOSTON	0.6170	0.1042	0.2017	2.5779	0.3719	1.0376
MANHAN	0.7715	0.0528	0.0268	2.1917	0.3937	0.3203
mitsui	0.4879	0.0387	0.0899	1.1116	0.3060	0.6224
SAUDI	0.6525	0.0512	0.0379	2.9693	0.9478	0.2179
INDO	0.4057	0.0533	0.0789	4.7903	0.4660	0.4470
STAND	0.5871	0.0492	0.0252	2.2163	0.3169	0.5993
BAHRAIN	0.3422	0.2911	0.1040	8.7633	0.7971	0.6347

## APPENDIX

NAME	TLEXP	FXEXP	FXRISK	LOANRT	DEPRT
ZIRAAT	7.81	-3.99	0.7602	0.4131	0.2487
SUMER	1.52	-11.35	0.2877	1.3028	0.3761
ETI	0.04	-4.21	1.3429	0.5036	0.2535
HALK	6.93	-4.92	1.2099	0.3985	0.2692
DENIZ	11.82	-5.54	1.0798	0.2350	0.2890
VAKIF	5.24	0.74	1.2533	0.6314	0.3020
TOBANK	-2.59	-1.43	0.9653	0.2147	0.2201
EMLAK	4.17	4.29	1.1231	0.1494	0.7097
ULUS	3.66	0.63	1.1040	0.2251	0.1074
AYDIN	0.24	-2.40	1.2991	0.6793	0.2671
TICARET	-0.81	-2.27	1.0312	0.6985	0.2680
IS	5.37	-2.06	0.9936	0.4240	0.2478
TUTUN	0.99	-2.65	1.3009	0.4566	0.2383
ESBANK	-2.62	-3.91	1.1975	0.6179	0.2327
EKONOMI	0.49	-1.82	1.2191	0.4698	0.1895
IKTISAT	-1.24	2.03	0.7817	0.3124	0.1028
EGE	3.58	-0.74	0.8580	0.5613	0.1956
IMAR	6.65	-4.42	0.7291	0.5108	0.0650
YKREDI	1.47	-1.72	0.9498	0.5153	0.1766
GARANTI	1.45	-0.11	1.0091	0.5543	0.2093
AKBANK	6.32	-0.31	1.1396	0.5802	0.2225
DEMIR	NA	NA	NA	0.5918	0.1775
SEKER	-4.07	-3.54	1.1742	0.5603	0.2198
PAMUK	0.94	-2.73	0.9297	0.4695	0.1944
DISBANK	1.28	-2.69	0.9715	0.4765	0.2434
ITHAL	4.32	1.40	1.1192	0.3611	0.1324
ADA	1.29	-7.22	1.2562	0.5310	0.1356
KOC	1.78	2.59	1.3319	0.2231	0.1892
BNP	NA	NA	NA	0.5002	0.5165
TEKSTIL	-0.73	-1.57	1.2176	0.5478	0.2490
FINANS	-7.58	3.06	1.1947	0.6390	NA
OSMANLI	-0.83	-1.55	1.5446	0.4705	0.3275
ROMA	-1.99	-0.55	1.5027	0.4343	0.2963
HOLANTSE	1.23	-5.53	0.7548	0.4705	0.3275
ARAP	5.96	4.13	1.0062	0.4343	0.2963
CITIBANK	7.11	-1.07	1.1794	0.4597	0.1012
MELLAT	0.02	-2.27	1.6788	0.1846	0.0948
CREDIT	1.45	0.30	0.7058	0.6061	0.3541
TURK	-1.08	0.31	1.1794	0.3709	0.0987
HABIB	-1.64	0.00	9.7538	0.2153	0.0634
CHASE	0.29	-0.97	1.9975	0.5866	0.1128
BOSTON	2.18	3.38	4.7800	0.4871	0.1194
MANHAN	4.71	1.48	0.5529	0.8915	0.7170
MITSUI	3.40	3.64	0.9226	0.5045	0.4503
SAUDI	NA	NA	NA	0.6824	1.6028
INDO	2.75	1.55	1.2357	0.1848	0.1449
STAND	NA	NA	NA	0.7778	0.3583
BAHRAIN	-1.06	-0.13	11.4987	0.4870	0.0605

## APPENDIX

NAME	DEPSHR	LNSHR	STD	BETA2	VARCO
ZIRAAT	0.2185	0.2618	0.0134	3.1250	6.3027
SUMER	0.0108	0.0016	0.0106	-0.9063	2.8083
ETI	0.0144	0.0132	0.0289	2.6196	1.5211
HALK	0.0478	0.0521	0.0084	-0.0701	0.7920
DENIZ	0.0053	0.0064	0.0485	-0.0072	1.2943
VAKIF	0.0585	0.0500	0.0072	0.5579	0.4317
TOBANK	0.0107	0.0109	NA	NA	NA
EMLAK	0.0710	0.1363	NA	NA	NA
ULUS	0.0067	0.0123	0.0102	-0.6748	0.6152
AYDIN	0.0011	0.0010	0.0074	-0.2080	0.4039
TICARET	0.0299	0.0195	0.0053	0.1999	0.3517
IS	0.1555	0.1510	0.0035	0.1007	0.9274
TUTUN	0.0040	0.0032	0.0173	-2.8032	2.4961
ESBANK	0.0073	0.0078	0.0058	0.9544	0.5320
EKONOMI	0.0033	0.0038	0.0153	-2.5047	0.5376
IKTISAT	0.0048	0.0123	0.0113	-1.0726	1.1086
EGE	0.0039	0.0033	0.0137	-2.0530	2.1009
IMAR	0.0053	0.0029	0.0310	1.7692	1.1152
YKREDI	0.0949	0.0581	0.0065	1.2905	1.2806
GARANTI	0.0480	0.0309	0.0050	0.3244	0.5338
AKBANK	0.0971	0.0566	0.0067	0.4211	0.3747
DEMIR	0.0018	0.0021	0.0144	1.1747	5.2891
SEKER	0.0076	0.0124	0.0122	0.6353	1.1818
PAMUK	0.0380	0.0313	0.0061	0.3115	1.3489
DISBANK	0.0070	0.0140	0.0098	0.0539	0.5637
ITHAL	0.0009	0.0011	0.0169	-0.5378	2.2977
ADA	0.0002	0.0002	0.0387	4.2840	2.8119
KOC	0.0029	0.0033	0.0110	-0.0369	0.3429
BNP	0.0012	0.0019	0.0158	-2.9511	0.3557
TEKSTIL	0.0006	0.0010	NA	NA	NA
FINANS	0.0029	0.0018	NA	NA	NA
OSMANLI	0.0133	0.0101	0.0186	1.0903	1.1055
ROMA	0.0012	0.0012	0.0113	0.0300	0.2673
HOLANTSE	0.0005	0.0008	0.0071	-0.1551	0.1954
ARAP	0.0101	0.0085	0.0086	-0.8245	1.6846
CITIBANK	0.0020	0.0015	0.0178	-3.3807	0.5828
MELLAT	0.0003	0.0001	0.0145	-1.7407	0.2581
CREDIT	0.0020	0.0022	0.0148	1.4782	0.5627
TURK	0.0004	0.0002	0.0150	3.0770	0.4558
HABIB	0.0000	0.0001	0.0197	-0.5157	0.5426
CHASE	0.0008	0.0009	0.0160	0.2338	0.3875
BOSTON	0.0005	0.0008	0.0172	1.6684	0.3230
MANHAN	0.0013	0.0019	0.0091	0.2130	0.4363
MITSUI	0.0019	0.0018	0.0117	0.0315	0.7880
SAUDI	0.0015	0.0008	0.0203	1.5776	0.6624
INDO	0.0001	0.0011	0.0240	3.8116	1.2020
STAND	0.0015	0.0025	0.0161	-1.2147	0.5576
BAHRAIN	0.0000	0.0000	NA	NA	NA