The ISE Review

Volume: 7 No: 25-26 January-June 2003

CONTENTS

The ISE Review is included in the "Wold Banking Abstracts" Index published by the Institute of European Finance (IEF) since 1997 and in the Econlit (Jel on CD) Index published by the American Economic Association (AEA) as of July 2000.

The ISE Review Volume: 7 No: 25-26 January-June 2003
ISSN 1301-1642 © ISE 1997

BANKS, STOCK MARKET AND ECONOMIC GROWTH: COINTEGRATION AND CAUSALITY ANALYSIS CASE OF TURKEY (1989-2000)

Hakan ÇETİNTAŞ*
Salih BARIŞIK**

Abstract
This paper examines the causality relationships between banking sector development, stock market development and economic growth in Turkey by using cointegration and causality tests. Evidences confirm the presence of long-term positive relationship between financial development and economic growth. Both banking sector development, stock market development are the statistically meaningful Granger causes of the economic growth.

I. Introduction

There are many empirical studies examining the relationship between financial development and economic growth. Although the large empirical literature accepting the existence of a positive relationship between both variables, these studies do not simultaneously examine relationships between banking sector development, stock market development and economic growth. Studies in this subject show that both the stock market and the banks have a strong positive relationship with the economic growth.

The aim of this study is to simultaneously examine the long-term and causality relationships between banking sector development, stock market development and economic growth in Turkey. Granger causality test is employed to determine the direction of the causality. This paper consists of three parts. In the first part, theoretical and empirical literature on the relationship between the financial development and economic growth is investigated. In the second part, information is given about data, methodology

* Asst. Prof. Hakan Çetintaş, Zonguldak Karaelmas University, Faculty of Economics and Administrative Sciences, Departmant of Economics, 67100 Zonguldak, Turkey.
Tel: (0372) 2574010 Fax: (0372) 2574057 E-mail: cetintash@yahoo.com,
** Asst. Prof. Salih Barışık, Zonguldak Karaelmas University, Faculty of Economics and Administrative Sciences, Departmant of Economics, 67100 Zonguldak, Turkey.
Tel: (0372) 2574010 Fax: (0372) 2574057 E-mail: sbarisik70@yahoo.com

and models used in the study. In the third part, the direction of the causality between the variables in Turkey is investigated and the findings are discussed.

II. Financial Development and Economic Growth: Theoretical and Empirical Literature

One of the most important continuing discussions is on whether the financial development is a cause of economic growth or it is the result of an increased economic activity. Both the theoretical and the empirical evidence show that a strong financial sector will accelerate the economic growth. 70 years ago, Schumpeter stressed the role of the banking sector in the growth process by stating that technological innovation is the basic cause of long run economic growth and that the cause for the innovation is the financial sector's ability to extend credits to the entrepreneurs (Filer, Hanousek and Campos, 2000). There is considerable debate on the channels through which financial development induces economic growth. As far as this issue is considered, it may separate the theorists into two group of thought as structuralists and financial repressionists (Sinha and Macri: 2001).

Structuralists claim that the composition and the quantity of the financial variables will accelerate capital accumulation, and thus it will increase the economic growth. For this reason, according to the structuralists, factors such as financial depth and the composition of aggregate financial variables are very important for economic growth.

The financial repressionists, led by, McKinnon and Shaw, referred to as the McKinnon and Shaw hypothesis argued that financial liberalization in the form of an appropriate rate of return on real cash balances is a means of promoting economic growth. The basic principle of this hypothesis is that a low or negative real interest rate will discourage saving. This will reduce the availability of loanable funds for investment, which in turn, will lower the rate of economic growth. Thus, the McKinnon-Shaw model suggests that a more liberalized financial system will induce an increase in saving and investment and therefore promote economic growth. However, structuralists and financial repressionists basically have identical idea. Both of them accept that an efficient utilization of resources can be reached via a highly organized, developed and liberated financial system and this will enhance economic growth.

The basic function of the financial system is to channel savings to investors with productive investment opportunities. This basic function can be divided into three basic sub-functions such as mobilization of savings, information collection and risk management. Financial system enhances both the quality and the quantity of real investments; improves the standard of living by increasing per capital income.

A well-developed and well functioning financial system can positively affect the economic growth in three different ways through investments (Pagano 1993 and Levine 1997).

First, financial intermediaries provide funds necessary for the investors. In the absence of the financial intermediaries, the financial system will consist of many small savers. In this case, firms will face considerable financial problems and they will have to make credit negotiations with many people. However, if the funds are collected in a little number of banks and other intermediaries then the cost of reaching and using these funds will considerably be reduced. The failure of the funds to be provided directly through banks and other intermediaries will reduce the investments. For example, Bagehot and Hicks argued that the financial system in England was an important catalyst in the industrialization of England by facilitating the movement of large amounts of funds (Sinha and Macri, 2001).

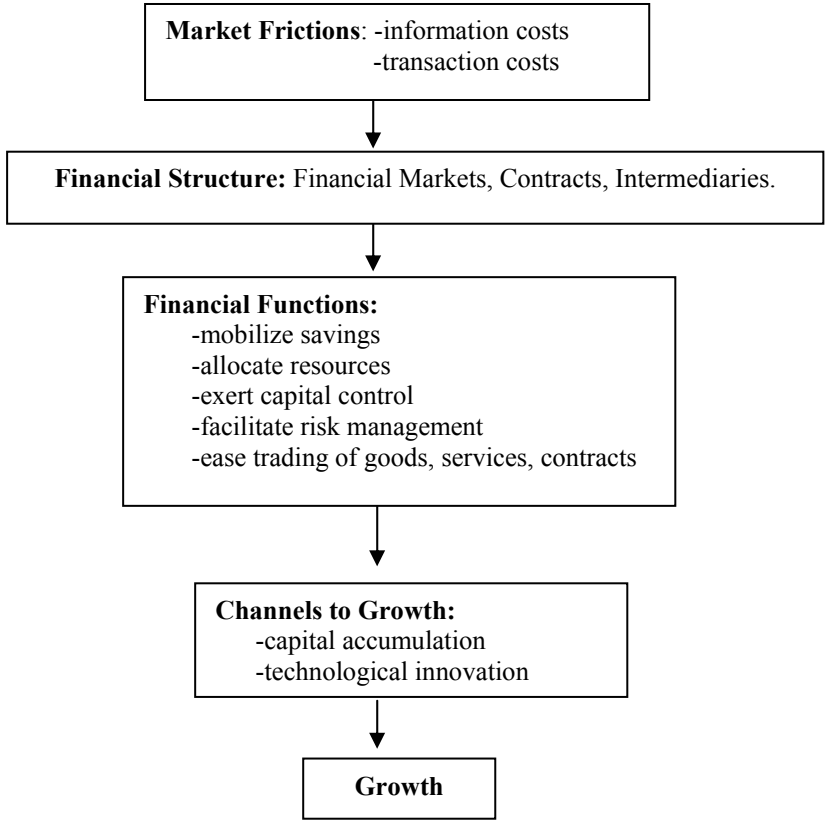
Second, financial intermediaries reduce the risk to be carried by individual savers. As the financial system expands, savers can channel much larger amount of resources with a lower risk and thus create larger funds for investments. Because, the savers do not generally enjoy risks, and projects with comparatively higher returns are riskier than those with low returns. Thus, financial markets, which enable risk diversity, lead the increase in capital accumulation and the portfolio shift to the projects expecting high returns (Levine 1977). Saint-Paul (1992), Devereux and Smith (1994), and Obstfeld (1994), in their models, prove that financial markets are a means of risk diversity. These models also show that greater risk diversity can induce economic growth by shifting the investments to the projects with higher returns.

Third, a well functioning financial system can improve the financial intermediaries' skills of evaluating investment projects and thus lead to an increase in the average quality of investments. The financial sector is important for the economic growth by identifying responsible firms, pooling risks, mobilizing savings, reallocating resources without loss via moral hazard. With the point of view of Schumpeter, a well functioning financial system would induce technological innovation and economic growth by carefully selecting, identifying and funding the entrepreneurs that would be expected to implement their product and production processes (Levine, 1997).

Levine (1997) describes the macroeconomic outcomes of the development of financial structure and the presence of the financial structure by considering the models, which take the process as a whole. Levine's view is based on the definition called as the functional approach. Functional approach examines the relationship between the quality of the functions implemented by the financial sector and the economic growth. Basically, these

functions are the same for each countries and they do not vary in time. It is possible to summarize the functional approach at the Figure 1 (Levine, 1997).

Figure 1: Functional Approach



Shortly, financial structure -by implementing some identified tasks- induces capital accumulation, saving rate and technological innovation and thus induces economic growth.

There are a large number of theoretical and empirical literatures investigating the importance of the financial sector for economic growth. King and Levine (1993a, 1993b) may be seen for the recent empirical evidences about the relationship between economic growth and financial structure.

Although there is considerable empirical and theoretical literature that suggests a positive relationship between financial sector development and economic growth, the empirical studies that attempt to establish causality by undertaking Granger causality tests are few. Jung (1986) found bi-directional causality between financial and real variables using post-war data for 56 countries, of which 19 are industrialized countries. Blackburn and Hung (1998) state that a bi-directional causality exists between growth and financial development. In their model, the lack of the financial sector results in the individual monitoring of the projects by each investor and thus means an extreme increase in the monitoring costs. In a well-developed financial sector, monitoring tasks are delegated to the intermediaries. Transaction costs decrease, more savings are allocated to the investments that produce new technology and hence this promotes economic growth. Luintel and Khan (1999) examined 10 developing economies and found bi-directional causality between two variables in for all countries. Harrison and others (1999) claim that the causality can operate bi-directionally between economic growth and financial sector development. Actually, they argue that economic growth will develop banking activities, increase profits and thus induce the entrance of more banks to the market. Demetriades and Hussein (1996) also used the causality tests and determined a bi-directional causality between financial development and economic growth in most of the 16 countries they examined. In most of the remaining countries, the direction of the causality is from economic growth to financial development.

Arestis and Demetriades (1997) found that causality between financial development and economic growth can change among countries. Shan, Morris and Sun (2001) have also found similar evidences. Rousseau and Wachtel (1998) investigated the rapid industrialization processes of 5 OECD countries during the period (1871-1929). They also found strong evidences for the one-way direction causality from finance to growth. On the contrary, Neusser and Kugler (1998) in their study on OECD countries covering the period 1960-1993 did not found strong evidences supporting that the financial sector induces economic growth.

To summarize, financial development has a positive effect on long run economic growth. This result is supported by cross-country studies, analyses at the firm level, estimations at the industry level and time series approaches.

Although the empirical literature argues that the well functioning banks will induce economic growth, these studies usually do not examine stock market development simultaneously. Thus, empirical evaluations on stock market, banks and economic growth are quite few.

Levine and Zervos (1996, 1998) investigate the role of stock markets and banking sector by using cross-county analysis. They examined the

empirical relationship between banking sector development and long run economic growth and concluded that both are good estimators of economic growth. Ignoring banking sector development, a higher stock market liquidity (or ignoring stock market development, a greater banking sector development) causes a higher economic growth. This strong positive relationship between financial development and economic growth indicates that financial sector is an essential part of the growth process.

Levine, Loayza and Beck (2000) show that banks have a strong causal effect on economic growth. However, Beck and Levine (2000) examined separate effects of both stock market development and banking sector development on economic growth. They concluded that both the stock market liquidity and banking sector development have a strong mutual relationship with the economic growth.

Arestis, Demetriades and Luintel (2001), by using the quarterly data and apply time series methods to five developed countries (Germany, USA, Japan, England and France), found that both stock market development and banking sector development are explanatory for the economic growth, and that the effect of the banking sector development on the growth process is broader than that of stock market development. Demirgüç-Kunt and Levine (1995) argue that a well-developed stock market also has well developed banks and non-bank financial intermediaries.

III. Data and Methodology

Turnover rate and total market capitalization are the variables taken in order to measure stock market development. Total market capitalization measure the size of the stock market and, is an indicator that measure market development and is used by a lot of researchers. Turnover ratio measures market liquidity and indicates the trading volume of the stock market relative to the magnitude of the stock market. This rate is equal to the total value of the traded stocks divided by the market capitalization. Although it is not a direct measure of the theoretical definitions of liquidity, a high turnover rate is usually used as an indicator of low transaction costs. Turnover rate and market capitalization are complementary. A broad but not an efficient market will have a larger market capitalization but a lower turnover rate. Turnover rate is also complementary for the total transaction volume rate. Total transaction volume rate indicates the trade volume relative to the magnitude of the economy, while turnover rate measures the trade volume relative to the magnitude of the stock market. A small liquid market will have a higher turnover rate but it will have a small rate of total transaction volume.

Levine an Zervos (1998), Back and Levine (2002) have used total credits extended to the private sector by deposit bank as an empirical measure of banking sector development as opposed to other studies examining the

relationship between financial development and growth that uses the ratio of broad money supply to GDP as a measure of development. A measure of banking sector development includes only the credits given to the private sector by deposit banks. Credits extended by development banks and credits given to the public sector by deposit banks are excluded. Thus, we chose to employ total credits extended to the private sector by deposit banks as a measure of banking sector development. Reel GDP per capita is taken as a measure of economic growth. Bank credits and total market capitalization are transformed into real terms by dividing by 1995 consumer price index, and natural logarithm of all variables are taken. The data for credit volume and GDP are taken from the Central Bank of Turkey web site, and turnover rate and total market capitalization are taken from the Capital Markets Board. The study covers the period 1989-2000 since the monthly turnover rates and total market capitalization start at 1989.

3.1. Unit Root Test

In order to be able to use the granger causality tests to examine the causality relationship between the variables, the time series should be either stationary or transformed to be stationary. In this context, the data are tested whether they are stationary or not.

In practice, Dickey-Fuller (DF) and aggregated Dickey-Fuller (1979) or ADF are the most frequently used tests. The ADF regression of an X_t can be formulated as below.

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{J=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t \qquad (1)$$

Here, ε_t is the random error term with mean zero, constant variance, and independent. For the unit root test H_0: $\alpha_1 = 0$ hypothesis is tested against H_1: $\alpha_1 < 0$. If H_0 is rejected, Y_t is stationary, if null hypothesis is not rejected, then the series is not stationary.

If the derived ADF statistic is smaller than the critical values in absolute value, it is accepted that the series is not stationary and has a unit root. However, if the derived test statistic is greater than the computed critical values in absolute value, then statistically, series is accepted to be stationary.

3.2. Cointegration Analysis

Both of time series may not be stationary, however, the linear combination of these two variables may be stationary. If the two time series are integrated of same order, then the two series are cointegrated and in this case, the results of formal granger causality tests may be misleading. For this reason, error correction models should be used to test the causality between the variables.

3.2. Engle-Granger Cointegration Test

Firstly, Engle-Granger (1987) cointegration method is used to determine whether the variables in the system are cointegrated or not. In the Engle-Granger method, if the variables are integrated of the same order, Equation (2) is estimated using least squares method.

$$Y_{t1} = \beta_0 + \sum_{J=2}^{n} \beta_j Y_{tj} + \varepsilon_t \qquad (2)$$

The presence of unit root in the error terms from this regression is tested by using ADF or PP. If the error terms ε_t of the regression are stationary I(0), which means that the variables are cointegrated and that even if the variables in the system are not stationary, the system consisting of these variables has a long term equilibrium point.

3.3. Johansen Cointegration Test

Another method used to determine the long-term relationship between the variables is the Johansen (1991) cointegration analysis. This method requires that the error correction function be estimated in order to obtain the likelihood ratio. The error correction function is formulated as:

$$\Delta Y_t = \theta_0 + \sum_{i=1}^{k-1} \theta_1 \Delta Y_{t-1} + \alpha \beta' Y_{t-k} + e_t \qquad (3)$$

In the equation Δ is the difference operator, ΔY_t denotes the variables, θ_0 is a constant and e_t is white noise process. B matrix is composed of r ($r \leq n-1$) cointegrating vectors. Similarly α matrix includes ($\prod=\alpha\beta'$) error correcting parameters.

3.4. Causality Test

Causality between two time series is improved by the contributions of Granger (1969). It is defined as Granger causality due to the greatest contributions made by him to the causality tests. This approach of Granger formed a basis for all of the studies on causality in recent years.

To determine causality relationship between the variables, the Granger causality test based on error correcting model is used instead of the formal Granger Causality test. Engle-Granger (1987) have indicated that when variables are cointegrated that there must be, at least, a one-way causality. To determine the direction of causality between variables following the error correcting model are estimated;

$$\Delta LnGDP_t = \lambda_1 + \sum_{i=1}^{a} \beta_{i1} \Delta LnGDP_{t-i} + \sum_{i=1}^{b} \alpha_{i1} \Delta LnBANK_{t-i} + \sum_{i=1}^{c} \gamma_{i1} \Delta LnTOVER_{t-i} + ECT_{t-1} + \mu_t \quad (4)$$

$$\Delta Ln\,BANK_t = \lambda_2 + \sum_{i=1}^{k} \beta_{i2} \Delta LnGDP_{t-i} + \sum_{i=1}^{l} \alpha_{i2} \Delta LnBANK_{t-i} + \sum_{i=1}^{m} \gamma_{i2} Ln\,\Delta TOVER_{t-i} + ECT_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta LnTOVER_t = \lambda_3 + \sum_{i=1}^{p} \beta_{i3} \Delta LnGDP_{t-i} + \sum_{i=1}^{q} \alpha_{i3} \Delta Ln\,BANK_{t-i} + \sum_{i=1}^{r} \gamma_{i3} \Delta LnTOVER_{t-i} + ECT_{t-1} + \omega_t \quad (6)$$

Here, Δ denotes the first difference of the series , $\mathcal{T}_s$ indicate the constant term, β_{ij}, α_{ij} and γ_{ij} indicate the parameters, a, b, c, k, l, m, p, q, r indicate the number of lags, μ_t, ε_t, ω_t indicate the non-correlated white noise process. ECT_{t-1} is a lagged value of the error term obtained from cointegrated per capita GDP equation. Using ECM model, it is possible to examine both the long and short-term causality between the variables. Causality can be analyzed by using F statistics (Wald test), which tests the lagged values of other variables to determine if they are statistically different from zero, and by testing the lagged value of ECT_{t-1} to see if it is statistically meaningful (t-statistics).

IV. Empirical Results

Table 1 shows the unit root test results for levels. Unit root hypothesis is not rejected for the all variables. ADF test statistics of four variables are smaller than the critical value. In other words, these series are not stationary at the level I(0).

Table 1: Results of Unit Root Test

	ADF Test			KPSS Test	
VARIABLE	***Test statistics***	***5% critical value***	***p***	***Test statistics***	***5 % critical value***
Ln GDP	-1.66	-2.88	5	1.22*	0.46
Ln BANK	-0.90	-2.88	4	1.22*	0.46
Ln TOVER	-2.70	-2.88	5	1.23*	0.46
Ln MARKET	-2.82	-2.88	1	1.29*	0.46

Note: p indicates the number of lags and Ln indicates natural logarithm. The number of lags used in ADF regressions was selected using Akaike information criterion (AIC). At the KPSS test * means that null hypothesis is rejected at significantly at 1 % level. GDP denotes GDP per capital, Bank denotes bank credits, TOVER denotes turnover ratio and MARKET denotes total market capitalization.

However, when the same tests are performed for the first differences, the series transform to be stationary. We tested stationarity of the series using KPSS (1992) test in addition to ADF. Results of KPSS testing reject the hypothesis that the series are stationary for levels. However, the hypothesis that first differences are stationary is not rejected and the results of ADF test are confirmed. Whether results of the ADF or results of the KPSS indicates that all variables are integrated at the same level, or in other words at l(1) level. This also means that although the series may be non-stationary their linear combination may be stationary.

Table 2: Results of Unit Root Test

	ADF Test			KPSS Test	
VARIABLE	*Test Statistics*	*5 % critical value*	*P*	*Test statistics*	*5 % critical value*
ΔLn GDP	-5.28*	-2.88	4	0.10	0.46
ΔLn BANK	-3.37**	-2.88	5	0.07	0.46
ΔLn TOVER	-6.96*	-2.88	5	0.35	0.46
ΔLNMARKET	-8.20*	-2.88	1	0.22	0.46

Note: p indicates the number of lags and the number of lags used in ADF regressions was selected using Akaike information criterion (AIC). Ln is natural logarithm and Δ is difference operator. * and ** refers significant at 1 % and 5 % respectively.

When the linear combination of the series that are non-stationary but integrated at the same level are stationary, the results found by formal Granger causality test may be spurious. Therefore, secondly the long term relationships or existence of cointegration between the series was examined using different cointegration techniques.

Table 3: Engle-Granger Cointegration Test Results

COINTEGRATION EQUATION	R^2	D.W	p	ADF-Statistics	MacKinnon critical value 5 %	10 %
GDP=f(BANK,TOVER)	0.55	1.93	5	-3.71*	-3.74	-3.45
BANK=f(GDP,TOVER)	0.48	2.11	1	-3.47*	-3.74	-3.45
TOVER=f(GDP,BANK)	0.31	1.97	2	-3.62*	-3.74	-3.45

Note: P indicates the number of lags and the number of lags used in ADF regression was selected using Akaike Information Criterion (AIC). Asymptotic Critical Values (ACV) is taken from Davidson and MacKinnon (1993). *refers significant at 10 % level.

Table 3-4 and 5 show the long-term relationships between the variables as found by Engle-Granger and Johansen cointegration tests. Results of the Engle-Granger cointegration test shows in Table 3 that the hypothesis that GDP per capital, bank credits and turnover rate are cointegrated is not rejected at %1 significance. Johansen cointegration test verifies that there is a long-term relationship between the variables . Johansen cointegration test results reject the hypothesis that there is no long-term relationship between the variables at 5 % significance.

Table 4: Johansen Cointegration Test Results

VARIABLES		λ_{Trace}	5 %	1 %	p
GDP,	$H_0: r = 0 \;\; H_1: r \geq 1$	30.51*	29.68	35.65	
BANK,	$H_0: r \leq 1 \;\; H_1: r \geq 2$	11.53	15.41	20.04	5
TOVER	$H_0: r \leq 2 \;\; H_1: r \geq 3$	2.27	3.76	6.65	

Note: p, indicates the number of lags and the number of lags was selected using Akaike Information Criterion (AIC). *, shows that null hypothesis is rejected at significantly at 5 % level.

Table 5 shows the long-term relationship between GDP, bank credits and market capitalization. Johansen cointegration test does not reject the hypothesis that there is no cointegration between the three variables at 5 % significance and confirm the long-term equilibrium relationship.

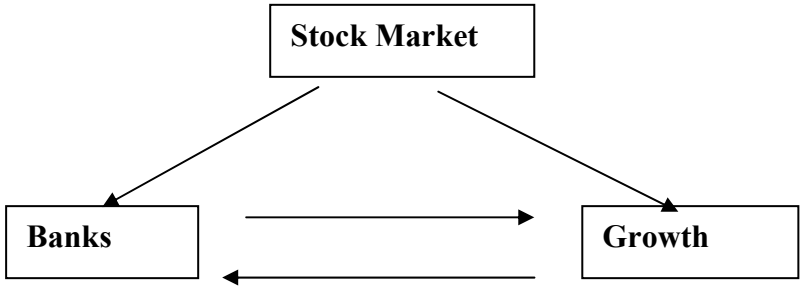
Table 5: Johansen Cointegration Test Results

VARIABLES		λ_{Trace}	5 %	1 %	P
GDP,	$H_0: r = 0 \;\; H_1: r \geq 1$	33.09*	29.68	35.65	
BANK,	$H_0: r \leq 1 \;\; H_1: r \geq 2$	15.39	15.41	20.04	5
MARKET	$H_0: r \leq 2 \;\; H_1: r \geq 3$	1.68	3.76	6.65	

Note: p, indicates the number of lags and the number of lags was selected using Akaike Information Criterion (AIC). *, shows that null hypothesis is rejected at significantly at 5 % level.

However, cointegration analysis does not offer any information about the direction of Granger causality. To determine the direction of causality between the variables we must look at the results based on the ECM model. Table 6 and 7 show the results based on the ECM model. The number of lags used in regressions was selected using Akaike's (1969) Final Predictor Error Criterion (FPE). Direction of causality between the variables does not change when either turnover rate or market capitalization is used as a measure of stock market development.

Figure 2: The Causality Relationship Between Economic Growth, Banking Sector and Stock Market



Results of these analysis show that there is a positive long-term causality relationship between economic growth and banking sector development and stock market development in both models. Granger causality from stock market development to economic growth in the long term and Granger causality from banking sector development to economic growth in both short and long term are not rejected.

Table 6: Results of Granger Causality Tests

	F-WALD STATISTICS				*DIAGNOSTIC STATISTICS*			
	ΔLn GDP	**ΔLn BANK**	**ΔLn TOVER**	**ECT_{t-1}**	**R^2**	**χ^2_{SER}**	**$\chi^2_{HET\ ()}$**	*CHOW*
ΔLn GDP	-	*8.691** *[0.000]*	*0.823* *[0.366]*	*-0.366** *(-3.208)*	*0.72*	*4.21*	$36.13_{(30)}$	*1.52*
ΔLn BANK	*5.143** *[0.000]*	-	*3.008* *[0.053]*	*0.560** *(2.947)*	*0.42*	*4.128*	$28.80_{(34)}$	*1.68*
ΔLn TOVER	*0.086* *[0.768]*	*0.068* *[0.389]*	-	*0.384* *(0.389)*	*0.24*	*3.776*	$15.34_{(22)}$	*0.79*

Note: Numbers in the parentheses represent values of t-statistics. Numbers inside brackets are p-values for Fvald-statistics. * Significant at the 1% level.
χ^2 SER indicates Breusch-Godfrey (BG)for serial correlation.
$\chi^2_{(\ )}$ HET indicates White's heterojedusticity test statistics.
April 1994 economic crisis is taken as the break point for the CHOW test.

On the other hand, our findings suggest there be directionally causality relationship between economic growth and banking sector development in both models. Economic growth brings along with it the growth of the real sector. And since the growth of real sector means more investment and the need for funding these investments, the demand for the bank loans (credits) increases. On the other hand, the development of the banking sector means the funding of more productive and more investments and this enhances the economic growth. These results are consistent with the models that anticipate that a well functioning financial system would reduce transaction costs and thus enhance economic growth by allowing efficient allocation of resources.

Another considerable result is the relationship between stock market development (when turnover or market capitalization is employed as stock market variable) and banking sector development. While stock market development is the meaningful Granger cause of banking sector development in the long-term, our data do not support a reverse relationship. This result between banking sector development and stock market development can be interpreted that stock market development stimulates banking sector development because the stock markets provides services different from banks.

Table 7: Results of Granger Causality Tests

F-WALD STATISTICS				DIAGNOSTIC STATISTICS				
	ΔLn GDP	ΔLn BANK	ΔLn MARKET	ECT_{t-1}	R^2	χ^2 SER	χ^2 HET()	*CHOW*
ΔLn GDP	-	*8.682** *[0.000]*	*0.572* *[0.450]*	*-0.284** *(-2.595)*	*0.72*	*5.38*	$37.43_{(30)}$	*1.58*
ΔLn BANK	*4.517** *[0.000]*	-	*1.604* *[0.053]*	*0.483** *(2.690)*	*0.39*	*2.72*	$56.78_{(32)}$	*1.52*
ΔLn MARKET	*0.088* *[0.770]*	*2.561*** *[0.030]*	-	*0.613* *(0.221)*	*0.10*	*0.94*	$15.72_{(16)}$	*1.71*

Note: Numbers in the parentheses represent values of t-statistics. Numbers inside brackets are p-values for Fvald-statistics. * Significant at the 1% level. ** significant at the 5 % level.
χ^2 SER indicates Breusch-Godfrey (BG)for serial correlation.
χ^2 ( ) HET indicates White's heterojedusticity test statistics.
April 1994 economic crisis is taken as the break point for the CHOW test.

V. Conclusion

In this paper, the relationships between banking sector development, stock market development and economic growth in Turkey are investigated for the period between 1989-2000 via cointegration and Granger causality tests. The empirical evidences indicate that both stock market development and banking sector development have a positive relationship with the economic growth. The hypothesis that the financial system development as a whole in Turkey is very important for economic growth and that it would enhance economic growth can not be rejected. Again, the research evidences agree with the theories that stress that the financial system development as a whole has an important positive role in the economic growth process.

Another important finding of the paper is that banking sector development induces the economic growth indirectly through stock market development. This result can be interpreted that stock market development is not a substitute for but a complementary of banking sector development in the economic growth process. Thus, since the policies to be implemented aiming to develop banking sector in Turkey without considering stock market development would slow down the economic growth, this issue should be considered while determining the financial policies.

References

Akaike, H., "*Fitting Autoregressive Models for Prediction"*, Annals of the Institute of Statistical Mathematics, 21, 1969, pp.243-247.

Arestis, P., Demetriades, P., *"Financial Development and Economic Growth",* Economic Journal, 107, 1997, pp.783-799.

Arestis, P., Demetriades, P. O., Luintel, K. B., *"Financial Development and Economic Growth: The Role of Stock Markets,"* Journal of Money, Credit, and Banking, 33, 2001, pp.16-41.

Beck, T., Ross, L., *"Stock Markets, Banks, and Growth: Panel Evidence"*, NBER Working Paper, No: 9082, 2002.

Blackburn, K., Hung, V. T. Y., *"A Theory of Growth, Financial Development and Trade",* Economica, 65, 1998, pp.107-124.

Davidson, R., Mackinnon, G., Estimation and Inference in Econometrics, New York: Oxford University Press, 1993.

Demetriades, P., Hussein, K. A., *"Does Financial Development Cause Economic Growth",* Journal of Development Economics, 51, 1996, pp.387-411.

Demirgüç-Kunt, A., Levine, R., *"Stock Market Development and Financial Intermediaries: Stylized Facts",* World Bank Policy Research Working Paper, No: 1462, 1995.

Devereux, M. B., Smith, G. W., *"International Risk Sharing and Economic Growth,"* International Economic Review, 35, 1994, pp.535–50.

Dickey, D. A., Fuller, W. A., *"Distribution of the Estimators for Autoregressive Time Series with a Unit Root",* Journal of the American Statistical Association, 74, 1979, pp.427–431.

Engle, R. F., Granger C. W. J., *"Co-integration and Error Correction: Representation, Estimation, and Testing"*, Econometrica, 55, 1987, pp.251–276.

Filer, R. K., Hanousek, J., Campos, N., *"Do Stock Markets Promete Economic Growth",* William Davidson Institute Working Paper, No: 267, 1999.

Granger, C. W. J., *"Investigating Causal Relations by Econometric Models and Cross-spectral Methods",* Econometrica, 37, 1969, pp.424-438.

Harrison, P., Sussman, O., Zeira, J., *"Finance and Growth: Theory and New Evidence"*, Federal Reserve Board Discussion Paper, No. 35, 1999.

Johansen, Soren, *"Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models,"* Econometrica, 59, 1991, pp.1551–1580.

Johansen, S,. Katarina, J., *"Maximum Likelihood Estimation and Inferences on Cointegration—with Applications to the Demand for Money"*, Oxford Bulletin of Economics and Statistics, 52, 1990, pp.169–210.

Jung, Woo S., *"Financial Development and Economic Growth: International Evidence",* Economic Development and Cultural Change, 24, 1986, pp.333-346.

Kwiatkowski, D., and others, *"Testing the Null Hypothesis of Stationary against the Alternative of a Unit Root,"* Journal of Econometrics, 54, 1992, pp.159-178.

King, R. G., Ross, L., *"Finance and Growth: Schumpeter Might Be Right",* Quarterly Journal of Economics, 108, 1993a, pp.717-737.

____ , *"Finance Enterpreneurship and Growth: Theory and Evidence"*, Journal of Monetary Economics, 32, 1993b, pp.513- 542.

Levine, Ross, *"Financial Development and Economic Growth: Views and Agenda"*, Journal of Economic Literature, Vol. XXXV, 1997, pp.688-726.

Levine, R., Zervos, S., *"Stock Market Development and Long-Run Growth",* World Bank Policy Research Working Paper 1582, 1996.

Levine, R., Sara, Z., *"Stock Markets, Banks and Economic Growth"*, American Economic Review, 88, 1998, pp.537-558.

Levine, R., Loayza, N., Beck, T., *"Financial Intermediation and Growth: Causality and Causes"*, Journal of Monetary Economics, 46, 2000, pp.31-77.

Luintel, K., Mosahid, K., *"A Quantitative Reassessment of the Finance-Growth Nexus: Evidence form a Multivariate VAR,"* Journal of Development Economics, 60,1999, pp.381-405.

Neusser, K., Kugler, M., *"Manufacturing Growth and Financial Development: Evidence from OECD Countries",* Review of Economics and Statistics, 80, 1998, pp.638-646.

Obstfeld, Maurice, *"Risk-Taking, Global Diversification, and Growth,"* American Economic Review, 84, 1994, p. 1310–29.

Pagano, M., *"Financial Markets and Growth: An Overview",* European Economic Review, 37, 1993, pp.613-22.

Rousseau, P. L., Wachtel, P., *"Financial Intermediation and Economic Performance: Historical Evidence from Five Industrial Countries,"* Journal of Money, Credit, and Banking, 30, 1998, pp.657-78.

Saint-Paul, Gilles, *"Technological Choice, Financial Markets and Economic Growth",* European Economic Review, 36, 1992, pp.763-781.

Shan, J. Z., Morris, A. G., Sun, F., *"Financial Development and Economic Growth: An egg-and-chicken problem?"*, Review of International Economics, 9, 2001, pp.443-454.

Sinha, D., Macri, J., *"Financial Development and Economic Growth: The Case for Eight Asian Countries,"* Economia Internazionale, 55, 2001, pp.219-237.

The ISE Review Volume: 7 No: 25-26 January-June 2003
ISSN 1301-1642 © ISE 1997

AN ANALYSIS ON THE DIVIDEND POLICY OF THE ISTANBUL STOCK EXCHANGE (ISE) CORPORATIONS: CASH DIVIDEND–INDUSTRY BEHAVIOR RELATION

Mustafa Kemal YILMAZ*

Abstract
Dividend policy behavior of corporations operating in emerging markets is significantly different from the widely accepted dividend policy behavior of corporations operating in developed markets. There has been much discussion in dividend policy, industry ranking by dividend among academicians. This study examines the effect of cash dividends on stock market by covering the difference between cash and net cash dividend (cash dividend - rights offerings) and the differentiation of industry ranking for one of the leading emerging markets, the Istanbul Stock Exchange (ISE), for the period between 1990-2002 for industry ranking with a free distribution right for cash dividends after 1995. Our results are consistent with those of many other studies. Industry ranking by cash dividend ratio neither change dramatically nor show a stable trend over years, but is considerably affected from economic changes. The most affected industry from the economical changes is the financial institutions with banks taking place in the first rank. Interestingly, net cash dividend ratio shows a downward sloping trend following the rights offerings after the year 1995. Thus, it can be concluded that cash dividends affect industry ranking moderately and this evidence challenges the significant impact of cash dividends on the stock market, which cause much discussion on the effectiveness of cash dividends in the financial markets.

I. Introduction

Dividend policy and profit distribution carry out a vital role in the global world economy for the corporations operating at both domestic and international markets where competitiveness becomes more and more important. Corporations aiming to appeal to new shareholders and to stimulate trading on their stocks through the capital market should inevitably establish and maintain an effective dividend policy. In this respect, dividend policy plays an important role in defining the corporate strategy as well as in taking further steps in the life cycle of companies.

Dividend policy that orients firms to consider various interrelated issues together, influences both the shareholders and other relevant parties that

* Dr. Mustafa K. Yılmaz, Floor Specialist, ISE Derivatives Market Department.
Tel: (0212) 298 24 94 E-Mail:mustafa.yilmaz@imkb.gov.tr

do not have direct relation with the company. From this point of view, the theoretical analysis of the interaction matrix among all these variables and the creation of an analytical solution for the optimization of dividend policy for corporations become very difficult. For these reasons, dividend policy is generally defined as a critical decision between making dividend payment and retaining earnings in the company to finance new investment opportunities and growth in the forthcoming future.

The yardstick that firm management takes into consideration while determining right dividend policy for the company is the cost of capital and its availability. On the other hand, while deciding on dividend payout ratio, other factors such as minimum or maximum limitation set for dividend payout ratio by regulatory authorities, tax regulations on dividend and capital gains, inflation, accounting system should also be taken into account by the corporations. From this perspective, while on the one hand corporations should satisfy the dividend payout ratio set by regulation, on the other hand they should protect the wealth of the company while establishing self-financing policies by retaining a considerable portion of the earnings.

In this study, within the context of dividend policy, cash dividend payout policy of corporations whose shares have been traded in the Istanbul Stock Exchange (ISE) is analyzed for the period between 1986-2001 focusing on industrial differentiation in particular. The paper is organized as follows. The next section reviews literature. The third section provides a general outlook to the dividend payout ratio pursued by developed and developing countries and then discusses the regulatory framework applicable for the ISE traded corporations in Turkey. The fourth section presents the data and methodology while the fifth section presents the empirical results. Summary and conclusions are reported in the last section.

II. Literature Review

Despite the rich literature on the overall issue of dividend policy and its relation with the firm value and industry, most studies stand to be far from providing insights about the dividend policy effect on firm valuation and the dividend policy, as Black (1976) stated in his article, stays being a puzzle on the strategic firm development process.

In a study held by Baker and Powell (1999 and 2000) on a survey sent to 603 chief financial officers of US firms listed on the New York Stock Exchange (NYSE), based on useable responses, the empirical results show that most survey respondents believe that dividend policy affects firm value, but that there is no difference among different industries for the ranking of important factors affecting dividend policy. In another survey research held by Farrelly, Baker, and Edelman (1985) it is revealed that corporate managers typically believe that dividend policy affects a firm's value to a considerable extent.

Michel (1979) and Baker (1988), in their relevant studies, represent evidence that dividend policies vary across industries. In another comparative study conducted by Ho (2003) on dividend policies in Australia and Japan, an industry effect is found to be significant in both countries. Lintner (1956), in his classic article, has suggested that dividend policies of firms in the same industry and certain factors (sales volume, current profit, internal fund flows) may be positively correlated and that firms operating within the same industry may be expected to pursue similar policies as they operate in the same environment. As well, Michel (1979), studying American firms in 1967-1976, has also found evidence for the industry classification related to the level of dividends.

Aivazian, Booth and Cleary (2003) comparing dividend policies of firms operating in eight emerging market countries to the US firms' dividend policy behavior, indicated that a firm's dividend policy is affected by profitability, size, debt, risk and growth. The study also shows that dividend policies of firms in the bank-oriented systems of Turkey, Zimbabwe, Pakistan and India to be the least simulated compared to those of US firms[1]. In this study, among the eight developing countries, in the period between 1981-1990, Turkey with an average dividend payout ratio of 60 % and a median dividend payout ratio of 62 % is placed in a significant position compared to the other seven developing countries. The reason for this is that, in Turkey, firms were constrained to provide cash dividends equal to the largest 50 % of earnings or 20 % of paid-in-capital, up to 75 % of earnings in the mentioned period.

In a study held by Glen, Karmokolias, Miller and Shah (1995) on seven emerging market countries, it is revealed that emerging market firms place more emphasis on dividend payout ratios than they do on the level of dividend paid. As a result, dividend payments tend to be more volatile in the emerging markets than in the developed countries. In the same study, interviews with the firms' managers revealed no indication that an industry norm existed or played an important role in their decision[2] on dividends.

III. A General Outlook to the Development in the World and Turkey

3.1. Statistical Facts for Dividend Policy

The dividend payout ratio and dividend payments by corporations over their current earnings in both developed and developing countries are highly affected from both internal factors such as board of directors decisions, long term capital investment policy and external factors such as regulatory

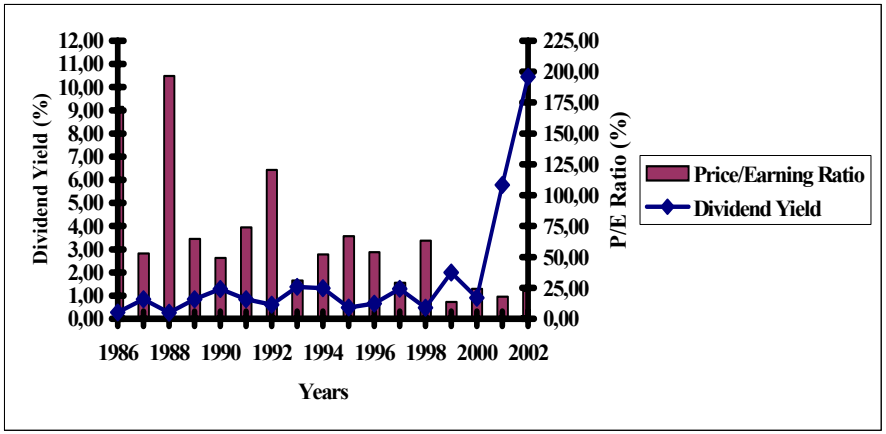
[1] The countries are; Korea, India, Malaysia, Thailand, Zimbabwe, Jordan, Pakistan and Turkey.
[2] The countries are; Chile, India, Jamaica, Mexico, Philippines, Thailand and Turkey.

environment, shareholders preferences, social and economical indicators. Table 3.1 shows the dividend yield and dividend payout ratio figures for some of the developed and emerging market countries, obtained from the "Standard & Poors Global Market Factbook" for the period 1993-2002.

Generally speaking, one of the peculiarities coming out of the dividend policies of firms is that dividend yield and price/earnings (P/E) ratio generally follows an inverse relationship. That is, firms with high dividend yields have relatively low P/E ratios. The most important reason for this fact is that, P/E ratio is considered by most of the investors as an indicator of the firm growth, for earnings not paid as dividends can be reinvested and the potential for higher future earnings can be expected. This fact also comes to be true when figures are analyzed for Turkey for the period 1988-2002 (Figure 3.1)[3].

When one multiply these two indicators, namely dividend yield and P/E ratio, dividend payout ratio can be obtained. When dividend payout ratio in Turkey is analyzed over time, it depicts a volatile picture. Especially, in the years preceding 1994 and 2001 where an economic crisis was experienced, the "interest income item" had a big share among other income items and firms, in a way, became obliged to distribute high dividends to their shareholders from the net profits obtained at the end of the years 1993 and 2000. However, in the period between these two crises, dividend payout ratio in Turkey was realized at about 35-40 % level (Figure 3.2).

Figure 3.1: Price/Earnings Ratio and Dividend Yield for the ISE Corporations (1986-2002)



Source: ISE Annual Reports.

[3] Dividend yield is calculated by dividing dividend per share to price per share, and dividend payout ratio is calculated by multiplying dividend yield and price/earnings ratio.

Table 3.1: Dividend Yield (DY) and Dividend Payout Ratio (DPR) in Some of the Developed and Emerging Market Countries (%) (1993-2002)

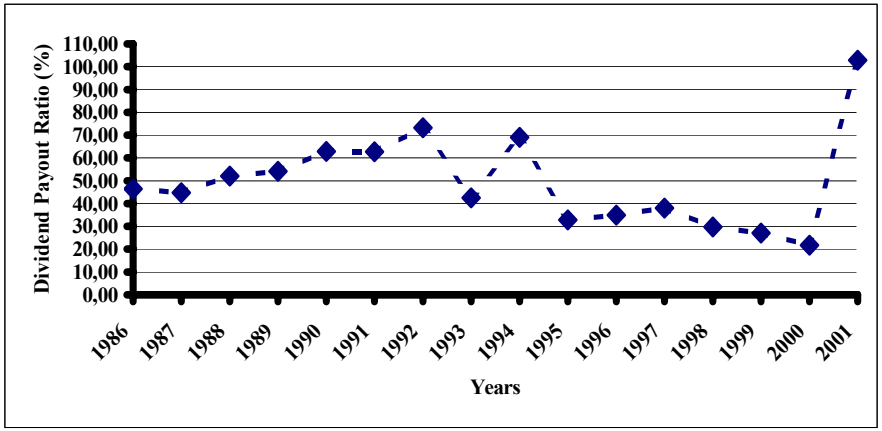
Country	1993		1994		1995		1996		1997	
Developed	DY	DPR	DY	DPR	DY	DPR	DY	DPR	DY	DPR
France	2.8	**67.2**	3.3	**87.5**	3.5	**90.0**	2.9	**109.6**	2.4	**65.8**
Germany	2.5	**62.0**	3.0	**117.3**	3.0	**68.4**	2.6	**59.5**	2.1	**56.9**
Italy	1.9	**206.7**	1.8	**119.2**	1.9	**70.7**	2.5	**61.0**	1.7	**44.0**
Spain	3.9	**58.5**	4.4	**91.5**	3.8	**54.7**	3.0	**51.6**	2.3	**55.2**
UK	3.8	**90.4**	4.4	**72.2**	4.2	**67.2**	4.2	**65.9**	3.4	**62.9**
USA	2.5	**51.5**	2.8	**46.8**	2.3	**43.0**	2.0	**40.2**	1.6	**37.8**
Emerging										
Brazil	0.4	**5.0**	0.7	**9.2**	3.4	**123.4**	2.3	**33.4**	3.9	**48.4**
Chile	2.7	**54.0**	2.4	**51.4**	3.5	**59.9**	3.9	**56.9**	3.9	**57.3**
Poland	0.4	**12.6**	0.4	**5.2**	2.6	**18.2**	1.2	**17.2**	1.5	**17.1**
Greece	5.8	**55.1**	5.4	**52.9**	6.5	**74.1**	6.2	**58.9**	3.2	**55.4**

Country	1998		1999		2000		2001		2002	
Developed	DY	DPR	DY	DPR	DY	DPR	DY	DPR	DY	DPR
France	2.3	**58.0**	1.7	**56.1**	1.8	**58.3**	2.0	**37.6**	3.6	**83.9**
Germany	2.1	**55.0**	1.9	**53.2**	2.4	**56.6**	2.3	**50.8**	2.9	**63.2**
Italy	1.3	**48.9**	1.5	**46.2**	1.6	**46.9**	2.1	**38.9**	3.5	**67.6**
Spain	1.9	**47.9**	2.2	**63.6**	2.0	**46.4**	2.2	**38.5**	3.2	**43.8**
UK	3.1	**62.0**	2.7	**66.2**	2.9	**67.0**	2.8	**52.4**	4.1	**89.0**
USA	1.4	**36.7**	1.3	**41.5**	1.4	**38.9**	1.6	**36.8**	2.0	**40.6**
Emerging										
Brazil	7.8	**54.6**	3.2	**75.2**	3.7	**42.6**	6.6	**58.1**	4.4	**59.4**
Chile	4.1	**61.9**	3.0	**105.0**	2.5	**62.3**	8.2	**132.8**	3.0	**48.9**
Poland	1.5	**16.1**	0.9	**19.8**	0.8	**15.5**	2.6	**15.9**	1.4	**124.0**
Greece	2.1	**52.3**	1.2	**43.3**	2.3	**35.2**	2.6	**35.9**	4.9	**48.0**

Source: Standard & Poors Global Market Factbook 2003.

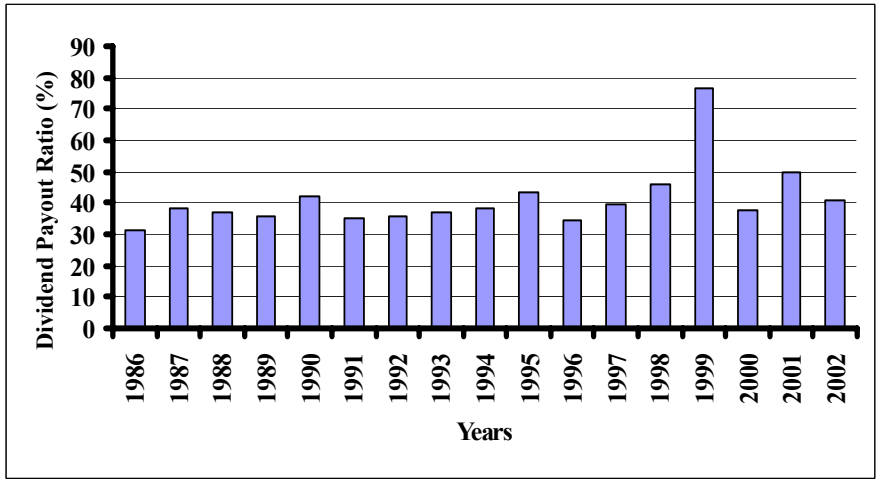
When dividend policies pursued by different country groups are analyzed, the payout ratio for a composite of all emerging market countries ranged from 30 to 40 percent over the period 1986-1994 with slight differences from year to year, while it varied within a larger range between 1995-2002 (Figure 3.3). Although dividend payout ratio ranged from 30 to 40 percent for developing counties between 1986-1994, by comparison, a global index of developed countries had a substantially higher level payout ratio for any year (e.g. 66 % in 1993). On the other hand, especially over the last years, among developed countries, while the dividend payout ratio of Japanese companies show a declining trend, those of the US firms show an upward direction. The overall average dividend payout ratio for developed countries from 1995 to 2002 is about 45-50 %. In the study held by Glen, Karmokolias, Miller and Shah (1995), it is stated that dividend payments tend to be more volatile in the emerging markets than in developed markets.

Figure 3.2: Average Dividend Payout Ratio for the ISE Corporations (%) (1986-2001)



Source: ISE Annual Reports.

Figure 3.3: Dividend Payout Ratio in the Emerging Market Countries (%) (1986-2002)



Source: Glen (1995) and Emerging Stock Markets Factbook 1997, 1998, 1999, 2000 and 2001.

3.2. Regulatory Environment in Turkey

When the regulatory framework for dividend policy in Turkey is reviewed until today, the relevance of cash dividend payments for publicly-owned corporations had been discussed at various platforms in the period before 1982 and a minimum payout ratio was tried to be set for the protection of

shareholders rights (Aytaç, 1997)[4]. Pursuant to Article 15 of the Capital Markets Law No. 2499 (as amended by Law 3794) that came into effect in 1982 and Article 7 of the Capital Markets Board (CMB) Communiqué IV, No: 1 concerning the "Principles Binding the Joint Stock Corporations Subject to the Capital Markets Law" (First Dividend and Dividend Payments) published on February 26, 1982, publicly owned corporations became obliged to distribute a certain percentage of their net profits as "first dividend". For the period between 1982-1994, the CMB set the minimum dividend payout ratio as 50 % of the distributable profit[5]. According to the aforementioned Article 15, all other dividend payments such as payments to employees or keeping it as retained earnings were not legally possible before the payment of "first dividend". During this period, dividends had to be paid to shareholders within 9 months after the end of the financial calendar (Adaoğlu, 1999).

In 1995, there was a significant change in the regulations providing extensive flexibility in dividend policy decision making for the corporations whose shares have been traded in the ISE. The first major change shortens the dividend payment period from 9 to 5 months. The second major change modifies the framework for the "first dividend" payment for corporations whose shares are traded on the ISE. For these corporations only, the "first dividend" payment is not compulsory any more (Official Gazette dated 27/12/1994, No. 22154, Communiqué IV. No. 9 "Principles for the Issuers Exemption Rules and Delisting Procedures"). However, this flexibility is not applicable for the corporations whose shares are not traded on the ISE. Additionally, by a Communiqué issued by the CMB on March 14, 1995 (Communiqué IV No: 10), if an ISE corporation decides to distribute the "first dividend", it can distribute it in cash and/or in stock dividends. It can also distribute dividends below the 50 % limit if the decision has been approved in the annual general assembly meeting. In summary, the ISE corporations have the following choices for their dividend policy according to these new regulations:

- all of the "first dividend" can be distributed in cash;
- all of the "first dividend" can be distributed in stock dividends;
- part of the "first dividend" can be distributed in cash and part of it can be distributed as stock dividends
- the corporation can retain the entire "first dividend" without paying it in cash and/or in stock dividends.

[4] Before 1982, to prevent companies from paying high dividend payments from earnings, the dividend payout ratio was set at 75 % of the net profit at most. However, this limitation became invalid by the Capital Market Law No. 2499 that came into effect in 1982.

[5] In the first part of Article 7 in this Communique, it is stated that; "first dividend" payment amount for the ISE corporations should not be less than 50 % of the distributable profit calculated after deducting taxes and other similar expenses from the net profit".

In addition to these regulations, the CMB Communiqué IV, No. 27 on the "Principles Concerning Dividends and Interim Dividends for Corporations Subject to the Capital Markets Law" issued on November 11, 2001 provides firms the opportunity to distribute interim dividends on a 3, 6 and 9 months periods from the net profits declared in their audited interim financial statements.

Finally, due to the decision taken on December 30, 2003, No. 16535 that was published in the weekly bulletin No. 2003/63, the CMB brings a mandatory dividend policy rule by setting a minimum dividend payout ratio of 20 % of the distributable profits as "first dividend" starting as of January 1, 2004 for the ISE corporations subject to the Capital Markets Law in Turkey. According to the same decision, inflation adjusted financial statements or statements prepared according to the international accounting standards should be taken into consideration for this purpose. The CMB allows the ISE corporations to distribute their dividends as cash and/or stock dividends subject to voting in the annual general meeting. The general view on this new regulatory framework is that the CMB aims to revive the capital markets as well as the stock exchange in 2004 taking into consideration the improving economical environment experienced in Turkey during the year 2003.

IV. Data and Methodology

In this study, distributed cash dividends, rights issues, stock dividends and net cash dividends (cash dividends minus rights issues) figures of the 310 ISE corporations that have traded between 1986-2001 are used in order to investigate the regulatory and industry influence on dividend policy. The data for empirical tests are obtained from the ISE publication "ISE Companies: Capital and Dividend Data: 1986-2001" and the ISE Annual Reports[6].

As a first step, the dividend policy of the ISE corporations is presented throughout the years to provide some insights about the issue. Then, the average cash and net cash dividend payout ratios on the basis of time and industry groups are investigated. Due to taxes applied to cash dividends distributed from 1999 profits and paid to shareholders in 2000, the cash dividend payment figures and dividend payout ratios are calculated by taking the net figures into consideration after 1999. As there were no such taxes before, the gross and net dividend values are accepted to be the same until the year 1998.

The data sample used to calculate average dividend payout ratios covers all the ISE corporations traded between 1986-2001. The sample industry groups, as classified by the ISE, are "Food, Beverage and Tobacco",

[6] The reason for excluding year 2002 from this study is that the following companies that have been included in the database between 1990-2001, have no longer been traded in the ISE since 2002 as their trading were halted: Aktaş Elektrik, Aktif Finans, EGS Dış Ticaret, Emek Sigorta, Gümüşsuyu Halı, İntermedya, Kepez Elektrik, Köytaş Tekstil, Rant Finansal Kiralama, Sezginler Gıda, Sınai Yatırım Bankası, Söksa, Toprakbank and Yasaş.

"Textile, Wearing Apparel, and Leather", Paper, Paper Products, Printing and Publishing", "Chemical, Petroleum, Rubber and Plastic", "Non-Metallic Mineral Products", "Basic Metal", "Fabricated Metal Products", "Machinery and Equipment", "Electric, Gas and Water", "Wholesale and Retail Trade", "Hotels and Restaurants", "Banks", "Insurance Companies", "Financial Leasing and Factoring Companies", "Holdings and Investment Companies", "Investment Trusts and Brokerage Houses", "Technology Companies".

Moreover, in this study, total net profit and cash dividend payment figures of the ISE corporations are adjusted according to the calculated State Institute of Statistics (SIS) Wholesale Price Index (1987=100) and the cycles in both variables are observed across time.

V. Empirical Results

5.1. Dividend Policy Behavior of the ISE Corporations

The dividend policy behavior of ISE corporations is presented in Table 5.1 by using the total amounts for cash dividends, bonus issues, stock dividends, rights issues and net cash dividends (cash dividends minus rights issues) figures. Table 5.1, however, does not include the figures of those of the corporations that have been merged or acquired by other companies[7].

Referring to Table 5.1, the most interesting finding on the dividend policy behavior is the fact that the ISE corporations collect back the distributed cash dividends paid from their earnings through simultaneous rights issues for acquiring new equity (exercising of pre-emptive rights). However, the simultaneous distribution of cash dividends and the rights offerings is no different than distributing stock dividends. This can be clearly observed from the "Net Cash Dividends" figures calculated in Table 5.1. In 1987, 1989, 1990, 1991, 1992, 1994, 2000, 2001 and 2002, in particular, the ISE corporations collected back more than the cash dividends that they distributed to shareholders.

Another interesting dividend policy behavior is that the ISE corporations distribute substantial amount of bonus dividends. As corporations are allowed to transfer the revaluation fund to the paid-in-capital by paying bonus dividends to the shareholders, they use this internal source for this purpose. Moreover, starting from 1995, the ISE corporations have preferred to distribute stock dividends rather than cash dividends. Financial researches on this subject stated that the main objective in distributing stock dividends is to conserve cash and at the same time satisfy the shareholders. Aydoğan and Muradoğlu (2003) claim that Turkish corporations issue bonus

[7] Corporations which have been merged or acquired by other companies are: Akçimento, Anadolu Biracılık, Ardem, Bugün Yayıncılık, Çanakkale Çimento, Ege Biracılık, Erciyas Biracılık, Güney Biracılık, Koç Yatırım, Pınar Entegre Et, Pınar Un, Tofaş Oto Ticaret and Turcas Petrolcülük.

and stock dividends in order to increase the book-value of their paid-in capital. By doing so, they can keep consistent debt to paid-in-capital ratios.

Table 5.1: Cash Dividends, Rights Issues and Bonus Issues for the ISE Corporations (in TL Billion)[8]

Distribution Year	Cash Dividends	Bonus Issues *(Internal Resources)*	Bonus Issues *(Stock Dividends)*	Rights Issues (Pre-emptive)	Net Cash Dividends
1986	60.35	49.38	-	41.77	18.58
1987	128.29	108.28	-	334.94	-206.65
1988	254.19	130.78	-	181.68	72.51
1989	552.40	562.48	-	846.78	-294.38
1990	1,399.73	2,916.71	-	1,405.02	-5.29
1991	2,905.79	4,111.21	-	5,554.41	-2,648.62
1992	4,875.97	3,932.25	-	4,925.71	-49.74
1993	8,085.76	6,092.63	-	4,704.17	3,381.59
1994	21,095.43	17,788.10	-	27,112.36	- 6,016.93
1995	44,773.02	40,716.88	4,576.07	40,504.72	4,268.30
1996	93,397.11	90,509.17	15,851.06	49,443.95	43,953.16
1997	197,393.97	186,045.17	21,894.80	139,416.12	57,977.85
1998	356,604.30	417,924.48	60,639.99	326,892.50	29,711.80
1999	432,254.00	1,018,117.00	183,150.00	369,439.00	62,815.00
2000	590,222.00	1,358,298.00	786,112.00	731,985.00	-141,763.00
2001	650,013.00	2,589,367.00	291,145.00	1,104,297.00	-454,284.00
2002	674,513.00	1,823,246.00	243,492.00	1,706,714.00	-1,032,201.00
Total	**3,078,528.31**	**7,559,915.58**	**1,606,860.92**	**4,513,799.13**	**-1,435,270.82**

Source: ISE Annual Reports.

5.2. Dividend Policy–Industry Relation

While the dividend policy of corporations operating in different industry groups may vary, it is as well possible to observe the dividend policy differentiation among companies operating in the same industry group. Table 5.2, focusing only on the level of cash dividend payments, presents the average cash dividend payout ratio across time for four broadly classified industry groups. While making this classification, manufacturing and financial institutions are expected to reflect the "financial" and the "industrial" indices published by the ISE, wholesale-retail trade and hotels and restaurants are expected to present the services industry, and finally electricity, gas, and water companies are expected to reflect the regulated utility industry. In the

[8] The emission premium used by some of the companies in the case of rights issues could not be excluded from the total figure, as there is not enough data for this item. Nevertheless, interviews with the ISE experts reveal that the total emission premium is at such a negligible level in the market that it is not expected to affect the overall findings of the study.

following part of the study, an enlarged industry classification will be used for making a detailed analysis on industry basis.

The analysis is divided into three sub-periods taking into consideration the historical development of the ISE. The first period is between 1986-1989, the early growth period of the ISE whereby the financial sector began to be incited in a relative way. In this period, a limited number of companies were traded in the ISE. The second period is between 1990-1994 period, during which the stock exchange was growing fast in terms of trading volume, market value and the number of corporations. The reason for limiting this period up to 1995 is the fact that the Turkish economy had experienced an economic crisis in 1994 and new regulations about dividend policy were put into effect just before 1995, which provided flexibility for the distribution of dividends from net profits. The last period covers the 1995-2001 period where the Turkish economy had experienced ups and downs.

Table 5.2: Average Cash Dividend Payout Ratio for Broadly Classified Industry Group in the ISE

Industry Groups	1986-1989	1990-1994	1995-2001
Manufacturing	55.49 %	55.88 %	33.34 %
Financial Institutions	65.08 %	62.55 %	24.79 %
Wholesale/Retail Trade, Hotels and Restaurants	45.53 %	52.90 %	27.00 %
Electricity, Gas and Water	49.42 %	81.94 %	56.35 %

Source: ISE Annual Reports.

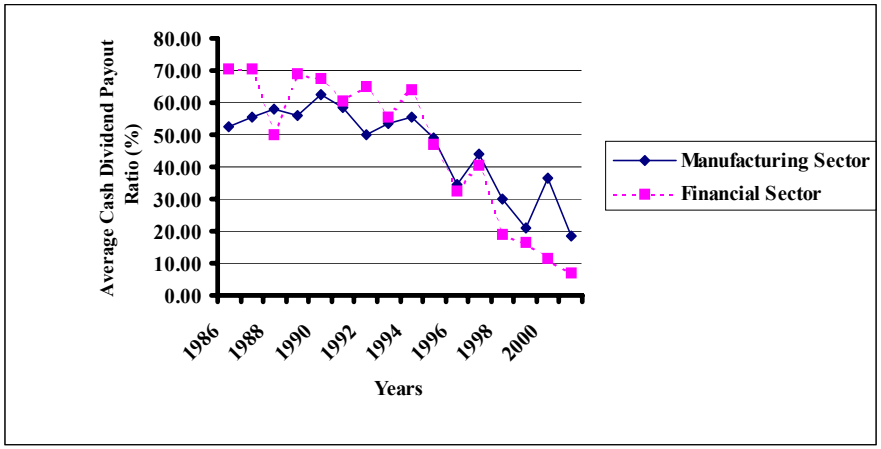
In the period between 1986-1994, when the average cash dividend payout ratio among different industry groups is analyzed, it is observed that the average cash dividend payout ratio in companies operating in the financial sector tends to be higher than those of the companies operating in the manufacturing sector over time. However, the difference between these two-industry groups did not exceed 15-20 points at any time during this period. Although most of the companies are heavily affected from the economic crisis experienced in 1994, the major change in the dividend policies of the ISE corporations has been experienced after 1995. The aforementioned trend between these two-industry groups has completely changed; cash dividend payout ratio of companies operating in the manufacturing industry became higher than those of the companies operating in the financial sector after 1995 (Figure 5.1). On the other hand, economic crises that the Turkish economy has experienced in November 2000 and February 2001, affected most of the firms negatively and corporations significantly decreased dividend payments to their shareholders in all industry groups. The only industry group where no serious

decrease has been observed is the utility industry (electricity, gas and water corporations). These corporations maintained having higher cash dividend payout ratios over time. Studies in other countries also reveal that regulated utility corporations, all over the world, tend to have high dividend payout ratios (Adaoğlu, 1999). Therefore, this findings for the ISE corporations is in line with the empirical findings[9].

As can be seen from Figure 5.1, the dividend policy of the ISE corporations has shown a considerable change over time. While this change can be partially explained by the losses experienced due to the destabilized economic environment, regulatory changes granting flexibility to the companies in their dividend payments also has contributed to this change. After 1995, the ratio of the number of the ISE companies making dividend payments to total number of companies traded in the ISE became smaller and smaller following a downward slope, from 77 % in 1995 to 24-25 % in the years between 2000-2001 (Figure 5.2). Another factor affecting this result is the regulations set by the Ministry of Finance on the taxation of dividend payments. In parallel to the latter regulatory arrangements, corporations do not prefer making dividend payments out of their earnings. The taxation of dividend payments requires further study and analysis that this study will not go in detail. Another interesting finding of this study is that the cash dividend payout ratios of the ISE corporations were not affected badly from the 1994 economic crisis as they kept making dividend payments. This is because most of the companies operating in this period dealt not only with their own operations, but also invested their resources in Treasury bills, which provided high interest income. In this way, the ISE corporations managed the economical difficulties by benefiting from the economic rent and at the same time did not change their dividend policy to a great extent.

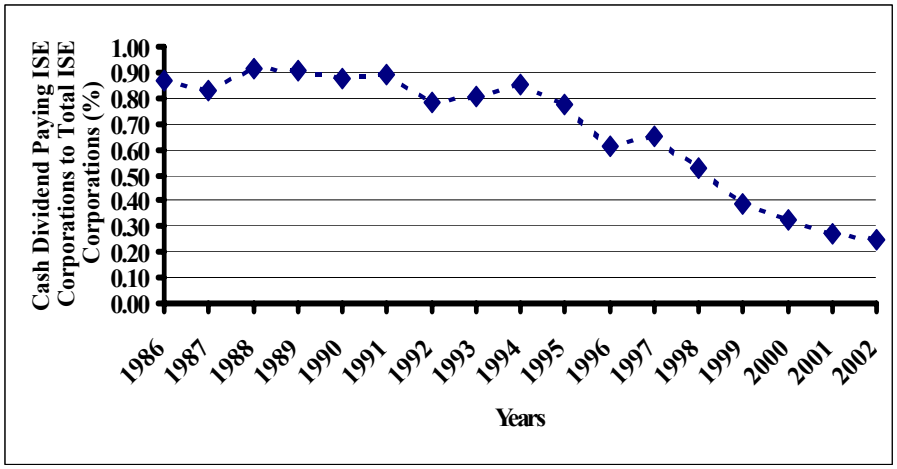
[9] In Article 7 of the Communique IV, No. 1 (as amended by Communique IV, No. 15 issued in the Official Gazette dated 01.11.1995, No.22450) concerning the "Principles Binding the Joint Stock Corporations Subject to Capital Market Law"), it is stated that the ISE corporations are given the flexibility to distribute "first dividend" as either cash or rights issues or not to distribute them at all However, in this regulation, the CMB possessed the right to set a minimum legal limit for the payment of first dividends for some of the companies if it requires necessary. Based on this regulation, the CMB, according to a decision taken on February 8, 1996 Meeting No. 9, sets a minimum legal limit for 13 companies for the payment of "first dividend". Among these companies, there are three electricity companies: Aktaş Elektrik, Çukurova Elektrik and Kepez Elektrik. This fact explains why electricity companies paid the highest cash dividends from 1995 to 2001. Other companies that are subject to this limitation are; Abana Elektromekanik, Bağfaş, Deva Holding, Ereğli Demir Çelik, Koç Yatırım ve Sanayi Mamulleri Pazarlama, Mardin Çimento, Marmaris Martı, Metaş, Petrokent Turizm, and Tire Kutsan.

Figure 5.1: Average Cash Dividend Payout Ratios for the Manufacturing and Financial Sector (1986-2001)



Note: Data is obtained from the sample compiled for the study.

Figure 5.2: The Ratio of Cash Dividend Paying Corporations to the Total ISE Corporations



Note: Data is obtained from the data sample compiled for the study.

When dividend policy of the ISE corporations are compared on industry basis, the results in Table 5.3 are obtained for the cash dividend and net cash dividend payout ratios from year 1990 to 2001.

The figures for the average cash dividend payout ratio (Csh) and net cash dividend payout ratio (NC) of companies show that there is a dramatic

decrease in the dividend payout ratio in the period between 1990-2001. In terms of the difference between "Cash-Net Cash Dividend Payout Ratio", the most notable difference is experienced in the financial sector (21 % on average) with banking sector being the pioneer (33 % on average). Other industry groups depicting high level of difference between "Cash-Net Cash Dividend Payout Ratio" are; "Holdings and Investment Companies" (21 % on average), "Paper, Paper Products, Printing and Publishing" industry (19 % on average) and "Chemical, Petroleum, Rubber and Plastic" industry (18 % on average).

When ranking among the industry groups are considered, there is a low-level positive correlation among them over time, expect for the year 1996 (Table 5.4). However, when analyzed throughout the years, the correlation has never been over 67 %, and shows less volatile trend between 1998-2000 as a result of stable economic environment in the country[10].

[10] Correlation between the series are calculated as follows:
$r_{rank} = 1 - [6\Sigma_d^2 / n (n^2 - 1)]$
d= the difference between the years in the series on industry basis.
n = number of industry groups in the series

Table 5.3: Average Cash (Csh) and Net Cash (NC) Dividend Payout Ratios by Industry Groups (1990-2001)[11]

	1990		1991		1992		1993		1994		1995	
Industries[12]	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**
I. Industry Average	0.40	**0.36**	0.46	**0.24**	0.34	**0.34**	0.47	**0.37**	0.58	**0.27**	0.55	**0.41**
No. of Firms	5	**5**	5	**5**	6	**6**	7	**7**	11	**11**	12	**12**
I. Industry Average	0.79	**0.18**	0.58	**0.28**	0.33	**0.24**	0.42	**0.39**	0.44	**0.23**	0.42	**0.20**
No. of Firms	7	**7**	12	**12**	12	**12**	14	**14**	16	**16**	20	**20**
III.Industry Average	0.79	**0.04**	0.53	**0.13**	0.59	**0.59**	0.56	**0.32**	0.49	**0.17**	0.41	**0.18**
No. of Firms	3	**3**	5	**5**	6	**6**	7	**7**	9	**9**	10	**10**
IV. Industry Average	0.82	**0.24**	0.57	**0.31**	0.48	**0.26**	0.50	**0.30**	0.58	**0.22**	0.52	**0.37**
No. of Firms	15	**15**	17	**17**	17	**17**	18	**18**	19	**19**	20	**20**
V. Industry Average	0.62	**0.48**	0.67	**0.42**	0.51	**0.38**	0.49	**0.26**	0.58	**0.39**	0.56	**0.34**
No. of Firms	15	**15**	18	**18**	18	**18**	19	**19**	19	**19**	23	**23**
VI. Industry Average	0.49	**0.22**	0.47	**0.10**	0.52	**0.37**	0.47	**0.39**	0.55	**0.38**	0.50	**0.47**
No. of Firms	8	**8**	8	**8**	9	**9**	9	**9**	11	**11**	12	**12**
VII.Industry Average	0.43	**0.33**	0.63	**0.24**	0.56	**0.21**	0.59	**0.43**	0.55	**0.27**	0.45	**0.26**
No. of Firms	12	**12**	14	**14**	17	**17**	18	**18**	21	**21**	23	**23**
VIII. Industry Average	0.74	**0.35**	0.44	**0.29**	0.37	**0.20**	0.32	**0.13**	0.53	**0.24**	0.51	**0.17**
No. of Firms	5	**5**	8	**8**	8	**8**	8	**8**	10	**10**	10	**10**
IX. Industry Average	0.63	**0.19**	0.55	**0.11**	0.58	**0.24**	0.52	**0.10**	0.59	**0.07**	0.51	**0.06**
No. of Firms	8	**8**	9	**9**	9	**9**	9	**9**	9	**9**	10	**10**
X. Industry Average	0.94	**0.94**	0.70	**0.00**	0.71	**0.00**	0.49	**0.49**	0.71	**0.26**	0.45	**0.19**
No. of Firms	1	**1**	1	**1**	1	**1**	2	**2**	5	**5**	7	**7**
XI. Industry Average	0.92	**0.92**	0.88	**0.23**	0.84	**0.51**	0.65	**0.40**	0.70	**0.07**	0.33	**0.15**
No. of Firms	1	**1**	2	**2**	2	**2**	4	**4**	5	**5**	6	**6**
XII. Industry Average	0.68	**0.34**	0.63	**0.33**	0.93	**0.17**	0.76	**0.53**	0.66	**0.29**	0.41	**0.18**
No. of Firms	7	**7**	7	**7**	9	**9**	10	**10**	11	**11**	12	**12**
XIII. Industry Average	N.A	**N.A**	N.A	**N.A**	0.72	**0.72**	0.56	**0.09**	0.58	**0.05**	0.59	**0.21**
No. of Firms	N.A	**N.A**	N.A	**N.A**	1	**1**	3	**3**	4	**4**	8	**8**
XIV. Industry Average	0.65	**0.26**	0.69	**0.69**	0.81	**0.41**	0.61	**0.29**	0.45	**0.00**	0.55	**0.28**
No. of Firms	2	**2**	2	**2**	2	**2**	3	**3**	3	**3**	3	**3**

[11] "Electricity, Gas and Water Companies" are not included in the industry analysis as the number of companies operating in the ISE (maximum 5) is not sufficient to allow one to make an effective comparison. One other reason is the fact mentioned in "Footnote 9".

[12] Industry Groups: I = Food, Beverage and Tobacco, II = Textile, Wearing Apparel and Leather, III = Paper, Paper Products, Printing and Publishing, IV = Chemical, Petroleum, Rubber and Plastic, V= Non-Metallic Mineral Products, VI = Basic Metal, VII = Fabricated Metal Products, VIII = Wholesale and Retail Trade, Hotels and Restaurants, IX = Banks, X = Insurance Companies, XI = Financial Leasing and Factoring Companies, XII = Holdings and Investment Companies, XIII = Investment Trusts and Brokerage Houses, XIV = Technology Companies.

	1996		1997		1998		1999		2000		2001	
Industries	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**	**Csh**	**NC**
I. Industry Average	0.42	**0.32**	0.85	**0.29**	0.18	**0.13**	0.14	**0.09**	0.18	**0.18**	0.20	**0.00**
No. of Firms	15	**15**	17	**17**	21	**21**	21	**21**	26	**26**	28	**28**
II. Industry Average	0.27	**0.14**	0.45	**0.36**	0.21	**0.16**	0.14	**0.12**	0.13	**0.13**	0.07	**0.00**
No. of Firms	26	**26**	33	**33**	36	**36**	36	**36**	37	**37**	37	**37**
III.Industry Average	0.46	**0.38**	0.33	**0.22**	0.36	**0.31**	0.25	**0.25**	0.19	**0.19**	0.13	**0.00**
No. of Firms	11	**11**	11	**11**	12	**12**	12	**12**	15	**15**	15	**15**
IV. Industry Average	0.56	**0.55**	0.43	**0.41**	0.36	**0.36**	0.25	**0.21**	0.34	**0.33**	0.32	**0.00**
No. of Firms	22	**22**	24	**24**	24	**24**	24	**24**	27	**27**	27	**27**
V. Industry Average	0.30	**0.14**	0.50	**0.39**	0.48	**0.32**	0.35	**0.32**	1.61	**1.61**	0.38	**0.00**
No. of Firms	23	**23**	25	**25**	25	**25**	25	**25**	27	**27**	27	**27**
VI. Industry Average	0.24	**0.24**	0.35	**0.35**	0.28	**0.28**	0.20	**0.20**	0.09	**0.09**	0.08	**0.00**
No. of Firms	12	**12**	13	**13**	14	**14**	14	**14**	14	**14**	14	**14**
VII.Industry Average	0.30	**0.20**	0.39	**0.34**	0.31	**0.31**	0.27	**0.26**	0.20	**0.19**	0.19	**0.00**
No. of Firms	24	**24**	27	**27**	28	**28**	28	**28**	29	**29**	29	**29**
VIII. Industry Average	0.29	**0.14**	0.27	**0.15**	0.29	**0.22**	0.12	**0.08**	0.04	**0.01**	0.13	**0.00**
No. of Firms	12	**12**	13	**13**	13	**13**	13	**13**	16	**16**	16	**16**
IX. Industry Average	0.43	**0.08**	0.50	**0.01**	0.28	**0.04**	0.23	**0.05**	0.04	**0.02**	0.05	**0.00**
No. of Firms	10	**10**	11	**11**	12	**12**	12	**12**	14	**14**	14	**14**
X. Industry Average	0.32	**0.11**	0.20	**0.10**	0.09	**0.07**	0.20	**0.20**	0.18	**0.18**	0.10	**0.00**
No. of Firms	7	**7**	8	**8**	8	**8**	8	**8**	9	**9**	9	**9**
XI. Industry Average	0.38	**0.11**	0.29	**0.21**	0.20	**0.10**	0.26	**0.20**	0.00	**0.00**	0.00	**0.00**
No. of Firms	6	**6**	8	**8**	8	**8**	8	**8**	10	**10**	10	**10**
XII. Industry Average	0.24	**0.24**	0.21	**0.15**	0.33	**0.20**	0.13	**0.09**	0.10	**0.07**	0.07	**0.00**
No. of Firms	14	**14**	17	**17**	19	**19**	20	**20**	23	**23**	22	**22**
XIII. Industry Average	0.25	**0.10**	0.50	**0.34**	0.18	**0.10**	0.11	**0.08**	0.17	**0.14**	0.10	**0.00**
No. of Firms	14	**14**	19	**19**	24	**24**	30	**30**	32	**32**	33	**33**
XIV. Industry Average	0.14	**0.14**	0.13	**0.13**	0.06	**0.06**	0.24	**0.24**	0.12	**0.12**	0.17	**0.00**
No. of Firms	3	**3**	3	**3**	3	**3**	3	**3**	7	**7**	7	**7**

Note: Data is obtained from the sample compiled for the study.
N.A: Not Applicable.

Dividend policies can not be evaluated independent from the economic changes. The best example for this is the effect of developments in the Turkish banking system on the banks. Although banks ranked as one of the highest dividend paying industry groups, in terms of dividend payout ratio, from 1990 to 1999, they receded to lower ranks during the 2000-2002 period, in which a serious restructuring process has been introduced in the Turkish financial system by the government. A similar trend is also observed for other financial institutions to a lesser extent. Besides this, "Chemical, Petroleum, Rubber and Plastic" and "Non-Metallic Mineral Products" industry groups also show a volatile trend over time, while some of the industry groups such as "Fabricated Metal Products", Wholesale and Retail, Hotels, Restaurants" follow a stable trend in ranking.

Table 5.4: Industry Group Ranking by Cash Dividend Payout Ratios (1992-2001)

Industry	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
I	12	12	10	13	4	1	5	5	5	5
II	11	11	11	5	3	5	3	7	4	4
III	14	14	12	1	9	9	4	11	7	1
IV	13	7	9	14	1	13	12	3	3	7
V	10	3	1	4	11	2	7	4	1	14
VI	3	13	4	8	10	4	8	14	10	3
VII	9	9	5	9	5	7	6	9	13	8
VIII	7	4	13	6	7	6	9	6	2	10
IX	6	5	6	7	8	3	2	10	14	13
X	5	10	7	10	2	11	11	1	12	6
XI	4	1	8	2	13	8	1	2	6	2
XII	8	6	3	3	6	12	13	12	8	12
XIII	1	2	14	12	12	10	10	8	9	3
XIV	2	8	2	11	14	14	14	13	11	11
Correlation		**0.41**	**0.03**	**0.09**	**-0.30**	**0.01**	**0.67**	**0.16**	**0.044**	**0.06**

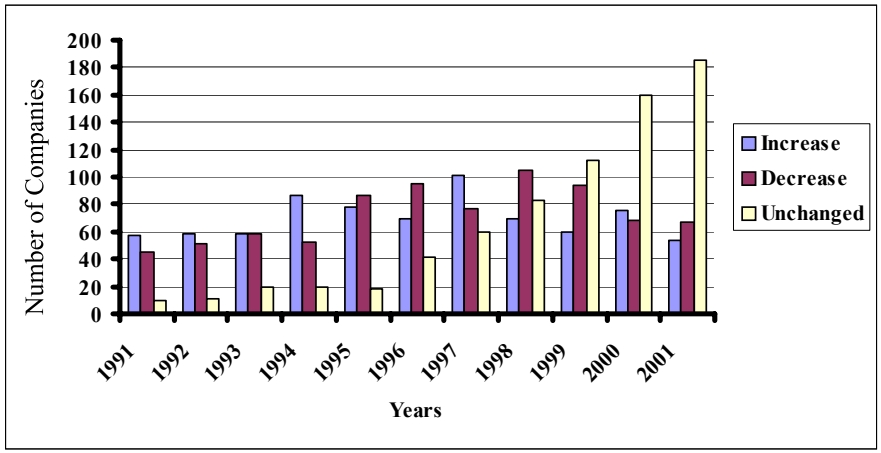
Note: Data is obtained from the sample compiled for the study.

When the dividend policy of the ISE corporations is analyzed by industry groups, the most striking feature may be that although the number of the ISE companies that increased their dividend payout ratios had a high percentage until 1995 within the total ISE corporations, there was a sharp increase in the number of the ISE companies decreasing their dividend payout ratio between 1995-1998. In the period between 1998-2003, following the changing behavior concerning the dividend policy of the ISE corporations, the percentage of the number of the ISE companies not changing their dividend payout ratio has grown to a great extent. The most appealing feature of this period is that an increasing number of the ISE companies began to employ 0.00 % dividend payout ratio that continued also in the forthcoming years. When the figures are reviewed, while the percentage of the number of the ISE companies paying no dividends (0.00 %) had a share of 11.60 % in 1991, this figure was realized at 22.53 % in 1995, 46.51 % in 1998 and finally 75.69 % in 2003. In other words, it can be stated that the ISE companies that did not change their dividend payout ratio were the ISE companies paying no dividends for a certain period of time (Figure 5.3).

In addition to these findings, one should also look at the cycles of net profits and dividend payment figures by using inflation adjusted data. For this reason, in this study, net profit and dividend payment figures of the ISE corporations are adjusted by using the State Institute of Statistics (SIS) Wholesale Price Indices (WPI) (1987 = 100) and the trend between these two

items is also analyzed (Figure 5.4)[13]. As can be seen from Figure 5.4, dividend payments by the ISE corporations trail the net profit figures and there is a meaningful cycle throughout the years.

Figure 5.3: The Number of ISE Corporations Whose Cash Dividend Payout Ratios Have Increased, Decreased and Remained Unchanged (1991-2001)

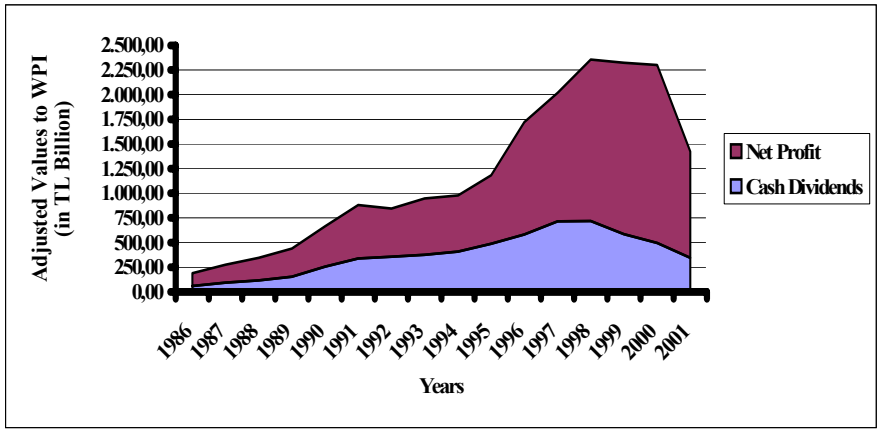


Note: It is constructed by using the database prepared for this study.

When inflation adjusted data set is analyzed, cash dividend payout ratio was realized at minimum 47 % and maximum 73 % (60 % on average) in the period between 1986-1994; and minimum 27 % and maximum 70 % (45 % on average) from year 1995 to 2001. In particular, within the four years following 1998, a severe decrease has been experienced in the cash dividend payments of the ISE corporations from their earnings. The most important reason leading to this sharp decrease on cash dividend payout ratio may be the preference of the ISE companies to retain their profits in the company and use them to finance new projects and investment opportunities in during the economic crises that prevailed in November 2000 and February 2001.

[13] Inflation adjusted figures are calculated according to the State Institute of statistics (SIS) Wholesale Price Index (1987=100) data pertaining to May every year. The reason for using the data for May is that the cash dividend payments by most of the ISE corporations are made in May every year.

Figure 5.4: Inflation Adjusted Net Profit and Cash Dividends (in TL Billion) (1986-2001)



Source: It is constructed by using the database prepared for this study and SSI WPI Data.

VI. Conclusion

Corporations' decisions on dividend payments to their shareholders may affect the stock price of the company, which is accepted as the long term value of the firm, as it may increase, decrease or remain unchanged.. At this point, the investors that buy the company stocks and expect to benefit from the dividend payments and capital gains may be affected either positively or negatively from the dividend policy.

As in other developing countries, the dividend policy of the companies in Turkey concerns all parties who have direct or indirect relation with the entity. The most serious step taken by the regulatory authorities in the Turkish capital markets is the amendment of the minimum dividend payout ratio limit. Accordingly, the procedure regarding the minimum dividend payout ratio limit of 50 % that was imposed between 1982-1994 was annulled and accordingly no limit on payment of dividends were applied after 1995 for the purpose of encouraging public offerings in the capital markets. On the other hand, the ISE corporations prefer collecting back the distributed cash dividends through simultaneous rights issues for new equity for the purpose of financing new investment opportunities. Another factor that affects the firms' dividend policy is the tax regulation imposed on dividend payments. Especially in the last 4-5 years, a sharp decrease in dividend payout ratio is observed in all industry groups, with the banking sector being the pioneer, as the sector experienced serious economic difficulties.

On the other hand, when dividend policy of the ISE corporations among industry groups are analyzed, some differences are observed among them. Because of the regulatory limit set up in 1980s, the dividend payout ratio of financial institutions tended to be higher than that of the manufacturing companies before 1994. This trend, however, is reversed, and the difference in terms of dividend payout ratio has increased year by year after 1995 and the dividend payout ratio of financial institutions decreased, in particular. Where the economic environment also plays a vital role, the ranking of the industry groups has changed over time with financial institutions ranked among the last place with a very low-level dividend payout ratio. In the last years, the industry groups that pursue more stable dividend policy are "Fabricated Metal Products", Wholesale and Retail, Hotels, Restaurants".

When all the above mentioned issues and the minimum dividend payout ratio limit of 20 % set by the CMB by the end of year 2003 are considered together, in particular, during periods in which low inflation and economic stability prevail, the government authority may encourage publicly owned companies to pay some part of their earnings as dividends and enforce interim dividends payments on 6 or 3 month basis. This "interim dividend payment policy" may encourage investors to buy new shares from the stock market for the purpose of having dividend gains in interim periods, especially during low inflationary environment and at the same time stimulate trading in the stock market. Moreover, bonus issues should be limited in the capital markets and the investors should be allowed to choose between receiving cash dividends and bonus issues from the company.

Besides these, in a developing country such as Turkey where companies need new and fresh capital for financing new investments, setting a minimum dividend payout ratio by regulation may discourage companies from going public by issuing their shares through the capital markets and at the same time will affect the new investment opportunities that may generate further income in the forthcoming future in a negative way.

As a last word, both the regulations issued by the government authorities and dividend policy decisions taken by corporations should generate a sound balance between profit distribution and self financing by taking all micro and macro variables into consideration and by calculating the economic value added to the whole economy. If all these can be accomplished in a convenient way, all parties in the economy may benefit optimally.

References

Adaoğlu, C., "*Yasal Düzenlemelerin İstanbul Menkul Kıymetler Borsası Şirketlerinin Temettü Politikalarına Etkisi",* ISE Review, Year: 3 No: 11, July-September 1999, pp.1-18.

Adaoğlu, C., "*Instability in the Dividend Policy of the Istanbul Stock Exchange (ISE) Corporations: Evidence From an Emerging Market*", Emerging Markets Review 1 (2000), pp. 252-270.

Aivazian, V., L. Booth, S. Cleary, *"Do Emerging Market Firms Follow Different Dividend Policies From US Firms?",* The Journal of Financial Research, Vol. XXVI, No. 3, Fall 2003, pp. 371-387.

Aydoğan K., G. Muradoğlu, "*Trends in Market Reactions: Stock Dividends and Right Offerings at Istanbul Stock Exchange",* European Journal of Finance *(9) (1)*, 2003, pp. 41-60.

Aytaç, Z., "*Halka Açık Anonim Ortaklıklarda Kar Dağıtımı," 15. Yıl Sempozyumu*, CMB, Publication No. 119, May 1998, pp. 35-94.

Baker, H. K., "*The Relationship Between Industry Classification and Dividend Policy"*, Southern Business Review, 14, No. 1, Spring 1988, pp. 1-8.

Baker, H. K., G. E., Farrelly, R.B., Edelman, "*A Survey of Management Views on Dividend Policy"*, Financial Management, 14, No. 3, Autumn 1985, pp. 78-84.

Baker, H. Kent, E. Gary Powell, "*Determinants of Corporate Dividend Policy: A Survey of NYSE Firms*", Financial Practice and Education, Spring/Summer 2000, pp. 29-40.

Baker, H. Kent, E. Gary Powell, "*How Corporate Managers View Dividend Policy,"* Quarterly Journal of Business and Economics, Lincoln, Spring 1999, pp. 17-35.

Baker, H. Kent, E. Gary Powell, E. Theodore Veit, "*Revisiting the Dividend Puzzle: Do All of the Pieces Now Fit?"*, North Holland Review of Financial Economics 11 *(2002)*, pp. 241-261.

Black, F., "*The Dividend Puzzle*", Journal of Portfolio Management, Winter 1976, No. 2, pp. 5-8.

Emerging Stock Markets Factbook 1997, International Finance Corporation, April 1997.

Glen, J. D., Y. Karmokolias, R. R. Miller, S. Shah, "*Dividend Policy and Behaviour in Emerging Markets: To Pay or Not to Pay"*, IFC Discussion Paper No. 26, The World Bank, 1995.

Global Stock Markets Factbook, Standard & Poors, 2003.

Ho, H., "*Dividend Policies in Australia and Japan",* International Advances in Economic Research 9 (2), May 2003, pp. 91-100.

ISE Weekly Bulletins

ISE Companies Capital and Dividend Data, 1986-2001, Volume 1, *ISE Publications*, July 2002.

Karyağdı, N., *Kar Dağıtımı ve Vergilendirilmesi*, Maliye Hesap Uzmanları Derneği, İstanbul 2002.

Korgun, A. "*Bir Temettü Politikası Olarak Temettü Avansı; Teorisi ve Türkiye'ye İlişkin Uygulama Önerileri"*, CMB Research Report, October 1999.

Lintner, J., "*Distribution of Incomes of Corporations Among Dividends, Retained Earnings and Taxes"*, American Economic Review, Vol.46, No.2, May 1956, pp.97-113.

Michel, A., "*Industry Influence on Dividend Policy*", Financial Management, 8, No. 3, Autumn 1979, pp. 22-26.

Michel, A. J., I. Shaked, "*Country and Industry Influence on Dividend Policy: Evidence From Japan and the USA",* Journal of Business Finance and Accounting, 13 (3) Autumn 1986, pp. 365-381.

Saxena, Atul K., "*Determinants of Dividend Payout Policy: Regulated Versus Unregulated Firms"*, Journal of Applied Topics in Business and Economics, 1999.

The ISE Review Volume: 7 No: 25-26 January-June 2003
ISSN 1301-1642 © ISE 1997

CAPITAL STRUCTURE OF THE TURKISH DOMESTIC AND INTERNATIONAL REAL SECTOR FIRMS

Halit GÖNENÇ*
Özgür ARSLAN**

Abstract
This study compares the capital structures of the international and domestic real sector firms listed on the Istanbul Stock Exchange (ISE). According to the results of the univariate analysis that are created by evaluating the periods 1995–1999 and 2000–2001, separately, the most striking feature of the international firms is that their short term borrowing is higher than that of the domestic firms for both periods. It is also noticed that the two groups that are alike in the various financial features have different concentrated ownership structure which is gauged by the percentage of shares held by the three largest shareholders and international firms own a higher concentrated ownership. The results of the multiple regression analysis show that international firms have different capital structure than domestic firms do even after controlling the factors, which are risk, profitability, size, fixed assets, potential growth, concentrated ownership, being connected to business groups and having a bank as a shareholder.

I. Introduction

As the results of the recent significant number of studies made on the capital structure, the following striking findings take place: The debt

* Asst. Prof. Halit Gönenç, Hacettepe University, Faculty of Economics and Administrative Sciences, Department of Business, 06532, Beytepe, Ankara, Turkey. Turkey. Tel: (312) 299 2064 /129 Fax: (312) 299 2055 E-mail: halit.gonenc@hacettepe.edu.tr.

** Özgür Arslan, Research Department, Hacettepe University, Faculty of Economics and Administrative Sciences, Department of Business, 06532, Beytepe, Ankara, Turkey. Tel: (312) 299 2064 /129 Fax: (312) 299 2055

We thank participants at METU International Economic Conference VII for helpful comments.
The data, findings and interpretations in this study belongs to the authors and do not reflect those of the Istanbul Stock Exchange. This study may be used as a source of reference.

level and specific firm features (the level of fixed assets, firm size, growth opportunities, risk and profitability) are consistently connected to each other, [Opler and Titman (1994), Rajan and Zingales (1995), Booth et al. (2001)]; these stated connections display similarity for the developed and the developing firms as well [Rajan and Zingales (1995), Demirguc-Kunt and Maksimovic (1995), Booth et al. (2001), for the Turkish firms; Durukan (1997) and Gönenç (2003)]; because of the features of the financial markets and the institutions operating in them, differences occur in the maturity of debt among firms [(Demirguc-Kunt and Maksimovic (1999)]; in determining the leverage, corporate diversities in the financial markets are as important as the financial variables [Booth et al. (2001)].

Considering all these findings, the international finance literature contains studies, which investigate the relationship between the international operations[1] of the firms and their debt level. Theoretically, the international firms (IFs) that operate in different industries and markets, which are very dissimilar and do not have strong correlation among themselves, may have a low bankruptcy risk and low fluctuation in their profitability because of their cash flow diversification. As the consequence of the connection of these features with the tax advantage that is provided by debt, internationally operating firms are supposed to have a higher debt ratio than that of the domestically operating firms. Doukas and Pantzalis (2003) point out the liquidity and hedging and risk avoiding factors along with the diversification factor, as the possible causes of the IFs to have higher debt ratios than those of domestic firms (DFs). The liquidity factor states that IFs own a higher priority in reaching the global capital sources in comparison with the DFs due to the structure of their operations [Eiteman et al. (2001)]. Another reason for expecting the IFs to have a higher debt ratio relative to the DFs is the hedging activities which are done for the protection against risk. The sensitivity of the IFs to the foreign currency fluctuations is higher than that of DFs on the account of their investments in abroad or their sales that they realize in the foreign currency. As being a financial diversification tool, debt can be used by the IFs for being able to lessen the foreign currency exchange rate risk. Besides, debt will be an important factor to reduce the sensitivity to the currency exchange rate when it is realized in a foreign currency. This situation involves the expectation that as the involvement of firms in the foreign operations increases their debt level may rise as well.

[1] In the related literature, firms that have international oprations are defined as the multinational firms. However, both our work and other studies in the literature, depend on the position of involvement of firms in the international operations to the foreign sales ratio. Since this seperation involves international firms (IFs) as well as the multinational ones in the data set, we believe that in our study it is more appropriate to use the definition as international instead of the notion of multinational.

On the contrary to the theoretical expectations, empirical studies show that IFs have a lower debt ratio. Classifying the IFs with employing the foreign sales rate, Fatemi (1988) finds that they have lower long term debt and higher short term debt ratio than DFs do. With the other empirical studies in the literature which follow Fatemi's work, we witness that agency cost which is created by debt comes ahead as the cause of the discrepancy between the debt levels of international and domestic firms. Lee and Kwok (1988) investigate the reason of the outcome that the debt level of the IFs, which are defined by the long term debt, is lower than that of DFs. They designate that, after controlling the size and the industry effect, the agency cost of the IFs is higher than that of the DFs, but they also find that both groups have no difference in the bankruptcy costs with the control of the size effect. Thus, they arrive at the conclusion that the reason of the difference in the debt ratio between the domestic and the IFs is rooted in the fact that the agency cost of the IFs is high. After discovering that the debt ratios of the IFs are lower than those of the DFs, Burgman (1996)[2] shows that the diversification of the operations of the IFs does not cause the earnings to have a low fluctuation. He also finds a negative relationship between the debt ratios of the two measures of the agency cost[3] and reaches the result that IFs are more subject to the agency cost than the DFs. Chen et al. (1997), demonstrates that after controlling the size, profitability, bankruptcy and the agency cost, the lower debt level for the IFs relative to the DFs is still valid. Additions to this finding, the authors find that the level of the international operations is positively related with the debt level. In other words, the debt level in the IFs is lower in comparison to that of DFs, however debt rate escalates as the involvement of firms in the foreign operations rises. Doukas and Pantzalis (2003) relate the less usage of long term debt but higher short term debt by the IFs compared to the DFs, to the usage of internal capital that the IFs may form among each other and the highness of the agency cost caused by the regional diversification. The findings concerning that the IFs have lower level of long term debt do not alter even after controlling for the degree of industry diversification and their structure of foreign operations and the equity ownership. Chkir and Cosset (2001) investigate the relationship between the diversification strategies that depend on international market and product, and the debt ratio. By realizing their analysis on the four different diversification

[2] Just like Lee and Kwok (1988), Burgman (1996) also use the foreign tax rate in order to classify the firms as international and domestic. Moreover, both these studies and Chen (1997) have measure the debt ratio with the ratio of long term debt / (long term debt + market value of the capital).

[3] Two measures for gauging the agency cost are the rate of sum of research and development and advirtisement expenditures to the total sales and the other one is the number of the foreign countries that the firm operates in.

regimes that they made with employing the switching regression methodology, they find that long term debt increases with both international market and product diversification and the combination of these two diversification regimes constitutes low level of bankruptcy cost.

Being inspired by the studies that have the empirical results summarized above, this study aims to compare the debt levels of the Turkish real sector DFs and the IFs listed on the Istanbul Stock Exchange (ISE) to determine whether they are statistically different from each other or not. Our study focuses on two essential points within this comparison. Firstly, the effects of the firm specific variables, which are found to be related with the debt ratio, as revealed in the literature on the capital structure, for both developed and the developing countries, are being controlled. Firm specific variables are; risk that is defined by the fluctuations in the profitability rates, profitability, firm size that is measured by the size of the total assets, dimension of the fixed assets and market to book value that determines the relationship between the market value of the firm and its book value. Moreover, by controlling the effects of the factors that may have an influence on the debt ratios of the Turkish firms, we compare the debt usage of the domestic and the international Turkish real sector firms. One of the factors we consider as important, is the concentrated ownership which is accepted as an alternative of the legal protection for a corporate governance mechanism in the economies that are legally inadequate for the protection of the investors. Concentrated ownership is measured by the percentage of the share held by the three largest shareholders among the group of shareholders. Other factors are; a) whether or not the firm belongs to a group of firms, which is determined to have an effect on the firms to provide internal capital and thus has the possibility to influence its capital structure, and b) whether or not an ownership of a bank exists within the group of shareholders.

The second important point our study concentrates on is that it considers two periods and includes the determination of the similarities and the differences between them. The first period is between the years 1995-1999, which can be accepted as the term during which the process that the Turkish economy has sustained in the normal conditions. The second period is the term covering years 2000 and 2001 that involves the economical and financial crisis of November 2000 and February 2001. Therefore, we also aim to find out how do the debt rates and the factors relevant to debt, belonging to the international funds and DFs were affected in the period of the crises.

The basic finding resulting from our analysis is that the most important difference between the IFs and DFs, which display similarities in the firm specific financial features, is the total capital share of the largest three shareholders is higher in the IFs. This situation

identifies high level of concentrated ownership for IFs. It is seen for both the international and the domestic Turkish real sector firms that short term debt reaches an important rate in the capital structure. The analysis that is made by considering this capital structure shows that the total debt ratio and the short term debt ratio of the IFs in the period of 1995–1999 are higher than those of the DFs. For the period of 2000–2001, the usage of the short term financial debt appears as an important difference in the debt policy between the two groups. There is no distinction between the two groups in the usage of long term debt for the two periods. Firm specific financial features determined by risk, profitability, size, level of the tangible fixed assets, market to book ratio and the effects of the ownership structure variables on the debt rates do not alter the conclusion that the IFs demonstrate a dissimilar capital structure.

The plan of our study after this part is as follows; the second part summarizes the expectations and the theoretical explanations of the variables that are probable to influence the debt ratios that are used in this analysis. The third part includes the statements concerning the data set and the method of the analysis, which are employed in this study. The fourth part explains the empirical findings that are obtained as the result of our analysis. Finally, our study is completed with summarizing the results in the fifth part.

II. The Factors that May Have an Impact on the Debt Ratios of the Turkish Real Sector Firms

Economical and political uncertainties, which were caused by the high levels of inflation and the fluctuations in the economical factors, may be identified as the striking elements in the Turkish economy in the 1990's. The fundamental concept behind these briefly summarized economical conditions is the obligation of the governments to obtain high levels of debt on account of meeting the budget deficits. The dominance of the structure of the short term debt in the Turkish economy is caused by the debt policy followed by the governments and the growing uncertainties. This has also affected the maturity structure of the debts of the real sector firms and the short term debts within the total debts have been utilized in the major levels. On the other hand, Turkish firms have no chance to obtain long term debt by issuing bonds through the means of the capital market. The sources of the firms to obtain debt are the banks and the commercial debt policies that the firms form among themselves. This situation puts forward the banking financial debts and the commercial debts within the short term debts for the Turkish real sector firms and the long term debt remains at the low level. Hence, in a study about the capital structure that targets the Turkish real sector firms, the identification of the debt structure by merely using the rate of long term debt just like any other studies in the literature is insufficient to examine

the subject within its entire dimensions. In order to clarify the differences in the capital structure among firms, examination of the debt ratios in various content and maturities is necessary to add a different view due to the characteristics of the financial structure within the Turkish Economy.

One of the firm specific variables, which is found to have a consistent effect on the debt ratio, is the fluctuation in the operation profits of the firm that is used in order to measure the bankruptcy risk of the firm. The firm with the high level of operation risk is not expected to own a high level of debt ratio. Another factor is the existence of the adverse relationship between the profitability and the debt ratio, explained by the pecking–order theory of the Myers and Majluf (1984). Firms with rather lucrative investment opportunities refer to the outside financial sources only when the internal financial sources are inadequate. Thus, they also aim to reduce the cost of the information asymmetry. The negative relationship that will be found between profitability and debt will be supportive for the presence of pecking order hypothesis and the information asymmetry. The third factor is controlling the impact of the level of assets of the firm on the debt level. The positive relationship between the size of the firm and the debt level expresses that the large firms may have higher debt ratios since they are considerably diversified and hardly ever subject to a failure. Appearing to be probable as well, negative relationship states that the high level of the information asymmetry for the external investors in the large firms causes these firms to prefer lower debt ratios. The fourth factor is the level of the tangible fixed assets. It is possible for a firm with a high level of tangible fixed assets to be able to obtain a high level of guaranteed loan. However, since the dimension of the agency problem differs among the firms and it depends on the structure of the assets of the firm, tangible fixed assets are accepted as an effective benchmark when they are compared with the intangible fixed assets. In the situation of its pointing to the high level of agency costs, it is possible to find out an adverse relationship between the high level of tangible fixed assets and the debt ratio. Booth et al. (2001) discover a negative relationship between the tangible fixed assets and total debt ratio but find out that it is positively related with the long term debt rate. They state that these results are consistent with the traditional "maturity matching" approach. The ultimate factor is the market to book ratio that measures the growth opportunities of the firm. Firms within the high level of growth trend own more risky projects. High level of debt escalates the agency cost of debt and prevents the firms from taking risky investments. Consequently, firms with high growth opportunities prefer low level of debt. Therefore, a negative relationship between the debt ratio and the growth opportunities is anticipated.

The common outcome from the empirical studies about the subject is that the agency cost of debt is the most important factor for the IFs to have a lower long term debt ratio than that of the DFs. The applications to reduce the agency problems are gathered under the title of "Corporate Governance". La Porta et al. (2000) define the corporate governance as: "Within a wide point of view, corporate governance is the set of goals that will provide a protection for the outside investors (as a shareholder or a creditor) from the expropriation by the managers and/or the controlling shareholders". The authors also emphasize that a strong legal base that protects the benefits of the outside investors is a good corporate governance system. La Porta et al. (1998) show that countries have different legislation and punishment boards for the protection of the outside investors. For instance, it is found that legal protection for both shareholders and creditors are the weakest in the countries which are dominantly developing and embrace the French legislative system. This situation is perceived as a weak mechanism of corporate governance. Considering the fact that there are differences among countries, the important issue here is; how the countries, which provide a weak protection, do and can overcome this problem if the legal protection and punishment is an essential mechanism in using the sources of the firm efficiently by reducing the agency problem. Schleifer and Vishny (1997) and La Porta et al. (1998) point out the hypothesis that the presence of controlling shareholders who own a large portion of the equity may create an alternative corporate governance mechanism in the developing countries that have a weak legal protection and particularly demonstrate a rapid growth. The agency problem between the managers and the investors can be avoided through this mechanism. The small number of shareholders who hold the large proportion of equity, which is called concentrated ownership, may form a better mechanism for monitoring the governance of the firm and prevent the management board from taking decisions against them. On the other hand, the largest shareholder may indulge in considering solely their own benefits and commit actions against creditors and minor shareholders.

It is comprehended from the above paragraph that the existence of the shareholder or the group of shareholders who hold a large portion in the ownership structure of the firm constitutes both advantages and costs for the firm. Gürsoy and Erdoğan (2002) underline that the high level of concentrated ownership is an important indicator of the corporate governance mechanism in Turkey and they add that market performance of the firm rise aligning with the concentrated ownership whereas performance of the accounting falls. Hence, if the agency problems are effective in the indication of the debt ratio, it is probable that concentrated ownership influences the debt ratio of the firm. The ownership structure of the Turkish real sector firms, that are traded on

the Istanbul Stock Exchange (ISE), is very concentrated. Therefore, while comparing the debt ratios of the international and domestic firms, concentrated ownership, which is measured by percentage of total shares held by the three largest shareholders, is controlled in our analysis. If the raise in the concentrated ownership has a diminishing effect on the agency problems for the outside investors, a positive relationship should be expected between the variable representing the concentrated ownership and the debt ratios. Otherwise, a negative relationship may emerge between the two variables.

The two factors that may have an important effect on the debt level within this ownership structure are; a) having a holding company that captures a portion of the capital of the firm or in other words whether the firm is connected to a group of firms or not, b) having a bank as a shareholder of the company. Khanna and Palepu (2001) stress that firms finance their investments through their internal capital sources by forming group of firms, because of the defects (weakness of corporate governance, inadequate accounting reporting, insufficient underwriting…etc.) which are seen in the rapidly developing capital markets of the countries. Firms that are connected to a group of companies provide some benefits by forming interrelationships with other firms in order to decrease the external capital market failures. Many Turkish real sector firms listed in the ISE are connected to a group of companies. Group of companies in Turkey are organized around a holding company and usually a bank serves this group as the source of capital. This structure makes up a well organized internal capital market. This attachment may be effective on the debt level of firms since they both create the fundamental source of financing and for their possible effects on the performance of the firm as well its riskiness. For comparing the debt levels of the IFs and DFs, this condition points out to the controlling of both being connected to a group of companies and having a bank as a shareholder. The consistent results have not been arrived among the studies that search the performance of the firm and encompass various companies through the situations of being connected to a group of companies and having a bank within the group of shareholders. Thus, it is arduous to have a prior expectation regarding these variables.

III. Data and Methodology

This study uses data set that encompasses the Turkish real sector firms listed to the ISE for the period of 1995–2001. The financial data of firms have been obtained from the FinNET database, which is a local data set of the ISE. Yearbook of the ISE companies is used for the ownership variables that involve ownership structure and shares of holding of companies and bank. For the shareholder group of each firm, The

Yearbook of Companies, which is prepared every year by the ISE documentation department since 1992, reports the real and the corporate names of them with the portion of the equity they own. Also, the ownership of the bank and the holding of companies within the group of shareholders are directly expressed. The ownership structure that we use in our analysis is calculated by adding the percentage of shares of the three largest shareholders in the equity of the firm. The firms, which have the ratio of foreign sales, that is reported on the income statement, greater than or equal to 10 % is classified as the IFs. On the other hand, DFs are defined as the ones that have the foreign sales to total sales ratio less than 10 % or no foreign sales at all.

Our analysis is done for the two separate periods that encompass the periods of 1995–1999 and 2000–2001. Table 1 represents the numbers of the domestic and IFs that take place in the data set for both periods and it also shows the summary statistics of the data set which is formed by the values of mean, median and the standard deviation of the financial variables. For the entire variables[4], averages of the annual values on the related periods are taken[5]. The definitions of the variables that are employed are given in the next section. The analysis depending on the single variable is one of the methods that we use in our work and it depends on comparisons of debt ratios and the other financial variables of the international and DFs. F statistics that depends on the normal distribution is used for comparing the statistically significant difference of the mean values of the variables between the international and DFs and Wilcoxon test statistics which is a non- parametric test is employed to compare the median values.

According to the information reflected in Table 1 for the period of 1995–1999, 96 firms are classified as domestic where 112 are as international. However, due to the deficiencies for reaching the essential information, numbers of observation belonging to the variables that are market to book value and concentrated ownership are less than the ones that are stated above. The prominent characteristics that emerge in Table 1 can be mentioned as the following. First of all, both groups do not have a statistically significant difference between each other for the size measured by the log of total assets. This similarity also reveals itself on the concept of tangible fixed assets. The important result that is striking in the summary statistics is that the mean, median values of profitability and market performance of the firm are considerably low in the period of 2000 – 2001, relative to the period of 1995–1999. For instance, while

[4] The ISE has not published the yearbook of companies in 1999. Therefore, the average values of the variables related to the ownership structure are taken for the years between 1995-1998 for the period of 1995–1999.

[5] It is assumed as a necessity for the firms that take place in the data set to own data in the each observation year. Therefore, the number of the firms for the each year of observation does not change.

the mean (median) value of profitability of DFs is 0.10 (0.09) for the period of 1995–1999, these values become –0.07 (0.02) in the period of 2000–2001. The result is similar for the IFs because the average (mean) value of profitability for the period of 1995–1999 is 0.10 (0.08) whereas it is –0.03 (0.01) for the period of 2000–2001. However, there is no statistically significant difference between the two groups regarding the profitability and the market performance in both periods. It is seen in the period of 2000-2001 that, despite the decrease in the performance of the firms in this period, the riskiness of the DFs increased compared to that in the period of 1995–1999 (while the mean value for the period of 1995–1999 is 0.10, this value for the period of 2000–2001 is 0.14), however the average riskiness of the IFs did not increase. Therefore, a statistically significant difference does not happen between the two groups in the mean and the median values of risk for the period of 2000–2001. However, considering the risk value, IFs are seen to be less risky when compared to the DFs for the period of 2000–2001. The results in Table 1 demonstrate that the most distinctive feature of the IFs from the DFs is the concentrated ownership. For both periods, the total percentage share of the three largest shareholders has higher values of mean and median for the IFs and the difference between the two groups is statistically significant. This situation points out the importance of controlling for the concentrated equity ownership structure in the analysis.

Being the second method of the study, multivariate regression analysis provides the comparison of the debt levels of the international and domestic firms with controlling the factors that influence the determination of the debt ratios. The previous similar empirical works have been referred in setting the variables that are used in the multiple regression analysis. The regression model involving the entire variables and the definitions of them are given below as follows:

$$\text{Total Debt} = \alpha_0 + \alpha_1 (INTERNATIONAL) + \alpha_2 (RISK)$$

$$+ \alpha_3 (PROFITABILITY)$$

$$+ \alpha_4 (SIZE) + \alpha_6 (T.FIXED\ ASSETS) + \alpha_6 (MV/BV)$$

$$+ \alpha_7 (C.OWNERSHIP) + \alpha_8 (HOLDING) + \alpha_6 (BANK) + \varepsilon$$

Table 1: Summary Statistics

Panel A: 1995-1999 Period										
Domestic Firms					International Firms					
Variable	N	Mean	Median	St. Deviation	N	Mean	Median	St. Deviation	F test	Chi-Square
RISK	96	0.10	0.08	0.07	104	0.09	0.07	0.07	(1.45)	[1.41]
PROFITABILITY	96	0.12	0.09	0.12	104	0.10	0.08	0.10	(1.03)	[0.18]
SIZE (Billion TL)	96	23275	11464	48326	104	24225	11117	41670	(0.02)	[0.15]
T. FIXED ASSETS	96	0.29	0.32	0.22	104	0.29	0.25	0.18	(0.00)	[0.04]
MV / BV	67	6.08	2.07	2.92	80	2.38	1.86	2.68	(1.62)	[0.84]
C. OWNERSHIP	83	0.64	0.66	0.21	85	0.68	0.71	0.19	(1.65)	[4.35]**
Panel B: 2000-2001 Period										
Domestic Firms					International Firms					
Variable	N	Mean	Median	St. Deviation	N	Mean	Median	St. Deviation	F test	Chi-Square
RISK	92	0.14	0.08	0.18	112	0.09	0.09	0.05	(8.43)***	[1.13]
PROFITABILITY	92	-0.07	0.02	0.46	112	-0.03	0.01	0.19	(0.54)	[0.18]
SIZE (Billion TL)	92	99375	40489	219986	112	106574	45538	187511	(0.06)	[1.59]
T. FIXED ASSETS	92	0.28	0.25	0.25	112	0.29	0.26	0.16	(0.14)	[1.47]
MV / BV	68	2.48	1.67	2.46	102	2.47	1.60	4.19	(0.00)	[0.98]
C. OWNERSHIP	80	0.62	0.65	0.22	89	0.69	0.71	0.17	(5.53)**	[4.51]**

This table represents the summary statistics, which take place in the data set for the periods 1995-1999 and 2000-2001, of the number of the international and the domestic firms and also the mean, median and standard deviation values related to the financial variables. For every variable, average of the annual values in the related periods is used. The variable of RISK indicates the variability of the profitability of the firm and measured with the standard deviation of the ratio of profits before the financial expenses for the past five years prior to the ending of the period of the analysis to the total assets. The variable of PROFITABILITY is the net profit return rate and the ratio of net profit to the total assets. The variable of SIZE is measured by the value of the natural logarithm of the total assets, whereas T.FIXED ASSETS represents the portion of the tangible fixed assets within the total assets. The variable of MV/BV is calculated by dividing the market value of the equity, which is found by multiplying the number of shares to the price of the shares to the book value. The variable of C.OWNERSHIP, which can be defined as the concentrated equity ownership as well, constitutes the total percentage share of the three largest shareholders. *, **, and *** indicates the statistical significance at the 10%, 5%, and 10% level, respectively.

As stated before, the value of all variables that are used in this analysis has been formed from the average of the annual numbers in the related periods. The debt ratios that are employed in this study are; (1) Total Debts 1 = (Short Term Debts + Long Term Debts) / Total Assets, (2) Total Debts 2 = (Short Term Financial Debts + Long Term Debts), (3) Long Term Debts = Long Term Debts / Total Assets and (4) Short Term Debts = Short Term Financial Debts / Total Assets.

The variable of INTERNATIONAL is a dummy variable that classifies the IFs and the DFs taking the value of "1" for the firms that have the ratio of foreign sales to total sales equal to or in excess of % 10

whereas the value of "0" is taken for the other firms. After controlling for the impact of the other factors, the estimated statistically significant coefficient will show that the IFs have a more distinctive debt ratio than that of the DFs.

Indicating the variability of the profits of the firms, the variable of RISK is measured with the standard deviation of the ratio of profits before the financial expenses for the last five years prior to the ending of the period of the analysis to the total assets. The variable of PROFITABILITY is the ratio of net profit to the total assets. The variable of SIZE is measured by the value of the natural logarithm of the total assets, whereas T. FIXED ASSETS represents the portion of the tangible fixed assets within the total assets. The variable of MV/BV is calculated by dividing the market value of the equity, which is found by multiplying the number of shares to the price of the shares, to the book value. The variable of C.OWNERSHIP, which can be defined as the concentrated equity ownership as well, constitutes the total percentage share of the three largest shareholders. The other two variables that represent the ownership structure are HOLDING, which measures the affiliation to a business group, and BANK indicating the shareholding of a bank. Both of those are dummy variables and they take the value of "1" for the firms which have the specific portion of their capital owned by a holding company or a bank, whereas the value "0" for the others.

IV. Empirical Results

4.1. Comparison of the Debt Ratios of the Domestic Firms and the International Firms

Table 2 reports the comparison of the debt ratios of the international and domestic firms. In this table, the level of the international operations for the IFs is examined by subjecting them to different classifications. The level of the international operations is taken into account in these classifications and the IFs are classified according to their ratio of foreign sales to the total net sales as being 10 %, 20 %, 30 %, 40 % and 50 %. In the Table, the mean and median values of the four various debt ratios, which are used in every analysis of the study together with the F and Chi – Square statistics, which compare the difference of these values between the international and the DFs, are reported on Panel A for the period of 1995–1999 and on Panel B for the 2000–2001 period. The difference between the variables of "Total Debts 1" and "Total Debts 2" in Table 2 is that the total short term debt takes place within the first debt ratio and the second debt ratio contains only the financial debt as a short term debt. Therefore, firms' ability to find opportunities of internal and external debt such as commercial debt and unpaid expenses is not considered in "Total Debts 2". The difference between the variables of "Total Debts 1" and "Total Debts 2" for both periods of

the analysis is around the level 20 – 30 %. At a first glance, the results of the Table show the existence of the notion of a dominant short term debt, which emerges by comparing the variable of both the two total debt ratios with the variable of "Long Term Debt", and the important part of this debt is created by the internal sources. This result can easily be seen by looking at the mean values related to the four debt rates that belong to the two groups of firm on Panel A and B in Table 2. For example, the mean value of the "Total Debt 1" belonging to the international (domestic) firms is 0.53 (0.47), the mean value of the "Total Debt 2" is 0.31 (0.22), the mean value of "Long Term Debt" is 0.12 (0.12) and finally the mean value of the "Short Term Financial Debt" is 0.19 (0.10). Thus, the level of the other short term debts excluded from the short term debt is on average 0.22 (0.25). The same values on Panel B are calculated as; 0.66 (0.62), 0.41 (0.32), 0.15 (0.13) and 0.26 (0.18), respectively. In accordance with these values, other short term debts out of short term financial debts are 0.25 (0.30) on average.

Table 2: The Comparison of the Debt Ratios for the Years 1995 – 2001

Panel A: 1995-1999 Period						
Domestic Firms		**International Firms**				
N=96		Fsales[1]≥10 N= 104	Fsales≥20 N=69	Fsales≥30 N=53	Fsales≥40 N=39	Fsales≥50 N=28
Total Debts 1						
Mean	0,47	0,53	0,56	0,59	0.59	0.60
Median	0,49	0,54	0,54	0,59	0,55	0,60
F statistics		4,57**	7,23***	11,54***	8,09***	6,92***
Chi-Square		3,91**	4,46**	5,19**	4,56**	2,93*
Total Debts 2						
Mean	0,22	0,31	0,34	0,37	0.38	0.40
Median	0,18	0,31	0,35	0,39	0,39	0,40
F statistics		12,56***	18,47***	26,08***	21***	20,46***
Chi-Square		9,64***	11,36***	15,87***	16,22***	11,71***
Long Term Debts						
Mean	0,12	0,12	0,11	0,11	0.10	0.10
Median	0,10	0,09	0,09	0,10	0,08	0,08
F statistics		0,37	0,59	0.48	1,14	1,61
Chi-Square		0,08	0,01	0,05	0.0181	0.73
Short Term Debts						
Mean	0,10	0,19	0,23	0.26	0.28	0.30
Median	0,06	0,15	0,21	0,24	0,24	0,26
F statistics		28,20***	41,39***	58,54***	53,86***	57,65***
Chi-Square		23,04***	31,06***	36,36***	35,04***	26,36***

Panel A: 2000-2001 Period						
Domestic Firms		**International Firms**				
N=92		Fsales≥10 N= 112	Fsales≥20 N=83	Fsales≥30 N=69	Fsales≥40 N=50	Fsales≥50 N=37
Total Debts 1						
Mean	0,62	0,66	0,63	0,64	0,67	0,66
Median	0,55	0,61	0,60	0,61	0,65	0,65
F statistics		0,38	0,05	0,06	0,37	0,14
Chi-Square		5,04**	4,14**	4,55**	6,01**	6,64**
Total Debts 2						
Mean	0,32	0,41	0,40	0,40	0,44	0,43
Median	0,20	0,39	0,38	0,38	0,41	0,41
F statistics		3,31*	2,08	2,14	3,18*	1,97
Chi-Square		11,35***	10,51***	11,57***	12,26***	13,99***
Long Term Debts						
Mean	0,13	0,15	0,14	0,14	0,14	0,14
Median	0,07	0,12	0,12	0,11	0,12	0,13
F statistics		0,32	0,00	0,00	0,01	0,02
Chi-Square		6,38**	2,05	2,24	3,06*	3,24*
Short Term Debts						
Mean	0,18	0,26	0,26	0,27	0,30	0,28
Median	0,08	0,23	0,23	0,24	0,27	0,27
F statistics		4,15**	3,74*	4,00**	5,97**	3,41*
Chi-Square		6,38**	6,96***	7,66*	9,93**	11,24***

[1] Foreign Sales / Total Sales
*, **, and *** indicates the statistical significance at the 10%, 5%, and 10% level, respectively.

The results of the test of diversity of the values of both mean and median values that are given in Panel B relating to the period of 1995–1999 demonstrate that the total debts and the short term financial debts of the IFs are higher than those of the DFs. For example, while the mean (median) values of the variable of "Total Debt 1" for the IFs is 0.53 (0.54), these values are 0.47 (0.49) for the DFs. The difference between the two values is statistically significant at the 5 % level. It is seen in the similar way that the short term financial debt ratios for the IFs and DFs are, respectively; 0.19 (0.15) and 0.10 (0.06) (the difference is significant at the 1 % level). Furthermore, the difference between the two groups for the total and short term financial debt is in the statistically significant amount for every level of international operations and the debt ratios (except the long term ones) rise as the level of international operations of the firms increase.

In Panel B where the results regarding the period of 2000–2001 are reported, we see 10–15 % increase in the average and median values of the variables except the variable of "Long Term Debt". This situation indicates that the firms that have long term debts remained in the similar level compared to the prior periods were obliged to meet their financial

deficits with the short term sources in the larger amounts. Differing from the period of 1995–1999, in the period of 2000– 2001, average ratios of total debt (the difference between the values of the median is statistically significant) belonging to the IFs and the DFs display similarities. However, the mean and the median values of the variable of "Short Term Financial Debts" are significantly different between the two groups. This result shows that in the periods of financial crisis as well as the previous periods, IFs can use the short term debt in the larger amounts compared to the DFs. The other interesting result is that, the debt ratios of the firms in this period do not increase as the level of the international operations rise.

4.2. The Results of the Regression Analysis

Table 3 represents the results of the multivariate analysis which tries to determine that the debt ratios of the international and the DFs are different and controls the firm specific features and equity ownership by controlling shareholders of the holding of companies and the bank. The Table has 4 different parts according to the independent variable used. The debt ratios employed as the depended variables in the regression analysis are; "Total Debts 1" (Panel A), "Total Debts 2" (Panel B), "Long Term Debts" (Panel C) and the "Short Term Financial Debts" (Panel D). Each panel is also formed by the two parts that show the results for 1995–1999 and the other one for 2000–2001. Four regression models are used for each period. Model 1 is a univariate model and involves the dummy variable that searches the difference of the debt ratios between the international and the DFs. In Model 2, the financial features, which influence the debt ratios of the firms, are risk, profitability, size and the level of the tangible fixed assets as control variables. Owing to the deficiency of data that reduces the number of the observation, the variables "MV / BV" is included to the analysis in Model 3 and the equity ownership variables in Model 4.

The results reported in Panel A, where the variable "Total Debts 1" is employed as a dependent variable, prove in every model that the total debt ratios of the IFs in the period of 1995–1999 is different from those of DFs. It is statistically significant that the estimated coefficient of the dummy variable of INTERNATIONAL is different from zero. In accordance with the results of the 2000–2001 period, the total debt between the IFs and DFs are not different in Model 1 and 2 where the number of observation is large. This outcome is consistent with the results of the univariate analysis that involves the test difference of the average values of the variable of "Total Debts 1" in Table 2 between the two groups. However, Model 3 and 4, which include relatively less number of observations, point out that, as in the 1995–1999 period, IFs own higher total debt ratio than the DFs in the 2000–2001 period.

Combining these findings with the result that the IFs have higher debt rates than the DFs for each median values of the variable "Total Debts 1" discovered in Panel B in Table 2, it is possible to interpret that the diversity of the capital structure for the firms that display the typical features of the sample is continuing for the 2000–2001 period as well.

The estimated coefficient of the C. OWNERSHIP, which constitutes the affinity of our study and is measured as the total share of the three shareholders that own the largest portion of the equity, is positive and statistically significant for both periods. Therefore, firms with higher concentrated ownership are able to have higher debt levels. We interpret this result as that small number of shareholders that holds the concentrated ownership is able to reduce the agency costs of debt by applying a better monitoring mechanism on the management. Particularly for the period of 2000–2001, other control variables PROFITABILITY and T.FIXED ASSETS have a negative relationship (estimated coefficients are different from zero) with debt ratios in each

Table 3: Results of the Regression Analysis

Panel A: "Total Debts 1"								
	1995 - 1999				2000 - 2001			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	0.46	0.29	0.62	0.65	0.61	0.29	0.23	0.19
	(20.63)***	(1.68)*	(2.95)***	(3.02)***	(12.29)***	(1.42)	(1.25)	(0.54)
International	0.07	0,04	0,07	0.08	0.05	0.04	0.06	0.06
	(2.40)**	(1.89)*	(2.77)***	(3.08)***	(0.69)	(1.22)	(2.68)***	(1.99)**
Risk		0.26	-0.03	-0.15		-0.98	0.37	0.28
		(-1.24)	(-0.12)	(-0.58)		(-6.00)***	(1,81)*	(1.14)
Profitability		-1.29	-1.19	-1.13		-1.48	-1,17	-1.09
		(-10.1)***	(-8.4)***	(-7.5)***		(-26.4)***	(-14.1)***	(-11.4)***
Size		0.03	0.01	-0.01		0.03	0.02	0.02
		(2.71)***	(0.45)	(-0.49)		(2.24)**	(2.30)**	(1.84)*
T.Fixed Assets		-0.32	-0.42	-0.38		-0.25	-0.35	-0.33
		(-5.05)***	(-5.84)***	(-5.09)***		(-3.20)***	(-5.34)***	(-4.05)***
MV / BV			0.00	0.00			-0.01	-0.01
			(0.38)	(0.02)			(-1.06)	(-1.27)
C.Ownership				0.26				0.17
				(3.41)***				(2.11)**
Holding				-0.03				0.03
				(-0.86)				(1.12)
Bank				-0.01				-0.01
				(-0.32)				(-0.41)
N	197	197	144	128	203	203	169	125
Adj. R	0.02	0.46	0.40	0.46	0.00	0.81	0.62	0.62
F value	(5.8)**	(22.6)***	(17.2)***	(13.2)***	(0.48)	(172.3)***	(47.4)***	(24.1)***

Panel B: "Total Debts 2"								
	1995 - 1999				2000 - 2001			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	0.22	0.28	0.33	0.35	0.31	-0.22	0.05	0.08
	(12.14)***	(1.78)*	(1.77)*	(1.80)*	(8.74)***	(-1.22)	(0.31)	(0.44)
International	0.09	0.07	0.08	0.09	0.09	0.09	0.08	0.08
	(3.60)***	(3.38)***	(3.69)***	(3.82)***	(1.86)*	(3.67)***	(3.80)***	(3.02)***
Risk		-0.18	-0.16	-0.14		-0.26	0.07	0.12
		(-0.92)	(-0.71)	(-0.62)		(-1.85)*	(0.38)	(0.58)
Profitability		-0.93	-0.88	-0.80		-0.95	-0.94	-0.86
		-(8.0)***	(-7.0)***	(-5.9)***		(-19.4)***	(-12.6)***	(-10.6)***
Size		0.01	0.00	-0.01		0.03	0.02	0.01
		(0.67)	(0.31)	(-0.50)		(3.20)***	(1.94)*	(0.84)
T.F. Assets		-0.11	-0.14	-0.01		-0.12	-0.16	-0.01
		(-1.88)*	(-2.26)**	(-1.47)		(-1.82)*	(-2.60)**	(-1.43)
MV / BV			-0.01	-0.01			-0.02	-0.02
			(-1.38)	(-1.30)			(-2.75)***	(-2.83)***
C.Ownership				0.15				0.15
				(2.16)**				(2.20)**
Holding				0.02				0.03
				(0.88)				(1.32)
Bank				-0.04				-0.03
				(-1.37)				(-0.89)
N	197	197	144	128	203	203	169	125
Adj. R	0.05	0.35	0.35	0.39	0,01	0.73	0.58	0.61
F value	(13.0)***	(22.6)***	(14.2)***	(10.2)***	(3.5)*	(110.1)***	(40.5)***	(23.1)***

Panel C: "Long Term Debts"								
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	0.13	-0.22	-0.20	-0.25	0.13	-0.54	-0.2	-0.24
	(12.65)***	(-2.34)**	(-1.83)*	(-2.29)**	(5.84)***	(-3.79)***	(-1.79)*	(-1.91)*
International	-0.01	-0,01	0.00	0.00	0.03	0.06	0.03	0.02
	(-0.59)	(-1.11)	(0.36)	(0.26)	(0.61)	(2.67)***	(1.77)*	(0.94)
Risk		0.12	0.12	0.26		0.83	0.14	0.25
		(1.10)	(1.10)	(2.00)**		(7.32)***	(1.14)	(1.72)*
Profitability		-0.26	-0.26	-0.24		-0.28	-0.20	-0.17
		(-3.91)***	(-3.9)***	(-3.08)***		(-7.12)***	(-3.84)***	(-3.00)***
Size		0.02	0.02	0.02		0.03	0.02	0.01
		(3.93)***	(3.93)***	(2.65)***		(3.68)***	(2.46)**	(2.06)**
T.F. Assets		0.08	0.08	0.12		0.13	0.10	0.13
		(2.39)**	(2.39)**	(3.00)***		(2.42)**	(2.54)**	(2.78)***
MV / BV			0.00	0.00			0.00	0.00
			(0.60)	(0.49)			(-0.04)	(0.76)
C.Ownership				0.07				0.10
				(1.72)**				(2.14)**
Holding				0.02				-0.02
				(0.98)				(-1.22)
Bank				-0.03				0.00
				(-1.76)*				(-0.08)
N	197	197	144	128	203	203	169	125
Adj. R	0	0.20	0.12	0.18	0	0.57	0.16	0.21
F value	(0.4)	(11.2)***	(4.4)***	(4.2)***	(0.4)	(53.9)***	(6.5)***	(4.6)***

Panel D: "Short Term Financial Debts"								
	1995 - 1999				2000 - 2001			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	0.60	0.10	0.49	0.53	0.18	0.32	0.25	0.32
	(3.95)***	(7.20)***	(4,28)***	(3.68)***	(7.03)***	(1.85)*	(1.87)*	(2.08)**
International	0.09	0.10	0.08	0.08	0.07	0.04	0.06	0.06
	(4.65)***	(5.36)***	(5.47)***	(4.52)***	(2.05)**	(1.59)	(3.16)***	(2.85)***
Risk		-0.30	-0.35	-0.40		-1.09	-0.07	-0.12
		(-2.12)**	(-2.03)**	(-2.24)**		(-7.91)***	(-0.49)	(-0.70)
Profitability		-0.66	-0.62	-0.57		-0.67	-0.74	-0.70
		(-7.79)***	(-6.41)***	(-5.29)***		(-14.17)***	(-12.10)	(-10.21)***
Size		-0.01	-0.01	-0.02		0.00	0.00	-0.01
		(-2.21)**	(-1.81)*	(-2.56)**		(0.29)	(0.32)	(-0.66)
T.F. Assets		-0.18	-0.23	-0.22		-0.25	-0.26	-0.23
		(-4.46)***	(-4.65)***	(-4.04)***		(-3.85)***	(-5.29)***	(-3.96)***
MV / BV			-0.01	-0.01			-0.02	-0.02
			(-2.25)**	(-2.00)**			(-3.32)***	(-2.77)***
C.Ownership				0.08				0.05
				1.49				0.90
Holding				0.01				0.06
				0.41				(2.57)**
Bank				-0.01				-0.02
				(-0.46)				(-0.99)
N		197	197	144	203	203	169	125
Adj. R		0.12	0.39	0.41	0.02	0.51	0.58	0.61
F value		(28.8)***	(26.5)***	(17.5)***	(4.2)**	(42.5)***	(39.5)***	(22.6)***

This table represents the results of the multivariate regression analysis which controls the concentrated ownership and the equity ownership by the holding of companies or the bank and the firm specific variables (risk, profitability, size, level, of the tangible fixed assets, market to book ratio) that try to determine that the debt ratios of the international firms and the domestic firms are different from each other. For every variable, the averages of the annual values in the related periods is used. The variable of RISK indicates the variability of the profitability of the firm and measured with the standard deviation of the ratio of profits before the financial expenses for the past five years prior to the ending of the period of the analysis to the total assets. The variable of PROFITABILITY is the net profit return rate and the ratio of net profit to the total assets. The variable of SIZE is measured by the value of the natural logarithm of the total assets, whereas T.FIXED ASSETS represents the portion of the tangible fixed assets within the total assets. The variable of MV/BV is calculated by dividing the market value of equity, which is found by multiplying the number of shares to the price of the shares to the book value. The variable of C.OWNERSHIP, which can be defined as the concentrated equity ownership as well, constitutes the total percentage share of the three largest shareholders. *, **, and *** indicates the statistical significance at the 10%, 5%, and 10% level, respectively.

model. This is consistent with our expectations. SIZE demonstrates a positive relation with the debt ratio however the variables of RISK, MV/BV, HOLDING and BANK have no impact on debt. It can be

mentioned that, it is not important to be attached to a group of firms or have a bank as a shareholder for the impact of the structure of the ownership of firms on the total debt. On the other hand, consistent with the theoretical dispute, the concentrated ownership is the fundamental determinant of capital structure which is accepted as an alternative corporate governance system in the countries with the weak legal protection. Consequently, apart from the impact of the basic variables that are controllable and determine the total debt, IFs have more ability to attain total debt than the DFs.

Results of the multiple regression analysis for the dependent variable of "Total Debts 2", which are calculated by using the short term financial debts instead of the total short term debts, are given in Panel B. It is proved in each model taking place in this table that the impact of the financial and capital structure firm specific variables are similar as in Panel A. IFs have higher total debt levels in every regression model related to the periods of 1995–1999 and 2000–2001. The estimated coefficients of the variable of INTERNATIONAL are positive and significantly different from zero.

Panel C reports the results of the regression models that investigate the difference between the IFs and DFs for the variable of "Long Term Debts". According to the results in which we find out that usage of long term debt do not differ between the two groups of firms, generally some differences occur in the firm specific financial structure variables when their relation with the total debt is compared. For instance, we notice that there is a positive relationship between the level of tangible fixed assets and long term debt. Consistent with the "maturity matching" approach, this result points out that Turkish real sector firms prefer the long term sources to finance the long term tangible fixed assets. As in the total debt variables, concentrated ownership possesses a positive and significant coefficient for the both periods.

In the Panel D in Table 3, the difference between the IFs and the DFs are investigated for the variable of "Short Term Financial Debts". The results show that IFs may obtain the larger amounts of short term debts in comparison with the DFs. This conclusion is valid for both periods of 1995–1999 and 2000–2001. While the variables of "RISK" and "MV/BV" are not seen as the indicators of debt in the results of other Panels, they are oppositely interacted with the short term debts. Firms with high risk and that have a higher market value than its book value, use less amounts of short term debt. Similarly, firms having a larger total assets own less short term debt. All these results exhibit the impact of the information asymmetry and the agency problem on the short debt level and demonstrate a consistency with the theoretical arguments that take place in the literature. High level of the variable

"MV/BV" represents the agency problems that will be created by the debt connected with the growth opportunities. The variable of the "SIZE" represents the asymmetric information. The negative coefficient that both of these two variables possess shows that firms having large growth opportunities and asymmetric information prefer to use less short term debt. Therefore, they become alienated to the troubles caused by the agency problems created by debt. In parallel with the expectations, the levels of profitability and the tangible fixed assets has a reducing effect on the short term debts. While a prominent effect of the variables of capital structure can not be seen in the 1995–1999 period, the results of the period of 2000–2001 show that, the firms that are connected to a business group are able to obtain more short term debt during this period.

V. Summary and Conclusions

The international finance literature has theoretically argued the possibility that the international and domestic firms may have diverse capital structures. Empirical works try to arrive at the outcomes that support this argument. The theoretical considerations that the IFs may employ higher levels of debt have not been supported by the empirical works whereas the recent studies have revealed that these firms use lower long term debt but higher short term debt than the DFs. The idea dominated is that the agency cost of debt is the most important factor that has an impact on the formation of this result.

This study carries this argument to the Turkish real sector firms. The objective of the study is to compare the debt levels of the Turkish domestic and real sector firms in order to test whether they are statistically different or not. The study has two contributions. (1) Our analysis controls the concentrated ownership which is accepted as a corporate governance system in the economies that are insufficient in the legal protection of investors and also is the typical feature of the Turkish real sector firms. The hypothesis in here is; if the agency costs are the most important factors for effecting debt levels of the IFs and DFs, analysis should consider present applications of the corporate governance that is related to the reduction of the agency problems being the reason for the emergence of these costs. Additionally, our analysis also controls the factors, which are prominent in the developing financial markets and determined to have an impact on the firms to provide internal capital, that whether the firm is connected to a group of firms or the ownership of a bank is found among the group of shareholders. (2) The view of the factors, which are related to the debt ratios of the IFs and DFs, are examined on a comparative basis in the periods in which the economical structure is different.

The first point that was arrived as the result of this analysis is that the Turkish real sector IFs and DFs have similar features in terms of the size, profitability and market performance. However, while the riskiness of both groups in which risk is measured by the fluctuations in the operation profits are the same in the period between 1995–1999, IFs appear to be less risky in comparison with the DFs in the 2000–2001 period. Also, the most important financial feature difference between the IFs and DFs is the concentrated ownership. For both periods, the total share of the three largest shareholders is higher for the IFs.

The capital structure differences, which are determined by employing univariate analysis, between the IFs and the DFs are as follows: short term debt ratio that is formed by the sum of short term financial debts and other debts is rather higher compared to the long term debts. Total debt and the short term financial debt ratio of the IFs are significantly larger than those of DFs and the difference is statistically significant. On the other hand, debt ratios (except long term debts) rise as the level of international operations increase. In the period between 2000–2001, even though the increases occur at the levels of 10–15 % in the debt ratios, the total debt ratios display similarities between the two groups. However, the usage of more short term debt by the IFs than that of DFs continues.

Regression analysis is used for both periods to test whether the differences between the debt ratios of the international and the DFs are rooted in the firm specific variables of the financial and capital structure that may affect the debt structure or not. The results show that the impact of the firm specific variables, which are; risk, profitability, size, level of tangible fixed assets and market to book value and ownership structure variables on the debt ratios are consistent with the theoretical arguments. There is a direct relationship between the concentrated ownership with total debts and long term debts. This result depicts that, by establishing a better monitoring mechanism on management, small number of shareholders that hold the concentrated ownership may lessen the agency cost of debt. For the variables of being connected to a group of firms and having bank as a shareholder, which we regard as probable to have an impact on the debt policies of the Turkish international and domestic real sector firms, the finding that the firms connected to a group of firms have more ability to obtain short term financial debt has been reached only for the period between 2000–2001. The general result arrived by the multivariate analysis is that the difference of total and short term financial debt between the IFs and DFs continues even after controlling for the effect of financial and equity ownership variables on the debt policies of the Turkish real sector firms.

References

Booth, L., Aivazian, V., Demirgüuc-Kunt, A., Maksimovic, V., *"Capital Structures in Developing Countries*", Journal of Finance, Vol. 56, No.1, 2001, pp. 87 – 130.

Burgman, T., "*An Emprical Examination of Multinational Corporate Capital Structure*", Journal of International Business Studies, Vol. 27, No.3, 1996, pp.553 – 570.

Chen, C., Cheng, C. S. A., He, J., Kim, J., "*An Investigation of The Relationship Between International Activities and Capital Structure*," Journal of International Business Studies, Vol.28, No.3, 1997, pp.563 – 577.

Chkir, I., Cosset, J-C., *"Diversification Strategy and Capital Structure of Multinational Corporations*," Journal of Multinational Financial Management**,** Vol. 11, 2001, pp.17-37.

Demirguc-Kunt, A., Maksimovic,V.*, "Capital Structures in Developing Countries: Evidence from Ten Country Cases*", Policy Research Working Paper, 1320, The World Bank, 1995.

Demirguc-Kunt, A., Maksimovic,V., "*Institutions, Financial Markets and Firm Debt Maturity*", Journal of Financial Economics**,** Vol. 54, 1999, pp. 295-336.

Doukas, J., Pantzalis, C., "*Geographic Diversification and Agency Cost of Debt of Multinational firms*", Journal of Corporate Finance, Vol. 9, No. 1, 2003, pp.59 – 92.

Durukan, B., "*An Investigation on Capital Structure of Firms Listed in the ISE*", ISe Review, Vol. 1, No. 3, 1997, pp.75–96.

Eiteman, D. K., Stonehill, A. L., Mofett, M. H., *Multinational Business Finance***,** Addison, Ninth Edition, Addison Wesley Longman, Boston, 2001.

Fatemi, A., "*The Effect of International Diversification on Corporate Financing Policy*", Journal of Business Research, Vol. 16, No.1, 1988, 17-30.

Gönenç, H., "*Capital Structure Under Micro Institutional Settings: The Case of Turkey*", The Journal of Emerging Market Finance**,** Vol.2, No. 1, 2002, 57-82.

Gürsoy, G., Aydoğan, K. "*Equity Ownership Structure, Risk Taking and Performance,*" Emerging Markets Finance and Trade**,** No. 38, 2002, pp.6 -25.

La Porta, R., Lopez De Silanez, F., Schleifer, A., Vishny, R. "*Law and Finance*", Journal of Political Economy, Vol.106, No. 6, 1998, pp.1113 -1156.

La Porta, R., Lopez De Silanez, F., Schleifer, A., Vishny, R. "*Investor Protection and Corporate Governance"*, Journal of Financial Economics, Vol. 58, No.1, 2000, pp.3 -27.

Lee, K., Kwok, C., "*Multinational Corporations Vs. Domestic Corporations: International Environmental Factors and Determinants of Capital Structure*", Journal of International Business Studies, Vol: 19, No: 2, 1988, pp.195 – 217.

Myers, S. C., Majluf, N. S., "*Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have*", Journal of Financial Economics, Vol. 13, 1984, pp.187 – 221.

Opler, T., Titman, S., "*Financial Distress and Corporate Performance*", Journal of Finance**,** Vol. 49, No.3, 1994, pp. 1015–1040.

Rajan, R., Zingales, L., "*What Do We Know About Capital Structure? Some Evidence From International Data"*, Journal of Finance, Vol. 50, No. 5, 1995, pp. 1421–1460.

Schleifer, A., Vishny, R., "*A Survey of Corporate Governance*", Journal of Finance**,** 52, 1997, pp. 737–783.

The ISE Review Volume: 7 No: 25-26 January-June 2003
ISSN 1301-1642 © ISE 1997

FORECASTING THE DIRECTION OF THE ISE NATIONAL-100 INDEX BY NEURAL NETWORKS BACKPROPAGATION ALGORITHM

Ali İhsan DİLER*

Abstract
The aim of this article is to start a discussion on application of neural network algorithms, which is widely used in world financial literature in the last decade, in the Turkish capital markets. In this article, the direction of the ISE National-100 Index is tried to be forecasted for the next day. A backpropagation with momentum algorithm which is usually used in this sort of financial analysis is used. According to the application results, the direction of the ISE National-100 index forecast for the next day is found to be 60,81 %.

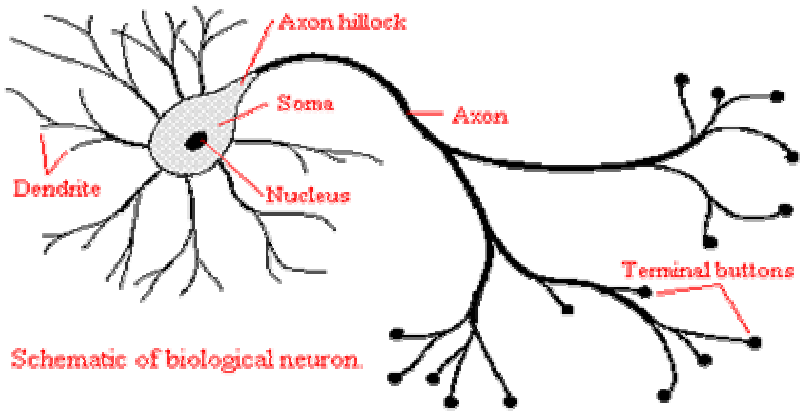
I. Introduction

1.1. Biological Neural Networks[1]

Biological neural networks are complex systems which is found in human body. The management of this complex system is made of neurons which processes the signals from the environment. The brain is a collection of about 10 billion interconnected neurons. The structure of the biological neuron is showed in Figure 1.

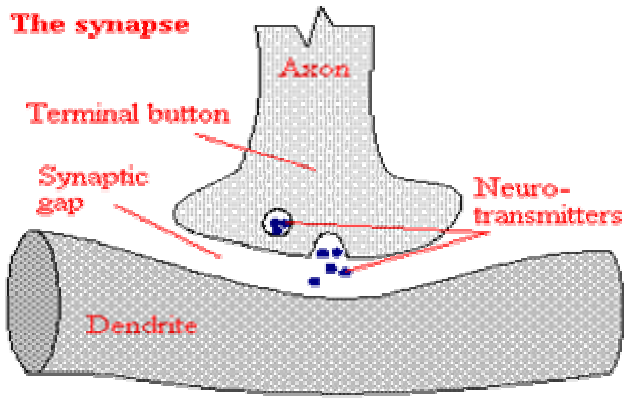
* Ali İhsan Diler, Specialist, ISE Research Department.
Tel: 0212 298 21 28 E-Mail: aliihsan.diler@imkb.gov.tr
[1] Information and figures are taken from http://vv.carleton.ca/~neil/neural/neuron-a.html

Figure 1: Structure of the Biological Neuron



Each neuron is connected to other neurons by dendric tree. When the neuron fires, signal is received by one of the dendrites. Transmitted signal is received by the dendrites of the other neurons. Received signals are summed and passed to soma. Soma and nucleus do not play a significant role in the process of received or transmitted data. Their primary function is to perform the continuous maintenance required to keep the neuron functional. The part of the soma that does concern itself with the signal is the axon hillock. If the aggregate input is greater than the axon hillock's threshold value, then the neuron fires, and an output signal is transmitted down the axon. The output strength is unaffected by the many divisions in the axon; it reaches each terminal button with the same intensity it had at the axon hillock.

Figure 2: Synaptic Gap



Each terminal button is connected to other neurons across a small gap called a synapse (Figure 2). The physical and neurochemical characteristics of each synapse determines the strength and polarity of the new input signal.

From this point of view we can summarize the similarities between the biological neurons and artificial neurons (processing element of artificial neural networks) as follows:

1) The processing element receives many signals.
2) Signals may be modified by a weight at the receiving synapse.
3) The processing element sums the weighted inputs.
4) Under appropriate circumstances (sufficient input), the neuron transmits a single output.
5) The output from a particular neuron may go to many other neurons (the axon branches)
6) Information processing is local.
7) Memory is distributed:
    a. Long-term memory resides in the neurons' synapses or weights.
    b. Short-term memory corresponds to the signals sent by the neurons.
8) A synapse's strength may be modified by experience .
9) Neurotransmitters for synapses may be excitatory or inhibitory.

1.2. Artificial Neural Networks

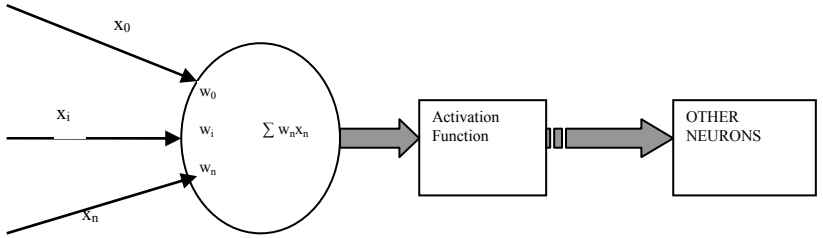
Artificial Neural Networks are information-processing system that has certain performance characteristics is similar with biological neural networks. Artificial neural networks (ANN) have been developed as generalizations of mathematical models of neural biology, based on the assumptions that;[2]

1) Information processing occurs at many simple elements called neurons.
2) Signals are passed between neurons over connection links.
3) Each connection link has an associated weight, which, in atypical neural net, multiplies the signal transmitted.
4) Each neuron applies an activation function (usually nonlinear) to its net input (sum of weighted input signals) to determine its output signal.

The structure of the artificial neurons, which produces ANNs, have the same characteristics with biological neurons.

[2] Fausett, Laurene, "Fundamentals of Neural Networks", Prentice Hall, 1994, p. 3.

Figure 3: Structure of the Artificial Neuron



ANNs are composed of many neurons. Neurons are interconnected to each other and each connection has a weight. The strength of the weights are determined by the learning process. ANNs are characterized by:

1) its pattern of connections between the neurons (called its architecture)
2) its method of determining the weights on the connections (called its training or learning algorithm)
3) its activation function

1.2.1. ANN Architecture

Generally, neurons are arranged in layers. The key factors in determining the behavior of a neuron are its activation function and the pattern of weighted connections over which it sends and receives signals. The behavior of the neurons in a layer are same with each other.

The arrangement of neurons into layers and the connection patterns within and between layers is called the "ANN Architecture". In determining the number of layers, the input units are not counted as a layer, because they perform no computation.

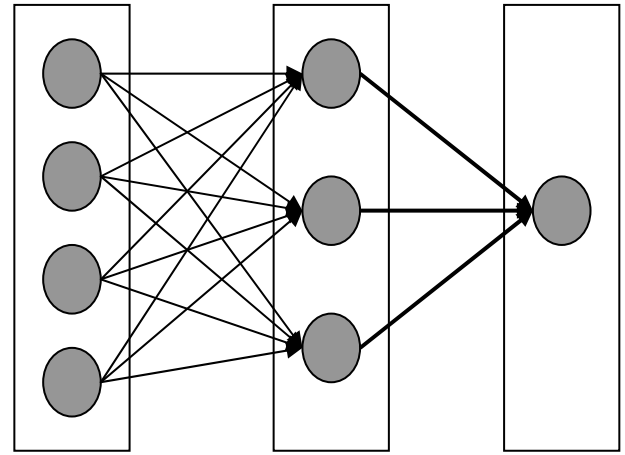
Besides the classification of ANN architectures according to number of layers, in most commonly used classification of ANNs in literature are as follows;

- Feedforward
- Recurrent

1.2.1.1. Feedforward ANNs

Feedforward ANNs are composed of three parts which are input, hidden and output layers. A typical feedforward ANN architecture is shown in Figure 4.

Figure 4: Architecture of Feedforward ANNs

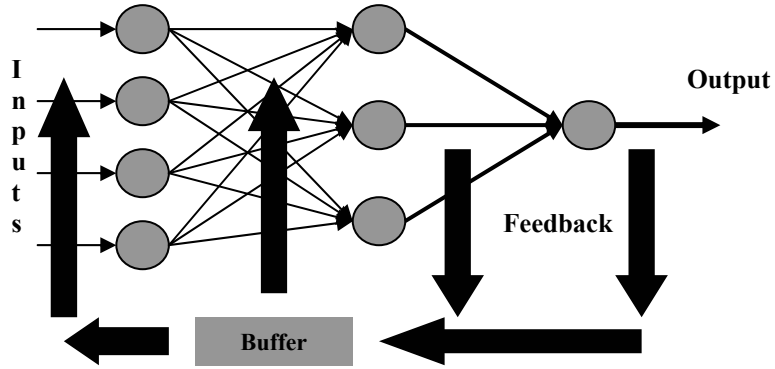


There is no limitation in determining the number of the neurons. Besides, the number of hidden layers are determined according to the nature of the problem. Information always flows from left to right in these type of networks.

1.2.1.2. Recurrent ANNs

This type of nets have feedback from outputs or hidden layers back into earlier layers through a buffer. While new inputs are entering to the net, the feedback signals send from the previous step are taken into process. This feedback component enables the net to give more accurate results. Architecture of the recurrent ANNs is shown in Figure 5.

Figure 5: Architecture of Recurrent ANNs



1.2.2. Setting the Connection Weights

In addition to the architecture, the method of setting the values of the weights is an important distinguishing characteristic of different ANNs. In this article, we shall distinguish two types of training;

- Supervised learning
- Unsupervised learning

In supervised learning, training is accomplished by presenting a sequence of input vectors, each with an associated target output vector. In this type of training, the objective is to determine the connection weights that gives us the target output vector. The connection weights are adjusted according to a learning algorithm.

In unsupervised learning, although there is an input vector, there is no target output vector. The net modifies the weights so that the most similar input vectors are assigned to the same cluster unit and will produce a representative vector for each cluster formed.

1.2.3. Activation Functions

The basic operation of an artificial neuron involves summing its weighted input signal and applying an output by transformation. The summation of weighted signals are transformed by a function. If the value obtained after this transformation is higher than the threshold value, the neuron fires, i.e. produces an output signal. Because of this, the transformation function is called “Activation Function”.

In general, activation functions are non linear. According to the problem, different activation functions can be applied. The most commonly used activation functions are given in Table 1 with their formulas.

Table 1: Activation Functions and Their Formulas

Name of the function	Formula
Logistic	$f(x) = 1/ (1+e^{-x})$
Linear	$f(x) = x$
Tanh	$f(x) = \tanh (x)$
Sine	$f(x) = \sin(x)$
Symmetric Logistic	$f(x) = [2/ (1+e^{-x})]-1$
Gauss	$f(x) = e^{-x2}$
Gauss Complement	$f(x) = 1- e^{-x2}$

II. Application of ANNs to the Financial Markets

2.1. Predictability of the Financial Markets[3]

For over 30 years, research has actively focused on searching for predictability in asset returns, with motivation arising from an economic interest in understanding how fluctuations in the economy influence financial markets. However, no consensus have been reached among academicians.

There are two main theories about predictability of the financial markets. These are "Random Walk Theory" and "Efficient Market Hypothesis".

Random Walk Theory assumes that prices of the securities are completely stochastic in nature, while the "Efficient Market Hypothesis" implies that profit opportunities do not exist in perfectly efficient markets. In essence, both of these theories imply that in well-functioning markets, prices are unpredictable and fully reflect all available information.

These two theories are well known in finance literature. Instead of examining the theories themselves, we preferred to inform the reader about the result of the empirical studies on these theories.

Empirical Studies and Their Results:

1) Seasonality Effect:
One of the first anomalies of the weak form of EMT was identified as the weekend effect (French, 1980). Gibbons and Hess analyzed daily closing data of the New York Stock Exchange and found that Monday's return was significantly lower than other days of the week (1981). A 17-year period (1962-1978) was examined where the annualized Monday return was found to be -33.5 %.

[3] Towers, Neville, "Evidence of Predictability in Financial Markets", Neural Networks and the Financial Markets, Springer, 2002.

In a number of other studies, seasonal behavior of monthly stock returns was investigated. Fama (1991) examined monthly returns over a 50-year period (1941-1991) on the New York Stock Exchange and discovered that returns in January were substantially higher than returns in other months.

Another comprehensive study examined a wide range of international equity markets and found the existence of a significant January effect of 17 countries (Gültekin and Gültekin, 1983).

In order to explain the January effect, researchers have proposed various explanations, one of the most notable tax advantages could produce market anomalies in January (Kato and Shalleim, 1985). However, subsequent works still found January effect in tax exempt markets. (Jones et al., 1987). In other related studies, which analyzed trading rules that exploit January effect, evidence suggests that assets purchased in December and sold at the end of the January outperform the market by approximately 8 % on average (Reingaum, 1983).

The general conclusion from these studies is that the January effect cannot be reconciled with the theoretical concept of an efficient market. Besides it is apparent that if the investors would act according to these results, there would be earlier price rises.

2) Using Past Returns to Predict Future:
A number of studies have examined the first-order autocorrelation between returns over time intervals, ranging from 1 day to 3 months, and over various stock markets (e.g. Fama, 1965; Cootner, 1974). However results have shown no significant correlations and studies argue that correlations should not be used to examine the efficiency of markets because of the influence of the outlying observations (Fama, 1965; Jennergen and Korsfold, 1975).

3) Non-linear Relationship Between Returns:
A common example is developing a trading strategy (Fama and Blume, 1966; Jennergen and Korsold, 1975). This formulates a trading strategy that sells when the asset price breaks through a lower price barrier and buys when the asset price rises above an upper price barrier. Results have shown some evidence of profitable trading rules, but profits often disappear with practical trading costs.

In conclusion, financial markets can be predicted by statistical and other models to a certain degree.

2.2. Application of ANNs

ANNs have a lot of applications in real-life. The main application areas are chemistry, biology, geology, sociology, physics, economics and finance. In the modeling phase, ANNs use non-linear functions. This feature improves the comparative degree of ANNs according to linear models. Since the subject of

this article is about finance, main applications of the ANNs to the financial markets are summarized in Table 2.

Table 2: The Main Financial Applications of ANNs

• Banktrupcy Prediction	• Option Pricing
• Credit Card Applications	• Capital Markets Analysis
• Mortgage Credits	• Forecasting Economic Indicators
• Bond Rating	• Mutual Fund Selection
• Index Forecasting	• Forecasting of Cash Flows
• Banktrupcy Prediction of Banks	• Forecasting Foreign Exchange Rates
• Stock Selection	• Arbitrage Pricing Theory

2.3. Applications of ANNs to the Financial Markets

According to the research done by Fadalla and Hua Lin's[4] on financial applications of ANNs;

- In the 1986-1997 period, a total of 1114 articles were published. The number of published articles increased significantly in recent years.
- Out of the 40 articles examined by the authors, 22 of them were about forecasting stock markets and 10 of them were about bankruptcy prediction.
- Among the 40 examined articles, it was observed that in 26 articles, the backpropagation algorithm is the most commonly used algorithm.

In the same article, a performance comparison of ANNs and statistical and econometric models in financial applications was made. This comparison was given in Table 3.

[4] Fadalla, Adam, Hua Lin Chien, "An Analysis of the Applications of Neural Networks in Finance", July-August 2001, Interfaces, Vol. 35, Issue 4.

Table 3: Performance Comparison of ANNs Versus Statistical and Econometric Models

			Performance		
Authors	**Domain**	**Statistical Model**	**Statistical Model**	**ANN**	**Conclusion**
Altman, Marco and Varetto, 1994	Corporate distress diagnosis	Linear Discriminant Analysis	Diagnosis accuracy: 88,4% (Training data) 94,7% (Test data)	Diagnosis accuracy: 87,8% (Training data) 93,6% (Test data)	Similar Performance
Barr and Mani, 1994	Investment Management	Linear Regression	Total return: 38%	Total return: 116%	ANNs outperform linear regression in trading profits
Berry and Trigueiros, 1993	Extraction of knowledge from accounting reports	Discriminant Analysis	Correct Conclusion: 30%	Correct Conclusion: 45%	ANNs perform better
Chiang, Urban and Baldridge, 1996	Mutual Fund net asset value forecasting	Regression	Mean Forecasting Error: 15,17%	Mean Forecasting Error: 8,76%	ANNs outperform both linear and nonlinear regressions
Dutta and Shekhar, 1988	Bond rating	Regression	Rating Accuracy: 67,7% (Training data) 82,4% (Test data)	Rating Accuracy: 92,4% (Training data) 64,7% (Test data)	ANNs perform better
Odom and Sharda, 1990	Bankruptcy Prediction	Discriminant Analysis	Prediction Accuracy: 59,26%	Prediction Accuracy: 81,48%	ANNs perform better
Rahimian et.al., 1993	Banktrupcy Prediction	Discriminant Analysis	Prediction Accuracy: 74,5%	Prediction Accuracy: 81,8%	ANNs perform better
Salchenberger, Çınar and Lash, 1992	Predicting thrift failures	Logit	Prediction Accuracy: 92,3%	Prediction Accuracy: 95,8%	ANNs perform better
Tam and Kiang, 1992	Bank failure predictions	Discriminant Analysis	Misclassification Rate: 11% (Training data) 15,9% (Test Data)	Misclassification Rate: 3,8% (Training data) 14,8% (Test data)	ANNs offer better predictive accuracy
Wilson and Sharda, 1994	Bankruptcy Prediction	Discriminant Analysis	Prediction Accuracy: 88,65% (Training data) 88,25% (Test Data)	Prediction Accuracy: 100% (Training data) 97,5% (Test Data)	ANNs perform better
Yoon, Swales and Margavio, 1993	Predicting stock-price performance	Multiple Discriminant Analysis	Prediction Accuracy: 74% (Training data) 65% (Test data)	Prediction Accuracy: 91% (Training data) 77% (Test data)	ANNs perform better

ANNs perform better than statistical and econometric methods in financial applications

In addition to these results, other articles about index forecasting are summarized below.

1) Neural Networks For Technical Analysis: A Study[5] on KLCI[6]
   In this study, authors have examined the use of ANNs in stock index forecasting. Frequently used technical indicators are used as inputs in the study. These are; moving average, momentum, relative strength index (RSI), stochastic (%K), moving average of stochastic (%D) and 1 day delayed value of KLCI. The authors have used the backpropagation algorithm in their model.
   In the conclusion of the study;
   - Useful predictions can be made for KLCI by the proposed ANN model.
   - 26% annual return could be achieved by using the proposed model. (For the same period, return of the bank savings were 7,98%)
   - To improve ANN capabilities in forecasting stock indexes, fundamental factors can be used as inputs.
2) Tracking the Amsterdam Stock Index Using Neural Networks[7]
   Authors have analyzed the Amsterdam General Stock Index by ANNs and compared its results by traditional regression and multiple discriminant analysis. Their aim is not to find out the indicator that determines the return of the next month but to solve the factors that lies behind it. A total of 18 variables were used and 14 of these are macro economic indicators while the rest of them are related with markets. In the ANN model, the backpropagation algorithm was used. In conclusion, ANNs are useful in analyzing the relationship between the macro economic indicators and the stock market returns.
3) Forecast Performance of Moving Average Rules With Stock Returns[8]
   This study uses the daily Dow Jones Industrial Average Index to examine the linear and nonlinear predictability of stock market returns with simple technical trading rules. Moving average indicator was the single variable which is the most common indicator in

[5] Yao, Jingtao , Lim Tan Chew, Poh Hean-Lee, "Neural Networks For Technical Analysis: A Study on KLCI", International Journal of Theoretical and Applied Finance, Vol. 2, No. 2, 1999.
[6] Kuala Lumpur Composite Index, composed of 86 listed companies in Kuala Lumpur Stock Exchange.
[7] Baestaens, Dirk Emma, Van den Berg Willem Max, "Tracking the Amsterdam Stock Index Using Neural Networks", Neural Networks in the Capital Markets, John Wiley & Sons Ltd, 1995.
[8] Gencay, Ramazan, "Forecast Performance of Moving Average Rules With Stock Returns", Neural Networks in Financial Engineering, World Scientific, 1995.

technical analysis. AR and GARCH-M, which are linear methods and neural networks as non-linear methods have been used in the article.

Strong evidence of nonlinear predictability in the stock market returns is found by using the past buy and sell signals of the moving average rules.

4) Applications of Artificial Neural Networks in the Emerging Financial Markets[9]
   This paper examines the application of ANNs in the emerging Stock Exchange of Greece in comparison with the developed German market. Momentum, MACD, KAIRI trend indicator, LQ trading volume indicators of the GIASE index (Greece Market) and DAX index (German) are used as inputs to the ANN model.
   In conclusion;
   - Although forecasting performances of ANNs in both markets performed well, it was found that the short-term trend of the emerging Greek Stock Market was easier to forecast.
   - It is specified that emerging financial markets, due to their highly volatile nature, are excellent candidates for the application of the ANN models.

III. Application of ANNs to the ISE National-100 Index

The subject of this article is to forecast the direction of the ISE National-100 index for the next day by using the ANN backpropagation algorithm. In general, this algorithm is widely used in forecasting the index. (See footnote 5)

3.1. Backpropagation Algorithm

The discovery of an effective general method of training a multilayer neural network [Rumelhart, Hinton and Williams (1986); McClelland and Rumelhart'ın (1988)] played a major role in the reemergence of neural networks as a tool for solving a wide variety of problems.

ANN models which are limited by the perceptron (Rosenblatt, 1962), require very long training times because the error occurred in each step was not propagated to the next step. Backpropagation method, propagates the error occurred in each step of the training phase to the next step by adjusting the weights.

There are three stages of this method:

[9] Siriopoulos C., Markellos R.N., Sirlantzis K., "Applications of Neural Networks in Emerging Financial Markets", Neural Networks in Financial Engineering, World Scientific, 1995.

1) Feedforward of the input training pattern
2) The calculation and backpropagation of the associated error
3) The adjustment of the weights.

Momentum is an alternative weight adjusting procedure which accelerates the training process.[10] The new weights for training steps t+1 are based on the weights at training steps t and t-1. Momentum coefficient is showed by μ and its weight update formula is given below.

$$w_{jk}(t+1) = w_{jk}(t) + \alpha\delta_k Z_j + \mu[w_{jk}(t) - w_{jk}(t-1)] \quad \text{or}$$

$$\Delta w_{jk}(t+1) = \alpha\delta_k Z_j + \mu\,\Delta w_{jk}(t) \quad \text{and}$$

$$v_{ij}(t+1) = v_{ij}(t) + \alpha\delta_j x_i + \mu[v_{ij}(t) - v_{ij}(t-1)] \quad \text{or}$$

$$\Delta v_{ij}(t+1) = \alpha\delta_j x_i + \mu\Delta v_{ij}$$

3.2. Variables Used in the Model

In order to forecast the next day direction of the ISE National-100 Index, the indicators which were most commonly used by technical analysts were taken as inputs of the model. These inputs are:

- Simple Moving Average (HO10-10 days)
- Weighted Moving Average (AHO5,AHO10-5 and 10 days)
- Momentum (M10-10 days)
- Stochastic (%K)
- Relative Strength Index (RSI)
- MACD (12 and 26 exponential averages)
- Daily return of the ISE National-100 Index.

The daily values of these variables have been used as inputs of the model from the beginning of 1990 until November 11, 2004.

The daily values of the ISE National-100 Index were taken from the data vendor, Euroline. Technical indicators were calculated according to the formulas used in literature.[11]

In order to make the variables of the same type, the daily changes were found and after that the entire data were adjusted to take the value between –1 and +1 by using the formula given below.

[10] Above mentioned footnote, Fausett.

[11] Murphy, John J., "Technical Analysis of the Futures Markets", New York Institute of Finance, 1986. Sarı, Yusuf , "Borsada Göstergelerle Teknik Analiz", Alfa, 2001.

Adjusted Value = 2 x (X- ((Maximum+Minimum)/2))/(Maximum-Minimum)

Data are separated into two groups; training and test. 80% of the data corresponding to 2700 were used for training while the remaining 718 data were used for testing the network.

3.3. Model

In order to forecast the direction of the ISE National-100 Index for the next day, one day lagged values of the inputs were used. The model has 7 inputs and 1 output. Output is the next day's return of the index.

In literature, ANNs' performance was measured by the sum of squared errors, mean of squared errors or root mean of sum of squared errors. However, since the aim the model is to predict the direction of the change in the index and not the magnitude of the change, the outputs of the network were compared by the corresponding actual values whether the sign of the difference is same or not (increase (+), decrease (-)). The performance of the model was measured according to this criterion. In addition, the RMS-Root Mean Square was used as an another indicator.

The model was designed as a two layered ANN. It consists of an input, a hidden and an output layers. The algorithm used for the training of the network was backpropagation with momentum.

Experiments were made in the computer firstly by changing the number of neurons in the hidden layer and then by changing the learning rate and momentum coefficient. The performance of the model was measured through each experiment and the results are shown in the table as follows:

Table 4: Experiment Results

Experiment No	No of Inputs (n)	No of neurons in hidden layer (p)	No of eurons in output layer (m)	Alfa (Learning Rate)	Momentum (Weight adjusting coefficient)	RMS	Success in test data (%)	Success in all data (%)
1	7	10	1	0.01	0.9	0.000225057	60.25	59.94
2	7	11	1	0.01	0.9	0.000230299	60.25	59.94
3	7	12	1	0.01	0.9	0.000229782	60.25	59.94
4	7	15	1	0.01	0.9	0.000230989	60.25	59.94
5	7	9	1	0.01	0.9	0.000227105	60.25	59.94
6	7	8	1	0.01	0.9	0.000227764	60.25	59.94
7	7	7	1	0.01	0.9	0.000224038	60.25	59.94
8	7	6	1	0.01	0.9	0.000225166	60.25	59.94
9	7	10	1	0.005	0.1	8.47438E-05	60.25	59.82
10	7	10	1	0.5	0.9	0.002794985	39.75	40.06
11	7	10	1	0.0001	0.1	8.47165E-05	59.97	56.48
12	7	10	1	0.05	0.1	6.73304E-05	60.25	60.11
13	7	10	1	0.07	0.1	3.1385E-05	60.67	59.94
14	7	10	1	0.06	0.1	6.02285E-05	60.25	59.99
15	**7**	**10**	**1**	**0.08**	**0.1**	**1.25624E-06**	**60.81**	**59.67**
16	7	10	1	0.09	0.1	3.70958E-05	59.69	59.61

As can be seen in Table 4, in the first 8 experiments the performance of the model does not change while keeping the learning rate and the momentum constant and changing the number of neurons in the hidden layer.

The performance of the model changes as the learning rate and momentum change. This can be observed in the last 8 experiments in Table 4.

It is more useful to evaluate these results according to the success rate in the test data because the test data are the most recent dated variables. On the other hand, the RMS can be taken as another performance measurement. According to these criteria, the highest success rate (60.81%) was obtained at the 15th experiment. Also, the minimum RMS value was obtained in this experiment.

IV. Conclusion

In this article, a model is developed for forecasting the direction of the ISE National-100 Index for the next day by using neural network algorithms. The algorithm used in the model is a momentum with backpropagation which usually is used in forecasting financial indicators. The inputs of the model are widely used technical indicators.

Technical indicators are used by Gencay, Ramazan (1995), Siriopoulos C., Markellos R. N., Sirlantzis K. (1995) Yao, Jingtao, Lim Tan Chew and Poh Hean-Lee, (1999) and several scientists[12] to forecast financial indicators with neural networks. Besides, these type of estimations are also used for determining trading strategies.

The aim of this article is to start a discussion on the application of neural network algorithms to the Turkish Capital Markets. For this reason, the model can be improved by applying other neural network algorithms. Besides, the outputs of the model can be used for generating buy/sell signals like technical indicators.

According to the results of the experiments, the direction of the ISE National-100 Index for the next day is estimated at a rate of 60.81%.

[12] See a.g.e. World Scientific, 1995 for other articles on this subject.

References

Apostolos-Paul, N. Refenes, Abu-Mostafa Yaser, Moody John, Weigend Andreas, *"Neural Networks in Financial Engineering"*, World Scientific, 1995.

Apostolos-Paul, N. Refenes, *"Neural Networks in the Capital Markets"*, John Wiley & Sons Ltd, 1995.

Baestaens, Dirk Emma, Van den Berg Willem Max, *"Tracking the Amsterdam Stock Index Using Neural Networks"*, Neural Networks in the Capital Markets, John Wiley & Sons Ltd, 1995, p.149-161.

Buscema Massimo, Sacco Pier Luigi, *"Feedforward Networks in Financial Predictions: The Future that Modifies the Present*", Expert Systems, July 2000, Vol.17, No.3.

Fadalla, Adam, Hua Lin Chien, *"An Analysis of the Applications of Neural Networks in Finance"*, Interfaces, Vol. 35, No.4, July-August 2001.

Fausett, Laurene *"Fundamentals of Neural Networks"*, Prentice Hall, 1994.

Feldman, Konrad, Treleaven, Philip, *"Intelligent Systems in Finance",* Applied Mathematical Finance, August 1994.

Feldman, Konrad, Kingdon J., *"Neural Networks and Some Applications to Finance",* Applied Mathematical Finance, Ocak 1995.

Gately, Edward, *"Neural Networks for Financial Forecasting"*, John Wiley & Sons Ltd, 1996.

Gencay, Ramazan, *"Forecast Performance of Moving Average Rules With Stock Returns",* Neural Networks in Financial Engineering, World Scientific, 1995, p.215-226.

Gurney, Kevin, *"An Introduction to Neural Networks"*, UCL Press, 1997.

Hawley, Delvin D., Johnson John D., Raina Dijjotam, *"Artificial Neural Systems: A New Tool For Financial Decision-Making",* Financial Analysts Journal, November-December 1990.

Kaynak, Okyay, Efe, Önder, *"Yapay Sinir Ağları ve Uygulamaları"*, Boğaziçi Üniversitesi, 2000.

Masters, Timothy *"Neural, Novel & Hybrid Algorithms for Time Series Prediction"*, John Wiley & Sons Ltd, 1995.

Murphy, John J., *"Technical Analysis of the Futures Markets"*, New York Institute of Finance, 1986.

Sarı, Yusuf, *"Borsada Göstergelerle Teknik Analiz"*, Alfa, 2001.

Siriopoulos C., Markellos R. N., Sirlantzis K., *"Applications of Neural Networks in Emerging Financial Markets"*, Neural Networks in Financial Engineering, World Scientific, 1995, p.284-302.

Shadbolt, Jimmy, Taylor, John G., *"Neural Networks and the Financial Markets",* Springer, 2002.

Walczak, Steven, *"An Emprical Analysis of Data Requirements for Financial Forecasting with Neural Networks"*, Journal of Management Information Systems, Spring 2001, Vol.17, No.4.

Wang, Shouhong, *"An Adaptive Approach to Market Development Forecasting",* Neural Computing & Applications, 1999, No.8.

Yao, Jingtao , Lim Tan Chew, Poh Hean-Lee, *"Neural Networks For Technical Analysis: A Study On KLCI"*, International Journal of Theoretical and Applied Finance, Vol. 2, No. 2 (1999), p. 221-241.

Zapranis Achilleas, Apostolos-Paul, N. Refenes, *"Principles of Neural Model Identification, Selection and Adequacy"*, Springer, 1999.

The ISE Review Volume: 7 No: 25-26 January-June 2003
ISSN 1301-1642 © ISE 1997

BANKING EFFICIENCY DURING THE FINANCIAL CRISIS PERIOD

Adnan KASMAN*

Abstract
This paper examines the performance of banks in the Turkish banking system over the period 2001-2002. The goal of the analysis is to quantify the impact of restructuring program on the banking efficiency. Using the stochastic frontier approach, efficiency scores were estimated for each bank in the sample. The results indicate that the mean cost efficiency improved significantly between 2001 and 2002. The results also indicate that private banks are the most cost efficient in 2002. There is evidence that large banks operate more cost efficiently and furthermore, there is a substantial difference in scale economies between small and large banks. Large banks show significant diseconomies of scale while small ones show significant scale economies.

I. Introduction

Following the financial liberalization programme of 1980, Turkish financial system witnessed substantial structural and institutional changes in the 1980s. The main goal of the programme was to develop a strong, stable and efficient financial system through fostering competition among banks and other financial institutions. To increase competition in the system, most restrictions on market entry, interest rates and foreign exchange rates were eliminated. Foreign banks that could produce positive externality due to know-how and expertise were considered to be the crucial element of competition in the sector[1].

The main feature of the Turkish experience was that the financial liberalization programme was introduced before the achievement of macroeconomic stability. While the fiscal deficit and their partial monetization continued to distort the macroeconomic environment, financial liberalization, in turn, complicated economic management and stabilization efforts

* Asst. Prof. Adnan Kasman, Department of Economics, Faculty of Business, Dokuz Eylül University, 35160, Buca, Izmir, Turkey.
Tel: (232) 453 5042/3109 Fax: (232) 453 5062
E-mail: adnan.kasman@deu.edu.tr
JEL classification: G21
Keywords: Turkish Banking; X-inefficiency; economies of scale.

[1] See Akyüz (1990), Atiyas (1990) and Atiyas and Ersel (1994) for details on the financial liberalization efforts in Turkey.

(Yıldırım, 2002). Particularly in early 1990s, the authorities lost control in the financing fiscal deficit and the first financial crisis, which was also an early warning signal for more financial crises in Turkey, occurred in January 1994[2]. The second major financial crisis occurred in February 2001[3]. The historically unstable macroeconomic environment, high inflation, fragility in the banking system and poor banking supervision have been common factors to the financial crises in Turkey.

Similar to the 1994 crisis, 2001 crisis began in the financial system and later spread to the real sector. In the aftermath of the 2001 crisis, the Turkish economy shrunk by 9.4%, a record level of annual output loss in the history of the country to that date. The Turkish Lira was devalued by more than 100% against the US dollar, and the most of the Central Bank reserves were eroded in managing the crisis. Banking system, representing a significant part of the financial system, was the most affected by the crisis due to the high level of foreign currency dominated liabilities. In 2001, the banks operating in the system were trying to manage high amounts of cash withdraws, to decrease the portfolio risk and to pay back short-term foreign debt. Total assets of the sector decreased about 30% in US dollars terms. Many banks became insolvent and administrations of eight private banks were taken over by the Savings Deposit Insurance Fund[4].

Turkey is currently committed to a standby agreement with the IMF. A financial restructuring program that emphasizes the importance of governmental regulation and supervision to enhance the stability of the Turkish banking system constitutes an important part of the agreement. A new banking law aiming at improving regulatory and supervisory standards and establishment of a new regulatory authority was introduced. The rules of the game are changing for banks in Turkey and there will be an increased need for monitoring the relative efficiency levels in order to survive in a new regulatory and more competitive environment.

Hence, the main aim of this paper is to examine banking efficiency in the Turkish banking system during the crisis period 2001-2002[5]. It is worthwhile to analyze the efficiency of the Turkish banking system in this new economic and

[2] The crisis of 1994 began in the financial sector and later spread to the real sector. At the end of 1994, the Turkish economy shrunk by 6% and the inflation rate hit three digit levels. As a result, the value of US dollar nearly doubled against Turkish Lira and about half of the Central Bank reserves was eroded in managing the crisis. Commercial banks, representing a significant part of the financial sector, were the most affected by the crisis because about half of their liabilities were in foreign currencies.

[3] The problem started with the disinflation program of 1999. After a relatively small crisis in November 2000, the Turkish financial system got into a deepening crisis period that reached to its peak with the abandonment of the pegged exchange rate regime in February 2001.

[4] The banks were Ulusal Bank, İktisat Bankası, Bayındırbank, EGS Bank, Kentbank, Tarişbank, Sitebank and Toprakbank.

[5] Since the banks operating in the banking sector have started to use different accounting standard (i.e. inflation accounting) since 2001 we did not cover the period before the crisis. The evolution of banking efficiency has recently been analyzed by several papers (see for example Isik and Hasan, 2003; Isik and Hassan, 2002; Yıldırım, 2002; Kasman, 2002).

regulatory environment for policy and research reasons [6]. It is believed that all recent financial (or currency) crises in Turkey were the products of policy errors made by the regulators and policy.

The remaining of the paper is organized as follows. Section two presents the methodology employed to estimate performance measures. The data and empirical results of the estimation are reported in section 3. An analysis of the determinants of the cost efficiency performance is presented in section 4. The paper's concluding remarks are provided in section 5.

II. Methodology

Following the applications from Mester (1996), Cebenoyan et al. (1993), Allen and Rai (1996), and Altunbas et al. (2000) among others, we use the stochastic frontier approach to estimate the cost efficiency scores[7]. Cost efficiency measures how close a bank's cost is to what a best-practice bank's cost would be for producing the same bundle of outputs. It then provides information on losses in the production process and on the optimality of the chosen mix of inputs. The specification of the functional form of the frontier is assumed to contain an error term with two components: one representing cost inefficiencies while the other random disturbances. The cost efficiency measure is derived from a cost function in which costs depend on the prices of inputs and the quantities of outputs. Thus the cost function is:

$$\ln tc = \ln f(w, y) + \varepsilon \tag{1}$$

where tc denotes observed total cost and w and y represent vectors of input prices and output quantities. The error term of the cost function is assumed to be $\varepsilon = u + v$. u is a one-sided component representing cost inefficiencies, meaning the degree of weakness of managerial performance. v is a two-sided component representing random disturbances, reflecting bad or good luck and measurement errors. The stochastic frontier approach requires specific distributional assumptions for the two components of the error term and generally assumes that inefficiencies follow an asymmetric half-normal distribution, while random errors follow a symmetric normal distribution.

Following Jondrow et al. (1982), bank-specific estimates of inefficiency terms can be computed by using the distribution of the inefficiency term

[6] The efficiency literature on the Turkish banking system is well established. The efficiency of Turkish banks after the liberalization program (in the deregulated era) has been examined by several paper (see for example, Aydoğan, 1990; Fields et al., 1993; Zaim, 1995; Ertuğrul and Zaim, 1996; Oral and Yolalan, 1990; Özkan-Günay, 1997; Denizer et al., 2000; Kasman, 2002; Yıldırım, 2002; Işık and Hassan, 2002). The impact of 1994 crisis on the efficiency and productivity in the Turkish banking system has been examined in a recent paper, Isik (2003).

[7] The stochastic frontier approach (SFA) was introduced by Aigner et al. (1977).

conditional on the estimate of the composite error term. The translog specification is used in modeling the cost function. The translog is one of the most widely used functional forms in the empirical literature on bank efficiency. It presents the well-known advantages of being a flexible form and of including, as a particular case, the Cobb-Douglas specification. We estimate the following multi-product (two input-two output) cost function:

$$\begin{aligned}\ln tc_{st} = {} & \alpha_0 + \sum_{i=1}^{2}\alpha_i \ln y_{ist} + \frac{1}{2}\sum_{i=1}^{2}\sum_{k=1}^{2}\alpha_{ik} \ln y_{ist} \ln y_{kst} + \sum_{j=1}^{2}\beta_j \ln w_{jst} \\ & + \frac{1}{2}\sum_{j=1}^{2}\sum_{m=1}^{2}\beta_{jm} \ln w_{jst} \ln w_{mst} + \sum_{i=1}^{2}\sum_{j=1}^{2}\delta_{ij} \ln y_{ist} \ln w_{jst} \\ & + \ln EQ + \ln PLL + v_{st} + u_{st}\end{aligned} \tag{2}$$

where tc is a measure of the costs of production, comprising operating costs and interest paid on deposits; the y_i (i =1,2) are output quantities; the w_j (j = 1, 2) are input prices; and the standard symmetry and linear restrictions apply[8].

Following Altunbas et al. (2000), we include loan-loss provisions as a proportion of total loans as the output quality proxy. As suggested in Hughes and Mester (1993) and Mester (1996) the level of equity is included in the cost function to control for differences in risk preferences. If managers of a bank are more risk-averse than the managers of other banks, they can hold a higher level of equity than the cost-minimizing level. Hence, by omitting the level of equity, we may consider a bank as inefficient even if it behaves optimally, given the risk preferences of its managers. Since it would significantly reduce the degrees of freedom this variable is not introduced as an interactive variable in the model.

Another dimension of efficiency is the evaluation of economies of scale. Banking firms in the industry realize economies of scale when output rises proportionately faster than costs. The following form in equation (3) is used to estimate overall economies of scale:

[8] To ensure that the estimated cost frontier is well behaved, two standard properties of the cost function, symmetry and linear homogeneity, are imposed via parameter restrictions. The linear homogeneity conditions are imposed by normalizing total cost (tc) and one input price by the other input price. The symmetry condition requires $\alpha_{ik} = \alpha_{ki}\ \forall\ i, k$ and $\beta_{jm} = \beta_{mj}\ \forall\ j, m$. We exclude factor share equations, which embody restrictions imposed by Shephard's Lemma or Hotelling's Lemma, because these would impose the undesirable assumption of no allocative inefficiencies [see, for example, Bauer, 1990; Cebenoyan et al., 1993; Berger and Mester, 1997].

$$\hat{\rho} = Scale = \sum_{i=1}^{3} \frac{\partial \ln tc}{\partial \ln y_i} = \sum_{i=1}^{2} \left[\alpha_i + \sum_{k=1}^{2} \alpha_{ik} \ln y_{kst} + \sum_{j=1}^{2} \delta_{ij} \ln w_{jst} \right] \quad (3)$$

If $\hat{\rho}$ is less than one (indicating overall economies of scale), then banks are operating below the optimal scale levels and can reduce costs by increasing output further. If $\hat{\rho}$ is greater than one (indicating overall diseconomies of scale), then banks should reduce their output level to achieve optimal input combinations.

III. Data and Empirical Results

3.1. Data

Our database was built on information from the annual reports of individual banks, which includes their balance sheets and income statements for the years 2001 and 2002. These reports were obtained from the Turkish Banking Association. The sample consists of 29 commercial banks. In 2002, there were 40 commercial banks operating in the Turkish banking sector. Eleven banks were excluded from the sample. Three banks that were either under the Deposits Insurance Fund or liquidated were dropped from the sample[9]. Moreover, three national private and five foreign banks were omitted from the sample either due to data inconsistency or established after 1998 (due to the high start –up costs). However, banks in our data set represent 89 percent of the industry's total assets[10].

There is little agreement in the banking literature as to whether deposits are an output or an input. It is common practice in the banking efficiency literature to follow either the intermediation approach or the production approach. According to the intermediation approach, banks are considered as financial intermediaries that combine deposits together with purchased inputs to produce financial services and products. Total cost includes interest expenses on deposits, plus operating expenses on purchased inputs (i.e. labor and capital). In the alternative production approach, banks utilize capital and labor inputs to produce outputs of loans and deposit accounts. The intermediation approach, which treats banks as financial intermediaries that collect funds from units in surplus and then transform these resources into loans, investments, and other assets, is the approach most commonly used in the conventional cost function literature. In this study, the intermediation approach is used. Banks operating in Turkey are assumed to produce two outputs and use three inputs.

[9] Those are Bayındırbank, Pamukbank and Imarbank.
[10] See the appendix for the names of banks analyzed.

The outputs include: y_1 = total loans and y_2 = other earning assets (investments). The inputs include labor, physical capital, and borrowed funds (including deposits and other purchased funds) used to fund outputs.

Since income statements for 2001 and 2002 do not include any information on the staff expenses and expenses on the fixed assets, following Hasan and Marton (2003) we computed a common price for labor and capital, w_1, by dividing operating costs by the total assets. The price of funds, w_2, is computed by dividing total interest expenses by total borrowed funds. Total cost, *tc*, includes both interest expenses and non-interest expenses. Table 1 presents the sample statistics of the main variables employed in the efficiency estimations.

Table 1: Descriptive Statistics of Bank Level Variables for 2001-2002

Variable	Mean	Standard Deviation	Coefficient of Variation
y_1 = total loans	982.414	1423.828	1.449
y_2 = other earning assets	1585.608	2887.155	1.821
w_1 = price of labor and capital	0.072	0.049	0.674
w_2 = price of loanable funds	0.202	0.138	0.684
tc = total costs (interest expenses + noninterest expenses)	952.141	1789.806	1.880
ta = total assets	4018.500	5919.254	1.473
tc/ta	0.221	0.114	0.514

Note: Assets, costs, earnings, deposits and loans are in millions of U.S. dollars. As in Işık and Hassan (2002), the denomination of the variables in U.S. dollars is expected to eliminate the adverse effect of the inflation on the real magnitudes.

3.2. Empirical Results

Table 2 reports summary statistics for inefficiency scores for the whole sample and different groups of banks. The overall mean efficiency score for the 58 observations was 0.224 with a standard deviation of 0.116. Hence, an average bank could improve its cost by 22.4 % thus matching its performances with the best-practice bank. In other words, about 22.4 % of costs are avoidable on average relative to the best-practice bank. The mean and standard deviation of cost efficiency improved significantly between 2001 and 2002. The average cost inefficiency score was 25.1 % in 2001 and decreased to 19.7 % in 2002. This result indicates that the banks operating in the Turkish banking system were working more costly in 2001 due to the financial crisis. The impact of the financial

restructuring program on banking efficiency seems to be positive[11]. Despite the decreased mean inefficiency, the Turkish banking system remains more inefficient than the European banking systems (see, for example, Allen and Rai, 1996; Cavallo and Rossi, 2001; Maudos et al., 2002).

Table 2 also reports the mean cost inefficiency levels by ownership types. We observe that state-owned banks are more cost efficient on average than private and foreign banks. The mean cost inefficiency score is 19.9% percent for state banks, while it is 21.6% and 24.4% for private and foreign banks, respectively. The cost efficiency of three groups improved significantly between 2001 and 2002. The most cost efficient group in 2002 was private banks. The cost inefficiency of private banks decreased by 27% from 24.9% in 2001 to 18.3% in 2002. Foreign banks, however, were the most cost inefficient during the sample period.

Although banks in the Turkish banking system have similar organizational structure and objectives, they vary significantly in size. Hence, we examine cost efficiency by dividing banks into three classes with respect to their total assets to check whether or not there is a relationship between size and inefficiency levels. The results suggest that the giant banks (those with assets greater than $10 billion) are the most cost efficient banks in the sample. The less cost efficient banks are the small banks (those with assets less than $1 billion). The result indicates that the performance of large banks is better than small banks and medium size banks. Therefore, there seems to be a clear relationship between size and cost efficiency.

We further analyze the performance of listed banks, which have been traded actively in the Istanbul Stock Exchange during the sample period. The mean inefficiency score is 21% indicating that listed banks performed better than an average bank in sample over the sample period. The cost efficiency of listed banks improved dramatically over the two years. The cost inefficiency of private banks decreased by 29% from 24.5% in 2001 to 17.5% in 2002. The result suggests that the listed banks were the most cost efficient in 2002.

The estimated coefficients of the translog cost function along with those of Equation (3) are used to compute economies of scale for each bank. Table 3 reports averages of overall scale for the whole sample, and banks grouped according to time period, asset size and ownership type. Results given in Table 3 show that the overall economies of scale the entire sample is statistically different from one, suggesting that the banks in the sample, on average, have overall economies of scale.

[11] We have to mention that it is early to analyze the evolution of the sector in the context of the structural changes to which it has been subjected right after the financial crisis. The first evidence, however, shows the impact of restructuring program on the banking efficiency is positive.

Table 2: Average Cost Inefficiency Scores

	Mean	Standard Deviation	Coefficient of Variation
Inefficiency	0.224	0.116	0.517
Trend			
2001	0.251	0.133	0.530
2002	0.197	0.089	0.454
Ownership			
State-owned (A.S. = 14092.2)	0.199	0.057	0.288
2001	0.204	0.088	0.434
2002	0.194	0.017	0.086
Private (A.S. = 4397.2)	0.216	0.066	0.307
2001	0.249	0.057	0.227
2002	0.183	0.060	0.327
Foreign (A.S. = 311.1)	0.244	0.177	0.726
2001	0.270	0.217	0.804
2002	0.219	0.134	0.611
Size (Million US Dollars)			
0-1000 (A.S. = 252.5)	0.241	0.160	0.664
1000-10000 (A.S. = 2748.6)	0.218	0.055	0.254
10000+ (A.S. = 14503.7)	0.196	0.049	0.250
Listed Banks (A.S. = 6785.4)	0.210	0.060	0.286
2001	0.245	0.060	0.101
2002	0.175	0.037	0.073

Note: Cost inefficiency scores are estimated by using a stochastic frontier. Pooled sample data includes 29 commercial banks over the period 2001-2002 consisting of 58 observations. Yearly estimates are simple averages for the year from the pooled estimate. A.S. denotes average asset size.
Listed banks and A.S. denote the banks that have been traded in the Istanbul Stock Exchange (Akbank, Alternatifbank, Finansbank, Sekerbank, Tekstilbank, Disbank, TEB, Garantibank, Isbank, Yapi ve Kredi Bankasi) and average asset size, respectively. Alternatifbank was dropped from the sample due to data inconsistency.

Table 3 also reports economies of scale by ownership types. As can be seen state-owned banks exhibit significant diseconomies of scale. Private banks, however, exhibit constant returns to scale. The results further indicate that foreign banks exhibit economies of scale. We also categorized banks in our sample based on their total assets as small, medium and large banks. Smaller banks exhibit increasing returns to scale while larger banks decreasing returns to scale. These results suggest that a size expansion by small banks may have greater cost advantage than size expansion by the large banks. Medium size banks, however, exhibit constant returns to scale. This is similar to the findings in previous empirical studies where larger banks were usually found to be facing scale diseconomies or decreasing scale economies (for example, Berger et al., 1987). Changes in economies of scale for banks over the period under study are also reported here. These estimates provide evidence for the existence of economies of scale in 2002. The measure of overall economies of scale has increased between 2001 and 2002.

Table 3: Overall Economies of Scale

		Mean	Standard Error of Estimate	Coefficient of Variation
Scale Economies		0.956**	0.021	0.170
Trend				
	2001	1.002	0.030	0.158
	2002	0.910*	0.029	0.172
Ownership				
State-owned	*(A.S. = 14092.2)*	1.071***	0.028	0.063
	2001	1.129*	0.008	0.012
	2002	1.014	0.021	0.086
Private	*(A.S. = 4397.2)*	0.976	0.017	0.109
	2001	0.977	0.030	0.135
	2002	0.974	0.018	0.079
Foreign	*(A.S. = 311.1)*	0.890***	0.053	0.253
	2001	1.004	0.077	0.205
	2002	0.775**	0.071	0.241
Size (Million US Dollars)				
0-1000	(A.S. = 252.5)	0.871*	0.036	0.216
1000-10000	(A.S. = 2748.6)	1.027	0.022	0.095
10000+	(A.S. = 14503.7)	1.034***	0.018	0.066
Listed Banks	(A.S. = 6785.4)	1.007	0.021	0.088
	2001	1.027	0.035	0.101
	2002	0.988	0.024	0.073

Note: SE<1 (SE>1) indicates economies (diseconomies) of scale and A.S. denotes average asset size.
* Scale economies are statistically different from one at 1% significance level.
** Scale economies are statistically different from one at 5% significance level.
*** Scale economies are statistically different from one at 10% significance level.

IV. Correlates of Cost-inefficiency Scores

We further examine the determinants of inefficiency by estimating a second stage efficiency regression. To explain inefficiency determinants, we regress inefficiency estimates (*INEFF*) on several economic, structural and financial variables. The second stage regression model is specified as follows:

$$INEFF = f(DEP,EQ, FINVEST, LIQUID, LTA, PLL, ROA, TL, OPEN, OBS) + \epsilon \quad (4)$$

Since the values of estimated inefficiencies are bounded between 0 and 1, the function is required to be monotonic increasing function that projects from the real line to the [0, 1] interval. Therefore, we use the logistic functional form as suggested in Mester (1993 and 1996). The independent variables included in the model are defined as follows. The firm characteristics used in the regression are: performance (ROA = net income/total assets); capitalization (EQ = book value of stockholders' equity/total assets); portfolio composition (TL = total loans/total assets and DEP = total deposits/total assets); and size (lnTA = the natural logarithm of total assets). Other related independent variables are: OBS = off-balance sheet activities/total assets, PLL = provision for loan losses loans/total loans, FINVEST = total investment securities/total assets, LIQUID = total liquid assets (minus securities)/total assets, and OPEN = open position.

LTA is included to control for the overall size of bank. PLL and LIQUID are included to account for output quality and liquidity risk, respectively. EQ is the financial capital ratio and this should be inversely related to inefficiency on the grounds that banks with low inefficiency will have higher profits and hence will be able to retain more earnings as capital. ROA is a performance measure and it should be inversely related to inefficiency. OBS and TL are proxies for business mix. OPEN is defined as foreign currency (FX) dominated assets/foreign currency (FX) dominated liabilities. This variable is included in the second stage regression to account for the effect of open position on the inefficiency[12].

[12] By the end of 2002, the FX liabilities in the Turkish banking system was about 50% of the total liabilities. That was the main reason that most banks suffered greatly from the financial (currency) crises.

Table 4: Correlates of Cost-inefficiency ScoresLogistic Regression Parameter Estimates

Variable	Coefficient	Standard error
C	0.406*	0.0858
DEP	0.048	0.0601
EQ	-0.058	0.2109
FINVEST	-0.317*	0.0766
LIQUID	-0.348	0.3426
LTA	0.004	0.0079
PLL	-0.002	0.0058
ROA	-0.184**	0.0770
TL	-0.503*	0.1195
OPEN	0.189**	0.0092
OBS	0.003	0.0119

Note: * and ** for values significantly different from zero at the 1% and 5% levels, respectively.

The results of the second stage regression are reported in Table 4. The TL variable is significantly and negatively related to cost inefficiency suggesting that more aggressive banks (engaged in greater amounts of lending activity) tend to be more efficient. Inefficiency scores are inversely correlated with bank performance (ROA), suggesting that banks with low inefficiency will have more profits. The coefficient on FINVEST is also negative and statistically significant, suggesting that banks that invested more in government papers (treasury bills, government bonds and other securities) tend to operate more efficiently. In recent years, due to the increasing public sector borrowing requirements (PSBR), management of commercial banks operating in the Turkish banking system displaced the traditional banking operations and invested heavily in public sector securities. For example, security portfolios, which are predominantly skewed towards public sector securities, constituted nearly 38% of total bank assets in 2001 and 2002, and have become the most lucrative asset. Finally, perhaps relatively more importantly, the coefficient estimate on the OPEN is positive and statistically significant. The result implies that banks with low open position have higher inefficiency level[13].

[13] Since OPEN is defined as foreign currency dominated assets/foreign currency dominated liabilities, an increase in OPEN means a decrease in open position. There is an open position if ratio (OPEN) is less than 100. In recent years, commercial banks operating in the Turkish banking industry have collected funds in foreign currency due to the currency substitution. They have also heavily invested in government bonds and opened their position. The major risk associated with open position is the currency risk. One of the main reasons that commercial banks in the system suffered greatly was the open position.

V. Conclusion

In this paper, we analyze the cost efficiency and economies of scale for a sample of commercial banks operating in the Turkish banking industry over the period 2001-2002 using a stochastic cost frontier model. We particularly focus on the crisis period to have an idea about the performance of banks in the system.

The results suggest that the Turkish banking system have a serious efficiency problem. The overall mean inefficiency level is 0.224. That means the average bank in our sample would have increased its efficiency level about 22.4% had it been able to operate on the efficient frontier. The results also suggest that the cost efficiency improved significantly between 2001 and 2002. The mean cost inefficiency score was 25.1% in 2001 and decreased to 19.7% in 2002.

We also analyze the performance of different ownership types. The results indicate that state-owned banks are more cost efficient on average than private and foreign banks. The efficiency of three groups improved significantly between 2001 and 2002. The most cost efficient group in 2002 was private banks. The cost inefficiency of private banks decreased by 27% from 24.9% in 2001 to 18.3% in 2002. Foreign banks, however, were the most cost inefficient during the sample period. Moreover, large banks are significantly more efficient than small and medium size banks.

The findings of this paper further indicate that there are scale diseconomies for state-owned and large banks. The results also indicate that there are significant scale economies for foreign and small banks. To identify the key determinants of the inefficiency, we fit a second stage regression, using the estimated inefficiency scores. The results suggest that efficient banks appear to have higher loan-to-assets ratios, higher return on assets, and higher open positions. Our results also suggest that banks that invested more in securities (particularly public sector securities) tend to be more efficient.

Appendix

Table A: The Names of Banks in the Sample

BANKS	**TOTAL ASSETS (two-year average) (Million US Dollars)**
ABN AMRO BANK N.V.	188
AKBANK T.A.Ş.	14250
ANADOLU BANK A.Ş.	722
ARAP TÜRK BANKASI A.Ş.	160.5
BANCA DI ROMA S.P.A.	41.5
BANK MELLAT	64
BNP-AK DRESDNER BANK A.Ş.	268
CITIBANK N.A.	969.5
DENİZBANK A.Ş.	1816
FİBA BANK A.Ş.	36.5
FİNANSBANK A.Ş.	2874
HSBC BANK A.Ş.	1941
ING BANK N.V.	33.5
KOÇBANK A.Ş.	4046.5
MNG BANK A.Ş.	69.5
OYAK BANK A.Ş.	2279
SOCIETE GENERALE S.A.	86.5
ŞEKERBANK T.A.Ş.	1397
TEKFENBAK A.Ş.	317
TEKSTİL BANKASI A.Ş.	823
TÜRK DIŞ TİCARET BANKASI A.Ş.	2257.5
TÜRK EKONOMİ BANKSI A.Ş.	1363.5
T.C. ZİRAAT BANKASI A.Ş.	23187.5
TÜRKİYE GARANTİ BANKASI A.Ş.	12406.5
TÜRKİYE HALK BANKASI A.Ş.	11482
TÜRKİYE İŞ BANKASI A.Ş.	13835
TÜRKİYE VAKIFLAR BANKASI A.Ş.	7607
WESTLB A.G.	152
YAPI VE KREDİ BANKASI A.Ş.	11862.5
OVERALL	*116536.5*

References

Aigner, D. J., Lovell, C. A., P. Schmidt, "*Formulation and Estimation of Stochastic Frontier Production Function Models,*" Journal of Econometrics, 6, 1977, p. 23-37.

Akyüz, Y., *Financial System and Policies in Turkey in the 1980s, in the Political Economy of Turkey,* (Eds) T. Aricanli and D. Rodrik, The Macmillan Press, London, 1990, p. 98–131.

Allen, L., A. Rai., "*Operational Efficiency in Banking: An International Comparison*," Journal of Banking and Finance, 20, 1996, p. 655-672.

Altunbas, Y., M. Liu, Molyneux, P., R. Seth, (2000),"*Efficiency and Risk in Japanese Banking,*" Journal of Banking and Finance, 24, 2000, 1605-1628.

Atiyas, I., *The Private Sector's Response to Financial Liberalization in Turkey: 1980–82, in the Political Economy of Turkey*, (Eds) T. Aricanli and D. Rodrik, The Macmillan Press, London, 1990, p.132–56.

Atiyas, I., Ersel, H., "*The Impact of Financial Reform: The Turkish Experience, in Financial Reform: Theory and Experience*", (Eds) G. Jr. Caprio, I. Atiyas, and J. A. Hanson, and Associates, Cambridge University Press, New York, 1994, p.103–39.

Aydogan, K., *An investigation of Performance and Operational Efficiency in Turkish Banking Industry, Discussion Paper,* No. 9022, May 1990, Research Department, The Central Bank of the Republic of Turkey, Ankara.

Bauer, P. W., "*Recent Developments in the Econometric Estimation of Frontiers,"* Journal of Econometrics, 46, 1990, p. 39-56.

Berger, A. N., G. A. Hanweck, D. B. Humphrey, "*Competitive Viability in Banking: Scale, Scope, and Reassessment,"* Journal of Money, Credit, and Banking,, 14, 1987, p. 435-456.

Berger, A. N., L. J. Mester., "*Inside the Black Box: What Explains Differences in the Efficiencies of Financial Institutions?,"* Journal of Banking and Finance, 21, 1997, p. 895-947.

Cavallo, L., S. P. S. Rossi, "*Scale and Scope Economies in the European Banking Systems,"* Journal of Multinational Financial Management, 11, 2001, p. 515-531.

Cebenoyan, S., Cooperman, E., Hudgins, S., C. Register, "*The Relative Efficiency of Stock Versus Mutual S & Ls: A Stochastic Cost Frontier Approach,"* Journal of Financial Services Research, June 1993, p. 151-170.

Denizer, C., M. Dinc, M. Tarimcilar, "*Measuring Banking Efficiency in the Pre- and Post-Liberalization Environment: Evidence from the Turkish Banking System,"* Policy Research Working Papers, No: 2476, World Bank Publication, 2000.

Ertugrul, M., O. Zaim, *Turk Bankaciliginda Etkinlik: Tarihi Gelisim Kantatif Analiz,* Unal Offset: Ankara, Turkey, 1996.

Fields, J. A., Murphy, N. B., D. Tirtiroglu, "*An International Comparison of Scale Economies in Banking: Evidence from Turkey,"* Journal of Financial Services Research, 17, 1993, p. 111 –125.

Hasan, I., K. Marton, "*Development and Efficiency of the Banking Sector in a Transitional Economy: Hungarian Experience,"* Journal of Banking and Finance, Forthcoming, 2003.

Hughes, J. P., L. J. Mester, "*A Quality and Risk-adjusted Cost Function for Banks: Evidence on the 'Too-big-to-fail' Doctrine,"* Journal of Productivity Analysis, 4, 1993, p. 293-315.

Isik, I., M. K. Hassan, *"Technical, Scale and Allocative Efficiencies of Turkish Banking Industry,"* Journal of Banking and Finance, 26, 2002, p. 719-766.

Isik, I., M. K. Hassan, "Financial Disruption and Bank Productivity: The 1994 Experience of Turkish," *The Quarterly Review of Economics and Finance,* 43, 2003, p. 291-320.

Jondrow, J., Lovell, C. A., Materov, I. S., P. Schmidt, "*On the Estimation of Technical Inefficiency in the Stochastic Frontier Production Model*," Journal of Econometrics, 19, 1982, p. 233-38.

Kasman, A., "*Cost Efficiency, Scale Economies and Technical Progress in Turkish Banking,"* Central Bank Review (Central Bank of the Republic of Turkey), 2, 2002, p. 1-21.

Maudos, J., J. M. Pastor, F. Perez, J. Quesada, "*Cost and Profit Efficiency in European Banks,"* Journal of International Financial Markets, Institutions and Money, 12, 2002, p. 33-58.

Mester, L. J., "*Efficiency in the Savings and Loan Industry,"* Journal of Banking and Finance, 17, 1993, p. 267-286.

Mester, L. J., "*A Study of Bank Efficiency Taking into Account Risk-preferences,"* Journal of Banking and Finance, 20, 1996, p. 1025-1045.

Oral, M., R. Yolalan, "*An Empirical Study on Measuring Operating Efficiency and Profitability of Bank Branches,"* European Journal of Operational Research, 46, 1990, p. 282-294.

Özkan-Günay, E. N., "*Measuring Cost Efficiency for Turkish Commercial Banks: The Stochastic Cost Frontier Approach,"* Review of Social, Economic and Administrative Studies, 11, 1997, p. 189-210.

Yıldırım, C., "*Evolution of Banking Efficiency within an Unstable Macroeconomic Environment: The Case of Turkish Commercial Banks,"* Applied Economics, Forthcoming, 2002.

Zaim, O., *"The Effect of Financial Liberalization on the Efficiency of Turkish Commercial Banks,"* Applied Financial Economics, 5, 1995, 257-264.

The ISE Review Volume: 7 No: 25-26 January-June 2003
ISSN 1301-1642 © ISE 1997

GLOBAL CAPITAL MARKETS

Following a series of adverse shocks in the first half of 2003, there were increasing signs of a renewed recovery and the balance of risks, in April, has improved significantly. In the event, with major hostilities in Iraq indeed ending quickly, forward-looking indicators generally turned up, with equity markets strengthening markedly, accompanied by some pickup in business and consumer confidence, particularly in the United States. Concurrent data initially remained weak, with industrial production and trade growth slowing markedly in the second quarter, the continued aftereffects of the bursting of the equity price bubble, and—particularly in Asia— the impact of Severe Acute Respiratory Syndrome (SARS).

Most recently, however, there have been growing signs of a pickup in activity— including investment—particularly in the United States, Japan, and some emerging market countries, notably in Asia. With inflationary pressures very subdued, macroeconomic policies have been eased further across the globe. Interest rates have been reduced in Europe and the United States, as well as in a number of other industrial and emerging market countries; and fiscal policy has been further relaxed in the United States and a number of Asian countries.

Low interest rate policies in the major financial centers were a key driver of financial market developments in the first half of 2003. Low rates induced investors to invest in corporate and emerging market bonds and then in equities.

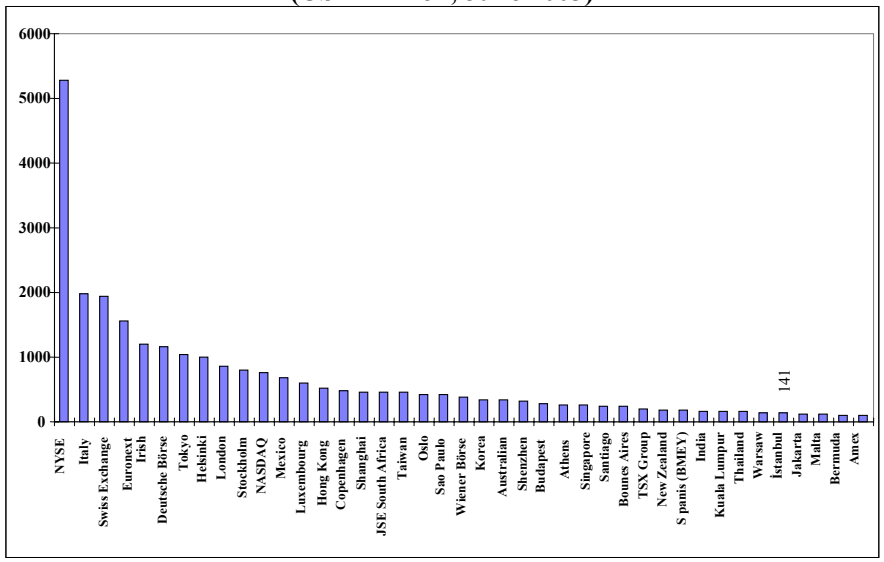
The performances of some developed stock markets with respect to indices indicated that DJI, FTSE-100, Nikkei-225 and Xetra DAX increased by 9.6%, 5.1%, 11.6 % and 23.0% respectively at the end of June 2003 in comparison with the Dec. 31st 2002. When US$ based returns of some emerging markets are compared in the same period, the best performer markets were: Argentina (71.3%), Israel (52.5%), Venezuela (49.4%), Brazil (47.9%), Russia (44.3%) and Thailand (37.9%). In the same period, the lowest return markets were: Hungary (-0.8%), Hong Kong (3.0%), S. Africa (4.5%), Malaysia (8.8%) and Singapore (9.0%). In Turkey, the performance of the ISE-100 index was up by 22.5% in the same period. The performances of emerging markets with respect to P/E ratios as of end-June 2003 indicated that the highest rates were obtained in Poland (107.7), Taiwan (59.2), Philippines (34.7), Chile (26.5), Korea (25.7) and Indonesia (25.1) and the lowest rates in Turkey (8.8), S. Africa (9,5), Brazil (10.1), Hungary (10.3) and Czech Rep.(10,5).

Market Capitalization (USD Million, 1986-2002)

	Global	Developed Markets	Emerging Markets	ISE
1986	6,514,199	6,275,582	238,617	938
1987	7,830,778	7,511,072	319,706	3,125
1988	9,728,493	9,245,358	483,135	1,128
1989	11,712,673	10,967,395	745,278	6,756
1990	9,398,391	8,784,770	613,621	18,737
1991	11,342,089	10,434,218	907,871	15,564
1992	10,923,343	9,923,024	1,000,319	9,922
1993	14,016,023	12,327,242	1,688,781	37,824
1994	15,124,051	13,210,778	1,913,273	21,785
1995	17,788,071	15,859,021	1,929,050	20,782
1996	20,412,135	17,982,088	2,272,184	30,797
1997	23,087,006	20,923,911	2,163,095	61,348
1998	26,964,463	25,065,373	1,899,090	33,473
1999	36,030,810	32,956,939	3,073,871	112,276
2000	32,260,433	29,520,707	2,691,452	69,659
2001	27,818,618	25,246,554	2,572,064	47,150
2002	23,391,914	20,955,876	2,436,038	33,958

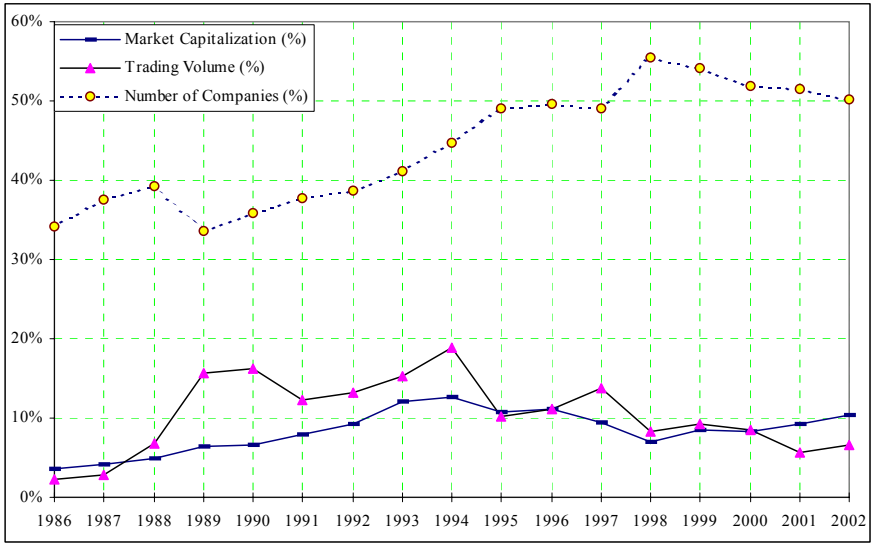
Source: Standard & Poor's Global Stock Markets Factbook, 2003.

Comparison of Average Market Capitalization Per Company (USD Million, June 2003)



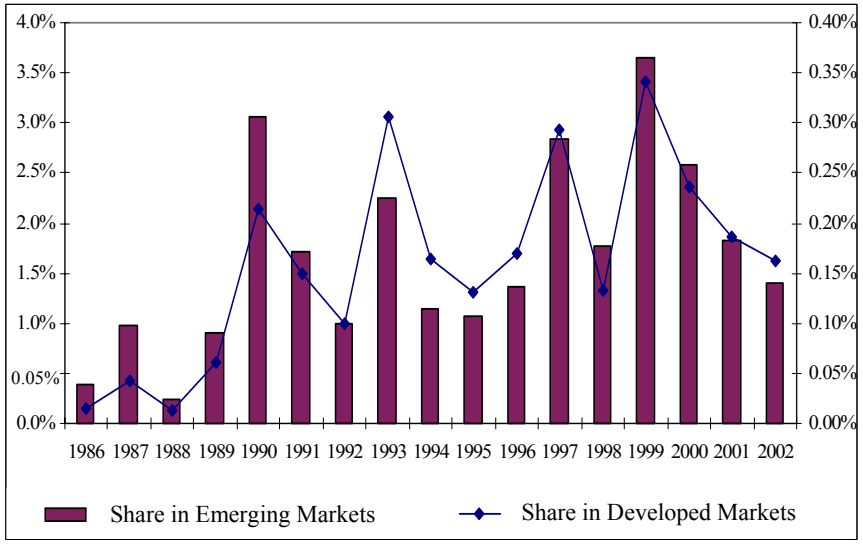
Source: FIBV, Monthly Statistics, June 2003.

Worldwide Share of Emerging Capital Markets (1986-2002)



Source: Standard & Poor's Global Stock Markets Factbook, 2003.

Share of ISE's Market Capitalization in World Markets (1986-2002)



Source: Standard & Poor's Global Stock Markets Factbook, 2003.

Main Indicators of Capital Markets (June 2003)

	Market	Monthly Turnover Velocity (June 2003) (%)	Market	Value of Share Trading (millions, US$) Up to Year Total (2003/1-2003/6)	Market	Market Cap. of Share of Domestic Companies (millions US$) June 2003
1	NASDAQ	298.38	NYSE	4,670,418	NYSE	9,865,615
2	Korea	213.10	NASDAQ	3,138,152	NASDAQ	2,292,019
3	Istanbul	194.73	London	1,654,804	Tokyo	2,238,931
4	Taiwan	186.92	Euronext	924,433	London	1,985,647
5	Spanish (BME)	155.29	Tokyo	745,001	Euronext	1,675,195
6	Deutsche Börse	145.60	Deutsche Börse	588,898	Deutsche Börse	815,901
7	Italy	133.67	Spanish (BME)	417,314	TSX Group	717,863
8	Euronext	125.12	Italy	409,347	Swiss Exchange	578,919
9	Helsinki	119.84	Swiss Exchange	305,408	Spanish (BME)	555,123
10	Stockholm	114.19	Amex	287,247	Italy	549,963
11	NSE India	113.59	Taiwan	236,729	Hong Kong	508,887
12	Swiss Exchange	110.77	TSX Group	209,129	Australian	453,699
13	London	105.77	Korea	206,033	Shanghai	341,474
14	NYSE	96.80	Bermuda	188,652	Taiwan	287,140
15	Shenzhen	82.78	Australian	166,825	Korea	232,575
16	Oslo	81.35	Shanghai	140,480	Stockholm	214,501
17	Australian	79.08	Stockholm	132,320	JSE South Africa	182,963
18	Thailand	74.01	Hong Kong	99,269	Shenzhen	161,456
19	Tokyo	69.45	Shenzhen	82,625	Sao Paulo	159,235
20	Shanghai	66.09	Helsinki	76,550	Mumbai	157,829
21	TSX Group	65.52	NSE India	67,996	Helsinki	141,394
22	Irish	61.85	Osaka	48,058	India	140,160
23	Copenhagen	59.80	JSE South Africa	45,552	Kuala Lumpur	137,028
24	Budapest	55.63	Istanbul	34,935	Singapore	115,664
25	Singapore	53.68	Oslo	33,496	Mexico	109,541
26	New Zealand	41.34	Mumbai	31,271	Copenhagen	95,452
27	Mumbai	40.84	Singapore	30,740	Athens	82,275
28	Hong Kong	39.06	Copenhagen	27,845	Oslo	71,733
29	JSE South Africa	35.62	Sao Paulo	26,126	Irish	68,594
30	Athens	35.37	Thailand	21,350	Tel-Aviv	62,291
31	Sao Paulo	34.79	Irish	21,170	Thailand	60,829
32	Jakarta	33.02	Kuala Lumpur	14,348	Santiago	60,096
33	Tel-Aviv	28.35	Athens	13,850	Amex	52,085
34	Warsaw	24.42	Mexico	11,548	Jakarta	41,055
35	Wiener Börse	22.90	Tel-Aviv	7,576	Istanbul	40,748
36	Tehran	20.86	New Zealand	5,411	Wiener Börse	40,278
37	Mexico	20.23	Jakarta	4,892	Warsaw	28,517
38	Kuala Lumpur	19.73	Wiener Börse	4,570	Luxembourg	27,903
39	Ljubljana	19.18	Budapest	3,969	New Zealand	26,896
40	Colombo	16.92	Warsaw	3,164	Buenos Aires	26,386
41	Philippine	9.62	Santiago	2,278	Philippine	21,466
42	Buenos Aires	9.13	Tehran	1,607	Tehran	17,139
43	Lima	8.94	Buenos Aires	1,287	Lima	13,887
44	Santiago	7.43	Philippine	747	Budapest	12,812
45	Osaka	6.86	Lima	590	Ljubljana	5,101

Source: FIBV, Monthly Statistics, June 2003.

Trading Volume (USD millions, 1986-2002)

	Global	Developed	Emerging	ISE	Emerging / Global (%)	ISE/Emerging (%)
1986	3,573,570	3,490,718	82,852	13	2.32	0.02
1987	5,846,864	5,682,143	164,721	118	2.82	0.07
1988	5,997,321	5,588,694	408,627	115	6.81	0.03
1989	7,467,997	6,298,778	1,169,219	773	15.66	0.07
1990	5,514,706	4,614,786	899,920	5,854	16.32	0.65
1991	5,019,596	4,403,631	615,965	8,502	12.27	1.38
1992	4,782,850	4,151,662	631,188	8,567	13.20	1.36
1993	7,194,675	6,090,929	1,103,746	21,770	15.34	1.97
1994	8,821,845	7,156,704	1,665,141	23,203	18.88	1.39
1995	10,218,748	9,176,451	1,042,297	52,357	10.20	5.02
1996	13,616,070	12,105,541	1,510,529	37,737	11.09	2.50
1997	19,484,814	16,818,167	2,666,647	59,105	13.69	2.18
1998	22,874,320	20,917,462	1,909,510	68,646	8.55	3.60
1999	31,021,065	28,154,198	2,866,867	81,277	9.24	2.86
2000	47,869,886	43,817,893	4,051,905	179,209	8.46	4.42
2001	42,076,862	39,676,018	2,400,844	77,937	5.71	3.25
2002	38,645,472	36,098,731	2,546,742	70,667	6.59	2.77

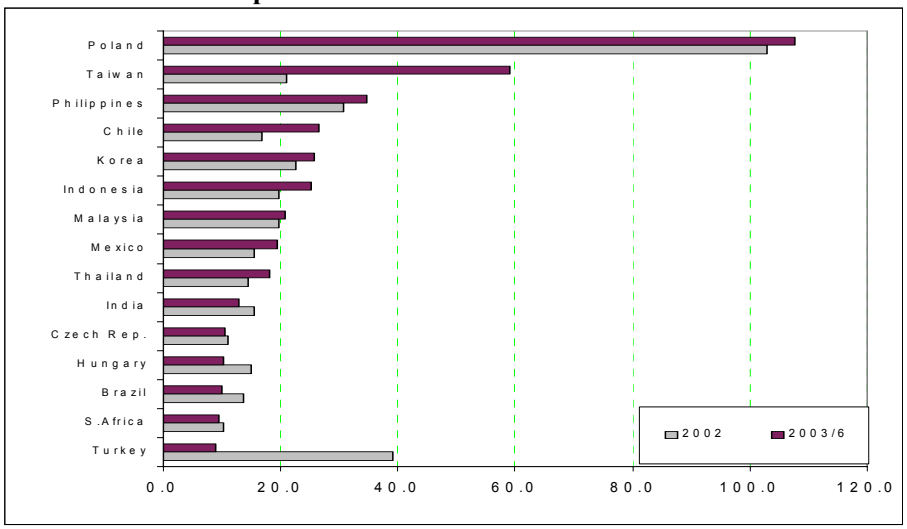
Source: Standard & Poor's Global Stock Markets Factbook, 2003.

Number of Trading Companies (1986-2002)

	Global	Developed Markets	Emerging Markets	ISE	Emerging / Global (%)	ISE/Emerging (%)
1986	28,173	18,555	9,618	80	34.14	0.83
1987	29,278	18,265	11,013	82	37.62	0.74
1988	29,270	17,805	11,465	79	39.17	0.69
1989	25,925	17,216	8,709	76	33.59	0.87
1990	25,424	16,323	9,101	110	35.80	1.21
1991	26,093	16,239	9,854	134	37.76	1.36
1992	27,706	16,976	10,730	145	38.73	1.35
1993	28,895	17,012	11,883	160	41.12	1.35
1994	33,473	18,505	14,968	176	44.72	1.18
1995	36,602	18,648	17,954	205	49.05	1.14
1996	40,191	20,242	19,949	228	49.64	1.14
1997	40,880	20,805	20,075	258	49.11	1.29
1998	47,465	21,111	26,354	277	55.52	1.05
1999	48,557	22,277	26,280	285	54.12	1.08
2000	49,933	23,996	25,937	315	51.94	1.21
2001	48,220	23,340	24,880	310	51.60	1.25
2002	48,375	24,099	24,276	288	50.18	1.19

Source: Standard & Poor's Global Stock Markets Factbook, 2003.

Comparison of P/E Ratios Performances



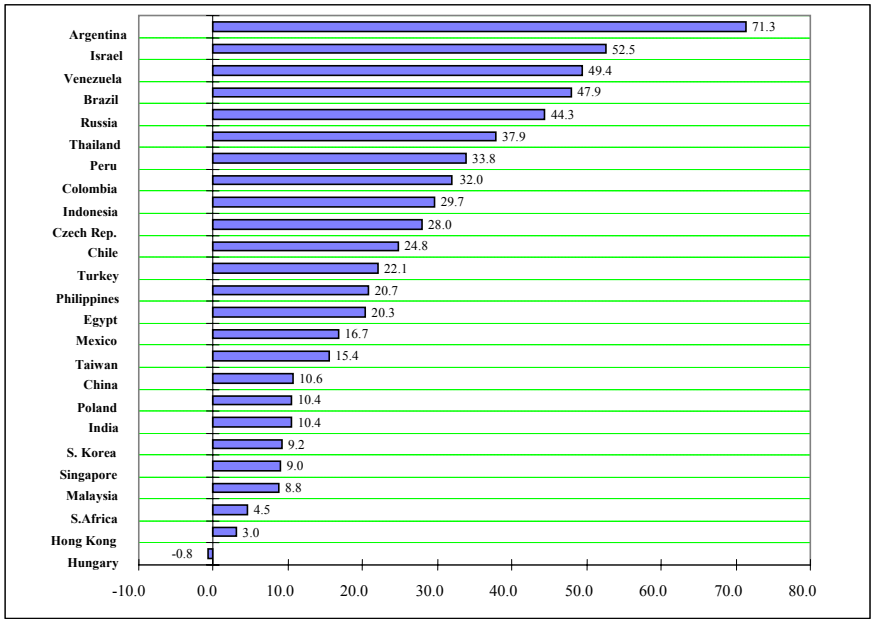
Source: IFC Factbook 2001. Standard & Poor's, Emerging Stock Markets Review, June 2003.

Price-Earnings Ratios in Emerging Markets

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003/6
Argentina	17.7	15.0	38.2	17.1	13.4	39.0	293.3	38.4	-1.7	-1838.1
Brazil	13.1	36.3	14.5	15.4	7.0	25.1	11.7	8.9	13.7	10.1
Chile	21.4	17.1	27.8	15.9	15.1	37.7	31.8	17.1	16.8	26.5
Czech Rep.	16.3	11.2	17.6	8.8	-11.3	-14.8	21.0	5.6	11.1	10.5
Hungary	-55.3	12.0	17.5	25.2	17.0	18.2	14.3	13.3	15.0	10.3
India	26.7	14.2	12.3	16.8	13.5	22.0	14.8	12.3	15.4	12.9
Indonesia	20.2	19.8	21.6	11.2	-106.2	-10.5	-6.5	-14.1	19.8	25.1
Korea	34.5	19.8	11.7	11.6	-47.1	-27.7	19.3	24.9	22.7	25.7
Malaysia	29.0	25.1	27.1	13.5	21.1	-19.1	71.7	53.2	19.6	20.8
Mexico	17.1	28.4	16.8	22.2	23.9	14.1	12.5	13.2	15.6	19.4
Philippines	30.8	19.0	20.0	12.5	15.0	24.0	28.2	28.4	30.6	34.7
Poland	12.9	7.0	14.3	10.3	10.7	22.0	19.4	6.0	103.0	107.7
S.Africa	21.3	18.8	16.3	12.1	10.1	17.4	10.7	11.7	10.2	9.5
Taiwan, China	36.8	21.4	28.2	32.4	21.7	49.2	13.7	28.5	20.9	59.2
Thailand	21.2	21.7	13.1	4.8	-3.7	-14.5	-12.4	47.3	14.5	18.1
Turkey	31.0	8.4	10.7	18.9	7.8	33.8	15.2	69.5	39.1	8.8

Source: IFC Factbook, 2001; Standard&Poor's, Emerging Stock Markets Review, June 2003.
Note: Figures are taken from IFC Investable Index Profile.

Comparison of Market Returns in USD (31/12/2002-2/7/2003)



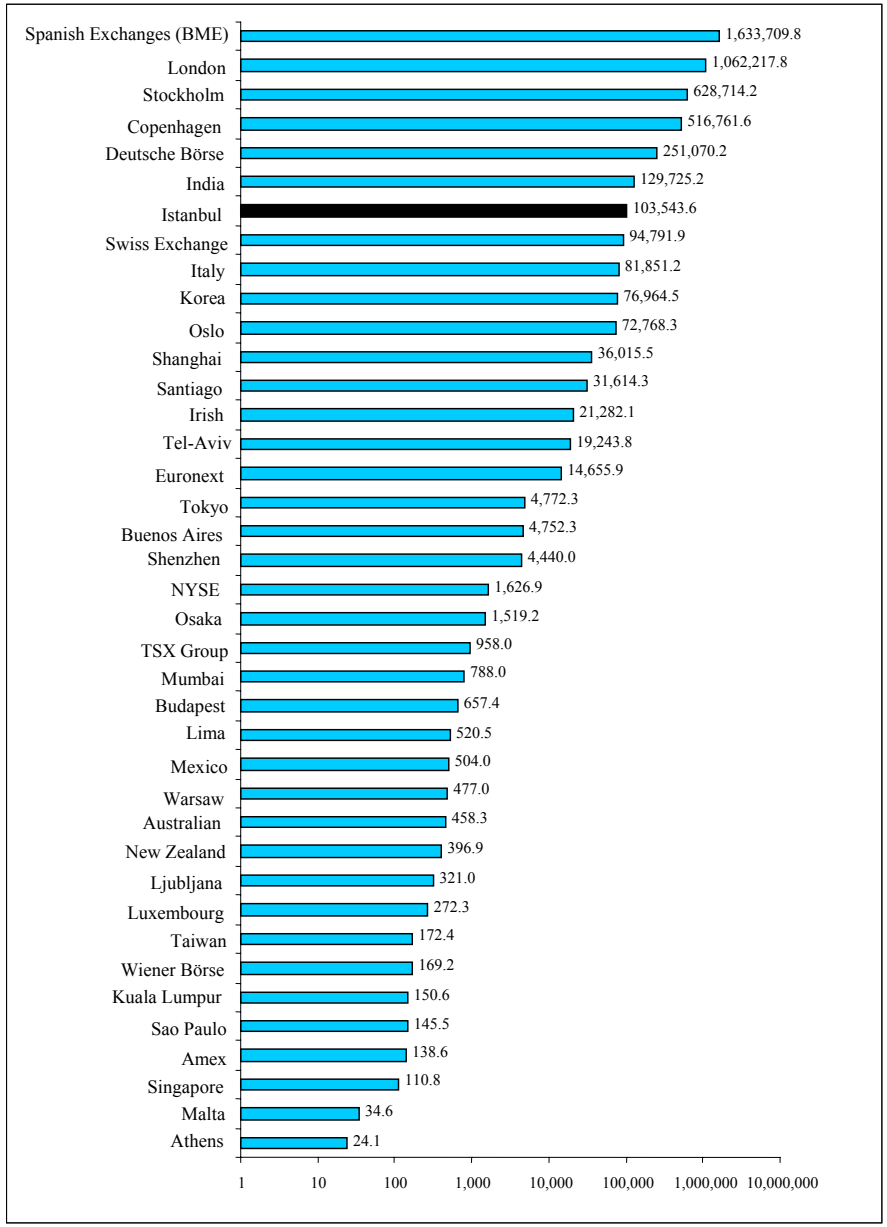
Source: The Economist, July 5th 2003.

Market Value/Book Value Ratios (1994-2003/6)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003/6
Argentina	1.4	1.3	1.6	1.8	1.3	1.5	1.0	0.6	0.9	1.5
Brazil	0.6	0.5	0.7	1.1	0.6	1.6	1.4	1.2	1.3	1.2
Chile	2.5	2.1	1.6	1.6	1.1	1.8	1.5	1.4	1.4	1.7
Czech Rep.	1.0	0.9	0.9	0.8	0.7	1.2	1.2	0.8	0.8	0.8
Hungary	1.7	1.2	2.0	3.7	3.2	3.6	2.5	1.8	2.0	1.7
India	4.2	2.3	2.1	2.7	1.9	3.1	2.5	2.0	2.6	2.4
Indonesia	2.4	2.3	2.7	1.5	1.6	2.9	1.6	1.9	1.0	1.2
Korea	1.6	1.3	0.8	0.6	0.9	2.0	0.8	1.3	1.1	1.2
Malaysia	3.8	3.3	3.8	1.8	1.3	1.9	1.5	1.3	1.4	1.5
Mexico	2.2	1.7	1.7	2.5	1.4	2.2	1.7	1.7	1.6	1.7
Philippines	4.5	3.2	3.1	1.7	1.3	1.5	1.2	1.1	0.9	1.1
Poland	2.3	1.3	2.6	1.6	1.5	2.0	2.2	1.4	1.3	1.3
S.Africa	2.6	2.5	2.3	1.9	1.5	2.7	2.1	2.1	1.9	1.7
Taiwan, China	4.4	2.7	3.3	3.8	2.6	3.3	1.7	2.1	1.7	1.8
Thailand	3.7	3.3	1.8	0.8	1.2	2.6	1.6	1.6	1.7	2.0
Turkey	6.3	2.7	4.0	9.2	2.7	8.8	3.1	3.8	2.8	1.6

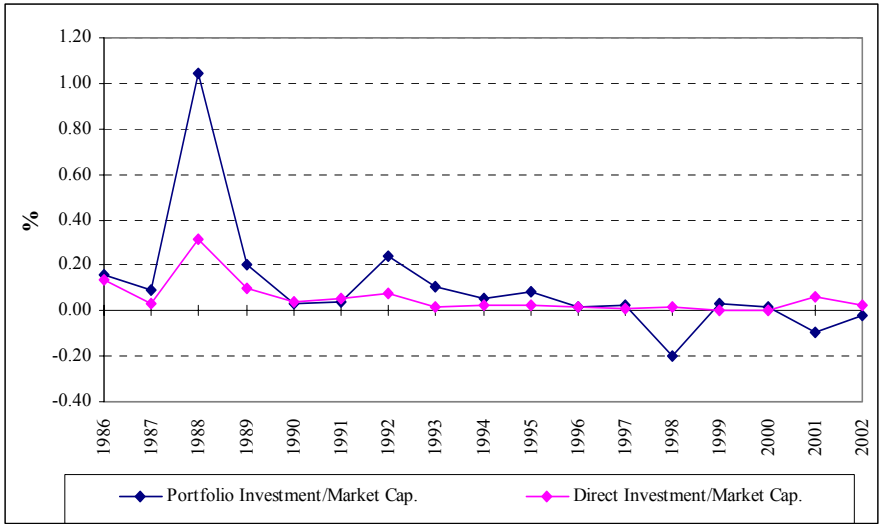
Source: IFC Factbook, 1996-2001; Standard & Poor's, Emerging Stock Markets Review, June 2003.
Note: Figures are taken from IFC Investable Index Profile.

Value of Bond Trading (Million USD Jan. 2003-June 2003)



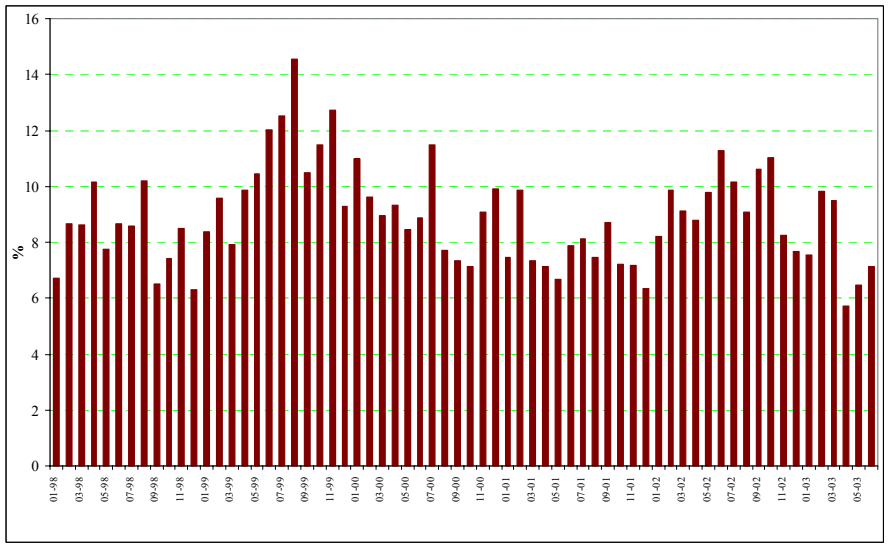
Source: FIBV, Monthly Statistics, June 2003.

Foreign Investments as a Percentage of Market Capitalization in Turkey (1986-2002)



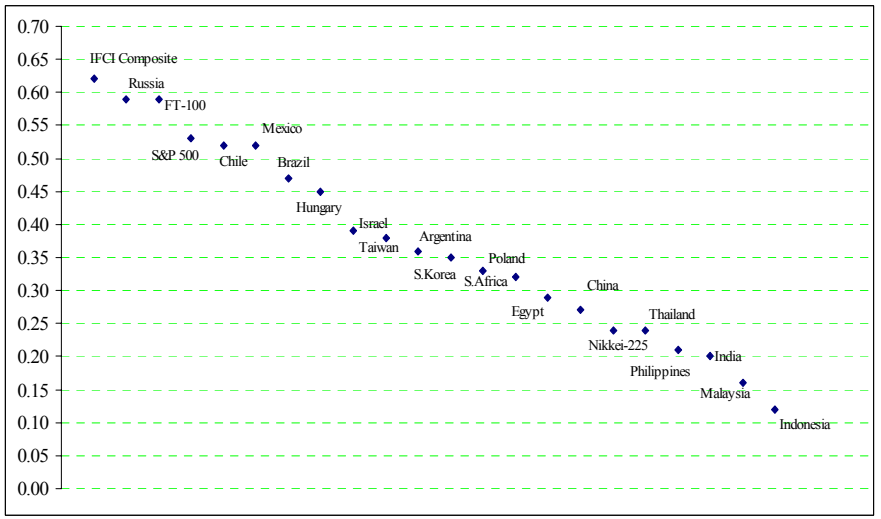
Source: ISE Data. CBTR Databank.

Foreigners' Share in the Trading Volume of the ISE (Jan. 98-June 2003)



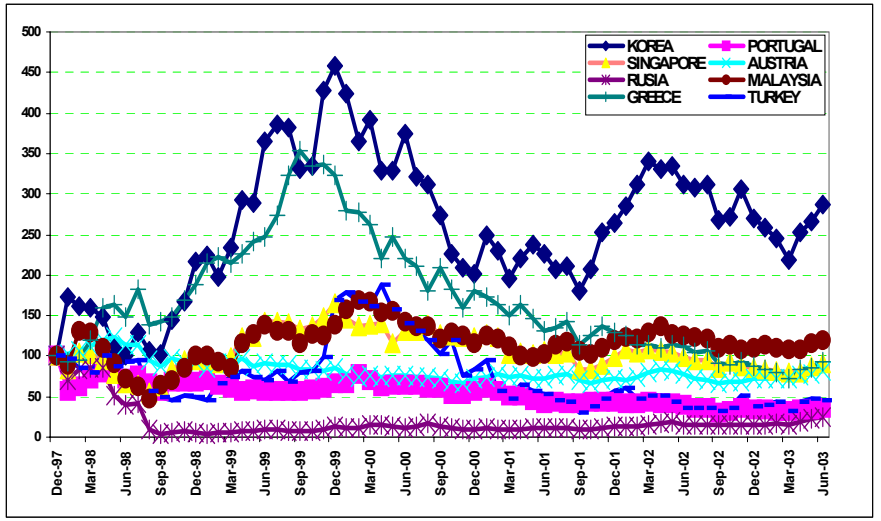
Source: ISE Data.

Price Correlations of the ISE (June 1998- June 2003)



Source: Standard & Poor's, Emerging Stock Markets Review, June 2003.
Notes: The correlation coefficient is between -1 and +1. If it is zero. for the given period. it is implied that there is no relation between two serious of returns. For monthly return index correlations (IFCI) see. IFC. Monthly Review. Oct. 1999.

Comparison of Market Indices (31 Dec 97=100)



Source: Reuters.
Note: Comparisons are in US$.

The ISE Review Volume: 7 No: 25-26 January-June 2003
ISSN 1301-1642 © ISE 1997

ISE
Market Indicators

STOCK MARKET

	Number of Companies	Traded Value				Market Value		Dividend Yield	P/E Ratios		
		Total		Daily Average							
		(TL Billion)	(US$ Million)	(TL Billion)	(US$ Million)	(TL Billion)	(US$ Million)	(%)	TL(1)	TL(2)	US$
1986	80	9	13	---	---	709	938	9,15	5,07	---	---
1987	82	105	118	---	---	3.182	3.125	2,82	15,86	---	---
1988	79	149	115	1	---	2.048	1.128	10,48	4,97	---	---
1989	76	1.736	773	7	3	15.553	6.756	3,44	15,74	---	---
1990	110	15.313	5.854	62	24	55.238	18.737	2,62	23,97	---	---
1991	134	35.487	8.502	144	34	78.907	15.564	3,95	15,88	---	---
1992	145	56.339	8.567	224	34	84.809	9.922	6,43	11,39	---	---
1993	160	255.222	21.770	1.037	88	546.316	37.824	1,65	25,75	20,72	14,86
1994	176	650.864	23.203	2.573	92	836.118	21.785	2,78	24,83	16,70	10,97
1995	205	2.374.055	52.357	9.458	209	1.264.998	20.782	3,56	9,23	7,67	5,48
1996	228	3.031.185	37.737	12.272	153	3.275.038	30.797	2,87	12,15	10,86	7,72
1997	258	9.048.721	58.104	35.908	231	12.654.308	61.879	1,56	24,39	19,45	13,28
1998	277	18.029.967	70.396	72.701	284	10.611.820	33.975	3,37	8,84	8,11	6,36
1999	285	36.877.335	84.034	156.260	356	61.137.073	114.271	0,72	37,52	34,08	24,95
2000	315	111.165.396	181.934	451.892	740	46.692.373	69.507	1,29	16,82	16,11	14,05
2001	310	93.118.834	80.400	375.479	324	68.603.041	47.689	0,95	108,33	824,42	411,64
2002	288	106.302.343	70.756	421.835	281	56.370.247	34.402	1,20	195,92	26,98	23,78
2003	298	53.820.537	34.412	444.798	284	58.035.612	41.258	1,53	12,84	14,24	16,73
2003/Q1	298	22.156.660	13.487	382.011	233	51.935.078	30.570	2,41	11,35	11,38	10,31
2003/Q2	298	31.663.876	20.926	502.601	332	58.035.612	41.258	1,53	12,84	14,24	16,73

Q: Quarter
Note:
- Between 1986-1992, the price earnings ratios were calculated on the basis of the companies' previous year-end net profits. As from 1993,
  TL(1) = Total Market Capitalization / Sum of Last two six-month profits
  TL(2) = Total Market Capitalization / Sum of Last four three-month profits.
  US$ = US$ based Total Market Capitilization / Sum of Last four US$ based three-month profits.
- Companies which are temporarily de-listed and will be traded off the Exchange under the decison of ISE's Board of Directors are not included in the calculations.

Closing Values of the ISE Price Indices

TL Based

	NATIONAL-100 (Jan. 1986=1)	NATIONAL-INDUSTRIALS (Dec.31, 90=33)	NATIONAL-SERVICES (Dec.27, 96=1046)	NATIONAL-FINANCIALS (Dec. 31, 90=33)	NATIONAL-TECHNOLOGY (June, 30,2000=14.466,12)
1986	1,71	---	---	---	---
1987	6,73	---	---	---	---
1988	3,74	---	---	---	---
1989	22,18	---	---	---	---
1990	32,56	32,56	---	32,56	---
1991	43,69	49,63	---	33,55	---
1992	40,04	49,15	---	24,34	---
1993	206,83	222,88	---	191,90	---
1994	272,57	304,74	---	229,64	---
1995	400,25	462,47	---	300,04	---
1996	975,89	1.045,91	1.046,00	914,47	---
1997	3.451,--	2.660,--	3.593,--	4.522,--	---
1998	2.597,91	1.943,67	3.697,10	3.269,58	---
1999	15.208,78	9.945,75	13.194,40	21.180,77	---
2000	9.437,21	6.954,99	7.224,01	12.837,92	10.586,58
2001	13.782,76	11.413,44	9.261,82	18.234,65	9.236,16
2002	10.369,92	9.888,71	6.897,30	12.902,34	7.260,84
2003	10.884,43	10.944,97	7.128,17	13.159,34	5.642,86
2003/Q1	9.475,09	9.692,32	6.333,52	11.221,19	6.220,19
2003/Q2	10.884,43	10.944,97	7.128,17	13.159,34	5.642,86

US$ Based

	NATIONAL-100 (Jan. 1986=100)	NATIONAL-INDUSTRIALS (Dec.31, 90=643)	NATIONAL-SERVICES (Dec.27, 96=572)	NATIONAL-FINANCIALS (Dec. 31, 90=643)	NATIONAL-TECHNOLOGY (June 30,2000=1.360,92)
1986	131,53	---	---	---	---
1987	384,57	---	---	---	---
1988	119,82	---	---	---	---
1989	560,57	---	---	---	---
1990	642,63	642,63	---	642,63	---
1991	501,50	569,63	---	385,14	---
1992	272,61	334,59	---	165,68	---
1993	833,28	897,96	---	773,13	---
1994	413,27	462,03	---	348,18	---
1995	382,62	442,11	---	286,83	---
1996	534,01	572,33	572,00	500,40	---
1997	981,99	756,91	1.022,40	1.286,75	---
1998	484,01	362,12	688,79	609,14	---
1999	1.654,17	1.081,74	1.435,08	2.303,71	---
2000	817,49	602,47	625,78	1.112,08	917,06
2001	557,52	461,68	374,65	737,61	373,61
2002	368,26	351,17	244,94	458,20	257,85
2003	450,27	452,77	294,88	544,38	233,43
2003/Q1	324,55	331,99	216,94	384,35	213,06
2003/Q2	450,27	452,77	294,88	544,38	233,43

EURO Based

	NATIONAL-100 (Dec.31, 98=484)
1986	---
1987	---
1988	---
1989	---
1990	---
1991	---
1992	---
1993	---
1994	---
1995	---
1996	---
1997	---
1998	484,01
1999	1.912,46
2000	1.045,57
2001	741,24
2002	411,72
2003	461,53
2003/Q1	349,47
2003/Q2	461,53

Q: Quarter

BONDS AND BILLS MARKET

Traded Value

Outright Purchases and Sales Market

	Total		Daily Average	
	(TL Billion)	*(US$ Million)*	*(TL Billion)*	*(US$ Million)*
1991	1.476	312	11	2
1992	17.977	2.406	72	10
1993	122.858	10.728	499	44
1994	269.992	8.832	1.067	35
1995	739.942	16.509	2.936	66
1996	2.710.973	32.737	10.758	130
1997	5.503.632	35.472	21.840	141
1998	17.995.993	68.399	71.984	274
1999	35.430.078	83.842	142.863	338
2000	166.336.480	262.941	662.695	1.048
2001	39.776.813	37.297	159.107	149
2002	102.094.613	67.256	403.536	266
2003	88.460.871	56.309	725.089	462
2003/Q1	43.293.698	26.339	733.791	446
2003/Q2	45.167.173	29.970	716.939	476

Repo-Reverse Repo Market

Repo-Reverse Repo Market

	Total		Daily Average	
	(TL Billion)	*(US$ Million)*	*(TL Billion)*	*(US$ Million)*
1993	59.009	4.794	276	22
1994	756.683	23.704	2.991	94
1995	5.781.776	123.254	22.944	489
1996	18.340.459	221.405	72.780	879
1997	58.192.071	374.384	230.921	1.486
1998	97.278.476	372.201	389.114	1.489
1999	250.723.656	589.267	1.010.982	2.376
2000	554.121.078	886.732	2.207.654	3.533
2001	696.338.553	627.244	2.774.257	2.499
2002	736.425.706	480.725	2.910.774	1.900
2003	456.506.810	288.783	3.741.859	2.367
2003/Q1	246.706.151	149.719	4.181.460	2.538
2003/Q2	209.800.659	139.064	3.330.169	2.207

Q: Quarter

ISE GDS Price Indices (December 25-29, 1995 = 100)

TL Based

	30 Days	91 Days	182 Days	General
1996	103,41	110,73	121,71	110,52
1997	102,68	108,76	118,48	110,77
1998	103,57	110,54	119,64	110,26
1999	107,70	123,26	144,12	125,47
2000	104,84	117,12	140,81	126,95
2001	106,32	119,29	137,51	116,37
2002	107,18	122,57	145,86	121,87
2003	107,69	124,29	149,64	126,24
2003/Q1	107,03	121,75	143,06	117,23
2003/Q2	107,69	124,29	149,64	126,24

ISE GDS Performance Indices (December 25-29, 1995 = 100)

TL Based

	30 Days	91 Days	182 Days
1996	222,52	240,92	262,20
1997	441,25	474,75	525,17
1998	812,81	897,19	983,16
1999	1.372,71	1.576,80	1.928,63
2000	1.835,26	2.020,94	2.538,65
2001	2.877,36	3.317,33	3.985,20
2002	3.718,40	4.667,82	6.241,47
2003	4.126,59	5.373,74	7.364,16
2003/Q1	3.930,32	4.989,31	6.837,34
2003/Q2	4.126,59	5.373,74	7.364,16

USD $ Based

	30 Days	91 Days	182 Days
1996	122.84	132.99	144.74
1997	127.67	137.36	151.95
1998	153.97	169.96	186.24
1999	151.03	173.47	212.18
2000	148.86	169.79	231.28
2001	118.09	136.14	163.55
2002	134.27	168.55	225.37
2003	173.57	226.03	309.75
2003/Q1	136.88	173.76	238.13
2003/Q2	173.57	226.03	309.75

Q: Quarter

ISE GDS Price Indices (January 02, 2001=100)					
	TL Based				
	6 Months (182 Days)	9 Months (273 Days)	12 Months (365 Days)	15 Months (456 Days)	General
2001	101,49	97,37	91,61	85,16	101,49
2002	106,91	104,87	100,57	95,00	104,62
2003	109,82	108,21	103,82	97,81	107,59
2003/Q1	105,17	101,26	95,05	87,82	100,87
2003/Q2	109,82	108,21	103,82	97,81	107,59

ISE GDS Performance Indices (January 02, 2001=100)				
	TL Based			
	6 Months (182 Days)	9 Months (273 Days)	12 Months (365 Days)	15 Months (456 Days)
2001	179,24	190,48	159,05	150,00
2002	305,57	347,66	276,59	255,90
2003	378,28	461,45	362,19	316,80
2003/Q1	340,51	384,38	301,70	285,16
2003/Q2	378,28	461,45	362,19	316,80
	USD $ Based			
	6 Months (182 Days)	9 Months (273 Days)	12 Months (365 Days)	15 Months (456 Days)
2001	7,34	7,79	6,62	6,14
2002	11,03	12,55	9,99	9,24
2003	15,91	19,41	15,23	13,33
2003/Q1	11,86	13,39	10,51	9,93
2003/Q2	15,91	19,41	15,23	13,33

Q: Quarter

The ISE Review Volume: 7 No: 25-26 January-June 2003

ISSN 1301-1642 © ISE 1997

BOOK REVIEW

"Measuring and Analyzing Behavior in Organizations: Advances in Measurement and Data Analysis", Fritz Drasgow & Neal Schmitt, Jossey-Bass Inc., San Francisco, CA, 2002, s.xiii-585.

The purpose of this organizational frontiers volume is to provide readable, up-to-date discussions of many of the most important areas of measurement, applied statistic, research methods, and data analysis.

Part 1 discusses the various types of problems applied researchers face in describing and understanding the data they collect and what specific chapters and techniques might be used to understand a set of observations best.

In Part 2, the authors primarily address issues concerning the way in which researchers collect data and evaluate the quality of those data. The first chapters in this part are oriented toward the development of additional theoretical questions about which data can and should be collected. Data collection procedures has been radically expanded with the use of the computer technology. In the following chapters the innovative ways in which computers can be and have been used to measure individual differences are discussed. Some of the earlier uses of computers to measure individual differences are briefly described and assessments that use unique characteristics of computers to display stimuli or measure responses are explored. Some of the reasons for using CBA are presented and problems that might be encountered in developing and using CBAs are focused on. Also, the typical development process, provided with an illustrative example is described, available platforms are discussed, and possible directions for future research are presented. statistical methods are given.

In the third part the authors deal primarily with the assessment of the interrelationships among different types of variables and the degree to which the data provide support for the substantive hypotheses and questions that motivated the research. This part first offers a concise introduction to SEM (Structural equation model) for readers who have little previous exposure to the topic but may be familiar with the related techniques of regression and factor analysis. In the following chapters in this part data analysis techniques are provided and advantages and disadvantages of the model are summarized.