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(MMag. Barbara Bauer)
Doktoratsreferat, Prüfungsabteilung

WIRTSCHAFTSUNIVERSITÄT WIEN 3 PRÜFUNGSABTEILUNG

Augasse 2–6
A-1090 Wien
Austria

Telefon: +43/1/313 36/6250 ▪ Telefax: +43/1/313 36/770
Web: www.wu-wien.ac.at ▪ E-Mail: pruefungsreferat@wu-wien.ac.at

# Doktorat der Sozial- und Wirtschaftswissenschaften

[redacted]

WIRTSCHAFTS UNIVERSITÄT WIEN

1. Beurteilerin/1. Beurteiler: **Prof. Dipl. Kfm. Dr. Otto Loistl**

2. Beurteilerin/2. Beurteiler: **Prof. Dr. Martin Schauer**

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# ABSTRACT

The thesis deals with the efficiency of electronic stock exchanges. The study targeted to reveal the efficiency grade in Istanbul Stock Exchange (ISE). The thesis starts with an introductory chapter emphasizing efficiency indicators in stock exchanges and their impacts on automation process. Automation process in the ISE is classified according to the efficiency indicators. Fama's Efficient Market Hypothesis (EMH) and the anomalies in the ISE are introduced to determine the efficiency grade in the developing exchange. Efficiency evaluations are deepened by considering the impacts of efficiency on ISE's trading system (ELIT) and on the components of Turkish capital markets. The study reached the conclusion that, ELIT system's sufficiency is not enough to consider ISE as an efficient exchange. Fama's EMH revealed that the ISE is not even weakly efficient. However, the exchange's promising character among its peers is illustrated by descriptive statistics. Technical infrastructure and legal framework supported by the EU alignment process are expected to improve the current conditions.

Die Arbeit präsentiert die Effizienz an den elektronischen Börsen. Sie ist auf das Ziel gerichtet, das Niveau der Effizienz an der Istanbuler Börse zu enthüllen. Die Arbeit beginnt mit einem einleitenden Abschnitt über Effizienzindikatoren an den Börsen und deren Einflüsse auf Automationsprozesse. Der Automationsprozess an der Istanbuler Börse wurde nach den Effizienzindikatoren sortiert. "Efficient Market Hypothesis" (EMH) von Fama und die Anomalien an der Istanbuler Börse wurden eingeführt, um das Niveau der Effizienz festzusetzen. Effizienzanalysen wurden durch die Berücksichtigung des Handlungssystems an der Istanbuler Börse (ELIT) und der Bestandteile der türkischen Kapitalmärkte vertieft. Am Ende der Arbeit wurde festgelegt, dass die Effizienz des Handlungssystems nicht genug ist, um Istanbuler Börse als effizient zu betrachten. EMH von Fama hat gezeigt, dass Istanbuler Börse nicht einmal die Effizienzbewertung von "schwach" (weak) erreicht hat. Jedoch wurden die dynamischen Eigenschaften der Istanbuler Börse unter ihren Gleichgestellten – mit Hilfe deskriptiver Statistiken – illustriert. Technische Infrastruktur und gesetzliche Rahmenbedingungen innerhalb der EU Orientierungsphase würden die aktuellen Umstände verbessern.

## Schlagworte:

Istanbul Stock Exchange / Turkish capital markets / ELIT system / Efficient Market Hypothesis / efficiency / efficiency indicators / electronic exchanges / automation

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# ABBREVATIONS

**adj:** adjusted

**app:** approximately

**Art:** Article

**ADR:** American Depository Receipt

**ADSL:** Asymmetric Digital Subscriber Line

**AMEX:** American Exchange

**BFup:** Betriebswirtschaftliche Forschung und Praxis

**bn:** billion

**BRSB:** Banking Regulatory and Supervisory Board

**btw:** between

**CBT:** Central Bank of Turkey

**cf:** consult or confer

**CMB:** Capital Markets Board

**CML:** Capital Market Law

**Co:** Company

**CONSOB:** Commissione Nazionale Per Le Societa E La Borsa

**CSEF:** Centre for Studies in Economics and Finance

**DBW:** Die Betriebswirtschaft

**D – L:** Decree – by – Law

**Dev:** deviation

**DR:** Depository Receipt

**DTB:** Deutsche Terminbörse

**DvP:** Delivery versus Payment

**EBRC**: eBusiness Research Center

**ed:** edition

**EDP:** Electronic Data Processing

**EFT:** Electronic Fund Transfer

**e.g.:** for example

**ELIT:** Electronic Trading

**EMH:** Efficient Market Hypothesis

**EU:** European Union

**EUREX:** European Derivatives Exchange

**et al.:** "and others"

**FEAS:** Federation of Euro – Asian Stock Exchanges

**FEEM:** Fondazione Eni Enrico Mattei

**FIBV:** Federation Internationale Des Bourses De Valeurs (World Federation of Exchanges)

**FTSE:** Financial Times Stock Exchange

**G – Bond:** Government Bond

**GDR:** Global Depository Receipt

**GDS:** Government Debt Security

**GmbH:** Gesellschaft mit beschrankter Haftung (limited company)

**GNP:** Gross National Product

**Hol:** Holding

**ID:** Identification

**IFC:** International Finance Corporation

**IFCG:** International Finance Corporation Global

**IFCI:** International Finance Corporation Index

**IFRS:** International Financial Reporting Standards

**IMF:** International Monetary Fund

**Inc:** Incorporated

**IOSCO:** International Organization of Securities Commissions

**IPO:** Initial Public Offering

**ISE:** Istanbul Stock Exchange

**IVR:** Interactive Voice Response

**i.e.:** id est "that is"

**İMKB:** İstanbul Menkul Kıymetler Borsası

**JCMC:** Journal of Computer – Mediated Communication

**m:** million

**Mcap:** Market Capitalization

**NASDAQ:** National Association of Securities Dealers Automatic Quotation

**NBER:** National Bureau of Economic Research

**NYSE:** New - York Stock Exchange

**ÖBA:** Österreichisches Bank Archiv

**p:** Page

**REIT:** Real Estate Investment Trust

**RWH:** Random Walk Hypothesis

**SDIF:** Savings Deposit and Insurance Fund

**SEC:** Securities Exchange Commission

**SFEMH:** Strong - Form Efficient Market Hypothesis

**SIS:** State Institut of Statistics

**SOES:** Small Order Execution System

**S&P:** Standart and Poors'

**SPO:** Second Public Offering

**SSFEMH:** Semi – Strong Form Efficient Market Hypothesis

**SSRN:** Social Science Research Network

**SUERF:** Société Universitaire Européenne de Recherches Financiéres

**T – Bill:** Treasury Bill

**TL:** Turkish Lira

**TSPAKB:** The Association of Capital Market Intermediary Institutions of Turkey

**UCITS:** Undertakings for Collective Investments in Transferable Securities

**US$:** United States dollar

**Vol:** Volume

**WAN:** Wide Area Network

**WAP:** Wireless Application Protocol

**WB:** World Bank

**WFEMH:** Weak - Form Efficient Market Hypothesis

**XETRA:** Exchange Electronic Trading (Deutsche Börse)

# PREFACE

Developing world and undeniable technological progress introduces "automation" term to our daily lives. Capital markets, as one of the most important pillars of the economy, also utilize automation process. Stock exchanges, in the middle of capital markets, target to increase efficiency and reach to optimal investment environment for investors through automation infrastructure.

The main heading of the dissertation is **'Efficiency in electronic stock exchanges and the special situation in the Istanbul Stock Exchange'.**

The thesis starts with the chapter called **"Establishment of Electronic Exchanges and Efficiency Criterion"** and gives general information about electronic markets, efficiency indicators in stock exchanges and their impacts on automation process. In order to perceive the specific situation in the ISE, it is taken necessary to outline the efficiency criterion in the automation process.

In the second chapter of the thesis, **"Analysis of an Emerging Stock Exchange: Istanbul Stock Exchange"**, (ISE) is introduced in terms of its history and market structure.

**"The efficiency analyses in the ISE"**, is the third and the main chapter of the thesis. Efficiency is considered from three different aspects; impacts of efficiency on the ISE trading system, so called ELIT, efficiency analyses according to Fama's Efficient Market Hypothesis (EMH) and the efficiency evaluation of the componets of Turkish capital markets. ISE's sensitive and volatile character made it necessary to handle the "efficiency" issue from 3 different sides.

The following chapter is the **"International comparison of the ISE"**. It was inevitable to define the global position of the ISE, in order to strengthen our analyses and forecasts.

The thesis ends with **"The Recent Developments and Expectations on Turkish Capital Markets"**.

# A. ESTABLISHMENT OF ELECTRONIC EXCHANGES AND "EFFICIENCY" CRITERION

## A.1 AUTOMATION PHASES

Automated markets are the consequences of technology. Fully automated markets are being developed in all fields of economy and finance sectors. Hereby, capital markets and especially stock exchanges are trying to adjust themselves to this global automation process. There are three major steps for the automation of stock exchanges:

### A.1.1 Floor Trading

Floor trading sytem, in which pricing is done by the support of electronical systems, is the first phase in stock exchange automation process. Electronic Data Processing (EDP) is implemented in floor trading in order to provide information transfer among parties by showing all price information on the screen. In line with the technological development, also bid and ask positions are entered into the EDP system and matched transactions are shown on the screen.

Market participants (so called brokers) of floor trading system - based - exchanges meet daily in a specific place at fixed session hours and trade either customer orders or for their own accounts. Since participants are gathered in a specific place, face – to - face contact is one of the most important factors of floor trading system.

Transaction sytem of floor trading is based on auction system.[1] The auction is implemented either by listing the orders according to a pre - defined daily standard price or by continuous auction method (cross matching of orders in different price levels).

In terms of efficiency, floor - trading sytem has both advantages and disadvantages. Fixed transaction hours, to some extent, might lead to a lack of transparency and liquidity. Since face - to - face contact is the major factor in terms of receiving information, same - time - based information dissemination is not possible and this could lead to insider trading, which is one of the most important disadvantages of todays' exchanges. On the other hand, direct communication also enables the rapid dissemination of especially non – price – based information, which is especially

[1] Auction system is a system in which financial instruments are bought and sold by Exchange Members acting as agents for the both institutional and invidula investors through trading on an exchange floor competing via open – outcry for the most advantageous price. Buy and sell orders meet directly on the trading floor and prices are determined by the interplay of supply and demand. NYSE and AMEX are two examples of auction markets.

important in case of avoiding trading with well – informed traders and with large price – discriminating traders.

One of the most important advantages of auction markets is that, there is no cost for bid and ask spread[2], since no dealer or market – maker takes place in the execution of transactios.[3] In order to minimize the effects of manipulation, a pre - defined limited margin account is set in continuous - auction method. As an instance, the spread between the highest sale price and the lowest buy price in the ISE is limited with the +-10% of the initial price[4] of the stock.

### A.1.2 Computer - supported Trading (Telephone Trading)

Trading per telephone is the second stage in transmission to fully automated stock trading. Bid - ask prices, clearing among market participants are realized per telephone and orders are entered into the system by the representatives of brokerage houses, present in the stock exchange.

### A.1.3 Fully – automated Trading Supported by Electronic Trading Systems (ETS)

In fully - automated exchanges, transactions are carried out by a fully - automated computer systems. Fully – automated electronic exchanges will be analysed in details.

## A.2 THE ESTABLISHMENT OF ELECTRONIC EXCHANGES

By the end of 1980s, as stated in Flory, a new concept "Electronic Markets and Electronic Hierarchies" entered into the finance literature.[5] Telematik, electronic information dissemination supported by digital news technique, formed the base of electronic markets. Thus, stock exchanges are not perceived as a physcial place where all market participants meet, anymore. In line with the globalisation, it became impossible to gather all participants to a fixed session saloon and therefore fully - automated trading systems are centered in the exchanges' structures.

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[2] Gerke / Aignesberger, " Computergestützte Handelsverfahren, " Österreichisches Bank Archiv April 1987: p: 211.

[3] Bid – ask spreads mostly occur due to dealers' cost of holding inventories, dealers' market power and risk aversion. Since brokers in auction markets are not permitted to trade for their own accounts, their functions are restricted. There are some exceptions such as so called "specialists" and "Maklers" in the NYSE and FSE. Even though the system is auction – based, "specialists" are obliged and "Maklers" are allowed to trade for their own accounts.

[4] Initial price of a stock in the ISE is determined by the weighted average of a stock in the last session.

[5] Flory, Computergestützter Vertrieb von Investitionsgütern (Wiesbaden, 1995) p: 223.

### A.2.1 Analysis of Structural Changes and Effects of Automation in Stock Exchanges

A lot of exchanges around the world are trying to replace their floor – based systems with fully – automated trading systems. The main idea of this replacement is the achievement of more fair, more efficient and cheaper trading. Empirical findings prove that automation increases the speed of trading, the information dissemination and the synergy among markets[6], whereas it also offers an operational fairness, fair access to participants and is scaleable in terms of executing small and large orders[7]. Furthermore, automation might offer lower bid / ask spreads, which result decline in transaction costs.[8]

### A.2.2 Classification of automated trading systems:

In fully - automated stock exchanges, transactions are carried out by two different methods:

- **Match Mode (Order - Driven System)**

Match Mode' System is implemented in auction (call auction & continuous auction) markets. There is no market maker and transactions, cross matching of buy and sale orders in all levels or the order listing according to a standard price, are carried out automatically by the system. Following the transaction, the prices and quantities are shown on the screen.

Unlike Accept Mode Sytem, orders are carried out according to time and price priorities and therefore the market impact of prices and the monopol sturcture of the market are minimized. Empirical evidences indicate that call auction market is superior in terms of transaction costs for small to medium sized orders, whereas continuous auction market outperforms in case of large orders.[9] NYSE, London Stock Exchange and ISE are examples of order - driven - system – based exchanges.

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[6] One of these empirical studies is conducted by Russell. Cf. Russell K., "Structural Changes on Capital Markets," Österreichisches Bank Archiv March 1988: p: 2.

[7] Harris, "Floor versus Automated Trading Systems: A Survey of the Issues," Paper prepared for the Financial Markets Group Conference, 18 May 2000, 12 June 2004 http://fmg.lse.ac.uk/upload_file/28_larryharris.pdf.

[8] Theissen, "Price Discovery in Floor and Screen Trading Systems," Journal of Empirical Finance 2002 Vol: 9 No: 4: p: 455 – 474.

[9] Freihube / Krahnen / Theissen, "Market Structure, Intermediation and Liquidity," Schmalenbach Business Review April 2001 Vol: 54, Special Issue: 1: p: 255 – 274.

➢ **Accept Mode (Quote - Driven System)**

In the Accept Mode System, price is determined during the quotation of the security. Both price and quantity or only preis or only quantity information is seen on the screen.

Unlike Match Mode System, market makers have a vital position in the system. They are authorized to set a binding bid and ask prices for proper securities.[10] They also have the possibility to trade for their own accounts. Market makers' main intervention is seen in the case of high volatility. Since a continuous trading mechanism takes place by the support of market makers, the liquidity, as one of the most important efficiency indicators, increases. Bid and ask spread is defined as the return of market maker.

Both price and quantity are quoted in Accept Mode System and matching is carried out through a consensus. Following the transaction, the result is shown on the screen. Settlement of transactions is carried out by Clearing Houses. Thus, Clearing House undertakes the monitoring function of transactions. Nasdaq is the best-known example of Accept - Mode implemented automated exchange. The quote – driven system is also used within the trading system XETRA in German Stock Exchange (Deutsche Boerse). "*The XETRA traders sit in front of their online trading screen, isolated from each other. During normal trading they can view all existing orders (open order book), and they can enter their own market or limit orders in any size at any time during XETRA trading*".[11]

According to findings of Theissen and Wolfgang, execution costs are higher in quote - driven systems (dealer markets) compared to that of order driven systems (auction markets). On the other hand, liquidity is considered to be higher in dealer markets, due to the double – counting of transactions.[12]

As seen, market structures of automated trading systems are different from each other and these differences lead to major contrasts in efficiency indicators.

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[10] Schäfer, Informationsverarbeitung und Preisbildung am Aktien-und Optionsmarkt, (Heidelberg, 1995) p: 133.

[11] Loistl / Vetter, "Computer – Modelled Stock Exchanges," User Manual in: <http://ifm.wu-wien.ac.at/kapsyndl/KapSyn30Handbook.pdf>, p: 90.

[12] Theissen / Wolfgang, Market Structure, Informational Efficiency and Liquidity: An Experimental Comparison of Auction and Dealer Markets, in: <http://www.wiwi.uni-frankfurt.de/finance/krahnen/Research/DFG/market_structure.pdf>, Stand: June 2000, p: 5 - 6.

## A.3 EFFICIENCY INDICATORS UNDER THE CONSIDERATION OF AUTOMATION PROCESS

It is stated by Peiseler that one of the most important responsibilities of an exchange is to fulfill its performance as efficient as possible.[13] Economic theory defines financial markets to be efficient if they can discover the right price of financial assets given all available information (informational efficiency), if they make optimal use of the signals provided by this set of prices to allocate current resources to the best real investment opportunities (allocative efficiency) and if they can perform these tasks at the minimum possible cost (operational efficiency).[14]

The most important efficiency indicators for stock exchanges, based on the economic theorie's classification, are underlined by many empirical researches[15] as reduced transaction costs, information, transparency, liquidity, consolidation of order flow & stock market integration, price determination and confidence.

### A.3.1 Transaction Costs

Transaction costs occur during the execution of securities' transactions and are important to determine the investment performances. In general, transaction costs are defined in two categories as explicit and implicit costs. Brokerage commissions & fees, taxes, clearing and settlement costs are considered as explicit costs, while implicit costs contain market impact of prices (bid / ask spread, timing cost) and the opportunity costs of failing to execute or margin deposit in case of short – selling. The researches of Edwards and Wagner (1993) state that explicit costs are the visual part of the iceberg and easy to quantify, while the greater part of the iceberg, formed by implicit costs, is hidden.[16] Market impact of prices tend to occur, when the market price slips away from the trader in the process of executing a relatively large stock transaction mostly in an illiquid market environment. The impact could be offset by splitting the order into several small

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[13] Peiseler, Börsencomputersysteme, (Köln, 1990) p: 91 - 92.

[14] Lazzari, "Myths of shareholder value and efficiency," European Business Forum Debate Autumn 2002 Issue: 11: p: 9 – 14.

[15] One of the most detailed researches is conducted by Bortenlänger, Börsenautomatisierung, Effizienzpotentiale und Durchsetzbarkeit (Wiesbaden, 1996).

[16] Edwards / Wagner, "Best Execution," Financial Analysts Journal January/February 1993: p:67.

orders or by delaying the execution at the price of timing cost.[17] Furthermore, administrative expenses such as confirmation and documentation are also included in transaction costs.

Low transaction costs are the key criterion of the efficiency and attractivity of an exchange for potential market participants and also the major target for a competitive trading platform.[18] In line with the decline in transaction costs, investments' internal rate of return rises.[19] However, trade difficulties, as measured by trade size and Mcap, order placement strategies, differences in market designs & investment styles, trading abilities, reputation and desire to trade quickly could lead to an increase in transaction costs. On the other hand, securities with higher transaction costs lead to higher risk – adjusted expected returns with longer average holding periods and therefore lower trading volume. Such securities are attractive for investors, who can amortize the higher trading costs over longer investment periods.[20]

Fully - completed automation contributes transaction costs' reductions. One major feature of automated markets is that, the electronic books are open for insight to all clients allowing for an optimal active liquidity management to control implicit transaction costs.[21] Domowitz's (2001) analysis indicates that commissions and fees (explicit costs) of a group of European automated exchanges 41% below the global average, while the implicit costs are 66% below others, on average.

On the other hand, his further analysis showed that despite the losing priority of floor - trading exchanges, 50% of NYSE's transaction volume is created by market participants, located in floor. According to Domowitz, 95% of NYSE transactions are carried out through the electronic order book however, the big orders, which directly affect the trading volume, are entered into the system by floor traders. Domowitz (2001) also analyzed that transaction costs in electronic systems are

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[17] Boussema / Bueno / Séquier, "Transaction Costs and Trading Strategies: An Empirical Analysis on Global Equity Markets," Executing Transactions in Securities Markets on behalf of Investors – A collection of essays - , published by European Asset Management Association 2002: p: 18 – 25.

[18] Bortenlänger (1996) p: 43.

[19] Bencivenga / Starr, "Transactions Costs, Technological Choice, and Endogenous Growth," Journal of Economic Theory 1995 Vol:67: p: 153 – 177.

[20] Barclay / Kandel / Marx, "The Effects of Transaction Costs on Stock Prices and Trading Volume," Journal of Financial Intermediation 1998 Vol: 7: p: 130 – 150.

[21] Degryse / Achter, "Alternative Trading Systems and Liquidity," in: SUERF – colloquium book 2002 Chapter: 10.

conditional on execution however, it is difficult to measure the possibility of unmatched orders.[22] As seen, both floor - trading and fully - automated exchanges have their own strengths and weaknesses.

NASDAQ, as the greatest fully - automated exchange, has higher transaction costs especially in terms of stocks with lower turnover, compared to that of NYSE.[23] However, empirical researches state that these differences might be explained by trade difficulty and market liquidity[24] and some researches also indicate that in case of switching from NASDAQ, the decline in execution costs is seen *before* commissions.[25] In comparison to XETRA, electronic trading system of Deutsche Börse, NASDAQ is more efficient supported by its ‚Small Order Execution System' (SOES)[26]. However, XETRA is advantageous by its lower costs in terms of medium and big orders.[27]

In general, empirical findings indicate that transaction costs in European exchanges are quite higher than that of American exchanges. Domowitz, et al., (2001) found that actual trading costs declined about 2,5 times more in the US than in Europe during the period of 1996 – 1998.[28] Even though the launch of the single currency EURO eased the comparison of prices, there is a remarkable competition amoung the exchanges in the European Union (EU). Statistics indicate

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[22] Domowitz, "Liquidity, Transaction Costs, and Reintermediation in Electronic Markets," eBusiness Research Center Working Paper April 2001: p: 1-28.

[23] Internet: <http// www.businessweek.com> Stand: 11/12/2000.

[24] Keim / Madhavan, "Transactions costs and investment style: an inter – exchange analysis of institutional euity trades," Journal of Financial Economics 1997 Vol:46: p: 265 – 292.

[25] For details, cf., Jones, "Execution Costs of Institutional Equity Orders," Science Research Network (SSRN) Electronic Library, Paine Webber Working Paper 1999 No: 99 – 10.

[26] Loistl / Schossmann / Veverka, "Tick Size and Spreads: The Case of Nasdaq's Decimalization," European Journal of Operational Research June 2004 Vol: 155 Issue: 2: p: 317 – 334. It is stated that there are more than 10 different trading systems and over 6000 market – maker in NASDAQ.

[27] Loistl / Schossmann / Vetter / Veverka, "A Comparison of Transaction Costs on XETRA and on NASDAQ," Quantitative Finance 2002 Vol: 2 Issue: 3: p: 199 – 216.

[28] Domowitz / Glen / Madhavan, "Liquidity, Volatility, and Equity Trading Costs Across Countries And Over Time," International Finance 2001Vol: 4: p: 221 – 255.

that the cost of trading in European exchanges is ten times higher than that of the exchanges in US.[29]

In terms of developed and emerging capital markets; France (0,53%) - Ireland (1,73%) as developed, Brazil (0,88%) - the Czech Republic (3,59%) as emerging markets, are on the edges in terms of minimum and maximum round – trip[30] transaction costs.[31] Transaction costs in the ISE could be considered as low especially in terms of brokerage fees (0.2% - 1%). Unlike European and American exchanges[32], brokerage fees in the ISE are defined according to a proper percent of the transaction volume.

### A.3.2 Information

Information is one of the most important efficiency determinants for the market participants, in order to participate in the return received in the exchange. On market's perspective, however, it is the definite condition for an efficient price determination mechanism. A capital market is informational efficient, when the fully information is continuously reflected in the stock prices[33], when excess return is prevented and when all investors have direct access to information without any transaction costs.

According to Fama[34], capital markets can be informationally efficient in three different ways:

- **Weak Form:** when current prices reflect solely historical information, no technical analysis is hold
- **Semi - strong Form:** when prices consider all public information, no fundamental analysis is hold
- **Strong Form:** when prices fully reflect all information including insider trading.

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[29] Pozniak, "Challenges and Opportunities in European Exchanges," Banking 2000 available under: http://www.bankingmm.com/Securities/European_Exchanges.htm, Stand: 21/05/2004.

[30] Round trip transaction costs are all the costs (commissions, market impact and taxes) associated with completing a transaction.

[31] Levich, "The Importance of Emerging Capital Markets," Stern School of Business New York University Working Paper March 2001, p: 1 – 62.

[32] In American and European exchanges, unlike ISE, costs are determined according to quantity of transactions.

[33] Beaver, "Zur Effizienz des Kapitalmarktes," Betriebswirtschaftliche Forschung und Praxis 1983 Heft: 4, p: 345.

[34] Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," The Journal of Finance 1970 Vol: 25: p: 383 - 417.

In reality, it's not possible to find a strong informational efficient capital market. If all information including insider trading were enabled for all investors, it would not be necessary to make any analyses and all investors could be able to predict the future return. On the contrary, today, the speed of information dissemination is the key factor in terms of outperforming the market.

### A.3.3 Transparency

Transparency, as one of the determinants of efficiency, can be defined as market participants' ability in analysing the information on markets. On a transparent market, participants have access on publicly available financial and non - financial information, which is incorporated into stock prices. In line with the development of technology, information dissemination is updated. Real time data dissemination is especially important on behalf of investors in taking investment decisions. Furthermore, data selection due to the needs of investors is also put forward on a transparent market. The table below indicates the needs of American investors:

| Ranking | Kind of Information | Weight |
|---|---|---|
| 1 | Reputation of the company | 78.8% |
| 2 | Sectoral expectations | 78.6% |
| 3 | Expectations about the company | 78.4% |
| 4 | Performance of the stock | 70.2% |
| 5 | Financial data about the company | 69.2% |
| 6 | Up - to - date company information | 69.2% |
| 7 | Posiible risk of the company | 67.6% |
| 8 | Historical financial data of the company | 57.7% |
| 9 | Information about company's production | 54.5% |
| 10 | Economic situation of the company | 52% |
| 11 | Company research reports | 42.5% |
| 12 | Recommendations | 42.4% |
| 13 | Information about cooperation | 39.50% |

**Table 1:**Information Needs of American Investors

**Source:** SRI International, Investor Information Needs and the Annual Reports, p: 30, quoted from Gokhan Ozer

As seen from Table 1, companies acquaintance, sectoral expectations and future expectations are important for American investors. Stock's actual performance and released financial data are also taken into account in investment decisions. The efficiency of all these kinds of information is directly related with the prevailing transparency on the market. Furthermore, transparent markets have also a positive impact on price determination by balancing the prices supported by the improvement of rapid and accurant information dissemination. However, the traders with superior

information prefer trading systems with less pre – trade transparency, which might harm the market performance.[35] Thus, it is vital to establish efficient surveillance mechanisms for preventing negative formations such as insider information and market manipulation. Liquidity, another efficiency determinant, is also affected by the transparency on markets.

### A.3.4 Liquidity

Liquidity of a capital market indicates securities' turn - over speed. In other words, liquid market is a place, where a large volume of trades can be immediately executed with minimum effect on price.[36] Liquidity on capital markets is directly affected both from transparency and volatility. While increase in transparecy positively effect liquidity, increase in volatility harms the liquidity of a market. Other factors, such as trading activities of market participants, capital market micro structure, intenseness of competition, legal framework, information asymmetry and price risk[37], which affect the liquidity grade of capital markets.

Liquid markets have four major characteristics:

- **Width:** Width of a market indicates increasing trading volume due to high turn - over and it is also possible to execute orders both from the equilibrium price and from different price levels.
- **Depth:** Depth of a market indicates the maximum size of a market, in other words; market's capability of executing big orders from market price.
- **Immediacy:** Immediacy is the grade of a transactions' effect on a market. On liquid markets, it is easier to execute big orders rapidly and without volatility. Since volatility is minimized, investors have confidence towards the market.
- **Resiliency:** Market's capability of adjusting itself after the short – time – based volatility.[38] The spread btw bid and ask prices are adjusted, transaction costs are reduced.

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[35] Lee, "Capital Markets that Benefit Investors," Oxford Finance Group Working Paper 30 / 09/ 2002: p: 1 – 68.

[36] Muranaga / Shimizi, "Market microstructure and market liquidity," Bank for International Settlements (BIS), Committee on the Global Financial System (CGFS) Publications, available under http://www.bis.org/publ/cgfs11mura_a.pdf, Stand: 15/07/2004.

[37] Veverka, "Operative Effizienz von Handelsplattformen" (PhD. Dissertation, Wirtschaftsuniversität, 2003), p:17-18.

[38] Bortenlänger (1996), p: 50.

As seen, liquidity is an important measure of efficient trading on capital markets. Furthermore, initial level of stock market liquidity, supported by these four dimensions, is also a robust predictor of economic growth and capital accumulation. Bortolotti, et al., (2002) conducted a survey among 19 OECD countries between 1985 – 2000 period and indicated that share issue privatization process on equity markets over time is also positively correlated with the liquidity of the overall market. The authors also mentioned the importance of share issue privatization strategy in terms of its ability to attract foreign investors.[39] Even though recent evidences do not verify, some economists, however, argue that too liquid markets might hurt economic development by allowing investors to sell their stocks quickly (short – term – based investment) and by leading stock owners to sell their shares instead of trying to improve their companies' performances.[40]

### A.3.5 Consolidation of Order Flow and Stock Market Integration

Technological improvements, financial innovations, globalization and increased competition force the consolidation of order flows on capital markets. In recent future, it is expected that markets would be diversified according to different financial products and the order flows among exchanges would consolidate in terms of enhancing efficiency, market power and managerial & governmental issues.[41] Consolidation of order flow has furthermore positive impact on liquidity and it may also strengthen price discovery by reducing price impact on markets. Since consolidation is strongly correlated with the synergy among exchanges, barriers for foreign investment are also expected to decline in line with the increase in consolidation process.

The establishment of the EU led to discussions regarding the consolidation of European capital markets, in which all transactions of one security will be able to be carried out from one common trading platform. At this point, "spatial consolidation" is pronounced and such a consolidation is underlined especially in terms of minimizing transaction costs. The merger of Euronext is a major

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[39] Bortolotti / de Jong / Nicodano / Schindele, "Privatization and Stock Market Liquidity," Social Science Research Network (SSRN) Electronic Library Electronic Paper Collection, Fondazione Eni Enrico Mattei (FEEM) Working Paper No. 105: 2002.

[40] Quoted from Levine, "Stock Markets, Economic Development, and Capital Control Liberalization," Investment Company Institute PERSPECTIVE December 1997: Vol:3 No: 5, p: 1 – 8, available under: <http://www.ici.org/pdf/per03-05.pdf> Stand: 07/06/2004.

[41] Abraham / Van Dijcke, European Financial Cross – Border Consolidation (Vienna: Société Universitaire Européenne de Recherches Financiéres (SUERF) Studies: 22, 2002) p: 16 - 17.

step in terms of consolidation and following the merger, it is not required anymore to have access to all exchanges to be able to trade all shares quoted in the FTSE Euro 100 Index. Access to the Euronext market offers access to about 50% of the Mcap of this index and about 54% of the DJ Eurostoxx 50.[42] Furthermore, implicit mergers[43] took place, in order to gain scale advantages through bilateral or multilateral alliances among exchanges. Some of these mergers are the merger of 9 exchanges in Germany, 4 in Spain, 3 in Benelux countries, 3 in the Scandinavian countries, the Vienna Stock Exchange with Deutsche Börse and Helsinki Exchange with EUREX. Implicit mergers enabled the utilization of economies of scale in the trading system by using common platforms and in some cases even the common operating trading system.[44] Multiple listings could also be pronounced in consolidation process. Cross – border stock trading in multiple exchanges supports foreign investments. Lower trading costs, good accounting standards and strong investor protection may play a role in the cross – listing decisions of companies.[45] Pagano, et al., (1999) as a result of his survey, documents that NYSE with lowest trading costs attracts most cross – listing, whereas UK, Austria, the Netherlands and Belgium with highest costs, respectively, have the largest net outflow of cross – listings. However, remote access via network connection (i.e., implicit mergers) is mostly preferred by exchanges, compared with fierce direct competition of multiple listings.[46]

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[42] Lefebvre / Went, "Consolidators frame bottom up," European Business Forum Debate Autumn 2002: Issue:11: p: 24 – 26.

[43] "Implicit merger is an agreement btw two or more exchanges. According to the agreement, securities, originally listed in one exchange, are also listed by the other exchanges and remote access is enabled for traders of each exchange, with reciprocity and without further requirements," definition quoted from Di Noia, "The Stock – Exchange Industry," Commissione Nazionale Per Le Societa E La Borsa (CONSOB), Quaderni Di Finanza, Working Paper No: 33: March 1999: p: 1 - 82.

[44] Cf. Iftekhar / Markku, "Are Expansions Cost Effective for Stock Exchanges? A Global Perspective," Bank of Finland Discussion Papers No: 20 18/12/2000: p: 1 – 36. The authors conducted a research and came to a conclusion that the formation of mergers & alliances among the biggest exchanges is supported in terms of standardization and scale however, it may not be cost saving in case of small and medium sized exchanges.

[45] Pagano / Röell / Zechner, "The Geography of Equity Listing," Centre for Studies in Economics and Finance (CSEF) Working Paper No:28: October 1999: p: 1 – 59.

[46] Cybo – Ottone / Di Noia / Murgia, "Recent Development in the Structure of Securities Markets," Brooking Institution Press, Papers of Financial Services 2000, p: 223 – 282.

### A.3.6 Price Determination

Price determination, as one of the most important functions of stock exchanges, is defined as the impounding of new information into the security price[47] and its aim is to be able to provide the equilibrium price for the market. Even though it is not possible to find a completely organised market in terms of efficient price mechanism, automation has a posivite impact on markets, since it operates with lower trading costs which leads to the tightening of bid / ask spread. Price determination process is strongly correlated with transaction costs; the lower the costs, the more profitable is the trading. An efficient price discovery mechanism enhances investor confidence and enables risk sharing.[48] In line with lower transaction costs, efficient information allocation, homegeneous allocation of trading securities, market transparency, and satisfaction optimalisation are also vital for efficient price discovery. Insider trading is, on the other hand, a big obstacle to be overcome, in order to establish a long – term – based equilibrium price. Information asymmetries, caused by informed traders lead to wider bid – ask spreads[49] and the balance of the market is damaged. Furthermore, volatility is one of the most important threats of efficient price determination.

#### A.3.6.1 Volatility

Volatility is a statistical measure and it indicates the amount by which a market or a security fluctuates in a given period of time. In other words, volatility measures the fluctuation of prices.[50] Volatility is typically measured by the variance or annualized standard deviation of the price or return. A highly volatile market means that prices have huge swings in very short periods of time.[51] A lot of researches, regarding the affects of high volatility on capital markets, have been made. One of these studies have been carried out by Domowitz et al., (2001) and they have come to a point that increased volatility acting through costs, reduces the expected return of the securites

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[47] Hasbrouck, "One Security, Many Markets," Journal of Finance September 1995: Vol: 50 No: 4: p: 1175 – 1199.

[48] Fong / Zurbruegg, "How much do locals contribute to the price discovery process?," Journal of Empirical Finance May 2003: Vol: 10 Issue: 3: p: 305 – 320.

[49] Howe / Ragan, "Price Discovery and the International Flow of Information," Journal of International Financial Markets, Institutions and Money July 2002: Vol: 12 Issue: 3: p: 201 – 215.

[50] Meyer zu Selhausen, "Trägt die Computerbörse zur Steigerung der Volatilität bei? , Stellungnahme zum Beitrag von Wolfgang Gerke," Die Betriebswirtschaft (DBW) 1994: (54. Jg.): Heft: 3: p: 421- 423.

[51] Internet: <http://www.investopedia.com/terms/v/volatility.asp> Stand: 21/02/2003.

portfolio[52] and the investors should face high amount of risk on the capital markets. Another research is carried out by Domowitz and Steil (1999), which underlines that volatility in an automated market is generally equal to, and sometimes less than, that in the traditional market.[53] Volatility can be caused by both internal and external factors. The bid – ask spread, market impact, momentum trading[54] and price discovery[55] could be considered as major short – term – based internal factors of volatility. Furthermore, the arrival of more public information and incorporation of informed investors' private information[56] might also lead to higher volatilility on capital markets. On the other hand, it is too difficult to exclude capital markets from the external factors such as political and economic developments in a country. Even though it is not directly related with the capital market transactions, negative political news could have an impact on investors' point of view and the consequences of this event might lead to volatility on the market. An example may help to illustrate the volatility in the ISE. In July 2001, the political conflicts among coalition government regarding the privatization of Türk Telekom, one of the structural reforms in the IMF - backed program, caused volatility on Turkish markets. Investors, in particular individual investors, had the tendency to sell their equities, which led to a lack of liquidity on the market, and switched to more defensive assets such as fixed income instruments. The issue was resolved by the resignation of the Minister responsible for privatization. Furthermore, the developments in the international arena, which cause uneasiness on the markets and lead to lack foreign capital in – flow, also affect volatility. Let's take the ISE example again in order to clarify the subject. Following the 2001 financial crises, Turkey had difficulties in meeting the targets set by IMF – backed

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[52] Domowitz / Glen / Madhavan (2001), p: 221 - 255.

[53] Domowitz / Steil, "Automation, Trading Costs and the Structure of the Securities Trading Industry," Brookings – Wharton Papers on Financial Services 1999: p: 15.

[54] "Momentum trading can be defined as the buying or selling of stocks based upon large increases in volumes of share traded. Higher the volume of shares traded of a particular scrip, higher is the momentum of that share," quoted from <http://www.stressfreetrading.com/momentum-trading.html>, Stand: 13/07/2004.

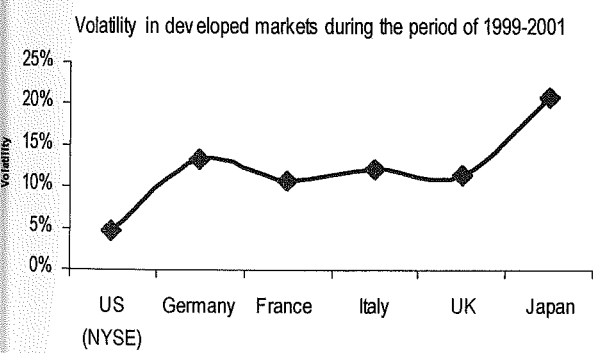
[55] Ozenbas / Schwartz / Wood, "Volatility in US and European Equity Markets: An Assessment of Market Quality," International Finance 2002 Vol:5 Issue:3: p: 437 – 461.

[56] French / Roll, "Stock Return Variance: The Arrival of Information and the Reaction of Traders," Journal of Financial Economics 1986 Vol: 17: p: 5 – 26.

economic restructuring program and the statements of the IMF, WB and the international rating agencies affected the markets in terms of leading to high volatility.

Liquidity, as one of the major efficiency determinants in stock exchanges, is also affected by volatility. During the volatile periods, investors usually tend to invest in more defensive assets (G-bonds, T - bills) rather than investing in equities. Therefore, liquidity shortage exists on the equity markets and the depth of the market is restricted with lower turnover. Even though lower turnover could be interpreted as a determinant of long - term stability especially for emerging markets, liquidity shortage and lower turnover during volatile periods indicate that investors are not willing to take the short - term volatility risk. In line with the decline in turnover, determined by investors' will, Mcap is also affected negatively. Following the lack of demand, the values of the quoted companies would tend to decline. All of these consequences depend on investors' point of view in volatile periods and they can be considered as internal factors affecting the stock exchanges.

The figures below show the volatility percentages of the stock exchanges of both developed and emerging countries in the period of 1999 - 2001.



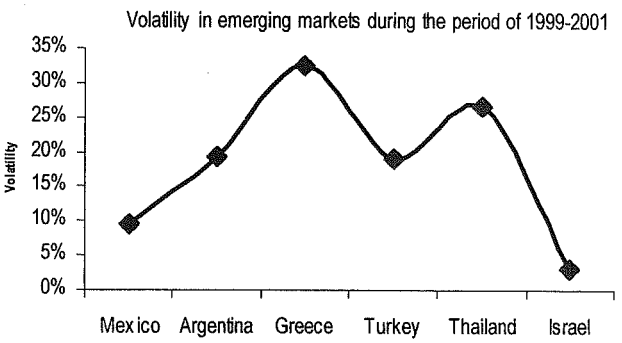



**Figure 1:** Volatility in both developed and emerging markets

**Source:** World Federation of Exchanges

As seen from the figures, emerging markets are more volatile compared to developed markets, due to prices' sensitivity toward inner and outer conditions. The volatility of Turkish market is 4 times higher than that of US market. Even though it is not stated in figures, theoretical literature indicates that Chinese and Russian markets are 600% and 800%, respectively as volatile as the US market.[57]

Referring back to our main topic, price determination, it should be mentioned that it is not easy to determine the optimal price on behalf of the parties on the market. Factors such as volatility, inefficient allocation of information, lack of transparency and other related factors, as a part of actual developments, could affect the market. From investors' point of view, it is suggested that they should watch out the alternative hedging instruments carefully and take the benefits of the prices set on the market, according to the sentiment on the market. Arrangements such as trading halts and increased commissions to a specified level[58] could also be taken as temporary precautions however; they cannot be successful without providing a secure environment for capital markets.

### A.3.7 Investor Confidence

Investors' confidence is one of the major determinants of efficiency on capital markets. Since confidence is the key factor in investing, other above mentioned factors should be succeeded in at least to an acceptable extend, in order to attract investors' attention to markets. Decline in volatility, supported by an efficient pricing mechanism, could lead to market stability and therefore to an increase in investors' confidence. On the other side, information generation is also an important factor in terms of investors. Analysts and investors generate information, such as interviewing management, verifying rumors and analyzing financial statements.[59] Daniel, et al., (1998) states that the execution of the generated information varies according to the skills of

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[57] Du / Wei, "Does Insider Trading Raise Market Volatility?," National Bureau of Economic Research (NBER) Working Paper Series 2003 Working Paper W9541.

[58] Gunes / Saltoglu, Analysing ISE Return Volatility in terms of Macroeconomic Conjuncture (Istanbul, 1998) p: 17.

[59] Daniel / Hirshleifer / Subrahmanyam, "Investor Psychology and Security Market Under – and Overreactions," Journal of Finance December 1998: Vol: 53 Issue: 6: p: 1839 – 1885.

investors and analysts and propounds that if an investor overestimates his ability to generate information, he will underestimate his forecast errors. Furthermore, trading strategies help to enhance the confidence on markets. Nelson, et al., (2003) conducted a survey and found that trader confidence and their trading actions are affected by whether they view a security individually or as part of a portfolio and, by past performance.[60] They found that investors' reliance on trading strategies is at its peak point, when decisions are made at the portfolio level. Besides these, macro - microbalances and political developments of the country also play a very important role in building confidence towards capital markets. The consequences of economic and political events, especially in emerging markets, determine investors' point of view. It could be easier to illustrate the situation by an example; if Treasury succeeds in rolling over its debt and extending its maturity through a long - term based auction in line with the prevailing optimistic political and economic environment, then, investors have the tendency to make longer - term – based investments. As seen, "building confidence" takes time and looking from international investment view, it should also go in line with the stability.

[60] Nelson / Krische / Bloomfield, "Confidence and Investors' Reliance on Disciplined Trading Strategies," Journal of Accounting Research June 2003: Vol: 41 No: 3: p: 503 – 523.

## A.4 CLASSIFICATION OF THE AUTOMATION PROCESS IN ELECTRONIC EXCHANGES SUPPORTED BY EFFICIENCY INDICATORS[61]

There are four basic transaction phases in computer - supported exchanges;

- Information phase
- Order - routing phase
- Execution phase
- Clearing and settlement phase

### A.4.1 Information Phase (Computerization of information dissemination services)[62]

Information phase is the period when investor searches for market information regarding securities and counterparties. In line with the automation process, this phase is taken over from brokers. Information, as one of the most important determinants of efficiency on capital markets, is required during pre - and post trade stages. Parties on the market need complete, comprehensive and high - qualified information before taking investment decisions. Therefore, market information services are required to collect, process and analyse market data systematically and continuously and to ensure delivery of information on a timely basis to all market participants.[63] On the other hand, post trade information is also important to be able to get informed about the executed trade. Information on exchanges can be allocated by two main channels; either the exchanges can use their own information services or it is disseminated through other information providers (data vendors).

Since information plays a very important role on capital markets, it should have some basic qualifications:

- Time factor
- The quantity and quality of information
- The need for more guidance

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[61] For details, see, for example, Picot / Bortenlaenger / Roehrl, "The Automation of Capital Markets," Journal of Computer – Mediated Communication (JCMC) December 1995: Vol:1: No: 3.

[62] Domowitz, "Taxonomy of automated trade execution systems," Journal of International Money and Finance December 1993: Vol: 12: Issue: 6: p: 607 - 631.

[63] Poon, "Guide to The Establishment of Market Information Services" available under: <http://www.fao.org/ag/ags/subjects/en/agmarket/misman.html >, Stand: October 2001.

➢ The need for more information dissemination tools[64]

It should be enabled for investors to reach real - time comprehensive and reliable information however, historical data regarding prices' quantities compiled over an extended period of time is also essential in terms of analyzing the medium - or long - term performances of securities. Information should be gathered according to needs of investors. Hence, investors will be able to take the benefit of the released data while taking investment decisions. Information is required to satisfy investors in terms of providing daily, weekly, monthly, quarterly, semi - annual and annual statistics regarding the securities and indexes. The more detailed the information, the more appropriate are the decisions.

As mentioned, information can also be disseminated by information providing services. Since information resources of exchanges are not enough in terms of efficient information allocation, information dissemination services so called data vendors, are put forward. The main goal is to maximize markets' transparency through allocating information supported by technology. It is quite difficult for data vendors to collect and gather required reliable real - time information but the main problem exists in processing stage. Following the supply of relevant information, an unfair competition starts among market participants. Since technology and cost factor play an important role in the usage of information dissemination services, it is evident that an equal and optimal information allocation among all market participants is not possible. Under these circumstances, publicly available broadcasts such as radio and TV seem to be the most appropriate dissemination channels in terms of receiving fair dissemination of market information. Information processing, therefore, is identified as a significant problem especially in emerging markets. Lack of technological infrastructure and cost issue are the main obstacles against optimal information dissemination. On the contrary, developed markets have solved the issue thanks to their technological formation (comprehensive Internet access, WAP technology) and through the usage of these dissemination services they have succeeded in minimizing most of their trading costs.

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[64] Unger, "Testimony Concerning Regulation Fair Disclosure" <http://www.sec.gov/news/testimony/051701tslu.htm>, Stand: 17 / 05 / 2001.

### A.4.2 Order Routing Phase

Order routing sytems enable the specification of orders and their transmission into the system. The degree of automation determines the content of order routing. In open - outcry systems, for example, an intermediary (e.g., broker) is required in terms of order management. On the other hand, direct access electronic markets enable investors to transmit their orders directly to the system rather than through an intermediary, which might increase the error possibility and reduce explicit transaction costs. In this case, order transmission speed increases and therefore, the depth of the market is effected positively. Investors' direct access to the system also provides anonymity and facilitates equal market access for all types of investors and sizes of orders. As one of the reasons for liquidity shortage, lack of transparency and higher transaction costs in emerging markets, the difficulties in launching of a direct access electronic market might be shown.

### A.4.3 Execution Phase

Following the transmission of orders, the system is to carry out the execution of given orders. During the execution phase, price discovery is the key determinant. The impacts of price discovery vary according to the implied trading systems. According to Theissen (2002)[65], price discovery process should be faster in fully electronic trading systems rather than open - outcry floor trading. On the other hand, Martens[66] states on his study that open - outcry systems are more efficient in a fast moving market, due to the way prices can be released. Since no limit order book exists on open - outcry floor trading system, prices are able to match in all levels and price discovery can be realized easily and faster especially in volatile periods.

If the analysis is deepen in terms of comparing these two trading systems by considering the efficiency determinants on exchanges, it is seen that both systems have advantages and disadvantages, in line with the current market sentiment. Fully - automated trading system minimizes trading costs mainly because of its excluding intermediaries. Through remote access, investors are able to execute their own transactions. Since the execution will be directly carried out by investors, the possibility of meeting the best bid / ask level is higher, compared to open – outcry

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[65] Theissen, "Price Discovery in Floor and Screen Trading Systems," Journal of Empirical Finance 2002 Vol:9 No:4: p: 455 - 474.

[66] Martens, "Price Discovery in High and Low Volatility Periods," Journal of International Financial Markets, Institutions & Money 1998: Vol: 8 1998: p: 243 – 260.

floor trading. In terms of liquidity, it is clear that the order matching will be carried out immediately, which will lead to depth of markets. On the other hand, as it is mentioned above, open - outcry trading system seems to be more appropriate for volatile periods. Since no limited order book exists, price adjustment can be carried out easily and matching process in each price level occurs. Even though fully automation is required on exchanges, Picot, et al., (1997) underlined the failures of the system. According to their findings, in particular in execution phase, the failures of the system in terms of price discovery such as the exact calculation of spread or balancing out mismatching orders like a specialist[67] are put forward.

Consequently, while fully - automation is definitely needed in information and order routing phases during the transaction, execution phase should be designed according to the factors affecting the exchanges.

### A.4.4 CLEARING & SETTLEMENT

Clearing & Settlement phase is the last stage of transaction on exchanges. *Clearing is the transmitting, reconciling and conforming payment order or security transfer instructions, while settlement is the exchange of a security against money.*[68]

The shorter the clearing and settlement process, the less has to be paid by investors until their transactions are fully completed.[69] Schmiedel, et al., (2002) propounds that US has the most effective settlement system and it might act as cost saving benchmark.[70] Thus, clearance and settlement process determines, to a large extent, the efficiency and effectiveness of a securities market.

In automated markets, centralization of clearing and settlement trend is being developed and this trend contributes to the integrity of markets thus, risk and costs regarding back office transactions tend to decrease. Progress in technology drives the inertia in clearing & settlement. Following the

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[67] Picot / Bortenlänger / Röhrl, "Organization of Electronic Markets," The Information Society Jan – Mar 1997: V: 13: p: 107 – 123.

[68] Levin, "Clearing and Settlement in the EU," The Centre for European Policy Studies Commentary, Stand: 12 July 2001.

[69] IOSCO Report, Towards a Legal Framework for Clearing and Settlement in Emerging Markets, Nov 1997, available under: http://www.riskinstitute.ch/142800.htm, Stand: 15/072004

[70] Schmiedel / Malkamaki / Tarkka, " Economies of scale and technological development in securities depository and settlement systems," Bank of Finland Discussion Papers No: 26: 2002.

execution phase, relevant data regarding transaction is sent to both parties (buyer and seller or to their intermediaries) and at a defined settlement period (T+2 in the ISE) the delivery of the security versus payment (DvP) is carried out through accounts.

# B. ANALYSIS OF AN EMERGING STOCK EXCHANGE: ISTANBUL STOCK EXCHANGE (ISE)

## B.1 HISTORICAL DEVELOPMENT OF THE ISE

The origin of an organized securities market in Turkey has its roots in the second half of the 19th century. During the war, the government borrowed heavily from foreign governments and the public by issuing domestic and foreign bonds. After the war, a group of minorities started buying and selling these bonds. The government decided to regulate these activities and issued a decree regarding the establishment of an exchange.[71] The first securities market in the Ottoman Empire was established in 1866 under the name of "Dersaadet Securities Exchange" following the Crimean War. Dersaadet Exchange also created a medium for European investors who were seeking higher returns in the vast Ottoman markets. Following the proclamation of the Turkish Republic on the ruins of the Ottoman Empire, a new law was enacted in 1929 to reorganize the fledgling capital markets under the new name of "Istanbul Securities and Foreign Exchange Bourse."

Soon, the Bourse became very active and contributed substantially to the funding requirements of new enterprises across the country. However, its success was clouded by a string of events, including the 1929 Depression and the impending Second World War abroad which had taken their toll in the embryonic business world in Turkey. During the industrial drive of the subsequent decades, there was a continuous increase in the number and size of joint stock companies, which began to open up their equity to the public. Those mature shares faced a strong and growing demand from mostly individual investors and some institutional investors.[72]

In the 1980's, the Turkish financial sector experienced a trauma[73] 'the bankers event'.[74] In 1981, the 'Capital Market Law' (CML) was enacted. One year later, the main regulatory body responsible

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[71] Yuce, An Examination of an emerging stock exchange (Istanbul, 1996) p: 10.

[72] Internet: http://www.ise.org/about/history.htm, Stand: October 2002.

[73] In the 1980's, Turkish investors started to invest large amounts of money into promissory notes of the so-called 'bankers'. The Central Bank had no control over the bankers. The primary cause of the bankers event was the hyperinflation (80 – 90%) of that period.

[74] Yuce (1996) p: 14.

for the supervision and regulation of the Turkish securities market, the "Capital Markets Board" (CMB), based in Ankara, was established.

In order to get rid of some emerging problems, a new decree was issued in October 1983 foreseeing the setting up of securities exchanges in Turkey. In October 1984, the "Regulations for the Establishment and Functions of Securities Exchanges" was published in the Official Gazette. The regulations concerning operational procedures were approved in the subsequent extraordinary meetings of the General Assembly and the "Istanbul Stock Exchange" was formally inaugurated at the end of 1985.

## B.2 ORGANISATION OF THE ISE[75]

The ISE is the only securities exchange in Turkey and is governed by an Executive Council composed of five members elected by the General Assembly. Chairman is appointed by the government. Four other members of the Council represent the three categories of Exchange members: invetment and development banks, commercial banks and intermediary institutions.[76]

As an autonomous, professional organization, the ISE enjoys a high degree of self - regulation. Its revenues are generated from fees charged on transactions, listing procedures and miscellaneous services. The profits of the ISE are retained to meet expenses and to undertake investments and are not distributed to any third parties. The ISE has its own budget.

### B.2.1 General Assembly

The General Assembly, composed of ISE Members (investment and development banks, commercial banks, intermediaries), is the supreme decision - making body of the ISE. Its decisions are subject to ratification and review by the CMB. The General Assembly also decides on important matters related to the management and administration of the ISE. Each member has one vote at the meetings, which can also be convened on an extraordinary basis.

### B.2.2 Executive Council

The Executive Council meets regularly to decide on matters concerning the daily operations of the ISE as well as to review listing admissions. The Council consists of five officers including the

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[75] Internet: http://www.ise.org/about/organize.htm, Stand: October 2002.

[76] According to Turkish Capital Market Law, Development banks, Commercial Banks and Intermediary Institutions are authorized to carry out transactions in the ISE on behalf of their customers.

Chairman and Chief Executive Officer. All officers except the Chairman are elected by the General Assembly for a term of four years and represent all three categories of ISE members.

### B.2.3 Audit Committee

All accounts and financial statements of the ISE are audited by two internal auditors appointed by the General Assembly. ISE's accounts are also independently audited.

### B.2.4 Vice Chairmen

The Senior Vice Chairman and five Vice Chairmen of the ISE act as links between the Chairman and Chief Executive Officer, the Executive Council, other departments of the ISE and intermediary institutions.

### B.2.5 Inspection Board

The Head of Inspection Board also acts as the link between the Chairman and Chief Executive Officer, the Executive Council, other departments of the ISE and intermediary institutions. The Inspection Board closely monitors the transactions conducted on the ISE as a measure to prevent manipulation in the Stock Market and reports directly to the Head of Inspection Board. The Board also inspects and observes the compliance of members and ISE personnel with the established rules and regulations.

### B.2.6 Advisors

The advisors are assigned to assist the Chairman and Chief Executive Officer on a wide variety of subjects including legal matters, arts, relations with the public and media, as well as other matters concerning securities markets in general.

### B.2.7 Departments

The daily operations of the ISE are carried out by various departments. These departments are Chief of Staff / Secretarial Board, Security, Information Systems, Research, Training and Publications, Administrative Affairs, Market Surveillance, Personnel, Evaluation and Statistics, Listing, Financial Affairs, International Relations, International Market, Building Maintenance, Bonds and Bills Market, Derivatives Market, Membership Affairs, Stock Market, Legal Affairs and Inspection Board.

### B.2.8 Committees

Various committees were established to include the voice of the ISE Members in certain areas such as the development of trading technology, introduction of new financial instruments including derivatives, and the promotion of the ISE.

## B.3 CAPITAL MARKET INSTITUTIONS

According to CML Art. 32, capital market institutions are;

- Intermediary Institutions
- Investment Trusts
- Mutual Funds
- Other Institutions given permission for the capital market operations

### B.3.1 Intermediary Institutions

These institutions are required to be established as joint stock corporations and 100% of their capital must be registered shares, which must be issued in return for cash. The capital must be in line with the amount determined by the CMB. According to an arrangement by the Capital Markets Board on 15th August 1996, banks intending to operate in the Equities Market transferred their stock market operations to the brokerage firms which they have either took over or established.[77] There are 118 ISE Members (banks and intermediaries) in the ISE Stock Market and 145 in the ISE Bonds and Bills Market, by the end of 2003.[78]

### B.3.2 Investment Trusts[79]

Investment trusts are closed - end investment companies established as joint stock corporations with registered capital[80] and they have the purpose of performing portfolio management on capital market instruments, real estates, gold and other precious metals.

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[77] Internet: <http://www.ise.org/members/members.htm>, Stand: October 2002.

[78] Internet: <http://www.ise.org/members/members.htm>, Stand: March 2004.

[79] Investment trusts gained importance in the recent years in Turkey. For a long time, financial institutions, especially banks, had the intention of building investment trusts. There are two types of investment trusts in Turkey; Type A and Type B and the differentiation depends on the type of security. Type A investment trusts are required to invest at least 25% of their assets in equities that are issued by Turkish companies. Investment trusts that have no such obligations are classified as Type B.

[80] Hirsch / Tekinalp, Das türkische Aktien - und GmbH- Recht (Baden-Baden, 1997) p: 350.

### B.3.3 Mutual Funds[81]

Mutual funds are the assets, which have been established with the money to be collected from the public in return for participation certificates with the purpose of managing portfolios on capital market instruments, real estate, gold and precious metal on the account of the holders of these certificates on the basis of principle of risk distribution and fiduciary ownership.

### B.3.4 Other Capital Market Institutions

These are the companies, which engage in the activities of clearing – settlement and custody of capital market instruments and engage in auditing of the issuing companies and of capital market institutions.

## B.4 CAPITAL MARKET INSTRUMENTS

These are securities and the other capital market instruments. Securities are negotiable instruments, which ensure a partnership or an amount of receivable, representing a certain amount, utilized as investment instrument, earning periodic income, equally qualified, issued in series, carrying the same sentence and owning conditions determined by the CMB. Shares[82], derivatives of shares (revenue and loss participation certificates), bonds, derivatives of bonds (preferred bonds, revenue sharing bonds), G – bonds, T – bills, revenue sharing certificates, bank bills and financing bills are the securities being traded on Turkish capital markets. Conditions of other capital market instruments are determined by the CMB.

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[81] There are two broad categories of mutual funds in Turkey; Type A and Type B. A-Type funds are required to have at least 25% of their portfolio value invested in equities traded on the Istanbul Stock Exchange. The minimum equity requirement in fund composition applies to the monthly weighted-average value of the portfolio. B-Type funds are not subject to restrictions on portfolio composition. As such, they tend to be invested heavily in fixed-income securities, with portfolios varying primarily in their particular mix of terms to maturity. Information is gathered from: http://www.hsbc.com.tr/English/RetailBanking/InvestmentServices/, Stand: October 2002.

[82] Art. (45a); about the legal issues regarding shares, cf. Hirsch / Tekinalp (1997); Poroy / Tekinalp / Çamoglu (1993).

(46a); about the legal issues regarding bonds in turkish Commercial Code and Capital Market Law, cf. Poroy / Tekinalp / Çamoglu (1993).

## B.5 ISSUANCE, PUBLIC OFFERING, SALE and REGISTRATION with the BOARD of CAPITAL MARKET INSTRUMENTS

According to CML Art. 4, registration of capital market instruments with the Board is obligatory when issuance or public offering will occur. Unregistered securities are traded on over - the - counter market. The exceptions of registration with the Board are the issuance of capital market instruments by administrations with general and annexed budget and by the Central Bank of Turkey (CBT). However, the Board shall be informed.

The information to be disclosed during the public offering of capital market instruments shall be included in the prospectus. After the registration of capital market instruments with the Board, prospectus shall be registered and announced at the trade registry gazette. The invitation to the public to purchase the capital market instruments shall be effected by means of a circular. As an investor protection supportive regulation, the law states that the announcements and explanations directed to the public may neither include inaccurate, exaggerated or misleading information, nor may they bear a direct or indirect meaning which will lead to the fact that registration with the Board is interpreted as an official guarantee. Within this context, the Board may prohibit the publication of advertisements, which it considers misleading.

The sale of the capital market instruments to public shall be affected within the context of the principles and within the duration determined in the prospectus. In order to protect the rights of shareowners and investors, the Board may demand the public offer or sale of capital market instruments to be effected through intermediary institutions and with purchase commitment if deemed necessary. The Board shall require from the ones determined by the Board among the founders, shareholders or intermediary institutions to submit a guarantee to the corporation such that the shares which remain unsold within the sales period will be purchased and be paid back completely. During the sale, the Board may demand from the parties effecting the sales to take the necassary measures for facilitating the purchasing of the instruments by the small investors and protecting their rights and benefits. The board is authorized to make regulations for providing the most extensive distribution and assigning priority to the purchases of small investors at public offerings.

Public offering through Internet could be the forthcoming step on the ISE's agenda.[83] However, public disclosure responsibility could easily be damaged. The confirmation of the supervisory bodies for information dissemination is required. Even though public offering application through Internet is quite early for Turkish capital markets in terms of markets' volatile character, it is implemented and worked out sufficiently in US.

The CML and the CMB aim capital distribution, companies' funding, efficient usage of savings and turning short - term based funds to long - term based funds by public offering and registration. Since the ISE is a major foundation for Turkish economy, directing savings to the exchange and acting on behalf of companies and investors by efficient distribution and funding is to be considered as an important need.

## B.6 MARKETS[84]

There are four main markets in the ISE.

- Stock Market
- Bonds and Bills Market
- International Market
- Derivatives Market

### B.6.1 Stock Market

Stock market was established in 26 December 1985 and the first transaction was carried out in 3 January 1986. Until 1994, prices used to be written on boards.[85] According to the board system, market participants used to write the orders, which were given by telephone from their central offices, on boards and the orders were matched due to their priorities.[86]

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[83] Tanor, Turkish Capital Market – II. Issue: Public Offering (Istanbul, 2000) p: 367.

[84] Internet: <http://www.ise.org/markets.htm>, Stand: October 2002.

[85] During 1986 – 1988 period, transactions were carried out by using "unique price – multiple price" or "opening price method'. After 1988, "multiple price – continuous auction" system was implemented.

[86] Ulusan, "Kapitalmarkrecht der Europäischen Union, Österreichs und der Türkei im Vergleich," (unpublished Diplomarbeit, Wirtschaftsuniversität, 1996) p: 87.

### B.6.1.1 Implementation of the computerized trading system on the ISE Stock Market[87]

In November 1994, fully - computerized trading system was introduced and stock market transactions are carried out through the new trading system. Transactions are carried out in two separate two and a half - hour sessions in the ISE. One session in the morning (9.30 a.m – 12.00 p.m) and the other in the afternoon (14.00 p.m – 16.30 p.m). Following the introduction of the fully - computerized trading system, the speed of execution, daily trading capacity on the market and market depth increased.

Price determination on the market is done according to "multiple price - continuous auction" method. In line with the fully automated system, buy and sell orders in all price levels are automatically matched on a price and time priority basis. The ISE members (i.e., brokers) on both buyer and seller sides enter the orders into the system through their workstations located at the ISE or in line with the "remote – access project," through their back offices.[88] Members are identified upon matching. In line with the transparency feature of the system, all relevant information is displayed on the screen during the session. In order to prevent misuses, members' IDs are shown after the execution of transaction. The system enables the execution of "Limit, Limit Value, Fill or Kill, Special Limit and Good Till Date" type orders and the standard lot size is 1000[89] shares with TL 1, 500 bn (US$ 1,05 m) trading limit[90] per order.

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[87] For details, see, for example, http://www.ise.org/markets/stock.htm>.

[88] Intermediaries can enter the orders into the system from their back offices in 2 ways; either the Electronic Order Transmission is carried out only for "limit orders" by using discs btw 9.30 – 9.45 (first session) and 14.00 – 14.10 (second session) or through Express – API (Ex – API) terminals located in intermediaries' back offices. EX – API is the remote workstation, enabling the transmission of orders during the whole session period and currently each brokerage house has one Ex - API terminal located in their head offices. *"Even though it is not possible for investors to trade directly, they are enabled to make order checks, see real – time based stock information, make fund transfers through their intermediaries' web – sites"* quoted from Coskun, "E – Trade in Derivatives Markets and the ISE Derivatives Market," Banka: Mali ve Ekonomik Yorumlar May 2002: Year: 39 No: 5: p: 77 – 91.

[89] There are 3 exceptional companies with lot sizes 1020, 100 and 1, due to the minimum denomination stated in their corporation charters.

[90] "Special orders are designated depending on the base price and the lot limits allowed for bidding or offering for each stock. Special orders can include shares up to the "block trade" limit, which is at least 10% of the paid-in-capital, and they cannot be partially matched," quoted from <http://www.ise.org/markets/stock.htm>.

In order to minimize price fluctuations, stock prices are determined by rounding the previous session's weighted average price to the nearest price tick, which is called "base price". Additionally, price margins are limited to 10 % above or below the base price.[91]

In ISE stock market both primary and secondary transactions of companies are carried out. The issuers and the investors meet directly on primary markets by initial public offerings (IPO). Stock sale on primary markets enables capital inflow to the publicly offered company.

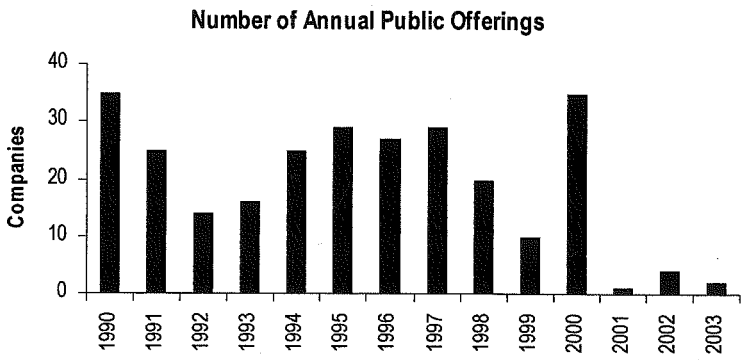



**Figure 2:** Public Offerings on the ISE Stock Market

**Source:** ISE

As seen from the figure above, 2001 has been a bad period in terms of public offerings, due to the financial crisis environment and only one company was offered to the public. 2001's repercussions can easily be seen from the figure and in 2002 and 2003 only 4 and 2 companies, respectively, were offered to the public. Those periods could also be defined as reform periods in Turkey and companies also started adjusting themselves to EU standards. They had to face strict measures also in terms of capital requirements and it was quite difficult for them to go to public. In line with the positive impacts of the progress both on the basis of Turkey and companies, the consequences started to bare their fruits and by the end of November 2004, 12 were opened to the public.

Since it's not allowed in primary markets to change stocks in money, secondary markets are established to carry out this important function. Secondary markets, therefore, realize the demand to primary markets through increasing securities' liquidity by transactions among investors.

ISE secondary market has five sub markets:

[91] The margin is 25 %, in the rights issue market.

- National market
- Second national market[92]
- Wholesale market
- New economy market
- Watch list companies market

### B.6.1.2 National market

National market is the main stock market in the ISE and all companies included in the National Market fulfill the listing requirements pre - determined by the ISE. ISE - National 100 Index[93] is the main index of the ISE Stock Market. As seen from the figures below, aftermath crises, the ISE – 100 Index exhibits an acceleration towards upward in TL basis however, the increase is not as significant as TL on real – term basis, due to the depreciation of US$.

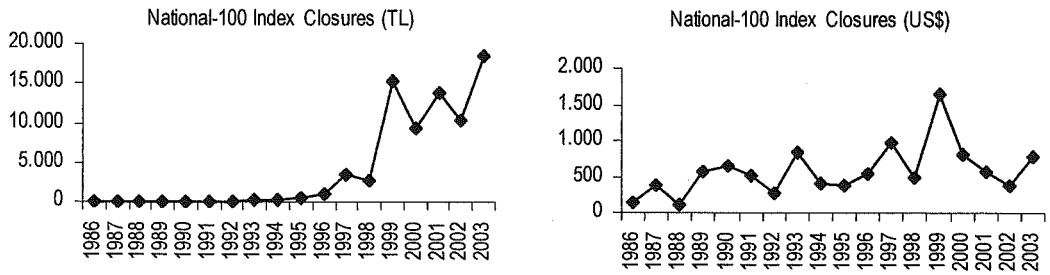



**Figure 3:** National - 100 Index Closures

**Source:** ISE

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[92] Since May 2000, regional market and new companies markets are named as second national market and new economy market, respectively.

[93] Companies are included in the ISE National – 100 Index, according to their market value and daily average trading volumes. The composition of the index is reviewed and adjusted four times on a quarterly basis. Additionally, ISE – 50 and ISE – 30 indices cover the first 50 and 30 companies also chosen according to their market values and liquidities. Their compositions are also changed on a quarterly basis. Furthermore, there is ISE – National Total Index, which covers all the traded companies on the national market, excluding investment trusts. Companies are also classified due to their related sectors. Sector indices give company information in line with the related sector. There are 6 basic sector indexes on the ISE; ISE – National Industrials, ISE – National Services, ISE – National Financials, ISE – National Technology, ISE – Regional and New Companies and ISE – Investment Trusts.

Settlement of securities traded on the National market is realized by the ISE Settlement and Custody Bank (Takasbank), which is the sole and exclusive central depository in Turkey. Settlement is carried out according to below given rules;

- Settlement period of T+2 days
- Multilateral netting system
- Payments cleared by same day funds
- Delivery versus Payment (DvP)

National market has major advantages, such as;

- Spreading of capital and activating idle savings of investors whereas enabling companies to make investments and transforming short-term based funds to longer terms,
- Supporting quoted companies' marketing, therefore leading to an increase in export and enabling joint-ventures,
- Providing a healthy price environment, determined according to real ask and bid prices.[94]

Companies, which fail to fulfill the requirements determined for the national market, are taken to second national market. On the other hand, second national market companies, succeed in fulfilling the pre – determined national market requirements, are taken into national market.

#### B.6.1.3 Second national market

*The 'Second National Market' was established in January 1995 with the aim of promoting trading in stocks of small and medium size companies incorporated in all parts of the country, in a reliable and transparent environment.*[95] The market consists of companies delisted temporarily or permanently from the ISE's National Market as well as companies, which fail to fulfill the listing requirements for trading on the ISE's National Market. Companies meeting the criteria for trading on the Second National Market are admitted upon the decision of the Executive Council of the ISE. Settlement transactions are carried out same as the national market settlement.

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[94] Capital Market and Stock Exchange Guide, 18th ed. (Istanbul: ISE, 2003) p: 236

[95] Internet: http://www.ise.org/markets/stock.htm, Stand: November 2002

### B.6.1.4 Wholesale market

The 'Wholesale Market' provides trading of stocks in large quantities. The market permits the sale of stocks which are traded on the ISE's National and Regional Markets as well as those which are not traded on the ISE, through capital increases or sale of stocks of existing shareholders to pre - determined and / or unidentified buyers.[96] Block sale of stocks within the framework of privatization scheme of public entities are also realized on this market.

Transactions are carried out between 11.00 a.m. – 12 a.m. Settlement of securities traded on the Wholesale Market is realized by the ISE Settlement and Custody Bank Inc. (Takasbank). The settlement period is T+2 and DVP method is utilized.

### B.6.1.5 New Economy Market

The New Economy Market was established on April 1995 and began operations on July 1996. The market was formed to enable young companies with growth potential to offer their stocks to the public via ISE, which allows trading of such stocks in an organized market. It encourages new - established companies, while offering new alternatives to investors willing to increase their earnings by taking relatively high risks. The New Companies Market promotes the transfer of idle funds in the economy to these young and dynamic companies, providing capital for their investments, which, in turn, will contribute to the development of the capital markets in Turkey.[97]

The transactions are carried out in two sessions between 9.30 a.m – 12.00 a.m. and 14.00 p.m – 16.30 p.m. Settlement process is also realized by Takasbank and the procedure is the same as in the National market. As of March 2002, there are no listed companies on new economy market.

### B.6.1.6 Watch List Market

The 'Watch List Companies Market' was established with an aim to provide an organized and liquid market for trading of stocks of companies under special surveillance and investigation due to extraordinary situations with respect to stock transactions or companies traded on the ISE; disclosure of incomplete, inconsistent or untimely information to the public; failure to comply with the existing rules and regulations as well as other situations leading to delisting of stocks or dismissal from the related market temporarily or permanently in order to protect investors' rights

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[96] Internet: http://www.ise.org/markets/stock.htm, November 2002

[97] Internet: http://www.ise.org/markets/stock.htm, Stand: November 2002

and public interest. The Watch List Companies Market began to operate on December 1996 and the trading takes place between 14:00 - 15:00.

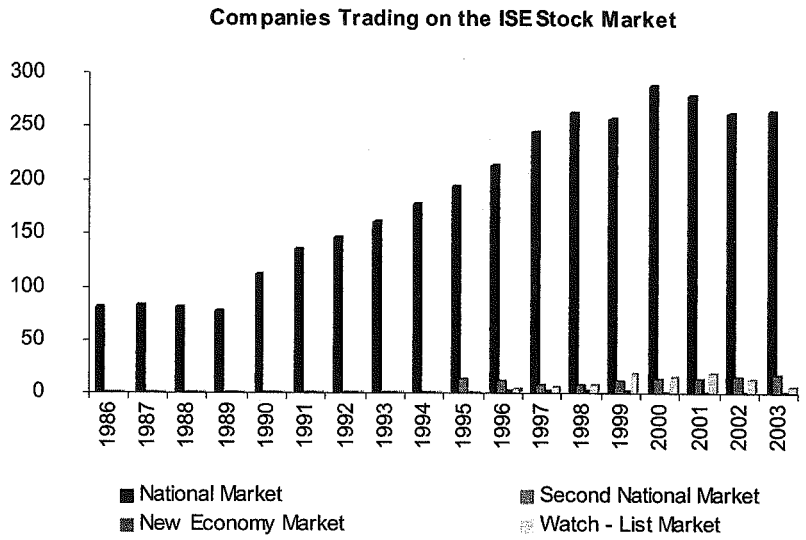



**Figure 4:** Number of companies trading on the ISE Stock Market

**Source:** ISE

By the end of 2003, there are 285 companies trading on the ISE Stock Market and 264 of them (92%) are quoted on the National Market.

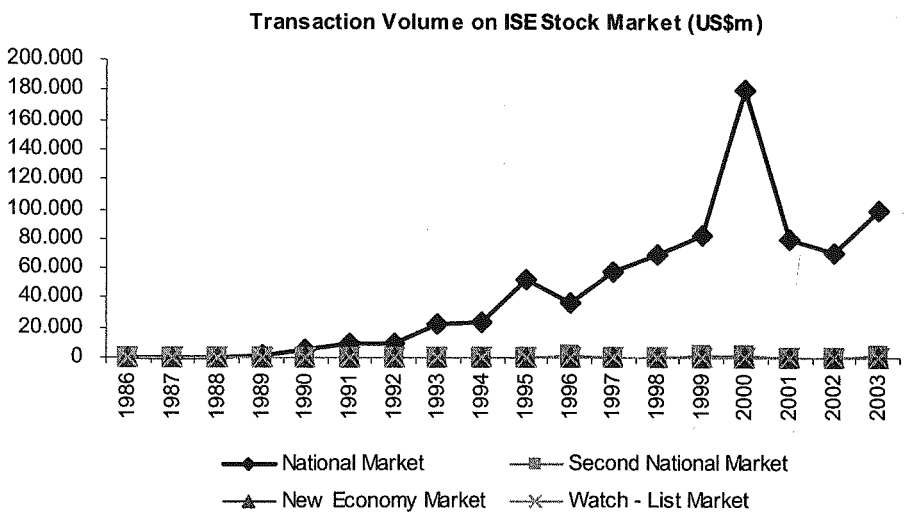



**Figure 5:** Transaction Volume on ISE Stock Market

**Source:** ISE

Transaction volume is a very important indicator in terms of determining the depth of a market. In other words, volume is related with the liquidity of a market and the liquidity leads to depth. Since a liquid and depth market enables the purchase and sale of securities from different price levels, volume is also a major determinant for efficiency. Total transaction volume by the end of 2003 is app. US$100 bn and 99% of it is realized in National Market. The increasing trend, supported mostly by the implemented reforms and recent developments regarding the EU, is partially seen from the figure, due to the depreciation of US$. However, total transaction volume exhibited a 42% increase on real – term basis compared to FY02.

| | National M. | | Second national M. | | New economy M. | | Watch list companies M. | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Transaction unit (m) | # of contracts ('000 unit) | Transaction unit (m) | # of contracts ('000 unit) | Transaction unit (m) | # of contracts ('000 unit) | Transaction unit (m) | # of contracts ('000 unit) | Transaction unit (m) | # of contracts ('000 unit) |
| **1986** | 3 | - | - | - | - | - | - | - | 3 | --- |
| **1987** | 15 | - | - | - | - | - | - | - | 15 | --- |
| **1988** | 32 | 112 | - | - | - | - | - | - | 32 | 112 |
| **1989** | 238 | 247 | - | - | - | - | - | - | 238 | 247 |
| **1990** | 1.537 | 766 | - | - | - | - | - | - | 1.537 | 766 |
| **1991** | 4.531 | 1.446 | - | - | - | - | - | - | 4.531 | 1.446 |
| **1992** | 10.285 | 1.682 | - | - | - | - | - | - | 10.285 | 1.682 |
| **1993** | 35.249 | 2.815 | - | - | - | - | - | - | 35.249 | 2.815 |
| **1994** | 100.062 | 5.085 | - | - | - | - | - | - | 100.062 | 5.085 |
| **1995** | 306.254 | 11.667 | - | - | - | - | - | - | 306.254 | 11.667 |
| **1996** | 377.026 | 11.912 | 12.765 | 492 | 963 | 35 | 170 | 7 | 390.924 | 12.446 |
| **1997** | 897.383 | 17.006 | 11.889 | 402 | 6.670 | 139 | 3.841 | 92 | 919.784 | 17.639 |
| **1998** | 2.205.345 | 21.091 | 17.665 | 273 | 18.165 | 177 | 1.357 | 30 | 2.242.531 | 21.571 |
| **1999** | 5.747.700 | 25.243 | 52.554 | 342 | 9.136 | 59 | 14.469 | 141 | 5.823.858 | 25.785 |
| **2000** | 10.988.802 | 31.746 | 64.626 | 500 | 4.364 | 35 | 17.892 | 145 | 11.075.685 | 32.427 |
| **2001** | 23.706.279 | 30.670 | 140.757 | 532 | - | - | 91.113 | 178 | 23.938.149 | 31.380 |
| **2002** | **33.411.837** | **28.064** | **322.127** | **618** | **-** | **-** | **199.287** | **285** | **33.933.251** | **28.967** |
| **2003** | **58.297.164** | **29.093** | **682.824** | **689** | **-** | **-** | **119.793** | **162** | **59.099.780** | **29.944** |

**Table 2:** Transaction Unit and # of Contracts on ISE Stock Market

**Source:** ISE

Number of contracts and therefore transaction unit in terms of shares are expected to increase by the developments regarding the automated trading system and "remote – access" project. Even though there is a 74% increase in transaction unit in 2003 compared to that of 2002, number of contracts is required to increase in order to enhance the liquidity. Since transaction costs could be considered as reasonable compared to many other exchanges, number of contracts are expected to increase in line with the positive developments in Turkish economic and polical arena.

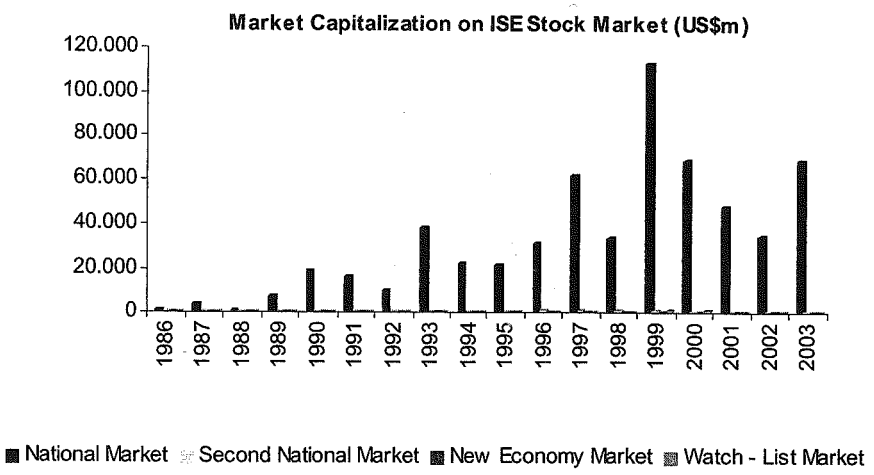



**Figure 6:** Mcap of trading companies on ISE Stock Market

**Source:** ISE

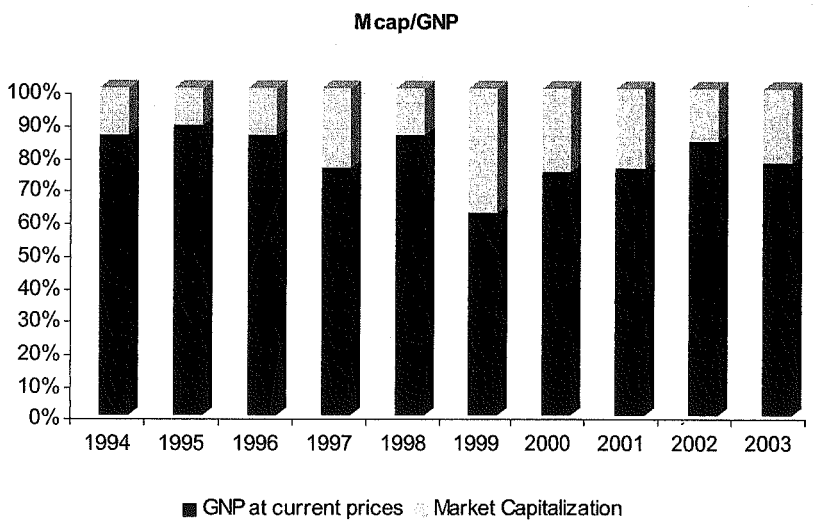



**Figure 7:** Contribution of market capitalization to GNP

**Source:** SIS, CBT and ISE

Market value defines the size of a market. As of FY03 total Mcap of trading companies is US$ 69 bn, which is doubled compared to US$ 34,4 bn in FY02. As seen from the Figure 6, total Mcap on the ISE stock market is almost covered by companies trading on the National Market (US$ 68,6 bn - 99%). Even though the ISE is a very dynamic market, the deterioration in the financial sector in 2001 affected the market and therefore Mcap of companies declined compared to previous years.

The significant increase in last two years is attributed to success in implemented reforms and especially foreign investors' attraction towards Turkish capital markets.

In order to talk about an efficient market, Mcap / GNP ratio should be considered. In line with the deterioration due to crises environment, the ratio stood at 32% and 19% in 2001 and 2002, respectively. However, IMF – backed economic restructuring program, EU expectations and determination in reform implementation had a major impact on Mcap and the ratio increased to 29% by the end of FY03. In line with these statistics, Mcap / GDP ratio stood at 38,5%, 20,4% and 26.7 in FY01, FY02, FY03, respectively.[98]

#### B.6.1.7 Recent Developments on the ISE Stock Market regarding ELIT System

ISE has taken major steps in order to increase the trading volume on the stock market. First step started with the establishment of workstations, in which transactions are carried out through automated ELIT System. The number of workstations increased rapidly following the automation of the market in 1994 and currently there are app. 1000 workstations on the floor. Furthermore, "remote - access" project, implemented partially on the ISE Stock Market since August 2000, plays a vital role in the ISE. The project aims to increase the number of investors and the depth of markets through electronic order transmission and Ex – API, enabling market participants to send their orders from their back offices. However, there are two basic points regarding "remote - access" project.

First of all, it should be underlined that "remote - access" in the ISE does not cover investors' direct existence on the system. In other words, investors are required to contact with brokerage houses by phone, fax or through internet and dealers are able to execute the transactions from their offices. Through "remote – access", orders are loaded by dealers through getting the information directly from the investors. Since dealers are not required to transmit the information to brokers, the probability of making an error is minimized and the speed increases. Additionally, the system on the ISE Stock Market is organized in such a way that investors are able to follow the purchased and sold stocks from their own screens, which leads to an increase in investors' confidence in line with the increasing transparency on the market. Even though it might also be thought that such a project could increase the costs of brokerage houses, it is also considered and "ADSL System Modem" which transfers the current telephone line to data line of the ISE, is used.

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[98] Internet: http://www.tspakb.org.tr, The Association of Capital Market Intermediary Institutions of Turkey.

Hence, brokerage houses do not have to establish an extra line for the remote - access. Second major point and also a concern regarding "remote - access" is that, since dealers take over brokers' duties, there will be significant lay - offs in the sector. Parties in the sector, in particular Stock Exchange Experts Association, work on this issue in order to benefit from these experienced staff in order to increase the efficiency in the sector.

Another concrete step taken by the ISE in order to increase transaction volume on the stock market is the extension of transaction periods. As it is mentioned before, transactions are carried out in two sessions on the ISE Stock Market and since mid - 2001, overall 4 - hour trading period is extended to 5 hours.

Even though ISE has efforts in order to provide liquidity on the market, political and economic factors have major impact on the market's direction and as a developing emerging market, the route of the ISE is determined mostly by external dynamics.

### B.6.2 BONDS AND BILLS MARKET

The Bonds and Bills Market, established in June 1991, is the organized market for both outright purchases and sales and repo / reverse repo transactions. The purpose of the market is to provide a transparent, liquid, competitive and efficient environment for secondary market trading of fixed-income securities comprising Government bonds, Treasury bills, revenue-sharing certificates, bonds issued by the Privatization Administration and corporate bonds listed on the ISE.[99] Even though there are various kinds of fixed income based capital market instruments, most of the transactions are focused on G-bonds and T-bills.

Market participants, authorized to carry out transactions in the market, are;

- The Central Bank of Turkey (CBT)
- Market member banks
- ISE member brokerage houses
- Members, authorized for a specific time period

[99] http://www.ise.org/markets/bonds.htm, Stand: November 2002

The bonds and bills market has 3 submarkets:

- Repo / Reverse Repo Market
- Outright Purchases and Sales Market
- Real Estate Certificates Market

### B.6.2.1 Implementation of Trading System on Bonds and Bills Market

An electronic order matching, administering and reporting system is employed in order to operate the Repo / Reverse Repo Market and Outright Purchases and Sales Market. Currently, in line with the "remote - access" project, all members are enabled to enter their orders directly from their own terminals located at their back offices.[100] After an order is entered into the ELIT computer system in the bonds and bills market, it is processed according to price and time priorities. Both the Outright Purchases & Sales Market and the Repo & Reverse Repo Market operate on a multiple price - continuous trading system. All orders are continuously entered into the computer system and only the best price orders[101] and volume are automatically matched. Members are subsequently informed about the executed transaction. Additionally, same day value orders as well as forward value date transactions up to 7 days for repo / reverse repo and up to 90 days for outright purchases and sales are available on the market.

Outright purchases & sales and repo & reverse repo transactions take place between 9:30 a.m - 17:00 p.m. Same day value orders can be matched until 14:00 p.m, whereas forward value orders are valid until 17:00 p.m. Same day value orders for mutual fund transactions can also be executed until 17:00.

In both markets, orders are classified with respect to their nominal values as normal orders and small orders and they are traded in different markets according to their sizes. An outright purchase or sale order with a nominal value of up to TL 100 billion (US$ 70.000) and repo and reverse repo order with a nominal value of up to TL 500 billion (US$ 347.200) are traded on the "small - orders market" (whereas orders with larger nominal values are traded on the normal -orders market).[102]

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[100] Before "remote - access", members used to communicate their orders via telephone to the ISE staff, which were acting as "blind brokers".

[101] Bid orders are matched with equal or lower - priced ask orders and ask orders are matched with equal or higher - priced bid orders

[102] Internet: http://www.ise.org/bonds.htm, Stand: November 2002

The ISE Bonds and Bills Market has been computing and disseminating ISE Government Debt Securities (GDS) Indices (Price and Performance Indices), since the beginning of 1996. All information pertaining to price, yield and volume of best orders as well as details of the last transaction and a summary of all transactions are disseminated on data vendors' screens.

Real Estate Certificates Market, as the third sub market on the ISE Bonds and Bills Market, was launched in June 1996. The aim of this market is to provide finance in order to accelerate the production of organized housing and work residence projects through funds obtained from the capital markets. The market operates on a multiple - price and continuous auction system btw 9:30 a.m -17:00 p.m. Transactions are conducted by matching ask and bid orders in the market. The unit of trading is the amount of real estate certificates with a nominal value of TL 10 million (US$ 7). The best bid and ask orders of Real Estate Certificates are disseminated via vendors' screens.[103]

Takasbank, according to the DVP principles, handles Clearing and settlement operations on the ISE Bonds and Bills market.

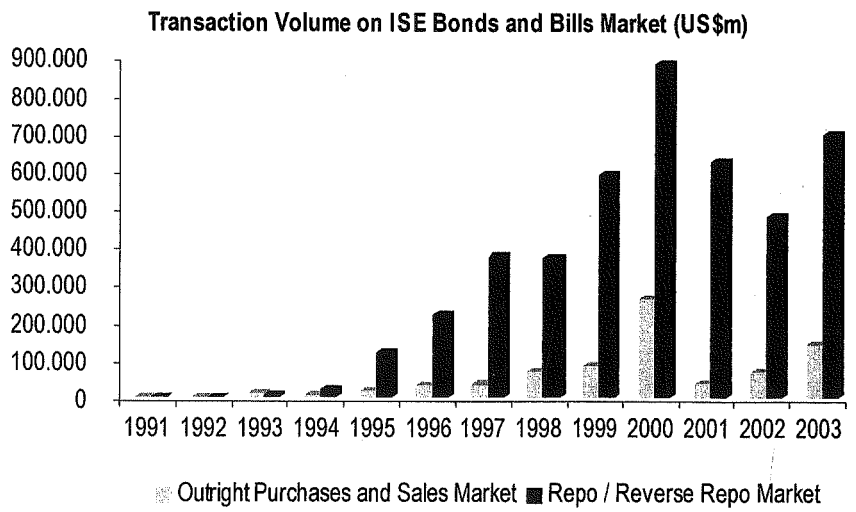



**Figure 8:** Transaction volume on ISE Bonds and Bills Market

**Source:** ISE

[103] Internet: http://www.imkb.gov.tr/bonds.htm, Stand: November 2002

2001 financial crisis had a major impact on Bonds and Bills Market and total transaction volume declined by 42% in FY01 compared to FY00. The impacts of the crisis are significantly seen in 2002 and the recovery began in line with the banking sector rehabilitation process. By the end of 2003, total volume increased to US$ 846 bn, which indicates a 54% increase on real – term basis.

### B.6.3 DERIVATIVES MARKET

The Derivatives Market Department is established on May 1994 in order to provide portfolio management and risk transfer opportunities to market participants, particularly to corporate, large - scaled investors and portfolio managers. The new market is expected to increase liquidity and depth of spot markets.[104]

The initial objective was to launch the index futures contracts as the first product, however with the adoption of the free - floating currency regime in February 2001, the exchange rates have become too volatile and as a result the establishment of the currency futures market was accelerated. On August 2001, the first futures contract on TL / US$ rate was launched with the maturity date of 27 September 2001. Therefore, speculative movements on exchange rates would be minimized and the CBT's supervisory function would be strengthened.[105] The contract size on the market is decreased to US$ 10.000[106] in line with the approval of the CMB. The base price used in the calculation of price movements is the settlement price of the last session. Transactions are executed in one continuous auction session btw 10:00 a.m - 14:00p.m with an hour lunch break between 12:00 - 13:00. Currently only commercial banks are authorized to trade on this market however, it is tried to be enabled for brokerage houses to trade as market participants.[107]

There are two regulations for the derivatives market. The first one is the Istanbul Stock Exchange Futures and Options Market Operations and Membership Regulation while the second one is the Regulation regarding the Operations and the Membership of the Istanbul Stock Exchange Futures and Market Clearing Center.

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[104] Internet: <http://www.ise.org/derivatives.htm>, Stand: November 2002

[105] Internet: <http://www.ataonline.com.tr/YatirimFonlari/FonNews.asp>, Stand: November 2002

[106] The contract size was US$ 100,000 prior to December 2003.

[107] Internet: <http://www.ntvmsnbc.com/news/149978.asp>, Stand: 1/ 05 / 2002

### B.6.3.1 Implementation of the Trading System on the Derivatives Market

Electronic trading platform has been decided for the ISE Derivatives Market and the development of the necessary software began in 1997 in cooperation with a foreign software company.[108] System enables automatic matching of orders according to price and time priority. Orders are entered into the system via terminals on the stock exchange floor. Orders must be entered with an account number for the system to check for sufficient collateral. Following the trade, collateral and position information of accounts are updated. In line with the change in prices, the system calculates profits / losses of accounts within certain time intervals and all trades are monitored on – line on the screen. It is also enabled by the system to obtain various kinds of daily and historical reports. Trader workplaces on the Derivatives Market are NT (Windows) based and can be customized by the user. Trader workplaces have different types of user categories. Each of the categories is assigned a different level of authority and for each user category all inquiry screens are updated real time. Various types of orders including; limit, market, keep remainder and stop loss orders are supported by the trading system.[109]

Through an online link between the ISE and the Takasbank, the system directly get updated all the information on the total amount of collaterals deposited and withdrawn. Trades are cash settled at T+0.

| | Contract Size US$ (10,000) | | | |
|---|---|---|---|---|
| | Traded Value (US$) | Daily Average /US$) | Volume | Number of Trades |
| 2001 | 2.600.000 | 27.660 | 26 | 20 |
| 2002 | 400.000 | 1.606 | 4 | 2 |

**Table 3:**Currency Futures on US$

**Source:** ISE

### B.6.4 International Market

The ISE International Market (ISE IM) has been established in the 'ISE International Securities Free Zone' and operates in a tax - free environment, which is a great opportunity for foreign investors. The objectives of the ISE International Market are to encourage the flow of international capital to the ISE and to provide a transparent and secure trading environment for securities

[108] Internet: <http://www.ise.org/derivatives.htm>, Stand: November 2002

[109] ISE Evaluation and Statistics Department's Stuff, Personal Interviews, August 2003.

issued in international markets.[110] In an environment of total freedom of mobility of funds, prices shall be determined freely and competitively, thereby raising the liquidity and variety of investments.

The market offers important opportunities for domestic and foreign individual and institutional investors. By eliminating operational risks such as cash transfer and foreign trade restrictions, the market offers international fund managers an opportunity to have access to regions, which in the past they have refrained from investing in. In addition, issuers wishing to obtain funds from international capital markets are now provided with the opportunity to acquire the funds they need by selling their securities in a transparent and highly liquid environment. Another advantage offered by the market is the level of automation that the Turkish banking and financial sector has reached, that is comparable to those in its Western counterparts, allowing for the repatriation of the proceeds of transactions conducted on the market. Also, as the market operates in a free zone, such repatriation is not subject to any restrictions.[111]

All proceeds (including but not limited to dividends, capital gains and interest) that foreign individual and institutional investors earn on the market, and operating in a free zone, are exempt from taxes. All trading and settlement operations and payments on the market are carried out in US dollars (or other hard currencies accepted by the ISE Executive Council). Nevertheless, regardless of the type of foreign currency in which the securities of foreign issuers are issued, the yield they receive from the securities listed on the Market will be denominated in US dollars (or other hard currencies accepted by the ISE Executive Council).[112]

ISE IM has two sub-markets:

#### B.6.4.1 ISE IM Depository Receipts Market

The market, launched in July 1997, is located inside the ISE building in the ISE International Securities Free Zone and the shares of foreign companies are traded as depository receipts (DR). Currently Kazkommertzbank is the only DR traded on ISE IM Depository Receipts Market.

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[110] Internet: http://www.ise.org/intmarket.htm, Stand: November 2002

[111] Internet: http://www.ise.org/intmarket.htm, Stand: November 2002

[112] Internet: http://www.byegm.gov.tr/yayinlarimiz/NEWSPOT/1998//Sep/N18.htm, Stand: September 1998

#### B.6.4.1.1 Implementation of the Trading System on the ISM IM Depository Receipts Market

The Market employs quote and order - driven continuous auction trading system with one market maker for each traded security. The market maker who may operate in more than one depositary receipt will provide price continuity and stability, correct order imbalance by quoting bid and ask prices on a continuous basis to assure the proper operation of the market and to provide high liquidity.

The market operates in an electronic environment and the trading system is fully - automated through a computer network. Orders are submitted to the system through brokers and matched automatically according to price and time priority rules. Trading activities are carried out in one session between 13:00 p.m and 16:30 p.m.

Normal orders are given as a trading unit or multiples of it. Order amounts given at one time may not exceed the limit determined by the Executive Council. Odd - lot orders that involve less security than a trading unit is given in terms of numbers of foreign securities. The system enables the execution of several types of orders such as 'limit,' 'fill or kill,' 'special limit value' and 'good till date' type orders. The Executive Council determines the time limit that an order may be valid. Time limited orders may be converted to daily orders by the member. Market makers may change their quotations at any time during a session. However, their altered quotations are sorted as a new order in terms of time priority.

There are no price limitations on the trading prices of foreign securities in the multiple - price continuous - auction system that employs a market maker. The Executive Council may decide to impose upper and lower price limits.[113]

Settlement of securities is realized through Takasbank. However, when the traded securities are safe kept abroad and transactions are carried out in foreign currencies. Takasbank finalizes related transactions via its correspondent banks. Collection and distribution of all rights of investors such as dividends, rights and bonus issues on deposited securities are handled by the intermediary representative institution of the related company and Takasbank will act as an intermediary in the execution of ISE IM Companies' corporate actions. However, relevant

[113] Internet: http://www.ise.org/intmarket.htm, Stand: November 2002

corporate actions are generally executed by depositary banks within the framework of depositary agreements.[114]

#### B.6.4.2 ISE IM International Bonds and Bills Market

In International Bonds and Bills Market, Outright Sales / Purchases transactions began on 24 February 1997 and Repo / Reverse Repo transactions began on 29 August 1997. Outright Sales / Purchases transactions can be carried out both by banks and intermediary institutions, whereas Repo / Reverse Repo transactions can be carried out only by banks. International bonds, issued by Republic of Turkey in US Dollar, Euro and Japanese Yen based, are traded on the market.

##### B.6.4.2.1 Implementation of the Trading System on the ISE IM International Bonds and Bills Market

International Bonds and Bills Market have a semi - automated trading system. Market members deliver their orders via telephone to an ISE expert. The system is the ancient sytem implemented on the ISE Bonds and Bills Market. The received order is entered into the computer system by the expert. Every order is assigned an identification number and then matched according to price and time priorities. All telephone communication is recorded and members are immediately informed about transactions via fax massages whenever their orders are executed. Only daily orders with certain execution prices are available in the trading system. Orders may have a value date of at least 3 and at most 90 business days. At the end of each trading day unexecuted orders are deleted from the system and the following trading day starts with a clean book.[115] Information dissemination is carried out through data vendors. Market activates btw 10:00 a.m to 17:00 p.m for outright sales / purchases and btw 10:00 a.m to 16:00 p.m. for repo / reverse repo transactions.

As a characteristic of the market, market members are allowed to deposit their securities either at an international clearinghouse, TAKASBANK or at any other custodian. Settlement of transactions is carried, at the value date, at an international clearinghouse through accounts of Takasbank.

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[114] Internet: <http:// www.takasbank.com.tr/eng>, Stand: November2002

[115] Internet:< http://www.ise.org/intmarket.htm>, Stand: November2002

## B.7 EXCHANGE & BROKERAGE FEES IN THE ISE

### B.7.1 Membership and Exchange Fees

There are two types of exchange membership fees in the ISE; entrance and annual. The Membership Entrance Fee is set as TL 400 bn ($ 295.000) and the Annual Fee for the existing members is TL 300 bn ($ 221.800). The amount of both fees can be changed by a decision that will be taken by the ISE Executive Council and ratification by the CMB.[116]

| Entrance Membership Fees of Some Exchanges | |
|---|---|
| Barcelona Stock Exchange | 100.000 € |
| Deutsche Boerse | 7.500€ / 15.000€ / 20.000€* |
| Hellenic Exchanges | 88.041 € |
| Istanbul Stock Exchange | 218.460 € |
| London Stock Exchange | 10.000£ (app.15.000€) |
| Swiss Stock Exchange | 20.000 CHF (app. 13.000€) |
| *varies according to transaction type | |

**Table 4:** Entrance Membership Fees

**Source:** The Association of Capital Market Intermediary Institutions of Turkey, Sermaye Piyasasinda Gundem, November 2004: p:7 – 16.

The high amount of entrance membership fee in the ISE is due to required collaterals paid by members to the ISE in order to assure their positions.

Besides Membership Fee, the Exchange Fee in the ISE is calculated as a percentage of trades executed by members. The table shows the amount of Exchange Fee paid to the Exchange by members for each market:

[116] Internet: <http://www.ise.org/about/fees.htm>, Stand: June 2003

| EXCHANGE FEES | |
|---|---|
| Stock Market Exchange Fees | 1 Per Hundred Thousand |
| Repo/Reverse Repo Market | |
| O/N Transactions | 0,75 Per Hundred Thousand |
| Other Maturities | 4 Per Hundred Thousand |
| Outright Purchases/Sales Market | 2 Per Hundred Thousand |
| Off Exchange Outright Sales Transactions | 9 Per Hundred Thousand |
| Off Exchange Repo/Reverse Repo Transactions | |
| O/N Transactions | 2,925 Per Hundred Thousand |
| Other Maturities | 9 Per Hundred Thousand |
| International Market | |
| Outright Purchases/Sales Market | 5 Per Hundred Thousand |
| Repo/Reverse Repo Transactions | 10 Per Hundred Thousand |
| Depository Receipts Market | |
| Market Maker Member | 7,5 Per Hundred Thousand |
| Market Member | 22,5 Per Hundred Thousand |
| Foreign Mutual Funds Market | |
| Representative Company | 7,5 Per Hundred Thousand |
| Market Member | 22,5 Per Hundred Thousand |
| Derivatives Market | 5 Per Hundred Thousand |

**Table 5:** Exchange Fees in the ISE

**Source:** ISE

### B.7.2 Brokerage Fees

Brokerage commissions paid by investors (courtage) for stock markets are set btw 0.2% (minimum) - 1% (maximum) by the CMB. Members can set their commission freely among these levels[117], depending upon the amount and frequency of trading. In line with the increase in transactions, the percentage of the courtage decreases.[118] Furthermore, intermediaries are also allowed by the CMB to issue a rebate to their clients to a maximum of 50% of their commission. According to Bonfil (1996), margin lending[119] is the competitive edge for brokerage fees on Turkish

[117] Capital Market Activities Advanced – Leveled Training Notes, The Association of Capital Market Intermediary Institutions of Turkey (Istanbul:2003) p: 50.

[118] Investor Guide, Introduction leaflet of the ISE (Istanbul: ISE, 2000) p: 43.

[119] Number of Clients with Margin Trading Agreement: 37.196; Number of Margin Trading Clients: 9709; Total Loan Size: US$ 133.300.030; Average Loan per Client: US$ 13.708 (calculated with the buying exchange rate of 31/12/03). Source: The Association of Capital Market Intermediary Institutions of Turkey.

capital markets.[120] It is one of the most important competition determinants especially for commercial banks. According to Bonfil, competition leads to a decline in basic brokerage fees and banks (unlike other intermediaries) are capable of baring such declines, thanks to their interest earnings. Since banks have their own brokerage houses and they command the majority of the ISE's broking business in terms of trading volume[121], it became inevitable for other intermediaries to consolidate. Following the financial & economic crises, some of the small firms collapsed however, squeezed margins, increased costs weak returns on commissions, taxes, legal obligations and being able to catch up with technological developments pressurize those mentioned companies with small operations and consolidation is pronounced strongly. On the other hand, "main players" try to launch new products, in order to attract both individual and institutional investors to markets. It is recently announced that the top 10 brokers have set up a consortium to launch an exchange rated fund, which will be a unit – based product tracking the ISE – 30 Index.[122]

## B.8 TAKASBANK

Takasbank is both the central securities depository of Turkey and a clearing and settlement center for the ISE. Takasbank was established as a department of the ISE in 1988. In 1992, the operations of the department were reorganized under a seperate company namely ISE Settlement and Custody Company. The company was transformed into a specialized bank and named as ,TAKASBANK' in 1996.[123]

Takasbank is owned by the Istanbul Stock Exchange (ISE) and 104 of its members. According to the Articles of Association of Takasbank, no single shareholder can hold a share of more than 5%, except for the ISE. Within the paid - in capital of the bank TL 60 trillion (appr. US$ 44 m), the ISE owns a 22,6%, 24 banks have a 41,4%, and 78 brokerage houses have a 36% share as of May 2002. The Board of Directors is composed of four representatives of the ISE, one representative of

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[120] Bonfil, "Unchain The Bull!," Private View , The Quarterly International Review of the Turkish Industrialists' and Businessmen's Association, Spring / Summer 1996: Vol: 1: No: 2: p: 32 – 38.

[121] According to ISE statistics, brokerage houses of banks contribute more than 50% (app. 52%) of total stock market transactions by the end of 2003.

[122] Internet: <http://www.thebanker.com/news/fullstory.php/aid/2287/Brokers_feel_the_squeeze.html>, Stand: 04/October/2004.

[123] Capital Market and Stock Exchange Guide (2003) p: 315.

the CMB, and five representatives of the ISE members (banks and brokerage houses) and the General Manager of Takasbank.

Functions and Services of Takasbank are stated as follows;

- Safekeeping and Custody
- Clearing and Settlement for the ISE
- Transfer Services
- Credits
- International Services
- International Responsibilities and Relations[124]

As Takasbank is both the Central Securities Depository of Turkey and the Clearing and Settlement Center for ISE trades, the CMB requires all ISE members to have one main (omnibus) custody account in their names and sub-accounts for each of their customers with Takasbank. Each ISE member is connected to Takasbank's system via leased lines through which they can monitor and make transfers between their custody accounts and their customer's sub-accounts from their own office terminals. Takasbank includes the name of the account holder in details of the sub-accounts of ISE members' customers. Information on the identification of the sub-account holders (customers of the ISE members) have been gathered from the ISE members and entered into the computer system, already. Each customer (real or legal entity) identified in the system is assigned a unique Customer Number. With this system, investors are enabled to monitor and check their holdings as a whole, even if they keep portfolio accounts with more than one ISE member. Investors are also able to put and release blockage on their securities holdings.

Takasbank provides an Interactive Voice Response system (IVR) called Alo - Takas, through which the sub - account holders are able to reach real - time information on their accounts, get one consolidated custody account statement even if they have more than one account under the main accounts of different brokerage houses, and block their equities entirely or partially within working hours using securities codes which have been provided within the Alo - Takas System.[125]

The major aim of the new system is to increase investor confidence in the system as a whole. This new system also aims to establish the required infrastructure for dematerialization.

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[124] Takasbank Guide (Istanbul: ISE Turkish Central Securities Depository, Settlement and Clearing Co. Inc., 1995).

[125] Internet: http://www.takasbank.com.tr/eng/Services/fs01.htm, Stand: June 2002

### B.8.1.1 Clearing and Settlement Services

Takasbank is the only authorized Clearing and Settlement Center for the ISE. Takasbank clears securities' transactions by creating binding statements of obligation for securities and funds due, via multilateral netting among the participants. These obligations, together with receivables due, are reported to the members electronically via Takasbank's proprietary automation system on T+0 for bonds and bills and on T+1 for equities. In line with the ISE's automated trading system, also Takasbank has a comprehensive automation infrastructure. Netting principal supported by the system is aimed to reduce principal risk and minimize the need for members to maintain large balances throughout the settlement process. At the end of consolidation of all the debits and credits, each brokerage house has a final net position (debit or receivable) for cash and each security. Settlement of securities' takes place each business day. Settlement of an individual transaction takes place at a given number of days after the deal have been struck. The 'Model 3 DvP Settlement Model' is applied by Takasbank where simultaneous net settlement of securities and funds tranfers takes place. Even though net obligations are legally binding, settlement is not guaranteed by Takasbank. Members do not get their receivables unless they fulfill their obligations (DvP). In case of partial fulfillment of the obligation, proportional payment / transfer out of the receivable is made to the member. Settlement is conducted in book entry form at Takasbank, rather than through physical movement of securities.

| Settlement Period for Transactions | |
|---|---|
| Bonds & Bills | T+0 |
| Equities | T+2 |
| International Market Transactions | T+3 |

**Table 6:** Settlement periods

**Source:** TAKASBANK

If the obligations are fulfilled after the deadline but within the working hours of Central Bank's National Payment System (EFT) on the settlement date, default payment calculations will be calculated on the prevailing market overnight interest rate (highest of the ISE Repo - Reverse Repo Market or the Central Bank of Turkey). If the failure still exists on T+3, penalty payment is calculated as a triple of the prevailing market overnight interest rate applied throughout the failure period. For fulfillment of obligations after 17:00 on the date of settlement, the ISE extends an inquiry to the member asking the reasons for the failure. If the failure still exists on T+1 for bonds and bills and on T+3 for equities, Takasbank notifies ISE for buy - in or sell - out, indicating the due

obligation (cash or securities) and the detailed list of securities and cash receivables under pledge at Takasbank. Takasbank has been appointed as the Clearing House for the ISE Forex Futures Market, launched on 15/08/2001. The transactions executed at the ISE Forex Futures Market will be based on client account numbers. The settlement of the transactions will be executed through the cash agreement method within the same day.

Members are expected to fulfill securities settlement obligations from their own office terminals, which are on - line connected to Takasbank computer system. Securities obligations are fulfilled in book - entry within Takasbank system, while cash obligations are fulfilled through CBT's EFT system. Takasbank delivers settlement receivables of the brokerage houses and their sub - clients to the required destination upon instruction of the members.

#### B.8.1.1.1 Efficiency Analysis on Clearing & Settlement

Investor protection is considered as the major issue in Takasbank's technological infrastructure. Hence, on - line connections of the ISE Members, the ISE, the CMB and the CBT ease the information exchange and the delivered information can be shared by investors through the mentioned parties. Besides, settlement of securities is done mostly by book entry and therefore the immobilization rate is high. The high the immobilization rate, the quick and cheap is the transaction. The automated infrastructure enables the transfer of the related security to the main account of the ISE member and then the system arranges according to the sub accounts of customers. Since physical delivery is not put forward, the cost minimization is optimized. Additionally, settlement is set upon DvP system, in order to protect investors and members against possible liquidity risks.

# C. EFFICIENCY ANALYSES ON THE ISE STOCK MARKET

Efficiency on capital markets is determined according to a combination of different factors. According to Kührer, Loistl and Veverka, the performance of any stock market depends on five groups of factors; behaviour of individuals, fundamental indicators, technical indicators, market climate and market microstructure.[126] In this chapter, efficiency analyses will be made in terms of efficiency of the automation system implemented in the ISE and the efficiency in terms of Efficient Market Hypothesis (EMH). Furthermore, the other compounds of Turkish capital market will be evaluated in terms of their efficiency levels. It is believed that the coverage of these analyses would lead us to a healthy conclusion in terms of determining the efficiency on the ISE Stock Market.

## C.1 EFFICIENCY ANALYSIS IN TERMS OF AUTOMATION SYSTEM (ELIT)

Fully automation in the ISE equities market started on 21 November 1994. The name of the electronic trading system is "ELIT", which was taken from the Vancover Stock Exchange in Canada and implemented to the ISE, following the required adjustments.

### C.1.1 Technical Features of ELIT System

ELIT system has a wide range of technological features, such as;

- Order entry and order routing
- Order view in various formats
- Order and transaction inquiry in terms of broker and share
- Order replacement and last order cancellation
- Execution of transaction
- Real time index, volume and quantity data
- Transaction reporting
- Real - time monitoring
- Information dissemination to data vendors
- Real - time data
- Order routing according to price and time priority
- Order view with best price and best quantity

[126] Kührer / Loistl / Veverka, A Holistic Approach to Portfolio Management, in: <http://ifm.wu-wien.ac.at/Forschung/portfolio.pdf> p: 3

- Order execution (automatic / manual)
- Transaction cancellation and change flexibility
- Broadcasting sent messages
- Previous transactions' data

In order to perceive the impacts of these features on efficiency, it is important to analyse the automation phases of stock exchange transactions in the ISE:

#### C.1.1.1 Information phase

Information is one of the most important efficieny determinants in stock exchanges. Through ELIT system in the ISE, all kinds of trading information is disseminated to data vendors. Market participants, as data vendors, transmit this market related information to investors. Market participants are able to see all kinds of information at the same time on the screen, through their terminals. Information can be classified as stock - related information such as data regarding trading stocks, indices, previous transactions, volume, depth, order entry and also information regarding the external factors affecting capital markets such as political, economic developments and company news.

The main issue in information phase is the rapid and equal dissemination of information among investors with lowest costs. All market participants on the ISE stock market have the possibility to reach information directly from their data vendor screens, such as Reuters, Euroline, etc. In general, market participants provide the related information to their customers per fax or through telephone but if required, investors can also have their own data vendor screens where they can follow both the sessions and market related information.

ELIT System's function in the information phase consists of accessing all relevant transaction data, receiving transaction reports following clearing & settlement and real - time information dissemination. Hence, the system has a wide range of technological infrastructure.

ELIT system's execution speed is 2 seconds, extending to 4 seconds at rush times, which means all information will be seen on the screen in the mentioned time. The system can serve 800 users at the same time, which is planned to be increased to 2,500 users. Additionally, up – to - date market information is the central element of the system. Participants can access all related data through market monitor and inquiry screens.[127]

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[127] Yildirim, Establishment and Design of a Financial Futures-Options Market in Turkey (Istanbul, 1997) p: 48.

Since the capacity of ELIT is increasing day by day, its positive impacts in terms of liquidity are seen on the markets. In line with the increase in ELIT's serving capacity, it is planned that the optimal information dissemination would be achieved and the transparency and the liquidity would increase.

Besides market participants, the ISE itself has also an active role in information dissemination through its investor relations department. Investors have the chance to have a direct contact with the ISE; in order to get each kind of market related information.

#### C.1.1.2 Order Entry Phase

For the companies traded on the stock market of the ISE, the unit of trading is 1000 shares (standard lot size). ELIT system enables market participants to enter round lot orders (ordinary orders), special orders and odd - lot orders. Members can enter buy and sell orders with various validity periods of up to 1 - business day. Unmatched orders without a specific validity period are canceled at the end of the trading session. Every order involving a price limit is also limited by a maximum lot quantity. Lot limits are 100, 250, 500, 1000, 2500 or 5000 lots. For rights coupons, one round lot represents the subscription coupons of a stock with a total nominal value of TL 1.000.000. Special orders are designated depending on the base price and the lot limits allowed for bidding or offering for each stock. Special orders can include shares up to the "block trade" limit, which is at least 10% of the paid – in - capital, and they cannot be partially matched. Any special order entered into the system can be canceled before it is executed. Special orders are not taken into consideration as registered transactions however, they are included in the calculation of the traded value and volume of the market.

"Wide Area Network" (WAN) project is the core of order entry process in terms of efficiency. The project enables market participants to route their orders directly to the ISE automated trading system through an interface software from their own terminals located at their back offices. The system is called Ex – API and it accelerated the speed of transaction and led to time saving. In line with the launch of the project, it is targeted that the system would enable market participants to enter, follow and inquire the transactions through their own terminals and therefore versus declining transaction costs, liquidity and depth of the market would increase.

A further development of "WAN" could be considered as investors' direct access to the system. However, such an implementation would require a wide range of technological infrastructure and

high costs. On the other hand, intermediaries strengthen the quality and the efficiency of capital markets by their financial services.

#### C.1.1.3 Orderrouting and Execution Phase

In ELIT system, prices are determined on a "multiple price - continuous auction" method, which automatically matches buy and sell orders on a price & time priority basis and enables matching many orders of investors with different prices. In volatile exchanges like ISE, "multiple price" model is a vital factor for markets' liquidity. Since there is a set margin, the possible threats of high volatility is tried to be minimized. The system is a blind order system and ISE members are identified upon matching. In terms of security and equality principals, market participants are not identified till the end of the execution. However, all information regarding transparency, except standing order IDs, are displayed in the trading system during the sessions. Unmatched orders without a specific validity period are canceled at the end of the session. Odd - lot orders in a specific security are matched according to the last trading price of the same security traded in round lots.

Another security principal is the inability of order cancellation. ELIT system enables to cancel only the last entered order however, the other orders can be changed or replaced during the session.[128] In line with this principal, investors' positions are secured. As an exception to this implementation, special orders are executed upon the approval of floor specialists. Any special order entered into the system can be canceled before it is executed.

ELIT System is continuously tested in order to increase its average transaction capacity. Current average capacity of the system is 14,000 transactions per hour and it is planned to be increased to 36,000.[129] There is a strong connection between information dissemination and order – routing phases. Disseminated information is reflected in the prices and matching process takes place according to the price movements. On – line information supports the quantity and the speed of transactions. ELIT System is also supported by "Fault – tolerant" qualification, which enables continuous execution of trading. Therefore, the depth and the liquidity of markets are secured.

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[128] Capital Market and Stock Exchange Guide (2003) p: 261.

[129] Yildirim (1997) p: 48.

#### C.1.1.4 Clearing & Settlement Phase

The main target of this phase is enabling the most rapid, secure and least expensive clearing and settlement of transactions. As mentioned before, Takasbank is the only authorized Clearing and Settlement Center for trading on all markets of the ISE. Securities' obligations are fulfilled in book - entry within Takasbank system, while cash obligations are fulfilled through CBT's Electronic Fund Transfer (EFT) system.

Takasbank's on – line software system enables the efficiency of transaction payments. The payment of transactions consists of e - mail, interbank and money transfers and settlement of transactions with confirmation. By the end of the day, transactions are cleared through the fully - automated system and the settlement is done by netting the total buy and sale amounts of brokerage houses.[130]

Since securities are transferred in book – entry system, costs are tried to be minimized. The capacity of the system is capable of realizing security transfers through accounts, receiving money transfers and supervising the transactions.

### C.1.2 IMPLEMENTATION OF ELIT SYSTEM ON THE ISE STOCK MARKET

#### C.1.2.1 Implementation of ELIT through screens

When the computer is turned on, market participant should enter the code and the password. Following this identification step, "order entry screen" exists, on which lot information, order type, stock name, order confirmation can be loaded and last checks can be made. On the other hand, "market watch screen" is available for both market participants and investors. While floor traders follow the market through their own terminals in the exchange, data vendor companies also provide real - time - based information to investors and other market participants outside the exchange, thanks to their cooperation with the ISE in terms of data dissemination.

[130] At the end of consolidation of all debits and credits, each brokerage house has a final net position (debit or receivable) for cash and each security.

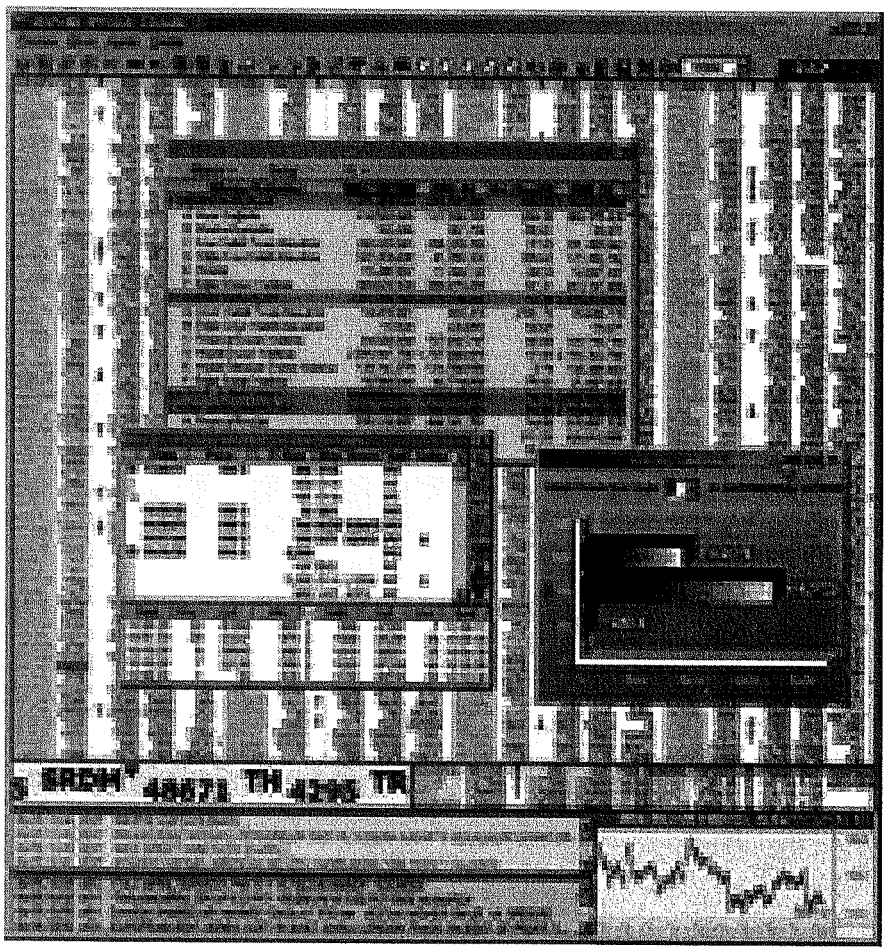


**Figure 9:** Market watch screen on the ISE Stock Market

**Source:** Internet: http://www.bdp.com.tr/file_upload/u_bl_mquote.gif, Stand: June 2002

The "market watch screen" is continuously updated, in line with the recent price changes. Ticker of the stock and the market, the best ask & bid price, maximum & minimum prices, last price and quantity of total transaction can be seen on the screen. As seen from Figure 9 above, price and quantity declines are shown in red, while the increases are identified in blue.

It is also possible to reach trading stocks depth information, which is very important in terms of transparency. By clicking on each stock ticker, it is enabled for the users to reach detailed depth information. In addition to these, financial data regarding stocks, recent stock and political & economic news can also be seen through "market watch screen".

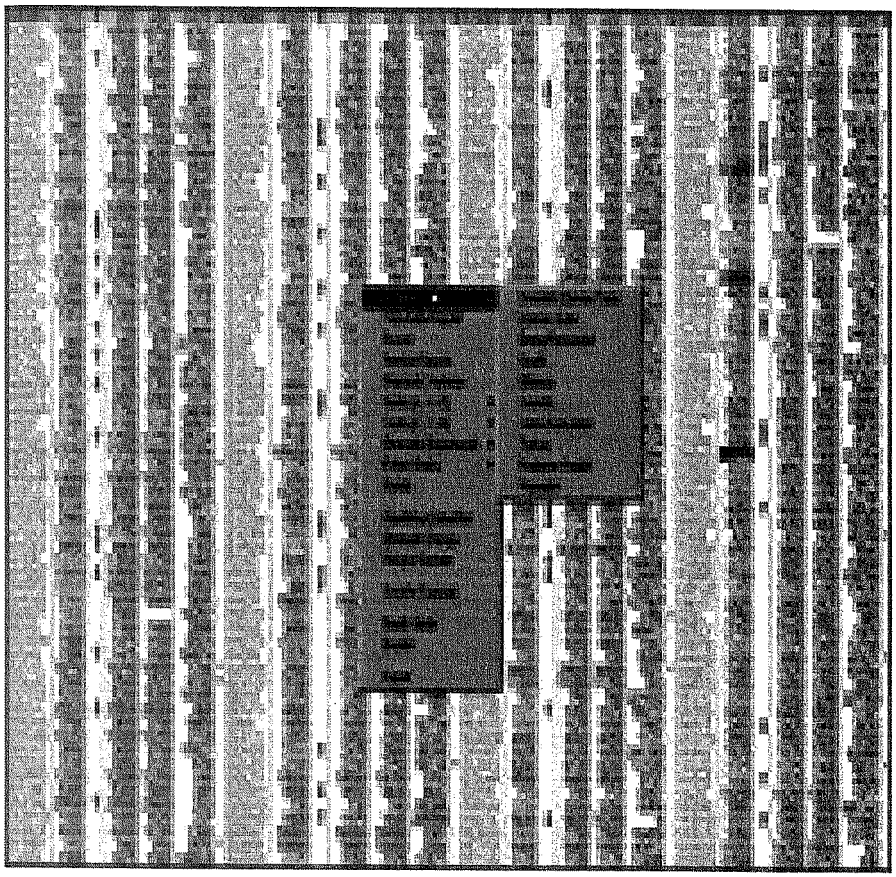


**Figure 10:** Inquiry screens

**Source:** Internet: <http://www.bdp.com.tr/file_upload/u_bl_full.gif>, Stand: June 2002

As seen from Figure 10 above, stock, order and price inquiries can be done through "inquiry screens". Stock inquiry gives detailed information regarding base price, volume margin and weighted average price of related stock. Depth market information and given orders of a stock according to price and time priorities are seen through "order inquiry screen". Additionally, cumulative buy and sale orders in each price level are followed by "price inquiry screen". "Inquiry screens" are seen in the middle of "market watch screen" and the information given is not real - time - based updated.

Besides these main screens, ELIT system consists of many other screens, from which market participants are enabled to follow all the participants' executed transactions of each stock, their own unmatched orders, the market in comparison with the previous trading day and they see their net buy and sale amounts in all stocks.

### C.1.2.2 Order transfer through disc

As a part of "WAN", each session is extended by 30 minutes in the ISE, starting from August 2001. According to the new system, market participants transfer their customer orders, which they have entered during the pre - session period, via disc directly to the system and the matching is carried out during the first 30 minutes of each session.

Order transfer through disc is a very important step in terms of "WAN". Since the orders are loaded into the sytem following the transfer, ELIT is capable of matching them according to the price and time priorities, automatically. Hence, the liquidity and the depth of the market is achieved.

ELIT system, in general, is capable of competing with its counterparts in terms of its technical infrastructure. The continuing tests and updates aim ELİT's compliance with the standards of developed markets. In line with the know – how of the personnel and infrastructure investments, ELIT system could be considered as efficient in terms of serving the needs of the ISE. However, the system is required to be perceived as a whole with the general structure of the market. Hence, it is vital to analyse the trading process.

## C.2 EFFICIENCY ANALYSES IN THE ISE BY CONSIDERING THE EFFICIENT MARKET HYPOTHESIS (EMH)

*An efficient market is the market in which security prices adjust rapidly to the arrival of new information and, therefore, the current prices of securities reflect all information about the security.*[131] In other words, old information cannot be used to predict future price movements; price changes are random and independent. Furthermore, an efficient market cannot be beaten and arbitrage is impossible.

Eugene Fama introduced the Efficient Market Hypothesis (EMH)[132] into the economic literature in the early 70s. According to Fama, sufficient conditions for market efficiency are;

- No transaction costs
- All relevant information is costlessly available to all market participants
- All participants agree on the implications of current information for the current price and distributions of the future price of each security; the current price of a security should "fully reflect" all available information

According to Erdogan (1996), Fama's hypothesis includes two important ideas: first, investors are rational; and second, rational investors trade only on new information, not on intuition. He supports the idea that noise traders[133] do not dominate the market, while accepting that they are necessary for markets to function.[134]

Fama's "efficiency on capital markets" is diversified in three grades;

- **Weak form efficiency:** Market prices rapidly reflect all information contained in the history of past prices. According to weak form efficient market hypothesis (WFEMH), past price movements are random and past price changes cannot be used to achieve abnormal returns. Thus, technical analysis is useless in order to predict future price patterns.
- **Semi-strong form efficiency:** Market prices reflect all publicly available information. New information is quickly reflected in the stock price and investors are not able to earn extra -

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[131] Reilly / Brown, Investment Analysis and Portfolio Management (New York, 2003) p: 212.

[132] For details, see, Fama (1970) p: 383 - 417.

[133] Noise traders are investors, who trade with the lack of company – related (fundamental) data.

[134] Erdogan, Comparable Approach to "The Theory of Efficient Markets" (Ankara, 1996) p: 21.

ordinary returns by trading after the announcement date. Therefore, fundamental analysis is useless to predict future price movements.

- **Strong form efficiency:** Market prices rapidly reflect all information including insight. In line with the strong form efficient market hypothesis (SFEMH), all prices would always be fairly priced and no investor would be able to make accurate forecasts of future price changes.

As it can be understood from the definition of strong form efficiency, it is impossible to find a strong efficient market. Even though it is the aim of all markets to provide all relevant information dissemination on equal basis among market participants without transaction costs, current conditions indicate that it is enabled for market participants to earn abnormal profits on different levels by taking the advantage of information. The focus of this section is planned to be the efficiency analysis in the ISE based on WFEMH. Relevant tests will be made in order to clarify the efficiency level in the ISE.

### C.2.1 Weak form of efficiency Analyses in the ISE: Tests and Results

WFEMH states in general that future returns are not dependent on past returns. Prices react to new information and since information flow is random, also stock prices change randomly.[135] Based on this point, Random Walk Hypothesis (RWH) is put forward. RWH states that market prices follow a random path up and down, making it impossible to predict with any accuracy which direction the market will move at any point. Furthermore, it is impossible to outperform the market without assuming additional risk.

#### C.2.1.1 Data and Methodology

Adjusted daily share prices and adjusted **daily** returns of ISE - 30 Index[136] shares are used in the analyses. Seven companies, marked with yellow, are evaluated according to adjusted **weekly** prices and returns, in order to compare the impacts of the analyses with different time intervals. Different quotation periods are also taken into account to analyse the quotation impact on prices. Time interval is set as 01 / 1989 – 08 / 2002.

In order to analyse the weak form efficiency based on RWH in the ISE, statistical tests of independence btw rates of return and a comparison of risk & return results for trading rules are

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[135] Fama, "Efficient Capital Markets:II," The Journal of Finance 1991 Vol:46 Issue: 5: p: 1575 - 1617.

[136] 3Q02 ISE - 30 Index composition is considered.

carried out. Statistical tests of independence consists of autocorrelation tests and runs tests, whereas test of trading rules includes filter rule trading.

#### C.2.1.2 Statistical tests of independence

There are two major statistical tests, in order to verify the independence of price movements on a weakly efficient market.

##### C.2.1.2.1 Autocorrelation tests

Autocorrelation tests measure the significance of positive or negative correlation in returns over time. The focus of the examination is to determine whether the rate of return of the ISE - 30 Index shares on day t correlate with the return on day t-1, t-2, t-3 or t-4 ...and t-10. In order to determine the significance, serial correlation is tested. Thus, daily price changes are calculated and time series based on price changes are obtained. Daily price changes are calculated as:

$$\Delta P_t = P_t - P_{t-k}$$

Autocorrelation analysis is made to the time series based on price changes and serial correlation coefficients are calculated by "Pearson Correlation Coefficient" as follows:

$$r_k = \frac{\sum (X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum (X_i - \overline{X})^2 (Y_i - \overline{Y})^2}}$$

whereas;

$$-1 \leq r_k \leq +1$$

As seen above, correlation coefficient varies btw –1 and +1. 1 indicates that there is a significant correlation between two series (positive or negative), wheras 0 indicates that there is no correlation. Therefore, results close to 1 show that there is strong correlation and results close to 0 show that correlation is getting weak. Number of observations (lags) minimizes the standard deviation in analysis.

As seen from the Appendix 1 and Appendix 2, all the values (Lag1, Lag 2,... Lag 10) are different than zero. There are no negative values and values are close to 1. Out of all values, maximum positive correlation is seen as 0.998962 (company: Enka) and minimum positive correlation is seen as 0.936736 (company: Turkcell) both in Lag 1. Turkcell, quoted on 07 / 2000, has a significant impact on statistics. Company's latest quotation in the ISE makes it difficult to compare with the other time intervals. On the other hand, it is taken essential to consider Turkcell as one of the most volatile companies with high trading volume. The significant impact of Turkcell is seen

clearly from the Appendix 2, especially in kurtosis and skewness calculations. Even though the distribution of data indicates a flat path, addition of Turkcell leads to a peak distribution. Skewness, the degree of asymmetry of the distribution around its mean, is also affected by Turkcell, in terms of extending towards more negative values.

It is possible to make some assumptions considering the Appendix 1;

- Closer to t, more significant is the correlation. As seen, Lag 1 has the strongest correlation.
- Weekly data is more volatile compared to daily data.
- Volatilitity is affected by quotation period. Lately quoted shares are more volatile.

In order to test the significance of correlation coefficients, t - test technique is applied. The hypothesis is;

H0: There is a random walk among series and values are independent;

H1: There is no random walk among series and seasonalities play a major role

$H0: r = 0$

$H1: r \neq 0$

$$S_r = \sqrt{\frac{1-(r)^2}{n-2}}$$

$$t = \frac{r}{S_r}$$

where r represents correlation coefficient,

$S_r$ represents standard deviation,

n-2 represents degree of freedom

t represents t value

| The Distribution of Correlation Values at 5% Level (P=1.96) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lag1 | Lag2 | Lag3 | Lag4 | Lag5 | Lag6 | Lag7 | Lag8 | Lag9 | Lag10 |
| H0 Accepted | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H1 Accepted | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

| The Distribution of Correlation Values at 1% Level (P=2.58) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lag1 | Lag2 | Lag3 | Lag4 | Lag5 | Lag6 | Lag7 | Lag8 | Lag9 | Lag10 |
| H0 Accepted | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H1 Accepted | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

**Table 7:** The distribution statistics

T – test analysis shows that all the correlation coefficients at all lags are different than zero. In other words, statistically it is significant and important to accept the H1 hypothesis. Therefore, it can concretely be said that there is a very strong relation among past price movements.

**Result of Autocorrelation tests in the ISE**

WFEMH states that future returns are not dependent on past returns. Prices react to new information; information flow is random and also stock prices change randomly. In other words, past price movements do not reflect the price pattern of future prices. Moving from this point, serial correlation is calculated for ISE - 30 Index shares quoted in the ISE for Lag 1, 2,....10 between 01 / 1989 – 08 / 2002 time interval. The results indicate that correlation coefficients are different than zero and close to one, which means that there is a significant correlation btw movements of prices. In other words, stock prices do not change randomly. Thus, an investor could beat the market by technical analysis based on past price pattern of shares. As a result, **according to autocorrelation tests, weak form of efficient market hypothesis is rejected in the ISE.**

#### C.2.1.2.2 Runs Tests

The second statistical test of independence is the runs test. A runs test can be performed to determine, if regular trends occur in price changes. Given a series of price changes, each price change is designated either a plus (+) if it is an increase or a minus (-) if it is a decrease. A run occurs when two consecutive changes are the same: two or more consecutive positive or negative price changes constitute one run. When the price changes in a different direction, a new run may begin. To test for independence, the actual number of runs for a given series will be compared to the expected number of runs. Number of expected runs is calculated by;

$$\mu_R = \frac{\left[ N(N+1) - \sum_{i=1}^{3} n_i^2 \right]}{N}$$

where $n_i$ represents the number of signs ("+", "-", "0") in price differences and N represents the number of price differences in a given time series.

If;

**H0: Actual runs – Expected Runs=0** → price movements are said to be independent and they occur randomly,

**H1: Actual runs – Expected Runs ≠ 0** → price movements are said to be strongly correlated.

In order to test the significance of the difference between actual runs and expected runs in terms of statistics, t test technique is applied and t values are checked both in 1% and 5% levels. The hypothesis of t – test is;

$$H0: F_R - \mu_R = 0$$
$$H1: F_R - \mu_R \neq 0$$

Standard deviation and t value are calculated as;

$$\sigma_r = \sqrt{\frac{\sum_{i=1}^{3} n_i^2 \left( \sum_{i=1}^{3} n_i^2 + N(N+1) \right) - 2N \sum_{i=1}^{3} n_i^3 - N^3}{N^2(N-1)}}$$

$$t = \frac{(F_R - \mu_R) + 1/2}{\sigma_R}$$

As seen from the Appendix 4: , actual runs are smaller than expected runs for all companies. The average of actual runs is 441, whereas expected runs' average is 1858. There is a significant difference between actual and expected runs. The greatest difference is seen in Eregli Demir Celik with –2461 and the smallest difference is analyzed in Turkcell with –69. In order to minimize the effects of N (the differences due to different quotation periods of companies between 01 / 89 – 08 / 2002 period), Appendix 5: is arranged considering the quotation periods of companies close to each other.

Since there is a huge difference btw actual and expected runs, it is also reflected to t values (see, Appendix 6: ). Negative t values also indicate that actual runs are less than expected runs and there could be a relation btw time series. High t values indicate that the results are statistically significant both in 1% (2.58) and 5% (1.96) levels. Therefore, H1 hypothesis is accepted and it can be said that there is a strong relation btw price movements.

**Result of Runs tests in the ISE**

It is found that expected runs are greater than actual runs for 30 companies quoted in the ISE - 30 Index between 01 / 1989 – 08 / 2002 period. Since, actual runs – expected Runs ≠ 0 price movements are said to be strongly correlated according to runs tests. As a result, **runs tests reject weak form of efficient market hypothesis in the ISE.**

Autocorrelation and runs tests support each other and they both reject WFEMH in the ISE. Therefore, an investor could beat the market by using technical analysis.

### C.2.1.3 Tests of Trading Rules

Tests of independence examines the degree of correlation between stock prices over time. On the other hand, tests of trading rules, - the second group of tests for the WFEMH is developed in response to technical analysts' not accepting a set number of positive or negative price changes as a signal of a move to a new equilibrium on the market. Hence, analysts examined alternative technical trading rules through simulation. Trading rules are rules based on stock prices, which indicate when to buy or sell a stock. The trading rule studies compare the risk & return results derived from a simulation with the results from a simple buy & hold policy.

The most popular trading rule technique is filter rule trading and a filter rule test application in the ISE is given below.

#### C.2.1.3.1 Filter Rule Trading

*Filter rule is a technical trading rule, in which an investor buys and sells stocks, if their price movement reverses direction by a minimally acceptable percentage.*[137] In other words, an investor should buy a stock if the price rises from a base price by the filter percentage, and sell it if it falls from a subsequent peak by the same filter percentage. Filter rule is supposed to permit investors to participate in a security's major price trends without being misled by small fluctuations.[138]

Filter rule is applied to closure prices of shares quoted in the ISE - 30 Index.[139] Filter technique is based on past prices and applied as;

> **Share is bought if the price rises from a base price by the filter percentage, and sold if it falls from a subsequent peak by the same filter percentage.**

Since maximum and minimum margin is limited with 10% in the ISE, filters used in the analysis vary between 0.5% - 10%. In order to reach to a conclusion, whether if it's possible to earn abnormal return or not, filter efficiency is compared with buy & hold strategy. The efficiency in buy &hold strategy is calculated as;

$$r_{B/H} = \frac{LASTPRICEOFINVESTMENT}{INITIALPRICEOFINVESTMENT} - 1$$

The efficiency on filter trading is calculated as;

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[137] Fama / Blume, "Filter Rules and Stock – Market Trading," The Journal of Business 1966 Vol: 39: p: 226 –241.

[138] Cf. Scott, Wall Street Words: An Essential A to Z Guide for Today's Investor (Boston: 2003)

[139] Brokerage commissions are neglected.

$$r_F = \frac{SALEPRICE - BASEPRICE}{BASEPRICE}$$

where, base price represents the price when the share is bought and it is base price until the share is sold. As seen from the formula, the percentage difference between the selling price and base price represents the efficiency of filter trading.

Hypothesis and formulas given below are used in t test analysis, in order to test the significance of the difference btw filter rule and buy & hold strategy;

$$H0: \overline{X}_1 - \overline{X}_2 = 0$$
$$H1: \overline{X}_1 - \overline{X}_2 \neq 0$$

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sigma_{\overline{X}_1 - \overline{X}_2}}$$

$$\sigma_{\overline{x}_1 - \overline{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

Appendix 9: shows that buy & hold strategy is much more efficient than filter trading in most cases by considering 08 - 1989 / 2002 period. However, recently quoted companies such as Akenerji, Anadolu Efes and Turkcell exhibit higher efficiencies in filter trading. It should be once more mentioned that; the shorter the quotation period, the more volatile the prices. The recessive character of filter strategy is seen with 4% - 13% (based on daily data of 23 companies) 14% (based on weekly data of 7 companies) btw 0.5% - 5% filter levels and 17% (based on daily data of 23 companies) 0% - 29% (based on weekly data of 7 companies) btw 5.5% - 10% levels. The volatility of companies with shorter quotation periods affects the result. Here, time has a major impact on efficiency. Since last quoted companies affect the consequence, in order to reach to a healthy conclusion, analysis should be widened by considering different time intervals. Therefore, time interval is limited with 01/2000 – 07/2002 and companies' closure prices are taken into account, according to the limited period. Hence, time effect is tried to be minimized.

The results (see, Appendix 10: and Appendix 11: ) of the limited time interval are significantly different from the previous analysis. Efficiency level of filter strategy for 0.5% – 10% filters vary btw 61% - 96% (based on daily data of 23 companies) and 86% - 100% (based on weekly data of 7

companies). Since time interval is shorter, volatility increases and mechanical rules work out in order to obtain abnormal return. It should be underlined that filter strategy is dominant in higher filter levels (around 90%, compared to 65% 70% in lower filter percentages). Even though risk increases, volatility supports mechanical rule trading. This is to be considered as one of the most significant characteristics of emerging markets.

T analysis indicates that H0 analysis is accepted at 1% in all filter levels on daily basis. In other words, the difference btw efficiencies is statistically rejected and found insignificant. On the other hand, H1 analyis is accepted both in 5% and 10% levels. Therefore, the difference btw efficiencies are statistically significant in 5% and 10 % levels on daily basis. On weekly basis, the analysis rejected H1 in 1% and 5% levels and the result found insignificant, whereas in 10% level the difference in efficiencies is found significant.

| Hypothesis | | 0.5%F | 1%F | 1.5%F | 2%F | 2.5%F | 3%F | 3.5%F |
|---|---|---|---|---|---|---|---|---|
| H0= The difference between means is equal zero. | | | | | | | | |
| H1= The difference between means is not equal to zero. | | | | | | | | |
| Calculated t value (daily) | | 2.30664 | 2.30663 | 2.30652 | 2.30646 | 2.30672 | 2.30663 | 2.30653 |
| 1% critical value | 2.58 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 5%: critical value | 1.96 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |
| 10% critical value | 1.65 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |
| Calculated t value (weekly) | | 1.73639 | 1.73639 | 1.73649 | 1.73630 | 1.73597 | 1.73582 | 1.73597 |
| 1% critical value | 2.58 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 5%: critical value | 1.96 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 10% critical value | 1.65 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |

| Hypothesis | | 4%F | 4.5%F | 5%F | 5.5%F | 6%F | 6.5%F | 7%F |
|---|---|---|---|---|---|---|---|---|
| H0= The difference between means is equal zero. | | | | | | | | |
| H1= The difference between means is not equal to zero. | | | | | | | | |
| Calculated t value (daily) | | 2.30791 | 2.30778 | 2.30758 | 2.30750 | 2.30733 | 2.30735 | 2.30742 |
| 1% critical value | 2.58 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 5%: critical value | 1.96 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |
| 10% critical value | 1.65 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |
| Calculated t value (weekly) | | 1.73605 | 1.73622 | 1.73607 | 1.73625 | 1.73599 | 1.73640 | 1.73643 |
| 1% critical value | 2.58 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 5%: critical value | 1.96 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 10% critical value | 1.65 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |

| Hypothesis | | 7.5%F | 8%F | 8.5%F | 9%F | 9.5%F | 10%F |
|---|---|---|---|---|---|---|---|
| H0= The difference between means is equal zero. | | | | | | | |
| H1= The difference between means is not equal to zero. | | | | | | | |
| Calculated t value (daily) | | 2.30810 | 2.30794 | 2.30779 | 2.30771 | 2.30765 | 2.30772 |
| 1% critical value | 2.58 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 5%: critical value | 1.96 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |
| 10% critical value | 1.65 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |
| Calculated t value (weekly) | | 1.73655 | 1.73667 | 1.73653 | 1.73672 | 1.73654 | 1.73674 |
| 1% critical value | 2.58 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 5%: critical value | 1.96 | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. | H0 ACC. |
| 10% critical value | 1.65 | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. | H1 ACC. |

**Results of Filter Trading tests in the ISE**

Filter trading tests based on different time intervals indicate two different results. According to the first analysis **based on 01 / 1989 – 08 / 2002 time interval, mechanical rules do not work in order to obtain abnormal return. In other words, buy & hold strategy is supported and therefore WFEMH exist.** Since ISE is an emerging market with volatile character, it is taken important to widen the analysis by considering shorter time interval to be able to reach to a healthy conclusion. Thus, second analysis is done with **01 / 2000 – 08 / 2002 time interval**. The consequence of the second analysis significantly differs from the previous one. In this case, **filter trading is dominant compared to buy & hold strategy. Since the period is shorter, volatility increases and mechanical rules are supported. Investors are able to get extra returns by applying some rules on specific shares. Therefore, WFEMH is rejected.**

Two different conclusions are found at the end of filter trading tests in the ISE, due to market's volatile character based on different time intervals. Even though longer time interval supports WFEMH, it is not sufficient to accept the hypothesis. Market is not determined in applying WFEMH and the inconsistent character of the market is seen clearly with the second analysis based on shorter time interval. Therefore, **investors are enabled to obtain abnormal returns from specific shares especially in short and medium time intervals however, market has a tendency in accepting WFEMH for long – term - based investments.**

### C.2.1.4 The Evaluation of Tests

Based on the results of serial autocorrelation tests and runs tests, WFEMH in the ISE is rejected. In other words, ISE is not even weakly efficient.[140] However, filter - trading tests indicated two different results due to different time intervals. WFEMH is accepted for long - term – based investments by showing that buy & holds strategy is much more efficient than mechanical rules. On the other hand, the results also indicated that the ISE is suitable for mechanical rules in order to obtain abnormal returns for short and medium term – based investments. Therefore, the ISE could be considered as promising in terms of weak efficiency for long - term – based investments and opened for abnormal returns by applying mechanical rules for short and mid term – based

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[140] There are several studies regarding the efficiency in the ISE. See, for example, Kondak (Ankara, 1997), in her book "The Efficient Market Hypothesis revisited: Some Evidence from the Istanbul Stock Exchange,"and Kiyilar (Ankara, 1997), in his book "Efficient Market Hypothesis and its Consideration in the ISE" used conventional tests for efficiency and they found that the companies in the ISE are not efficiently priced in the weak – form. Köse (1993), "Filter Rule Test," Journal of Istanbul University Business Administration Faculty Vol: 22 Issue: 2: p: 105 – 127, applied filter rule test to 45 quoted companies in 1990 – 1991 period. He came to a conclusion that it is possible to obtain abnormal returns by applying mechanical rules and therefore WFEMH does not exist in the ISE. Öncel (1993), "Filter Rule and Trading in the ISE" – Unpublished MBA Thesis, Bogazici University, 1993 - concluded that it is possible for an investor to earn more than the buy and hold policy for certain securities using several filter sizes. However, he also stated that this conclusion cannot be generalized for the whole market. Balaban (1995), "Informational Efficiency of the ISE and Some Rationale for Public Regulation," The Central Bank of Turkey Discussion Paper No: 9502 1995, found that the ISE is neither weak – form nor semi – strong form efficient. Alparslan (1989), "Tests of Weak Form Efficiency in Istanbul Stock Exchange" - Unpublished MBA Thesis, Bilkent University, 1989 - also applied autocorrelation, run and filter tests in his study. Even though run and autocorrelation tests accepted the WFEMH, the results of filter tests rejected. Özün (1999), "Kaos Theory (...)," ISE Journal Vol: 9 (Jan – Mar): p: 41 -71, analysed weak form efficiency in 1987 – 1998 time span and found that the ISE is weak form efficient excluding 1995 and 1996. Buguk / Brorsen (2003), "Testing Weak – Form Market Efficiency," International Review of Financial Analysis Vol: 12: p: 579 – 590, tested random – walk hypothesis for ISE's composite, industrial and financial index prices by using different tests. They stated that tests largely cannot reject random – walk hypothesis. Şengül / Önkal (1992), "Semi – Strong Form Efficiency on the ISE Stock Market," METU Development Journal Vol: 19 Issue: 2: p: 197 – 207, analysed semi – strong form of efficiency in the ISE btw 1986 – 1991 by considering financial and monetary variables. They came to a conclusing that the ISE is not efficient in terms of semi – strong efficiency. Zengin / Kurt (2004), "Econometric Analysis of ISE's Weak and Semi – Strong Form Efficiency," Öneri Journal Vol: 6, Issue: 21, p: 145 – 152, used different tests to analyse both weak and semi – strong form of efficiency in the ISE. They found that the ISE is efficient in terms of WFEMH however, it is not efficient according to SSFEMH.

investments, due to market's volatile character. These mixed findings also indicate that the market does not have a stabile character and is opened for speculative returns. However, the market is capable of approaching to weak form of efficiency and needs to be supported by long – term - based investments and corporate investors.

## C.3 Anomalies[141] in the ISE[142]

Anomalies could be considered as an important factor in explaining the deviation from the Efficient Market Hypothesis. Anomalies could also be considered as an important part of weak – form – efficient market hypothesis. In this section seasonality, regularities & trends, as an important part of stock market anomalies in the ISE, are aimed to be analysed.

### C.3.1 Day - of - the - week effect

One of the most significant anomalies is considered to be the days – of – the - week effect. *This effect states that, expected return or standardized return is not the same for all weekdays[143].* Numerous studies indicates that average stock returns are negative on Mondays and abnormally positive on Fridays in many countries around the world. However, an important part of empirical studies regarding especially Australia, Japan, Canada and the UK showed that Tuesday returns are said to be the lowest. Thus, day – of – the - week effect differs from one country to the other in particular in terms of negative returns.[144]

The data set, used in order to analyse the day - of - the - week effects on stock returns in the ISE, consists of daily closures of the ISE – 100 Index from January 1989 to December 2001. It is aimed to test the equality of mean changes in stock returns among all the days of the week. If there is a strong seasonality in stock returns among the days of the week, it means that the WFEMF is rejected.

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[141] In order to get informed regarding the attacks on the EMH especially in terms of anomalies, see, for example, Malkiel, "The Efficient Market Hypothesis and Its Critics," Journal of Economic Perspectives Vol:17 No:1 Winter 2003: p: 59 – 82.

[142] Bildik, Seasonalities on Stock Markets and an empirical study in the ISE (Istanbul: 2000) is considered as the main source.

[143] Hansen / Lunde, "Testing the Significance of Calendar Effects" Working Paper, Brown University Department of Economics, 2003/3: p: 4.

[144] Bildik, (Istanbul: 2000) p: 17 – 18.

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|---|
| 1989 | 425% | 419% | 426% | 456% | 478% |
| 1990 | 20% | 22% | 22% | 28% | 33% |
| 1991 | 31% | 33% | 39% | 34% | 20% |
| 1992 | -11% | -11% | -14% | -7% | -7% |
| 1993 | 381% | 380% | 372% | 391% | 400% |
| 1994 | 27% | 21% | 24% | 21% | 15% |
| 1995 | 57% | 59% | 54% | 45% | 49% |
| 1996 | 136% | 142% | 143% | 145% | 142% |
| 1997 | 216% | 216% | 202% | 209% | 208% |
| 1998 | -30% | -29% | -31% | -28% | -27% |
| 1999 | 471% | 439% | 371% | 386% | 429% |
| 2000 | -50% | -47% | -46% | -43% | -40% |
| 2001 | 20% | 36% | 43% | 33% | 38% |
| Average | 130% | 129% | 123% | 129% | 134% |

**Table 8:** Annual returns in the ISE

Table 8 indicates Friday as the highest return day of the week, whereas Wednesday is seen as the lowest on **annual basis** by considering the average btw 1989 – 2001 time span. Furthermore, according to **cumulative daily return**, Friday has highest as 359435% whereas, Tuesday is the lowest with 332866%. However, as seen from Table 9, Friday is the most volatile day – of – the – week on daily basis.

| 1989 - 2001 | 10 highest | | 10 lowest | |
|---|---|---|---|---|
| | Number of days | % | Number of days | % |
| Monday | 1 | 10% | 0 | 0% |
| Tuesday | 2 | 20% | 2 | 20% |
| Wednesday | 1 | 10% | 1 | 10% |
| Thursday | 3 | 30% | 1 | 10% |
| Friday | 3 | 30% | 6 | 60% |
| Total | 10 | 100% | 10 | 100% |

**Table 9:** Distribution of highest and lowest daily returns

| | Pos.Return | % | Neg.Return | % |
|---|---|---|---|---|
| Monday | 315 | 47% | 352 | 53% |
| Tuesday | 247 | 37% | 428 | 63% |
| Wednesday | 359 | 53% | 320 | 47% |
| Thursday | 374 | 55% | 308 | 45% |
| Friday | 319 | 48% | 351 | 52% |

**Table 10:**Positive / Negative distribution of daily returns among days

In line with its volatile character, 60% of lowest returns and 30% of highest returns are realized on Friday, which has an enormous impact on standard deviation. On the other hand, Thursday's and Wednesday's possibility of creating positive return is higher than the other days of the week with 55% and 53%, respectively. Tuesday has the highest possibility of creating negative return among the other days of the week with 63%. In other words, it is significant that high and positive returns

are achieved over the second part of the week whereas, low and negative returns seem to be realised over the first part of the week.

| Returns % | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|---|
| Mean | 0,00064 | 0,00438 | 0,00469 | 0,00522 | 0,00041 |
| Median | -0,00023 | 0,00333 | 0,00263 | 0,00350 | -0,00055 |
| Maximum | 0,19451 | 0,18641 | 0,11608 | 0,16940 | 0,13107 |
| Minimum | -0,10384 | -0,18109 | -0,13146 | -0,11347 | -0,14617 |
| Std.Dev. | 0,03053 | 0,03270 | 0,03131 | 0,02933 | 0,03791 |
| Skewness | 0,42858 | -0,01258 | -0,11600 | 0,55720 | 0,06963 |
| Kurtosis | 3,27483 | 4,04197 | 1,31556 | 3,40883 | 1,11259 |
| Observations | 637 | 649 | 648 | 652 | 640 |

**Table 11:** Descriptive Statistics of Daily Stock Returns in the ISE in 1989 – 2001 time span

According to **daily average** returns shown in Table 11, Thursday is the highest whereas, Friday is the lowest. The high degree of Friday's standard deviation is the main reason of the lowest daily average returns. Most of the return of the week is generated from Tuesday to Thursday. Wednesday produces the second highest return of the week whereas, Monday is the second lowest. The volatility of the returns in terms of standard deviation across the week is the highest on Friday and the lowest at Thursday. When the **daily average** returns are compared by considering the risk levels for the days of the week according to the "mean return / standard deviation" ratio, it has been observed that, Thursday generates higher average return periods (18%) than any other weekday in all periods at the same risk level.

These evidences indicate that **the - day - of - the - week effect exists in the ISE and WFEMH is rejected**. On annual and cumulative daily return basis, Friday is the highest return day of the week whereas, Wednesday and Tuesday are the lowest, respectively. However, Friday is the lowest return day of the week on daily average return basis, due to high standard deviation. Thursday seems to be the highest return day of the week, by considering daily average returns. Thursday is followed by Wednesday and Tuesday, relatively. In other words, Tuesday – Thursday period generate higher average returns than Friday and Monday.[145]

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[145] It is important to mention that ISE has 2 trading sessions, which is rarely seen in stock exchanges worldwide. As stated in Cheung, et al., "Intraday Stock Return Volatility: The Hong Kong Evidence," Pasific – Basin Finance Journal Vol: 2 Issues: 2 – 3 May 1994: p: 261 – 276, it is possible to see some unusual behaviours of returns in the markets with two trading sessions. Besides studies considering the daily closures, there are also some specific studies regarding the trading session effect in the ISE. For example, see, Gokce / Sarioglu, "Trading Session Effect," Multinational Finance Society (MFS) Submitted Paper, MFC – 165. The authors analysed the trading session effect in the ISE and found that there is a trading session effect for ISE 100 Index for the period January 1995 – September

### C.3.2 Month - of – the – year effect

Month - of - the - year effect shows the returns on monthly basis. Previous findings in the literature have shown that January effect exists in the ISE.

The data set, used in order to analyse the month - of - the - year effects on stock returns in the ISE, consists of daily closures of the ISE – 100 Index from January 1989 to December 2001. It is aimed to test the equality of mean changes in stock returns among all the months of the year. If there is a strong seasonality in stock returns among the months of the year, it means that the WFEMF is rejected.

| turns% | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ean | 0.0070 | 0.0033 | 0.0013 | 0.0052 | 0.0005 | 0.0049 | 0.0009 | -0.0014 | 0.0031 | 0.0017 | 0.0034 | 0.0074 |
| edian | 0.0045 | 0.0031 | 0.0002 | 0.0032 | -0.0016 | 0.0033 | -0.0006 | -0.0009 | 0.0043 | -0.0012 | 0.0034 | 0.0048 |
| aximum | 0.1311 | 0.1123 | 0.1205 | 0.1353 | 0.0802 | 0.1047 | 0.0959 | 0.0922 | 0.1694 | 0.1100 | 0.1032 | 0.1945 |
| inimum | -1.1754 | -0.1811 | -1.6638 | -0.1045 | -0.0825 | -0.0640 | -0.0901 | -2.9143 | -2.0165 | -1.2478 | -0.1470 | -0.3781 |
| d.Dev. | 0.0815 | 1.4336 | 0.1055 | 0.0788 | 0.0892 | 0.0607 | 0.3307 | 0.1787 | 0.1253 | 0.0817 | 0.0410 | 0.0438 |
| kewness | -11.3719 | 15.9808 | -14.5403 | 11.7812 | 13.8472 | 12.1312 | 16.5621 | -15.8697 | -15.1064 | -13.0660 | 1.8693 | -1.8340 |
| urtosis | 164.6054 | 255.5882 | 229.2554 | 167.3346 | 214.3895 | 179.0550 | 276.1740 | 258.6105 | 243.4309 | 199.5577 | 16.5282 | 23.5368 |
| bservations | 267 | 255 | 269 | 244 | 268 | 269 | 279 | 272 | 276 | 272 | 280 | 272 |

**Table 12:** Distribution of daily returns on monthly basis

2003. According to their analyses, highest returns are achieved during the 1. session of Thursday and 2. session of Friday, respectively. Furthermore; Ozmen, "Anomalies Seen in World Exchanges and a trial over ISE," (Ankara, 1997) also studied the anomalies in the ISE for the period January 1988 – June 1996 and found that all the first trading sessions of the days of the week provide positive returns and the lowest return is realized on Monday 2. session, whereas he highest one on Thursday 1. session.

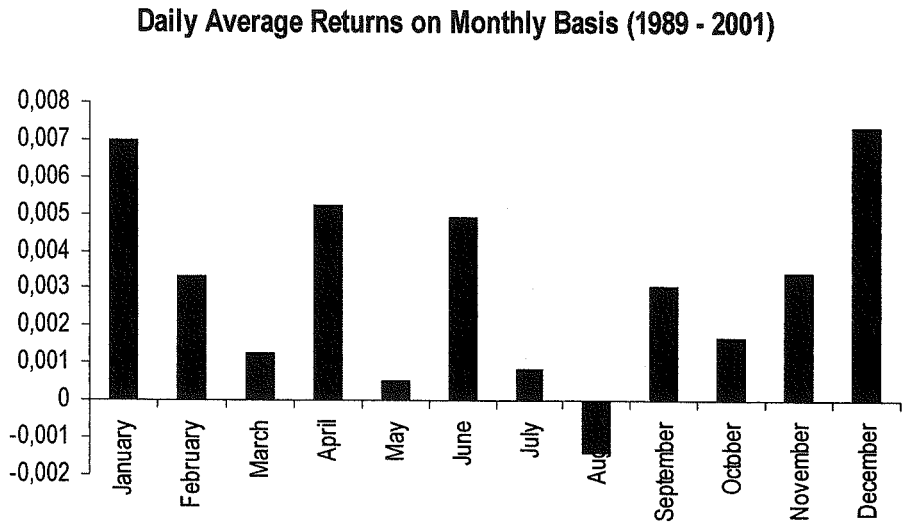



**Figure 11:** Distribution of daily returns on monthly basis

Average stock return in December (0.0074) is the highest among the other months of the year. However, December is closely followed by January (0.0070). In terms of median returns, the ranking is the same; December and January are followed by September and November. August is the only month of the year with negative return. Standard deviation, in other words, risk, is at its peak levels in February. It is also observed from the Figure 11 that, peaks are followed by price corrections.

In order to test the January effect[146] in the ISE, the analysis is widened. Since empirical findings[147] suggest that most of January returns are achieved during the first 5 trading days of the month, average returns in the first 1, 5 and 10 trading days in January are calculated and compared with other time intervals.

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[146] According to Haugen / Jorion, "The January Effect," Financial Analysts Journal Vol: 52 Jan - Feb 1996: p: 27 – 31, January effect is the best – known example of anomalous behaviour in security markets throughout the world. Price increase in January are tried to be explained by various factors, such as tax – loss selling hypothesis, size – effect, risk – return trade off and new information provided by firms. For details, see, Fountas / Segredakis, "Emerging Stock Markets Return Seasonalities," Applied Financial Economics 1 April 2002 Vol: 12 No: 4: p: 291 – 299.

[147] For details, see, Keim, "Size – Related Anomalies and Stock Return Seasonality," Journal of Financial Economics Vol: 12 1983: p: 13 – 32 and Reinganum, "The Anomalous Stock Market Behaviour of Small Firms in January," Journal of Financial Economics 1983 Vol: 12: p: 89 - 104.

| uary Effect | Non-January trading days | First 10 trading days in January | First 5 trading days in January | First trading day in January |
|---|---|---|---|---|
| an | 0.3% | 1.08% | 1.09% | 1.3% |
| dian | 0.0016 | 0.0077 | 0.0078 | 0.0236 |
| ndard deviation | 0.0320 | 0.0370 | 0.0349 | 0.0281 |
| imum | -0.1811 | -0.1080 | -0.1080 | -0.0348 |
| imum | 0.1945 | 0.1161 | 0.1161 | 0.0490 |
| servations | 2956 | 120 | 65 | 13 |

| | Days excluding the first 5 trading days of January | Days excluding the first 10 trading days of January | January exluding the first 10 trading days |
|---|---|---|---|
| an | 0.00292 | 0.00279 | 0.00392 |
| dian | 0.00177 | 0.00168 | 0.00294 |
| ndard deviation | 0.03248 | 0.03233 | 0.03822 |

**Table 13:** Returns realized in January among 1989 – 2001 time span

Average return in the first 1, 5 and 10 trading days of January is significantly higher than other months of the year. The highest return is generated in the first trading day of January with 1.3%. Return of the first 5 and 10 trading days in January are higher than non – January trading days. As seen from Table 13, the return is mostly generated in the first 10 trading days of January.

Month - of - the - year analyses indicated that, December and January are said to be the months with highest average returns in the ISE however, January effect has a major impact. Most of the return is generated in the first 10 trading days of January and it can be said that **there is a consistent path in terms of January effect in the ISE therefore, WFEMH is rejected.**[148]

[148] In line with our evidences, cf. Bildik (2000) also found out that there are seasonalities in the ISE. He considered the daily closing values of the ISE – 100 Index from January 1988 to January 1999 and found significant evidence that shows the day – of – the week effects in stock market with a pattern of low or negative returns over the first part of the week and high and positive returns over the second part of the week. Specifically, Fridays and Thursdays provide higher returns than the other days of the week whereas, Mondays have the lowest returns. He also found that January effect exists in stock returns in the ISE and average return in January is significantly higher than other months of the year. Since our analysis consists of ISE's peaks by the end of 1999 and by the beginning of 2000 whereas, the impacts of the financial crises in 2001; unlike Bildik, we came to a conclusion that Friday is the most volatile day with lowest daily average return. Even though daily cumulative and annual returns indicate that Friday is the highest in 1989 – 2001 period, volatile character of the day (60% of ten lowest days), due to crises, affects the average returns. For other studies regarding anomalies in the ISE, see, for example, Muradoglu / Oktay, "Weak Form of Efficiency on Turkish Stock Market," Journal of Hacettepe University Faculty of Economics and Administrative Sciences 1993 Vol: 11: p: 51 – 62. Kivilcim et al., "Days – of – the – Week Effect in the ISE," ISE Review 1997 (Oct – Dec) Vol: 1 No: 4: p: 15 – 25.

## C.4 EFFICIENCY ANALYSIS OF THE ELEMENTS OF TURKISH CAPITAL MARKET

Capital market consists of five basic components, namely, stock exchange, legal framework, quoted companies, intermediaries and investors. It is important to support the analysis of the ISE by considering the other four major components of Turkish capital market.

### C.4.1 Efficiency analysis of legal framework

#### C.4.1.1 Capital Market Law

The "Capital Market Law" (CML) was enacted in 1981 and following the Law, the main regulatory body responsible for the supervision and regulation of the Turkish securities market, the "Capital Markets Board" (CMB), based in Ankara, was established in 1982. Until this period, general provisions of the Civil Code, Commercial Code, and Obligation Law were valid however; they were not sufficient for the capital market activities.

**The Objectives of CML**

- to provide fair disclosure to persons to whom new issues of corporate securities and securities traded on stock exchanges are offered and sold of the basic business and financial facts necessary for an investor to make and informed decision whether to purchase the securities
- to assure the basic integrity of the Turkish capital markets
- the detection, prevention, and punishment of fraud in the purchase as well as in the sale of securities[149]

According to CML Article 1, the subject of the Law is to regulate and control the secure, transparent and stable functioning of the capital market and to protect the rights and benefits of the investors with the purpose of ensuring an efficient and widespread participation by the public in the economic development by investing their savings in the securities market.

In line with the objectives and the subject of the CML, there has been an extensive amendment in CML in 1999 especially in terms of investor protection. Central Registry Agency (CRA) Inc. was established as a legal entity in 2001 under the provision of the CML. According the the legislation, the mission of CRA is to dematerialize and maintain capital market instruments and rights affixed

[149] Can, "Proxy Rules in the Turkish Capital Law," <http://www.jura.uni-sb.de/turkish/MCan.html>, Stand: 13 / 02 / 2000.

thereon with respect to issuers, intermediary institutions and owner of rights through available electronic records; to chech consistency of actual records maintained by member groups and to manage and represent the Investors' Protection Fund.[150] Investors' Protection Fund was established in 2001 as a legal entity according to CML Articles 46 /A and 46 / B. The mission of the Fund is to cover stock delivery and cash payment obligations arising from stock transactions of intermediary institutions and the banks for which a liquidation or bankruptcy decision is made. The fund also carries out administrative liquidation operations for intermediaries. All intermediaries are required to participate in the Fund by paying annual fees. By the end of 2003, the Fund covered the losses of 1293 investors by paying Euro 3.279.087.[151] Furthermore, the amendment in 1999 consisted of the rearrangement of penalties. Hence, the extension of penalties were widened and fines & imprisonment were updated.

Current Turkish CML, in general, is not completely different from the directives of the EU. However, an extensive work, supported by EU PHARE Project[152], is being executed for a fully compliance, in line with the EU Directives of Free Flow of Services and Free Flow of Capital. It is stated in the National Program that the new CML will be enacted till the end of 2005.

The new CML draft involves legal arrangements regarding publicly – held joint stock corporations, undertakings for collective investments in transferable securities (UCITS), stock exchanges, Investors' Protection Fund and precautionary measures & penalties. In line with the EU compliance, mergers & split – offs, public disclosure obligations and exemptions of publicly – held joint stock corporations are being handled delicately. Terms of establishment is being facilitated for UCITS and exchanges are being enabled to establish as both private or public corporate bodies. Since current implementation of Investors' Protection Fund covers only stock transactions, its extension is being widened by covering all financial instruments and protection limit is being determined as Euro 20.000. Furthermore, insider trading and manipulation are being re-regulated, in line with the alignment of EU Directives. The principal of "economic penalty for economic crime" is being targeted to stand in the forefront. One of the most important novelties of the Turkish CML

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[150] Internet:<http://www.mkk.com.tr/en/missvis.html>, Stand: January 2005

[151] Internet: <http://www.ykf.org.tr/genel/Presentation%20YKF3.pps>, Stand: January 2005

is planned to be the definition and arrangement of "mortgage". Mortgage practices started in Turkey, thanks to the decline in inflation and the consistency in economy. It is seen as a major opportunity for Turkish capital markets to establish an organized market for mortgage bonds and asset – backed securities. Capital Markets Board recently announced that the second hand mortgage market is planned to be supported by international advisory services and the costs will be covered by the international institutions such as WB, IMF and FIRST.[153]

In accordance with the amendment of Turkish CML, legislations regarding "corporate governance" also continue in all areas by considering all the capital market elements. Furthermore, other legislations, such as Decree – by – Law[154] (D – L /91), incorporated into Law in 1983 as the second legal framework for Turkish capital markets, ISE Regulations regulating stock exchange quotation, work regulations, Courtage and discipline rules, communiqués, circulars and Decrees of both Council of Ministers and Ministries, are required to be renewed, in line with the EU alignment procedure.

Since legal framework targets to increase efficiency on Turkish capital markets, EU alignment procedure is expected to fill the gaps. Besides the Action Plan regarding the alignment, it might also be taken into account to enact a Stock Exchange Law, other than the CML in the recent future.

### C.4.2 Efficiency analysis of companies

IMF – backed economic program of Turkey aims healthy growth and development in Turkish economy. Since companies are the backbones in economic development, they should adjust themselves to new technologies by increasing their capacities and applying better quality norms.

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[152] The Phare Program is one of the three pre – accession instruments financed by the EU to assist the applicant countries of Central and Eastern Europe in their preparations for joining the EU. Source: http://europa.eu.int/comm/enlargement/pas/phare/, Stand: January 2005

[153] Internet: <http://www.spk.gov.tr/HaberDuyuru/konferans/konusmametni_08112004.html>, Stand: January 2005

[154] A decree – by - Law has the force of a Law. The difference is that, other decrees are not authorized to chnage or abolish the prevailing legal provisions however, a decree – by – Law has this authority through a legal framework. The Council of Ministers are entitled to enact D – Ls. D – L must be approved by the President. Following the publication in the official gazette, D – L comes into force as Law. D – L is submitted to the Parliament for negotiations, following the publication. The Parliament is authorized to change or abolish the D – L. After the publication in the official gazette, the denied D – L is invalid. The constitutional Court has the authority to review the judgement.

Under these circumstances, production costs will decline and the companies will have the opportunity to make new investments. In order to increase their capacities, companies should be financed and there are two main sources for companies' financing;

- Companies can finance themselves with their own resources
- Companies can be financed by out sources such as credits

Especially small and medium – sized companies could take it risky to use credits, due to the high costs. As an alternative, joint ventures and strategic alliances are on companies' agenda. Besides these alternatives, stock exchange quotation appears as the third and attractive alternative.

Advantages of stock exchange quotation for companies are:

- **Outsource financing:** Since shares are issued with premium price, companies have the opportunity to use long - term - based source with lower costs compared to other funding alternatives. Additionally, companies can show their quoted shares as guarantee, while using credit or issuing bonds as other funding alternatives.
- **Providing liquidity:** Shares are traded on an organized market environment and prices are determined due to real offer and demand. Therefore, liquidity increases.
- **Domestic and foreign advertisement:** In line with the transparency and public disclosure functions of the ISE, relavant stock information is disseminated to domestic and foreign investors through data vendors, press and other media instruments. Information dissemination enables companies' advertisement. Thus, domestic or foreign companies operating in the same sector could cooperate.
- **Institutionalization:** Companies are required to get their financial statements audited according to public disclosure function of the ISE, and the CMB and the ISE act as supervising bodies. At this point, institutionalisation period is faster for trading companies compared to others.
- **Tax Advantage:** Income tax deduction from dividends for publicly traded joint stock companies are 5%, whereas it is 15%for other companies. Hence, publicly traded companies provide 10% saving in dividend payments.

However, crises environment and companies' financial burdens affected companies and as seen from Figure 12, number of traded companies and market values declined till 2003. In line with the

structural reforms, an increase in both quoted companies and Mcaps are recognized by the end of FY03.

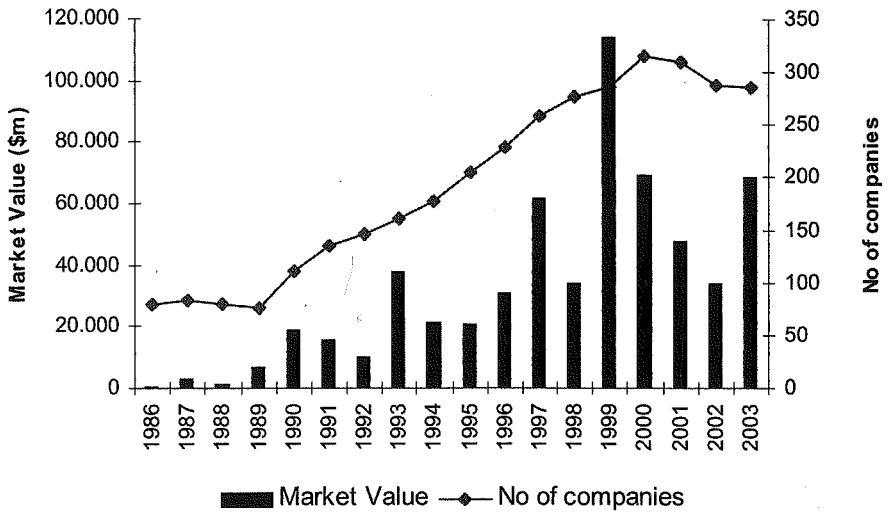



**Figure 12:** Number of traded companies and Market Values in the ISE

**Source:** ISE

In line with the Action Plan for the EU alignment, CMB works on some legal obligations regarding quoted companies in the ISE. As of 2005, all quoted companies are obliged to report their financial statements according to International Financial Reporting Standards (IFRS). According to the announcement of the CMB, 89 quoted companies have already reported their statement in line with the IFRS in 2004.[155] Companies are also required to change their independent auditing firms in every 5 years, in line with the "rotation" principal in corporate governance, they are obliged to establish audit committees in their own management structures. Additionally, transparency of public disclosure in special cases and in financial statements is aimed to be strengthened. New accounting standards are implemented for companies to be able to have a positive impact on grade of transparency. Legal framework in accordance with the EU alignment also covers the free float ratios for companies. Companies are required to increase their free floats up to 25% for succeeding in providing liquidity and depth for their own stocks. All these legislations aim to increase the efficient, confident and transparent trading of companies on Turkish capital markets. In line with the strengthening of quotation and trading standards, it could also be considered to

[155] Internet: <http://www.spk.gov.tr/HaberDuyuru/konferans/konusmametni_08112004.html>, Stand: January 2005

provide some enticing tax advantages and facility of duty payments for companies to increase their interests towards the ISE.

### C.4.3 Efficiency analysis of Intermediary Institutions

The intermediary institutions, which shall operate in accordance with the CML, are brokerage houses, and banks. According to Turkish Glass - Steagall Act[156], banks should establish their intermediaries as separate legal entities, in order to operate on the ISE Stock Market. However, they are authorized to trade directly on the other markets of the ISE. The separation of banking and stock market activities targets to increase the efficiency especially in terms of public disclosure. Investors have the possibility to be informed by their investment analists, who are experienced in this field. On the other hand, it was quite difficult to reach the stock related information through banks, due to their other operations. However, in case of EU Membership, it would be enabled for banks to act as intermediaries on the ISE Stock Market and it would also be possible for them to give investment counselling services and be active in portfolio management on stock market.[157]

The CMB has concrete efforts on strengthening the financial structures of intermediaries, in terms of investor protection. Minimum capital requirement is one of the most important measures in this field. According to legislation, minimum capital requirement for intermediaries with all certificates of authority is app. Euro 880.000, which is currently over the EU implementation of app. Euro 730.000.[158] Furthermore, the Association of Capital Market Intermediary Institutions of Turkey (TSPAKB) was established to support surveillance mechanism, to provide latest technological infrastructures and to improve education level of the personnel. Current implementation regarding the certificate exam for capital market experts is a major step in reaching to high – qualified

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[156] Glass – Steagall Act is an Act passed by American Congress in 1933, that prohibiting commercial banks from collaborating with full – service brokerage firms or participating in investment banking activities. The Act was enacted during the Great Depression and was dismantled in 1999. Currently, many banks in the US own brokerage firms and provide investment services. Source: <http://www.investopedia.com/terms/g/glass_steagall_act.asp>, Stand: January: 2005. On the other hand, legislation of CMB of Turkey obliged banks to establish their own brokerage houses as legal entities, in order to operate on the ISE Stock Market. Thus, starting from January 1997, banks are not allowed to trade on the ISE Stock Market.

[157] Internet: <http://www.tspakb.org.tr/yayinveraporlar/AB_Yol_SerPiy.pdf>, Stand: January 2005

[158] Internet: <http://www.tspakb.org.tr/yayinveraporlar/AB_Yol_SerPiy.pdf>, Stand: January: 2005

personnel. The CMB provides also financial aid to the Association for its future projects on behalf of intermediary institutions.

The CMB allows institutions to set their commissions freely btw 0.2% (minimum) - 1% (maximum) levels for the ISE stock market. Intermediaries are also allowed by the CMB to issue a rebate to their clients to a maximum of 50% of their commission. However, it is also CMB's agenda to abolish the minimum and maximum levels. One of the major difficulties of intermediaries is the competiton, due to the squeeze in commissions. Since intermediaries of banks and other big – sized intermediaries decrease their commissions and issue rebate to their clients, small and medium – sized institutions have difficulties in competing and surviving. TPSAKB statistics indicate that there are 33 big – sized intermediaries (most of them are bank – owned) and they contribute 62% of total transaction volume by the end of 2003. Especially bank – owned intermediaries use also the advantage of margin lending, which has an impartont impact on their income. These circumstances force small – sized institutions either to liquidation or to merger. It is considered positively from CMB's point of view, since the decrease in the sector leads to the survival of the ones with strong capital structures and good reputations.

### C.4.4 Efficiency analysis of Investors

Optimal economic growth, resource allocation due to the needs of the market, real and fair price determination and investment valuation are the basic signals of an efficient capital market. Such an efficient market is to be completed with well – informed investors.

Turkish Capital Market Law takes the responsibility of providing a successful market mechanism through its public disclosure item. Public disclosure has three major functions:[159]

- **Protection:** Transmitting real - time - based relevant information to investors regarding management and financial situation of companies and shares
- **Dissuasiveness:** Articles about insider trading and manipulation
- **Information:** Providing detailed information to investors for their investment decisions.[160]

Investor Protection Fund is the most important development in terms of protection. Since the new Turkish CML will organize the Fund's covering of all financial market instruments, investors would feel themselves more secure and the tendency of trading is expected to increase. The elimination

[159] Kilic, Investor Protection (Ankara, 1997) p: 19.

[160] Kilic (1997) p: 20.

of intermediaries and the survival of the ones with strong capital structures also leads to investors' confidence. Furthermore, "Investor information center", established in February 1995, targets to give capital market relavant information to investors and undertakes the duty of investor training and arranges free of charge conferences for investors, in which capital market related themes are handled. Even though volatile character of the ISE seems to welcome manipulative transactions, investor training courses and reinforced regulations in line with the EU standards aim to increase the investor efficiency.

As an emerging exchange, the ISE needs long - term - based investments supported by institutional investors.

| Investor - Based Distribution of Stock Transactions | | |
|---|---|---|
| | 2002 | 2003 |
| Domestic Individual Investors | 77,5% | 75,5% |
| Domestic Institutions | 8,3% | 10,5% |
| Domestic Institutional Investors | 4,3% | 6,2% |
| Total Domestic Investors | 90,1% | 92,2% |
| Foreign Individual Investors | 0,6% | 0,4% |
| Foreign Institutions | 3,1% | 2,5% |
| Foreign Institutional Investors | 6,3% | 5,0% |
| Total Foreign Investors | 10,0% | 7,9% |

**Table 14:** Distribution of Stock Transactions in the ISE

**Source:** The Association of Capital Market Intermediary Institutions of Turkey

Table 14 shows the distribution of stock transactions. There is an increase in domestic institutions and institutional investors. Besides investment funds and investment trusts, also the implementation of retirement funds has a significant positive impact on the increase in institutional investors in 2003. The CMB allows maximum 20% of the asssets of liquid retirement investment funds to be invested on Turkish capital markets.[161] On the other hand, even though there is a decline in total foreign investors by the end of 2003, the percentage increased upto 12,3% by the end of 1H04[162], in line with the determination of implementing structural reforms and positive rankings of international ranking institutions. Positive environment supported by the reform process is also expected to attract long – term – based foreign investments. The ISE and the TSPAKB

[161] Internet: <http://www.spk.gov.tr/kyd/yf/eyf/genel_duyurular/basin_duyurusu_08102004.html>, Stand: January 2005

[162] Internet: <http://www.tspakb.org.tr/index_tur.htm>, Stand: January 2005

statistics indicate that average investment term of foreign investment is 7 months by the end of 2003.

Turkey has one of the most liberal foreign exchange regimes in the world, with a fully convertible currency as well as a policy that allows foreign institutional and individual investments in securities listed in the ISE, since 1989. There are **no restrictions on foreign portfolio investors** trading on the Turkish securities markets. Decree No. 32 passed in August 1989, removes all restrictions on overseas institutional and individual investment in securities listed in the Istanbul Stock Exchange. Hence, the Turkish stock and bond markets are open to foreign investors, without any restrictions on the repatriation of capital and profits. Decree No. 32 also allows Turkish citizens to buy foreign securities.

| Equity investments owned by foreign investors on the ISE Stock Market (US$ million) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | February | March | April | May | June | July | August | September | October | November | December |
| 2.457 | 2.849 | 3.029 | 2.736 | 2.489 | 2.965 | 2.617 | 2.551 | 2.790 | 2.926 | 3.165 | 3.085 |
| 4.655 | 4.564 | 3.997 | 3.577 | 3.793 | 4.456 | 4.728 | 4.938 | 5.970 | 5.881 | 5.465 | 6.018 |
| 5.718 | 5.296 | 5.373 | 6.864 | 5.765 | 6.095 | 6.589 | 3.845 | 3.200 | 3.068 | 3.668 | 3.700 |
| 3.429 | 5.196 | 5.554 | 6.741 | 5.853 | 5.555 | 6.603 | 5.555 | 7.001 | 7.362 | 8.920 | 15.358 |
| 14.597 | 13.362 | 12.734 | 15.046 | 11.390 | 11.338 | 11.999 | 11.188 | 9.503 | 10.645 | 8.079 | 7.404 |
| 8.636 | 5.331 | 4.009 | 5.725 | 4.863 | 4.796 | 3.938 | 3.949 | 2.988 | 3.742 | 4.580 | 5.635 |
| 5.812 | 4.719 | 5.430 | 5.370 | 4.313 | 3.716 | 3.643 | 3.413 | 3.124 | 3.657 | 4.533 | 3.450 |
| 3.769 | 4.108 | 3.033 | 3.914 | 4.270 | 4.323 | 4.237 | 4.945 | 5.770 | 6.810 | 6.693 | 8.954 |

**Table 15:** Equity investments owned by foreign investors on the ISE Stock Market

**Source:** ISE

As seen from Table 15, foreign equity investments were at their peak levels in 2000, in line with the high performance of the ISE - 100 Index. Following the banking crisis environment, foreign investors were recessive in years 2001 and 2002. Since they mostly invest in financial institutions, this is one of the main reasons of the withdrawal in recent years. In line with the deterioration of the financial sector in Turkey (especially banks), foreigners drewback. The establishment of the Banking Regulatory and Supervisory Board (BRSB) was one of the most important milestones of financial sector restructuring program. According to the program, financially distressed banks were taken over to the Savings Deposit and Insurance Fund (SDIF), which was established due to the BRSB's authority. Turkish financial sector's day – by – day recovery started to be felt in 2003 and the investments exihibited an increase in 2003. December 2003 gave the signs of a significant increase in foreign investments and it started to bear its fruits in 2004 by the increase in the percentage of foreign investors. Financial institutions and manufacturing industry are the most

attractive sectors on foreign investors' agenda. Given that the negotians with the EU will start in October 2005, it is expected that these sectors and also whole Turkish capital markets would be followed up closely for foreign investment decisions.

## C.5 NEGATIVE FORMATIONS IN THE ISE

### C.5.1 Insider Trading

Turkish CML Art. 47/A defines insider trading as;

> *To benefit to his or her self - owned property or to eliminate a loss so as to damage equal opportunity among the participants operating on capital markets with the aim of gaining benefit for himself or herself or for third parties by making use of non - public information which will be able to affect the values of capital market instruments.*

The Art. includes potential insiders as presidents, board members, staff of the CMB, employees of stock exchanges and publicly owned companies. CML Art. 47/A also regulates the penalty; potential insiders are punished with imprisonment from 2 to 5 years and face a heavy pecuniary fine of from TL 10 bn to TL 25 bn (app. US$ 6500 to 16.500), depending on the scope and the severity of the Act. The ISE has also concrete efforts to avoid insider trading supported by its surveillance and inspection departments. Furthermore, the exchange focuses on insider trading and surveillance operations as the President of Federation of Euro – Asian Stock Exchanges (FEAS).

Insider trading has a vital importance for Turkey in terms of EU integration. The EU Insider Dealing Directive Art. 1 classifies inside information by three characteristics: It must be precise, not made public and likely to have a significant price impact if disclosed. Based on this context, it is vital for Turkish capital markets to strengthen confidence, enable public disclosure and prevent unjust gain by efficient supervising systems.[163] The issue would be one of the most important criteria in EU's capital market efficiency evaluation.

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[163] Tezcanli / Erdogan, European Union, Capital Markets Integration and Istanbul Stock Exchange (Istanbul, 1996) p: 70.

### C.5.2 Market Manipulation

CML Art. 47/A (2) regulates market manipulation as;

> *If real entities, the authorized persons of legal entities and those acting together with them all which trade capital market instruments in order to artificially affect their demand and supply, to give the impression of the existence of an active market, to hold the prices at the same level, to increase or decrease the prices.*

The penalty stated in the CML Art. 47 is also valid for market manipulation. Therefore, market manipulators are punished with imprisonment from from 2 to 5 years and face a heavy pecuniary fine of from TL 10 bn to TL 25 bn (app. US$ 6500 to 16.500),depending on the scope and the severity of the Act. ISE Regulation also prohibits some specific actions of the ISE members to prevent creation of artificial prices and it gives the president of the ISE the authority to halt trading of a security involved in one of the situations related with market manipulation. Besides these, the CML prohibits insider trading and manipulation by regulating the public offering, sale and registration with the Board of capital market instruments and by regulating the disclosure standards. The aim of these regulations is to manage the equal accessibility by capital market participants to information, to prevent individuals with privileged information to profit by using this type of information and to prevent the creation of misleading and false information in order to change the prices of the securities.[164] Therefore, market participants will be knowledgeable enough to balance the competition and efficient pricing mechanism would be achieved.

### C.5.3 Development of a Market Surveillance Mechanism

Empirical researches state that a good regulation system against insider trading and market abuses is based on three complementary pillars: a legislative framework; regulation by the competent national authorities and the Exchanges themselves; and self – regulation by market participants.[165] Furthermore, regulator's investigation conditions, imposed penalty schedule in case of insider trading and a transaction tax[166] to fund this enforcement policy are mentioned in various

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[164] Tezcanli, Insider Trading and Market Manipulation (Istanbul, 1996) p: 86.

[165] Micossi, "A beacon of best practice," European Business Forum Debate Autumn 2002 Issue: 11: p: 22 – 25.

[166] Even though transaction tax is a need for today's exchanges, its negative affects on price discovery, volatility and liquidity thus on market efficiency should be considered. For details, cf., Habermeier / Kirilenko, "Securities Transaction Taxes and Financial Markets," International Monetary Fund (IMF) Working Paper, Monetary and Exchange Affairs Department, 2001 WP / 01 / 51.

reserches.[167] Tezcanli (1996) has also made a survey regarding the insider trading and market manipulaton on stock markets and has come to a point that an efficient market surveillance mechanism is inevitable for today's competitive markets.

In line with the global development of securities markets, investor protection has become a very crucial issue. Investors try to get maximum return with minimum transaction costs and minimum risk. In the reality, it is not possible to find a strong efficient market and therefore investors do not have the possibility of equal accessibility to information. Hence, insider trading and market manipulation occur. In order to prevent these negative formations, stock exchanges should take some measures in terms of establishing market surveillance systems, which should also be supported by legal framework. The main target of the market surveillance is to collect up – to – date, reliable and accurate market data, trying to forecast the developments, future prospects and to determine the inefficiency on the market. Hence, surveillance systems should guarantee stability and optimal transaction environment in stock exchanges. Crisis and volatile market conditions has arosen the need for surveillance mechanisms in the exchanges. Tezcanlı's (1996) survey indicated that a surveillance set – up should maintain a record of input details for all matched bargains, records on member firms' daily transactions, all kinds of information on securities, records of all best or worst quotations, portfolio information, data on alternative investment vehicles and macroeconomic indicators. She has also stated that automated sources are essential for detecting possible insider trading and manipulation.[168] Under these circumstances, a computer - assisted surveillance system is taken important for Turkish capital market and has already been established for the protection of investors against negative formations in the ISE. The CMB and the ISE have also established surveillance and inspection departments to develop an efficient enforcement program. The CMB regulates and supervises all capital market activities and investigates possible violation of the CML. On the other hand, the ISE is the surveillance authority that supervises all members of the ISE. The surveillance department monitors abnormal transactions such as manipulation and insider trading, while inspection department examines and supervises the outstanding issues.

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[167] DeMarzo / Fishman / Hagerty, "The Optimal Enforcement of Insider Trading Regulations," Journal of Political Economy 1998 Vol: 106 No: 3: p: 602 – 632.

[168] Tezcanli (1996) p: 100.

Even though there is cooperation btw the CMB and the ISE in implementing surveillance mechanism on Turkish capital markets, the system needs to be improved by fully - computerized network among all the capital market institutions. Electronic registry of securities[169], electronic signature implementation and Disaster Recovery Center projects are the pillars of providing full automation on Turkish capital markets. The training of the stuff plays also an important role in this issue and especially foreign experts are invited to improve the stuff and the system quality of Turkish markets.

[169] Trading companies in the ISE and intermediaries have started to transmit their announcements by using electronic signatures through Public Disclosure Platform, by the beginning of June 2004.

## C.6 THE EVALUATION OF EFFICIENCY ANALYSES IN TERMS OF TECHNICAL INFRASTRUCTURE, EMH and TURKISH CAPITAL MARKET COMPONENTS

ISE is a dynamic trading platform for both domestic and international investors. However, as an emerging market characteristic, the ISE is sensitive towards economic and political developments, which take place both in the international and domestic arena. This peculiarity is taken into consideration in our analyses and therefore, performance of the trading platform is considered as a combination of technical infrastructure, EMH and capital market components such as legal framework, trading companies, intermediaries and investors.

Trading system of the ISE, namely ELIT, is a foreign originated system adjusted due to the requirements of the exchange. System is based on competitiveness in all price levels. Prices are automatically matched in all levels according to time and price priorities in the multiple prices - continuous auction market. Market structure and the implementation of the system are almost similar to its counterparts in European exchanges. Additionally, the exchange personnel are qualified and are able to implement the recent technical developments to the existing technology with its noteworthy budget. Besides, close integration of the ISE with the world's leading exchanges also gives rise to follow the current improvements. Thus, performance and efficiency determination handled from technical infrastructure brings us to a point that **the ISE could not only compete with its peers; could also compete with developed exchanges in terms of technical infrastructure**. However, the current situation, which is also performed by our analyses, indicated that the picture looks cloudy. Despite of wide - ranging technical infrastructure, the ISE is very sensitive towards external factors. Since ISE is the most important component of Turkish capital market, mutual interaction of capital market and economy is directly reflected in the ISE. The recent financial and economic crises have fully affected the exchange and led to high volatility. Furthermore, high inflation and interest rates have been the sticking issue of the country and their affects on the exchange has been long - term based. Political instability also casted a shadow on the ISE's success. False policies enforced by governments have often obstructed the stabile growth of the exchange however, the existing government's determinance in applying the restructuring reforms started to pave the way of Turkish capital markets. Today, both economic and political negativities started to go to wrack, thanks to measures taken in line with the IMF -

backed restructuring program, EU alignment procedure and the government's determinance and willingness. It should be kept in mind that the fruits of these positive developments would be seen gradually on Turkish capital markets.

Another contradictional issue is that, the technical infrastructure's efficiency meets the sequence of ISE's not holding the qualifications of a weakly efficient market. The results of the EMH indicated that **the ISE is not weakly efficient** (exceptionally, long – term - based filter test accepted WFEMH) and **it is possible to get abnormal returns** in the current trading environment. Even though surveillance mechanisms supported by the automated system work efficiently, above - mentioned external factors put pressure on run of the ISE. Technical capacity of the system is not capable of forestalling the external factors and that brings us once more to the point that **sole ELIT system's sufficiency cannot give a healthy result in determining the efficiency in the ISE**.

Components of Turkish capital market also depend on external factors. However, technical infrastructure and legal framework on behalf of investors have positive impacts on investor confidence. Consequently, sufficient and day-by-day developing electronic hardware of the ISE suffers an eclipse. Current reform period would have indirect impact on ELIT system to stick out and the ISE could get the reward that it merits.

# D. INTERNATIONAL COMPARISON OF THE ISE

In order to define the current position of the ISE and to make accurate forecasts, international comparison of the ISE is also required to be considered. Here are some 2003 results of both emerging and developed markets:

| Number of Listed Companies | |
|---|---|
| Emerging Markets | |
| Mexico | 237 |
| San Paolo (Brazil) | 391 |
| Athens | 332 |
| Warsaw | 203 |
| Budapest | 49 |
| Istanbul | 285 |
| Thailand | 418 |
| Philippine | 236 |
| Developed Markets | |
| NYSE | 2308 |
| Deutsche Börse | 866 |
| Borsa Italiana | 279 |
| London | 2692 |
| Wiener Börse | 125 |
| Tokyo | 2206 |

| Value of Share Trading: Main and Parallel Markets ($m) | |
|---|---|
| Emerging Markets | |
| Mexico | 25.868 |
| San Paolo (Brazil) | 66.427 |
| Athens | 39.672 |
| Warsaw | 9.663 |
| Budapest | 8.270 |
| Istanbul | 98.160 |
| Thailand | 102.421 |
| Philippine | 2.673 |
| Developed Markets | |
| NYSE | 9.691.335 |
| Deutsche Börse | 1.299.327 |
| Borsa Italiana | 820.642 |
| London | 3.609.718 |
| Wiener Börse | 11.135 |
| Tokyo | 2.108.732 |

**Table 16:** Number of listed companies and share trading value in 2003

**Source:** FIBV Focus Monthly Statistics (Federation Internationale Des Bourses De Valeurs)

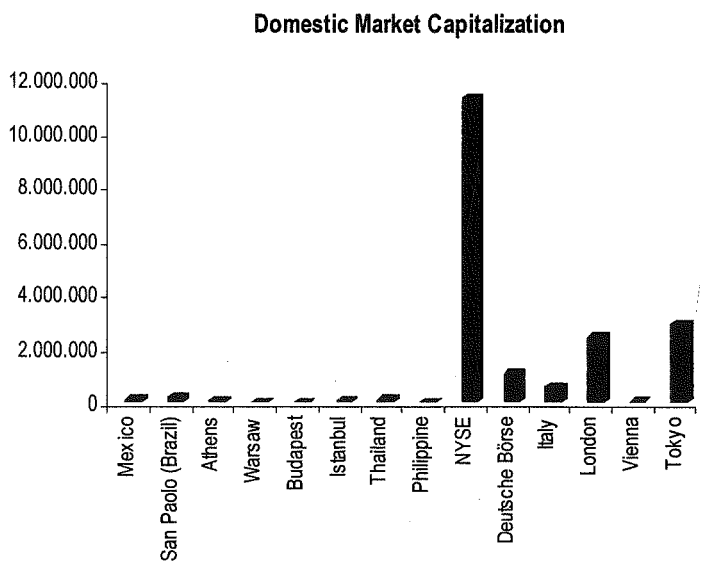



**Figure 13:** Mcap of Shares of Domestic Companies

**Source:** FIBV Focus Monthly Statistics (Federation Internationale Des Bourses De Valeurs)

Globalisation, foreign investors, institutionalization, funding, tax advantages and reputation make listing attractive for companies. In countries like Turkey self - funding could be risky and difficult especially in terms of small – sized companies and exchange listing could be perceived as an attractive alternative for their new investments. As seen from Table 16, **the ISE is leading with 285 companies in Eastern Europe**, compared to Warsaw and Budapest Exchanges. Borsa Italiana, as a developed exchange, is also behind the ISE with 279 quoted companies by the end of 2003. Athens is also a rapidly - developing exchange with 332 companies and the companies benefit from the favours of EU membership.

Share - trading value indicates the depth and therefore the liquidity of a market. **The ISE is remarkable in terms of share trading value among its peers.** This is a concrete proof of the ISE's dynamic structure. Reform period in all areas due to the requirements of the IMF – backed program and the future EU membership, technological capital market infrastructure supported by automation, the establishment of new parallel markets and the privatisation process have major impacts on the increase in trading value. Since there are no restrictions for foreign investors, it is expected that foreign capital would be linked to the ISE in the recent future, in line with the IMF - backed restructuring program and the announcements of international rating institutions.

Market Capitalization defines market size and it is a very important indicator especially for emerging markets. The ISE is ahead of Warsaw, Budapest, Thailand and Philippine, which are also emerging markets. The legislation regarding the increase in free - float ratio is expected to have a positive impact on Mcap in the ISE. Furthermore, **reform process and EU membership expectations trigger foreign investment and it could be expected that the ISE would also get its share from foreign investors and increase its market share like Latin American Exchanges**.

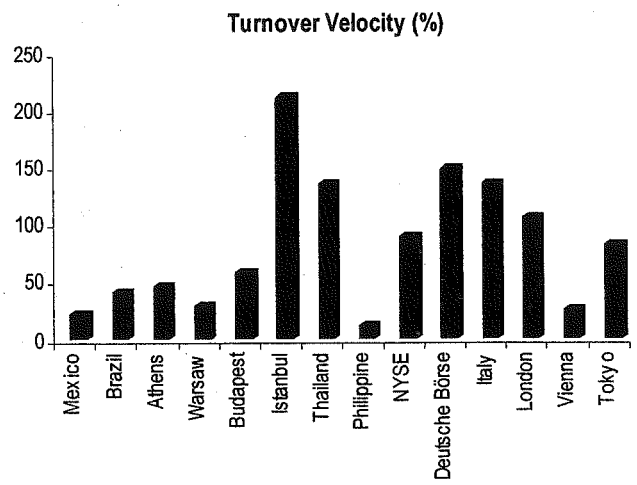



**Figure 14:** Average Turnover Velocity by the end of 2003

**Source:** FIBV Focus Monthly Statistics (Federation Internationale Des Bourses De Valeurs)

Turnover ratio is defined as trading volume over average Market Capitalization. It is one of the most important determinants of liquidity. As seen form the Figure 14, Turkey is leading with 211,9% turnover ratio. Even though it is wished to be considered that the ISE is efficiently liquid, in reality, **there is a vicious circle of buying and selling of securities among investors due to the uncertainty caused by the recent financial and economic crises**. This ratio indicates that the **ISE needs long – term – based investments and therefore institutional investors** for future stability of its market.

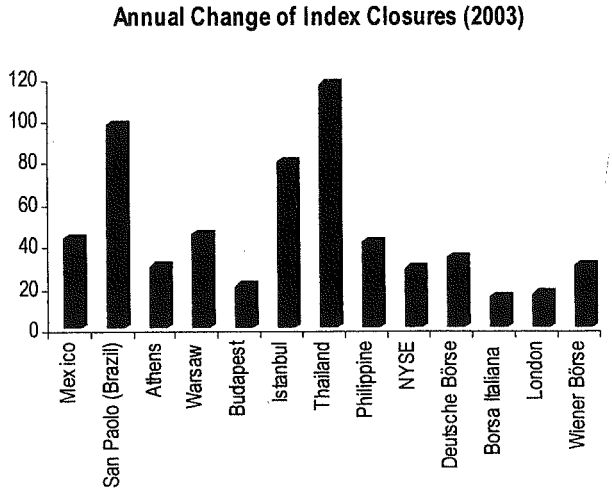


**Figure 15:** Annual Change of Indexes

**Source:** FIBV Focus Monthly Statistics (Federation Internationale Des Bourses De Valeurs)

The recovery of the indexes is significant, following the global recession period in 2002. Thailand, San Paolo and the ISE are the three bull emerging markets. **The determinance in applying structural reforms especially in the banking sector had a major contribution in the increase of the National – 100 Index of the ISE.** Since reforms diverge to all economic, financial and political areas as requirements of the IMF – backed program and the EU alignment process, it would be accurate to follow up the National – 100 Index closer.

Capital markets indicators are required to be in coordination with economic determinants for profitability of capital market instruments especially listed companies.[170] Gross domestic product (GDP) is one of the major determinants for measuring the size of financial markets in the economy. Table 17 shows that Thailand's exchange has the greatest contribution to the economy. Greece has also exhibited a significant increase in recent years. **Even though the ISE is a rapidly increasing exchange, it requires to be supported by foreign and long – term – based investments.**

| Mcap / GDP | |
|---|---|
| Thailand | 83,1 |
| Greece | 61,3 |
| Italy | 41,8 |
| Turkey | 28,5 |
| Hungary | 20,1 |
| Poland | 17,7 |

**Table 17:** Mcap / GDP by the end of 2003

**Source:** Data is quoted from TSPAKB

In line with the IMF program, Turkey provides funding from the International Finance Corporation (IFC) and is one of the 10 largest borrowers. The cooperation also supports Turkish private sector by investing in some private enterprises from different sectors. Furthermore, **Turkey is the fifth largest exposure accounting for about 6,2% of IFC's global portfolio.**

[170] Dogu, Developing Stock Markets and Turkey (Ankara, 1996) p: 60.

| | 2004 (US$ m) | | | | % Total IFC Exposure |
|---|---|---|---|---|---|
| | Loans | Equity | Other | Total | 2004 |
| Brazil | 846,5 | 198,2 | 24,2 | 1.068,9 | 8,4 |
| India | 597,8 | 176,5 | 68,7 | 842,9 | 6,6 |
| Mexico | 694,6 | 108,7 | 7,0 | 810,2 | 6,4 |
| Russia | 728,1 | 52,3 | 10,3 | 790,8 | 6,2 |
| Turkey | 750,3 | 24,1 | 0,0 | 774,4 | 6,1 |
| Argentina | 582,2 | 79,2 | 0,0 | 661,4 | 5,2 |
| China | 132,6 | 282,4 | 0,0 | 415,0 | 3,3 |
| Thailand | 281,8 | 53,6 | 58,9 | 394,3 | 3,1 |
| Colombia | 217,8 | 80,4 | 35,2 | 333,4 | 2,6 |
| Indonesia | 195,9 | 91,0 | 22,8 | 309,7 | 2,4 |
| 10 largest borrowers | 5.027,6 | 1.146,5 | 226,9 | 6.401,0 | 50,5 |
| Total | 9.739,6 | 2.556,9 | 389,6 | 12.686,1 | 100,0 |

* Other includes guarantees and risk management

**Table 18:** IFC Exposure in 2004

**Source:** International Finance Corporation

These statistics highlight the dynamic and liquid character of emerging markets. Turkey, as an emerging market, is especially attractive for foreign investments, due to country's continuing structural reforms and the near future EU membership negotiations. Increase in both domestic and foreign long – term – based investments would help to fulfill thegaps of the market.

## E. RECENT DEVELOPMENTS AND EXPECTATIONS ON TURKISH CAPITAL MARKETS

Following 2001 financial crisis, caused by the depreciation of the TL against US dollar, and the deterioration of the banking sector, Turkey's economy policy based on three major principles, in line with the IMF - backed restructuring program;

- reducing public debt by high primary surplus
- achieving the balance of financial sector and public sector funding by restructuring reforms
- inflation targeting by implementing an active monetary policy in line with the floating exchange rate

Main targets of Turkey were foreign capital inflow and a stable growth in the medium - term. However; crises, tight finance & monetary policies led to a pressure and early elections were called. Following the political uncertainty, public expenditures increased, premium collection problems occurred in social security institutions and therefore, budgetary targets were deviated. Even though the targeted primary surplus was 6.5%, it stood at 4.6% of the GNP. The elections were held in November 2002 and Ak Parti erected a new government. The government's determinance in implementing structural reforms set by the IMF - program beared its fruits and the ratio of total public setor debt (US$ 151 bn) to GNP retreated to 81% (87% in 2002). Furthermore, foreign trade volume expanded due to the restricted political uncertainty and 6.5% economic growth was realized by the end of 2002. Government's determinance in implementing restructuring reforms and taking required measures continued also in 2003 and 2004. Declining interest rates and stable economic growth minimized the pressure on budget surplus target. The appreciation of Euro had also a positive impact on foreign trade deficit and economic growth targets were met. On the other hand, the appreciation of TL led to cash - inflow on fixed income market. The Treasury succeeded in its long – term – based borrowings hence, no difficulty is to be expected in public debt roll – overs in the near future.

Iraq War represented a vital importance for Turkey both in terms of economy and capital markets. Motion crisis btw Turkey and US, regarding Turkish Parliament's rejecting the motion which would give the attack on Iraq a northern front by getting US troops on the ground in Turkey, had great repercussions. Turkish markets exhibited a speculative movement in the short - term due to the

uncertainty. However, rising tension was eased by the government's passing another motion granting US aircraft the use of Turkish airspace. US also eased Turkey that Iraqi Kurds would not seize the oil - rich city of Kirkuk. Therefore, the government made a statement that there's no need for Turkish troops to be deployed in Northern Iraq and added that Turkey will be watching the developments in the area at close range. In line with the announcements, markets relieved.

After the War, Turkish capital markets focused on the structuring reforms and public funding policies. In line with the appreciation of the TL, especially fixed - income based capital instruments became attractive for investors. Stock market was inluenced by the statements of the IMF, WB and the international ranking agencies and exhibited a cautious upward trend.

Future looks promising for Turkish markets, by considering the continuing structural reforms in all areas, due to the requirements of the EU membership. Current circumstances show that international arena appreciates the determinancy in applying structural reforms. It would be accurate to expect that, Turkey would be in close contact with international institutions and investors in this period and Turkish capital markets would benefit the issue in terms of increasing confidence in the international arena.

One more issue, which closely involves with capital market decisions, is Turkey's EU accessment. Dispute with the EU over Cyprus still remains a sticking point ahead of Turkey's membership. However, the negative effects of the conflict have mainly been reflected in capital markets and therefore its impacts during negotiation period would be at reasonable levels.

Consequently, high public debt payments, IMF's and WB's strict supervision, EU issues, and other possible domestic or international events could put pressure on markets but, in line with the prevailing positive atmosphere, markets would expected to be supported.

# CONCLUSION

Capital markets are the vital points of economies. Stock exchange, as the most important element of capital markets, undertakes a major role. The automation of exchanges is inevitable in today's rapidly developing world. However, it should be underlined that, automation should be supported by external factors in emerging exchanges.

Trading sytem in the ISE, namely ELIT, is a developed system in terms of transaction speed and transparency. Even though the technology is changing like the velocity of light, the system is capable of adjusting itself to new technologies. Qualified personnel is also one of the most important positive values of the exchange. Hence, a dynamic and liquid exchange is established.

Since sole automation cannot be determined as "efficiency criterion" especially on emerging markets, the ISE, as an emerging exchange, is also dependent on external developments. The greatest threat of the exchange could be Turkey's drift from the IMF- backed economic program. The implementation of structural reforms is vital for providing efficiency on Turkish capital markets. Government's willingness and determination in applying structural reforms is appreciated in the international arena and as a result, international arena started to follow up Turkey closely.

A further threat for the ISE is the lack of long - term - based investments. The exchange should try to attract corporate investors and long - term - based investments maintain stabile and secure market environment.

In our study, efficiency criterion is brought up with the automation process, EMH and the components of Turkish capital market. External factors made it necessary analyse the EMH and the components of Turkish capital markets.

As a result of our analyses;

- **ELIT system has a comprehensive technological infrastructure and is capable of adjusting itself to new developments supported by the qualified personnel and efficient investments of the ISE.**
- **However, the performance of automation is shadowed by the external factors. Therefore, efficiency analyses are widened by considering Fama's EMH.**
- **Weak Form of Efficient Market Hypothesis (WFEMH) is applied to the ISE; the results indicated that the ISE rejected the hypothesis. Hence, it can be said that it is possible to get abnormal returns by implementing mechanical rules and the past**

performances help to forecast the future performance of the exchange. Even though filter - trading based on long - time - interval accepted the hypothesis, it could only be accepted as a promising clue for approaching to weak - form of efficiency by taking essential measures such as long - term - based investments and institutional investors.

- The - day - of - the - week effect exists in the ISE. On annual and cumulative daily return basis, Friday is the highest return day of the week however; Thursday seems to be the highest return day of the week, by considering daily average returns. Tuesday – Thursday period generate higher average returns than Friday and Monday, due to Friday's high standard deviation. Month - of - the - year analyses indicated that, December and January are said to be the months with highest average returns in the ISE however, January effect has a major impact. Since consistent paths are seen in the analysis of anomalies, WFEMH is rejected.
- A further step in efficiency analyses is the evaluation of capital market components. In this context, it is found that legal framework, quoted companies and intermediaries should comply with the EU standards. Companies' registration should also be encouraged by the Capital Markets Board by some incentives whereas, capital market institutions should give the priority to increase personnel qualification for efficient portfolio management and public disclosure. Investors are required to be informed and to be made conscious of capital market run of. Since there are no restrictions for foreigners, it should be taken as a great opportunity for foreign capital in – flow and drawing attention in the international arena should be taken as a priority.
- Finally, it is seen that the ISE is a dynamic emerging market among its peers.

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# APPENDICES

# DETAILED TABLES

- **AUTOCORRELATION TESTS**

## Appendix 1: SERIAL CORRELATION COEFFICIENTS

| | Serial Correlation Coefficients (Lagk=1,2,.....,10) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Companies | Lag1 | Lag2 | Lag3 | Lag4 | Lag5 | Lag6 | Lag7 | Lag8 | Lag9 | Lag10 |
| AKENERJI | 0.98840 | 0.97615 | 0.96335 | 0.95212 | 0.94068 | 0.92838 | 0.91619 | 0.90323 | 0.88968 | 0.87495 |
| AKBANK | 0.99860 | 0.99724 | 0.99580 | 0.99442 | 0.99313 | 0.99200 | 0.99094 | 0.98989 | 0.98878 | 0.98754 |
| AKSA | 0.99878 | 0.99758 | 0.99616 | 0.99475 | 0.99331 | 0.99180 | 0.99034 | 0.98887 | 0.98737 | 0.98575 |
| AKSIGORTA | 0.99822 | 0.99637 | 0.99457 | 0.99304 | 0.99144 | 0.99007 | 0.98887 | 0.98760 | 0.98600 | 0.98430 |
| ALARKO HOLDING | 0.99893 | 0.99788 | 0.99675 | 0.99566 | 0.99440 | 0.99310 | 0.99187 | 0.99054 | 0.98914 | 0.98754 |
| ANADOLU EFES | 0.98674 | 0.97123 | 0.95581 | 0.94380 | 0.93373 | 0.92415 | 0.91480 | 0.90597 | 0.89623 | 0.88345 |
| ARCELIK | 0.99859 | 0.99701 | 0.99545 | 0.99398 | 0.99258 | 0.99108 | 0.98965 | 0.98832 | 0.98684 | 0.98535 |
| DOGAN HOLDING | 0.99788 | 0.99606 | 0.99380 | 0.99161 | 0.98937 | 0.98738 | 0.98517 | 0.98293 | 0.98040 | 0.97736 |
| DOGAN YAYIN HOL. | 0.99606 | 0.99231 | 0.98862 | 0.98449 | 0.98001 | 0.97602 | 0.97244 | 0.96845 | 0.96381 | 0.95863 |
| ENKA INSAAT | 0.99896 | 0.99801 | 0.99704 | 0.99603 | 0.99492 | 0.99398 | 0.99311 | 0.99227 | 0.99137 | 0.99056 |
| EREGLI DEMIR CELIK | 0.99879 | 0.99766 | 0.99646 | 0.99540 | 0.99422 | 0.99314 | 0.99211 | 0.99094 | 0.98956 | 0.98815 |
| FORD OTOSAN | 0.99881 | 0.99770 | 0.99650 | 0.99539 | 0.99420 | 0.99308 | 0.99212 | 0.99106 | 0.98999 | 0.98872 |
| GARANTI | 0.99849 | 0.99688 | 0.99527 | 0.99350 | 0.99160 | 0.98990 | 0.98814 | 0.98637 | 0.98458 | 0.98266 |
| IS GMYO | 0.99067 | 0.98128 | 0.97118 | 0.96261 | 0.95392 | 0.94411 | 0.93335 | 0.92148 | 0.90902 | 0.89473 |
| KOC HOLDING | 0.99869 | 0.99738 | 0.99594 | 0.99451 | 0.99316 | 0.99195 | 0.99066 | 0.98934 | 0.98790 | 0.98630 |
| NETAS TELEKOM | 0.99820 | 0.99627 | 0.99426 | 0.99234 | 0.99060 | 0.98892 | 0.98733 | 0.98539 | 0.98321 | 0.98098 |
| PETKIM | 0.99789 | 0.99538 | 0.99267 | 0.99016 | 0.98740 | 0.98450 | 0.98174 | 0.97927 | 0.97681 | 0.97452 |
| SABANCI HOLDING | 0.99699 | 0.99441 | 0.99144 | 0.98868 | 0.98568 | 0.98308 | 0.98072 | 0.97815 | 0.97521 | 0.97182 |
| SISECAM | 0.99829 | 0.99654 | 0.99450 | 0.99276 | 0.99096 | 0.98944 | 0.98784 | 0.98617 | 0.98400 | 0.98166 |
| TANSAS | 0.99773 | 0.99501 | 0.99190 | 0.98847 | 0.98518 | 0.98167 | 0.97778 | 0.97346 | 0.96907 | 0.96464 |
| TOFAS OTO FABRIKA | 0.99856 | 0.99714 | 0.99564 | 0.99422 | 0.99275 | 0.99125 | 0.98987 | 0.98851 | 0.98703 | 0.98538 |
| TRAKYA CAM | 0.99882 | 0.99760 | 0.99631 | 0.99515 | 0.99394 | 0.99283 | 0.99170 | 0.99034 | 0.98883 | 0.98725 |
| YAPI KREDI | 0.99839 | 0.99649 | 0.99453 | 0.99277 | 0.99100 | 0.98936 | 0.98763 | 0.98592 | 0.98416 | 0.98239 |
| HURRIYET | 0.99158 | 0.98462 | 0.97627 | 0.96625 | 0.95806 | 0.95005 | 0.94215 | 0.93488 | 0.92901 | 0.92202 |
| IS BANKASI | 0.99431 | 0.98901 | 0.98270 | 0.97452 | 0.96767 | 0.96024 | 0.95423 | 0.94844 | 0.94400 | 0.94016 |
| MIGROS | 0.99513 | 0.98982 | 0.98442 | 0.97947 | 0.97453 | 0.96917 | 0.96467 | 0.95910 | 0.95420 | 0.94936 |
| PETROL OFISI | 0.98897 | 0.97890 | 0.96832 | 0.95913 | 0.94737 | 0.93925 | 0.93101 | 0.92392 | 0.91690 | 0.90950 |
| TURKCELL | 0.93674 | 0.88359 | 0.84272 | 0.79615 | 0.77345 | 0.74768 | 0.73400 | 0.72532 | 0.71559 | 0.69878 |
| TUPRAS | 0.99335 | 0.98508 | 0.97670 | 0.96668 | 0.95762 | 0.94914 | 0.94184 | 0.93564 | 0.92957 | 0.92313 |
| VESTEL | 0.99319 | 0.98571 | 0.97909 | 0.97146 | 0.96471 | 0.95706 | 0.95013 | 0.94270 | 0.93456 | 0.92595 |

## Appendix 2: DESKRIPTIVE STATISTICS

| Statistics | Lag1 | Lag2 | Lag3 | Lag4 | Lag5 | Lag6 | Lag7 | Lag8 | Lag9 | Lag10 |
|---|---|---|---|---|---|---|---|---|---|---|
| AVERAGE | 0.9942 | 0.9885 | 0.9831 | 0.9777 | 0.9731 | 0.9685 | 0.9644 | 0.9605 | 0.9564 | 0.9518 |
| MEDIAN | 0.9980 | 0.9962 | 0.9940 | 0.9920 | 0.9900 | 0.9882 | 0.9863 | 0.9842 | 0.9818 | 0.9792 |
| MODE | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| STAND. DEV. | 0.0114 | 0.0211 | 0.0288 | 0.0373 | 0.0418 | 0.0469 | 0.0500 | 0.0524 | 0.0551 | 0.0591 |
| VARIENCE | 0.0001 | 0.0004 | 0.0008 | 0.0014 | 0.0017 | 0.0022 | 0.0025 | 0.0027 | 0.0030 | 0.0035 |
| KURTOSIS | 23.7818 | 22.4437 | 20.6641 | 20.4448 | 18.7533 | 17.6590 | 15.9424 | 14.0734 | 12.4591 | 11.2544 |
| Kurtosis excl. TURKCELL | 0.6710 | 1.1424 | 1.1884 | 0.6369 | 0.2941 | 0.0787 | 0.0055 | -0.0084 | 0.0845 | 0.2352 |
| SKEWNESS | -4.6758 | -4.5062 | -4.2768 | -4.2409 | -4.0138 | -3.8635 | -3.6302 | -3.3729 | -3.1502 | -2.9858 |
| Skewness excl. TURKCELL | -1.3627 | -1.4469 | -1.4531 | -1.3196 | -1.2461 | -1.1905 | -1.1730 | -1.1642 | -1.1828 | -1.2204 |
| MINIMUM | 0.9367 | 0.8836 | 0.8427 | 0.7961 | 0.7734 | 0.7477 | 0.7340 | 0.7253 | 0.7156 | 0.6988 |
| MAXIMUM | 0.9990 | 0.9980 | 0.9970 | 0.9960 | 0.9949 | 0.9940 | 0.9931 | 0.9923 | 0.9914 | 0.9906 |
| SUM | 29.8247 | 29.6563 | 29.4942 | 29.3295 | 29.1916 | 29.0538 | 28.9324 | 28.8145 | 28.6928 | 28.5536 |
| COUNT | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

## Appendix 3: T – ANALYSIS (Standard Deviation & t Values)

| | Standard Deviation (Sr) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Companies | Lag1 | Lag2 | Lag3 | Lag4 | Lag5 | Lag6 | Lag7 | Lag8 | Lag9 | Lag10 |
| AKENERJI | 0.0068 | 0.0097 | 0.0119 | 0.0136 | 0.0151 | 0.0166 | 0.0179 | 0.0191 | 0.0203 | 0.0216 |
| AKBANK | 0.0010 | 0.0014 | 0.0017 | 0.0019 | 0.0022 | 0.0023 | 0.0025 | 0.0026 | 0.0027 | 0.0029 |
| AKSA | 0.0009 | 0.0013 | 0.0016 | 0.0019 | 0.0021 | 0.0023 | 0.0025 | 0.0027 | 0.0029 | 0.0031 |
| AKSIGORTA | 0.0014 | 0.0020 | 0.0024 | 0.0027 | 0.0030 | 0.0032 | 0.0034 | 0.0036 | 0.0038 | 0.0041 |
| ALARKO HOLDING | 0.0008 | 0.0012 | 0.0014 | 0.0017 | 0.0019 | 0.0021 | 0.0023 | 0.0024 | 0.0026 | 0.0028 |
| ANADOLU EFES | 0.0073 | 0.0107 | 0.0132 | 0.0149 | 0.0161 | 0.0172 | 0.0182 | 0.0191 | 0.0200 | 0.0211 |
| ARCELIK | 0.0009 | 0.0013 | 0.0016 | 0.0019 | 0.0021 | 0.0023 | 0.0025 | 0.0026 | 0.0028 | 0.0029 |
| DOGAN HOLDING | 0.0014 | 0.0019 | 0.0023 | 0.0027 | 0.0031 | 0.0033 | 0.0036 | 0.0039 | 0.0042 | 0.0045 |
| DOGAN YAYIN HOL. | 0.0028 | 0.0040 | 0.0048 | 0.0056 | 0.0064 | 0.0070 | 0.0075 | 0.0080 | 0.0086 | 0.0091 |
| ENKA INSAAT | 0.0008 | 0.0011 | 0.0014 | 0.0016 | 0.0018 | 0.0020 | 0.0021 | 0.0023 | 0.0024 | 0.0025 |
| EREGLI DEMIR CELIK | 0.0008 | 0.0012 | 0.0015 | 0.0017 | 0.0019 | 0.0020 | 0.0022 | 0.0023 | 0.0025 | 0.0026 |
| FORD OTOSAN | 0.0008 | 0.0012 | 0.0014 | 0.0017 | 0.0019 | 0.0020 | 0.0022 | 0.0023 | 0.0024 | 0.0026 |
| GARANTI | 0.0010 | 0.0014 | 0.0018 | 0.0021 | 0.0024 | 0.0026 | 0.0028 | 0.0030 | 0.0032 | 0.0034 |
| IS GMYO | 0.0054 | 0.0076 | 0.0094 | 0.0107 | 0.0118 | 0.0130 | 0.0141 | 0.0153 | 0.0164 | 0.0176 |
| KOC HOLDING | 0.0009 | 0.0013 | 0.0016 | 0.0018 | 0.0020 | 0.0022 | 0.0024 | 0.0025 | 0.0027 | 0.0029 |
| NETAS TELEKOM | 0.0012 | 0.0018 | 0.0022 | 0.0026 | 0.0028 | 0.0031 | 0.0033 | 0.0035 | 0.0038 | 0.0040 |
| PETKIM | 0.0012 | 0.0018 | 0.0022 | 0.0026 | 0.0029 | 0.0032 | 0.0035 | 0.0037 | 0.0039 | 0.0041 |
| SABANCI HOLDING | 0.0022 | 0.0030 | 0.0037 | 0.0043 | 0.0048 | 0.0052 | 0.0055 | 0.0059 | 0.0063 | 0.0067 |
| SISECAM | 0.0010 | 0.0015 | 0.0019 | 0.0022 | 0.0024 | 0.0026 | 0.0028 | 0.0030 | 0.0032 | 0.0034 |
| TANSAS | 0.0018 | 0.0026 | 0.0033 | 0.0040 | 0.0045 | 0.0050 | 0.0055 | 0.0060 | 0.0065 | 0.0069 |
| TOFAS OTO FABRIKA | 0.0010 | 0.0014 | 0.0018 | 0.0021 | 0.0023 | 0.0025 | 0.0027 | 0.0029 | 0.0031 | 0.0033 |
| TRAKYA CAM | 0.0009 | 0.0013 | 0.0016 | 0.0019 | 0.0021 | 0.0023 | 0.0025 | 0.0026 | 0.0028 | 0.0030 |
| YAPI KREDI | 0.0010 | 0.0015 | 0.0018 | 0.0021 | 0.0023 | 0.0025 | 0.0027 | 0.0029 | 0.0031 | 0.0033 |
| HURRIYET | 0.0057 | 0.0076 | 0.0095 | 0.0113 | 0.0125 | 0.0136 | 0.0146 | 0.0155 | 0.0162 | 0.0169 |
| IS BANKASI | 0.0043 | 0.0060 | 0.0075 | 0.0091 | 0.0102 | 0.0113 | 0.0121 | 0.0128 | 0.0133 | 0.0138 |
| MIGROS | 0.0041 | 0.0059 | 0.0073 | 0.0084 | 0.0094 | 0.0103 | 0.0110 | 0.0118 | 0.0125 | 0.0131 |
| PETROL OFISI | 0.0062 | 0.0086 | 0.0105 | 0.0119 | 0.0135 | 0.0145 | 0.0154 | 0.0161 | 0.0168 | 0.0175 |
| TURKCELL | 0.0361 | 0.0483 | 0.0555 | 0.0624 | 0.0654 | 0.0685 | 0.0700 | 0.0710 | 0.0720 | 0.0738 |
| TUPRAS | 0.0049 | 0.0073 | 0.0091 | 0.0108 | 0.0122 | 0.0133 | 0.0142 | 0.0149 | 0.0156 | 0.0162 |
| VESTEL | 0.0047 | 0.0068 | 0.0082 | 0.0096 | 0.0107 | 0.0117 | 0.0126 | 0.0135 | 0.0144 | 0.0153 |
| t values | | | | | | | | | | |

| Companies | Lag1 | Lag2 | Lag3 | Lag4 | Lag5 | Lag6 | Lag7 | Lag8 | Lag9 | Lag10 |
|---|---|---|---|---|---|---|---|---|---|---|
| AKENERJI | 146.10 | 100.94 | 80.62 | 69.91 | 62.24 | 56.08 | 51.33 | 47.25 | 43.74 | 40.57 |
| AKBANK | 1024.88 | 729.50 | 590.79 | 512.26 | 461.32 | 426.92 | 400.87 | 379.20 | 359.65 | 340.97 |
| AKSA | 1108.62 | 785.95 | 622.59 | 532.39 | 471.11 | 424.94 | 391.02 | 363.98 | 341.23 | 320.84 |
| AKSIGORTA | 726.14 | 507.85 | 414.85 | 365.92 | 329.46 | 305.59 | 288.43 | 273.03 | 256.60 | 242.00 |
| ALARKO HOLDING | 1212.92 | 862.89 | 695.87 | 602.07 | 529.07 | 476.49 | 438.55 | 406.14 | 378.60 | 353.04 |
| ANADOLU EFES | 134.99 | 90.56 | 72.19 | 63.40 | 57.92 | 53.71 | 50.29 | 47.52 | 44.86 | 41.87 |
| ARCELIK | 1087.03 | 746.71 | 604.91 | 525.15 | 472.58 | 430.37 | 399.07 | 375.31 | 353.26 | 334.44 |
| DOGAN HOLDING | 727.82 | 532.82 | 424.27 | 364.21 | 322.92 | 295.99 | 272.56 | 253.61 | 236.20 | 219.28 |
| DOGAN YAYIN HOLDING | 349.62 | 249.68 | 204.67 | 174.75 | 153.42 | 139.63 | 129.90 | 121.04 | 112.59 | 104.89 |
| ENKA INSAAT | 1206.40 | 870.64 | 713.71 | 615.92 | 543.62 | 499.14 | 466.43 | 440.04 | 416.01 | 397.62 |
| EREGLI DEMIR CELIK | 1178.61 | 845.29 | 686.90 | 602.32 | 536.82 | 492.11 | 458.69 | 427.64 | 397.87 | 373.12 |
| FORD OTOSAN | 1185.04 | 851.09 | 689.45 | 600.46 | 534.66 | 488.91 | 458.07 | 429.73 | 405.72 | 381.80 |
| GARANTI | 994.39 | 691.38 | 561.10 | 477.80 | 419.93 | 382.39 | 352.43 | 328.34 | 308.21 | 290.26 |
| IS GMYO | 184.78 | 129.50 | 103.57 | 90.32 | 80.80 | 72.80 | 66.08 | 60.30 | 55.44 | 50.92 |
| KOC HOLDING | 1130.50 | 797.50 | 639.94 | 549.69 | 492.07 | 452.92 | 420.15 | 392.99 | 368.44 | 345.77 |
| NETAS TELEKOM | 800.33 | 555.68 | 447.01 | 386.46 | 348.28 | 320.42 | 299.36 | 278.31 | 259.15 | 243.11 |
| PETKIM | 838.07 | 565.79 | 448.13 | 386.03 | 340.45 | 306.24 | 281.54 | 263.74 | 248.89 | 237.04 |
| SABANCI HOLDING | 452.84 | 332.03 | 267.69 | 232.18 | 205.97 | 189.16 | 176.86 | 165.82 | 155.31 | 145.30 |
| SISECAM | 951.50 | 667.96 | 528.61 | 460.33 | 411.37 | 380.10 | 353.84 | 331.35 | 307.57 | 286.74 |
| TANSAS | 562.74 | 378.46 | 296.36 | 247.70 | 217.93 | 195.44 | 177.00 | 161.41 | 149.02 | 138.89 |
| TOFAS OTO FABRIKA | 975.50 | 690.90 | 559.03 | 484.72 | 432.28 | 393.13 | 364.92 | 342.39 | 321.84 | 302.79 |
| TRAKYA CAM | 1076.70 | 753.80 | 607.33 | 529.18 | 473.11 | 434.67 | 403.68 | 373.80 | 347.15 | 324.66 |
| YAPI KREDI | 1005.21 | 680.35 | 544.20 | 472.76 | 422.90 | 388.52 | 359.87 | 336.90 | 317.21 | 300.47 |
| HURRIYET | 175.24 | 129.02 | 103.19 | 85.86 | 76.53 | 69.68 | 64.34 | 60.29 | 57.47 | 54.52 |
| IS BANKASI | 230.94 | 165.46 | 131.28 | 107.49 | 94.91 | 85.09 | 78.93 | 74.03 | 70.78 | 68.26 |
| MIGROS | 241.97 | 166.74 | 134.27 | 116.50 | 104.21 | 94.33 | 87.79 | 81.24 | 76.48 | 72.46 |
| PETROL OFISI | 158.29 | 113.57 | 91.92 | 80.35 | 70.15 | 64.87 | 60.47 | 57.25 | 54.46 | 51.87 |
| TURKCELL | 25.95 | 18.29 | 15.18 | 12.76 | 11.83 | 10.92 | 10.48 | 10.22 | 9.93 | 9.47 |
| TUPRAS | 204.38 | 135.59 | 107.80 | 89.44 | 78.74 | 71.40 | 66.38 | 62.79 | 59.72 | 56.87 |
| VESTEL | 210.31 | 144.43 | 118.77 | 101.07 | 90.42 | 81.47 | 75.19 | 69.73 | 64.82 | 60.51 |

- **RUNS TESTS**

## Appendix 4: RUNS TEST RESULTS

| Runs Test Results | | | | |
|---|---|---|---|---|
| Companies | Number of observations | Actual runs | Expected runs | Actual runs-Expected runs |
| AKENERJI | 505 | 114 | 480 | -366 |
| AKBANK | 2954 | 658 | 2808 | -2150 |
| AKSA | 2999 | 664 | 2853 | -2189 |
| AKSIGORTA | 1884 | 421 | 1791 | -1370 |
| ALARKO HOLDING | 3169 | 724 | 3005 | -2281 |
| ANADOLU EFES | 494 | 113 | 469 | -356 |
| ARCELIK | 3351 | 750 | 3184 | -2434 |
| DOGAN HOLDING | 2256 | 506 | 2144 | -1638 |
| DOGAN YAYIN HOLDING | 972 | 220 | 923 | -703 |
| ENKA INSAAT | 3028 | 695 | 2869 | -2174 |
| EREGLI DEMIR CELIK | 3359 | 737 | 3198 | -2461 |
| FORD OTOSAN | 3346 | 790 | 3160 | -2370 |
| GARANTI | 3000 | 669 | 2852 | -2183 |
| IS GMYO | 647 | 150 | 613 | -463 |
| KOC HOLDING | 3346 | 748 | 3180 | -2432 |
| NETAS TELEKOM | 2315 | 497 | 2209 | -1712 |
| PETKIM | 2977 | 639 | 2841 | -2202 |
| SABANCI HOLDING | 1243 | 269 | 1186 | -917 |
| SISECAM | 3102 | 734 | 2929 | -2195 |
| TANSAS | 1441 | 335 | 1364 | -1029 |
| TOFAS OTO FABRIKA | 2741 | 624 | 2600 | -1976 |
| TRAKYA CAM | 2740 | 623 | 2599 | -1976 |
| YAPI KREDI | 3266 | 720 | 3108 | -2388 |
| HURRIYET | 525 | 123 | 497 | -374 |
| IS BANKASI | 613 | 143 | 581 | -438 |
| MIGROS | 578 | 134 | 548 | -414 |
| PETROL OFISI | 563 | 133 | 533 | -400 |
| TURKCELL | 95 | 22 | 91 | -69 |
| TUPRAS | 574 | 129 | 546 | -417 |
| VESTEL | 610 | 137 | 580 | -443 |
| **Average** | | **441** | **1858** | **-1417** |

## Appendix 5: RUNS TEST RESULTS

| Companies | Number of observations (days) | Actual runs | Expected runs | Actual runs-Expected runs |
|---|---|---|---|---|
| AKENERJI | 505 | 114 | 480 | -366 |
| ANADOLU EFES | 494 | 113 | 469 | -356 |
| IS GMYO | 647 | 150 | 613 | -463 |
| DOGAN YAYIN HOLDING | 972 | 220 | 923 | -703 |
| SABANCI HOLDING | 1243 | 269 | 1186 | -917 |
| TANSAS | 1441 | 335 | 1364 | -1029 |
| AKSIGORTA | 1884 | 421 | 1791 | -1370 |
| DOGAN HOLDING | 2256 | 506 | 2144 | -1638 |
| NETAS TELEKOM | 2315 | 497 | 2209 | -1712 |
| TRAKYA CAM | 2740 | 623 | 2599 | -1976 |
| TOFAS OTO FABRIKA | 2741 | 624 | 2600 | -1976 |
| AKBANK | 2954 | 658 | 2808 | -2150 |
| PETKIM | 2977 | 639 | 2841 | -2202 |
| AKSA | 2999 | 664 | 2853 | -2189 |
| GARANTI | 3000 | 669 | 2852 | -2183 |
| ENKA INSAAT | 3028 | 695 | 2869 | -2174 |
| SISECAM | 3102 | 734 | 2929 | -2195 |
| ALARKO HOLDING | 3169 | 724 | 3005 | -2281 |
| YAPI KREDI | 3266 | 720 | 3108 | -2388 |
| FORD OTOSAN | 3346 | 790 | 3160 | -2370 |
| KOC HOLDING | 3346 | 748 | 3180 | -2432 |
| ARCELIK | 3351 | 750 | 3184 | -2434 |
| EREGLI DEMIR CELIK | 3359 | 737 | 3198 | -2461 |

| Companies | Number of observations (weeks) | Actual runs | Expected runs | Actual runs-Expected runs |
|---|---|---|---|---|
| HURRIYET | 525 | 123 | 497 | -374 |
| IS BANKASI | 613 | 143 | 581 | -438 |
| MIGROS | 578 | 134 | 548 | -414 |
| PETROL OFISI | 563 | 133 | 533 | -400 |
| TURKCELL | 95 | 22 | 91 | -69 |
| TUPRAS | 574 | 129 | 546 | -417 |
| VESTEL | 610 | 137 | 580 | -443 |

## Appendix 6: T – ANALYSIS (Standard Deviation & t Values)

| Runs test statistics | | |
|---|---|---|
| Companies | Standard Deviation | t value |
| AKENERJI | 32.05 | -11.41 |
| AKBANK | 77.45 | -27.76 |
| AKSA | 78.03 | -28.05 |
| AKSIGORTA | 61.86 | -22.14 |
| ALARKO HOLDING | 80.24 | -28.42 |
| ANADOLU EFES | 31.71 | -11.22 |
| ARCELIK | 82.49 | -29.5 |
| DOGAN HOLDING | 67.69 | -24.18 |
| DOGAN YAYIN HOLDING | 44.45 | -15.81 |
| ENKA INSAAT | 78.44 | -27.72 |
| EREGLI DEMIR CELIK | 82.57 | -29.8 |
| FORD OTOSAN | 82.48 | -28.73 |
| GARANTI | 78.05 | -27.96 |
| IS GMYO | 36.29 | -12.75 |
| KOC HOLDING | 82.43 | -29.49 |
| NETAS TELEKOM | 68.54 | -24.97 |
| PETKIM | 77.72 | -28.32 |
| SABANCI HOLDING | 50.24 | -18.24 |
| SISECAM | 79.42 | -27.64 |
| TANSAS | 54.13 | -19 |
| TOFAS OTO FABRIKA | 74.62 | -26.47 |
| TRAKYA CAM | 74.61 | -26.48 |
| YAPI KREDI | 81.43 | -29.32 |
| HURRIYET | 32.83 | -8.95 |
| IS BANKASI | 35.32 | -12.38 |
| MIGROS | 34.3 | -12.05 |
| PETROL OFISI | 33.86 | -11.79 |
| TURKCELL | 13.97 | -4.9 |
| TUPRAS | 34.17 | -12.19 |
| VESTEL | 35.22 | -12.57 |

- **FILTER RULE TRADING**

**Appendix 7: The COMPARISON of 'BUY – and – HOLD' STRATEGY with 'FILTER - TRADING' (time interval vary due to quotation periods of companies)**

| Companies | Buy/Hold Strategy (%) | 0.5%F | 1%F | 1.5%F | 2%F | 2.5%F | 3%F | 3.5%F |
|---|---|---|---|---|---|---|---|---|
| AKENERJI | 16 | 46 | 43 | 20 | 11 | -5 | 7 | -70 |
| AKBANK | 31597 | 501 | 475 | 452 | 531 | 496 | 374 | 385 |
| AKSA | 24321 | 8915 | 8915 | 9001 | 8853 | 8830 | 8864 | 8854 |
| AKSIGORTA | 9048 | 372 | 334 | 421 | 398 | 520 | 551 | 537 |
| ALARKO HOLDING | 4037884 | 1005 | 1048 | 1089 | 1275 | 1298 | 1183 | 947 |
| ANADOLU EFES | 48 | 97 | 117 | 71 | 73 | 61 | 73 | 81 |
| ARCELIK | 578433 | 539 | 548 | 603 | 849 | 904 | 845 | 969 |
| DOGAN HOLDING | 14326 | 583 | 583 | 575 | 550 | 586 | 658 | 620 |
| DOGAN YAYIN HOL. | 275 | 96 | 108 | 200 | 233 | 337 | 313 | 350 |
| ENKA INSAAT | 3188066 | 731 | 743 | 547 | 770 | 722 | 794 | 887 |
| EREGLI DEMIR CELIK | 63040 | 718 | 743 | 847 | 878 | 699 | 700 | 611 |
| FORD OTOSAN | 2444344 | 979 | 1026 | 831 | 680 | 732 | 871 | 879 |
| GARANTI | 83520 | 969 | 975 | 710 | 701 | 687 | 576 | 669 |
| IS GMYO | -68 | -58 | -58 | -78 | -96 | -102 | -73 | -96 |
| KOC HOLDING | 1605539 | 1010 | 1028 | 1253 | 977 | 919 | 897 | 1002 |
| NETAS TELEKOM | 13076 | 623 | 649 | 701 | 590 | 704 | 759 | 701 |
| PETKIM | 34910 | 2095 | 2109 | 2174 | 2176 | 801 | 825 | 878 |
| SABANCI HOLDING | 1181 | 131 | 124 | 159 | 235 | 203 | 181 | 246 |
| SISECAM | 29633 | 672 | 646 | 757 | 579 | 607 | 651 | 914 |
| TANSAS | 2360 | 418 | 414 | 372 | 359 | 431 | 423 | 517 |
| TOFAS OTO FABRIKA | 20349 | 454 | 421 | 507 | 505 | 549 | 814 | 1012 |
| TRAKYA CAM | 98849 | 372 | 366 | 428 | 683 | 596 | 680 | 637 |
| YAPI KREDI | 347253 | 869 | 853 | 1144 | 1318 | 1146 | 1204 | 1212 |
| HURRIYET | 192124 | 878 | 878 | 792 | 829 | 924 | 947 | 742 |
| IS BANKASI | 71619 | 320 | 320 | 399 | 410 | 391 | 527 | 548 |
| MIGROS | 1036169 | 740 | 734 | 755 | 797 | 969 | 967 | 848 |
| PETROL OFISI | 159948 | 662 | 662 | 505 | 552 | 640 | 770 | 804 |
| TURKCELL | -35 | 36 | 36 | 63 | 63 | 51 | 51 | 33 |
| TUPRAS | 182503 | 1108 | 1108 | 1166 | 1118 | 1132 | 1033 | 1044 |
| VESTEL | 19229 | 818 | 818 | 788 | 874 | 854 | 810 | 943 |

| Companies | Buy/Hold Strategy (%) | 4%F | 4.5%F | 5%F | 5.5%F | 6%F | 6.5%F | 7%F |
|---|---|---|---|---|---|---|---|---|
| AKENERJI | 16 | 6 | 35 | 52 | 38 | 59 | 49 | 48 |
| AKBANK | 31597 | 322 | 447 | 579 | 484 | 526 | 426 | 595 |
| AKSA | 24321 | 603 | 634 | 800 | 833 | 871 | 795 | 812 |
| AKSIGORTA | 9048 | 566 | 529 | 625 | 580 | 588 | 534 | 503 |
| ALARKO HOLDING | 4037884 | 995 | 1233 | 1212 | 1234 | 1352 | 1299 | 1271 |
| ANADOLU EFES | 48 | 32 | 30 | 29 | 107 | 116 | 75 | 119 |
| ARCELIK | 578433 | 1049 | 929 | 897 | 899 | 981 | 1019 | 1072 |
| DOGAN HOLDING | 14326 | 674 | 913 | 786 | 971 | 905 | 854 | 874 |
| DOGAN YAYIN HOL. | 275 | 520 | 464 | 400 | 423 | 359 | 397 | 393 |
| ENKA INSAAT | 3188066 | 942 | 971 | 930 | 805 | 835 | 828 | 836 |
| EREGLI DEMIR CELIK | 63040 | 684 | 802 | 1084 | 1079 | 1089 | 1107 | 941 |
| FORD OTOSAN | 2444344 | 913 | 841 | 925 | 968 | 1091 | 1149 | 1003 |
| GARANTI | 83520 | 535 | 523 | 641 | 829 | 903 | 1009 | 1063 |
| IS GMYO | -68 | -70 | -49 | -52 | -34 | -49 | -31 | -35 |
| KOC HOLDING | 1605539 | 1124 | 1232 | 1248 | 1308 | 1391 | 1385 | 1313 |
| NETAS TELEKOM | 13076 | 643 | 774 | 870 | 951 | 892 | 833 | 792 |
| PETKIM | 34910 | 994 | 1015 | 955 | 916 | 1034 | 1140 | 1030 |
| SABANCI HOLDING | 1181 | 302 | 299 | 422 | 397 | 412 | 508 | 472 |
| SISECAM | 29633 | 837 | 754 | 1035 | 1055 | 1165 | 1127 | 1042 |
| TANSAS | 2360 | 650 | 500 | 550 | 576 | 673 | 600 | 713 |
| TOFAS OTO FABRIKA | 20349 | 951 | 1012 | 981 | 915 | 925 | 961 | 849 |
| TRAKYA CAM | 98849 | 725 | 768 | 916 | 979 | 1026 | 968 | 930 |
| YAPI KREDI | 347253 | 1235 | 1238 | 1108 | 1126 | 1241 | 1243 | 1258 |
| HURRIYET | 192124 | 746 | 734 | 770 | 706 | 987 | 712 | 721 |
| IS BANKASI | 71619 | 675 | 534 | 558 | 524 | 598 | 675 | 647 |
| MIGROS | 1036169 | 732 | 813 | 819 | 848 | 863 | 765 | 704 |
| PETROL OFISI | 159948 | 783 | 855 | 843 | 866 | 786 | 716 | 816 |
| TURKCELL | -35 | 33 | 17 | 20 | 20 | 20 | 12 | 12 |
| TUPRAS | 182503 | 1012 | 866 | 923 | 944 | 985 | 953 | 953 |
| VESTEL | 19229 | 906 | 908 | 934 | 784 | 700 | 719 | 674 |

| Companies | Buy/Hold Strategy (%) | 7.5%F | 8%F | 8.5%F | 9%F | 9.5%F | 10%F |
|---|---|---|---|---|---|---|---|
| AKENERJI | 16 | 112 | 114 | 93 | 93 | 48 | 70 |
| AKBANK | 31597 | 615 | 647 | 737 | 743 | 732 | 793 |
| AKSA | 24321 | 878 | 803 | 778 | 709 | 866 | 868 |
| AKSIGORTA | 9048 | 584 | 636 | 577 | 599 | 611 | 604 |
| ALARKO HOLDING | 4037884 | 1222 | 1252 | 1247 | 1576 | 1605 | 1637 |
| ANADOLU EFES | 48 | 76 | 82 | 105 | 79 | 53 | 53 |
| ARCELIK | 578433 | 1022 | 984 | 1029 | 1088 | 965 | 948 |
| DOGAN HOLDING | 14326 | 858 | 879 | 959 | 923 | 855 | 1232 |
| DOGAN YAYIN HOL. | 275 | 339 | 321 | 338 | 340 | 412 | 396 |
| ENKA INSAAT | 3188066 | 1027 | 979 | 930 | 1149 | 1148 | 1159 |
| EREGLI DEMIR CELIK | 63040 | 957 | 892 | 883 | 934 | 920 | 909 |
| FORD OTOSAN | 2444344 | 1075 | 1125 | 1142 | 1299 | 1204 | 1472 |
| GARANTI | 83520 | 1000 | 984 | 1110 | 1103 | 1029 | 1039 |
| IS GMYO | -68 | -72 | -54 | -15 | -35 | -43 | -60 |
| KOC HOLDING | 1605539 | 1264 | 1294 | 1412 | 1631 | 1585 | 1584 |
| NETAS TELEKOM | 13076 | 707 | 801 | 948 | 900 | 944 | 927 |
| PETKIM | 34910 | 1023 | 880 | 835 | 894 | 772 | 744 |
| SABANCI HOLDING | 1181 | 443 | 422 | 330 | 407 | 358 | 357 |
| SISECAM | 29633 | 1058 | 1016 | 1051 | 984 | 1108 | 1075 |
| TANSAS | 2360 | 659 | 792 | 812 | 902 | 963 | 809 |
| TOFAS OTO FABRIKA | 20349 | 849 | 779 | 813 | 997 | 1020 | 1243 |
| TRAKYA CAM | 98849 | 862 | 829 | 836 | 802 | 782 | 871 |
| YAPI KREDI | 347253 | 1170 | 1262 | 1252 | 1283 | 1295 | 1235 |
| HURRIYET | 192124 | 624 | 610 | 650 | 561 | 634 | 606 |
| IS BANKASI | 71619 | 585 | 711 | 760 | 706 | 706 | 677 |
| MIGROS | 1036169 | 754 | 728 | 788 | 762 | 877 | 838 |
| PETROL OFISI | 159948 | 831 | 749 | 791 | 824 | 782 | 770 |
| TURKCELL | -35 | 12 | -38 | -38 | -39 | -43 | -61 |
| TUPRAS | 182503 | 931 | 912 | 871 | 873 | 907 | 854 |
| VESTEL | 19229 | 670 | 624 | 602 | 562 | 558 | 539 |

## Appendix 8: DESKRIPTIVE STATISTICS

| daily adj. data | Buy/Hold Strategy (%) | 0.5%F | 1%F | 1.5%F | 2%F | 2.5%F | 3%F | 3.5%F |
|---|---|---|---|---|---|---|---|---|
| Mean | 54904348% | 96248% | 96565% | 99061% | 100557% | 94439% | 96391% | 98878% |
| Median | 2963300% | 58300% | 58300% | 57500% | 59000% | 60700% | 68000% | 66900% |
| Mode | #N/A | 372 | 743 | #N/A | #N/A | #N/A | #N/A | #N/A |
| Standard Dev. | 113953699% | 179282% | 179409% | 181215% | 177879% | 175175% | 175527% | 175052% |
| Variance | 129854454995708% | 321420181% | 321874969% | 328390207% | 316410535% | 306864252% | 308097481% | 306431827% |
| Kurtosis | 406% | 1970% | 1960% | 1939% | 1921% | 2109% | 2108% | 2092% |
| Skewness | 223% | 432% | 430% | 427% | 424% | 451% | 450% | 447% |
| Minimum | -6800% | -5800% | -5800% | -7800% | -9600% | -10200% | -7300% | -9600% |
| Maximum | 403788400% | 891500% | 891500% | 900100% | 885300% | 883000% | 886400% | 885400% |
| Sum | 1262800000% | 2213700% | 2221000% | 2278400% | 2312800% | 2172100% | 2217000% | 2274200% |
| Count | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| weekly adj. data | Buy/Hold Strategy (%) | 0.5%F | 1%F | 1.5%F | 2%F | 2.5%F | 3%F | 3.5%F |
| Mean | 23736529% | 65171% | 65086% | 63829% | 66329% | 70871% | 72929% | 70886% |
| Median | 15994800% | 74000% | 73400% | 75500% | 79700% | 85400% | 81000% | 80400% |
| Mode | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Standard Dev. | 36068260% | 36150% | 36126% | 35217% | 34962% | 37697% | 34286% | 33648% |
| Variance | 13009193674024% | 13068190% | 13051048% | 12402057% | 12223124% | 14210457% | 11755224% | 11321881% |
| Kurtosis | 600% | 14% | 14% | 42% | 22% | 7% | 228% | 281% |
| Skewness | 239% | -78% | -77% | -27% | -67% | -92% | -155% | -159% |
| Minimum | -3500% | 3600% | 3600% | 6300% | 6300% | 5100% | 5100% | 3300% |
| Maximum | 103616900% | 110800% | 110800% | 116600% | 111800% | 113200% | 103300% | 104400% |
| Sum | 166155700% | 456200% | 455600% | 446800% | 464300% | 496100% | 510500% | 496200% |
| Count | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |

| daily adj. data | Buy/Hold Strategy (%) | 4%F | 4.5%F | 5%F | 5.5%F | 6%F | 6.5%F | 7%F |
|---|---|---|---|---|---|---|---|---|
| Mean | 54904348% | 66226% | 69104% | 73883% | 75822% | 79935% | 79457% | 77800% |
| Median | 2963300% | 67400% | 76800% | 87000% | 89900% | 90300% | 85400% | 84900% |
| Mode | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Standard Dev. | 113953699% | 35869% | 37558% | 36819% | 37329% | 40223% | 40757% | 37918% |
| Variance | 129854454995708% | 12866147% | 14106323% | 13556242% | 13934418% | 16178987% | 16611217% | 14377982% |
| Kurtosis | 406% | -28% | -44% | -1% | -17% | -27% | -46% | -8% |
| Skewness | 223% | -57% | -45% | -85% | -80% | -70% | -66% | -77% |
| Minimum | -6800% | -7000% | -4900% | -5200% | -3400% | -4900% | -3100% | -3500% |
| Maximum | 403788400% | 123500% | 123800% | 124800% | 130800% | 139100% | 138500% | 131300% |
| Sum | 1262800000% | 1523200% | 1589400% | 1699300% | 1743900% | 1838500% | 1827500% | 1789400% |
| Count | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| weekly adj. data | Buy/Hold Strategy (%) | 4%F | 4.5%F | 5%F | 5.5%F | 6%F | 6.5%F | 7%F |
| Mean | 23736529% | 69814% | 67529% | 69529% | 67029% | 70557% | 65029% | 64671% |
| Median | 15994800% | 74600% | 81300% | 81900% | 78400% | 78600% | 71600% | 70400% |
| Mode | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Standard Dev. | 36068260% | 31499% | 31584% | 32311% | 31709% | 33420% | 29599% | 29857% |
| Variance | 13009193674024% | 9921648% | 9975657% | 10440057% | 10054724% | 11169095% | 8761057% | 8914590% |
| Kurtosis | 600% | 443% | 369% | 380% | 326% | 336% | 522% | 470% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Skewness | 239% | -189% | -192% | -193% | -178% | -172% | -207% | -194% |
| Minimum | -3500% | 3300% | 1700% | 2000% | 2000% | 2000% | 1200% | 1200% |
| Maximum | 103616900% | 101200% | 90800% | 93400% | 94400% | 98700% | 95300% | 95300% |
| Sum | 166155700% | 488700% | 472700% | 486700% | 469200% | 493900% | 455200% | 452700% |
| Count | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |

| daily adj. data | Buy/Hold Strategy (%) | 7.5%F | 8%F | 8.5%F | 9%F | 9.5%F | 10%F |
|---|---|---|---|---|---|---|---|
| Mean | 54904348% | 61680% | 65309% | 69084% | 70844% | 72366% | 70605% |
| Median | 2963300% | 67200% | 80000% | 81900% | 83000% | 86300% | 79200% |
| Mode | #N/A | #N/A | 1229 | #N/A | #N/A | #N/A | #N/A |
| Standard Dev. | 113953699% | 36604% | 38220% | 38876% | 39396% | 41535% | 41822% |
| Variance | 12985445499570 8% | 13398575% | 14607377% | 15113567% | 15520546% | 17251445% | 17490698% |
| Kurtosis | 406% | -61% | -48% | -33% | -41% | -46% | -66% |
| Skewness | 223% | -65% | -60% | -80% | -74% | -55% | -46% |
| Minimum | -6800% | -7027% | -4874% | -5213% | -3348% | -4928% | -3121% |
| Maximum | 403788400% | 112100% | 122900% | 124400% | 130400% | 138700% | 138100% |
| Sum | 1262800000% | 1295277% | 1371482% | 1450765% | 1487731% | 1519688% | 1482712% |
| Count | 23 | 23 | 23 | 23 | 23 | 23 | 23 |

| weekly adj. data | Buy/Hold Strategy (%) | 7.5%F | 8%F | 8.5%F | 9%F | 9.5%F | 10%F |
|---|---|---|---|---|---|---|---|
| Mean | 23736529% | 62957% | 61371% | 63200% | 60700% | 63157% | 60329% |
| Median | 15994800% | 67000% | 71100% | 76000% | 70600% | 70600% | 67700% |
| Mode | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Standard Dev. | 36068260% | 29776% | 30404% | 30910% | 30907% | 32268% | 31533% |
| Variance | 13009193674024% | 8866029% | 9244224% | 9554100% | 9552133% | 10412162% | 9943190% |
| Kurtosis | 600% | 384% | 492% | 515% | 391% | 394% | 416% |
| Skewness | 239% | -175% | -204% | -219% | -187% | -186% | -193% |
| Minimum | -3500% | 1200% | -3800% | -3800% | -3900% | -4300% | -6100% |
| Maximum | 103616900% | 93100% | 91200% | 87100% | 87300% | 90700% | 85400% |
| Sum | 166155700% | 440700% | 429600% | 442400% | 424900% | 442100% | 422300% |
| Count | 7 | 7 | 7 | 7 | 7 | 7 | 7 |

## Appendix 9: COMPANIES EXCEEDING and NOT EXCEEDING BUY – HOLD STRATEGY BASED ON FILTER – TRADING

| Companies | 0.5%F | 1%F | 1.5%F | 2%F | 2.5%F | 3%F | 3.5%F | 4%F | 4.5%F | 5%F |
|---|---|---|---|---|---|---|---|---|---|---|
| AKENERJI | + | + | + | - | - | - | - | - | + | + |
| AKBANK | - | - | - | - | - | - | - | - | - | - |
| AKSA | - | - | - | - | - | - | - | - | - | - |
| AKSIGORTA | - | - | - | - | - | - | - | - | - | - |
| ALARKO HOLDING | - | - | - | - | - | - | - | - | - | - |
| ANADOLU EFES | + | + | + | + | + | + | + | - | - | - |
| ARCELIK | - | - | - | - | - | - | - | - | - | - |
| DOGAN HOLDING | - | - | - | - | - | - | - | - | - | - |
| DOGAN YAYIN HOL. | - | - | - | - | + | + | + | + | + | + |
| HURRIYET | - | - | - | - | - | - | - | - | - | - |
| EREGLI DEMIR CELIK | - | - | - | - | - | - | - | - | - | - |
| FORD OTOSAN | - | - | - | - | - | - | - | - | - | - |
| GARANTI | - | - | - | - | - | - | - | - | - | - |
| IS GMYO | + | + | - | - | - | - | - | - | + | + |
| KOC HOLDING | - | - | - | - | - | - | - | - | - | - |
| NETAS TELEKOM | - | - | - | - | - | - | - | - | - | - |
| PETKIM | - | - | - | - | - | - | - | - | - | - |
| SABANCI HOLDING | - | - | - | - | - | - | - | - | - | - |
| SISECAM | - | - | - | - | - | - | - | - | - | - |
| TANSAS | - | - | - | - | - | - | - | - | - | - |
| TOFAS OTO FABRIKA | - | - | - | - | - | - | - | - | - | - |
| TRAKYA CAM | - | - | - | - | - | - | - | - | - | - |
| YAPI KREDI | - | - | - | - | - | - | - | - | - | - |
| Number 0f + (daily) | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 1 | 3 | 3 |
| % of + (daily) | 13% | 13% | 9% | 4% | 9% | 9% | 9% | 4% | 13% | 13% |
| Number 0f - (daily) | 20 | 20 | 21 | 22 | 21 | 21 | 21 | 22 | 20 | 20 |
| % of - (daily) | 87% | 87% | 91% | 96% | 91% | 91% | 91% | 96% | 87% | 87% |
| HURRIYET | - | - | - | - | - | - | - | - | - | - |
| IS BANKASI | - | - | - | - | - | - | - | - | - | - |
| MIGROS | - | - | - | - | - | - | - | - | - | - |
| PETROL OFISI | - | - | - | - | - | - | - | - | - | - |
| TURKCELL | + | + | + | + | + | + | + | + | + | + |
| TUPRAS | - | - | - | - | - | - | - | - | - | - |
| VESTEL | - | - | - | - | - | - | - | - | - | - |
| Number 0f + (weekly) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| % of + (weekly) | 14% | 14% | 14% | 14% | 14% | 14% | 14% | 14% | 14% | 14% |
| Number 0f - (weekly) | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| % of - (weekly) | 86% | 86% | 86% | 86% | 86% | 86% | 86% | 86% | 86% | 86% |
| Number 0f + (total) | 4 | 4 | 3 | 2 | 3 | 3 | 3 | 2 | 4 | 4 |
| Number 0f - (total) | 26 | 26 | 27 | 28 | 27 | 27 | 27 | 28 | 26 | 26 |

| Companies | 5.5%F | 6%F | 6.5%F | 7%F | 7.5%F | 8%F | 8.5%F | 9%F | 9.5%F | 10%F |
|---|---|---|---|---|---|---|---|---|---|---|
| AKENERJI | + | + | + | + | + | + | + | + | + | + |
| AKBANK | - | - | - | - | - | - | - | - | - | - |
| AKSA | - | - | - | - | - | - | - | - | - | - |
| AKSIGORTA | - | - | - | - | - | - | - | - | - | - |
| ALARKO HOLDING | - | - | - | - | - | - | - | - | - | - |
| ANADOLU EFES | + | + | + | + | + | + | + | + | + | + |
| ARCELIK | - | - | - | - | - | - | - | - | - | - |
| DOGAN HOLDING | - | - | - | - | - | - | - | - | - | - |
| DOGAN YAYIN HOL. | + | + | + | + | + | + | + | + | + | + |
| ENKA INSAAT | - | - | - | - | - | - | - | - | - | - |
| EREGLI DEMIR CELIK | - | - | - | - | - | - | - | - | - | - |
| FORD OTOSAN | - | - | - | - | - | - | - | - | - | - |
| GARANTI | - | - | - | - | - | - | - | - | - | - |
| IS GMYO | + | + | + | + | - | + | + | + | + | + |
| KOC HOLDING | - | - | - | - | - | - | - | - | - | - |
| NETAS TELEKOM | - | - | - | - | - | - | - | - | - | - |
| PETKIM | - | - | - | - | - | - | - | - | - | - |
| SABANCI HOLDING | - | - | - | - | - | - | - | - | - | - |
| SISECAM | - | - | - | - | - | - | - | - | - | - |
| TANSAS | - | - | - | - | - | - | - | - | - | - |
| TOFAS OTO FABRIKA | - | - | - | - | - | - | - | - | - | - |
| TRAKYA CAM | - | - | - | - | - | - | - | - | - | - |
| YAPI KREDI | - | - | - | - | - | - | - | - | - | - |
| Number 0f + (daily) | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| % of + (daily) | 17% | 17% | 17% | 17% | 13% | 17% | 17% | 17% | 17% | 17% |
| Number 0f - (daily) | 19 | 19 | 19 | 19 | 20 | 19 | 19 | 19 | 19 | 19 |
| % of - (daily) | 83% | 83% | 83% | 83% | 87% | 83% | 83% | 83% | 83% | 83% |
| HURRIYET | - | - | - | - | - | - | - | - | - | - |
| IS BANKASI | - | - | - | - | - | - | - | - | - | - |
| MIGROS | - | - | - | - | - | - | - | - | - | - |
| PETROL OFISI | + | + | + | + | + | - | - | - | - | - |
| TURKCELL | + | + | + | + | + | - | - | - | - | - |
| TUPRAS | - | - | - | - | - | - | - | - | - | - |
| VESTEL | - | - | - | - | - | - | - | - | - | - |
| Number 0f + (weekly) | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| % of + (weekly) | 29% | 29% | 29% | 29% | 29% | 0% | 0% | 0% | 0% | 0% |
| Number 0f - (weekly) | 5 | 5 | 5 | 5 | 5 | 7 | 7 | 7 | 7 | 7 |
| % of - (weekly) | 71% | 71% | 71% | 71% | 71% | 100% | 100% | 100% | 100% | 100% |
| Number 0f + (total) | 6 | 6 | 6 | 6 | 5 | 4 | 4 | 4 | 4 | 4 |
| Number 0f - (total) | 24 | 24 | 24 | 24 | 25 | 26 | 26 | 26 | 26 | 26 |

## Appendix 10: The COMPARISON of 'BUY – and – HOLD' STRATEGY with 'FILTER - TRADING' (time interval: 01/2000 – 08/2002)

| Companies | Buy/Hold Strategy (%) | 0.5%F | 1%F | 1.5%F | 2%F | 2.5%F | 3%F | 3.5%F |
|---|---|---|---|---|---|---|---|---|
| AKENERJI | 16 | 46 | 43 | 20 | 11 | -5 | 7 | -70 |
| AKBANK | -12 | 45 | 43 | 55 | 52 | 29 | 11 | 17 |
| AKSA | 27 | 25 | 25 | 64 | -10 | 9 | 17 | 25 |
| AKSIGORTA | -13 | 40 | 38 | 76 | 15 | 58 | 53 | 26 |
| ALARKO HOLDING | -21 | -28 | 8 | 34 | 18 | -1 | 5 | -53 |
| ANADOLU EFES | 48 | 97 | 117 | 71 | 73 | 61 | 73 | 81 |
| ARCELIK | 10 | -61 | -61 | -78 | 6 | 94 | 80 | 166 |
| DOGAN HOLDING | -66 | -99 | -99 | -20 | -3 | -20 | -10 | -62 |
| DOGAN YAYIN HOL. | -22 | 94 | 105 | 106 | 165 | 247 | 211 | 202 |
| ENKA INSAAT | 96 | -18 | 0 | 64 | 120 | 93 | 79 | 95 |
| EREGLI DEMIR CELIK | -24 | -75 | -75 | 1 | -21 | -69 | -74 | -52 |
| FORD OTOSAN | 45 | 59 | 59 | 37 | 28 | 31 | 78 | 51 |
| GARANTI | -43 | 47 | 58 | 7 | 55 | 51 | -33 | -10 |
| IS GMYO | -68 | -58 | -58 | -78 | -96 | -102 | -73 | -96 |
| KOC HOLDING | -8 | 76 | 83 | 88 | -29 | -31 | -29 | 0 |
| NETAS TELEKOM | -66 | 16 | 28 | 66 | 30 | 67 | 82 | 48 |
| PETKIM | -62 | -129 | -129 | -100 | -52 | -55 | -57 | -100 |
| SABANCI HOLDING | -24 | -37 | -37 | -41 | -36 | -18 | -34 | 29 |
| SISECAM | -52 | -7 | -17 | 4 | -22 | -47 | -43 | -10 |
| TANSAS | -78 | 12 | 12 | -33 | 12 | 73 | 94 | 133 |
| TOFAS OTO FABRIKA | 49 | 65 | 59 | 124 | 97 | 117 | 135 | 150 |
| TRAKYA CAM | 41 | 10 | 10 | 10 | 22 | 24 | 46 | 94 |
| YAPI KREDI | -69 | -54 | -54 | 4 | 6 | 32 | 11 | 9 |
| HURRIYET | 92 | 139 | 139 | 90 | 102 | 102 | 102 | 87 |
| IS BANKASI | -49 | -21 | -21 | 36 | -3 | -3 | -11 | -11 |
| MIGROS | -29 | -11 | -11 | 10 | 10 | 13 | 0 | 0 |
| PETROL OFISI | -42 | 75 | 75 | 63 | 86 | 86 | 77 | 98 |
| TURKCELL | -35 | 36 | 36 | 63 | 63 | 51 | 51 | 33 |
| TUPRAS | -51 | -21 | -21 | -19 | 18 | 12 | 10 | 10 |
| VESTEL | -22 | 117 | 117 | 101 | 134 | 136 | 132 | 89 |

| Companies | Buy/Hold Strategy (%) | 4%F | 4.5%F | 5%F | 5.5%F | 6%F | 6.5%F | 7%F |
|---|---|---|---|---|---|---|---|---|
| AKENERJI | 16 | 6 | 35 | 52 | 38 | 59 | 49 | 48 |
| AKBANK | -12 | 0 | -2 | 40 | 35 | 17 | 34 | 73 |
| AKSA | 27 | 51 | 136 | 152 | 180 | 174 | 167 | 164 |
| AKSIGORTA | -13 | -9 | -19 | -17 | -13 | -16 | -31 | -12 |
| ALARKO HOLDING | -21 | -61 | -25 | 9 | 71 | 53 | 61 | 99 |
| ANADOLU EFES | 48 | 32 | 30 | 29 | 107 | 116 | 75 | 119 |
| ARCELIK | 10 | 155 | 131 | 136 | 141 | 136 | 96 | 106 |
| DOGAN HOLDING | -66 | -89 | 1 | -59 | -6 | -25 | -18 | 48 |
| DOGAN YAYIN HOL. | -22 | 171 | 132 | 74 | 99 | 53 | 97 | 94 |
| ENKA INSAAT | 96 | 130 | 137 | 98 | 108 | 142 | 88 | 46 |
| EREGLI DEMIR CELIK | -24 | -51 | -25 | -27 | -9 | 22 | 14 | 15 |
| FORD OTOSAN | 45 | 53 | 67 | 67 | 67 | 106 | 99 | 89 |
| GARANTI | -43 | -21 | -12 | 33 | 92 | 148 | 174 | 195 |
| IS GMYO | -68 | -70 | -49 | -52 | -34 | -49 | -31 | -35 |
| KOC HOLDING | -8 | 79 | 55 | 37 | 39 | 35 | 61 | 42 |
| NETAS TELEKOM | -66 | -19 | -15 | 39 | 117 | 133 | 132 | 119 |
| PETKIM | -62 | -104 | -52 | -59 | -71 | 7 | -3 | 36 |
| SABANCI HOLDING | -24 | 78 | 55 | 59 | 88 | 113 | 107 | 78 |
| SISECAM | -52 | -37 | -25 | 26 | 59 | 71 | 43 | 57 |
| TANSAS | -78 | 149 | 76 | 76 | 111 | 150 | 122 | 160 |
| TOFAS OTO FABRIKA | 49 | 149 | 67 | 72 | 64 | 95 | 118 | 88 |
| TRAKYA CAM | 41 | 137 | 144 | 131 | 130 | 157 | 144 | 118 |
| YAPI KREDI | -69 | 8 | 141 | 75 | 47 | 87 | 128 | 125 |
| HURRIYET | 92 | 79 | 79 | 116 | 118 | 86 | 74 | 102 |
| IS BANKASI | -49 | -15 | 2 | 27 | 54 | 52 | 45 | 29 |
| MIGROS | -29 | -5 | -6 | -9 | -10 | -14 | -36 | -26 |
| PETROL OFISI | -42 | 79 | 79 | 79 | 81 | 34 | 34 | 50 |
| TURKCELL | -35 | 33 | 17 | 20 | 20 | 20 | 12 | 12 |
| TUPRAS | -51 | 47 | 49 | 71 | 59 | 75 | 44 | 35 |
| VESTEL | -22 | 65 | 62 | 98 | 62 | 88 | 56 | 33 |

| Companies | Buy/Hold Strategy (%) | 7.5%F | 8%F | 8.5%F | 9%F | 9.5%F | 10%F |
|---|---|---|---|---|---|---|---|
| AKENERJI | 16 | 112 | 114 | 93 | 93 | 48 | 70 |
| AKBANK | -12 | 100 | 115 | 130 | 108 | 65 | 76 |
| AKSA | 27 | 165 | 129 | 136 | 119 | 113 | 107 |
| AKSIGORTA | -13 | -18 | 27 | 3 | 17 | 31 | 29 |
| ALARKO HOLDING | -21 | 111 | 91 | 74 | 61 | 50 | 49 |
| ANADOLU EFES | 48 | 76 | 82 | 105 | 79 | 53 | 53 |
| ARCELIK | 10 | 90 | 73 | 118 | 142 | 102 | 100 |
| DOGAN HOLDING | -66 | 84 | 144 | 148 | 124 | 102 | 129 |
| DOGAN YAYIN HOL. | -22 | 88 | 78 | 95 | 78 | 118 | 106 |
| ENKA INSAAT | 96 | 106 | 91 | 104 | 91 | 58 | 63 |
| EREGLI DEMIR CELIK | -24 | 6 | 7 | -1 | 13 | 16 | 19 |
| FORD OTOSAN | 45 | 54 | 43 | 24 | 12 | 22 | 22 |
| GARANTI | -43 | 221 | 205 | 192 | 156 | 130 | 70 |
| IS GMYO | -68 | -72 | -54 | -15 | -35 | -43 | -60 |
| KOC HOLDING | -8 | 18 | 7 | 124 | 121 | 115 | 127 |
| NETAS TELEKOM | -66 | 131 | 142 | 149 | 124 | 98 | 88 |
| PETKIM | -62 | 9 | 6 | 44 | 34 | 32 | 8 |
| SABANCI HOLDING | -24 | 57 | 69 | 46 | 80 | 49 | 59 |
| SISECAM | -52 | 39 | 33 | 9 | -54 | -17 | -13 |
| TANSAS | -78 | 154 | 143 | 98 | 125 | 177 | 92 |
| TOFAS OTO FABRIKA | 49 | 77 | 76 | 54 | 114 | 131 | 95 |
| TRAKYA CAM | 41 | 132 | 129 | 134 | 74 | 77 | 85 |
| YAPI KREDI | -69 | 104 | 92 | 81 | 37 | 44 | 39 |
| HURRIYET | 92 | 102 | 179 | 181 | 165 | 144 | 115 |
| IS BANKASI | -49 | 29 | -5 | -5 | -7 | -18 | -32 |
| MIGROS | -29 | -31 | -18 | -18 | -18 | -18 | -27 |
| PETROL OFISI | -42 | 55 | 28 | 14 | 27 | 14 | 2 |
| TURKCELL | -35 | 12 | -38 | -38 | -39 | -43 | -61 |
| TUPRAS | -51 | 23 | 9 | -9 | -13 | -15 | -34 |
| VESTEL | -22 | 33 | 41 | -1 | -1 | -1 | -1 |

## Appendix 11: COMPANIES EXCEEDING and NOT EXCEEDING BUY – HOLD STRATEGY BASED ON FILTER – TRADING

| Companies | 0.5%F | 1%F | 1.5%F | 2%F | 2.5%F | 3%F | 3.5%F | 4%F | 4.5%F | 5%F |
|---|---|---|---|---|---|---|---|---|---|---|
| AKENERJI | + | + | + | - | - | - | - | - | + | + |
| AKBANK | + | + | + | + | + | + | + | + | + | + |
| AKSA | - | - | + | - | - | - | - | + | + | + |
| AKSIGORTA | + | + | + | + | + | + | + | + | - | - |
| ALARKO HOLDING | - | + | + | + | + | + | - | - | - | + |
| ANADOLU EFES | + | + | + | + | + | + | + | - | - | - |
| ARCELIK | - | - | - | - | + | + | + | + | + | + |
| DOGAN HOLDING | - | - | + | + | + | + | + | - | + | + |
| DOGAN YAYIN HOL. | + | + | + | + | + | + | + | + | + | + |
| ENKA INSAAT | - | - | - | + | - | - | - | + | + | + |
| EREGLI DEMIR CELIK | - | - | + | + | - | - | - | - | - | - |
| FORD OTOSAN | + | + | - | - | - | + | + | + | + | + |
| GARANTI | + | + | + | + | + | + | + | + | + | + |
| IS GMYO | + | + | - | - | - | - | - | - | + | + |
| KOC HOLDING | + | + | + | - | - | - | + | + | + | + |
| NETAS TELEKOM | + | + | + | + | + | + | + | + | + | + |
| PETKIM | - | - | - | + | + | + | - | - | + | + |
| SABANCI HOLDING | - | - | - | - | + | - | + | + | + | + |
| SISECAM | + | + | + | + | + | + | + | + | + | + |
| TANSAS | + | + | + | + | + | + | + | + | + | + |
| TOFAS OTO FABRIKA | + | + | + | + | + | + | + | + | + | + |
| TRAKYA CAM | - | - | - | - | - | + | + | + | + | + |
| YAPI KREDI | + | + | + | + | + | + | + | + | + | + |
| Number 0f + (daily) | 14 | 15 | 16 | 15 | 15 | 16 | 16 | 16 | 19 | 20 |
| % of + (daily) | 61% | 65% | 70% | 65% | 65% | 70% | 70% | 70% | 83% | 87% |
| Number 0f - (daily) | 9 | 8 | 7 | 8 | 8 | 7 | 7 | 7 | 4 | 3 |
| % of - (daily) | 39% | 35% | 30% | 35% | 35% | 30% | 30% | 30% | 17% | 13% |
| HURRIYET | + | + | - | + | + | + | - | - | - | + |
| IS BANKASI | + | + | + | + | + | + | + | + | + | + |
| MIGROS | + | + | + | + | + | + | + | + | + | + |
| PETROL OFISI | + | + | + | + | + | + | + | + | + | + |
| TURKCELL | + | + | + | + | + | + | + | + | + | + |
| TUPRAS | + | + | + | + | + | + | + | + | + | + |
| VESTEL | + | + | + | + | + | + | + | + | + | + |
| Number 0f + (weekly) | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 6 | 6 | 7 |
| % of + (weekly) | 100% | 100% | 86% | 100% | 100% | 100% | 86% | 86% | 86% | 100% |
| Number 0f - (weekly) | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| % of - (weekly) | 0% | 0% | 14% | 0% | 0% | 0% | 14% | 14% | 14% | 0% |
| Number 0f + (total) | 21 | 22 | 22 | 22 | 22 | 23 | 22 | 22 | 25 | 27 |
| Number 0f - (total) | 9 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 5 | 3 |

| Companies | 5.5%F | 6%F | 6.5%F | 7%F | 7.5%F | 8%F | 8.5%F | 9%F | 9.5%F | 10%F |
|---|---|---|---|---|---|---|---|---|---|---|
| AKENERJI | + | + | + | + | + | + | + | + | + | + |
| AKBANK | + | + | + | + | + | + | + | + | + | + |
| AKSA | + | + | + | + | + | + | + | + | + | + |
| AKSIGORTA | 0 | - | - | + | - | + | + | + | + | + |
| ALARKO HOLDING | + | + | + | + | + | + | + | + | + | + |
| ANADOLU EFES | + | + | + | + | + | + | + | + | + | + |
| ARCELIK | + | + | + | + | + | + | + | + | + | + |
| DOGAN HOLDING | + | + | + | + | + | + | + | + | + | + |
| DOGAN YAYIN HOL. | + | + | + | + | + | + | + | + | + | + |
| ENKA INSAAT | + | + | - | - | + | - | + | - | - | - |
| EREGLI DEMIR CELIK | + | + | + | + | + | + | + | + | + | + |
| FORD OTOSAN | + | + | + | + | + | - | - | - | - | - |
| GARANTI | + | + | + | + | + | + | + | + | + | + |
| IS GMYO | + | + | + | + | - | + | + | + | + | + |
| KOC HOLDING | + | + | + | + | + | + | + | + | + | + |
| NETAS TELEKOM | + | + | + | + | + | + | + | + | + | + |
| PETKIM | - | + | + | + | + | + | + | + | + | + |
| SABANCI HOLDING | + | + | + | + | + | + | + | + | + | + |
| SISECAM | + | + | + | + | + | + | + | - | + | + |
| TANSAS | + | + | + | + | + | + | + | + | + | + |
| TOFAS OTO FABRIKA | + | + | + | + | + | + | + | + | + | + |
| TRAKYA CAM | + | + | + | + | + | + | + | + | + | + |
| YAPI KREDI | + | + | + | + | + | + | + | + | + | + |
| Number 0f + (daily) | 21 | 22 | 21 | 22 | 21 | 21 | 22 | 20 | 21 | 21 |
| % of + (daily) | 91% | 96% | 91% | 96% | 91% | 91% | 96% | 87% | 91% | 91% |
| Number 0f - (daily) | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 3 | 2 | 2 |
| % of - (daily) | 4% | 4% | 9% | 4% | 9% | 9% | 4% | 13% | 9% | 9% |
| HURRIYET | + | - | - | + | + | + | + | + | + | + |
| IS BANKASI | + | + | + | + | + | + | + | + | + | + |
| MIGROS | + | + | - | + | - | + | + | + | + | + |
| PETROL OFISI | + | + | + | + | + | + | + | + | + | + |
| TURKCELL | + | + | + | + | + | - | - | - | - | - |
| TUPRAS | + | + | + | + | + | + | + | + | + | + |
| VESTEL | + | + | + | + | + | + | + | + | + | + |
| Number 0f + (weekly) | 7 | 6 | 5 | 7 | 6 | 6 | 6 | 6 | 6 | 6 |
| % of + (weekly) | 100% | 86% | 71% | 100% | 86% | 86% | 86% | 86% | 86% | 86% |
| Number 0f - (weekly) | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| % of - (weekly) | 0% | 14% | 29% | 0% | 14% | 14% | 14% | 14% | 14% | 14% |
| Number 0f + (total) | 28 | 28 | 26 | 29 | 27 | 27 | 28 | 26 | 27 | 27 |
| Number 0f - (total) | 1 | 2 | 4 | 1 | 3 | 3 | 2 | 4 | 3 | 3 |