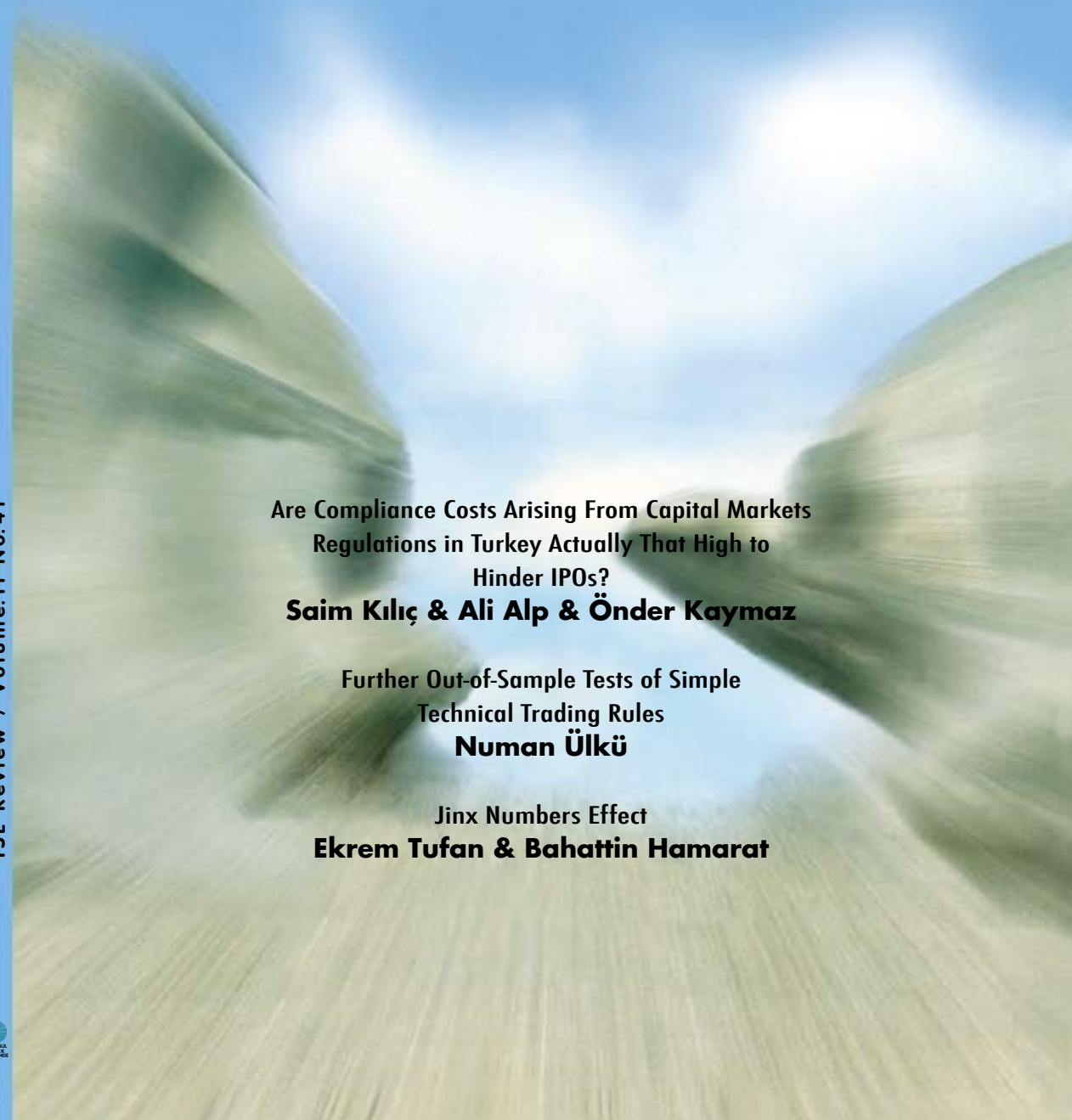
ISE REVIEW
Istanbul Stock Exchange

ISSN 1301-1642

Volume: 11 No: 41



ISE Review / Volume:11 No:41

The ISE Review

Quarterly Economics and Finance Review

Editorial Production & Printing
İMAK OFSET
Merkez Mah. Atatürk
Cad. Göl Sokak No: 1
Yenibosna/İSTANBUL
Tel: 0212 656 49 97
Fax: 0212 656 29 26
www.imakofset.com.tr

Print Date: May 2009

This review is published quarterly. Due to its legal status, the Istanbul Stock Exchange is exempt from corporate tax.
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Objectives and Contents

The ISE Review is a journal published quarterly by the Istanbul Stock Exchange (ISE). Theoretical and empirical articles examining primarily the capital markets and securities exchanges as well as economics, money, banking and other financial subjects constitute the scope of this journal. The ISE and global securities market performances and book reviews will also be featuring, on merits, within the coverage of this publication.

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    -Articles:
    [9]Harvey, Campbell R., “The World Price of Covariance Risk,” The Journal of Finance, Vol.XLVI, No.1, March 1991, pp. 11-157.
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The ISE Review Price and Payment Information:
Hard Copy US$ 7.5 per copy (Issue No. 41)
Wire transfer to T. İş Bankası Borsa Branch

Account No. 1125 4599 (US$ account)
Please write the name of the publication and send us a copy of the receipt. Please do not send cash.

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The ISE Review

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The ISE Review is included in the "World Banking Abstracts" Index published by the Institute of European Finance (IEF) since 1997, in the Econlit (Jel on CD) Index published by the American Economic Association (AEA) as of July 2000, and in the TÜBİTAK-ULAKBİM Social Science Database since 2005.

The ISE Review Volume: 11 No:41
ISSN 1301-1642 ©ISE 1997

ARE COMPLIANCE COSTS ARISING FROM CAPITAL MARKETS REGULATIONS IN TURKEY ACTUALLY THAT HIGH TO HINDER IPOs?

Saim KILIÇ[*]
Ali ALP[**]
Önder KAYMAZ[***]

Abstract

In this study, the costs arising from compliance with the disclosure and reporting obligations in the Capital Markets Regulations of 610 public companies registered at the Capital Markets Board, have been measured by exploiting the Standard Cost Model which is an internationally recognized approach. 335 of these public companies are the listed ones whose stocks are traded in the stock exchange, and the resting 275 companies are the non-listed ones whose stocks are not traded in the stock exchange market. Accordingly, as for the year 2007, the average compliance cost per public company has been estimated to be 254 thousand Turkish lira for the listed companies and 20 thousand Turkish lira for the non-listed companies. When the results of the study are evaluated together with the other findings, the assertion suggesting that costs arising in compliance with capital markets regulations, compliance costs, constitute an obstacle for the companies that are willing to go public is shown to be invalid.

I. Introduction

The regulation issue has become one of the most debated topics by both academicians and implementers in the recent years. Studies done so far show

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The authors write here in a personal capacity and the views expressed in this paper are not necessarily those of the Capital Markets Board of Turkey.

Keywords: Capital Market Regulations, Public Companies, Regulation Costs, Standard Cost Model, Compliance Costs
JEL Classification: G-28, K-23, L-51

that costs burdened by regulations on the public and the concerning sectors are of a large economic magnitude. According to a research in the U.S., the total annual costs arising owing to the regulations correspond to approximately 10-12% of its GDP (Kılıç, Alp and Kaymaz, 2008; BRTF, 2005; Ekici, 2006). The fact that costs arising from regulations reach significant amounts have been set forth in some academic studies has led the way for the development of cost-saving policies for the sectors such as financial markets in particular where regulations heavily take place (Kılıç, Alp and Kaymaz, 2008; Kılıç, 2008).

One of the policies built in this area is the cost-benefit analysis or with its more common recent expression!, the regulatory impact analysis which is performed whilst new regulations are being made. The cost-benefit analysis is a decision making process which measures possible benefits, costs and other effects of policies proposed among many choices by consulting the opinion of the concerning bodies in a systematic and consistent manner (OECD, 1997; Baldwin and Cave, 1999; OECD, 2004; Dudley, 2005; Kılıç, Alp and Kaymaz, 2008). As a result of this analysis, in case the benefits of the proposed policy get higher than its costs, then its adoption is to be acknowledged. The impact analysis, which was first used in the U.S. and used by many OECD countries including The United Kingdom at the foremost since the 1980s, has turned out to be one of the most important tools of the regulatory reforms (Kılıç, Alp and Kaymaz, 2008).

Another policy tool widely exploited for the purpose of reducing the burden caused by the regulations is the reduction of the compliance costs arising from the obligations such as disclosure and reporting stipulated in the current regulations by measuring them with the Standard Cost Model in line with a targeted goal. The credibility of this model which was used in The Netherlands for the first time has increased in time and it began to be used in countries such as Denmark, The United Kingdom, Belgium, Sweden, Slovenia, Estonia, France, Italy, Hungary, Norway, Poland, and South Africa. The use of this model is recommended by the OECD for its members in measuring the compliance costs (BRTF, 2005; SCM Networks, 2004). Thanks to this model, it has been observed that some significant cost savings have been achieved in the above mentioned countries. For instance, The Netherlands has calculated that it may save 6,7 billion Euros in five years by just spending 35 million

Euros, and The United Kingdom has calculated that it may save 16 billion pounds for the same period by spending just 35 million Pounds (AGPC, 2005; BRTF, 2005; Alp and Kılıç, 2007).

Unlike the practices in foreign countries, in Turkey, it can be said that getting the compliance costs arising from regulations reduced through measuring them along a preset goal has not been sufficiently examined neither by academic communities nor by the regulators. On the other hand, in the last years, it is frequently observed that public companies complain that compliance burdens are high, the statute is not clear and simple enough and there is overregulation. As a matter of fact, in a survey study oriented at the 500 largest companies in Turkey (Sancak, 1999) it has been contended that the reason why these companies have not preferred to go public has been given on the grounds of (i) refraining from regulatory agencies, (ii) hefty costs on compliance with the regulations and (iii) permanent reporting obligation. Therefore, there is a need to investigate whether or not compliance obligations constitute an actual problem in this market. Hence, the objective of this study is to contribute to filling the existing gap in this field in Turkey through the measurement with the Standard Cost Model, the capital markets statute compliance costs of public companies operating in the capital markets, which is one of the industries where regulations are the most frequently observed ones.

Within this scope, the study is composed of six main sections. In the next section, second section, the Standard Cost Model is introduced. In the third section, the scope of the study to be conducted is presented. In the fourth section, how the data set necessary for performing the said study was obtained is explained. In the fifth section, the findings obtained from the measurement results are discussed separately for each indexed and non-indexed companies. Hence the last section concludes with some recommendations.

II. The Standard Cost Model

The Standard Cost Model is a numeric method used for measuring the costs arising due to the obligation on information disclosure and reporting provisioned in the regulations (SCM Networks, 2004).

In order to put forth which type of cost the Standard Cost Model measures in a more downright manner, it would be appropriate, first of all,

to classify the costs burdened on the sectors regulated by the regulations. Regulation costs are split in two as policy costs and compliance costs (BRTF, 2005; Ekici, 2006). *Policy costs* basically consist of two types of costs. The first type of policy costs are the payments which the regulated sectors are obliged to pay to the state or the authorities concerned. For instance, the payment of a fee of two thousandths to the Capital Markets Board for public offerings is such a cost. Again, the certificate fee paid to the Association of Capital Market Intermediary Institutions of Turkey by the people working in the capital markets is cost of this kind. The second type of cost is the long term structural expenses regarding the formation of a suitable structure and system for the implementation of regulations. For instance, the expenditure of related institutions on electronic signature card purchases and the establishment of a system due to the regulation governing the execution of special event announcements in an electronic medium is a type of structural expense. Similarly, the expense made for purchasing an accounting program for preparing some desired charts of mutual funds has a structural characteristic. In this sector, it is relatively easy to measure policy costs, which occur only once. This is because both the payments to the concerning authorities and the expenses for the additional system rely on documents and their amounts can be easily accessed in the records of the institutions in the sector and the related authorities (Kılıç, Alp and Kaymaz, 2008).

The second type of costs incurred by the regulated sectors is compliance costs. The compliance costs may be briefly defined as the costs arising from reporting and disclosure obligations envisaged in the regulations. The European Commission (EC, 2005) defines the compliance costs as "the costs incurred by enterprises, the voluntary sector, public authorities and citizens in meeting legal obligations to provide information on their action or production, either to public authorities or to private parties. Administrative costs are to be taken in a broad sense, including the costs of labelling, collecting, organising, storing, maintaining, reporting, and monitoring to provide the information and registration" (Alp and Kılıç, 2007). For instance, with a regulation in the capital markets, mutual funds have been charged for the preparation and the delivery of monthly reports to the Capital Markets Board. The cost incurred for the preparation of the said report is a compliance cost (Kılıç, 2008). We

see that, in the literature, concepts such as red tape, administrative costs or administrative burdens are used same wise as compliance costs (Kılıç, Alp and Kaymaz, 2008).

Current studies suggest that regulations-compliance burdens are economically significant. In the empirical studies, compliance costs are estimated to constitute approximately 30% of the total costs (BRTF, 2005; Ekici, 2006; SCM Networks, 2004). The OECD estimates that the compliance burden of small and medium sized businesses in Australia emanating from labor, taxation and environmental regulations in 1998 was 17 Billion US $. The Netherlands has calculated that the total compliance burden in the country is annually 16,4 billion Euros or 3,6% of the Dutch GDP. Similarly, in Denmark the compliance burden of the business world is 4,5 billion Euros and corresponds to 2,4% of the Danish GDP. It is estimated that this burden gets between 20-40 billion Pounds in The United Kingdom (AGPC, 2005; SCM Networks, 2004; BRTF, 2005).

The Standard Cost Model used in our study measures this second type of cost, costs arising in compliance with regulations, or compliance costs shortly. The Standard Cost Model, which was first used in The Netherlands in 2003, is currently the most widely accepted method in measuring compliance burdens. In the year 2003, an International Standard Cost Model Network was established under the guidance of the OECD for the purpose of reducing compliance costs in member countries. The work group formed by this network, after preparing a booklet on how compliance costs could be measured with the standard cost model on August of 2004 by benefiting from the experience of countries currently implementing the model (SCM Networks, 2004), has presented it at the disposal of countries (Kılıç, 2008).

The formula of the Standard Cost Model is given as follows:

$$\text{Compliance Cost} = \sum P * Q, \text{ Here;}$$
$$P \text{ (Price)} = \text{Tariff} * \text{Time}$$
$$Q \text{ (Quantity)} = \text{Number of Businesses} * \text{Frequency}$$

The ‘Price’ in the formula is equal to the multiplication of the wage and time. The ‘Tariff’ indicates the gross wage per hour a business pays its staff in the state it employs them in the fulfilment of information disclosure or

reporting obligations and the total of the general administrative expenses per staff member, or the fee per hour paid out to the service provider in the state service is rendered through outsourcing. The 'Time' indicates the time spent on the fulfilment of each information disclosure or reporting obligation. The 'Quantity' is equal to the multiplication of the number of businesses and the frequency and the number of businesses indicates the number of companies and organizations in the sector obliged to comply with statute and frequency indicates the number of times the obligation has to be fulfilled within a year (SCM Networks, 2004; AGPC, 2005; Alp and Kılıç, 2007; Kılıç, Alp and Kaymaz, 2008).

For instance, we can continue on with the example mentioned above on the obligation regarding the preparation of monthly reports on mutual funds and sending them to the Capital Markets Board. In order to comply with the mentioned obligation, we can assume that a personnel affiliated to the fund spends 3 hours and this personnel is paid an average of 10 NTL (New Turkish Lira) per hour including the general administrative expenses. According to this, the *price* in the formula shall be 30 NTL (=3*10). Furthermore, assuming that it is compulsory for 300 mutual funds to comply with this obligation 12 times (frequency) a year, the quantity in the formula would amount 3.600 (=300*12). In such a case, total cost of the mentioned obligation shall be calculated as 108.000 NTL (=30 * 3.600) (Kılıç, 2008; Kılıç, Alp and Kaymaz, 2008).

The data used in the said model is obtained basically by sending a survey to at least three sample businesses selected in the sector and/or through meeting with the officials of these businesses. When necessary, regulating authorities receive support from consultancy companies and use their own expertise. Further, information on the average gross hourly wage of personnel working in the sector is obtained from statistics organizations. In the implementation of the model; it is required that (i) sorting each disclosure and reporting obligation imposed by each regulation, (ii) preparing a survey for each of these, (iii) warranting that organizations in the sector answer these surveys correctly by allocating time, (iv) conducting interviews with these organizations, (v) resorting to additional interviews or including other businesses in the sampling where there are significant differences among the data presented by businesses and, if necessary, (vi) consulting the simulation technique by experts are in place.

Therefore, together with the formula being simple, the collection and sorting of the data used in the formula requires both information for the sector recognition and time and also great care (Kılıç, 2008; Kılıç, Alp and Kaymaz, 2008).

Within this view, the process of measuring compliance costs using the standard cost model essentially constitutes 3 phases and 15 steps within these stages, which is summarized in the table below (SCM Networks, 2004).

Table 1: Phases of the Standard Cost Model

Phase 1: Preparatory Analysis		
	Step 1	Identification of information disclosure obligations in the statute and the activities in order to fulfill these obligations
	Step 2	Determination of the same types of obligations appearing in other statute and review of the obligation list considering this
	Step 3	Classification of information disclosure obligations by type (optional step)
	Step 4	Classification of the regulated sectors
	Step 5	Determination of the number of organizations obliged to disclose information and how many times this obligation has to be fulfilled annually
	Step 6	Interviews with sector representatives or the determination of the points to be included in the survey to be delivered to the sector and the issues to be assessed by experts later on
	Step 7	Identification of cost parameters to be used in the measurement
	Step 8	Preparation of the interview text or survey
	Step 9	Review of steps 1-8 by experts
Phase 2: Obtaining Time and Cost Data		
	Step 10	Selection of businesses for interviews or surveys
	Step 11	Conducting interviews with the selected businesses or sending out the prepared survey to these businesses
	Step 12	Analysis of the data obtained on the basis of each obligation or activity and ensuring their standardization
	Step 13	Review of steps 10-13 by experts
Phase 3: Calculating Compliance Costs and Reporting		
	Step 14	Performing necessary calculations within the framework of obtained up-to-date and standard data
	Step 15	Reporting

III. Objective and Scope of the Study

The compliance costs burdened on public companies by the capital markets statute as of 2007 in Turkey shall be measured in this study[1]. Thus, on one hand, if the compliance costs arising due to the reporting and information disclosure obligations in the statute is huge in magnitude in terms of public companies shall be shown in general; and on the other hand, the validity of the argument that "the compliance costs, induced owing to the capital markets regulations, play an important role in companies' in Turkey not preferring the capital markets by going public" will be tested in particular.

Within this framework; 610 companies consisting of two company groups have been included under the scope of this study. 335 companies within 610 companies are the listed companies whose stocks are being traded in the Istanbul Stock Exchange (ISE), while 275 companies out of 610 are the non-listed ones that are not traded in the market. The Capital Markets Statute which these companies are obliged to comply with consists of the following regulations:

- The Capital Markets Law,
- All Communiqués, Regulations and Resolutions issued by the Capital Markets Board,
- Regulations of the Istanbul Stock Exchange with Circulars and General Letters issued by the ISE,
- The Central Registry Agency Regulation and Circulars and General Letters issued by this agency,
- Circulars and General Letters issued by the ISE Settlement and Custody Bank Inc.,
- The General Status of the Association of Capital Market Intermediary Institutions of Turkey and Circulars and General Letters issued by this association,
- Other secondary regulations which have not been listed above and directly concern the capital markets.

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[1] An extensive study on the measurement of the costs of the capital market sector in compliance with statute in Turkey which covered public companies was done by Saim Kılıç in the doctoral dissertation titled "*Cost-Benefit Analysis for the Capital Markets Regulations: Theories, Tools and An Empirical Study on Turkey*" and published as a book by İktisadi Araştırmalar Vakfı in December of 2008 and the results presented in this study do mainly rely on the findings in the mentioned book.

Costs arising from activities on the obligations of the Banking Law, Turkish Commercial Code, Tax Laws and other laws and statute related to these have been excluded from the scope of this study. The reason is that the obligations arising from these regulations do not only apply to the capital markets but also to the related sectors.

IV. Data Set and Methodology

In order for obtaining the data constituting the basis for a complete and accurate cost calculation, it is first necessary to present the information disclosure and reporting obligations in the regulations at full length and sort the works and transactions necessary for satisfying each of the obligations into administrative activities in a manner to facilitate the data collection. Within this framework, primarily, the Capital Markets Statute has been scanned completely and the information disclosure obligations envisaged for four organization groups has been listed one by one. Afterwards, the work and the activities, which have to be performed in order to fulfill each of these obligations, have been separated into logical phases. Hence, a separate draft table has been construed for both the listed and non-listed companies. In this table; the regulation name and article, obligation type and the activity, which needs to be carried out in order to satisfy the obligation, has been listed. On the other hand, in order to guarantee that the information in these draft tables cover all the information disclosure obligations and that these obligations have been separated into correct and logical activity phases in such a manner, which is suitable for obtaining data, interviews have been executed with the experts of the respective authorities and the managers of the implementing organizations. The draft table has been finalized by assessing opinions obtained in this way.

As a result of the study conducted, the information disclosure obligations determined for each of the companies under the scope of the research and the number of activities, which should be executed in order to carry out these, are concretely provided in Table 2 underneath.

Table 2: Information Disclosure Obligations on the Company Group Basis and the Number of Administrative Activities

Company Group	Obligation Number	Activity Number
Listed Public Companies	22	148
Non-Listed Public Companies	13	69

After the obligations of the companies and the activities, which need to be exercised in order to fulfill these obligations, have been determined in this manner, the next step was to obtain the required data. In the measurement of compliance costs with the standard cost model, there is a need for the data regarding the time (hours) spent on fulfilling the obligation, the average hourly cost of workers in the sector, if there is any, the other procurements for the fulfilment of the obligation and the number of times the obligation has to be fulfilled yearly (frequency). According to the model, data on the average hourly cost of personnel internally serving can be obtained from the Turkish Statistics Institution and the other data from the selected sample businesses.

For this purpose, first of all, information on the average personnel costs including the hourly wages, salary and social security costs incurred by the ones working in incorporations in Turkey was requested in writing from the presidency of the Turkish Statistics Institution. As a result of the examination of the tables in the annexed reply of the Turkish Statistics Institution, it has been realized that the most up-to-date labor force costs for incorporations belong to the year 2001 and the costs were calculated as annual costs. In order for calculating compliance costs, which is the subject of this study, there was a need to primarily convert this raw data into hourly wages and then have updated to the year 2007 by increasing it at such a rate equal to the inflation rate calculated as per consumer price indexes of each year. As a result of the calculations in this vein, the average hourly wage for each staff member in companies was determined to be 11, 87 NTL as of the year 2007.

In order to obtain the other data, there is a need for making interviews with the selected sample organizations and/or send them surveys. However, in the implementation of this model, it is not necessary to have an interview with a business in each organization group or to send a survey to all of these organizations. On the contrary, as businesses in each organization group are assumed to have encountered the same obligations, it is needed to make a detailed investigation on a small amount of businesses, at least three. However, in order to obtain correct results from the conducted research, it is necessary to have each organization group represented in the best way in terms of both number and size and it is necessary for the selected samples to have a sufficient capacity in providing the data.

It has been considered that selecting 12 sample organizations for each group of organizations with a cautious approach will be suitable by taking account the previously mentioned constraints and the possibility that some organizations may not provide adequate information. However, in order to ensure that these 12 organizations represent each group of organizations in the best manner in terms of size, each of the group of organizations has been divided into three sub-groups by ordering them from large to small along a certain criterion. Public companies being traded in the stock exchange have been divided into three sub-groups considering their total trading volume on the stock exchange in 2006 and public companies outside of the stock exchange have been divided into three sub-groups by being ordered according to their active sizes in 2006. By selecting four organizations for each sub-group a total of 12 organizations have been determined for each group of organizations. The selection of organizations was not carried out randomly; on the contrary, a conscious selection has been made by taking into account whether they had the capacity to provide complete, sufficient and correct information. Regarding the existence of such capacities, the opinions of experts supervising them in the respective units of the Capital Markets Board have been benefited from. Thus, both having the selected samples represent the whole group has been ensured and correctness and robustness of the data to be obtained has been guaranteed.

For the purpose of obtaining the needed information from the sample companies, a table has been prepared on the basis of the needed activities to satisfy the obligations above. This table, which has been added some columns on hour, annual procurement costs and frequency, has been sent out to the sample companies in the February of 2007 and requested them to fill in through an official letter. Among the companies that the calculation tables of the information disclosure obligation were already sent to, the desired data was obtained from all of the 12 companies selected as samples for the listed public companies and from 9 of the 12 companies selected as samples for the non-listed public companies and those companies. The rate of sample organization responding to our research is relatively high, and when the fact that it is necessary to obtain data from at least 3 sample organizations, according to the standard cost model is taken into consideration, it can be clearly seen that

the number of the organizations, which have provided data, is sufficient for both cost calculation for each organization group, and the execution of a cost analysis as for the sizes of the organizations. For this reason, it was not regarded necessary to select another sample organization among the organization groups under the scope of the study.

Thus, the data necessary for cost calculation has been obtained by implementing a combination of the methods such as survey studying, written information requesting and interviews through telephone calls and/or electronic mail. As a result of embedding this data onto the Standard Cost Model formula above, the compliance costs have been calculated and the results have been presented as the following.

V. Findings Obtained as a Result of the Measurement

a) Compliance Costs on the Listed Public Companies:

The annual compliance costs incurred by 335 public companies, whose shares are traded on the stock exchange, due to 149 activities performed for the purpose of fulfilling 22 information disclosure and reporting obligations in the Capital Markets Statute have been calculated as 85 million NTL according to the standard cost model as of 2007. The amount of this cost corresponds to 64 million US $ as per the exchange rate of the same date. The regulation compliance cost per company is 254 thousand NTL.

The summary of the breakdown of compliance costs incurred by the listed public companies whose stocks are traded in the stock exchange on an obligation basis is presented in Table 3 below.

Table 3: Breakdown of Compliance Costs on an Obligation Basis Measured for Companies Traded in the Stock Exchange

The Capital Markets Statute		Compliance Cost (Thousand NTL)	Percentage in the Sum (%)
Name of Regulation and Article	**Regulation Type**		
CMB Serial: XI, No:25 art.2	Preparation of annual financial statements (detailed balance sheet with footnotes, income statement, cash flow statement and statement in change in owner's equity)	2.119	2,49%
CMB Serial: XI, No:25 art.720	Independent auditing of annual financial statements	38.968	45,74%
CMB Serial: XI, No:25 art.57, 711, 714	Preparation of the annual activity report of the Board of Directors, having it available for examination by the partners and having it published in electronic medium	5.647	6,63%
CMB Serial: XI, No:25 art.103, 104	Preparation of 3, 6 and 9 monthly interim financial statements in detail and as a full set (interim balance sheet with footnotes, income statement, cash flow statement and statement in change in owner's equity)	7.120	8,36%
CMB Serial: XI, No:25 art.720	Limited-scope independent auditing of detailed 6 monthly financial statements	23.479	27,56%
CMB Serial: IV, No: 27 art.7, 9; CMB Serial: VIII, No: 39 art. 5, 7, 8, 11, 12, 13; The ISE circular concerning the procedures and principles regarding the sending of Special Event Announcements and other announcements to the Stock Exchange and its public announcement	The obligation on notifying the special events regarding the capital structure of the partnership, the control of management, purchase, sale, hiring, hiring out and placing as capital in rem, the activities of the partnership, financial fixed assets, administrative issues, meetings, dividend advances, grants and other matters and verifying news and rumours in the media and press and the public regarding the company	2.776	3,26%
17 Other Obligations		5.082	5,96%
Total		***85.190***	***100,00%***

As a result of the examination of the table, it has been determined that the obligation of the independent auditing of financial statements is the obligation with the highest rate of 73, 2%. Companies traded in the stock exchange bear a cost of 39 million NTL (45,7%) for the independent auditing of annual financial statements and a cost of 23,5 million NTL (27,5%) for the independent auditing of semi-annual financial statements. According to these figures, the obligation of having financial statements audited independently causes a burden of 186.000 NTL annually for each company. When the independent auditing costs of the listed and non-listed public companies are compared, it can be seen that the listed companies whose stocks are traded on the stock exchange incur costs, which are 8 times as much as costs incurred by the non-listed companies whose stocks are not traded. While a company traded in the stock exchange pays an independent auditing company 112 thousand NTL annually, companies outside of the stock exchange pay 15 thousand NTL. It is considered that the obligation of preparing financial statements in accordance with international standards imposed on the listed companies as of 2005 plays an important role in the independent auditing costs being so high for these companies alongside the fact that these companies are large in size.

The type of obligation, which has the highest cost coming after the obligation of independent auditing, is the preparation of financial statements. Companies traded on the stock exchange incur an annual cost of 9,2 million NTL (10, 8%) for the preparation of annual and interim financial statements. The obligations, which have the highest costs following these obligations, are the preparation of an activity report with 8, 3% and special event announcement with 3,2%. The costs caused by 17 obligations apart from the above mentioned obligations have a cost of 5 million NTL and correspond to approximately 6% of all costs.

A striking point in the compliance costs of companies traded in the stock exchange is the size of costs spent on the preparation of the activity report of the board of directors. As a result of the calculations, it is estimated that companies traded in the stock exchange incur an expense of 5,6 million NTL for the preparation of activity reports. Accordingly, the cost of preparing activity reports alone is more than two times that of the cost for each of the obligations on the preparation of annual financial statements and special event announcements. In order to find out the reason for the preparation of activity reports having such a high cost for companies traded in the stock exchange,

the breakdown of the mentioned obligations on an activity basis has been analyzed. In the light of the conducted analysis, it has been determined that a large proportion of these costs (3, 6 million NTL) is due to the printing of the prepared reports. Therefore, it has been concluded that, the companies traded in the stock exchange have an inclination to print high quality activity reports due to reasons such as prestige and image has been drawn. The important matter that needs to be emphasized here is that this is not an obligation arising from the statute. The companies traded on the stock exchange voluntarily make such a high spending for activity reports.

In the mean time, the point of to what extent the size of the stock exchange companies has an impact on the increase of the compliance costs has also been investigated. For this purpose, 335 companies being traded on the stock exchange have been classified into three groups comprising of 112 large scale companies, 111 medium sized and 112 small sized companies. According to the calculation results in Table 4, it is concluded that the size of stock exchange companies plays an important role in compliance costs. The average compliance cost for large scale companies traded on the stock exchange has been estimated as 453 thousand NTL for every large sized company, 209 thousand NTL for every medium sized company and 101 thousand NTL for every small sized company. According to these figures; large scale companies incur a compliance cost which is two times that of medium sized companies and medium sized companies incur a compliance cost which is two times as that of small sized companies.

Table 4: Breakdown of the Compliance Costs Measured for Companies being Traded in the Stock Exchange on the Basis of Size

Size Category	Number	Compliance Cost (Million TL)	Cost Per Company (1000 NTL)	Percentage Within Sum
Large Scale Companies Traded in the Stock Exchange	112	50,8	453	59,6%
Medium Sized Companies Traded in the Stock Exchange	111	23,2	209	27,2%
Small Sized Companies Traded in the Stock Exchange	112	11,3	101	13,3%
Total	***335***	***85,2***	254	**100%**

In order to find an answer to the question of why the size factor is important in terms of the compliance costs of companies being traded in the stock exchange have an in, compliance costs measured for each company category have also been compared on an obligation basis (Table 5). As a result of the comparison conducted, it has been realized that costs arising from the independent auditing obligation and financial statement preparation obligation increase in line with the size of companies. The basic reason for this is that, large companies are frequently obliged to prepare consolidated financial statements in concordance with the international financial reporting standards as they are usually in the form of a main partnership within a holding company or a group firm. As the preparation and auditing of consolidated financial statements naturally need more time and resources, compliance costs increase.

Table 5: Breakdown of Compliance Costs Measured According to Size for Companies Traded in the Stock Exchange on an Obligation Basis

Regulation Name and Article	Regulation Type	Category of Company Size		
		Large Scale (NTL)	Medium Sized (NTL)	Small Sized (NTL)
CMB Serial: XI, No:25 art.2	Preparation of annual financial statements (detailed balance sheet with footnotes, income statement, cash flow statement and statement in change in owner's equity)	1.290.314	453.945	376.814
CMB Serial: XI, No:25 art.103, 104	Preparation of 3, 6 and 9 monthly interim financial statements in detail and as a full set (interim balance sheet with footnotes, income statement, cash flow statement and statement in change in owner's equity)	3.720.537	1.946.273	1.457.166
CMB Serial: XI, No:25 art.720	Independent auditing of annual financial statements	25.587.450	10.664.454	2.736.164
CMB Serial: XI, No:25 art.720	Limited-scope independent auditing of detailed semi-annual financial statements	15.230.075	6.223.401	2.039.951
CMB Serial: IV, No:27 art.7, 9; CMB Serial: VIII, No:39 art. 5, 7, 8, 11, 12, 13; related Circular of the ISE	Delivery of the special event announcement of the partnership and other matters to the ISE in order to be announced to the public and the obligation of verification regarding news	1.115.899	846.333	814.490
Total		***46.944.274***	***20.134.406***	***7.424.585***

b) Compliance Costs on the Non-Listed Public Companies:

The annual compliance costs, incurred by 275 public companies who are subject to the Capital Markets Statute and who are not listed in the stock exchange market, due to the realization of 69 activities performed for the purpose of satisfying 13 information disclosure and reporting obligations in the statute have been estimated as 5, 5 million NTL (4,1 million US $) according to the standard cost model as of 2007. As a result of these estimates, the average annual compliance costs for each non-listed public company amount 20.000 NTL.

The breakdown of compliance costs incurred by public companies outside of the stock exchange on an obligation basis, is presented in Table 6.

Table 6: The Breakdown of Compliance Costs Measured for the Non-Listed Public Companies on an Obligation Basis

The Capital Markets Statute		Compliance Cost (Thousand NTL)	Percentage Within Sum (%)
Regulation Name and Article	**Regulation Type**		
CMB Serial: XI, No: 1 art. 48-49 and CMB Serial: XII, No:1 art.3,11, 12, 15, 16, 19, 20, 23,24	Preparation of detailed annual balance sheet, income statement, annual condensed balance sheet and income statement and their footnotes and additional financial statements (fund flow, cash flow, cost of sales and profit sharing statements)	634.279	11,54%
CMB Serial: XI, No:1 art.48 and CMB Serial: XII, No:1 art.11,19	Independent auditing of annual balance sheet and income statements	2.184.469	39,75%
CMB Serial: XI, No: 1 art.49, 56 and CMB Serial: XII, No:1 art. 12, 16, 20, 24	The announcement of condensed financial reports together with condensed auditor reports in the Turkish Commercial Registry Gazette and two local newspapers within 30 days following the general assembly meeting	1.160.437	21,12%
CMB Serial: XI, No:1 art.53 and CMB Serial: XII, No:1 art.12,16, 20, 24	Preparation of the annual activity report	498.784	9,08%
CMB Serial: IV, No: 27 art.7, 9 and CMB Serial: VIII, No: 39 art. 5, 7, 8, 11, 13	The obligation of notifying the special events regarding the capital structure of the partnership, the control of management, purchase, sale, hiring, hiring out and placing as capital in rem, the activities of the partnership, financial fixed assets, administrative issues, meetings, dividend advances, grants and other matters and verifying news and rumours in the media and press and the public regarding the company	539.366	9,81%
Other 8 Obligations		478.087	8,70%
Total		***5.495.423***	***100,00%***

As it can be seen in the table, costs arising from the obligation of independent auditing have the highest proportion with 39,7%. A point which needs to be noted down here is that not all non-listed public companies are subject to the independent auditing obligation. This is because, in accordance with the CMB Communiqué on the principles on the Exemption Conditions of Issuers and Exclusion from The Records of the Board Serial: IV, No: 19, non-listed public companies whose total assets are under a certain amount or which has 95 % or more of its capital belonging to 20 partners at most may be exempted from independent auditing. As of the date the compliance costs were measured, 143 of the 275 non-listed public companies were exempted from independent auditing by the CMB. Therefore, as costs on independent auditing obligations were calculated, not all the companies but only 132 companies which were subject to this obligation had been taken considered.

The second highest compliance cost coming after the independent auditing obligation was the obligation for announcing the financial statements in the Turkish Commercial Registry Gazette and two local newspapers with 21, 1%. This was followed by the annual financial statement preparation, activity report preparation and special event announcement obligations.

VI. Results and Recommendations

In this study through the use of internationally and generally accepted standard cost model, the compliance costs to capital market regulations of a total of 610 companies engaging in Turkish capital market have been measured. 335 of these companies are the listed public companies whose stocks are traded in the stock exchange, and the resting 275 ones are the non-listed public companies whose stocks are not traded in the stock exchange. As is seen in Table 7 below where the measurement results are presented altogether, due to these companies' disclosure and reporting obligations resulting from capital market regulations, annual compliance cost incurred by them is estimated as approximately 90,7 million NTL as of the year 2007.

Table 7: Compliance Costs on Public Companies

Company Group	Quantity	Total Compliance Cost (Thousand NTL)	Compliance Cost Per Company (Thousand NTL)
Listed Public Companies	335	85.190	254
Non-Listed Public Companies	275	5.495	20
Total	***610***	***90.685***	***274***

According to these measurement results, first, it is clear that the public companies' compliance costs arising from capital market regulations are generally at a low level. Although the compliance cost per listed company is 254 thousand NTL annually, this cost for the non-listed companies that are outside of the stock exchange is about 20 thousand NTL. The ratio of the compliance costs incurred by the listed companies to their total assets in sectoral financial statements dated 31.12.2006 is 0, 0001.3, to the equity sums is 0,0006.7 and to the total net sales is 0,0003. It is also clear that being traded in the Stock Exchange causes an extra annual cost amounting to 234 thousand NTL for the companies. The reason of the cost being so low in the non-listed companies, these companies have been found as eligible to be exempted from the obligations such as independent auditing. The reason underlying the listed public companies' having huge compliance costs relative to those burdened by the non-listed ones derives from the fact that, as the listed companies are large sized and obligated to prepare their financial statements in line with the international financial reporting standards as well, the obligations on getting through with an independent auditing process and on arranging financial statements require more time and resource. 186 thousand NTL of the cost amounting to 254 thousand NTL measured for the listed companies accounts for independent auditing expenses.

Secondly, when it is considered that the listed companies benefit from the capital market by incurring an annual cost amounting to only 254 thousand NTL, and that, they arrange financial statements and have them independently audited in concordance with international financial reporting standards, the argument that compliance costs hinder the entry of the firms' going public loses its credibility. When it is considered that most of these

companies for international business and operations are already in the position of arranging financial statements in accordance with international financial reporting standards, it is apparent that the extra cost caused by the capital markets statute will further decrease. Another remarkable finding for the listed companies is that these companies make substantial expenses by printing the annual activity reports in high quality. Listed companies, for the issuance of the activity reports, bear an expense amounting to a total of 5,6 million NTL on a yearly basis. When it is considered that printing an activity report of high quality is not an obligation deriving from the statute, it is concluded that listed companies lend credit to the values like prestige and image. Finally, as the size category increases in the listed companies, costs increase about as much as twice. The main reason for the increasing costs as the size goes up is that as the big companies are either holdings or parents, they arrange consolidated financial statements in concordance with international financial reporting standards. Preparing a consolidated financial statement and having them independently audited naturally bring on more costs compared to the solo financial statements.

After the compliance costs have been measured with the standard cost model and the results have been set forth, it would be appropriate for making recommendations on how compliance burdens on these companies can be reduced in the light of this data. It is considered that companies whose shares are traded on the stock exchange can achieve cost savings in two areas over the short run. One of these areas is in relation to publishing the financial statements in the Turkish Commercial Registry Gazette. According to the CMB Communiqué with the Serial: XI, No:25, listed companies are obliged to announce their annual financial statements in the Turkish Commercial Registry Gazette within thirty days after their ordinary general assembly. When it is considered that the financial statements and reports of the listed companies are delivered to the Stock Exchange in order to be published in the CMB and ISE Bulletins and published on the internet, there is no need for them to be additionally published in the Turkish Commercial Registry Gazette. As there are sources by which investors can easily and conveniently access financial statements and reports, it would not be realistic to expect them to consult

the Turkish Commercial Registry Gazette. Therefore, the abolishment of the obligation for having the annual financial statements published in the Turkish Commercial Registry Gazette would be appropriate. If this recommendation is respected, it has been anticipated that listed companies shall achieve a saving of 1 million NTL per annum.

The second area where listed companies can achieve savings is the printing of the activity report of the board of directors. In the CMB Communiqué with the Serial: XI, No: 25 the preparation of annual activity reports, having them ready for the examination of the partners and having them published in electronic medium has been envisaged. While the preparation of activity reports and having them copied on standard paper is sufficient, as companies prefer to print and copy these onto colored and quality paper, they incur an additional cost of 3,6 million NTL. The elimination of this burden will provide savings for the companies.

The space which public companies whose shares are not traded in the stock exchange can achieve savings in the short run is the reduction of the number of newspapers in which financial statements are announced. In accordance with the Communiqués of the CMB with Serial: XI, No: 1 and the serial: XII, No: 1, it is compulsory for the non-listed public companies to announce their annual condensed financial statement in the Turkish Commercial Registry Gazette and two local newspapers. The cost of this obligation for companies is approximately 1,1 million NTL annually. It is believed that the reduction of the number of newspapers for the announcements will provide cost savings for companies. It seems possible that an exemption can be implemented particularly for the companies who publish their financial statements on their websites. Within this view, for instance, when the number of newspapers for the announcement is reduced to 2, the sector will have saved 350-400 thousand NTL in a year.

Thereby, given that the above mentioned simplification and changes are actualized, in the short run, a cost saving totalling to 5 million NTL can be achieved, of which 4,6 million NTL will be for the listed public companies and 400 thousand NTL will be for the non-listed public companies. In the medium and long runs, it is considered that compliance costs could be reduced at much higher rates.

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The ISE Review Volume: 11 No:41
ISSN 1301-1642 ©ISE 1997

FURTHER OUT-OF-SAMPLE TESTS OF SIMPLE TECHNICAL TRADING RULES

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Abstract

The intriguing findings by Brock, Lakonishok, and LeBaron (1992, BLL hereafter), that some simple technical trading rules were profitable on Dow Jones Industrial Average (DJIA), have been replicated in many other markets with similar results, and triggered debate on market efficiency. In this study, I test the profitability of these rules i) on more recent DJIA data to see if their profitability survives out-of-sample and is robust to publicity and presence of an index futures market, ii) on the Istanbul Stock Exchange (ISE), which enables useful comparisons. Results suggest that the profitability of the technical rules tested by BLL have recently disappeared on DJIA, and that these rules have performed better on the ISE-100 index. I notice one exception which BLL overlooked: The 22-day simple moving average rule, which has been widely used by short-term traders, still performs positively on DJIA and produces significantly positive profits on the ISE-100 index, even after transaction costs. I use results on these samples with contrasting characteristics to develop hypotheses on the determinants of the profitability of these simple technical trading rules.

I. Introduction

In 1992, the study of Brock et al. triggered renewed interest on Technical Analysis (TA) among academicians. The interest in TA among practitioners had, despite early academic findings to the contrary, remained hot and been in an uptrend. Recent surveys suggest that around 90% of foreign exchange traders utilize TA in their trading decisions, especially for the short-term (Taylor and Allen, 1992; Lui and Moole, 1998); around 30% of them define themselves as "technical trader" (Cheung and Chinn, 2001); and 11 of the 21 institutional investors analysed by Keim and Madhavan (1995), responsible for 61% of trading volume in their sample, employ strategies based on TA and/or momentum.

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I thank Eva Porras and anonymous referees for helpful comments.
Keywords: simple technical trading rules, out-of-sample tests, economic significance, ISE-100 index
JEL classification: G14

The findings of Brock et al. (1992; BLL hereafter) has led to a few reactions (Kho, 1998; Bessembinder and Chan, 1998), some extensions (e.g.; Goldbaum, 1999; Gençay, 1998; Sullivan et al.1999), and to quite many replications in other markets with similar or even stronger results (Hudson, et al. (1996) in UK stock index; Lewich and Thomas (1993) in the foreign exchange market; Lee and Mathur (1996) in European spot cross excange rates; Davidson et al. (1999) in Nasdaq stocks; Ratner and Leal (1999) in ten emerging equity markets of Asia and Latin America; Parisi and Vasquez (2000) in Chile; etc.).

BLL's findings on technical trading rules constituted one of a series of challenges against efficient markets in 1990's. They have invoked as many replications and repercussions as the momentum strategies of Jegadeesh and Titman (1993), hence it also deserves an out-of-sample test like Jegadeesh and Titman (2001). The function of this paper will be to fill this gap, and place the results, along with some additional findings on Turkish stock market, into the context of the debate on TA's efficacy in real life.

Specifically, the purpose of this paper is to assess real-life efficacy of simple technical trading rules by using more recent out-of-sample data. A second aim is to document interesting test results on the Turkish stock market, where BLL's technical rules have not been extensively tested previously. A more important final aim is to shed some light on the determinants of the profitability of simple technical rules by using results obtained under contrasting market characteristics. Note that the last sentence in BLL was "why such rules might work is an intriguing issue left for further studies", and there has been little work in this direction since then.

Section 2 reminds main previous work on simple technical trading rules, and discusses the elements of the debate on interpreting findings of studies on technical trading rules and related problems. Section 3 presents out-of-sample replication of BLL's tests on more recent daily Dow Jones Industrial Average (DJIA) data, and then on the daily ISE (Istanbul Stock Exchange) – 100 index data for a corresponding period. Section 4 outlines the main results, and discusses, based on these findings obtained from samples with contrasting market characteristics, potential hypotheses about the determinants of the profitability of simple technical trading rules.

II. Literature Review

As a natural starting point, a reminder of BLL's study and a summary of major repercussions to it are provided below.

BLL report statistically significant profitability of simple technical trading rules implemented on daily DJIA data over the 1897-1986 period. They test two simple and popular technical trading rules, namely moving average and trading range break. Specifically, the moving average (MA) rule produces a buy (sell) signal if the short MA crosses the long MA up from below (down from above) beyond a filter band around it. Thus, an MA-cross-over rule is defined as (s, l, f) where s is the length of the short MA, l is the length of the long MA, and f is the size of the filter used to avoid whipsaw signals. A signal is valid either until an opposite signal occurs (variable-length MA rule, VMA) or for a fixed holding period h (fixed-length MA rule, FMA) ignoring other signals during h. The trading range break-out rule (TRB) produces a buy (sell) signal when the price rises above (falls below) the local maxima (minima) over the last n days; defined as (n,f) where f is the filter size. To avoid data-snooping biases, the authors employ the mostly used parameters without trying to optimize, report all of their results, divide their sample into 4 sub-samples and base their inferences on average (rather than best-rule) results. In addition to standard statistical analysis, they also employ bootstrap methodology to assess the significance of technical trading rule profits. Overall, their results provide strong support for the technical strategies: Buy signals consistently generate higher returns than sell signals; returns following buy signals are less volatile than returns following sell signals; and returns following sell signals are negative, which is not easily explained by any of the currently existing equilibrium models. Four null models simulated in the bootstrap comparison series, the random walk, the AR(1), GARCH-M, and EGARCH cannot explain the trading rule profits, even though AR(1), GARCH-M and EGARCH provide some improvement over random walk. The difference in returns following buy and sell signals cannot be easily explained by risk since stock returns are less volatile following a buy signal than following a sell signal. GARCH-M does a poor job even in predicting volatility. As to economic significance, however, the study does not take transaction costs into account and assumes that transactions can be executed at the daily close by which the signal is generated.

Bessembinder and Chan (1998) further investigate and evaluate BLL's findings. They find that transaction costs are likely to prevent any economic significance of trading rule profits, concluding that technical rules fail to reject the implications of market efficiency even though they have statistically significant forecast power. They note that the evidence in favor of the forecast power of simple technical rules has weakened in recent years. They also claim that the forecast ability is partially, but not solely, attributable to spurious positive serial dependence in measured portfolio or index returns due to non-synchronous trading. However, their one-day-lag method to adjust for the effect of non-synchronous trading may be misleading as it unfairly takes away, without justifying, an essential part of the profits immediately upon observing the signal.

A critical point needs attention here: BLL explain their VMA trading rule as follows: "The moving average rule is used to divide the entire sample into either buy or sell periods depending on the relative position of the moving averages. If the short moving average is above (below) the long, the day is classified as a buy (sell). This rule is designed to replicate returns from a trading rule where the trader buys when the short moving average penetrates the long moving average from below and stays in the market until the short moving average penetrates the long moving average from above. After this signal the trader moves out of the market and sells short." (p.1738 in BLL). Comparisons of MA(s) vs. MA(l) can only be made after the close of the day. Labelling of days on which the cross-over occurred as buy and sell days is not available information for a trader applying the rule who has to take position at previous day's close. My own analysis of the sensitivity of results to a 1-day lag (as will be presented in the next section) indicates a significant disappearance of profitability present under the wrong assumption that cross-overs could have been known at the close of the previous day. The passage above does not make clear how BLL labelled cross-over days, but their results seem to reflect the correct procedure. Hence, Bessembinder and Chan's (1998) correction by 1-day lagging would be justified only if BLL did label up (down) cross-over days as buy (sell) days, but it appears they did not.

Kho (1996) tests moving average cross-over rules, similar to those of BLL, applied to weekly foreign exchange futures data, and finds significant

profitability and large differences between buy and sell mean returns that cannot be explained by transaction costs, serial correlations in returns or a simple volatility-expected return relation. However, the measured profits turn out to be insignificant when time varying risk premia, estimated from a general model for the conditional CAPM are taken into account, and time-varying conditional volatility explains an additional 10% of the profits. He concludes that large parts of technical rule profits in currency futures markets can be explained by the time-varying risk premia, arguing that previous studies which examine technical rules by measuring risk premia in a static sense (not allowing for time variation in the price of risk) have failed to attribute the trading rule profits to risk.

Sullivan, et al. (1999) emphasize that a researcher testing popular technical trading rules on past data may be subject to a subtle form of data snooping: The survivorship bias determining popular rules makes him/her use the past data twice; an unintended use for model selection as well as the explicit use for testing. Extant studies contain no adjustment for data snooping but they do avoid optimization of the trading rule thus potentially failing to pick some of the predictive power. Sullivan et al. applied White's Reality Check bootstrap methodology to the test of technical trading rules as a remedy for this problem. The suggested methodology conveys statistical significance robust to data-snooping as a p-value (reality check p-value) that increases with the number of tried models (here technical rules) and decreases as a tried model improves maximum performance. In their empirical implementation, 26 simple technical rules tested by BLL as well as 7846 technical trading rules selected out of a wide review of literature on TA have been tested on 1897-1996 daily DJIA data as well as 1984-1996 S&P500 futures data. Trading rule performance is evaluated on the basis of mean return and Sharpe ratio. The best performing rule from BLL's study (1,50,0.01 VMA) maintained its statistical significance after correcting with White's Reality Check Methodology (with a 9.4% annual return compared to 4.3% of buy-and-hold strategy over the 100-year sample). The overall best performing rule according to mean return criterion was (1,5,0 VMA) with 17.2% per year, and a reality check p-value of 0.002. The best performing rule for every subperiod achieved significant positive returns after correction for data-snooping. The cumulatively best performing rule of the available past, set at the beginning of each year, has earned a mean annual

return of 14.9%. The best rule according to Sharpe ratio criterion is (1,50,0.001 VMA) with a ratio of 0.390 out of 26 rules tested by BLL and (1,5,0.01 VMA) with 0.820 out of the full universe, compared to the Sharpe ratio of the DJIA which is at 0.034. The number of long vs. short positions produced by the best rules are generally balanced, but long positions performed much better. The break-even transaction cost for the best rule to maintain its profitability is calculated as 0.27%. Authors believe that actual transaction costs have been higher than this figure in earlier periods, but lower recently. In the out-of-sample test over the 1987-1996 subperiod, however, the best rule of the previous period has not been successful (mean annual return = 2.8%, reality check p = 0.322). The best rules over this recent subperiod have been (0.12, 0.10) filter rule (mean annual return=14.41%, reality check p = 0.341) according to mean return criterion, and 200-day channel rule according to Sharpe ratio criterion. The differences between reality check p-values and conventional p-values in this subperiod are significant. On the 1984-1996 S&P500 futures sample, the best rules according to mean return criterion have been (1,200,0 VMA) out of BLL and 30 and 75 days on-balance volume out of universe (mean annual return: 9.4%, reality check p = 0.908, conventional p = 0.042). The cumulative best rule of the past has not been successful in this recent subperiod with -5.5% annual return on S&P500 futures. Results are robust to the exclusion of "Black Monday" in 1987. Overall, Sullivan et al. conclude that Brock et al.'s results are robust to correction for data-snooping, some better performing rules existed on their sample, but the best rules of the past failed out-of-sample. Finally, no profitability after transaction costs has been observed, which is in line with the implications of efficient markets.

2.1. Issues Concerning the Applicability of Technical Trading Strategies in Real Life

As the review above suggests, main adjustments to BLL's results are transaction costs, possible deviations of the execution price from the signal price, spurious positive portfolio autocorrelation, time-varying risks and subtle data snooping. These issues concern not only academicians interpreting implications of tests of

TA on market efficiency, but also practitioners trying to utilize these findings in real life on ex ante basis rather than ex post. So, a discussion of these problems and potential solutions is common interest for both academicians and practitioners:

Transaction costs: BLL's results over the 1897-1986 period are not likely to have been profitably used by practitioners who traded during that sample period because of high transaction costs, as most other papers conclude. Almost none of the mean 10-day buy-sell differences produced by FMA and TRB rules are significantly above 1%. Leave aside bid-ask spread, trading commissions only, which had been above 0.5% per side for ordinary individual investors until the rise of electronic trading, are enough to erase these profits. Only some of the VMA rules might have provided profits after transaction costs. Some papers (e.g.; Sweeney, 1986) concluded that only exchange members could have utilized technical rules profitably. In sum, results from earlier periods, though statistically significant, offer little room for profitability of technical rules for ordinary real-life investors, providing little evidence against efficient markets. With the availability of index futures, however, transaction costs are reduced dramatically: An effective round-trip commission of $12 per contract for internet traders[1] now amounts to less than 1% of the mean daily buy-sell difference of BLL, and the bid-ask spread (around 1-2 pips) another 1% of it; these are quite ignorable. Interestingly, Sullivan et al.'s (1999) results on S&P500 index futures over the 1982–1996 period suggest, however, that the best performing technical rules of the past periods failed to produce positive profits. Then, it remains intriguing to see whether the profitability observed by BLL survives over the 1996–2004 period when a DJIA futures market is available. This is done in Section 3 of this paper.

Possible deviations of the execution price from the signal price: This problem can be reduced, to a large extent, with the use of intraday data, a point well-known to practitioners but overlooked in academic tests. It is quite possible to identify, with almost perfect accuracy, daily closes that are likely to produce a signal a few minutes before the close, and execute a trade signal at

[1] This is the figure one of the leading global futures brokers has been charging all of its internet clients since 2001.

favourable (even better than the closing price[2]) transaction prices. Hence, there is no reason to expect execution price to unfavourably deviate from the closing price. As a result of this, I strongly believe that Bessembinder and Chan's (1998) adjustment by lagging execution on signal by 1 day is unjustified and unnecessarily takes away a big portion of the two essential sources of profits to technical signals: the signalling of asymmetric information[3], and the self-fulfilling prophecy effect[4].

Spurios positive portfolio autocorrelation: It can easily be eliminated, as an argument, with the use of futures price data, as well as by the fact that infrequent trading is not an issue in actively traded DJ stocks on daily data in the more recent samples.

Risk Explanations: Any argument that attributes profits to technical strategies to constant market risk premium simply loses its relevance if buy- and sell signals are evenly distributed. Time varying risk argument would survive only if it can be shown that buy periods are more risky than sell periods. If time varying risk is proxied by conditional volatility, then BLL's findings that "buy periods are less volatile than sell periods" does only increase the efficacy of technical trading rules. Conclusions in recent papers are similar: "... risk adjustment improves the relative attractiveness of the [technical trading] rules"... (Neely, 2003). In sum, returns to technical trading rules do not seem to be compensation for risk[5].

Data-snooping: This is perhaps the most critical issue that restricts research on technical trading rules, as it keeps any researcher using past data from optimizing his/her trading rule. Two proposed solutions to this problem are statistically

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[2] Closing prices which produce a technical signal may already reflect part of the information contained in the signal, possibly because technical traders jump in around the market close to exploit the signal. If this is true on average, then expected prices to a technical trader a few minutes before the close would be more favourable.

[3] If private information available to some informed traders on the cross-over days becomes public on the next day, which is a likely event as informed traders most aggressively trade and cause cross-overs when their private information is likely to perish in the near future, then lagging execution by 1 day misses, in vain, the bulk of the gain from utilizing the information.

[4] The self-fulfilling prophecy effect is most pronounced when a technical signal has just emerged as positive feedback traders rush in, and weakens and even reverses in time, as fundamental traders sort out signals that contain no information.

[5] Kho's (1996) results in foreign exchange market are open to discussion about how risk in the foreign exchange market is modeled.

correcting for data-snooping bias (Sullivan, et al., 1999) and using different periods for model selection and testing (as done in tests of genetic programming applications, see Allen and Karjaleinen, 1999; and Neely, 2003). The out-of-sample tests, conducted in this paper, will also be a remedy for data-snooping and reveal the economic significance of BLL's findings free of this bias.

To sum up: Transaction costs seem to eliminate significance of profitability found in earlier tests of technical trading rules, but it remains intriguing to see if the profitability is present out-of-sample in a period when transactions costs are dramatically lower thanks to electronic trading of index futures. Concerns such as possible deviation of execution price from the signal price and spurious portfolio return autocorrelation can easily be eliminated via the use of intraday and index futures data, respectively. Risk does not seem to account for profits from technical strategies. Finally, data-snooping problem may be overcome by implementing out-of-sample tests.

III. Out-of-Sample Tests of BLL's Technical Trading Rules

3.1. Out-of-Sample Test on More Recent DJIA Data

The versions of the VMA, FMA and trading range break-out (TRB) trading rules originally tested by BLL are retested on daily DJIA data from January 12, 1996 to September 17, 2004, which is the most recent out-of-sample test of BLL's findings at the time of writing this paper. DJIA daily closing values[6] are obtained from Euroline®, a vendor redistributing data from DowJones®.

Daily returns are calculated as logged differences of the ISE-100 index's daily closing levels. Summary statistics for daily returns over our sample period are presented in Table 1 below. Compared to BLL's original sample, our 1996-2004 sample represents a period of higher positive return. Significant autocorrelations have disappeared. Also, a significant decrease in kurtosis is worth attention, which makes use of t-tests in the statistical evaluation of trading rule performance less troublesome.

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[6] Over the sample period, the futures returns data exhibited a perfect one-to-one association to spot data, with ignorable deviations, hence we can safely assume that results with futures data were essentially identical. Thus, we can regard this test to produce identical results with a test using futures data.

Table 1: Summary Statistics for 1-Day and 10-Day Returns

	1-day returns		10-day returns		
	1996-2004	BLL Full Sample	1996-2004	BLL Full Sample	
N	2114	25036	210	2503	
Mean	0.00041	0.00017	0.002428	0.0017	
StDev	0.01197	0.01080	0.035558	0.0351	
Skew	-0.127	-0.1047 **	-0.672	-0.458	**
Kurtosis	3.172	16.00 **	2.295	7.91	**
p(1)	-0.006	0.033 **	0.014	0.037	*
p(2)	-0.033*	-0.026 **	-0.114**	0.018	
p(3)	-0.015	0.012 *	-0.097*	0.013	
p(4)	0.014	0.046 **	-0.034	0.011	
p(5)	-0.012	0.022 **	0.109**	0.032	

Note: * (**) significant at the 5% (1%) level for a two-tailed test. *p*(t) is the coefficient of serial correlation at lag t.

Trading rules are defined in the same way as in BLL. But, a critical issue to discuss is the sensitivity of results to the execution price assumptions. This is shown, as an example, on the (1,50,0 VMA) rule: If a day t is labelled as "buy" if $P_t > MA_t(50)$ and as "sell" if $P_t < MA_t(50)$, the mean buy return is 0.00202 (t=3.78), the mean sell return is -0.00228 (t=-5.39), and the mean buy-sell difference is 0.0043 (t=7.94)[7]. Under the accurate definition which labels a day t as "buy" if $P_{t-1} > MA_{t-1}(50)$ and as "sell" if $P_{t-1} < MA_{t-1}(50)$, however, the mean buy return is 0.00025 (t=-0.37), the mean sell return 0.00054 (t=0.36), and the mean buy-sell difference is -0.00029 (t=-0.53). Hence, inclusion of the days on which a signal is generated into the set of signal days spurs an apparent profitability which does not exist at all in reality. This note is quite interesting as it suggests that an ability to anticipate technical signals before they emerge (i.e.; betting that a trading signal will emerge) would provide profitable results even if the technical rule itself would not work. In other words, most of the profits to MA rules accrue on the day on which a signal is generated.

Statistical evaluations of trading rule performance are based on standard t-test. For our purpose of comparison across samples, this is a more appropriate methodology. Our emphasis in this paper is rather on economic significance.

[7] t-values are computed in the same way as in BLL (see footnote 9 on p. 1738).

Results from replicating BLL's variable-length moving average (VMA) rules are presented in Table 2 below (compare to Table II of BLL on p.1739):

Table 2: Standard Test Results for the VMA Rules

Rule	N(buy)	N(sell)	Buy	Sell	Buy-Sell
(1, 50, 0)	1260	795	0.00025	0.00054	-0.00029
			(-0.38)	(0.26)	(-0.53)
(1,50,0.01)	1062	618	0.00012	0.00073	-0.00061
			(-0.64)	(0.60)	(-1.01)
(1,150,0)	1258	697	0.00005	0.00092	-0.00087
			(-0.83)	(0.97)	(-1.54)
(1,150,0.01)	1140	564	0.00006	0.00136	-0.00130
			(-0.78)	(1.67)	(-2.11)
(5,150,0)	1253	702	0.00016	0.00072	-0.00056
			(-0.59)	(0.60)	(-0.99)
(5,150,0.01)	1122	570	0.00029	0.00135	-0.00106
			(-0.26)	(1.67)	(-1.72)
(1,200,0)	1245	660	0.00004	0.00082	-0.00078
			(-0.84)	(0.77)	(-1.35)
(1,200.0.01)	1142	543	0.00009	0.00120	-0.00111
			(-0.71)	(1.38)	(-1.78)
(1,22,0)	1214	869	0.00055	0.00013	0.00042
			(+0.33)	(-0.57)	(+0.79)

Note: A VMA Rule is defined by the set of parameters (s,l,f) where s is the length of short moving average, l is the length of long moving average, and f is the size of the filter. N(buy) and N(sell) are the number of days on which the rule keeps buy and sell signals, respectively, based on previous day's closing price. Buy (Sell) is the mean return on buy (sell) days; t-statistics, computed as in BLL fn.9 on p.1738, are given in parentheses. Buy-Sell is the difference between mean buy and sell return; t-statistic in parenthesis is for the test that it is different from zero.

It is clearly seen that, in the 1996-2004 period, the profitability of VMA rules have disappeared. All buy-sell differences were negative, some of them borderline significant (i.e.; doing just the opposite of what the technical signal said might have been more useful). Moreover, negative returns following sell signals are no longer the case.

Results with FMA rules (not reported) are essentially the same.

Results for the TRB Rules (presented in Table 3 below; compare to Table IV of BLL on p.1742) lead to the same suggestion: All of the buy-sell differences are negative, some borderline significant; and returns following sell signals are no longer negative.

These results are qualitatively similar to those of Sullivan et al. over the 1987-1996 period. Note that results reported so far do not include transaction costs, meaning that they are worse after the inclusion of transaction costs.

Table 3: Standard Test Results for the Trading-Range Breakout Rules

Rule	N(buy)	N(sell)	Buy	Sell	Buy-Sell
(1, 50, 0)	121	59	0.00022	0.00803	-0.0078
			(-0.54)	(1.07)	(-1.38)
(1,50,0.01)	38	39	0.00100	0.00211	-0.00111
			(-0.22)	(-0.05)	(-0.14)
(1,150,0)	94	18	-0.00194	0.01382	-0.01576
			(-0.98)	(1.30)	(-1.72)
(1,150,0.01)	25	16	-0.00322	0.01269	-0.01591
			(-0.75)	(1.11)	(-1.39)

Note: A TRB Rule is defined by the set of parameters (s,n,f) where s is the length of short moving average, n is the length of the past period over which local minimum and maximum points are defined, and f is the size of the filter. N(buy) and N(sell) are the number of 10-day periods on which the rule keeps buy and sell signals, respectively, based on previous day's closing price. Buy (Sell) is the mean 10-day return on buy-signal (sell) days; t-statistics, computed as in BLL fn.9 on p.1738, are given in parentheses. Buy-Sell is the difference between mean buy and sell return; t-statistic in parenthesis is for the test that it is different from zero.

The clear conclusion is that any real life practitioner (for instance, a mechanically trading technician) implementing these rules would have lost money in nominal terms, and would exhibit worse performance compared to buy-and-hold.

I discovered, however, one exception which was not employed by BLL: 22-day moving average rule or VMA(1,22,0). The 22-day simple moving average has been widely used by practitioners. It can even be said that, from a short-term perspective, 22-day MA is among the most widely used technical tools[8]. More importantly, it has been widely known for decades, long before the study of BLL. Hence, this finding is not a product of data-snooping; it was noticed at the first and single trial, motivated by curiosity why BLL might have omitted this widely used version. Results with VMA(1,22,0) rule, seen in the last row of Table 2, suggest that it is the only rule that produced positive buy-

[8] Some variants use 20 or 25 day simple MA. They essentially represent the same logic: the number of working days in a month. Results with these variants were essentially the same.

sell differential in our sample period, though still insignificant. Sell days still failed to provide negative returns. So, our overall conclusion is not altered. The contribution here is just to bring this interesting finding into attention.

3.2. Tests on Istanbul Stock Exchange:

The same tests as in Section 3.1 are applied to the ISE-100 index, the most widely used stock market index in Turkey, on daily data from January 12, 1996 to September 17, 2004, a corresponding sample. The ISE-100 daily closing values are obtained from *Euroline*®, who redistributes official data from the ISE. This will constitute the first documented extensive replication of BLL's technical trading rules in Turkish stock market, at the time of writing this paper. Note that there was no index futures market in Turkey in the sample period.

The case of the ISE is interesting from several points: Besides being an emerging market, Turkey has been under a sticky high inflation environment for more than two decades. Due to excessive government borrowing, real interest rates have been unusually high. This is a quite remarkable characteristic of Turkish stock market as the unconditional (since the beginning of available data up until the end of our sample period) mean excess market return was negative, constituting a significant anomaly for asset pricing models. Finally, the Turkish stock market has been dominated by short-horizon traders, and TA has been widely followed by an overwhelming majority of stock market participants.

Several methodological issues arise due to high inflation and high risk-free interest rates. First, because of persistently high inflation, price series in local currency (TL) are strictly non-stationary. A symptom of this problem was revealed by the bias of technical signals towards "buy" as the MA gets longer. A solution for this problem is to use $-based index series, which were not severely affected by currency fluctuations before February 21, 2001, when Turkey had to shift from managed to floating exchange rate regime. Before this date, the Central Bank followed a policy of smoothly depreciating the currency in line with inflation. When interpreting results for the February 21, 2001 – September 17, 2004 subperiod, however, one has to be careful, as results from implementing technical rules to stock index may be attributed to currency fluctuations as well. I perform the tests both on TL and US$ denominated values of the ISE-100 index, conduct additional robustness checks by dividing subperiods by February 21, 2001, and provide all necessary remarks in interpreting results.

Summary statistics for daily returns over our sample period are presented in Table 4 below.

Table 4: Summary Statistics for Daily and 10-day Returns

	1-day Returns		10-day Returns
	TL-based	**$-based**	**$-based**
N	2148	2148	214
Mean	0.00228	0.00029	0.0029
StDev	0.0319	0.0349	0.1124
Skew.	0.257	-0.053	0.025
Kurtosis	3.879	3.537	0.926
P(1)	0.020	0.030	0.118*
P(2)	0.043**	0.040	-0.029
P(3)	-0.021	-0.013	-0.006
P(4)	0.028	0.034	-0.078
P(5)	-0.049**	-0.027	0.060

Note: * (**) significant at 10% (5%) level. ρ(t) is the coefficient of serial correlation at lag t.

Trading rules are the same as before. Results from VMA strategies are presented in Table 5 below.

Table 5.a: Test Results for the VMA on the ISE-100 Index (TL)

Rule	N(buy)	N(sell)	Buy	Sell	Buy-Sell
(1, 50, 0)	1283	813	0.00234	0.00186	0.00048
			(0.05)	(-0.32)	(0.34)
(1,50,0.01)	1223	745	0.00234	0.00196	0.00038
			(0.05)	(-0.24)	(0.26)
(1.150.0)	1332	664	0.00310	0.00060	0.00250
			(0.74)	(-1.19)	(1.66)
(1,150,0.01)	1294	631	0.00320	0.00086	0.00234
			(0.82)	(0.99)	(1.52)
(5,150,0)	1325	671	0.00288	0.00106	0.00182
			(0.54)	(-0.87)	(1.21)
(5,150,0.01)	1294	634	0.00289	0.00126	0.00163
			(0.54)	(-0.71)	(1.06)
(1,200,0)	1344	602	0.00237	0.00184	0.00053
			(0.08)	(-0.30)	(0.34)
(1,200.0.01)	1322	571	0.00242	0.00182	0.0006
			(0.12)	(-0.30)	(0.37)
(1,22,0)	1224	900	0.00342	0.00067	0.00275
			(1.00)	(-1.27)	(1.97)

Table 5.b: Test Results for the VMA Rules on $-based ISE-100 Index

Rule	N(buy)	N(sell)	Buy	Sell	Buy-Sell
(1, 50, 0)	1096	1000	0.00095	0.00067	0.00028
			(0.04)	(-0.17)	(0.18)
(1,50,0.01)	1040	941	0.00085	0.00043	0.00042
			(-0.03)	(-0.34)	(0.27)
(1.150.0)	1132	864	0.00132	0.00050	0.00082
			(0.33)	(-0.27)	(0.52)
(1,150,0.01)	1104	818	0.00155	0.00044	0.00111
			(0.50)	(-0.31)	(0.68)
(5,150,0)	1135	861	0.00116	0.00071	0.00045
			(0.21)	(-0.13)	(0.29)
(5,150,0.01)	1096	813	0.00137	0.00052	0.00085
			(0.37)	(-0.26)	(0.53)
(1,200,0)	1191	755	0.00121	0.00048	0.00073
			(0.25)	(-0.28)	(0.45)
(1,200.0.01)	1159	734	0.00118	0.00071	0.00047
			(0.22)	(-0.12)	(0.48)
(1,22,0)	1095	1029	0.00298	-0.00134	0.00432
			(1.61)	(-1.69)	(2.85)

Note: See explanations below Table 2. t-statistics are given in parentheses.

These results indicate that all mean buy-sell differences were of the expected sign, however, generally insignificant. Mean returns on "sell" days are not negative.

We can assess economic significance by deducting the product of transaction cost with the number of trades from the cumulative raw buy-sell difference over the sample, as suggested by BLL.[9] Transaction costs include round-trip commissions and an estimate of average bid-ask spread. Effective commission rates for a middle-size individual client in the ISE have decreased from around 0.5% per side in 1996 to around 0.1% per side in 2004. They have been lower for big traders. The most common rate during our sample period has been 0.2%, as a floor (minimum rate) at this level was implemented by the Capital Markets Board. Bid-ask spread in the ISE is basically determined by the tick size, the representative value of which was 1.75% over our sample period (the mid-point of the 1% - 2.5% range). In the absence of an index futures contract or index fund, the technical trading signals on the ISE-100 can be implemented by a simultaneous transaction in all of the component stocks.[10]

[9] As returns to technical rules were negative in the DJIA test, there was no need to assess economic significance there.

[10] While this may seem impractical, it is possible to replicate a very close proxy of ISE-100 index returns using a portfolio of 8-10 stocks which are most highly correlated with the index.

Thus, a reasonable estimate for the average round-trip transaction cost over our sample period is 2.15% (1.75% bid-ask spread plus twice 0.2% commission).

Given the frequency of trades and the transaction costs estimated above, these results imply no economic significance.[11] For a simple comparison, VMA rules on $-denominated ISE-100 index performed about as profitably as they did on DJIA in 1897-1986 period.

The only exception is again (1,22,0) VMA rule, which BLL omitted. The performance of the (1,22,0) VMA rule is the highest among the rules tested in the literature cited in this paper. It provided economically significant profits after transaction costs. The economic significance is more pronounced under the realistic assumption that sell days are utilized by investing in the risk-free TL asset (overnight repo)[12].

Results with TL-based ISE-100 index are qualitatively similar to those with the $-based ISE-100 index. Notice, however, that buy and sell days are not evenly distributed with the TL-based index. Results for the subperiod between 21.February.2001-17.September.2004 (not reported) on the $-based index indicate lower profitability for technical rules.

Results with FMA rules are qualitatively similar, and not reported.

Results with TRB rules applied on $-based index are presented in Table 6 below.

Table 6: Test Results for the TRB Rules on $-based ISE-100 Index

Rule	N(buy)	N(sell)	Buy	Sell	Buy-Sell
(1, 50, 0)	75	58	0.02766	-0.01541	0.04307
			(1.64)	(-1.09)	(2.18)
(1,50,0.01)	72	56	0.01628	-0.01283	0.02911
			(0.87)	(-0.92)	(1.45)
(1,150,0)	40	29	0.05491	-0.01082	0.06573
			(2.68)	(-0.61)	(2.39)
(1,150,0.01)	40	27	0.03855	-0.00476	0.04331
			(1.84)	(-0.33)	(1.54)

Note: See explanations at Table 3. t-statistics are given in parentheses.

[11] Net returns on technical rules are not presented, in line with the convention in the literature, as they are sensitive to any specific assumption on transaction costs. However, they are easy to compute using the information provided in tables and any specific level of assumed transaction costs.

[12] The average risk-free (overnight repo) rate decreased from around 0.2% per day in 1996-1999 and 2001 to near 0.03% per day in 2000, 2003 and 2004.

As seen in Table 6, these results are stronger: All buy-sell differences are positive, and borderline-significant. All sell returns are negative. Given our estimates of transaction costs, these results imply economic significance. Again, the economic significance is much more pronounced when sell-days are utilized by investing in the risk-free TL asset.

IV. Conclusions and Discussion

To summarize, we have observed that simple technical trading rules, tested and found statistically profitable by BLL, were no more profitable on recent DJIA data, in the presence of a futures market. Over the corresponding sample period on ISE-100 index, however, they performed better: MA rules delivered insignificantly positive profits, and TRB rules delivered significantly positive profits. We have also discovered a superior version of MA rules: 22-day VMA, which has been more widely used by traders long before BLL was published, still produced positive profits on DJIA and significantly positive economic profits on the ISE-100 index.

Our test markets with contrasting characteristics enable us to establish supported hypotheses on the determinants of simple technical trading rules' profitability. The test markets in this paper basically differ in at least three key characteristics: level of volatility, degree of return autocorrelation, and transaction costs.

Level of volatility: Volatility of DJIA in both original BLL sample and the recent sample in this paper were almost the same, while the volatility of the ISE-100 index was much higher. Although a comparison of results on the ISE-100 to those on DJIA suggests an association between the level of volatility and technical rule profitability, a comparison across DJIA sample periods discards it because the profitability disappeared in the recent sample although volatility remained almost the same.

Degree of return autocorrelation: The technical rules tested by BLL are essentially momentum type rules, so one would expect their profitability to be associated with the degree of positive return autocorrelation. Our results provide only moderate support for such association. As the significance of autocorrelations reduced in recent DJIA sample, the profitability of technical trading rules disappeared. However, autocorrelations were low in ISE sample,

where technical rules turned out to be still profitable. This suggests that technical rules do more than picking up constant-parameter positive autocorrelation in returns.

Transaction costs: A comparison of our results across different samples provides support for the hypothesis that transaction costs are a key factor determining the statistical significance of profits to technical trading rules. Our results suggest that profits to these simple technical trading rules could persist when transaction costs were sufficiently high, and disappeared after the introduction of a low cost trading facility, index futures. The analysis in this study makes the contribution of enabling comparison across samples distinguished in terms of the availability of index futures market.

We can also examine the effect of publicity: While a comparison of results on DJIA before and after the publicity of BLL's findings gives rise to the assertion that publicity might have led to the disappearance of technical trading rule profits, the persistence of profits in the corresponding recent ISE sample does not support it.

Findings of this study reiterate the earlier conclusions that observed average statistical profitability of simple technical trading rules of BLL does not violate market efficiency, as they fail out-of-sample. However, I also show that some technical rules, well-known by traders for a long time hence not product of data-snooping, may still be providing positive economic profits, as is the case with the 22-day MA rule; even though average rules turn out to be useless. I document that the same technical rules over the same sample period may be useless in one market while they produce economically significant positive profits in another, depending on certain characteristics of the market, such as transaction costs. Then, it will be interesting to see, as a more conclusive test of the hypothesis that transaction costs are the main determinant of the profitability of simple technical trading rules, whether the profitability observed in the ISE will survive after the introduction of index futures in Turkey. This is left to a further study in the future when sufficient index futures data will be accumulated in Turkish Derivatives Exchange (VOB).

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The ISE Review Volume: 11 No:41
ISSN 1301-1642 ©ISE 1997

JINX NUMBERS EFFECT

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Abstract

Some economy theories assume that human is rational and when they make a decision in uncertainty conditions, they will prefer the best choice. Many evidences have been given against these theories. Especially psychology professor Daniel Kahneman's studies provide evidence that human behave intuitively rather than rationally.

It can be alleged that some superstitions which affect on human psychology such as number 13 fallacy can have an effect on stock exchanges trading behaviors. In this study, number 13 fallacy has been searched for both Romanian and Turkish stock exchanges and not found the anomaly evidence for both stock exchanges. The anomaly has been found for Turkish stock exchange but it is not supported by statistics so, it is a random result.

I. Introduction

Under uncertain conditions, human behaviour is accepted as rational by some economic theories such as the Expected Utility Theory, the Efficient Market Hypothesis or the Rational Choice Theory. Taking into consideration the Rational Choice Theory assumes human behaviour is guided by instrumental reason. Accordingly, individuals always choose what they believe to be the best means to achieve their goals[1].

These theories "initially suppose that people behave logically and can calculate possibilities when taking their decisions. Originally Kahneman's

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This paper has been presented at International Conference Competitiveness and Stability in the Knowledge based Economy, Croiva-Romania, 20-21 October 2006.

1 http://en.wikipedia.org/wiki/Rational_choice_theory, (25.04.2007).

Keywords: Turkish and Romanian stock exchanges, Jinx Number Effect, Descriptive Statistics, Mann Whitney U Test, Kruskal Wallis Test, Logistic Regression Analysis.
JEL Classification: G14, G10, G15, F30

studies, a psychological professor, indicate a reverse situation and investors may use their intuitional idea in economic decisions that could substitute rational idea when they could prefer using logical way in place of probabilitiy calculation"[2]. This claim has been supported by much evidence, such as the days of the week, January, weather effects etc., but there is still no satisfactory explanation about these anomalies.

Psychology plays a key role in determining the behaviour of stock markets. Investors' psychology is affected by some factors such as their childhood background, the weather etc. Because of these factors every investor has their own priorities. But some factors which are related to human psychology are common for investors, such as loss aversion, regret aversion, mental accounting and self control. In addition to these factors, there are also cultural fears, superstitions and habits.

Because of the cultural differences some numbers, dates and habits come to foreground as unlucky or lucky numbers. For example, 13 is being accepted as an unlucky number by some communities and is not preferred in their daily life. There are some habits which are very interesting such as using the right foot for the first step into a bathroom. Especialy, some Turkish muslims do it for Islamic reasons.

The number 13 is laden with superstition, especially for Christian cultures. If the 13th day of the month falls on a Friday, then this means double bad luck. This superstitious belief finds its roots in ancient history. Norse mythology talks about 12 gods having a dinner party at Valhalla, the ancient Norse heaven, when the mischievous Loki entered as an uninvited 13th guest. Once there, Loki arranged for Hoder, the blind god of darkness, to shoot Balder the Beautiful, the god of joy and gladness, with a mistletoe-tipped arrow. Balder died and the Earth got dark. The whole Earth mourned[3].

At the same time other numbers are unlucky numbers for Asian people, for instance. For example according to Indian beliefs, the numbers 1, 3, and 8 are unlucky numbers, and people do not sell their properties on Fridays, large numbers of people do not make any payments on Fridays and brides do not leave their mother's house on Friday[4].

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2 Yazıcı Bigehan, Behavioral Finance, Basic Concepts, www.bilgehanyazici.com, (25.04.2007).
3 http://www.corsinet.com/trivia/scary.html#friday (08.02.2009).
4 http://www.webindia123.com/tamilnadu/People/beliefs%202.htm (08.02.2009).

For the Chinese, numbers 4 and 58 are unlucky numbers while in Japanese the pronunciation of the number 4 sounds similar to bad things such as death[5][6].

Unreasoned fear of the number 13 is termed triskaidekaphobia. Due to this fear, some tall buildings have resorted to skipping the "thirteenth floor", either by numbering it "14" (though it's really still the thirteenth floor) or by designating the floor as "12a" or something similar. Likewise, some streets do not contain a house number 13. The thirteenth of a month is seen as ominous, particularly when it falls on a Friday, on a Tuesday in the Greek and Spanish-speaking world, or on a Monday in Russia. Months with a Friday the 13th always begin on a Sunday[7]. The number 13, avoided and accepted as an unlucky number by some cultures and societies, has created a paradox in life: research by Lionello et al. suggests that the number 13 is even at the basis of microtubules, which serve as tracks for the transport of cell organelles in nerve cells and which control the activity of the brain, and therefore also the processes which are responsible for fear[8].

On the other hand, superstitions can be observed in all societies, from traditional to modern ones. Literature research gives us some insight into the reasoning and related factors behind superstitions. For example Rudsky[9] researched the relationship between illusion of control[10], optimism and pessimism. The researcher applied a questionnaire to 275 university students and reported that students demonstrating an illusion of control showed greater levels of overall paranormal beliefs. The superstitions were about such things as black cats, the number 13 and breaking mirrors, which are all superstitions

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5 http://skepdic.com/superstition.html (08.02.2009).

6 http://www.japan-guide.com/e/e2209.html (08.02.2009).

7 http://en.wikipedia.org/wiki/13_%28number%29#As_lucky.2C_unlucky.2C or significant_number

8 It can be reached more details on Pogliani Lionello,a Milan Randi and Nenad Trinajstic, 2004, "What Can Be Said About the Number 13 Beyond the Fact that it is a Prime Number?", Croatica Chemica Acta Ccacaa 77 (3) pp. 447-456, Issn-0011-1643, Cca-2946, Essay.

9 Rudsky Jeffery, Winter 2004, "The Illusion of Control, Superstitious Belief, and Optimism, Current Psychology: Developmental, Learning, Personality", Social, Vol. 22, No. 4, pp. 306-315.

10 Illusion of control: An expectancy of success which is greater than the objective probability would warrant. Langer, E. (1975). The illusion of control, Journal of Personality and Social Psychology, 32, 311-328. (Hill Eileen and Janis Williamson, Choose six numbers, any numbers, The Psychologist, January 1998, p.18)

socially shared by society. In addition the researcher claims that people who exhibited an illusion of control were not likely to be more or less optimistic or pessimistic than people who did not exhibit such an illusion.

Over-optimism and self-confidence are the main reasons of heuristic anomalies. For example in some sports, professional players carry some objects and choose uniforms with special numbers. Some people choose special numbers when they play lottery. The players do this because they believe that they can get control of the result[11]. Sometimes this situation affects consuming habits. For example, Taiwanese are willing to spend over 50% more money for 25% fewer tennis balls because of their positive superstitious beliefs with the number 8[12].

Illusion of control is not limited just to numbers. It even differs from culture to culture, and is very important in some cultures. In this context, when experts create a brand they use alphanumeric names such as 007 (Bond). The name of the good is very important for some cultures, while for others it is not. As a result, particular items will not be chosen by a culture even when it is of high quality. This situation should be especially taken into consideration by companies who exports to India and China. For example, in Chinese culture 3, 6, 8 and 9 numbers are lucky numbers while 4 is unlucky. So, names that have pronunciation similar to unlucky numbers (e.g. which infer death) are not to be preferred. Because the entire system of writing is different in West and China, the perception of numbers and characters is different too[13]. In summary, names can have positive or negative impact on people in different cultures.

If we accept that numbers and names can be more important than we assumed in human life, it is possible that investors will commit some shares and intend to trade them on their luckiest day, while avoiding unlucky days. So, this should be investigated.

The common fascination and preoccupation with symbolic or

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11 Hill Eileen and Janis Williamson, January 1998, "Choose Six Numbers, Any Numbers", The Psychologist, p.20.

12 Block Lauren and Thomas Kramer, January 2008, "The Effect of Superstitious Beliefs on Performance Expectations", J. of the Acad. Mark. Sci., DOI 10.1007/s11747-008-0116-y p.9.

13 Ang Swee Hoon, 1997, "Chinese Consumers' Perception of Alpha-Numeric Brand Names", Journal of Consumer Marketing, Vol: 14 No. 3, p. 233.

interesting numbers in general life also pervades financial markets. Human behavior is being affected by some internal and external factors. To our knowledge, there are few articles about cultural, superstition and habits effects on stock markets in literature accompanied by many articles on behavioural finance. Brown et all. have searched clustering daily closing prices for six Asia-Pacific stock markets, three of which were predominantly on Chinese populations. They reported that Chinese culture and superstition influence the number preferences of traders but the evidence is largely confined to Hong Kong. Specifically, Chinese culture and superstition appear to be significiant in Hong Kong during the auspicious Chinese festivals of Chinese New Year and the Dragon Boat and Mid-Autumn festivals[14].

Some researchers are focused on the clustering and some are on psychological barriers in financial markets. For example, Mitchell[15] aptly searched numbers and psychological effects in finance literature. He reports that people select numbers they believe others to recognise or that are readily discernible to other individuals to facilitate the decision-making process and achieve equilibrium. These focal points also draw on culture and the decimal place-value convention. Niederhoffer[16] has searched stock prices clustering in NYSE with using samples of the books of the specialists. He reports that stock market decision makers place their limit and stop orders at numbers with which they are accustomed to dealing.

Another subject on numbers effect is rounding prices. Round prices appear to be used more often than non-round prices in financial markets. Kandel et all.[17] have researched the investor inclination to use round stock prices by examining investor orders placed in Israeli IPOs conducted as uniform-price auctions. They report that investors are more likely to use round prices.

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[14] Brown Philip, Angelina Chua and Jason Mitchell, 2002, "The Influence of Cultural Factors on Price Clustering: Evidence from Asia-Pacific Stock Markets", Pacific-Basin Finance Journal, 10, pp.307-332.

[15] Mitchell Jason, 2001, "Clustering and Psychological Barriers: The Importance of Numbers", The Journal of Futures Markets, Vol: 21, No:5, p.395.

[16] Neiderhoffer Victor, 1964, "Clustering of Stock Prices", Harward University, Cambridge, Mass, pp.258-265, http://links.jstor.org/sici?sici=0030-364X(196503%2F04)13%3A2%3C258%3ACOSP%3E2.0.CO%3B2-%23

[17] Kandel, Shmuel, Oded Sarig and Avi Wohl, 2001, "Do Investors Prefer Round Stock Prices? Evidence from Israeli IPO Auctions", Journal of Banking & Finance, Vol: 25, pp.1543-1551.

The evidence about cultural effect on stock prices has been given by Chan et all.[18] They have researched market anomalies such as day of the week effects, and month of the year effects for four Asian stock markets. They report that cultural holidays prove a stronger effect than state holidays.

This study's aim is to search if the Romanian and Turkish stock exchange traders accept number 13 as unlucky number and keep this in mind when they trade.

II. Data and Methodology

This study is conducted using two kinds of data from the Istanbul Stock Exchange (ISE) and Bucharest Stock Exchange databases. The first of these data sets includes daily closing values of the ISE-100 Index. The second set consists of BET-C Index daily closing price variables for the Bucharest Stock Exchange. Bucharest Stock Exchange's BET-C index data set has 1.629 observations; they range from January 05, 2000 to July 25, 2006. ISE-100 Index has 1665 observations; they range from January 5,2000 to September 20, 2006. For both indexes returns are calculated as follows:

$$R_t = \frac{V_t - V_{t-1}}{V_{t-1}} x100 \qquad (1)$$

where R_t denotes return on t day and V_t, V_{t-1} denotes closing prices on t and t-1, respectively.

To search jinx and days of the week anomalies, we applied descrip!ive statistics. Then to determine whether we should use parametric or non-parametric tests to search significant differences between days of the week, we investigated the normality of the series. We found that the series has no normality. So, we applied non-parametric tests namely, the Mann Whitney U and Kruskal Wallis Tests. To search days returns and 'days 13' returns effect on negative returns we have used the logistic regression method.

Logistic regression can be used when the dependent variable is categorically observed in sets of two (binary, dichotomous), three or more,

[18] Chan, M.W.L., Anya Khanthavit and Hugh Thomas, 1996, "Seasonality and Cultural Influences on Four Asian Stock Markets", Asia Pacific Journal of Management, October, Vol:13, No:2, pp.1-24.

to determine any causal relationships between dependent and independent variables. The method aims to estimate the parameters using logistic models. It calculates the expected values of the dependent variables as possibilities, so it enables us to classify the probability rules[19]. Logistic models which based on data type can be establish as below. Logistic model should be shown below if there is unique independent variable:

$$P(Y) = \frac{e^{\beta_0 + \beta_1 X}}{1 + e^{\beta_0 + \beta_1 X}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X)}} \tag{2}$$

Multi-varible, binary Logistic model:

$$P(Y) = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p)}} \tag{3}$$

Here, β_i's indicate regresyon coefficients. Regresyon coefficients should be calculated as below.

$$\ln\left(\frac{P(Y)}{Q(Y)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p \tag{4}$$

Here, Q(Y) is calculated as Q(Y)=1-P(Y). Odds Ratio is calculated as $OR = \frac{P(Y)}{Q(Y)}$. Values of Exp(β) of every parameters is taken as OR values. So, Exp(β_p), indicates observation probability of Y dependent variable's which affected by X_p[20].

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19 Bonney, G. E., 1987. Logistic Regression for dependent binary observations, Biometrics, 43(4): 951-973.

20 Ozdamar Kazım, 2004, Paket Programlar ile İstatistiksel Veri Analizi, Kaan Kitabevi, Eskişehir, s. 475.

III. Empirical Results

As can be seen in Table 1, the 'days 13' data set return (mean) have been established at 0,38002 with an 'other days' mean of 0,13898 respectively. So, we could claim that the 'days 13' returns are higher than the 'other days' returns even though statistically speaking the difference is insignificant.

Table 1: Descriptive Statistics of BET –C Index Returns

	Days							
	Descriptive Statistics	Days 13	Other Days (None- 13 days)	Monday	Tuesday	Wednesday	Thursday	Friday
	Mean	0,38002	0,13898	0,10727	0,10759	0,15873	0,16986	0,19073
	Median	0,22629	0,11528	0,10389	0,09691	0,18003	0,13224	0,13413
	Std. Deviation	1,33782	1,33517	1,51734	1,37324	1,20588	1,32951	1,23892
	Minimum	-3,1996	-9,7761	-9,7761	-6,1933	-4,72575	-6,9678	-5,0218
	Maximum	6,44486	6,03078	5,35817	4,61033	4,58886	6,44486	6,03078
	Coefficient of Skewnes	1,629	-0,284	-0,406	-0,459	-0,173	0,095	0,063
	Coefficient of Kurtosis	7,809	4,629	6,857	2,970	2,670	4,953	3,204
	n	54	1575	320	328	327	328	326
Normality Test	**Kolmogorov-Smirnov**	0,147	0,073	0,095	0,063	0,084	0,085	0,086
	P	0,005	0,000	0,000	0,003	0,000	0,000	0,000

On the other hand, standard deviation as a measurement of risk has been observed almost equal for both data set, 'days 13' is 1,33782 and 'days non 13' is 1,33517 respectively. If we compare minimum returns, 'days non 13' minimum return has been observed -9,7761 while 'days 13's minimum return is -3,1996. In terms of maximum returns, there are no significant differences between 'days 13' (6,03078) and 'days non 13' returns (6,44486).

The highest return has been observed on Fridays (0,19073) while the lowest was Monday (0,10727) and on Tuesdays (0,10759). There are no significant differences in the standard deviations between the days of the week. The highest risk day is observed on Monday while lowest risk on Wednesday and Friday.

As can be seen in the Table 2 there are no significant differences between the returns of 'days 13' and 'days non 13', p>5%. We also searched days of the week effect with applying Kruskal Wallis Test.

Table 2: Mann Whitney U Test Results BET-C Index Returns (Days 13 and Days non 13's Returns)

	Return
Mann-Whitney U	38939,0
Wilcoxon W	1280039,0
Z	-1,055
Asymp. Sig. (2-tailed)	,291

As can be seen in Table 3, there are no differences between days of the week, P>0,05.

Table 3: Kruskal Wallis Tests Results for BET-C Index Returns (Days of the Week)

Chi-Square	1,506
Df	4
Asymp. Sig.	,826

After finding no significant differences between days returns, we searched which days' returns affect the negative returns in the whole data set. To achieve this we rearranged the data set. Dependent variable arranged as formula 5 as binary. Independent variables are arranged like formula 6 and 7. To explain interested category's negative or neutral returns which indicated formula 1 in our study it needs to determine a reference category. So, to search negative returns for number 13 days, non-13 days returns are taken 2 reference category for X_1 variable. Because Fridays returns are higher than other days, Friday (5) is chosen as a reference category for X_2 variable. So, it will be searched to get negative returns for non-Friday days with compared by Friday returns.

In this case a dependent variable is indicated as follows;

$$Y_i = \begin{cases} 1, \text{ if return is negative} \\ 0, \text{ if return is positive} \end{cases} \quad (5)$$

Where independent variables are indicated as follows;

$$X_1 = \begin{cases} 1, \text{ days 13 return} \\ 2, \text{ days non 13 return} \end{cases} \quad (6)$$

$$X_2 = \begin{cases} 1, \text{ if day Monday} \\ 2, \text{ if day Tuesday} \\ 3, \text{ if day Wednesday} \\ 4, \text{ if day Thursday} \\ 5, \text{ if day Friday} \end{cases} \quad (7)$$

Logistic Regression results show that there is no statistically significant coefficient for all days in regression equity (p>0,05). So, it is meaningless to explain Exp(B) values (Odds Ratio). The results are given at Table 4. As can be seen in Table 4 regression equity could not find statistically significant including sub-categories of independent variables. So, there is no days returns effect on the negative returns of the whole period.

Table 4: Results of Logistic Regression for BET-C Index Returns

	B	S.E.	Wald	df	Sig.	Exp(B)
Days 13 returns (1)	-0,108	0,280	0,149	1	0,699	0,897
Days (whole period)			1,171	4	,883	
Monday (1)	0,159	0,158	1,010	1	0,315	1,172
Tuesday (2)	0,113	0,157	0,516	1	0,473	1,120
Wednesday (3)	0,069	0,158	0,192	1	0,661	1,072
Thursday (4)	0,052	0,158	0,109	1	0,741	1,054
Constant	-0,268	0,112	5,727	1	0,017	0,765

Note: a Variable(s) entered on step 1: 'days 13' returns, Days returns for whole period.

The same procedure has been repeated for BET Index but no interesting or statistically significant results could be found, so we preferred to add its results to the annex rather than showing it here.

We also applied descrip!ive statistics for the ISE-100 Index. As can be seen in Table 5., the 'days 13' data set return (mean) have been calculated at -0,3479, with an 'other days' mean of 0,099 respectively. So, we could claim that the 'days 13' returns are lower than other days returns, which is, from a statistical point of view, even insignificant.

Standard deviation as a measurement of risk has been observed almost equally for both data set: 'days 13' is 2,8921 and 'days non 13' is 2,7566 respectively. If we compare minimum returns, 'days non 13' minimum return has been observed -18,1093 while the minimum return of 'days 13' is -8,9296. If we consider maximum returns, 'days non 13' maximum return has been observed as 19,4509 while the maximum return of 'days 13' is 7,1137.

The highest return has been observed on Thursdays; the lowest on Mondays. There are no significant differences between the standard deviations of the different days of the week.

Table 5: Descriptive Statistics of ISE-100 Index Returns

	Days							
	Descriptive statistics	Days 13 Return	Other days (Days non-13)	Monday	Tuesday	Wednesday	Thursday	Friday
	Mean	-0,3479	0,0997	-0,5052	-0,021	0,0447	0,4619	0,4467
	Median	-0,4478	0,1135	-0,3901	-0,227	0,1243	0,377	0,4386
	Std. Deviation	2,8921	2,7566	2,8973	2,669	2,8315	2,8785	2,3942
	Minimum	-8,9296	-18,1093	-14,6171	-9,011	-18,1093	-9,8505	-9,0101
	Maximum	7,1137	19,4509	10,6225	19,451	18,6411	12,5176	13,5255
	Skewness	-0,318	0,326	-0,551	1,41	0,199	0,404	0,538
	Kurtosis	1,932	6,002	3,139	9,462	10,234	2,245	4,932
	n	55	1610	332	336	334	334	329
Tests of Normality	Kolmogorov-Smirnov	0,091	0,064	0,055	0,072	0,076	0,076	0,076
	P	,200(*)	0	0,018	0	0	0	0

Like the BET-C Index, the ISE-100 Index series (except number 13's returns series) is also not normally distributed. So, we applied non-parametric tests, namely the Mann Whitney U and Kruskal Wallis Tests.

As can be seen in Table 6 there are no significant differences between returns of 'days 13' and 'days non 13', p>5%.

Table 6: Mann Whitney U Test Results for ISE-100 Index Returns (Days 13 and Days non-13 returns)

	Return
Mann-Whitney U	40377
Wilcoxon W	41917
Z	-1,112

We have investigated if there are any differences between days of the week by applying the Kruskal-Wallis Test, and found statistically significant differences, P<0,001. Results can be seen in Table 7.

Table 7: Kruskal Wallis Tests Results for ISE- 100 Index Returns (Days of the Week)

Chi square	28,577
Df	4
Asymp. Sig.	0

To determine which days have the differences and on which days these differences are related to each other, we applied Dunn's Test which is multi-compared test. As can be seen in Table 8 there are significant differences between Friday to Tuesday and Mondays returns. Similarly, there is difference between Thursday and Monday returns.

Table 8: Dunn's Test Results for ISE-100 Index Returns

Comparison	Diff of Ranks	Q	P<0,05
Friday vs Monday	172,907	4,623	Yes
Friday vs Tuesday	111,685	2,995	Yes
Friday vs Wednesday	85,550	2,291	No
Thursday vs Monday	155,184	4,165	Yes
Thursday vs Tuesday	93,961	2,529	No
Wednesday vs Monday	87,357	2,345	No

After we found significant differences between days returns, we searched which days returns affect the negative returns in the whole data set. To achieve this we rearranged the data set and applied a logistic regression test. The X_1, X_2, and Y_i variables which are used in this analysis are calculated the same way as Bet-C Index for ISE-100 Index. So, Y_i indicates dependent variable while X_1 and X_2 indicates independent variables.

In this test, we appointed days returns for the whole period as a dependent variable and day of the week returns and 'days 13' returns as independent variables. We defined the dependent and independent variables in the way we have discussed before.

Table 9: Results of Logistic Regression for ISE-100 Index Returns

	B	S.E.	Wald	df	Sig.	Exp(B)	95,0% C.I.for EXP(B)	
							Lower	Upper
Days 13 Returns (1)	-,260	,303	,739	1	,390	1,297	0,717	2,348
Days			28,058	4	,000			
Monday (1)	-,703	,158	19,783	1	,000	2,021	1,482	2,755
Tuesday (2)	-,555	,157	12,474	1	,000	1,742	1,280	2,370
Wednesday (3)	-,329	,157	4,364	1	,037	1,389	1,020	1,890
Thursday (4)	-,109	,158	,473	1	,491	1,115	0,818	1,520
Constant	,431	,113	14,579	1	,000	0,650		

Note: a Variable(s) entered on step 1: 'days 13', Days.

According to the Logistic Regression results we could say that both 'days 13' and 'days non 13's returns have no effect on the negative returns ($P>0.05$). But if take a Fridays results as a reference point, some days of the week have an effect on the negative returns. These days are Monday, Tuesday and Wednesday, $p<0,05$. According to Exp(B) values Monday returns have 2,021 times effect on negative returns than Friday returns. Similarly, if we compare Fridays returns effect on negative returns with other days returns Tuesdays returns 1,742 times, Wednesday returns 1,389 times and Thursday returns 1,115 times effect on negative returns. Results can be seen in Table 9.

IV. Conclusions

Jinx numbers such as the number 13 are very important in some people's lives. To understand how important they are for investors trading in both Romanian and Turkish stock exchanges we applied some statistical methods. We could find that there is a reverse jinx effect for the Romanian stock exchange even though it is not statistically significant. Jinx effect has been observed in Turkish stock exchange, but there as well it is statistically insignificant.

There is no days of the week effect in the Romanian stock exchange while the Turkish stock exchange does show an effect. In the Turkish stock market the effect seems to result in negative returns at the start of the week but then it turns into a positive change towards the end of the week.

For the Turkish stock market, the Friday pray effect could be searched using minute data. We lacked the time to investigate this effect, however, and could not include it in this paper.

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The ISE Review Volume: 11 No:41
ISSN 1301-1642 ©ISE 1997

GLOBAL CAPITAL MARKETS

The global economy entered a major slowdown in the third quarter of 2008 due to the deepening crisis in financial markets, by major corrections in housing markets in a number of advanced economies. The financial crisis that erupted in August 2007 after the negative developments in the U.S. subprime mortgage market has adversely affected the global financial institutions and markets. The US economy has suffered from the direct effects of the financial crisis that originated in its own subprime mortgage market which has tightened credit conditions. Economy in Europe has also slowed appreciably, dampened by high oil prices, tightening credit conditions, housing downturns in several economies and the appreciating euro. Japan's economy was also negatively affected by slowing exports and the impact of deteriorating terms of trade on domestic demand.

The financial crisis also affected the emerging markets as growth prospects in emerging economies also weakened. Equity prices have fallen sharply and spreads on both sovereign and corporate paper have widened significantly.

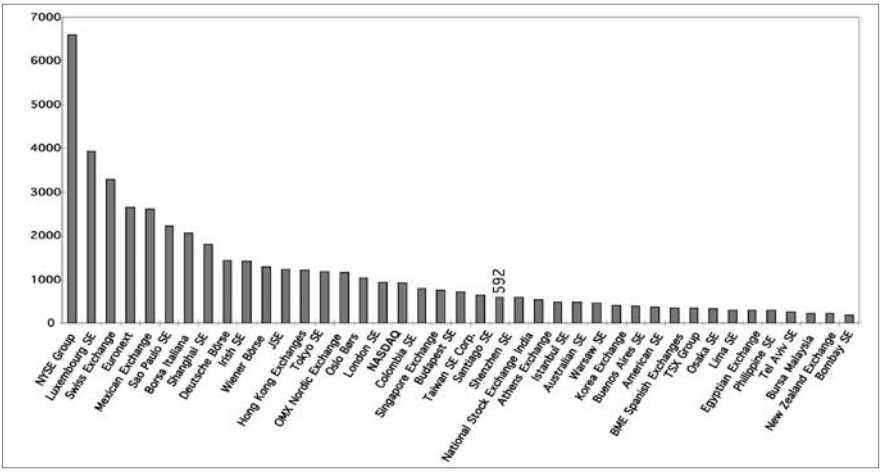
The performances of some developed stock markets with respect to indices indicated that DJIA, FTSE-100, Nikkei-225 and DAX changed by –18.3%, -31.7%, -21.4% and –31.1%, respectively, at October 1st, 2008 in comparison with the December 31, 2007. When US $ based returns of some emerging markets are compared in the same period, the best performer markets were: Mexico (-15.6 %) Chile (-16.9 %), Colombia (-19.7 %), Israel (-23.0 %) and Argentina (-24.9%). In the same period, the lowest return markets were: China (-63.7 %), Venezuela (-52.2 %), and Pakistan (-48.6 %). The performances of emerging markets with respect to P/E ratios as of end of September 2008 indicated that the highest rates were obtained in Jordan (29.4), Czech Rep. (24.1), Indonesia (22.3) and Taiwan (19.2) and the lowest rates in Brazil (7.0), Thailand (7.8), Russia (8.2) and Korea (9.3).

Market Capitalization (USD Million, 1986-2007)

	Global	Gelişmiş Piyasalar	Gelişen Piyasalar	İMKB
1986	6,514,199	6,275,582	238,617	938
1987	7,830,778	7,511,072	319,706	3,125
1988	9,728,493	9,245,358	483,135	1,128
1989	11,712,673	10,967,395	745,278	6,756
1990	9,398,391	8,784,770	613,621	18,737
1991	11,342,089	10,434,218	907,871	15,564
1992	10,923,343	9,923,024	1,000,319	9,922
1993	14,016,023	12,327,242	1,688,781	37,824
1994	15,124,051	13,210,778	1,913,273	21,785
1995	17,788,071	15,859,021	1,929,050	20,782
1996	20,412,135	17,982,088	2,272,184	30,797
1997	23,087,006	20,923,911	2,163,095	61,348
1998	26,964,463	25,065,373	1,899,090	33,473
1999	36,030,810	32,956,939	3,073,871	112,276
2000	32,260,433	29,520,707	2,691,452	69,659
2001	27,818,618	25,246,554	2,572,064	47,689
2002	23,391,914	20,955,876	2,436,038	33,958
2003	31,947,703	28,290,981	3,656,722	68,379
2004	38,904,018	34,173,600	4,730,418	98,299
2005	43,642,048	36,538,248	7,103,800	161,537
2006	54,194,991	43,736,409	10,458,582	162,399
2007	64,563,414	46,300,864	18,262,550	286,572

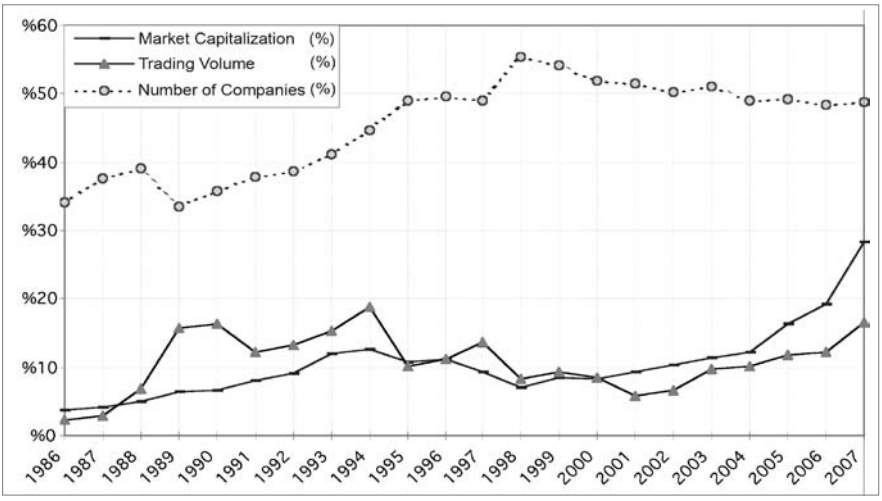
Source: Standard & Poor's Global Stock Markets Factbook, 2008.

Comparison of Average Market Capitalization Per Company (USD Million, Sep. 2008)



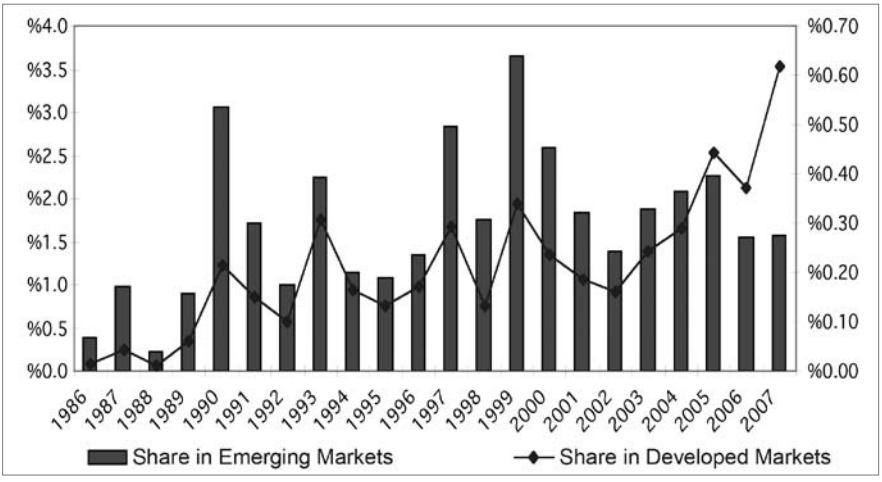
Source: FIBV, Monthly Statistics, September 2008.

Worldwide Share of Emerging Capital Markets
(1986-2007)



Source: Standard & Poor's Global Stock Markets Factbook, 2008.

Share of ISE's Market Capitalization in World Markets
(1986-2007)



Source: Standard & Poor's Global Stock Markets Factbook, 2008.

Main Indicators of Capital Markets (Sep. 2008)

	Market	Monthly Turnover Velocity (Sep. 2008) (%)	Market	Value of Share Trading (millions, US$) Up to Year Total (2008/1-2008/9)	Market	Market Cap. of Share of Domestic Companies (millions US$) Sep.2008
1	NASDAQ	864.9%	NYSE Group	26.597.295	NYSE Group	13,045,902,7
2	Shenzhen SE	221.3%	NASDAQ	13.532.364	Tokyo SE	3,334,406,1
3	NYSE Group	219.6%	London SE	5.514.229	NASDAQ	3,110,698,0
4	Deutsche Börse	209.3%	Tokyo SE	4.373.620	Euronext	2,691,846,2
5	Borsa Italiana	195.4%	Euronext	3.676.202	London SE	2,565,051,2
6	Korea Exchange	179.4%	Deutsche Börse	3.130.555	Shanghai SE	1,775,791,0
7	BME Spanish Exchanges	166.9%	Shanghai SE	2.077.296	Hong Kong	1,614,590,3
8	London SE	153.2%	BME Spanish	2.009.975	TSX Group	1,520,520,4
9	Taiwan SE Corp.	151.9%	TSX Group	1.406.794	Deutsche Börse	1,351,774,4
10	Tokyo SE	144.8%	Borsa Italiana	1.332.067	BME Spanish	1,222,069,0
11	Oslo Børs	144.4%	Hong Kong	1.329.056	Swiss Exchange	999,072,8
12	Osaka SE	138.2%	Swiss Exchange	1.249.426	Australian SE	925,946,8
13	Euronext	136.2%	Korea Exchange	1.151.227	Bombay SE	884,746,8
14	OMX Nordic Exchange	132.4%	OMX Nordic Exchange	1.118.809	National Stock Exchange India	828,416,5
15	Swiss Exchange	126.9%	Australian SE	1.075.686	OMX Nordic Exchange	757,065,1
16	Istanbul SE	125.5%	Shenzhen SE	1.007.714	Borsa Italiana	663,260,2
17	Australian SE	115.8%	Taiwan SE Corp.	724.260	Korea Exchange	656,116,3
18	Shanghai SE	107.4%	National Stock Exchange India	619.030	JSE	535,184,5
19	TSX Group	94.6%	American SE	480.897	Taiwan SE Corp.	453,064,5
20	Hong Kong Exchanges	90.0%	Oslo Børs	396.320	Shenzhen SE	387,660,5
21	Irish SE	83.5%	JSE	324.137	Singapore	349,451,1
22	Budapest SE	80.7%	Bombay SE	264.000	Mexican Exchange	329,127,9
23	National Stock Exchange India	74.9%	Singapore	218.667	Bursa Malaysia	217,044,1
24	Egyptian Exchange	73.2%	Istanbul SE	206.801	Oslo Børs	202,968,2
25	Singapore Exchange	65.7%	Osaka SE	188.731	Tel Aviv SE	191,828,3
26	Wiener Börse	61.6%	Athens Exchange	98.110	Istanbul SE	188,150,1
27	Athens Exchange	60.6%	Mexican Exchange	93.176	Santiago SE	169,208,6
28	JSE	60.4%	Wiener Börse	92.681	American SE	160,530,6
29	Tel Aviv SE	53.2%	Tel Aviv SE	90.768	Osaka SE	155,008,4
30	New Zealand Exchange	48.0%	Egyptian	84.063	Warsaw SE	145,512,8
31	Warsaw SE	39.6%	Bursa Malaysia	79.430	Athens Exchange	137,517,6
32	Bursa Malaysia	38.4%	Irish SE	72.629	Wiener Börse	117,864,4
33	Bombay SE	29.7%	Warsaw SE	56.756	Egyptian	114,043,6
34	Mexican Exchange	29.4%	Santiago SE	28.716	Colombia SE	105,880,3
35	Tehran SE	27.4%	Budapest SE	24.239	Luxembourg SE	105,235,9
36	Philippine SE	24.1%	New Zealand	16.229	Irish SE	71,157,6
37	Santiago SE	21.6%	Colombia SE	16.226	Philippine SE	70,309,1
38	Colombia SE	18.9%	Philippine SE	13.084	Tehran SE	65,447,0
39	Colombo SE	15.5%	Tehran SE	12.425	Lima SE	50,258,1
40	Cyprus SE	12.7%	Buenos Aires SE	5.357	Buenos Aires SE	48,481,1
41	Ljubljana SE	11.9%	Lima SE	4.990	Budapest SE	31,606,5
42	Lima SE	9.3%	Ljubljana SE	1.911	New Zealand	31,153,1
43	Buenos Aires SE	8.3%	Cyprus SE	1.653	Ljubljana SE	17,156,8
44	Mauritius SE	5.6%	Colombo SE	949	Cyprus SE	13,401,3
45	Bermuda SE	3.4%	Mauritius SE	322	Mauritius SE	6,748,3

Source: FIBV, Monthly Statistics, September 2008.

Trading Volume (USD millions, 1986-2007)

	Global	Developed	Emerging	ISE	Emerging / Global (%)	ISE/ Emerging (%)
1986	3,573,570	3,490,718	82,852	13	2.32	0.02
1987	5,846,864	5,682,143	164,721	118	2.82	0.07
1988	5,997,321	5,588,694	408,627	115	6.81	0.03
1989	7,467,997	6,298,778	1,169,219	773	15.66	0.07
1990	5,514,706	4,614,786	899,920	5,854	16.32	0.65
1991	5,019,596	4,403,631	615,965	8,502	12.27	1.38
1992	4,782,850	4,151,662	631,188	8,567	13.20	1.36
1993	7,194,675	6,090,929	1,103,746	21,770	15.34	1.97
1994	8,821,845	7,156,704	1,665,141	23,203	18.88	1.39
1995	10,218,748	9,176,451	1,042,297	52,357	10.20	5.02
1996	13,616,070	12,105,541	1,510,529	37,737	11.09	2.50
1997	19,484,814	16,818,167	2,666,647	59,105	13.69	2.18
1998	22,874,320	20,917,462	1,909,510	68,646	8.55	3.60
1999	31,021,065	28,154,198	2,866,867	81,277	9.24	2.86
2000	47,869,886	43,817,893	4,051,905	179,209	8.46	4.42
2001	42,076,862	39,676,018	2,400,844	77,937	5.71	3.25
2002	38,645,472	36,098,731	2,546,742	70,667	6.59	2.77
2003	29,639,297	26,743,153	2,896,144	99,611	9.77	3.44
2004	39,309,589	35,341,782	3,967,806	147,426	10.09	3.72
2005	47,319,584	41,715,492	5,604,092	201,258	11.84	3.59
2006	67,912,153	59,685,209	8,226,944	227,615	12.11	2.77
2007	98,816,305	82,455,174	16,361,131	302,402	16.56	1.85

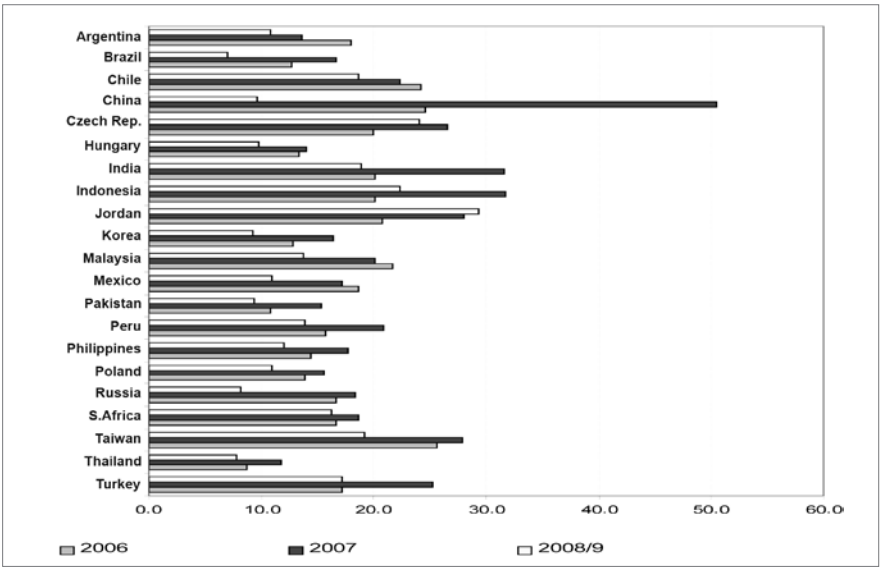
Source: Standard & Poor's Global Stock Markets Factbook, 2008.

Number of Trading Companies (1986-2007)

	Global	Developed Markets	Emerging Markets	ISE	Emerging / Global (%)	ISE/ Emerging (%)
1986	28,173	18,555	9,618	80	34.14	0.83
1987	29,278	18,265	11,013	82	37.62	0.74
1988	29,270	17,805	11,465	79	39.17	0.69
1989	25,925	17,216	8,709	76	33.59	0.87
1990	25,424	16,323	9,101	110	35.80	1.21
1991	26,093	16,239	9,854	134	37.76	1.36
1992	27,706	16,976	10,730	145	38.73	1.35
1993	28,895	17,012	11,883	160	41.12	1.35
1994	33,473	18,505	14,968	176	44.72	1.18
1995	36,602	18,648	17,954	205	49.05	1.14
1996	40,191	20,242	19,949	228	49.64	1.14
1997	40,880	20,805	20,075	258	49.11	1.29
1998	47,465	21,111	26,354	277	55.52	1.05
1999	48,557	22,277	26,280	285	54.12	1.08
2000	49,933	23,996	25,937	315	51.94	1.21
2001	48,220	23,340	24,880	310	51.60	1.25
2002	48,375	24,099	24,276	288	50.18	1.19
2003	49,855	24,414	25,441	284	51.03	1.12
2004	48,806	24,824	23,982	296	49.14	1.23
2005	49,946	25,337	24,609	302	49.27	1.23
2006	50,212	25,954	24,258	314	48.31	1.29
2007	51,322	26,251	25,071	319	48.85	1.27

Source: Standard & Poor's Global Stock Markets Factbook, 2008.

Comparison of P/E Ratios Performances



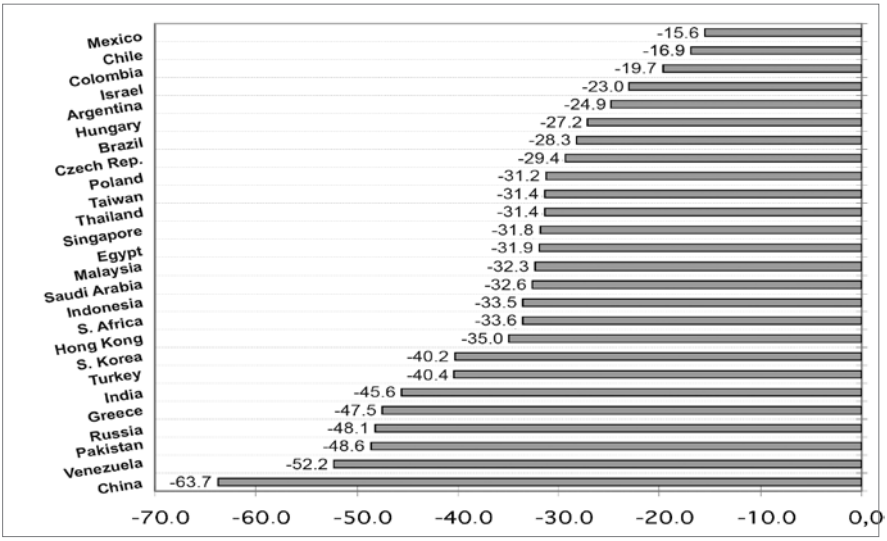
Source: IFC Factbook 2001. Standard & Poor's, Emerging Stock Markets Review, September 2008.

Price-Earnings Ratios in Emerging Markets

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008/9
Argentina	39.4	-889.9	32.6	-1.4	21.1	27.7	11.1	18.0	13.6	10.9
Brazil	23.5	11.5	8.8	13.5	10.0	10.6	10.7	12.7	16.6	7.0
Chile	35.0	24.9	16.2	16.3	24.8	17.2	15.7	24.2	22.3	18.6
China	47.8	50.0	22.2	21.6	28.6	19.1	13.9	24.6	50.5	9.7
Czech Rep.	-14.9	-16.4	5.8	11.2	10.8	25.0	21.1	20.0	26.5	24.1
Hungary	18.1	14.3	13.4	14.6	12.3	16.6	13.5	13.4	14.0	9.8
India	25.5	16.8	12.8	15.0	20.9	18.1	19.4	20.1	31.6	18.9
Indonesia	-7.4	-5.4	-7.7	22.0	39.5	13.3	12.6	20.1	31.7	22.3
Jordan	14.1	13.9	18.8	11.4	20.7	30.4	6.2	20.8	28.0	29.4
Korea	-33.5	17.7	28.7	21.6	30.2	13.5	20.8	12.8	16.4	9.3
Malaysia	-18.0	91.5	50.6	21.3	30.1	22.4	15	21.7	20.1	13.7
Mexico	14.1	13.0	13.7	15.4	17.6	15.9	14.2	18.6	17.2	11.0
Pakistan	13.2	-117.4	7.5	10.0	9.5	9.9	13.1	10.8	15.3	9.4
Peru	25.7	11.6	21.3	12.8	13.7	10.7	12.0	15.7	20.9	13.9
Philippines	22.2	26.2	45.9	21.8	21.1	14.6	15.7	14.4	17.7	12.0
Poland	22.0	19.4	6.1	88.6	-353.0	39.9	11.7	13.9	15.6	11.0
Russia	-71.2	3.8	5.6	12.4	19.9	10.8	24.1	16.6	18.4	8.2
S.Africa	17.4	10.7	11.7	10.1	11.5	16.2	12.8	16.6	18.7	16.2
Taiwan	52.5	13.9	29.4	20.0	55.7	21.2	21.9	25.6	27.9	19.2
Thailand	-12.2	-6.9	163.8	16.4	16.6	12.8	10.0	8.7	11.7	7.8
Turkey	34.6	15.4	72.5	37.9	14.9	12.5	16.2	17.2	25.2	17.2

Source: IFC Factbook, 2004; Standard&Poor's, Emerging Stock Markets Review, September 2008.
Note: Figures are taken from S&P/IFCG Index Profile.

Comparison of Market Returns in USD
(31/12/2007-01/10/2008)



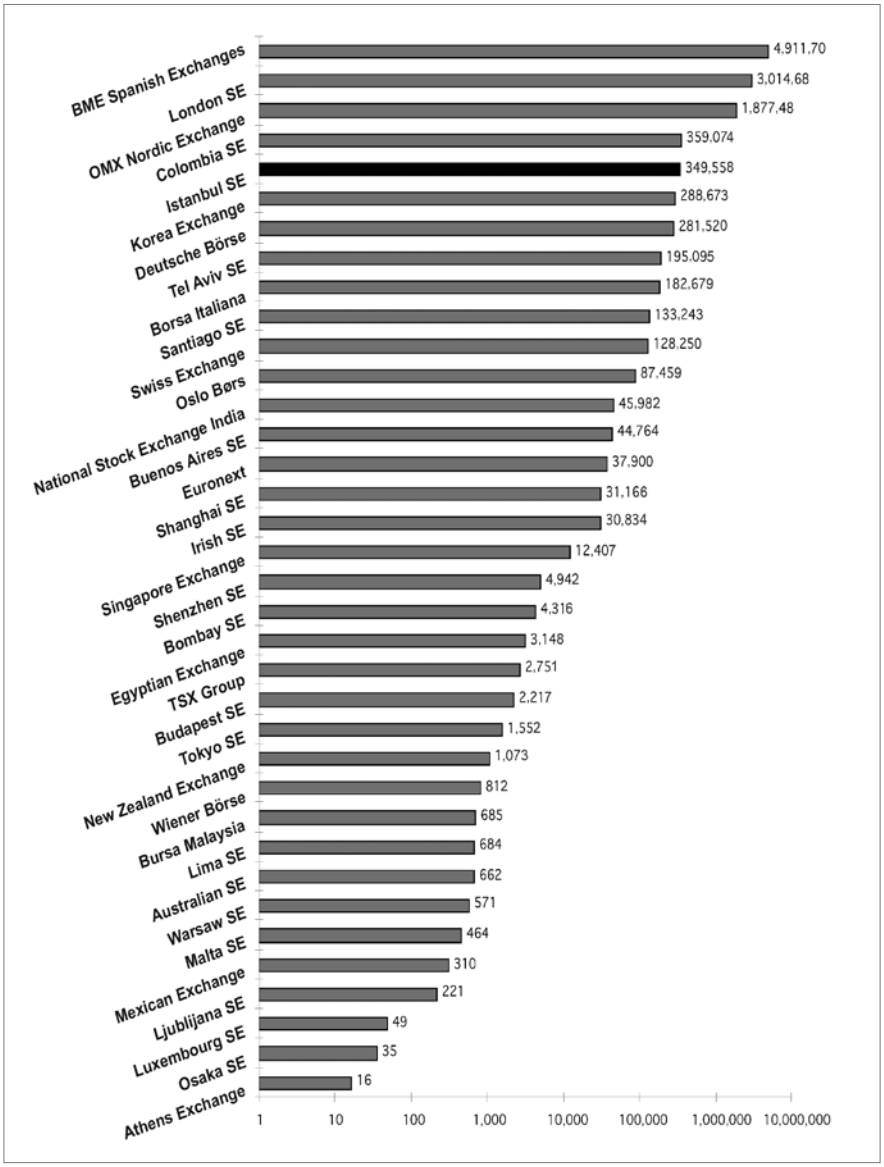
Source: The Economist, Oct 1st 2008.

Market Value/Book Value Ratios

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008/9
Argentina	1.5	0.9	0.6	0.8	2.0	2.2	2.5	4.1	3.2	2.6
Brazil	1.6	1.4	1.2	1.3	1.8	1.9	2.2	2.7	3.3	1.4
Chile	1.7	1.4	1.4	1.3	1.9	0.6	1.9	2.4	2.5	2.1
China	3.0	3.6	2.3	1.9	2.6	2.0	1.8	3.1	6.3	1.4
Czech Rep.	0.9	1.0	0.8	0.8	1.0	1.6	2.4	2.4	3.1	2.9
Hungary	3.6	2.4	1.8	1.8	2.0	2.8	3.1	3.1	3.2	2.3
India	3.3	2.6	1.9	2.0	3.5	3.3	5.2	4.9	7.9	4.8
Indonesia	3.0	1.7	1.7	1.0	1.6	2.8	2.5	3.4	5.6	3.9
Jordan	1.5	1.2	1.5	1.3	2.1	3.0	2.2	3.3	4.4	4.7
Korea	2.0	0.8	1.2	1.1	1.6	1.3	2.0	1.7	2.2	1.2
Malaysia	1.9	1.5	1.2	1.3	1.7	1.9	1.7	2.1	2.5	1.7
Mexico	2.2	1.7	1.7	1.5	2.0	2.5	2.9	3.8	3.6	2.5
Pakistan	1.4	1.4	0.9	1.9	2.3	2.6	3.5	3.2	4.7	2.9
Peru	1.5	1.1	1.4	1.2	1.8	1.6	2.2	3.5	6.0	4.2
Philippines	1.4	1.0	0.9	0.8	1.1	1.4	1.7	1.9	2.8	1.8
Poland	2.0	2.2	1.4	1.3	1.8	2.0	2.5	2.5	2.8	2.0
Russia	1.2	0.6	1.1	0.9	1.2	1.2	2.2	2.5	2.8	1.3
S.Africa	2.7	2.1	2.1	1.9	2.1	2.5	3.0	3.8	4.4	3.8
Taiwan	3.4	1.7	2.1	1.6	2.2	1.9	1.9	2.4	2.6	1.8
Thailand	2.1	1.3	1.3	1.5	2.8	2.0	2.1	1.9	2.5	1.6
Turkey	8.9	3.1	3.8	2.8	2.6	1.7	2.1	2.0	2.8	1.9

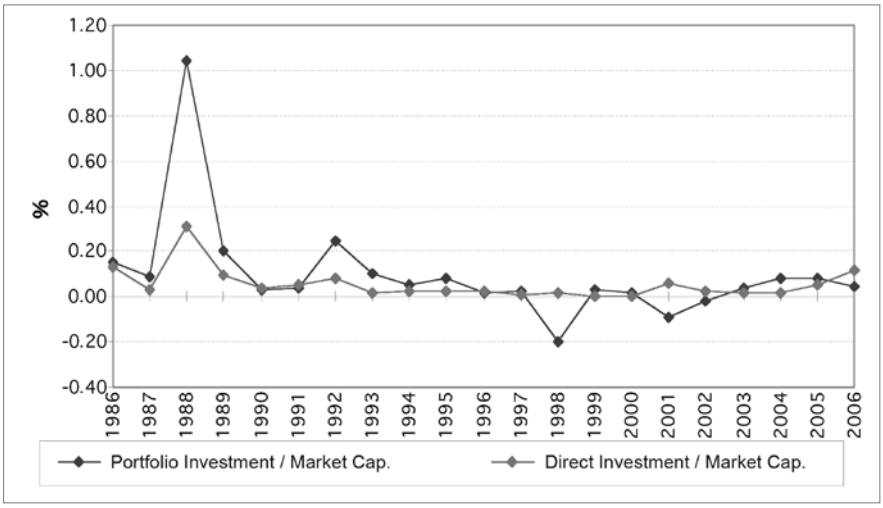
Source: IFC Factbook, 2004; Standard & Poor's, Emerging Stock Markets Review, September 2008.
Note: Figures are taken from S&P/IFCG Index Profile.

Value of Bond Trading
(Million USD Jan. 2008-Sep. 2008)



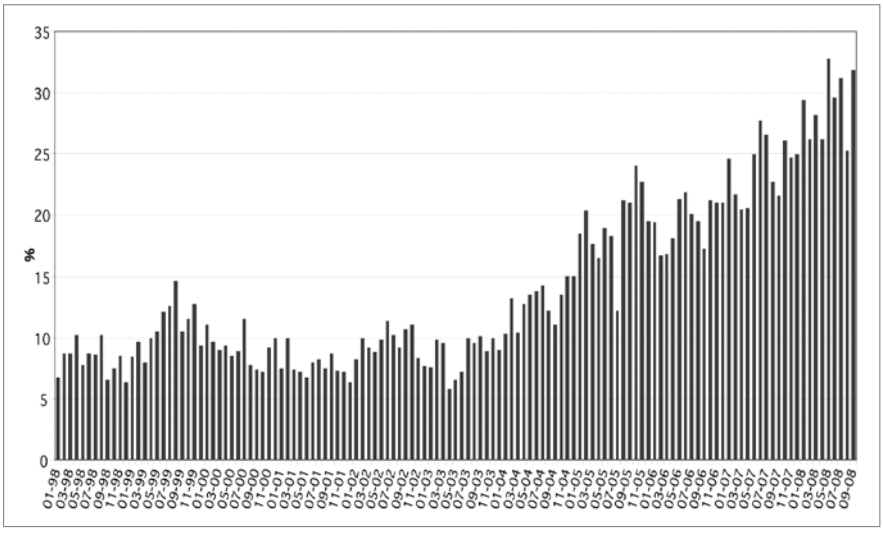
Source: The Economist, Oct 1st 2008.

Foreigners' Share in the Trading Volume of the ISE (Jan. 1998-Sep. 2008)



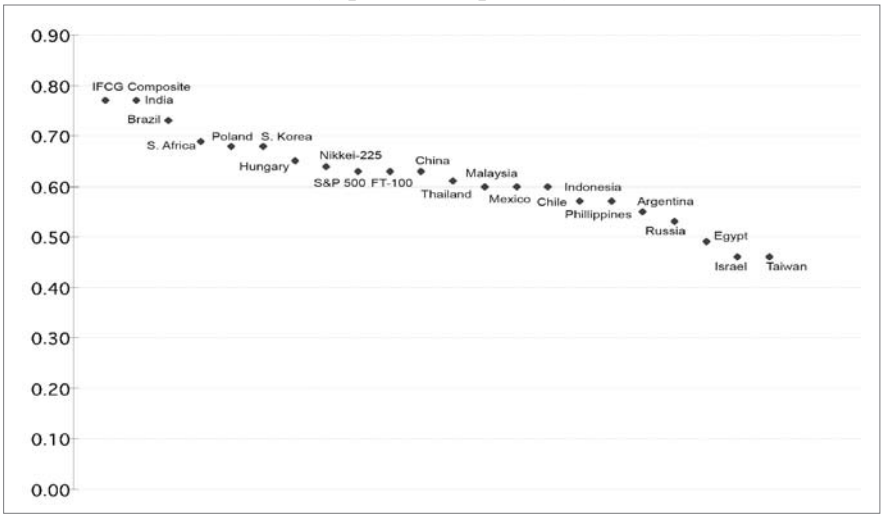
Source: ISE Data. CBTR Databank.

Foreign Investments as a Percentage of Market Capitalization in Turkey (1986-2006)



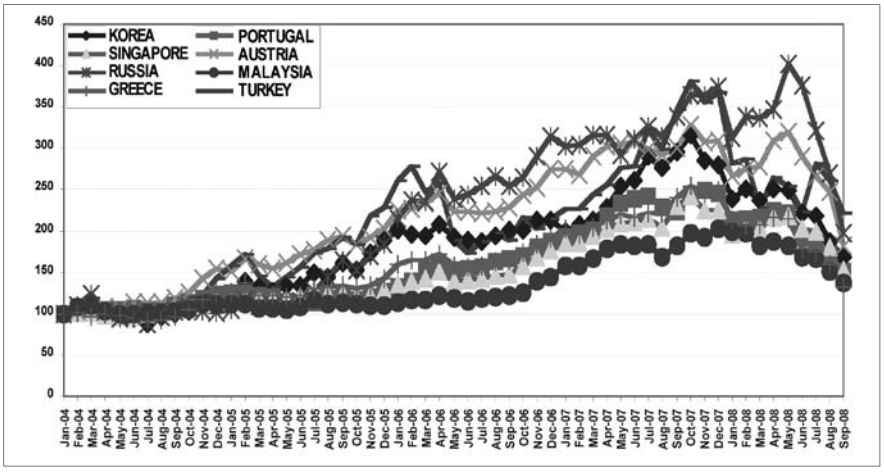
Source: ISE Data.

Price Correlations of the ISE
(Sep. 2003- Sep. 2008)



Source: Standard & Poor's, Emerging Stock Markets Review, September 2008.
Notes: The correlation coefficient is between -1 and +1. If it is zero. for the given period. it is implied that there is no relation between two serious of returns.

Comparison of Market Indices
(31 Jan. 2004=100)



Source: Bloomberg

The ISE Review Volume: 11 No:41
ISSN 1301-1642 ©ISE 1997

ISE
Market Indicators

	STOCK MARKET										
	Number of Companies	Traded Value				Market Value		Dividend Yield	P/E Ratios		
		Total		Daily Average							
		YTL Million	US$ Million	YTL Million	US$ Million	YTL Million	US$ Million	(%)	YTL(1)	YTL(2)	US$
1986	80	0.01	13	---	---	0.71	938	9,15	5,07	---	---
1987	82	0.10	118	---	---	3	3.125	2,82	15,86	---	---
1988	79	0.15	115	---	---	2	1.128	10,48	4,97	---	---
1989	76	2	773	0.01	3	16	6.756	3,44	15,74	---	---
1990	110	15	5.854	0.06	24	55	18.737	2,62	23,97	---	---
1991	134	35	8.502	0.14	34	79	15.564	3,95	15,88	---	---
1992	145	56	8.567	0.22	34	85	9.922	6,43	11,39	---	---
1993	160	255	21.770	1	88	546	37.824	1,65	25,75	20,72	14,86
1994	176	651	23.203	3	92	836	21.785	2,78	24,83	16,70	10,97
1995	205	2.374	52.357	9	209	1.265	20.782	3,56	9,23	7,67	5,48
1996	228	3.031	37.737	12	153	3.275	30.797	2,87	12,15	10,86	7,72
1997	258	9.049	58.104	36	231	12.654	61.879	1,56	24,39	19,45	13,28
1998	277	18.030	70.396	73	284	10.612	33.975	3,37	8,84	8,11	6,36
1999	285	36.877	84.034	156	356	61.137	114.271	0,72	37,52	34,08	24,95
2000	315	111.165	181.934	452	740	46.692	69.507	1,29	16,82	16,11	14,05
2001	310	93.119	80.400	375	324	68.603	47.689	0,95	108,33	824,42	411,64
2002	288	106.302	70.756	422	281	56.370	34.402	1,20	195,92	26,98	23,78
2003	285	146.645	100.165	596	407	96.073	69.003	0,94	14,54	12,29	13,19
2004	297	208.423	147.755	837	593	132.556	98.073	1,37	14,18	13,27	13,96
2005	304	269.931	201.763	1.063	794	218.318	162.814	1,71	17,19	19,38	19,33
2006	316	325.131	229.642	1.301	919	230.038	163.775	2,10	22,02	14,86	15,32
2007	319	387.777	300.842	1.539	1.194	335.948	289.986	1,90	12,16	11,97	13,48
2008	318	259.745	213.403	1.353	1.111	244.501	198.668	3,68	7,43	7,43	7,34
2008/Ç1	319	96.652	80.737	1.510	1.262	245.394	187.969	2,55	8,70	8,65	8,39
2008/Ç2	320	79.531	63.266	1.262	1.004	235.863	193.695	3,73	7,55	7,64	7,79
2008/Ç3	318	83.562	69.400	1.286	1.068	244.501	198.668	3,68	7,43	7,43	7,34

Q: Quarter

Note: Between 1986-1992, the price earnings ratios were calculated on the basis of the companies' previous year-end net profits. As from 1993,

YTL(1) = Total Market Capitalization / Sum of Last two six-month profits

YTL(2) = Total Market Capitalization / Sum of Last four three-month profits.

US$ = US$ based Total Market Capitalization / Sum of Last four US$ based three-month profits.

- Companies which are temporarily de-listed and will be traded off the Exchange under the decision of ISE's Executive Council are not included in the calculations.

Closing Values of the ISE Price Indices

YTL Based

	NATIONAL-100 (Jan, 1986=1)	CORPORATE GOVERNANCE (Aug,29.2007= 48.082,17)	NATIONAL-INDUSTRIALS (Dec, 31,90=33)	NATIONAL-SERVICES (Dec, 27.96 =1046)	NATIONAL-FINANCIALS (Dec, 31,90=33)	NATIONAL-TECHNOLOGY (Jun, 30,2000 =14,466.12)	INVESTMENT TRUSTS (Dec 27. 1996=976)	SECOND NATIONAL (Dec 27. 1996=976)	NEW ECONOMY (Sept 02.2004 =20525.92)
1986	1,71	---	---	---	---	---	---	---	---
1987	6,73	---	---	---	---	---	---	---	---
1988	3,74	---	---	---	---	---	---	---	---
1989	22,18	---	---	---	---	---	---	---	---
1990	32,56	---	---	---	---	---	---	---	---
1991	43,69	---	49,63	---	33,55	---	---	---	---
1992	40,04	---	49,15	---	24,34	---	---	---	---
1993	206,83	---	222,88	---	191,90	---	---	---	---
1994	272,57	---	304,74	---	229,64	---	---	---	---
1995	400,25	---	462,47	---	300,04	---	---	---	---
1996	975,89	---	1.045,91	---	914,47	---	---	---	---
1997	3.451,--	---	2.660,--	3.593,--	4.522,--	---	2.934,--	2.761,--	---
1998	2.597,91	---	1.943,67	3.697,10	3.269,58	---	1.579,24	5.390,43	---
1999	15.208,78	---	9.945,75	13.194,40	21.180,77	---	6.812,65	13.450,36	---
2000	9.437,21	---	6.954,99	7.224,01	12.837,92	10.586,58	6.219,00	15.718,65	---
2001	13.782,76	---	11.413,44	9.261,82	18.234,65	9.236,16	7.943,60	20.664,11	---
2002	10.369,92	---	9.888,71	6.897,30	12.902,34	7.260,84	5.452,10	28.305,78	---
2003	18.625,02	---	16.299,23	9.923,02	25.594,77	8.368,72	10.897,76	32.521,26	---
2004	24.971,68	---	20.885,47	13.914,12	35.487,77	7.539,16	17.114,91	23.415,86	39.240,73
2005	39.777,70	---	31.140,59	18.085,71	62.800,64	13.669,97	23.037,86	28.474,96	29.820,90
2006	39.117,46	---	30.896,67	22.211,77	60.168,41	10.341,85	16.910,76	23.969,99	20.395,84
2007	55.538,13	55.406,17	40.567,17	34.204,74	83.822,29	10.490,51	16.428,59	27.283,78	32.879,36
2008	36.051,30	32.961,65	28.573,16	25.371,72	52.318,20	5.708,12	10.894,23	12.790,41	21.859,26
2008/Q1	39.015,44	39.330,78	33.264,72	29.323,22	53.210,19	7.650,83	11.096,39	19.810,76	24.707,47
2008/Q2	35.089,53	34.950,87	33.163,23	25.653,19	45.045,68	6.745,00	10.717,18	15.660,86	22.533,84
2008/Q3	36.051,30	32.961,65	28.573,16	25.371,72	52.318,20	5.708,12	10.894,23	12.790,41	21.859,26

US $ Based

Euro Based

	NATIONAL-100 (Jan. 1986=100)	CORPORATE GOVERNANCE (Aug.29,2007= 2,114.37)	NATIONAL-INDUSTRIALS (Dec. 31.90=643)	NATIONAL-SERVICES (Dec. 27,96 =572)	NATIONAL-FINANCIALS (Dec.31.90= 643)	NATIONAL-TECHNOLOGY (Jun. 30,2000 =1.360.92)	INVESTMENT TRUSTS (Dec 27, 96=534)	SECOND NATIONAL (Dec 27,96=534)	NEW ECONOMY (Sept 02, 2004 =796,46)	NATIONAL-100 (Dec.31,98= 484)
1986	131,53	---	---	---	---	---	---	---	---	---
1987	384,57	---	---	---	---	---	---	---	---	---
1988	119,82	---	---	---	---	---	---	---	---	---
1989	560,57	---	---	---	---	---	---	---	---	---
1990	642,63	---	---	---	---	---	---	---	---	---
1991	501,50	---	569,63	---	385,14	---	---	---	---	---
1992	272,61	---	334,59	---	165,68	---	---	---	---	---
1993	833,28	---	897,96	---	773,13	---	---	---	---	---
1994	413,27	---	462,03	---	348,18	---	---	---	---	---
1995	382,62	---	442,11	---	286,83	---	---	---	---	---
1996	534,01	---	572,33	---	500,40	---	---	---	---	---
1997	982,--	---	757,--	1.022,--	1.287,--	---	835,--	786,--	---	---
1998	484,01	---	362,12	688,79	609,14	---	294,22	1.004,27	---	---
1999	1.654,17	---	1.081,74	1.435,08	2.303,71	---	740,97	1.462,92	---	1.912,46
2000	817,49	---	602,47	625,78	1.112,08	917,06	538,72	1.361,62	---	1.045,57
2001	557,52	---	461,68	374,65	737,61	373,61	321,33	835,88	---	741,24
2002	368,26	---	351,17	244,94	458,20	257,85	193,62	1.005,21	---	411,72
2003	778,43	---	681,22	414,73	1.069,73	349,77	455,47	1.359,22	---	723,25
2004	1.075,12	---	899,19	599,05	1.527,87	324,59	736,86	1.008,13	1.689,45	924,87
2005	1.726,23	---	1.351,41	784,87	2.725,36	593,24	999,77	1.235,73	1.294,14	1.710,04
2006	1.620,59	---	1.280,01	920,21	2.492,71	428,45	700,59	993,05	844,98	1.441,89
2007	2.789,66	2.783,03	2.037,67	1.718,09	4.210,36	526,93	825,20	1.370,45	1.651,52	2.221,77
2008	1.704,61	1.558,52	1.351,02	1.199,65	2.473,75	269,90	515,11	604,77	1.033,57	1.368,59
2008/Q1	1.739,06	1.753,12	1.482,73	1.307,05	2.371,78	341,03	494,61	883,04	1.101,30	1.289,85
2008/Q2	1.676,85	1.670,22	1.584,79	1.225,91	2.152,63	322,33	512,15	748,40	1.076,84	1.244,13
2008/Q3	1.704,61	1.558,52	1.351,02	1.199,65	2.473,75	269,90	515,11	604,77	1.033,57	1.368,59

Q: Quarter

BONS AND BILLS MARKET

Traded Value

Outright Purchases and Sales Market

	Total		Daily Average	
	(YTL Million)	(US $ Million)	(YTL Million)	(US $ Million)
1991	1	312	0.01	2
1992	18	2.406	0.07	10
1993	123	10.728	0.50	44
1994	270	8.832	1	35
1995	740	16.509	3	66
1996	2.711	32.737	11	130
1997	5.504	35.472	22	141
1998	17.996	68.399	72	274
1999	35.430	83.842	143	338
2000	166.336	262.941	663	1.048
2001	39.777	37.297	158	149
2002	102.095	67.256	404	266
2003	213.098	144.422	852	578
2004	372.670	262.596	1.479	1.042
2005	480.723	359.371	1.893	1.415
2006	381.772	270.183	1.521	1.076
2007	363.949	278.873	1.444	1.107
2008	250.738	206.295	1.306	1.074
2008/Q1	99.246	82.986	1.551	1.297
2008/Q2	67.571	53.728	1.073	853
2008/Q3	83.921	69.580	1.291	1.070

Repo-Reverse Repo Market

Repo-Reverse Repo Market

	Total		Daily Average	
	(YTL Million)	(US $ Million)	(YTL Million)	(US $ Million)
1993	59	4.794	0.28	22
1994	757	23.704	3	94
1995	5.782	123.254	23	489
1996	18.340	221.405	73	879
1997	58.192	374.384	231	1.486
1998	97.278	372.201	389	1.489
1999	250.724	589.267	1.011	2.376
2000	554.121	886.732	2.208	3.533
2001	696.339	627.244	2.774	2.499
2002	736.426	480.725	2.911	1.900
2003	1.040.533	701.545	4.162	2.806
2004	1.551.410	1.090.477	6.156	4.327
2005	1.859.714	1.387.221	7.322	5.461
2006	2.538.802	1.770.337	10.115	7.053
2007	2.571.169	1.993.283	5.102	3.955
2008	2.144.968	1.759.002	11.172	9.161
2008/Q1	669.583	558.817	10.462	8.732
2008/Q2	724.052	576.238	11.493	9.147
2008/Q3	751.333	623.947	11.559	9.599

Q: Quarter

ISE GDS Price Indices (January 02, 2001=100)

	YTL Based					
	3 Months (91 Days)	6 Months (182 Days)	9 Months (273 Days)	12 Months (365 Days)	15 Months (456 Days)	General
2001	102,87	101,49	97,37	91,61	85,16	101,49
2002	105,69	106,91	104,87	100,57	95,00	104,62
2003	110,42	118,04	123,22	126,33	127,63	121,77
2004	112,03	121,24	127,86	132,22	134,48	122,70
2005	113,14	123,96	132,67	139,50	144,47	129,14
2006	111,97	121,14	127,77	132,16	134,48	121,17
2007	112,67	122,83	130,72	136,58	140,49	128,23
2008	112,05	121,48	128,53	133,49	136,51	122,31
2008/Q1	112,41	122,15	129,44	134,57	137,65	125,06
2008/Q2	112,03	121,10	127,46	131,43	133,21	124,37
2008/Q3	112,05	121,48	128,53	133,49	136,51	122,31

ISE GDS Performance Indices (January 02, 2001=100)

	YTL Based				
	3 Months (91 Days)	6 Months (182 Days)	9 Months (273 Days)	12 Months (365 Days)	15 Months (456 Days)
2001	195,18	179,24	190,48	159,05	150,00
2002	314,24	305,57	347,66	276,59	255,90
2003	450,50	457,60	558,19	438,13	464,98
2004	555,45	574,60	712,26	552,85	610,42
2005	644,37	670,54	839,82	665,76	735,10
2006	751,03	771,08	956,21	760,07	829,61
2007	887,85	916,30	1.146,36	917,23	1.008,52
2008	1.002,15	1.036,27	1.303,90	1.024,15	1.166,56
2008/Q1	921,98	949,85	1.188,33	944,28	1.045,45
2008/Q2	959,61	988,61	1.236,83	977,05	1.088,12
2008/Q3	1.002,15	1.036,27	1.303,90	1.024,15	1.166,56

ISE GDS Portfolio Performance Indices (December 31, 2003=100)

	YTL Based						
	Equal Weighted Indices			Market Value Weighted Indices			
	EQ 180-	EQ 180+	EQ COMPOSITE	MV 180-	MV 180+	MV COMPOSITE	REPO
2004	125,81	130,40	128,11	125,91	130,25	128,09	118,86
2005	147,29	160,29	153,55	147,51	160,36	154,25	133,63
2006	171,02	180,05	175,39	170,84	179,00	174,82	152,90
2007	203,09	221,63	211,76	202,27	221,13	212,42	177,00
2008	228,73	247,04	237,40	227,72	245,89	237,51	196,16
2008/Q1	210,57	227,06	218,30	209,69	226,29	218,60	182,87
2008/Q2	219,03	231,48	224,73	218,14	230,70	224,66	189,10
2008/Q3	228,73	247,04	237,40	227,72	245,89	237,51	196,16

Q: Quarter
GDS: Government Debt Securities

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