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VALUE AT RISK (VaR): CASE STUDY OF ISE

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ABSTRACT

As an unavoidable element of financial markets, risk has become more important during last 25 years and thus a need has emerged for more complex risk management methods. In my study, I discussed the risk in terms of market risk, arising from the changes in the prices of financial assets and liabilities.

Value at Risk (VaR) is a statistically-based method used more commonly in the recent years for the determination of market risk. VaR means the maximum possible loss within a specified time span and at a given confidence level.

The main aim of my study is to introduce value at risk management, and to present this method with an application. In the light of this aim, the study included the growing importance of the risk management in recent years, in parallel with this, the factors enabling the common usage of VaR as a risk management instrument, the importance of VaR in the context of risk management, the definition of VaR, the methods used in VaR calculations, and the application areas of VaR and the basic regulations dealing with the method.

Thus, in this study, Istanbul Stock Exchange (ISE) 100 index and a portfolio constituting 5 stocks were analyzed under Value at Risk method.

LIST OF FIGURES

Page No.

LIST OF TABLES

Page No.

TABLE OF CONTENTS

SECTION 1

INTRODUCTION

1.1. AIM OF STUDY

It is very difficult for the investor to decide among the investment opportunities formed by various components of securities. As the number of opportunities increase, the problem becomes more complicated and the portfolio theory emerges. At this point, the aim of my study is to explain the market risk management which has a big role in constructing an optimal portfolio which is very important for investor by using Value at risk method and to examine its importance in risk management.

1.2. BROAD PROBLEM AREA

The 2001 crises in Turkish banking sector revealed that the necessary importance was not paid to risk management and there existed a gap in this issue in Turkey. What is the risk and how is it measured? In a broad context, risk can be defined as reaching an unexpected result. From the point of investor, it is the failure in getting an expected return or the loss. In that context, what is the market risk and which methods are used to measure it? All the answers to these questions will be given in details in this study.

1.3. METHODOLOGY

VaR is one of the instruments used for measuring the risk and although it takes many critics, it is now used worldwide. VaR helps managers foreseeing and contributing to the decision-making process. The main characteristic of VaR is that it can summarize several risk types in a number and so its usage is simple and practical. Thus the non-bank financial institutions, regulator authorities and all similar institutions now have a growing interest toward VaR.

The methods used for measuring VaR are classified into 3 categories.

- Analytic Variance- Covariance Methods,
- Historical Simulation method,
- Monte-Carlo simulation method

In our study, VaR will be introduced through measuring the ISE 100 index and 5 stocks in scope of the index by using Variance- Covariance Method.

1.4. STRUCTURE OF STUDY

In section one, the aim of study, broad problem area, methodology and structure of study were examined.

In section two, risk and risk management, risk types in financial markets, importance, aims and development of risk management was examined.

In section three, emergence of VaR, parameters in VaR measuring process, VaR measuring methods and the regulations on VaR made by Basle Committee were examined.

In section four, VaR for ISE 100 index and 5 stocks in the index was measured and the measurement method was introduced.

In section five, the last section, a general assessment was made and the results were disclosed.

SECTION 2

BANKING RISK MANAGEMENT

2.1. WHAT IS RISK AND RISK MANAGEMENT?

Although the risk concept is used very often in daily life, it is hard to define this "risk" concept. Risk can be defined in various ways. Some of them are:

Risk can be defined as the probability of decrease in economic use as a result of either a monetary loss or a cost following a transaction (Danielson;1998). Risk describes the probable loss for investments.

There exists a risk for the decisions of the banks almost in all their areas of activity. Risk is an unavoidable and undiversible part of the banking activities. When discussed from the stand point of banks, the risk means failure rather than success. In case the risk is managed successfully, then it becomes increasingly an important instrument for the bank in terms of profitability.

Risk management is the process of enabling the suitable transition or shift between risk and return in firm management and investment analysis (Colak:2001). In other words, the risk management covers the measures taken against all kinds of uncertainties which may come from either domestic or foreign markets in order to prevent losses dealing with money, security, precious metal, futures and foreign exchange. It also includes all processes involved in identifying and evaluating the possible losses and forming the management information system and the systems for fast and right decision-making in case of a condition requiring urgent decisions.

Today, one of the most comprehensive resolutions achieved by modern business administration theories is the risk management. Because risk management is an approach, a method and an understanding, which establish links and optimum balance among return, capital and risk. Risk management is important for all enterprises. But it is especially important for banks. Because any new risk which may emerge in banking sector will affect not only the banking sector but also the whole economic system like the domino effect (Elton :2003).

2.1.1. The Aim of Risk Management

While the concepts such as assets and liabilities management and fund management which reflect to the balance of the institution are related with the risk regarding the cash or securities management, the risk management deals with all risks that the institution faced.

Today, the risk management is the first priority in the strategic plans of financial institutions. Through strong and effective risk management, on the one side the banks in particular can decrease the probable losses during the periods of extraordinary conditions of the markets, on the other side they contribute their shareholders by growing with the return analysis prepared in comply with the risk and more profitable products (Elton :2003).

The banks having a robust and effective risk management examine the market risks, credit risks and transactional risks comprehensively. They evaluate their losses in advance toward probable crises, take precautions minimizing these losses and make their risk/profit assessment in advance (Elton :2003).

The main aim is the formation of a risk management system which can meet the regularly increasing and diversifying difficult demands of the market while linking the capital, return and risk to each other for increasing the profitability.

2.1.2. The Importance of Risk Management

Risk management is an issue having a strategic importance for banks. Since many of the banks operating in Turkish banking sector could not manage the financial risks well, they were taken to Saving Deposits Insurance Fund (SDIF). As the problems caused by financial risks encountered in banking sector increased, the Basle Committee acting under "Bank for International Settlements" (BIS) has taken decisions advising all banks to establish risk management departments and risk management systems within their structure. The opportunity of getting foreign funds will decrease anymore for the financial institutions and firms which do not pay required attention to the risk management. The most important criteria that the international fund institutions paid attention while giving credit is whether risk management system is established or not.

2.1.3. Risk Management Process

Risk management in banking sector is a mechanism concerning the processes of standard identification, exchanging information, compliance test, decision-making and application formed for monitoring, controlling and changing (if required) the risk-return structure of the bank that will be created by cash flow in future and in parallel with this, the qualification and the level of the banking activities (Croughy:2001).

There are five phases in risk management process. These are:

- identification of probable risks that banks may face
- measurement and evaluation of the identified risks via risk measuring methods
- making risk management decisions against those risks measured
- implementation of decisions
- controlling the results of risk management policy

One of the most important actors in banking sector is the "Board of Directors of the Bank". A strong risk management can not be formed only by the identification of the risks and evaluation by analytic models. The senior management has to internalize these issues. Risk management can not be achieved, if the management doesn't take measures against those risks identified and evaluated (Croughy:2001).

2.2. DEVELOPMENT OF RISK MANAGEMENT

On the one side, Turkish banking sector has endeavored to prepare for low inflationist environment through economic stabilization programs in the framework of legal arrangements and in accordance with the developments in the global markets in recent years, on the other side, it places emphasis on heightened competition and productivity as well as risk and information management system, by controlling the branches and subsidiary companies.

The financial crises occurring in the late 2001 created new and varied risks for all the banks acting in Turkish banking sector. Why banks focused on risk managements with an increasing concern is below (Croughy:2001):

- There have been big changes in the job environment of the banks recently. There are new products created in financial markets.
- A tightened competition has been formed depending on changing working environments. The competition environment created by new opportunities and products increased the pressure on the banks made by bank shareholder.
- The structure of the institutions has become complicated. Risk-taking responsibilities couldn't be defined fully and definitely. System has much operational deficiencies.
- Procedures and operations within job environment has become complicated and transparency couldn't be implemented.
- Demand time of the products marketed by the banks has reached to the points where senior management can't assess. There is a very fast change in technology.
- Cost of management and implementation faults made in strategic fields is increasing extremely and a probable control deficiency is resulting in negatively.
- There are over imbalances between maturity structure and foreign exchange position.
- Investors, customers and shareholders place much more importance to the risk management process.

The international capital has begun to invest developing markets together with the decreasing profit margins in those countries and the contribution of communication

technologies improving very fast. In order to guarantee the return of the investments, the developed countries aimed to accept more strict rules all over the world.

2.3. INVESTMENT RISKS AND TOTAL RISK SOURCES

While transforming the risk into numerical form is very crucial, on the basis of consolidated group, specification of risk-taking tendency and capacity as a whole by integrating the risks from various business lines requires the formation of a difficult process. As mentioned above, the total risk that investors faced comprises two components as systematic risk and non-systematic risk (Croughy:2001). Firms and investors can make any effect on eliminating the systematic risks. However, non-systematic risks can be decreased by following various strategies and portfolio diversifications.

The systematic risk and non-systematic risk types are as follows.

- ✓ Systematic risks
  - Credit Risk
  - Interest Rate Risk
  - Market Risk
  - Exchange Rate Risk

- ✓ Non-systematic risks
  - Liquidity Risk
  - Operational Risk

2.3.1. Credit Risk

Credit risk arises when a borrower will fail to perform on an obligation of an agreement. Banks may encounter such risks not only in crediting but also the off-

balance sheet transactions (guarantees, acceptances, security investments etc.) Therefore, although it regards mostly the banks, it is a risk type which can regard other types of firms (Gokgoz:2006).

The credit risk is highly probable in monetary market. There is always a risk for debtor in this debtor-creditor relation, which is, the risk that debtor could not pay at due date. Even though the creditor lends with a very profitable interest rate, the creditor meets a loss in case of failure of debtor in paying back.

2.3.2. Interest Rate Risk

Interest rate risk is a concept expressing the probability of increase or decrease in market interest rate. The change in the market interest rate cause changes in the market prices of securities which have a given interest income and so the return. Interest rate risk is central for securities which enables borrowing with fixed interest rate. Investors investing fixed income securities will lose in case of a rise in market interest rate. The interest rate risk falls to the lowest level when the interest rate is low whereas it reaches the maximum level when the interest rate is high (Gokgoz:2006).

Interest rate risk can be discussed in two dimensions. On the one hand, the changes in the interest rates affect the price of the securities; on the other hand the rise in the interest rates becomes a lost opportunity for investor. Because the increase in the interest rates means the fall in the price of the security. Therefore, as in the inflation risk, a loss arises. The term of the fixed income securities has an important effect on the price when the interest rates change. Because there is a reverse correlation between the security price and market interest rate. Accordingly, the rise in the interest rates means the fall of security prices or vice versa (Croughy:2001).

2.3.3. Exchange Rate Risk

Exchange rate risk is also called as currency risk in some sources. Exchange rate risk is a type of risk arising in the investments made over foreign currencies when the currency value changes. In the following years, the existence of the investments exceeding the national borders will enhance the importance of this risk. In parallel with

the changeability of currencies, the profitability of the investments made in foreign countries will vary.

2.3.4. Liquidity Risk

Liquidity risk arises for two basic reasons: Enterprises are unable to manage the increase and decrease in their obligations or they don't keep sufficient sources which will meet the rise in their assets.

Liquidity risk is the change what legal demands of depositors and the level of meeting the funds demanded by credit debtor made in the profitability of the commercial bank. Another definition of liquidity risk is that in order to meet the cash requirement created by the events like rapid deposit drawing, the bank borrows at a high-cost for a short term or the bank encashes its illiquid assets at a loss.

2.3.5. Operational Risks

Operational risk is the risk arising due to the technology or legal arrangements dealing with the operations .Operational risk comes out of especially the delays in the in-house controls and the faults of firm management. Since the delays in the internal controls will result in missing the present faults and frauds, it may cause loss or falling behind the time and conditions. As a result of this, the firm interests may suffer. Other examples dealing with operational risks are the faults and problems stemming from information technology system as well as the losses that disasters such as fire and floods may cause (Gokgoz:2006).

2.4. MANAGEMMENT OF INVESTMENT RISKS AND TOTAL RISK SOURCES

2.4.1. Credit Risk

The aim of the credit risk management is to maximize the return, within the most suitable conditions, from credits that the bank granted. Banks can take into account the risks for each credit alone they granted as well as they can monitor the risks

of their whole credit portfolio all together. Credit risk management is very important for the bank risk management and in the long-term it is very crucial for success (Saker :1998).

Banks have to determine on which credit demands carry acceptable risks. While assessing the credit risk, a bank has to consider those factors stated below (Saker :1998):

Character: It means the willingness of person demanding credit in paying back his/her loan.

Capacity: It shows the payback capability of a person or institution borrowing credit. For firms, it can be calculated by making financial statement analysis. Besides, management quality and experience is examined.

Capital: It shows the capital structure of a person or institution demanding credit.

Guarantee: It is the assurance for the credit demanded. The feature of convertibility to cash is important.

Conditions: Determination of the national economic conditions during which the firm demanding credit acted and the sectoral means.

Banks developed various methods in order to decrease the credit risk which can be measured by rates. For instance, the guarantees are taken from borrower or a third party. These guarantees may be collaterals as well as bill of guarantee. Reducing the risk total or diversifying the risk is a second way. The credit risk over the customer is reduced through giving it to more customers instead of one or two. It is another way to put an upper limit to the credits or determination of credit policies in comply with legal arrangements.

2.4.2. Interest Rate Risk

The interest rate risk management is important in the countries like Turkey, where the interest rates fluctuated abnormally and high interest rates are applied.

Various methods have been developed to measure and manage the interest rate fluctuating risk carried by banks. These are; Maturity Mismatch and GAP analysis, Duration analysis, interest rate elasticity analysis and simulation analysis (Gokgoz:2006).

Duration analysis is a preliminary preparation phase for banks in terms of measuring the interest rate fluctuating risk and the precautions to hedge from this risk. In this method, a portfolio is pooled by accounting each fixed income position in the bank's asset and liability as a separate security. Depending on the interest rate changing, the positions are compared. This method is the analysis of the effective due date. Effective due date is the weighted average of the expected cash flow time of asset and liability. That is, bank's netting down the effective due dates of its all assets and liabilities to the net present value.

Interest rate elasticity is a method developed for filling the vacant of GAP and duration analysis. According to this method, the assets and liabilities carry the interest rate changing risk definitely whether they are much sensitive or not. To what extent they carry the risk can be measured by adaptability of each item to the interest rate changes.

Simulation method is one of the new methods used for the identification of interest rate risk. The most important aim of this method is to set how much interest rate risk the balance strategies and combinations based on current balance carry under varied interest rates. By estimating the possible interest rate changes in the future, this method tries to determine the bank cash flows through developing various scenarios by the help of a mathematical model (Croughy:2001).

2.4.3. Exchange Rate Risk

In order to hedge from exchange rate risk, banks apply two types of policies. These are the policies either restricting or hedging the risk. The risk restricting policies seek to impede the gaps in the spot or derivative positions reach a level over the capacity of the bank. Hedging policy requires two reverse actions concurrently, which

are the risk-taking and developing the techniques to meet that risk. These are; Forward, Special, Bartering and Commitment contracts.

Forward contract is a legal agreement resolving that contracting side is to buy an asset at a pre-agreed future time with the price fixed in the contract. The buyer in special contract, as in the forward contract, gets the right of buying or selling a financial asset with a fixed price at a pre-agreed date. What makes the special contract distinct is that depending on the rise and fall of the contracting value, instead of making a single payment within the terms of the contract, it s credited or debited amounting the rise and fall in the contracting value depending on the daily changes of the value. In the bartering contract, the parties exchange the cash flows within the terms and conditions specified in the contract. Cash flows is exchanged depending on the interest rate, parity or other financial indexes in general. Different from forward, special and bartering contracts, commitment contracts don't oblige the either sides to buy or sell a financial asset with a pre-agreed maturity and price specified in the contract (Akbulut:1995).

2.4.4. Liquidity Risk

Regarding the hedging liquidity risk, we can divide the liquidity management into two as structural and operational liquidity managements. Within the context of structural liquidity management, we can include the arrangement of investment and financing policies of a bank in accordance with the liquidity requirements, basing these issues on the related legal regulations, interbank agreements and agreements with non-bank institutions and required insuring. As for the operational liquidity management, it includes the determination of the upper and lower limits for the sources allocated by bank senior management, usage of these sources and determination of the principles as well as the short and long term cash requirements dealing with the strategic decisions that the bank will commit (T.C. Ziraat Bank Search and Development institution:2000).

2.4.5. Operational Risks

As in the other risks, a bank also has to measure the operational risks and four phases are required to allocate the necessary capital. These phases are institutional concept development, monitoring-evaluation, numerical measurement and integration.

Institutional concept development: Formation of operational control units, description of the risks belonging to operational risk group and formation of operational risk policies are realized in this phase.

Monitoring-evaluation: Analytic and qualitative risk indicators should be formed, operation faults causing losses should be found, required precautions should be taken to prevent the repeat of previous loss in the bank and the guidelines formed for this settlement should be determined.

Numerical Calculation: In the light of previous losses, a loss database should be formed and by using this database numerical loss models should be developed. For the bank, an expected loss value should be identified.

Integration: Each risk measurement instrument should be used on the unit base. A training and support should be given on this point. Risk reducing resolutions should be included to the system. The required capital is determined in this phase, depending on the operational risk amount found by the bank(T.C. Ziraat Bank Search and Development institution:2000).

2.5. MARKET RISK AND MANAGEMENT

Market risk can be defined as the risk created by price/value changes in the foreign exchange market or commodity market, changes in interest rates and changes in the price of stocks, commodity and financial instruments.

Market risk arises as a result of fluctuations realized in four economic markets that a bank operated. The possible changes emerging in the markets may affect the prices and the values of financial instruments marketed by the bank. The value of any financial instrument will be the function of the price, coupon, coupon frequency, time, interest rate and other factors. In this case, if the bank is keeping financial instruments

such as shares or bonds, then it face to face price risk or market risk. The risk herein is the fluctuation in the price of the financial instrument (Gokgoz: 2006).

Since the prices will change depending on the liquidity level in the markets, the risks that banks encounter will increase or decrease. During the periods when the liquidity excess exists, there will be a declining tendency in the interest rates. So there may be rise in the prices of stocks. Besides, during the periods when the interest rates are inclined to fall, the banks having fixed price debt instruments in their stocks will gain if they are payees or lose if they are payers. Therefore, in order to manage the market risk, the banks need well-organized, full-authorized fund managements and assets and liabilities managements.

A bank may encounter market risks via loaned securities, loaned derivatives, shares, share derivatives and monetary transactions (Gokgoz:2006). So that, it is required to follow the progress in the new financial instruments, to have a comprehensive knowledge about new instruments and to make accurate pricing.

There are two methods measuring market risk. The first one is the Value at Risk (VaR) and the second is Risk Adjusted-Return on Capital (RAROC).

RAROC is a group method based on economic capital in which the risk adjusted. This method is an approach designed for supporting decision-making mechanisms and linking risk, capital and value. The characteristic of this method is that firstly it enables the usage of income and capital in same quality in accordance with risk type and business process. Bank RAROC assesses the risks undertaken by the bank and evaluates the economic capital depending on the correlation between these risks and the level of the each risk undertaken. Bank RAROC provides information to the management on how much capital is required to meet all risks, which instrument the shareholders invested and which rate on the capital was achieved. Additionally, since all risks are measured among the same qualities, Bank RAROC enables the managers to analyze the impact of the changes in various risk factors on total capital adequacy (Hull:1998).

SECTION 3

VALUE AT RISK (VAR)

3.1. INTRODUCTION OF VALUE AT RISK (VAR) CONCEPT

The concept of VaR isn't a new concept in terms of being a statistically-based technique. The use of VaR in finance and econometric calculations has become widespread accompanied by the importance paid to risk management concept and needs for new risk management techniques in recent years.

Risk management is the process enabling appropriate transition or change between risk and revenue in firm management and investment analysis (Gokgoz:2006).

To make a standard definition of VaR becomes impossible because of the reasons stated below:

- diversified activities related to risk.
- changes in the features of risks that the institutions faced.
- difficulty in estimating the potential impact of risk on firms.
- The compliance calculation of the operations of hedging, minimizing, transforming and accepting the risk depends on the needs and resources of firms.

However, measuring the risks accurately is crucial to establish an effective and robust risk management system. That is why VaR is used and becomes increasingly widespread. In table 1 below is shown the development process in the financial risk management.

Table 3.1. Development process in financial risk management.

1938	Dated Bonds
1952	Markowitz's Mean-Variance Study
1963	Sharpe's Capital Asset Pricing Model (CAPM)
1966	Multi-Factor Models
1973	Black-Sholes Option Pricing Model
1979	Binomial Option Model
1983	Risk Adjusted Return On Capital (RAROC)
1988	Risk Adjusted Active Structure For Banks
1992	Stress Testing
1993	Value at Risk (VaR)
1994	RiskMetric
1997	CreditMetrics, CreditRisk+
1998	Credit and Market Merger
2000	Entrepreneur Based Risk Management

Source: Dr. Elif Gökgöz.,Value at Risk and Portfolio optimization, Istanbul,2006

The studies of firms to measure all risks in their organizations started in 1970s and 1980s. After then these studies were sold to consultancy firms and to other institutions and firms which are not capable of developing their own model but need it. The most widespread of them is Riskmetric using VaR as a criterion, which was developed by JP Morgan. Following this, VaR was used more commonly and it was applied by not only the banks working on securities but also the pension funds, other financial institutions and non-financial firms (Mausser:1998).

3.2. PARAMETERS IN VaR CALCULATION PROCESS

As it is known from the definition, the VaR measurement is based on measuring the price changes of a portfolio within a certain period of time. There is a direct proportion between time horizon and market risk. That is, as the time extends, so the expected price change will be higher. Most of the banks use 1 day time horizon in their VaR calculations. The reason for this is that the portfolio is generally composed of very liquid assets such as bonds or foreign exchange and the time horizon is in comply with the time adviced for portfolio. Nevertheless, the time horizon for measuring real risks should be longer, considering the low liquidity in Turkish markets. Basle Committee envisages 10 days time horizon in VaR calculations. Time horizon is correlated with the square root of time while reflecting VaR calculation (Bolgün: 2003).

1 day time horizon = $\sqrt{1} = 1$

10 days time horizon = $\sqrt{10} = 3.162278$

21 days time horizon = $\sqrt{21} = 4{,}582576$

252 days time horizon = $\sqrt{252} = 15{,}87451$

3.2.1. Sampling Period

One other parameter of VaR calculation process is the observation period where the price changes are monitored and volatility and correlations are calculated depending on this. The VaR figures calculated within the same time horizon may vary substantially according to the period length and the price volatility.

3.2.2. Determination of Confidence Level

Confidence level is one of the most important parameters that must be taken into account in VaR calculation. Basle Committee asks the use of one-sided 99% confidence level. As much higher the confidence level is, so the resulting VaR figures become higher. In foreign banks the confidence levels varying between 90-99% are

used. For instance, JP Morgan's Riskmetrics model, which has a big role in spreading VaR methodology, uses 95% confidence level and Chase Manhattan uses 97.5% (Shapiro:2001).

3.2.3. Determination of the Correlation among Risk Factors

While measuring VaR, the correlations among risk factors of the assets in portfolio are used too. Historical data is enjoyed in calculating correlation figures. Correlation figures may reach very different levels midst negative market conditions. For example, a +0.9 correlation as historical data may come to – 0.3 in a crisis. To determine the efficiency of a correlation is very difficult. The validity of correlation assumptions used in each risk factor category (interest rate, exchange rate, shares prices) will be analyzed by the institution monitoring the market. The aim of this application is to hedge from the effects of correlation assumptions of VaR calculations. But this regulation yields VaR figures higher than normal figures.

3.2.4. Calculation of Capital Obligation

Basle Committee assesses that VaR is not sufficient to analyze capital conditions based on market risk. Therefore, VaR is multiplied by a multiplying factor and the result is the capital amount that banks have to keep. This multiplying factor was fixed as 3 by Basle Committee (http://www.bis.org/about/index.htm).

3.2.5. VaR Calculations for Instruments with Non-linear Return Functions

Due to the options or option-like instruments in banks' portfolio, the measurement of risk includes several difficulties. For these instruments, it is required to use complex simulation models. The rough calculations made by present parametric methods don't give accurate results.

3.2.6. Stress Testing

Stress testing was designed for estimating possible economic losses under non-normal market environment. The historical analysis of market reveals that the statistical

distribution of incomes is fat tails and that the market movements in the tail of distribution realize more frequent than the normal distribution envisioned. Stress tests control the tail event of return distribution. In this case, stress test can be seen as supplementary of VaR; VaR is for normal market conditions while stress testing is for non-normal one (http://www.bis.org/about/index.htm).

Stress tests enhance transparency by searching the low probable events during which VaR bands are exceeded. A more understandable risk table is achieved by combining stress test and VaR. There are three main phases for stress test. To make a scenario, review the portfolio and summarize the results.

3.2.7. Back Testing Procedure

Although there is only one method for back testing, the banks using VaR models for capital that should be kept due to the market risks have to make back testing of their models on a regular basis. Basle Committee forces the institutions of which VaR models have low performance keeping more capital (http://www.bis.org/about/index.htm). In general, banks control the models with back testing to confirm the accuracy on a monthly and three-month basis. By these tests, it is monitored whether trading results are successful on the pre-fixed confidence bands in VaR models. The most important back testing is the one formed for trading incomes at the collective level, indicating to what extent VaR estimates perform well.

3.3. CALCULATION OF VALUE AT RISK (VaR)

Financial decisions taken under uncertainty require undertaking a certain risk. VaR models were developed to estimate how much the firms' portfolio constituting especially cash, foreign currency, stocks, bonds and derivative products may lose by the effects of price movements at a certain time period.

As known well, the most popular risk criteria of modern finance is standard deviation value inherited from Harry Markowitz's studies. But today there are critics toward standard deviation to be used as risk measurement (Markowitz :1952).

The critics toward using standard deviation as risk criteria have led to study for alternative criteria showing only the movements in the undesired direction. These criteria called as left-side risk criteria focus on only the tail values of distribution at negative side. So that the interest is increasing for this type of risk criteria.

VaR is defined as either maximum loss or undesired change in the value of a portfolio constituting financial assets or a single financial asset during a T time period at a fixed confidence level (Shapiro:2001).

$$Pr[\Delta V \leq - VaR_{T,CL}]=1-CL \qquad (3.1)$$

The equity (3.1) shows the formal definition of VaR. The possibility of exceeding VaR value of financial asset or portfolio is equal to subtraction of the confidence level value from 1.

There are many methods suggested for measuring VaR. But VaR calculation methods are classified into three categories (Jorion:2000)

- Analytical Method (Variance-Covariance)
- Historical Simulation Method
- Monte-Carlo Simulation Method

Each VaR method aforementioned and their variations have their own superiority and constraints. Among these methods, Analytical (Variance-Covariance) method is called as parametric and Historical Simulation and Monte-Carlo Methods are called as non-parametric methods. In parametric methods, the process starts with the determination of asset return distribution and then the distribution parameters are determined and finally VaR is calculated. Analytical (Variance-Covariance) method is a parametric method based on normality assumption. The advantage of this method compared with others is to be able to characterize the whole distribution with mean and standard deviation and to get many data by these two parameters (Shapiro: 2001).

3.4. ANALYTICAL (VARIANCE-COVARIANCE) METHOD

In variance-covariance method, the statistics obtained by the calculations using past data dealing with price changes are used and in addition to this, the correlations in and between markets are taken into consideration. Variance-covariance method is also called as parametric method. In parametric VaR analysis, statistics are estimated by using time series, for example under the assumption that it comes from a mass having parametric features such as mean and variance. The mean (μ) and variance (σ^2) of unknown mass of values are parameters. Given that the assumption is based on these parameters, the process used becomes parametric. Since the mean and variance is unknown, these are estimated through an example and calculations are based on mean (x) and variance (s^2) statistics of that example. Therefore, there exists the possibility of estimation error at VaR calculation. On the other hand, the historical simulation method that will be discussed in the next section is known as non-parametric VaR calculation method (Gokgoz:2006).

The variance-covariance method, which is the most frequently used method in VaR calculations, is based on the assumption that the returns of investment instruments, that is, the changes in the factors causing risks such as the interest rate, exchange rate or shortly to say, risk or market factors have a normal distribution. Portfolio risk becomes the linear composition of the risk factors which are supposed to be normal distributed and it is calculated through the estimation of covariance matrix regarding risk factors. Consequently, the volatility and correlation estimates for each factor to apply the method.

Volatility can be defined as standard deviation under normal distribution assumption. As the feature of normal distribution curve, 90% of the observations will be at below and above (double-sided) the mean with a 1,65 standard deviation in terms of VaR calculation, since the only biggest possible loss is important, one-sided possibility will be enough and due to the standard feature of normal distribution curve, the probability of any observation being 1,65 standard deviation below the mean will be 5%. In a normal distribution curve, while 1,65 standard deviation gives 95% confidence level, 99% confidence level is obtained via 2,33 standard deviation.

In this framework, if VaR amount is calculated for one asset, for instance, if calculate the VaR for a gold position of 1 milion US $ worth at 95% confidence level, the volatility is to be multiplied by 1,65. 1 day volatility of gold is measured as 0,55% . 1,65 and 2,33 are obtained from the normal distributions table.

VaR= Confidence factor x volatility x position amount

= 1,65 (for 95% confidence) x 0,0055 x 1.000.000 US $

= 9.075 US $

Thus, the loss that may be faced within 24 hours will not exceed 9.075 US $ at 95% confidence.

VaR amount of a portfolio is calculated in four phases by variance-covariance method (Murat:2002).

1. In order to calculate the standard deviation and the VaR amount of a portfolio, first of all, the assets in the portfolio should be defined in terms of more simple standard position and instruments. This process is called as risk mapping. Standard position is related with only one market factor.

2. In this phase, supposing that the mean of the changes in basic market factors is "0" and they have normal distribution, the parameters of this distribution (standard deviation and correlations) are estimated by using the data belonging to past period. The changeability of market factors is taken into consideration via standard deviations while comovement criteria are via correlation coefficients.

3. Standard deviations and correlations of market factors are used in determining the standard deviations and correlations of standard position. Standard deviations of standard positions are yielded by multiplying standard deviation of market factors by the sensitivity of standard positions to the market factors.

On the other side, the correlation between standard positions is equal to the correlations between market factors. But if the value of the standard position is reverse

to the change in market factor, then the sign of correlation coefficient, which is positive, has to change.

4. Standard deviations and correlations relating to the value changes in standard positions, that is, the standard deviation of any portfolio constituting standard positions formed following the yielding covariance matrix, can be calculated via the formula which is used for finding the standard deviation of the total of normal random variables and portfolio profit or loss distribution can be obtained. Standard deviation of the value changes in mark-to market portfolio is calculated depending on the standard deviation of standard positions, volume and correlations. VaR amount of portfolio is the volatility of that portfolio.

3.4.1. VaR in Terms of Portfolio

Rational investors have to always diversify their financial risk sources. Rational investors never invest on a single financial instrument.

Volatility calculation becomes more complicated for a portfolio than a single financial asset. The risk of a share kept in a portfolio is less than the one invested alone. In this case, it should be considered that the value of the assets in portfolio may rise or fall together or it may be inclined to move in reverse directions. Portfolio is characterized to the constituent assets and VaR value of portfolio is a combination of the risks of assets constituting the portfolio(Gokgoz:2006).

3.5. HISTORICAL SIMULATION METHOD

Historical simulation method is not based on a specific assumption about the market factor distribution, so there are not parameters such as standard deviation and correlation which require estimation. Because of this, historical simulation method is also known as a VaR calculation method. In this method, the distribution of possible profit and loss is obtained by the application of the changes in market factors during the passed N period to the present portfolio. Thus, N each presumptive portfolio valued by market prices is yielded and each of these presumptive portfolio values is compared with present portfolio value. The difference obtained yields the distribution of portfolio return which has presumptive profit and loss (Murat:2002). The returns obtained by this

method means the reformation of a portfolio's past by using the present weight of the assets in portfolio rather than representing the real portfolio. Although the real values that market factor got in the past are used, why the profit and loss obtained according to the market prices are presumptive is the fact that the present portfolio was not kept in hand during passed N period. The most fundamental characteristics of the method is the usage of real historical data to calculate presumptive profit and loss and this gives the name of the method (Murat:2002).

VaR is calculated in 5 phases with historical simulation method (Murat :2002).

1. Firstly, portfolio is defined in terms of main market factors and a formula is required to describe the values of portfolio assets according to market prices in terms of market factors.

2. In this phase historical data should be obtained, which realized during last N period. Data must be in complying with time horizon at which VaR is calculated. For instance, if VaR amount is calculated with 1 day time horizon, in other words, if VaR amount is to be used as a measure of a loss resulting during 1 day period, then the daily changes in market factors will be used to get presumptive profits and losses.

3. In this phase of historical simulation method, the changes that realized during passed N period is applied to present portfolio with the market rates and prices and after finding presumptive portfolio values, presumptive profits and losses are obtained by subtracting the present portfolio value from each presumptive portfolio value.

4. In this phase, presumptive portfolio profits and losses found as a result of valuation with market prices are ranged from maximum profit to maximum loss.

5. In the last phase, the loss corresponding with the selected confidence level is found. For instance, when 1000 days data and 95% confidence level is used, if the loss exceeds the VaR then it will be waited for 5% of the total period or 50 days. So that VaR will be the biggest 51st loss. In historical simulation method there is no need to estimate any parameters such as volatility and correlation. So there is not any risk of

estimating the parameter wrongly. Correlations and volatilities are thus taken into account within the framework of market prices information.

3.5.1 Advantages of Historical Simulation Approach

First of all, the calculation of historical simulation method is very easy. One other important convenience is that the return distribution assumption isn't made in this method. Besides, returns are thought to be independent from time. Therefore Historical Simulation method is less restraint than other methods.

The non-parametric structure of Historical Simulation method renders unnecessary the estimation of volatility, correlation and other parameters. The risk of making wrong estimation which exists in other methods doesn't exist in this method. However, here only the calculation of realized returns is needed, variance-covariance matrixes which are difficult to calculate are not used. Besides, VaR estimations are independent from any risk model assumption.

Historical simulation approach can be applied in any risk type or for any portfolio position. Recently, some modifying studies have been made to calculate VaR accurately with historical simulation approach (Murat:2002).

3.5.2 Problematic Areas in Historical Simulation

Data Problem: Historical Simulation approach has some problems inherently. One of them is about finding data. Especially, when all risks rather than financial risks that firms faced are calculated, the risk factors should be required to be reachable. It will cause problems if data is collected via methods incompliant to each other. However, this situation will cause problems not only for Historical Simulation but also for other methods where VaR calculation is made. In Historical Simulation approach it is required that each instrument should have been transacted and data setting should be broad (Gokgoz:2006).

Dependence to Special Historical Data Setting: The saying of "The past is like near future" gives an ides about the estimation of risks in the future. The risks of the

future will be similar to those we faced in the past. But there may be some concerns here (Gokgoz:2006).

- Data in the estimation period may be abnormal. For instance, if data during this period have fluctuated abnormally, then VaR value will be high.

- There may be extraordinary events like crises during estimation period. But when a long observation is used, it may be thought that a single crisis does not affect VaR estimate. In other words, as the observation period is extended so the estimation will be accurate.

- It is possible to make a VaR calculation according to the probable events in the future.

Problem of Estimation Period Length: As we mentioned above, an observation period as long as possible should be used for the accuracy of estimations. Nevertheless, since there is the possibility of some systematic changes in time, it may be required to prefer a shorter estimation period. In case a long period is used, VaR calculation will lose its sensitivity to the developments in the near past. If the estimation period is too short, it means we will not have enough historical observation. Consequently there is no clear idea on how the length of observation period will be selected (Gokgoz:2006).

3.6 MONTE-CARLO SIMULATION METHOD

The most powerful method among the VaR calculation methods is Monte-Carlo simulation (MCS) method, which is the most comprehensive approach used for market risk measurement when used properly. Although there are similarities between Monte-Carlo Simulation and Historical Simulation methods, the main difference between these two methods is that; while in Historical Simulation method, the real changes observed among market factors during historical sampling period are used for forming presumptive portfolio profits and losses, in Monte-Carlo Simulation method unreal random market price and rates are generated through selecting a statistical distribution supposed to represent the possible changes in the market factors efficiently. These random values will be used for obtaining the distribution of presumptive profits

and losses relating to present portfolio and so VaR amount will be yielded from this distribution (Murat:2002).

VaR is calculated in 5 phases by Monte-Carlo simulation method (Murat :2002).

1. In just the same way as Historical Simulation method, here, first of all portfolios must be defined in terms of main market factors and a formula is required to describe the values of assets in the portfolio according to market prices in terms of market factors.

2. Following the determination of basic risk factors, a specific distribution is fixed or accepted for the changes in these factors and parameters of this distribution are estimated. Since the distribution of the changes in market factors in other two methods is defined as a part of the method, distribution selecting feature distinguishes Monte-Carlo Simulation from the other two methods. The accepted distribution is not compulsory to be normal distribution. Risk managers may select any of the distributions that they believed to define the possible changes correctly in market factors in the future. The possible changes in market factors can be based on past observations. As a result, a distribution which can represent the changes realized in the past is possible to be selected.

3. Following the selection of the distribution, 1.000 or more than 10.000 presumptive changing values are generated for each one and by using these market factors the presumptive portfolio values will be calculated. Presumptive profits and losses can be found by comparing the present value of portfolio with presumptive portfolio value.

The next phases are the same with fourth and fifth phases of historical simulation method. In other words, following the procedures above portfolio profits and losses will be ranged from maximum profit to maximum loss and VaR amount will be fixed as the amount corresponding to the selected confidence level.

3.6.1 Simulation with a Single Random Variable

The pivot of Monte Carlo approach is the simulation of values that random variable may take according to several possible conditions. The distributions of these variables are supposed to be known. Because of this, portfolio values are created again in accordance with this distribution.

The first and most important step in simulation is the selection of a special stochastic model for price behaviors. The model used in general is Geometric Brownian Motion (GBM) model. According to this model the innovations in distinct prices are independent from time.

3.6.2 Speed and Accuracy in Monte-Carlo Method

The basic disadvantage of Monte Carlo method is its complexity and time consuming feature. For instance, in case a portfolio offers a single risk factor, if we think that 10000 data copies are made for this risk factor and suppose that the portfolio includes 1000 assets, it means 10000000 assessments will be needed. If the portfolio is including complex instruments like options, even its assessment alone requires a simulation.

3.7. COMPAREMENT OF VAR CALCULATION METHODS

There is no answer to the question of "Which VaR calculation method is the best one?" and the method should be determined according to the perspective of the user. The debates on which VaR method is the best at which conditions are still going on. On the other hand, whichever the method is, software is required to combine the risk measurements with the present positions (Shapiro:2001).

The differences among the methods can be assessed in 5 basic criteria.

3.7.1. Capacity for Covering the Risks of Options and Option-like Instruments

Unlike simulation methods, variance-covariance method may not reflect the risks of options or option-like instruments accurately. The reason is that variance-covariance method segments the options and defines them in terms of a linear function, which is delta-equivalents. In this case, vis-à-vis the changes in the rates and prices of option, to what extent the value of option has changed may not be calculated completely (Gokgoz:2006).

As the simulation methods calculated portfolio value again for each value of main market factors, options existing in portfolio do not reduce the calculation capability of simulation methods. But since the portfolio value distribution generated by Monte-Carlo Simulation method is based on the statistical distribution selected for main market factors and the parameters estimated for this distribution, in case of any error VaR amount will also be calculated wrongly. In Historical Simulation method as well, in case the past period that sampling was made has a low capability of representing the future, the distribution generated for portfolio value will be misleading.

3.7.2. Reliability of Results

Although all methods are based on historical data to a degree, Historical Simulation method is the only one based on historical data directly. In this case, a typical price movements of the past period create the risk. In other words, because of the features peculiar to that period, low volatility will cause a low VaR amount. Vice versa is also possible. As a result, the managers should consider this effect and similar ones. For example, they should pay attention to that Var amount in the first case, that is the risk, is more than the one calculated (Gokgoz:2006).

In Historical Simulation method, another disadvantage is that; in case the sampling period is too short, historical observation yielding reliable results cannot be obtained. In case the period is too long, this time, the estimation is made based on out-of-date data and so it doesn't become sensitive enough to update information.

As variance-covariance and Monte-Carlo Simulation methods use the historical data while estimating distribution parameters, the risk of being atypical of price movements in the past period is also valid for these methods. But, when a normal distribution assumption in which the mean is zero is made for a given risk factor, the price movements are limited. For example, the probability of falling in the price below the mean is accepted to be maximum 50%, so the normal distribution assumption limits this effect even though the changes in the previous period are not typical (Gokgoz:2006).

In variance-covariance methods, there is also the risk that the statistical distributions can't represent the real distributions of market forces efficiently. For instance, in variance-covariance method, the number of observations deviating from the mean in the distribution of market forces may be more than the one accepted in the normal distribution. As to Monte-Carlo Simulation method, the distribution selected for representing the changes of market forces may be distinct from the distribution observed in reality.

3.7.3. Flexibility of Using with Other Assumption

Risk managers, in case of any abnormal price movements while setting the market risk via VaR method, will need to determine how the portfolio will be affected by these movements, by using the stress tests and scenario analysis. Stress tests will be discussed in details in the next section.

As Historical Simulation method is depended on the changes in market factors directly, it is difficult to use stress tests with this method. On the other side, to the extent the software permits, it is easy to use variance-covariance and Monte-Carlo Simulation methods, which is enjoyed for estimating the parameters of statistical distribution in the changes of market factors of historical data, with stress tests. In these methods, users can use any of the consistent parameters set ignoring the estimates obtained from historical data (Mausser:1998).

3.7.4. Application Convenience

In order to apply easily the Historical Simulation method which has a simple conceptual base, it is required to obtain the past data and pricing models regarding assets. Today, there are also the pricing models in many of the software prepared to be used in risk management. But multinational corporations acting in many countries and having credits and debts in various currencies may face with difficulties in obtaining data about the market interest rates in certain currencies for different maturities in the developing capital markets or the new instruments started to used (Gokgoz:2006).

Considering the software making VaR calculations via variance-covariance method, the application of the method will be easy for the portfolios including the foreign currencies in particular and other instruments that said software covered. However, the application of variance-covariance method will be very difficult for the portfolios constituted foreign currencies and instruments that the software did not covered. As mentioned above, because of the need to get the market interest rates in certain currencies for various maturities in particular, it may be difficult to calculate the standard deviation and correlation coefficients. Besides, separating the instruments in order to define in terms of main market factors will be more difficult (Gokgoz:2006).

As the application variance-covariance method is easy for the portfolios supported by software, so the application of Monte-Carlo Simulation method got easy through improved software even though the calculation time is longer. Besides, no need for separating the instruments is an advantage of the method. Although one of the inconvenient aspects of Monte-Carlo Simulation method is the generation of unreal random figures, this inconvenience can be overcome by means of the software providing the required instrument to generate these figures. But selecting the distribution and estimating the parameters requires advanced expertise and experience. One other disadvantage of Monte-Carlo Simulation method is the long calculation time for big portfolios (Gokgoz:2006).

Beside this, since pricing models are necessary for all methods, this necessity may cause problems especially in the portfolios including option. Although pricing models are not necessary directly for variance-covariance method, the options are

separated into its delta-equivalents in this method; because of this pricing models are required for calculating deltas.

3.7.5. Explaining Convenience

Because of its simple conceptual base, Historical Simulation is the easiest method which can be explained to the users, for instance, the top management. In order to calculate the standard deviation, so the VaR amount, the features of normal distribution is used. But this makes difficult explaining the variance-covariance to the users not having technical knowledge. It is notably difficult to explain Monte-Carlo Simulation method; so many people are not familiar with the concepts of fixing a statistical distribution which can represent the changes in the market factors which are key point for the said method and making an unreal random sampling from this distribution (Gokgoz:2006).

As it is seen, each method has its own advantages and disadvantages and it may yield different results for the same portfolios. James Jordan and Robert Mackay carried a study on VaR results for portfolios constituting option in 1996. In this study it was observed that each of the three methods gave similar results for a portfolio constituting shares. But for a portfolio including both the shares and option positions based on shares, variance-covariance method yielded very different results from the other two methods.

3.8. APPLICATIONS OF VAR METHOD

Although the VaR method is mainly an important part of risk management systems, it is also used in firms to report information about risks (informing public opinion), to specify where the resources are to be used in the firm (resource allocation) and to measure the performance.

3.8.1 VaR as Risk Management Instrument

VaR method as a risk management instrument is used by both financial institutions and firms. Here the pivotal point is that VaR method is only a part of risk management system established in the whole firm. The rival's risk, liquidity risk,

operational risk and other risks that VaR is estimated is insufficient to measure should be reviewed within a central risk management system.

VaR method, combining the risks arising from several assets, defines the total risk with a single measure. VaR method provides advantage for measuring financial risks of financial institutions acting at various places throughout the world and so encountering many distinct risk factors. It is also advantageous for getting the current risk situation of investment funds of which assets are shared by managers more than one.

In addition, monetary managers may change their investment decisions at times. In these cases, the fund management should perceive the effect what this change created. For instance, the positions of hedge fund amounting 600 million US Dollar managed by David Askin whom lost with a rate 28 percent corrected by SEC in 1994 were opened to public. In this example, if the fund had valued at the market prices, the investors would have measured the risks.

Today, the non-financial institutions have begun to use derivative instruments too, consequently they have begun to apply risk management systems and VaR method as an obligation. Risk management policies are created in three phases for real sector firms. Firstly, the aim is determined by the top management (i.e., cash flows in the next period), then VaR amount of the firm is fixed and in the last step hedging decision is taken in accordance with VaR amount. In case the firm decides on hedging, VaR provides a strong framework for the efficiency of hedging policies.

3.8.2 VaR as Capital Allocation Instrument

VaR method can be applied as a capital allocation instrument in two different forms; those are *within the firm* and *whole the firm.*

There are two types of capital obligations for the whole firm: internal capital obligation fixed by firm and legal capital obligation. As VaR enables the measurement of market risks, considering other risks, it can be used for determining the internal capital need as well as legal capital obligations. As we will discuss in the fifth section of

our study, regulator authorities accept VaR in determining the capital obligation against market risk.

Since VaR functions like a common denominator in risk measurement, it can be used as risk adjusted return criteria by combining return criteria. Risk adjusted return has two basic application area. The first one is the comparison of the returns having varied risk levels and the second is the applications of internal capital allocation and position limits.

Thus, within the firm VaR can be used as a criterion on how the capital will be distributed among the operating units, for instance, together with RAROC which is one of the risk adjusted return criteria.

In addition to this, another application area for VaR as a capital allocation instrument within a firm is the limitation put to the positions that operating units can take. In case the position limits are defined in terms of monetary amount, the risk situation of positions isn't taken into consideration. Since Var provided a common denominator enabling the comparement of various risky activities, it is a suitable criterion to fix the position limit on the basis of operating units.

3.8.3 VaR as Performance Measurement Standard

As mentioned in 3.8.2 part, since VaR provides a common denominator, it will be used as a criterion for comparing the realized performance of investments which bring different returns, but at the same time have different risks. For example, Sharpe rate will be formulated as Profit/VaR, which is used for performance evaluation and measuring the rate of average returns exceeding riskless interest rate to total return volatility.

Therefore what makes VaR available as a capital allocation instrument within a firm or as a performance measuring standard arises from its feature of providing risk adjusted return criteria, which enables the comparement among investment decisions having different returns and risks.

3.9 VaR ACCORDS OF BASLE COMMITTEE

Basle Capital Accord issued by Basle Committee toward G-10 countries in 1988 regulates the minimum capital obligations that banks have to keep respecting credit risk. "Weighted risky assets" criteria was used to specify this obligation and it brought the rule that a bank capital had to be equal to minimum 8% of weighted risky assets (http://www.bis.org/about/index.htm).

Even though Basle Capital Accord is criticized for some aspects, the critic which is important for our study is that the Accord doesn't include any provision regulating capital amount that banks have to keep against market risk they are exposed. Taking the critics into account, Basle Committee embarked on a study to revise the 1988 Accord and in the proposal package opened to debate in April 1993, the Committee brought the minimum capital amount issue on the table that banks would be liable to keep against market risk. 1993 proposals separated the bank operations into two, as "bank book" and "trading book" and obliged the banks to keep a minimum capital against market risk arising from only trading book.

The method used for the calculation of the capital which was set forth in the said proposal and would be kept against market risk is known as *"Standard Approach"* in general. This method is a "building block" approach, where the capital burden required for each factor such as interest rate, shares, foreign currencies and commodities causing market risk using certain guides is calculated independently and the amounts are picked for finding the capital liability against market risk. It is suggested that capital be kept at a constant rate over this total amount (http://www.bis.org/about/index.htm).

Standard Approach was criticized for ignoring the correlations, so the diversifying effects within/among four risk categories which were defined as interest rate, exchange rate, share and commodity and the proposed Standard Model approach did not get very positive responses from the sector.

Some amendments were made in 1996 and by these amendments new concepts and processes such as value approach in parametric risk, value approach in the simulation-based risk, stress analysis, 99% confidence level, testing, and green, yellow

and red areas used for the classification of deviated results from model were brought to agenda (http://www.bis.org/about/index.htm).

The main elements of the 1996 Market Risk Amendment are discussed as following.

Quantitative Criteria: In the abroad although many banks use 1 day time horizon and 95% confidence level in their VaR calculations, in accordance with the guidelines of Basle Committee VaR will be calculated with 10 days time horizon and 99% confidence level. Because of these criteria, VaR amounts calculated in the direction of the Committee guidelines will yield bigger figures than the amounts found by banks in application. According to the quantitative criteria of Basle Committee, in VaR calculation models,

- 10 days time horizon,
- one-sided, 99% confidence level (considering only negative values)
- minimum 1 year historical observation period (sampling period) and minimum three-month update level
- otherwise the risk management indications of bank required, minimum 3 multiplying factor will be used and VaR calculations will be made daily.

The daily capital amount that the bank has to keep against the changes in the market prices is found by; the VaR amount of the previous day and the average of the last 60 days VaR amounts are multiplied by a multiplying factor which is minimum 3 and the bigger one is the daily capital amount.

Multiplying factor: Having thought the fact that the statistical VaR model could not represent the financial markets perfectly,Basle Committee developed the multiplying factor to cover the possible problems (non-normal distributions, assumption mistakes, abnormal price movements, low representation capability of the past period) during modeling.

Qualitative criteria: For the bank to use its internal VaR model as the legal capital amount, the model has to be approved by the related authority. In the Accord, it is stated that only the banks completing the points in the qualitative standards perfectly can apply to use minimum multiplying factor.Accordingly (http://www.bis.org/about/index.htm):

- Bank will establish an independent risk unit which will be responsible for the preparation and implementation of risk management system.
- This unit will perform a regular back testing program.
- Considering the fact that risk control is an essential part of banking, the bank board of management and the top level managers will allocate all the required resources and involve in the risk control process actively.
- The measurement model within the bank should be integrated with daily risk management process as far as possible.
- Risk measurement system should be used consistent with in-house trading and risk limits.
- As a supplementary part of risk analysis based on the daily outputs of the bank's risk measurement models, the stress testing should be applied which covers all kinds of unexpected scenarios.
- To what extent the models applied are in complying with the internal strategies and control system should be reviewed through certain periods.
- The evaluation of risk management system should be made independently on a regular basis through the bank's own inspection process.

Backtesting : By the 1996 Amendment the Basle Committee took measures to enable the accuracy of VaR models in use. This process monitoring the accuracy of the model by taking the difference between the estimated and realized VaR amounts into

consideration is called as backtesting. Accordingly, in case of any results deviating from acceptable margins (the number of acceptable deviations is 4), a *"plus factor"* with a value varying between 0 and 1 will be added to multiplying factor and in this way the multiplying factor will reach up to 4. In order to determine the plus factor, three areas were defined as green, yellow and red. Considering the backtesting process, the bank has to be using the VaR model at least in the last 250 days and explaining the backtesting results in order to be allowed to use the model (http://www.bis.org/about/index.htm).

On the other side, from the point of backtesting process, the authorities may act flexible in case of any extraordinary conditions such as regime change, structural factors, extreme fluctuations in the markets.

SECTION 4

APPLICATION OF VaR ON ISE STOCKS

As the financial decisions are taken under uncertainties and because of the need for the development of risk management systems and management instruments, the importance given to new risk criteria like VaR has increased. As stated before, the most popular risk criteria is standard deviation value. However, since the standard deviation measures the positive and negative return movements with the same probability values, the interest for VaR, a risk criteria focused on tale values in the negative area of distributions, has been increased. In this section of the study, VaR will be found by using variance-covariance method.

4.1. MEASUREMENT OF VAR BY VARIANCE-COVARIANCE APPROACH

The accuracy of any VaR model based on analytic approach depends on the proper formation of return distributions of assets and the accurate estimation of distribution parameters. Therefore, these approaches are called as parametric approaches. In any analytic model, the important step is the calculation of Variance-Covariance matrixes of asset returns. So this approach is also called as Variance-Covariance approach. In Variance-Covariance approach, the normal distribution assumption is used in general. For 1 day time horizon and a single financial asset, the VaR formula can be indicated as follows.

$$VaR_{CL} = -W(\mu + \sigma.Z_{1-CL}) \quad (4.1a)$$

$$VaR_{CL} = -W(\mu - \sigma.Z_{CL}) \quad (4.1b)$$

(4.1a) and (4.1b) equities were derived from the symmetry of standard normal distribution. On the other side, expected return μ is accepted as zero in general. Herein; W means the initial investment amount, σ is the return changeability or standard deviation and Z_{1-CL} indicates the standard normal value of returns under normal

distribution assumption and is accepted as zero in general. $Z_{1\text{-}CL}$ is calculated by standard normal value (4.2) formula and for 95% confidence level it takes the value of 1.645 and for 99% confidence the value is -2.326.

$$Z_{1\text{-}CL} = \frac{X - \mu}{\sigma} \qquad (4.2)$$

Figure 4.1 VaR value on the normal distribution curve.

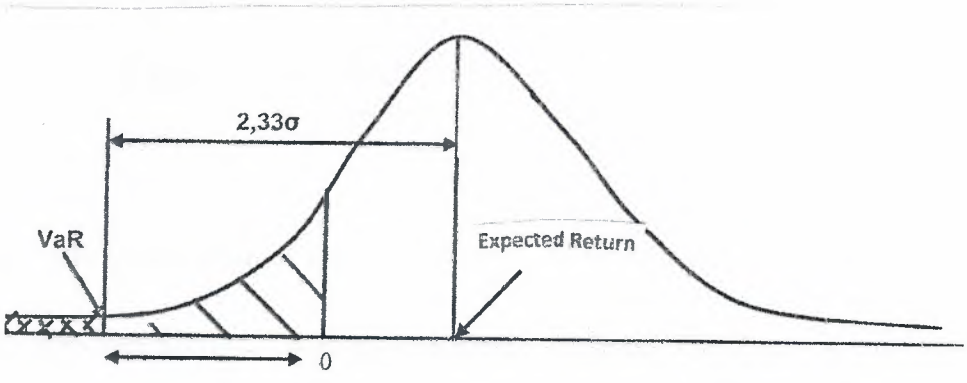


Figure 4.1 shows the VaR value under normal distribution assumption, at 99% confidence level. As seen on the figure, VaR value is calculated by means of multiplying 2,33 standard normal value corresponding 99% confidence by standard deviation. But another point show on the figure is that in case the expected return takes a positive value bigger than zero, absolute VaR value is calculated by means of subtracting the expected loss value from the multiplication of standard normal value with standard deviation.VaR method is calculated with normal distribution variables.Because VaR method is located in both tails of normal distribution, it shown in the above graph. So that the interest is increasing for this type of risk criteria.

The normality assumption in analytic VaR calculation makes the calculation easy, besides it enables the use of the square root of time rule. This rule is based on the

thought that as the time horizon for financial assets rises so the uncertainty rises. Shortly, the variance of N days return rises as the N number rises. The returns for N days and M days are statistically independent from each other and also their variances are different. Accordingly, the standard deviation value for more than 1 day is equal to the multiplication of the standard deviation value for 1 day by $\sqrt{T}$.

$$T\ days\ volatility = \sigma\sqrt{T} \qquad (4.3)$$

Similarly, the VaR value calculated for more than 1 day is equal to the multiplication of the VaR value caculated for 1 day by $\sqrt{T}$.

$$T\ days\ VaR = VaR * \sqrt{T} \qquad (4.4)$$

4.1.2. VaR Calculation of the Portfolio

In the previous section, focusing on a single financial instrument, the risk and VaR calculations of this instrument were explained. Investors usually prefer the diversification way to reduce the risk. VaR calculation of a portfolio is more complex than a single variable. The expected return of a portfolio can be defined as in the equity (4.5) below.

Expected Return of a Portfolio = $E(p) = \mu_p = \Sigma^n_{i-1}$ **Wiμi** (4.5)

In the formula, μ_i shows the expected return of each asset and w_i is the weight of each asset in the portfolio and it is defined as the rate of investment amount of an asset to the total amount of portfolio. There are N shares in the portfolio. While the portfolio return is calculated by the weighted average of the assets composing the portfolio, the portfolio risk (σ_p) is usually less than weighted average risk of securities composing portfolio. As a rule as the share number in portfolio increases, the portfolio risk reduces. The diversified portfolio variance is calculated as follows.

$$\sigma^2_{p=}\ \Sigma^n_{i=1}\, Wi\, \sigma^2 = \Sigma^n_{i=1}\, \Sigma^n_{j=1} W_i W_j\, \sigma_{ij} \qquad (4.6)$$

As it is seen, portfolio variance includes also the covariance among assets. In matrix form variance can be defined as in equity (4.7)

$$\sigma_p = \left\{ \begin{bmatrix} W_1 \\ W_2 \\ W_3 \\ . \\ . \\ W_N \end{bmatrix} \times \begin{bmatrix} \sigma_{11} & \sigma_{12} & \sigma_{13} & . & . & \sigma_{1N} \\ \sigma_{21} & 1 & \sigma_{23} & . & . & \sigma_{2N} \\ \sigma_{31} & \sigma_{32} & 1 & . & . & \sigma_{3N} \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ \sigma_{N1} & \sigma_{N2} & \sigma_{N1} & . & . & \sigma_{NN} \end{bmatrix} \times \begin{bmatrix} W_1 & W_2 & W_3 & . & . & W_N \end{bmatrix} \right\}^{\frac{1}{2}} \qquad (4.7)$$

If we define the sum (Σ) sign as covariance matrix, portfolio variance can defined in equity (4.8).

$$\sigma^2_p = w' \Sigma w \qquad (4.8)$$

In order to convert portfolio variance to VaR measure of portfolio, if we convert c confidence level to α standard normal value and define W as the portfolio initial value, then we can define VaR value of the portfolio as in the equity (4.9).

$$\textit{Portfolio VaR} = VaR_p = \alpha\, \sigma_p W = \alpha \sqrt{x' \Sigma x} \qquad (4.9)$$

VaR value of portfolio includes diversification among the returns of portfolio components. At this point, the standard deviation and weight of each asset should be known.

4.2. METHOD AND DATA

Data used in the study was taken from ISE. Portfolio stocks were selected among 83 stocks,namely: Akbank,Dohol,Tofas,Migros,Vestel which are processed 05.01.2004 and 29.06.2007.

VaR of ISE 100 index and stocks were calculated using variance-covariancce with the data obtained from ISE. Variance and covariance matrix and VaR calculation were made through Excel program.

Table 4.1 gives the descriptive statistics of the returns of ISE 100 index and stocks dealing with the said period on a daily and monthly basis. By following the general principle in application, the return was defined as the logarithm of the price changes (Δ). The number of observations was 874 on the daily basis and 42 on the monthly basis.

Skewness, characterizes the degree of asymmetry of a distribution around its mean. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicates a distribution with an asymmetric tail extending toward more negative values. Kurtosis, characterizes the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution. Negative kurtosis indicates a relatively flat distribution(Excel information:2007). In order to find the Skewness and Kurtosis shown in Table 4.1 in Excel, the formula is indicated in the equity below.

Skewness= SKEW (beginning:ending)

Kurtosis = KURT(beginning:ending)

The average daily return is even below 1% in all shares. On the other hand, the average returns of stocks rise as the return period extends. In parallel with returns, as the time period extends, the standard deviation of shares and ISE100 index (risk, if accepted as a measure of risk) increases.

The fact known in the finance literature that the returns of shares have fat tail is also valid for the shares used in my study in general. Kurtosis values which are more than 3 and Skewness values are the indications of fat tail feature.

Table 4.1. The descriptive statistics of ISE 100 index and stocks and normality test.

DAILY RETURNS	ISE 100 index	Akbank	Doğan Holding	Migros	Tofas	Vestel
Mean	0,001031	0,000654	0,000078	0,000092	0,000812	-0,00075
Standard Deviation	0,024134	0,035841	0,0371	0,15994	0,026449	0,020581
Skewness	0,019994	6,170768	-9,8282	-0,3262	-0,06276	-0,13585
Kurtosis	27,42315	132,5111	195,969	190,448	2,921266	1,300145
Observation number	874	874	874	874	874	874
MONTHLY RETURNS						
Mean	0,001147	0,026921	0,030938	0,0333	0,029695	-0,01209
Standard Deviation	0,003827	0,093779	0,120766	0,09876	0,130839	0,074159
Skewness	-0,33274	0,308423	0,31515	-0,04835	0,490787	-0,64651
Kurtosis	-0,31718	0,628962	-0,16954	-0,52265	2,772238	0,180721
Observation number	42	42	42	42	42	42

Although the returns don't have normal distribution, VaR calculated using variance-covariance method, under the assumption that the distribution is normal, will understate the real VaR. This will be apparently seen especially for the 95% and smaller confidence levels.

Table 4.2. Variance-Covariance among shares

DAILY RETURNS					
	Akbank	Dohol	Migros	Tofas	Vestel
Akbank	0,001283	0,000401	0,00057	0,000332	0,000282
Dohol	0,000401	0,001378	0,00015	0,000337	0,000332
Migros	0,00057	0,000148	0,02555	0,000192	0,000113
Tofas	0,000332	0,000337	0,00019	0,000699	0,000264
Vestel	0,000282	0,000332	0,00011	0,000264	0,000423
MONTHLY RETURNS					
	Akbank	Dohol	Migros	Tofas	Vestel
Akbank	0,008585	0,006619	0,00476	0,005195	0,003036
Dohol	0,006619	0,014237	0,00398	0,008911	0,005303
Migros	0,004763	0,003979	0,00952	0,003003	0,00258
Tofas	0,005195	0,008911	0,003	0,016711	0,004111
Vestel	0,003036	0,005303	0,00258	0,004111	0,005369

The small covariance values in the variance-covariance matrix presented in Table 4.2 indicate that the changes in the returns will not affect more each other and portfolio variance. The data in variance-covariance matrix presented in Table 4.2 were obtained through COVAR in Excel.

VaR of the portfolio and ISE 100 index above was found by the formulas below in Excel. Firstly, the return of the portfolio was calculated and then including the confidence level VaR was calculated.

Portfolio Return=MMULT(TRANSPOSE(Average of stocks); weights in the portfolio)

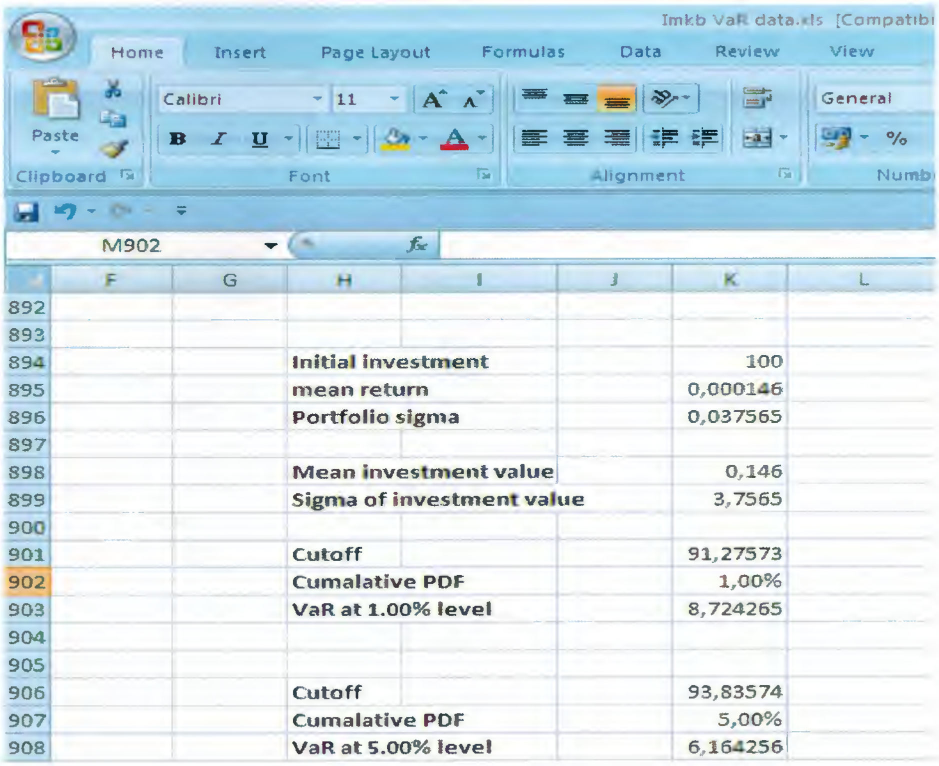
Standard Deviation of Portfolio= SQRT(MMULT(MMULT(TRANSPOSE (weight of stocks in the portfolio);variance covariance matrix); weight of stocks in the portfolio))

VaR Cutoff= NORMINV(CL;(1+Mean return)*Initial investment;portfolio sigma* Initial investment)

VaR= Initial investment- VaR Cutoff

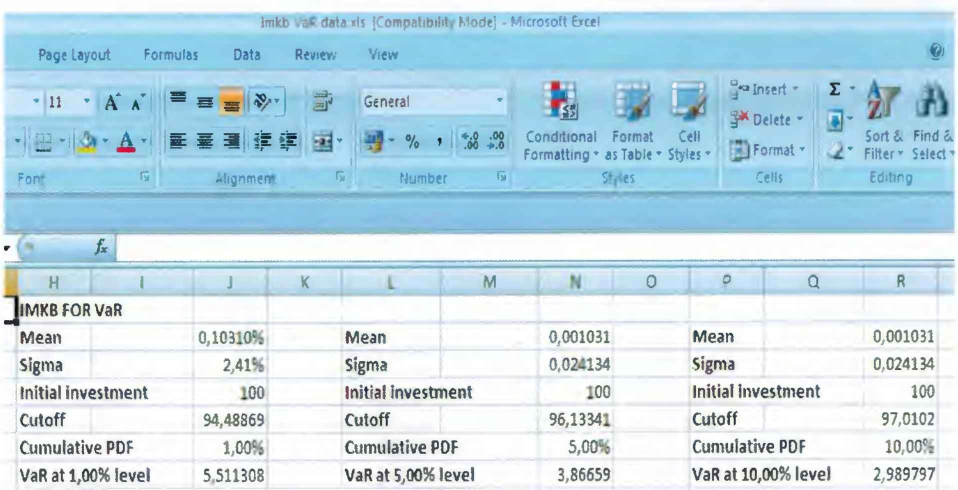
Figure 4.2 and figure 4.3 below shows the VaR values of the portfolio and ISE100 index on the daily basis calculated in Excel program.

Figure 4.2 Daily VaR calculation of the portfolio



	F	G	H	I	J	K	L
892							
893							
894			Initial investment			100	
895			mean return			0,000146	
896			Portfolio sigma			0,037565	
897							
898			Mean investment value			0,146	
899			Sigma of investment value			3,7565	
900							
901			Cutoff			91,27573	
902			Cumalative PDF			1,00%	
903			VaR at 1.00% level			8,724265	
904							
905							
906			Cutoff			93,83574	
907			Cumalative PDF			5,00%	
908			VaR at 5.00% level			6,164256	

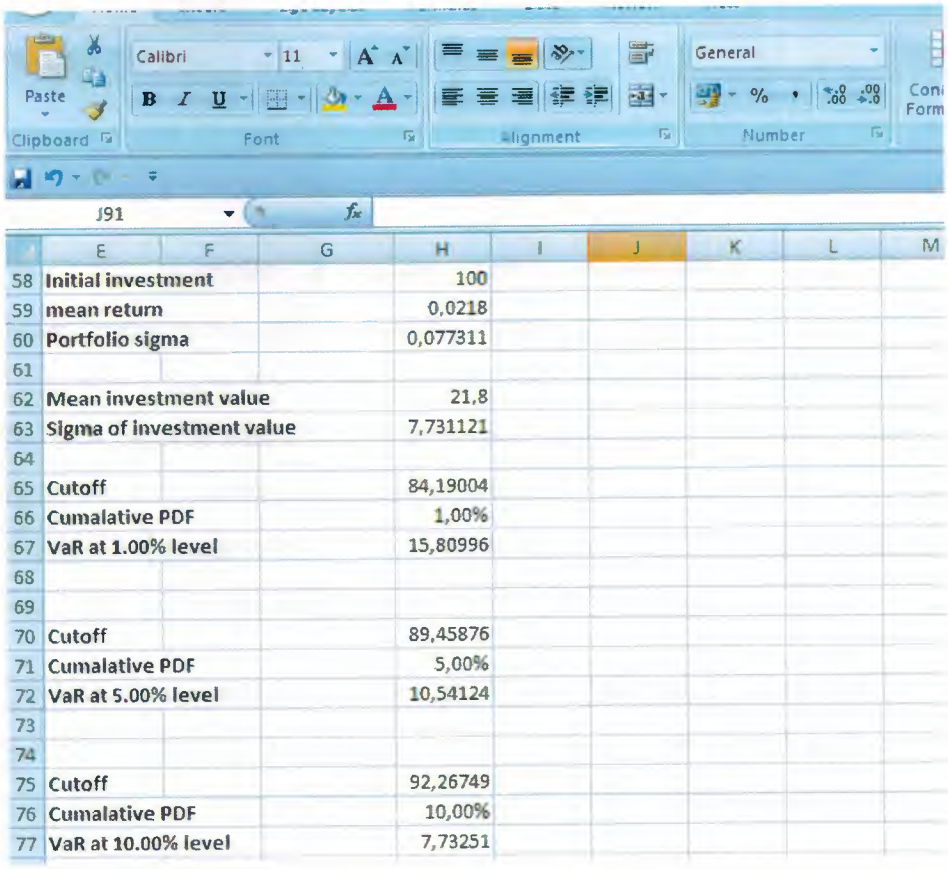
Figure 4.3 Daily VaR calculation of ISE 100 index



H	I	J	K	L	M	N	O	P	Q	R
IMKB FOR VaR										
Mean		0,10310%		Mean		0,001031		Mean		0,001031
Sigma		2,41%		Sigma		0,024134		Sigma		0,024134
Initial investment		100		Initial investment		100		Initial investment		100
Cutoff		94,48869		Cutoff		96,13341		Cutoff		97,0102
Cumulative PDF		1,00%		Cumulative PDF		5,00%		Cumulative PDF		10,00%
VaR at 1,00% level		5,511308		VaR at 5,00% level		3,86659		VaR at 10,00% level		2,989797

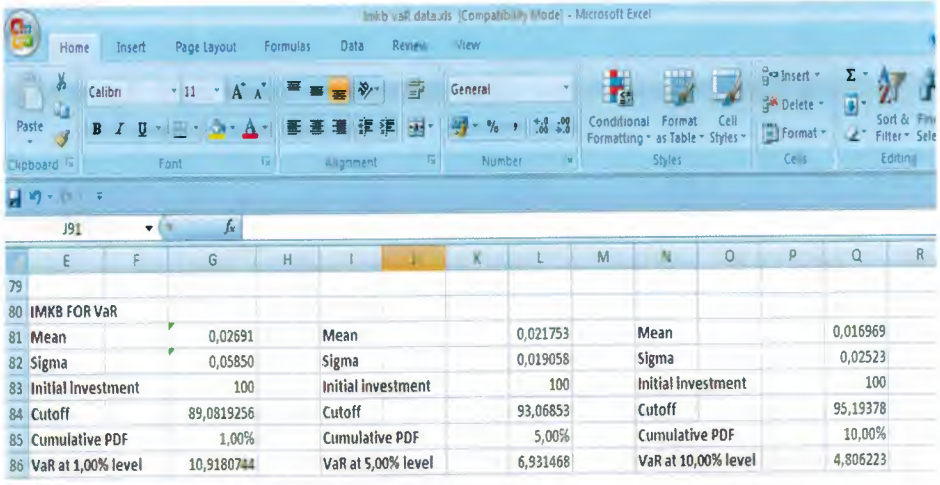
Figure 4.4 and figure 4.5 below shows the VaR values of the portfolio and ISE100 index on the monthly basis calculated in Excel program.

Figure 4.4 Monthly VaR calculation of the portfolio



	E	F	G	H	I	J	K	L	M
58	Initial investment			100					
59	mean return			0,0218					
60	Portfolio sigma			0,077311					
61									
62	Mean investment value			21,8					
63	Sigma of investment value			7,731121					
64									
65	Cutoff			84,19004					
66	Cumalative PDF			1,00%					
67	VaR at 1.00% level			15,80996					
68									
69									
70	Cutoff			89,45876					
71	Cumalative PDF			5,00%					
72	VaR at 5.00% level			10,54124					
73									
74									
75	Cutoff			92,26749					
76	Cumalative PDF			10,00%					
77	VaR at 10.00% level			7,73251					

Figure 4.5 Monthly VaR calculation of ISE 100 index



	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
79														
80	IMKB FOR VaR													
81	Mean		0,02691		Mean			0,021753		Mean			0,016969	
82	Sigma		0,05850		Sigma			0,019058		Sigma			0,02523	
83	Initial Investment		100		Initial investment			100		Initial Investment			100	
84	Cutoff		89,0819256		Cutoff			93,06853		Cutoff			95,19378	
85	Cumulative PDF		1,00%		Cumulative PDF			5,00%		Cumulative PDF			10,00%	
86	VaR at 1,00% level		10,9180744		VaR at 5,00% level			6,931468		VaR at 10,00% level			4,806223	

Value at Risk can be also calculated by the matlab and Evidence programs, but in order to calculate VaR with these programs we need various VaR codes.

4.3. EMPIRICAL RESULTS

In this section there are the VaR outcomes calculated by variance covariance method. While calculating VaR of ISE 100 index return was supposed to have normal distribution. In order to calculate the VaR of ISE 100 index under the normality assumption, having the mean, standard deviation and confidence level will be enough.

For the portfolio composing five stocks,namely: Akbank, Dohol, Migros,Tofas,Vestel it is supposed that the weight of stocks (20%). The total portfolio value is 100.000 YTL,to invest and 20.000 YTL is invested to each stock. Table 4 shows the VaR figures calculated at different confidence levels and return periods. According to variance covariance method and at 99% confidence level, the daily VaR of the portfolio is approximately 8.724 YTL. It means that with 1% probability or at any time within 100 days the portfolio may lose 8.724 YTL or more.

If VaR is calculated by other methods, VaR value calculated by variance covariance will be smaller. The reason for this is that as mentioned before in variance covariance method the returns have fat tail and don't have normal distribution.

The last column in Table 4.3 shows how the calculated value changes when the confidence level rises from 95% to 99%. In variance covariance method, if the confidence level rises from 95% to 99%, the VaR value will increase 34,73%.

Table 4.3. VaR value changes at different confidence levels

Confidence Level		0,90	0,95	0,99	% Change
Portfolio					
Daily	Variance-covariance	4,79952	6,1642555	8,724265	34,73%
Monthly	Variance-covariance	7,732510	10,541243	15,809957	40,53%
ISE index					
Daily	Variance-covariance	2,98980	3,86659	5,51131	35,44%
Monthly	Variance-covariance	4,80622	6,93147	10,91807	45,43%

Table 4.4 shows how the calculated value changes invested with 100.000 YTL when the confidence level rises from 95% to 99%. In variance covariance method, if the confidence level rises from 95% to 99%, the VaR value will increase 34,73%.

Table 4.4. VaR value invested 100.000 YTL changes at different confidence level

Confidence level		0,90	0,95	0,99	%Change
Portfolio	(YTL)				
Daily	variance-covariance	4,799.52	6,164,26	8,724.26	34.73%
Monthly	variance-covariance	7,732.51	10,541.24	15,809.95	40.53%
ISE index	(YTL)				
Daily	variance-covariance	2,989.80	3,866.59	5,511.31	35.44%
Monthly	variance-covariance	4,806.22	6,931.47	10,918.07	45.43%

In the figures below, VaR values of an equal-weighted portfolio calculated by variance-covariance method are shown on the normal distribution curve.The investor choice in invest ISE index,because low risk.

Figure 4.6 Daily VaR values of portfolio

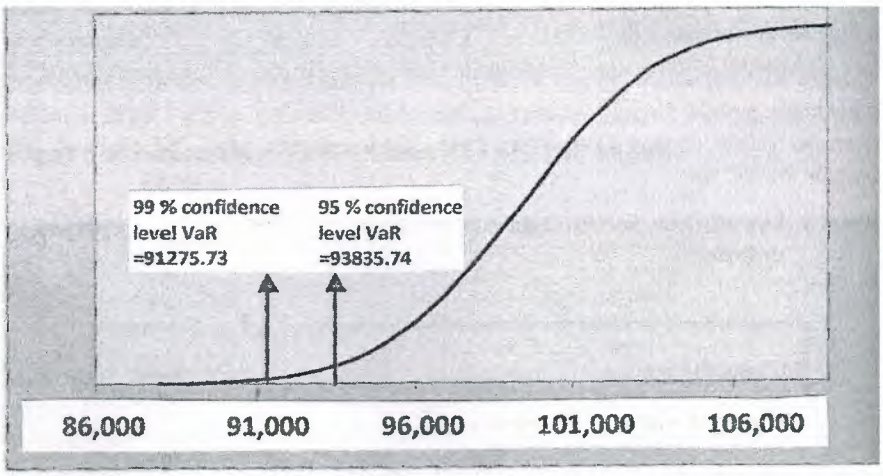


Figure 4.7 Daily VaR values of ISE 100 index

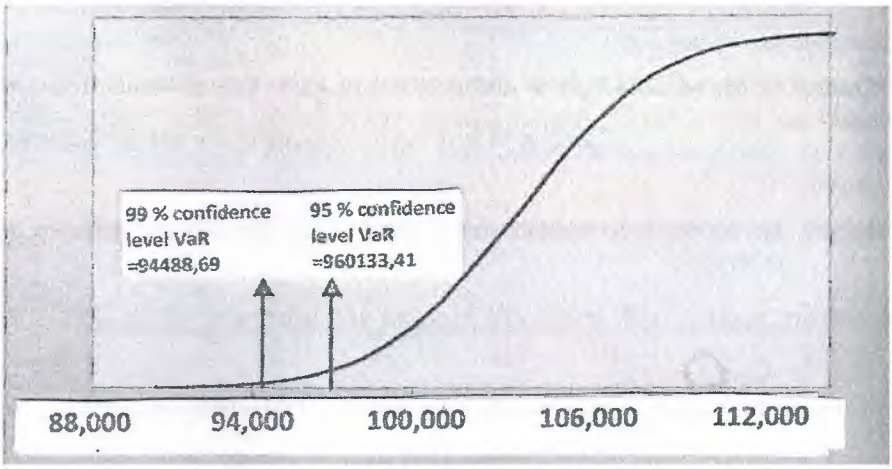


Figure 4.8 Monthly VaR values of portfolio

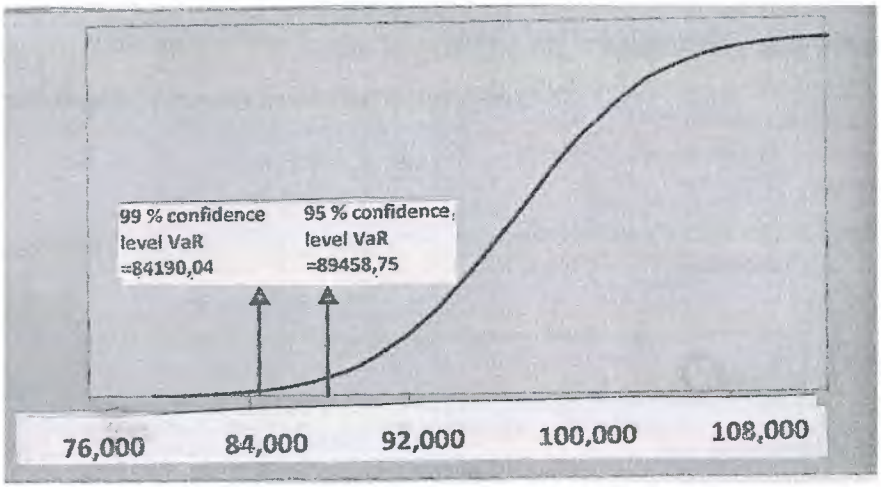
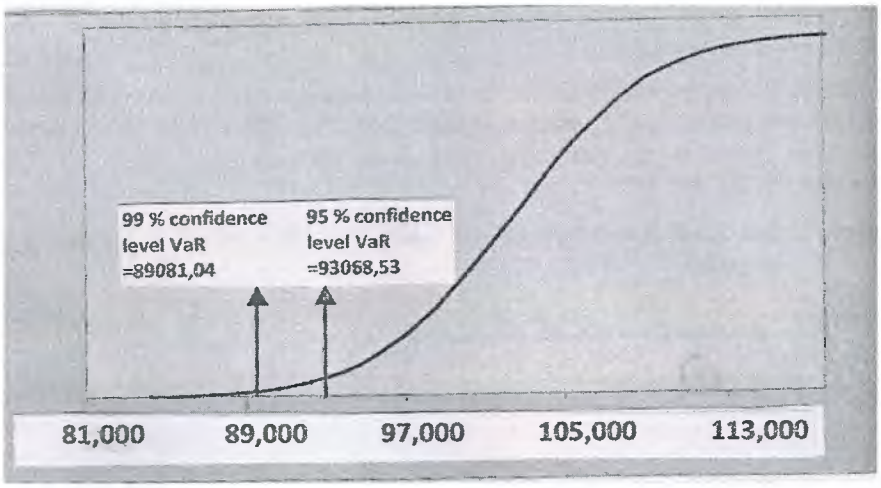


Figure 4.9 Monthly VaR values of ISE 100 index



VaR results help to decision makers in many type of decisions (www.finansbank.com.tr/ risk managent central):

- If there is any risk in investment, hedge and portfolio management, help us to generate accurate decisions and low risk.
- If gives chance to evaluate performance of supervisors' decisions.
- Helps to determine the amount of capital that institutions needs.
- Used to purpose for make a report when define the unique risk.
- Provide attent of relations between risks and this makes the possibility of risk calculation.
- VaR makes the banks to manage the market risk , and the result of this get capital for each asset that is invested.

SECTION 5

CONCLUSION

The big financial crises occurring during the last 20-30 years mostly arose from inefficient risk managements and so undertaking risks more than they can carry. After these crises international regulating authorities presented a prudential approach toward the issue, but the regulations made thereafter were insufficient. Now the Regulators are seeking to protect both the national economies from crises arising from banks' undertaking excess risks and the competitiveness for the banks. The accords made for this purpose allowed of institutions to use VaR as an internal risk management method.

This study, in the light of other academic studies made on this field, examined the VaR as portfolio risk criteria and portfolio optimization. In the analysis of portfolio optimization, VaR as a risk criteria was assessed in the portfolio optimization technique developed by Markowitz.

Risk management has become more important in the last 25 years due to the factors such as the market mobility, developments in information Technologies, increase in worldwide trading volume and development of new financial products like derivative instruments. More complex risk management techniques such as VaR and stress tests were needed by the effect of these developments.

In VaR calculations three basic approaches variance-covariance method, historical simulation and Monte Carlo simulation are used and each method has its own advantages and disadvantages. Yet there is no firm consensus in the literature on the accuracy of the outcomes generated by the methods. Finally, since VaR is yielded after statistical calculations, it doesn't change the fact that VaR is an estimation. On the other hand, whichever method is used, there will be need for software as VaR amounts are taken by statistical and mathematical calculations.

In variance-covariance method, VaR is estimated by means of variance-covariance matrix of asset returns. When the asset returns are not linear and the

distribution is not normal, VaR outcomes calculated by variance-covariance method may be wrong.

In the historical simulation method, VaR is estimated from the profit-loss distribution obtained through simulation using data belonged to past period. Historical simulation method can also be used when the returns are non-linear and the distribution is non-normal. On the other side, the most important disadvantage of this method is the full dependence to historical data, so that the method may give wrong results in case the past period has low capability to represent the future.

As for the Monte Carlo Simulation method, the distribution of the values that the portfolio get in the future is obtained by using techniques generating random numbers and VaR is estimated from this distribution. The basic disadvantage of Monte Carlo simulation, which is the most robust and flexible type among the VaR calculation methods, is the long calculation time for dense computerized proceedings and requires more expertise compared with other methods.

In the fourth section of the study, VaR was calculated for ISE 100 index and the portfolio composed of 5 stocks selected randomly at various confidence levels and for return periods. Variance-covariance method was used to calculate VaR and it was found that the extension of return period increases VaR. As the confidence level rises, so the VaR rises, even though this is an expected result the changing rates vary.

Nowadays, the banks and financial institutions operating in Turkey and the world calculate the VaR on a daily basis. The daily VaR values determine the strategies that banks and financial institutions will follow and affect their investments. VaR method is at the alerter position against the risks that financial institutions may encounter in the future and in case of very risky conditions it helps the reviewing of the planned investments.

VaR method is required but not enough for risk control, so the limits of the method must be analyzed well enough. Although all advantages of VaR, depending on the methods used in calculations, some points should not be ignored, those are; VaR amount may be misleading; the models don't take the risks arising in extraordinary

conditions into account; the usage of these models requires advanced experience and knowledge. In addition to this, in my opinion VaR does not make sense by itself, however, when combined with expertise and experience and used within a framework of risk management system applied in the overall institution.

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BANK OF INTERNATIONAL SETTLEMENTS, http://www.bis.org/about/index.htm

CAPITAL MARKETS BOARD OF TURKEY, www.spk.gov.tr

CENTRAL BANK OF TURKEY, www.tcmb.gov.tr

ISTANBUL STOCK EXCHANGE, www.ise.org

RISKMETRICS www.riskmetrics.com

FINANSBANK www.finansbank.com.tr

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
05.01.2004	0,028266	0,656106	0,034786	0,024332	0,023717	0,024491
06.01.2004	-0,03528	-0,03195	-0,08004	-0,03423	-0,03985	-0,02449
07.01.2004	0,019219	0,012903	0,054067	0,019705	0,016129	0,05624
08.01.2004	0,00114	0,012739	-0,0177	-0,00489	-0,01613	0,015504
09.01.2004	0,009114	0	0,035091	0,009756	0,032003	0,015267
12.01.2004	-0,00121	-0,01917	-0,04406	-0,00976	-0,02391	0,007547
13.01.2004	-0,00505	-0,00647	0,026668	0,00489	0,008032	0
14.01.2004	-0,03353	-0,04652	-0,03572	-0,00489	-0,02429	-0,06204
15.01.2004	0,007077	-0,00683	0	0,009756	0,008163	-0,00803
16.01.2004	-0,04044	-0,02778	-0,06575	-0,95212	-0,02469	-0,01626
19.01.2004	-0,02293	-0,02857	0	-0,01266	-0,04256	-0,05043
20.01.2004	0,05704	0,069959	0,074801	0,037504	0,050858	0,066691
21.01.2004	0,00356	-0,02048	0,008969	-0,01235	0,00823	0,008032
22.01.2004	-0,02041	-0,03509	-0,02715	-0,01881	-0,04185	-0,02429
26.01.2004	-0,00876	-0,00717	0	-0,01917	0,01695	0,016261
27.01.2004	-0,02577	-0,00722	-0,05662	-0,00647	-0,04293	-0,02449
28.01.2004	0,000697	0	0,02871	-0,01967	-0,03572	-0,0083
29.01.2004	-0,03523	-0,04445	-0,06832	-0,02685	-0,04652	-0,0601
30.01.2004	-0,00133	-0,01527	0,020001	-0,00683	-0,02899	-0,02691
05.02.2004	-0,01315	-0,02335	0	0	-0,00985	-0,02765
06.02.2004	-0,004	-0,01587	0,009852	-0,00687	0,019608	0,009302
09.02.2004	0,039023	0,069526	0,045985	0,027213	0,074801	0,027399
10.02.2004	-0,01269	-0,00749	-0,02657	-0,02721	-0,0367	-0,0367
11.02.2004	0,032852	0,058411	0,056089	0,020479	0,036701	0,027652
12.02.2004	0,048029	0,061875	0,044452	0,026668	0,04406	0,05311
13.02.2004	0,006048	-0,00669	0	-0,01325	0,017094	0,017094
16.02.2004	0,01691	0,006689	0,059089	0,006645	0,033336	0,0415
17.02.2004	-0,0164	-0,04779	-0,03334	0	-0,0249	-0,03306
18.02.2004	0,024348	0,027588	0,0415	-0,00664	0,024898	0,033061
19.02.2004	-0,04584	-0,06318	-0,05001	-0,04082	-0,03334	-0,05859
20.02.2004	-0,00012	0,00722	0,008511	0,013793	0	0
23.02.2004	-0,01734	-0,02182	-0,02575	-0,02076	-0,01709	-0,01739
24.02.2004	0,011621	0,014599	0,025752	-0,00702	0	0,008734
25.02.2004	0,011255	0	0,008439	0,020907	0,008584	0,008658
26.02.2004	0,003443	0,00722	0,016667	0	0,008511	0
27.02.2004	0,006244	0	0,024491	-0,00692	0	-0,0262
01.03.2004	-0,00546	0	-0,01626	0,00692	-0,00851	-0,01786
02.03.2004	0,012839	0,04226	0,024293	0,033902	0,025318	0,035402

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
03.03.2004	0,007475	-0,02091	0	-0,00669	0,016529	0
04.03.2004	-0,00819	0	-0,02429	-0,02034	-0,00823	-0,01754
05.03.2004	0,007869	0,013986	-0,00823	0,006826	0,016394	0,017544
08.03.2004	0,015514	0	0,00823	0,013514	0,024098	0,025752
09.03.2004	0,001187	0	0,008163	-0,00673	0	-0,03449
10.03.2004	0,015798	0,00692	0,016129	0,052644	0,015748	0,017392
11.03.2004	-0,02131	-0,02797	-0,03252	-0,02598	0,007782	-0,03509
12.03.2004	-0,00088	-0,00712	0	0	0,007722	0
15.03.2004	0,008338	-0,00717	0	0,013072	-0,0155	0,0177
16.03.2004	-0,01055	0	-0,02511	-0,00651	0	-0,02667
17.03.2004	-0,0014	0	-0,00851	0,006515	-0,01575	-0,00905
18.03.2004	0,016277	0,014286	0,033617	0,006473	0,015748	0,035718
19.03.2004	0,020823	0,014085	0,024491	0,068563	0,04581	0,008734
22.03.2004	0,007138	-0,00702	0,016	0,035507	0	0,025752
23.03.2004	0,00092	0,013986	-0,016	-0,0295	-0,01504	-0,00851
24.03.2004	0,007995	-0,00697	0,031749	-0,01205	0	-0,01724
25.03.2004	0,006114	0,006969	0,015504	0,018019	0,007547	0,008658
26.03.2004	0,0176	0,013793	0,015267	0,040822	0,022306	0,025533
29.03.2004	0,002439	0	-0,0076	-0,01149	-0,00738	0,016667
30.03.2004	-0,04186	-0,05635	-0,03892	-0,02933	-0,03774	-0,03362
31.03.2004	0,007962	0,014389	0,007905	0	0,007663	0,008511
01.04.2004	0,006484	0,007117	0,007843	0,005935	0,007605	0
02.04.2004	0,007982	-0,01429	0,007782	0	0,037179	0,008439
05.04.2004	-0,00755	-0,01449	-0,01563	-0,02395	0,007273	-0,02553
06.04.2004	-0,00285	-0,00733	-0,01587	-0,0122	-0,0146	-0,00866
07.04.2004	-0,01155	-0,00738	-0,02429	-0,00615	0	-0,01754
08.04.2004	-0,03144	-0,02247	-0,03334	-0,025	-0,03746	-0,03604
09.04.2004	0,004387	-0,0076	0	0,025001	0,007605	0
12.04.2004	-0,01268	0	-0,0433	-0,03774	-0,02299	-0,02791
13.04.2004	-0,00809	0,007605	0	-0,00643	-0,0315	0
14.04.2004	-0,02254	-0,03861	-0,05456	0,01917	-0,04082	-0,04832
15.04.2004	0,000482	0,023347	0,009302	0	0,056695	-0,00995
16.04.2004	0,030664	0,030305	0,054067	0,006309	0,03101	0,039221
19.04.2004	0,033992	0,05092	0,034486	0,0125	0,052056	0,046957
20.04.2004	-0,02066	-0,00712	-0,02575	-0,0125	-0,02198	-0,01852
21.04.2004	-0,01328	0	-0,04445	-0,00631	-0,02247	-0,00939
22.04.2004	0,008326	0,007117	0,018019	0,006309	0,037179	0
26.04.2004	-0,04446	-0,04349	-0,05506	-0,03847	-0,06017	-0,05827

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
27.04.2004	-0,02004	-0,02247	-0,03847	-0,03323	-0,00778	-0,05129
28.04.2004	0,000658	-0,0076	0,038466	-0,00678	0	-0,01058
29.04.2004	-0,02735	-0,03101	-0,04832	-0,04167	-0,01575	-0,00533
30.04.2004	0,015929	0,038615	0,03884	0,007067	0,015748	-0,00536
03.05.2004	-0,0193	0	-0,02899	-0,05055	-0,08135	-0,02725
04.05.2004	0,031542	0,051672	0,028988	-0,00743	0,033336	0,021859
05.05.2004	0,001513	0,007168	0	0,022141	-0,0249	0,03714
06.05.2004	-0,03613	-0,0438	-0,06899	-0,00733	-0,04293	-0,04801
07.05.2004	-0,03594	-0,03803	-0,05022	-0,02231	-0,05407	-0,01099
10.05.2004	-0,01149	-0,03953	-0,00862	0	-0,02817	0
11.05.2004	0,017388	0	0,038221	0,007491	0,037388	0,02725
12.05.2004	0,00246	0,001612	0,028749	0,007435	-0,00922	0,005362
13.05.2004	-0,02952	-0,0261	-0,04133	-0,03774	-0,03774	-0,0271
14.05.2004	-0,00691	-0,0083	0,008403	0	-0,01942	-0,01105
17.05.2004	-0,03752	-0,05129	-0,04274	0,022815	-0,05026	-0,02817
18.05.2004	0,012598	0,008734	0,025864	0,007491	0,042388	0,016998
20.05.2004	0,012934	0,025752	0,004246	-0,01504	0,04634	0
21.05.2004	0,017873	0	0,02923	0,022473	0,00939	0,027703
24.05.2004	0,031879	0,016807	0,032391	0,021979	0,027652	0,021622
25.05.2004	-0,02217	-0,01681	-0,02419	-0,0146	-0,03704	0
26.05.2004	0,026124	0,033336	0,028171	0,014599	0,00939	0,010638
27.05.2004	-0,00416	0,008163	0	-0,00727	-0,00939	-0,016
28.05.2004	0,009503	0,024098	0,011834	0,014493	-0,02871	-0,00539
31.05.2004	-0,01434	-0,0241	-0,0198	-0,00722	-0,00976	-0,01087
01.06.2004	-0,01857	-0,02469	-0,02429	0	-0,04001	-0,01099
02.06.2004	0,00599	0,008299	-0,00411	0,014389	0,024195	0
03.06.2004	0,010434	0,032523	0,004107	0,007117	0,015811	0,00551
04.06.2004	0,038201	0,046884	0,040166	0,007067	0,038466	0,027102
07.06.2004	0,017473	-0,19307	0,032917	0	-0,00948	0,026387
08.06.2004	-0,02337	-0,01869	-0,04879	-0,01418	-0,01923	-0,04256
09.06.2004	0,000654	0,00939	0,00995	0	-0,02956	0,00542
10.06.2004	0,009652	0,027652	-0,00995	0,007117	0,019803	-0,01087
11.06.2004	-0,00688	-0,02765	0,003992	0,001417	-0,0198	-0,00548
14.06.2004	-0,03366	-0,02844	-0,04481	-0,0157	-0,0202	-0,02786
15.06.2004	0,008781	0,03774	0,012423	0,021353	0,012171	-0,00567
16.06.2004	-0,00766	-0,01869	-0,02079	0,020907	-0,01217	-0,01143
17.06.2004	-0,01162	0	-0,00844	-0,02797	-0,01646	-0,01156
18.06.2004	0,002523	-0,00948	0,008439	0	0,004141	0,011561

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
21.06.2004	-0,00941	-0,01923	-0,01269	-0,02151	0	-0,00576
22.06.2004	-0,00195	0	0,004246	0,001448	0,004124	-0,0058
23.06.2004	0,004007	0,00194	0,008439	-0,00872	0	0,005797
24.06.2004	0,004068	-0,02155	0,004193	0,056753	-0,00826	-0,0058
25.06.2004	0,027251	0,02927	-0,17815	-0,01389	0,028632	0,028655
28.06.2006	0,02026	0,019048	0,029559	-0,00702	0,019961	0,011236
29.06.2006	0,00142	0,00939	0	0	0,015687	-0,0056
30.06.2006	0,013	0,018519	0,004843	0,013986	-0,00781	0,022223
01.07.2006	0,017801	0,053584	0,019139	0,027399	0,019418	0,016349
02.07.2006	0,00687	0,017242	0,014118	-0,02048	-0,00966	0,010753
05.07.2004	0,007488	-0,02598	0,018519	0	0,02871	0,010638
06.07.2004	-0,01724	-0,00881	-0,00922	0,013699	-0,04832	-0,02139
07.07.2004	0,003235	0,017544	0,018349	-0,0137	0,009852	0
08.07.2004	-0,01209	-0,01754	-0,01835	0	0,009756	-0,01087
09.07.2004	0,013746	0,008811	0,013793	0,006873	0,0381	0,016261
12.07.2004	0,002255	0,025975	0	0,013606	0	0,005362
13.07.2004	0,006758	0	0,022574	0,006734	-0,00939	-0,01075
14.07.2004	0,007658	0,001708	0,026433	0	0,018692	0,010753
15.07.2004	0,017611	0,006803	0,008658	0,013334	0,009217	0,026387
16.07.2004	0,010023	-0,00851	0,021323	0,006601	0,053584	0,020619
19.07.2004	-0,01119	-0,02598	-0,01274	0,019545	0,017242	-0,02062
20.07.2004	-0,00332	-0,00881	-0,00858	-0,01299	-0,00858	0,002081
21.07.2004	-0,00539	0,034786	-0,00866	-0,00656	-0,0262	-0,01255
22.07.2004	-0,00808	0	0,008658	0	0	0
23.07.2004	0,014685	0,025318	0,025533	0,013072	0,026202	0,010471
26.07.2004	-0,01379	-0,01681	-0,02123	-0,01967	-0,01739	-0,03175
27.07.2004	0,006908	0,016807	0,008547	0	0,008734	0
28.07.2004	0,012913	0	0,008475	0,019673	0,025752	0,021277
29.07.2004	0,004864	0,008299	0	0,006473	0	0,002103
30.07.2004	0,014003	0	0,004211	0,012821	0,0415	0,023872
02.08.2004	0,016237	0	0,012526	0,012658	0,032003	0,035268
03.08.2004	-0,01384	-0,01667	-0,01674	-0,01266	-0,032	-0,02506
04.08.2004	-0,01969	-0,02553	-0,01274	-0,01282	0	-0,0102
05.08.2004	0,015406	0,017094	0,012739	0,006431	-0,00816	0,015267
06.08.2004	-0,00813	-0,01709	0	-0,02598	-0,00823	0
09.08.2004	0,003151	0,008584	-0,00847	0,006557	0	0,039609
10.08.2004	0,007481	0	0,016878	0,006515	0,040491	0,019231
11.08.2004	-0,02528	-0,02598	-0,02543	-0,01307	-0,04049	-0,02899

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
12.08.2004	-0,00706	-0,00881	0	0,001315	-0,0083	-0,00985
13.08.2004	0,002687	0	0,012793	-0,00131	0,016529	0,009852
16.08.2004	0,000328	0,008811	0,004228	0	-0,00823	-0,00985
17.08.2004	0,032781	0,051293	0,029108	0,032365	0,024491	0,048319
18.08.2004	-0,0099	0	-0,0207	0,012658	0	-0,01905
19.08.2004	-0,00417	0	-0,0084	0,00627	-0,0081	-0,01942
20.08.2004	0,005122	0,008299	0,004211	-0,01258	0,008097	0,019418
23.08.2004	0,004002	0,00823	0,012526	0,006309	-0,0081	0,019048
24.08.2004	0,01537	0,008163	0,020535	0,018692	0,024098	0,018692
25.08.2004	-0,00538	-0,01639	-0,00816	-0,01242	-0,016	-0,01869
26.08.2004	0,00073	-0,0083	0,00409	-0,01258	0,023906	0
27.08.2004	0,014354	0,016529	0,020203	0,018809	0,023347	0,018692
31.08.2004	0,018123	0,048009	0,029559	0,006192	0,007663	0,009217
01.09.2004	0,014428	0	0	0,006154	0,022642	0,009132
02.09.2004	0,000669	0,007782	0	-0,00615	-0,01504	0
03.09.2004	0,012062	-0,00778	0,009662	0,006154	0,022473	0,00905
06.09.2004	0,003678	-0,00784	0,028438	0	0	0,008969
07.09.2004	0,012752	0,015625	0,027652	0,006116	0,014706	0
08.09.2004	0,016395	0,02299	0,018019	0,018127	0,014493	0,008889
09.09.2004	-0,00328	-0,0076	0	-0,01205	0,007168	-0,00889
10.09.2004	-0,01858	-0,03101	-0,02715	-0,00608	-0,01439	-0,01802
13.09.2004	0,002667	0,015625	-0,05662	0,012121	-0,0146	0
14.09.2004	0,030171	0,02299	0,047402	0,023811	0,028988	0,026907
15.09.2004	-0,0041	0	-0,01869	-0,0059	-0,00717	0
16.09.2004	0,004077	0	0	0,011765	-0,01449	0,008811
17.09.2004	-0,04099	-0,05449	-0,04832	-0,06026	-0,04478	-0,04485
20.09.2004	-0,02231	-0,01613	-0,01396	-0,0125	-0,04688	-0,03739
21.09.2004	0,039433	0,047628	0,035507	0,037041	0,031499	0,028171
22.09.2004	0,01399	0,015385	0,02677	0,012048	0,007722	0,009217
23.09.2004	0,035889	0,066445	0,027909	0,029501	0,04512	0,03604
24.09.2004	0,001377	-0,00717	0	-0,0117	0,028988	0
27.09.2004	-0,01011	-0,00722	0,009132	-0,0059	0,014185	-0,00177
28.09.2004	0,009502	0	0	0,0059	0,034606	0,019316
29.09.2004	-0,00332	-0,00727	-0,00913	-0,0059	-0,00683	0,008658
30.09.2004	-0,01206	-0,00733	-0,00922	-0,0119	-0,01379	0,008584
01.10.2004	-0,01058	-0,02231	-0,03008	0,00597	-0,02247	-0,03479
04.10.2004	0,012136	-0,00755	0,007605	0,005935	0	0,008811
05.10.2004	-0,01721	-0,02299	-0,03077	-0,00593	-0,0057	-0,03572

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
06.10.2004	0,03074	0,02299	0,03832	0,0177	0,03371	0,04445
07.10.2004	0,00649	0,00755	0,00375	0,01163	0,00551	-0,0087
08.10.2004	0,02288	0,0369	0,02588	0,01149	0,01635	0,02598
11.10.2004	-0,0072	-0,022	0	-0,0115	-0,0054	-0,026
12.10.2004	-0,0221	-0,0301	-0,0372	-0,0175	-0,0054	-0,0177
13.10.2004	0,01515	0,03746	0,02247	0,02326	0,01626	0
14.10.2004	-0,0138	-0,0148	-0,0225	0,00573	-0,0108	-0,018
15.10.2004	0,00706	0,00743	0,00755	-0,0115	-0,0054	0
18.10.2004	-0,0064	0,00738	-0,0075	0,00576	-0,0055	-0,0091
19.10.2004	0,00965	0,0146	0,01504	0	0	0,01818
20.10.2004	-0,0147	-0,022	-0,0075	-0,0174	-0,011	-0,0182
21.10.2004	-0,0009	-0,0149	-0,0152	0,00583	-0,0168	-0,0092
22.10.2004	0,00191	-0,0152	0,0076	0,0058	-0,0114	0
25.10.2004	-0,0152	-0,0232	-0,0308	-0,0058	-0,029	-0,0187
26.10.2004	0,01066	0	0,0155	0	0,02899	0,01869
27.10.2004	0,01894	0,02317	0,00766	0,02866	0,017	0,03637
01.11.2004	0,01286	-0,0077	0,0076	0,02235	0,02222	0
02.11.2004	0,01552	0,01527	0,00755	0,01644	-0,0279	-0,009
03.11.2004	0,00953	0,02985	0,02231	0,02151	-0,0229	0,00897
04.11.2004	-0,0186	-0,0375	-0,0074	-0,0107	-0,0175	-0,018
05.11.2004	0,00905	0,02264	0	0,0107	0	0
08.11.2004	-0,0262	-0,0458	-0,0455	-0,0161	-0,0238	-0,0183
09.11.2004	-0,0032	0	0,00772	0	-0,0182	-0,0093
10.11.2004	0,00327	-0,0078	-0,0077	0	-0,0123	0,0093
11.11.2004	-0,0192	-0,0239	-0,0235	-0,0109	-0,0575	-0,0377
12.11.2004	-0,0037	-0,0081	-0,02	0,00109	0,00328	0
17.11.2004	0,02067	0,04763	0,02004	0,01517	-0,0643	-0,0097
18.11.2004	0,02478	0,03054	0,03125	0,016	0,01389	0,0381
19.11.2004	0,00191	0,01493	0,00384	-0,0053	0,04055	0,0093
22.11.2004	-0,0106	-0,0149	-0,0272	-0,0053	-0,0066	-0,0187
23.11.2004	0,02332	0,01493	0,02335	0,02116	0	0,00939
24.11.2004	0,00187	-0,0149	0,00766	0,00105	-0,0067	0
25.11.2004	-0,0022	0,0369	-0,0077	-0,0116	-0,0067	-0,0284
26.11.2004	-0,0073	0,00722	-0,0313	0,00528	-0,0414	0
29.11.2004	-0,0214	0	-0,008	-0,0159	-0,058	-0,0392
30.11.2004	-0,0138	-0,0145	-0,008	-0,0108	0,00743	0
01.12.2004	0,00332	-0,0073	0,016	0,03192	0,01471	-0,0101
02.12.2004	0,02578	0,00147	0,01575	0,01558	0,02166	0,02985

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
03.12.2004	-0,0062	0,01313	-0,0237	-0,0421	-0,0217	-0,0198
06.12.2004	0,0018	0,05635	-0,008	0,0107	-0,0221	-0,004
07.12.2004	0,00113	0,00137	0,00402	-0,0053	0,00743	-0,0285
08.12.2004	-0,0197	0,0323	-0,0285	0,00533	-0,0074	0
09.12.2004	0,0024	0	-0,0125	0,02625	0	0,00412
10.12.2004	0,01156	-0,0337	0,01247	0,00517	0,02941	0,02439
13.12.2004	0,02968	0,02034	0,03252	0,00514	0,01439	0,02381
14.12.2004	-0,0092	0,02649	-0,008	-0,0155	-0,0144	-0,0198
15.12.2004	-0,0055	0,05097	0,00803	0	0,00722	0
16.12.2004	0,02734	-0,0125	0,02372	0,01036	0,01429	0,00399
17.12.2004	0,01762	-0,045	0,08244	0,02041	0,01408	0,01188
20.12.2004	-0,0008	0,03871	-0,0292	0,05884	-0,0356	0,00393
21.12.2004	-0,0123	0,01881	-0,0301	0,07343	0	-0,0099
22.12.2004	0,0198	0	0,02264	-0,0734	-0,0073	0,01961
23.12.2004	-0,0039	-0,0315	0,02214	0,00948	0	0,00966
24.12.2004	0,00437	0,02532	0,00727	0	-0,0221	-0,0097
27.12.2004	0,00216	0,01858	0,00722	-0,0095	0,00372	0
28.12.2004	0,01393	0,01824	0,03534	0,01887	0,01842	0,01923
29.12.2004	0,00144	0	-0,007	0,04567	0	-0,0096
03.01.2005	0,01878	0,01198	0,01389	0,06062	0	0,00957
04.01.2005	-0,016	-0,0426	-0,0139	-0,0342	0,00727	0
06.01.2005	-0,0194	-0,0315	-0,0212	-0,0264	-0,022	-0,0192
07.01.2005	0,02994	0,04389	0,0212	0	0,01471	-0,0196
10.01.2005	0,01164	0,0122	0,03437	-0,009	-0,0147	0,00985
11.01.2005	0,01955	0,00604	0,03323	0	0,0292	0,02899
12.01.2005	0,00615	0	0	-0,0182	0,02837	-0,0096
13.01.2005	0,0084	0,01791	0,02581	0,01818	0,02759	0,00957
14.01.2005	-0,0049	-0,0059	0,05574	-0,0182	-0,0276	-0,0096
17.01.2005	0,01881	0,0177	0	0,07083	0	0,00957
18.01.2005	-0,0019	-0,0237	0,00601	-0,0172	0,01389	0
24.01.2005	-0,0129	-0,012	-0,006	-0,0536	-0,0423	-0,0192
25.01.2005	0,01465	0,00604	0,01198	-0,0092	0,01429	0,0474
26.01.2005	0,00727	0,01198	0,04082	-0,0093	0,00707	-0,0093
27.01.2005	0,00908	-0,006	0,0057	-0,0094	0,04139	0
28.01.2005	-0,0084	-0,012	0,02247	-0,0483	0	-0,0094
31.01.2005	0,00942	0,01205	0	0,02927	0,03323	0,00939
01.02.2005	0,01883	-0,006	0,04349	0,02844	0,01299	0,02765
02.02.2005	0,00311	0,00601	-0,0053	-0,0094	-0,0195	-0,0091

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
03.02.2005	-0,0138	-0,0242	0,02639	0	-0,0199	-0,0185
04.02.2005	0,00933	-0,0062	0,0155	-0,019	-0,0135	0,0093
07.02.2005	0,01387	0,00615	-0,0155	0,02844	0,0202	0,00922
08.02.2005	0,00241	0	-0,0264	-0,0094	0	0
09.02.2005	-0,0266	-0,0062	-0,0382	-0,0287	-0,0202	-0,0374
10.02.2005	-0,008	-0,0187	0,04879	-0,06	0,00678	-0,0096
11.02.2005	0,01553	0	0,01575	0,03545	-0,0136	-0,0097
14.02.2005	0,00959	0,01869	0	-0,005	0,02703	0,05662
15.02.2005	0,00571	-0,0124	-0,0157	0,00499	-0,0067	-0,0185
16.02.2005	-0,018	-0,0189	0	-0,0252	-0,0203	-0,0189
17.02.2005	-0,0242	-0,0128	-0,0268	-0,0154	-0,042	-0,029
18.02.2005	0,01079	-0,0261	0,02681	0,01031	0	0,00976
21.02.2005	-0,0158	-0,0405	-0,0377	-0,0051	-0,0217	-0,0098
22.02.2005	-0,0077	0,0137	-0,0279	-0,0052	-0,0073	-0,0099
23.02.2005	0,00985	0,01351	0	0,01031	0,03611	-0,002
24.02.2005	0,01597	0,03301	0,02786	0,0102	-0,0071	0,02159
25.02.2005	0,02444	0,0129	0,01635	0,03	0	0,00966
28.02.2005	0,01293	0,02532	0	0,0339	0,00712	0,01905
01.03.2005	-0,0224	-0,0253	-0,0274	-0,029	-0,0288	-0,0287
02.03.2005	-0,0197	-0,0392	0	-0,0198	-0,0147	-0,0098
03.03.2005	0,01214	0	0,0274	0,0198	0,01471	0,00976
04.03.2005	0,00378	0,01325	0,01075	0	-0,0073	0
07.03.2005	0,00454	-0,0132	0,01592	0,05716	0,00733	0
08.03.2005	-0,0033	-0,0202	0	-0,0093	-0,0147	0
09.03.2005	0,00173	-0,0068	0,00525	-0,0284	0,00738	-0,0098
10.03.2005	-0,0082	-0,0348	-0,0265	-0,0293	-0,0148	0,02899
11.03.2005	0,00192	0,03485	0,00536	0,01961	0	0,02817
14.03.2005	-0,0233	-0,0069	-0,0437	0	-0,0226	0
15.03.2005	-0,0146	-0,0139	0,00557	0,00966	-0,0154	0,03637
16.03.2005	-0,0469	-0,0356	0	-0,0697	-0,0476	-0,018
17.03.2005	-0,0344	-0,0294	-0,0397	0,01026	-0,0331	-0,0091
18.03.2005	0,03503	0,02941	0,02286	-0,0051	0,01667	-0,0185
21.03.2005	-0,0285	-0,0369	-0,0463	-0,0473	-0,0294	-0,0189
22.03.2005	0,02333	0,01493	0,02339	0,016	0,01688	0
23.03.2005	-0,0314	-0,0225	-0,0353	-0,0488	-0,0384	-0,0568
24.03.2005	0,02542	0,02247	0,0178	0,03279	0,01724	0,04725
25.03.2005	0,01717	0,00738	0,01749	0,00536	0,04594	0,04696
28.03.2005	-0,0262	-0,0606	-0,0353	-0,0271	-0,0123	-0,0374

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
29.03.2005	-0,0147	-0,0237	0,0119	0,00548	-0,0125	0
30.03.2005	0,00494	-0,008	0	0,00545	0,01247	0
31.03.2005	0,03816	0,05492	0,04059	0,02151	0,02045	0,02817
01.04.2005	0,00713	0,03008	0,00567	0,04676	0,02795	-0,0093
04.04.2005	-0,0116	-0,0074	-0,0287	-0,0102	-0,032	-0,0094
05.04.2005	0,00929	0,01482	0,0058	0,01527	0	0,00939
06.04.2005	0,01446	0,02899	0,02849	0	0,00406	-0,0094
07.04.2005	-0,0087	-0,0072	-0,0113	-0,0256	-0,0041	0,00939
08.04.2005	-0,0017	0	0	-0,0104	-0,0164	-0,0094
11.04.2005	-0,0163	-0,0218	0	-0,0373	-0,0294	0
12.04.2005	-0,0116	-0,0148	-0,0057	-0,0164	-0,0259	-0,019
13.04.2005	0,00855	0,02214	0,01136	0,06936	-0,0132	0,00957
14.04.2005	0,00979	-0,0448	-0,0404	-0,0421	-0,0406	-0,0192
15.04.2005	-0,0684	-0,031	-0,0544	-0,0108	-0,052	-0,0498
18.04.2005	-0,0241	-0,0079	-0,0252	0	-0,0652	-0,0248
19.04.2005	0,03618	0,03125	0,0375	0,05806	0,02558	0,03697
20.04.2005	0,00132	0,01527	-0,0312	-0,0366	0,00504	-0,0122
21.04.2005	0,01002	0	0,00631	0,02625	-0,005	0,01619
22.04.2005	0,01267	0	0,00627	0,04558	0,00504	0,01396
25.04.2005	0,00272	0,01504	-0,0063	0,02927	-0,0152	0
26.04.2005	-0,0127	0	-0,0255	-0,0293	-0,0311	-0,0302
27.04.2005	-0,017	-0,015	-0,0195	-0,0251	0,01047	-0,0041
28.04.2005	-0,0231	-0,0076	-0,0199	-0,0309	-0,0317	-0,0207
29.04.2005	0,00306	0,01515	-0,0067	0	-0,0108	0,00418
02.05.2005	0,02765	0,05841	0,03974	0,00522	0,01617	0,03681
03.05.2005	-0,0048	-0,0215	0,01929	-0,0052	0,01592	-0,0121
04.05.2005	0,01734	0,04256	0	0,02073	0,01567	0,00406
05.05.2005	0,02173	0,03413	0,02516	0,04021	0,02558	0,01207
06.05.2005	-0,006	-0,0272	-0,0062	0,00491	-0,0256	-0,004
09.05.2005	-0,01	0	0	0,00976	-0,0157	-0,0244
10.05.2005	-0,0006	0	0,01858	-0,0196	0	-0,0083
11.05.2005	-0,001	-0,0069	-0,0062	-0,01	-0,0053	0,01237
12.05.2005	0,01814	0,00692	0,0304	0,02956	0,03637	0,01222
13.05.2005	0,00838	0,00687	0,00597	0,00966	0	-0,0041
16.05.2005	-0,0161	0	-0,018	-0,0194	-0,0206	-0,0164
17.05.2005	-0,003	-0,0138	-0,0122	-0,0198	-0,0052	-0,0167
18.05.2005	0,01436	0,00692	0,01824	0,02956	0,01558	0,00419
20.05.2005	0,01024	0,02048	0,00601	0	0,01026	0,00833

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
23.05.2005	-0,0456	-0,0772	-0,0491	-0,0296	-0,0364	-0,0252
24.05.2005	-0,0078	-0,0296	-0,0385	-0,0101	-0,0106	-0,0128
25.05.2005	-0,0009	-0,0075	0,01299	0	-0,0216	-0,0087
26.05.2005	-0,0027	0,00755	-0,0261	0,01005	-0,0055	-0,0087
27.05.2005	0,01645	0,02231	0,01967	0,00995	0,01093	0,02598
30.05.2005	0,02123	0,03611	0,02564	0,02927	0,01081	0,01695
31.05.2005	0,0103	0,03485	-0,0063	0,01905	0,016	-0,0042
01.06.2005	-0,0002	0,00683	0	-0,019	-0,0106	-0,017
02.06.2005	0,02227	0,01351	0,0375	0,00957	0,02116	0,02543
03.06.2005	0,00974	0	0,0122	0,02817	0,00522	0
06.06.2005	-0,0201	-0,0411	-0,0308	0,00922	-0,0052	-0,0126
07.06.2005	-0,0022	0	0,01242	-0,0185	0,00522	-0,0042
08.06.2005	0,01177	0,00697	0	0	0	0,00847
09.06.2005	-0,0109	-0,014	-0,0187	-0,0094	-0,0105	-0,0085
10.06.2005	0,0088	0,00702	0,00627	0,00939	0,00525	0
13.06.2005	-0,0045	-0,0141	-0,0126	0	-0,0105	-0,0043
14.06.2005	0,01242	0,00707	0,01258	0	0	0
15.06.2005	0,01072	0,01399	0,00623	0,0093	0,01053	0
16.06.2005	0,01403	0,00692	0,02454	0,01835	0,03599	0,01695
17.06.2005	-0,0019	-0,0069	-0,0122	-0,0277	0,04445	-0,0042
20.06.2005	0,00676	0,01379	0,00612	0	0,00962	0
21.06.2005	0,00139	0	0	-0,0094	0,03294	0,00421
22.06.2005	0,00123	0,02034	-0,0031	0,01869	-0,014	0,00419
23.06.2005	0,00901	0,01333	0,01517	0,00922	0,00935	-0,0042
24.06.2005	0,00044	0,0066	-0,006	-0,0092	0,02299	0
27.06.2005	-0,0162	-0,0199	-0,0308	2,26484	-0,0277	-0,0084
28.06.2005	0,008	0	0,01242	0,00957	0,00466	0,00423
29.06.2005	0,01203	0,02649	0,03637	-2,3026	0,03204	0,02088
30.06.2005	-0,0066	0,00651	0	2,29302	0,02227	0,00823
01.07.2005	0,02417	-0,1317	0,0177	-2,2741	-0,0044	0,02028
04.07.2005	0,00309	0,00738	0,00583	-0,0094	-0,0044	-0,004
05.07.2005	-0,0118	-0,0148	-0,0176	-0,0287	-0,027	0,01202
06.07.2005	0,01464	0,02941	0,0059	0,01923	0,00909	-0,004
07.07.2005	-0,0033	-0,0073	0	0	-0,0091	-0,008
08.07.2005	0,00551	-0,0147	0,02326	0,00948	0,05335	0,01202
11.07.2005	-0,0012	-0,0074	-0,0058	0	0,01717	0
12.07.2005	-0,0043	-0,015	-0,0116	-0,019	-0,0259	0,01581
13.07.2005	0,01337	0,00755	0,00583	0,01905	0,01302	0

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
14.07.2005	0,01552	0,01493	0,03989	0,01869	0,0339	0,00976
15.07.2005	-0,0026	-0,0074	-0,0226	-0,0282	-0,0042	-0,0098
18.07.2005	-0,0009	-0,015	0,0057	0	-0,0966	0,01942
19.07.2005	0,00956	0,02985	0,00567	0,00948	0,01827	-0,0097
20.07.2005	0,00133	0	0,02235	0,01869	-0,0137	0
21.07.2005	0,00966	0	0,03261	-0,0093	0,00458	0,00966
22.07.2005	0,00674	-0,0074	0	0,0093	-0,0046	0
25.07.2005	0,00291	0,05757	0,00267	-0,0187	-0,0092	-0,0097
26.07.2005	-0,0187	-0,0356	-0,0027	-0,019	-0,0187	-0,0098
27.07.2005	0,015	0,03559	0,00533	0,02844	0,01405	0,00976
28.07.2005	0,00609	0,0411	-0,0053	-0,0094	-0,0235	-0,0098
29.07.2005	0,00924	-0,0135	0,03158	-0,0095	0,01418	0,00976
01.08.2005	0,00544	0,01351	-0,0104	0,02817	0	0
02.08.2005	-0,0079	0,00669	-0,0105	0,0274	-0,0142	0,00966
03.08.2005	0,00619	0,00664	0,00528	0,02667	0,00948	0
04.08.2005	0,01325	0,01967	0	0	0,01405	-0,0097
05.08.2005	-0,0059	0	-0,0053	-0,0267	-0,0141	0,00966
08.08.2005	-0,0007	0,03195	0	-0,0182	-0,0047	0
09.08.2005	-0,0075	-0,0127	-0,0106	-0,0185	-0,0048	0,00957
10.08.2005	-0,0006	-0,0324	0,00267	0,0093	-0,0096	-0,029
11.08.2005	-0,0194	-0,0199	-0,0243	-0,0282	-0,0145	-0,0099
12.08.2005	-0,0327	-0,0552	-0,0333	-0,0192	-0,05	-0,018
15.08.2005	-0,0036	0,00707	0	0	-0,0051	-0,0204
16.08.2005	0,00649	0,01399	0,02235	0,0474	0,01026	0
17.08.2005	-0,0125	-0,0282	-0,028	-0,0093	-0,0103	-0,0166
18.08.2005	0,00335	0,00712	0	0	0,00514	-0,0042
19.08.2005	0,01618	0,00707	0,0113	0,04567	0,02532	0,00837
22.08.2005	0,01723	0,01399	0,01117	0,05219	0,01489	0,0083
23.08.2005	0,00826	0,00692	0,00554	-0,0085	-0,0149	0,00412
24.08.2005	0,00617	0,0339	-0,0167	-0,026	-0,005	-0,0083
25.08.2005	0,01493	0,02632	0,02222	0	0,00501	0
26.08.2005	0,00698	-0,0131	0,0271	0,01739	0,01489	0,00414
29.08.2005	-0,0003	-0,0066	0,00533	-0,0174	0	-0,0041
31.08.2005	0,02931	0,05162	0,03142	0,00873	0,04809	0,02459
01.09.2005	0,03309	0,08439	0,01535	0,02575	0,00468	0,02795
02.09.2005	-0,0077	-0,0413	-0,0051	-0,0171	-0,0236	0,00393
05.09.2005	0,00559	0,01791	0,01015	0	0,01425	0
06.09.2005	-0,0015	-0,0179	0,00504	-0,0174	-0,0095	-0,0099

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
07.09.2005	-0,0142	-0,0182	-0,0152	0	-0,0096	-0,014
08.09.2005	0,00319	-0,0062	-0,0051	-0,0088	0	0
09.09.2005	0,02253	0,02439	0,01527	0,0262	0,06514	0,01198
12.09.2005	0,01567	0,01198	-0,0153	0,02553	0,04406	-0,008
13.09.2005	-0,0052	-0,018	-0,0313	-0,0342	-0,0087	-0,0284
14.09.2005	0,0028	0	-0,016	0,04256	0,00866	0
15.09.2005	0,01938	0,04735	0,016	0,04879	0,01285	0,00411
16.09.2005	0,0007	0,02849	-0,016	0	-0,0085	0
19.09.2005	-0,0022	-0,0113	0,02128	0	0,0379	0,00409
20.09.2005	0,01488	0,0113	0,02598	-0,008	0,00823	0,00813
21.09.2005	0,00428	-0,0113	-0,0051	0	-0,0041	0
22.09.2005	-0,0118	-0,0172	-0,0208	-0,0243	-0,0041	-0,0081
23.09.2005	-0,0065	-0,0234	-0,0106	-0,0333	-0,0041	-0,0041
26.09.2005	0,00796	0,02916	0,00531	0,01681	0,00414	0
27.09.2005	-0,0059	0,00573	-0,0053	-0,0339	0	-0,0041
28.09.2005	-0,0174	-0,0231	-0,0215	-0,0351	0,01232	-0,0041
29.09.2005	0,01969	0,02312	0,02151	0,0177	0,0202	0,00412
30.09.2005	-0,0019	0,0226	0	0	0	0,0082
03.10.2005	0,02862	0,03297	0,03656	0,01739	0,03537	-0,0123
04.10.2005	0,03787	0,0475	0,01527	0,08269	0,03416	0,02852
05.10.2005	-0,0241	-0,0421	-0,0465	0	-0,0075	-0,0285
06.10.2005	-0,0371	-0,061	-0,0432	-0,016	-0,0462	-0,0041
07.10.2005	-0,0029	-0,0115	0	0,00803	0,04616	0
10.10.2005	0,00276	0,00576	0	-0,008	0,0369	-0,0042
11.10.2005	0,01582	0,04495	0,00551	0	0,00722	0,00416
12.10.2005	-0,0275	-0,045	-0,045	-0,0412	-0,0366	-0,0125
13.10.2005	-0,0327	-0,0411	-0,0531	-0,0517	-0,0226	-0,0212
14.10.2005	-0,0194	-0,0428	-0,0122	0,0262	-0,0232	0
17.10.2005	0,01298	0,02469	0,02424	0,02553	0,0155	0,01702
18.10.2005	-0,0083	0,00608	-0,0242	0	-0,0233	-0,0042
19.10.2005	-0,0263	-0,0245	-0,0062	-0,0255	-0,0079	-0,0042
20.10.2005	0,0205	0,04256	0,01227	0,01709	0	-0,0085
21.10.2005	0,00079	0	0	-0,0085	-0,016	-0,013
24.10.2005	0,01318	0,02933	0,01212	0,01695	0	-0,0044
25.10.2005	-0,0055	-0,0058	0,00601	-0,0084	0	-0,0044
26.10.2005	-0,0062	-0,0235	0	-0,0258	-0,0122	0,00438
27.10.2005	-0,0064	-0,0241	0	0	-0,0082	0,00436
31.10.2005	0,02184	0,0241	0,0119	0,02575	0,0284	0,02575

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
01.11.2005	0,02557	0,04652	0,0176	0,00844	0,02372	0,00423
07.11.2005	0,03117	0,04445	0,02866	0,00837	0,04581	0,01674
08.11.2005	-0,0024	0	0,01124	-0,0084	0,02214	-0,0125
09.11.2005	0,00292	-0,0054	0,00557	-0,0084	-0,0372	0
10.11.2005	0,02513	0,01626	0,05407	0,01681	0,02247	0,01253
11.11.2005	-0,0178	-0,0217	-0,0106	-0,0253	-0,0225	-0,0167
14.11.2005	0,0022	0	0,01583	0	0,05167	-0,0042
15.11.2005	0,00445	0,01093	0,00522	0,00851	-0,0072	-0,0042
16.11.2005	0,01568	0,00542	0,0155	0,00844	0	0,00847
17.11.2005	0,00745	0,01075	0,00512	0	-0,0073	0,00421
18.11.2005	0,00531	-0,0054	0,00509	0,04116	0	0,00419
21.11.2005	0,0096	0,00536	0,0101	-0,0245	0,00727	0,01247
22.11.2005	-0,0113	0	-0,0306	0,00823	-0,022	-0,0125
23.11.2005	0,0259	0,04701	0,04061	0,04017	0,05757	0,01247
24.11.2005	0,01994	0,06422	0,03423	-0,0159	0	-0,0041
25.11.2005	-0,004	-0,0145	-0,0048	-0,0161	-0,0141	0,01237
28.11.2005	-0,0038	-0,0196	-0,0195	-0,0082	0,00707	0,00816
29.11.2005	0,02358	0,02927	0,01951	0,04017	0,02091	0,0081
30.11.2005	0,0157	0,03774	0	0,03861	-0,0069	-0,0081
01.12.2005	0,00545	0	0,00962	0,02247	-0,0211	0
02.12.2005	0,0072	-0,0093	-0,0096	0,07146	0,01408	-0,0041
05.12.2005	0,01434	0	0,00962	-0,0209	0	0,01619
06.12.2005	-0,0055	-0,0284	0,03294	-0,0071	-0,0141	-0,004
07.12.2005	-0,0123	-0,0097	-0,067	0	0,01408	-0,0163
08.12.2005	0,0038	0,02871	0,01474	-0,0215	0,00697	-0,0041
09.12.2005	-0,0287	-0,0287	-0,0347	-0,0521	-0,0353	0,01633
12.12.2005	0,01865	0,0381	0,03961	0,01515	0,02837	-0,0041
13.12.2005	-0,0121	-0,0284	0	-0,0228	0	-0,0123
14.12.2005	0,00341	0,00957	0,00966	-0,0155	0,00697	0
15.12.2005	-0,0063	0,00948	-0,0194	-0,0078	0,01379	0,00411
16.12.2005	0,00226	-0,019	0,0146	0,02335	0	0,00409
19.12.2005	0,00643	-0,0097	0,01914	0,02281	0,01361	0
20.12.2005	-0,0061	-0,0098	-0,0095	-0,0305	-0,0205	-0,0041
21.12.2005	0,01266	0,02899	0,01896	0	0	0,00409
22.12.2005	0,01668	0,00948	0,01399	-0,0078	0,0137	0
23.12.2005	0,00171	0	0	0,0155	-0,0068	0,00813
26.12.2005	0,00563	0,00939	0,01835	0,01527	0	0
27.12.2005	-0,0032	0	-0,0091	-0,0076	-0,0278	0

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
28.12.2005	0,00522	0	0,00458	0,0076	0	0
29.12.2005	0,01561	0,01852	0,00909	0,01504	0,01399	0,01606
30.12.2005	-0,0015	0,00913	-0,0045	-0,0226	-0,014	0
02.01.2006	-0,0154	-0,0091	-0,0137	-0,0154	0	0,02557
03.01.2006	0,03745	0,04485	0,03175	0,02299	0,02091	0
04.01.2006	0,017	0,00873	-0,0045	0,01504	0,0537	0,00966
05.01.2006	0,00866	0	0,05241	-0,0075	-0,0132	0,00957
06.01.2006	0,00438	0,00866	-0,0043	0,01493	0,0066	-0,029
16.01.2006	0,0403	0,07472	0,02114	0,01471	0,01954	0,00976
17.01.2006	0,01022	0	0,05297	0,02166	0,01282	-0,0098
18.01.2006	-0,0335	-0,008	-0,0323	-0,0217	-0,0193	-0,0441
19.01.2006	0,0237	0,00803	0,04017	0,01449	0,05064	0,03226
20.01.2006	0,01862	0	0,00393	0,02135	0,08289	0,00198
23.01.2006	-0,0139	-0,0325	0	-0,0071	0,03352	-0,014
24.01.2006	0,01321	0,02449	0,01942	-0,0143	0,08426	0,00401
25.01.2006	0,02909	0,016	0,03774	0	0	0,02956
26.01.2006	0,00083	-0,008	0,01835	0,02837	0,01005	0,0381
27.01.2006	-0,0103	-0,0325	-0,037	0,00697	0,02469	0,0093
30.01.2006	-0,0094	-0,0251	-0,0095	0	0,00487	-0,0187
31.01.2006	-0,0067	-0,0258	0	0,01379	0,01923	-0,0095
01.02.2006	0,0147	0,03419	0,02817	0,09157	0,01887	0,01887
02.02.2006	-0,0172	-0,0084	-0,0282	-0,0189	-0,0094	0,02765
03.02.2006	-0,0057	-0,0258	-0,0192	0,01893	-0,0143	0,00905
06.02.2006	0,01409	0,01724	0,05662	0,03077	0,00477	0
07.02.2006	-0,0045	0,00851	0,00913	0,05311	-0,0241	-0,009
08.02.2006	-0,0183	-0,0345	-0,0091	-0,0292	0	-0,037
09.02.2006	0,00625	0,00873	0,02715	-0,0119	0,00487	0
10.02.2006	0,01475	0,04256	0,07729	0,02367	-0,0098	0,01869
13.02.2006	-0,0164	-0,0253	-0,0167	-0,0479	-0,0049	-0,0187
14.02.2006	-0,0123	-0,0172	0,00837	-0,0123	0,0339	-0,0095
15.02.2006	0,00679	0,01724	0,01653	0	-0,0048	0,00948
16.02.2006	0,03494	0,04185	0,04801	0,02454	0,01425	0,03704
17.02.2006	0,01928	0,04017	0,02317	0,02985	0,03704	0,04445
20.02.2006	0,00957	0,00784	0,01515	0,05159	0,01354	0
21.02.2006	0,00047	0,0155	0,00749	-0,0226	0	-0,0087
22.02.2006	-0,0096	-0,0155	0	0,01136	-0,0045	-0,0088
23.02.2006	0,00621	0	0,02214	-0,0114	0,00897	0,0262
24.02.2006	0,00705	0,03077	0,01449	0	-0,0135	0,00858

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
27.02.2006	0,01787	0,04445	0,06947	-0,0115	0,00901	0,01695
28.02.2006	-0,015	-0,0294	-0,0623	0,00576	-0,0181	-0,0342
01.03.2006	0,0101	0,00372	0,03509	-0,0116	0,00456	0,00866
02.03.2006	-0,0128	-0,0188	-0,0351	-0,0117	0	-0,0262
03.03.2006	-0,0113	-0,0153	-0,0513	0	0,01354	-0,0089
06.03.2006	-0,008	-0,0155	-0,0152	-0,0059	-0,0135	-0,009
07.03.2006	-0,0469	-0,0398	-0,0549	-0,0485	-0,0513	-0,0367
08.03.2006	-0,0359	-0,05	-0,0496	-0,0062	-0,0048	-0,0479
09.03.2006	0,01228	-0,0172	-0,0085	0,00623	0,05153	0,01942
10.03.2006	-0,008	0	0,02532	-0,0125	0,0181	-0,0097
13.03.2006	0,042	0,04256	0,0567	0,02485	0,00447	0,02871
14.03.2006	-0,033	-0,0339	-0,0079	-0,0123	-0,009	-0,0287
15.03.2006	-0,0157	0,00858	0,00791	-0,0062	0,01786	0,00966
16.03.2006	0,04207	0,03362	0,00784	0	0,0433	0,00957
17.03.2006	0,01435	0,04049	0,0155	0,01242	-0,0042	0
20.03.2006	-0,0059	-0,0241	-0,0233	0,00615	0,01688	0,00948
21.03.2006	-0,0006	0	0	0	-0,0042	0,02791
22.03.2006	-0,0016	0	0	-0,0123	0,00419	0,00913
23.03.2006	0,00456	-0,0164	0	-0,0062	-0,0126	0
24.03.2006	-0,0286	-0,0336	-0,0484	0	-0,0389	-0,0091
27.03.2006	-0,0131	-0,0086	0,00823	-0,0253	-0,0497	0
28.03.2006	-0,0229	-0,0441	-0,0333	-0,026	-0,0329	-0,0374
29.03.2006	0,01816	0	0,00844	0,09411	0,01896	0,03739
30.03.2006	0,01017	0,01786	0,00837	0,0178	-0,0047	0,00913
31.03.2006	-0,0007	0	0,02469	-0,0178	0,00471	0,00905
03.04.2006	0,0257	0,0601	0,04763	0,00597	0,01399	0,00897
04.04.2006	0,00097	-0,0168	0	0,0177	-0,014	0
05.04.2006	0,0004	-0,0258	-0,0078	-0,0418	0,01861	0,0177
06.04.2006	-0,0086	0,00866	0,00778	-0,0247	-0,0186	0,00873
07.04.2006	0,01304	0,02553	0,01538	0,00623	0,03234	0,00866
10.04.2006	-0,0271	-0,0342	-0,0549	-0,0125	-0,0183	-0,0351
11.04.2006	-0,0049	-0,0175	0,00803	-0,0063	0,01379	-0,018
12.04.2006	-0,009	0,00881	-0,0161	0,00631	0,0181	-0,0091
13.04.2006	-0,0139	-0,0357	-0,0331	0	-0,0273	-0,0762
14.04.2006	0,00696	-0,0091	0,01667	-0,0127	0	0,00198
17.04.2006	-0,0084	-0,0185	-0,0167	-0,0193	-0,0139	-0,0159
18.04.2006	0,02371	0,0367	0,04116	0,04445	0,0231	0,01988
19.04.2006	0,02004	0,01786	0,016	0,03659	0,00456	0,00393

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
20.04.2006	0,0032	0,01754	-0,008	0,0119	-0,0091	0,00976
21.04.2006	0,02705	0,01724	0,06204	0,03489	0,00458	0
24.04.2006	0,00448	0,01695	0,01493	0	-0,0138	-0,0196
25.04.2006	0,00164	0	-0,0074	-0,0057	0,00462	0
26.04.2006	-0,0135	-0,0255	-0,0226	0,01709	-0,0328	-0,01
27.04.2006	-0,0225	-0,0262	-0,0469	0,02235	0,00475	-0,0408
28.04.2006	0,00293	-0,0269	0,00797	0,01644	0,00473	-0,0042
01.05.2006	0,00341	0,00905	0	-0,022	0,00471	-0,0211
02.05.2006	0,00867	0,00897	0,03892	0	0	0
03.05.2006	0,00526	0,0177	0,02264	0,00554	-0,0047	-0,0043
04.05.2006	-0,0089	-0,0357	0,05799	-0,0111	-0,0095	-0,0043
05.05.2006	-0,0009	-0,0091	-0,0142	0	0	0,01709
08.05.2006	0,01125	0,01818	-0,0072	-0,1122	0,03279	0,03743
09.05.2006	-0,0034	0,00897	0	0,00623	-0,0046	0,00407
10.05.2006	0,02298	-0,0364	-0,0292	-0,0252	-0,0046	-0,0205
11.05.2006	-0,0422	-0,0093	0,01471	0,00635	0,00464	0
12.05.2006	-0,0407	-0,0577	-0,068	-0,0192	-0,0426	-0,0295
15.05.2006	-0,0414	-0,0404	-0,0729	-0,0328	-0,0804	-0,0847
16.05.2006	0,01907	0,02041	0,0249	0,01325	0,06093	0,03204
17.05.2006	-0,0148	-0,0308	-0,0333	-0,0132	-0,03	-0,009
18.05.2006	-0,0199	0	-0,0345	0	-0,0051	-0,0277
22.05.2006	-0,0867	-0,1042	-0,1015	-0,1128	-0,1365	-0,0577
23.05.2006	0,02415	0,05619	0,02871	0,02214	0,07869	0
24.05.2006	-0,0311	-0,0333	-0,0385	-0,0758	-0,0274	-0,0404
25.05.2006	0,01729	0,02235	0,02899	0,00784	0,04879	-0,0052
26.05.2006	0,04948	0,05378	0,03739	0,04581	0,03125	0,01031
29.05.2006	0,03351	0,02073	0	0	-0,0051	0,06454
30.05.2006	-0,0527	-0,0313	-0,047	0,00372	-0,0052	-0,0342
31.05.2006	0,00714	-0,0053	0,00957	-0,034	0	0,01482
01.06.2006	0,00687	-0,0107	-0,0192	-0,0155	0	-0,0248
02.06.2006	0,02293	0,02653	0,05662	0,04581	0,02558	0,01
05.06.2006	-0,0342	-0,0428	-0,0664	-0,0616	-0,0256	-0,0354
06.06.2006	-0,0132	-0,0277	-0,0099	-0,0323	0,01542	-0,0156
07.06.2006	-0,0204	-0,0401	-0,01	0	-0,0417	-0,0212
08.06.2006	-0,0381	-0,2589	-0,004	-0,0165	-0,0352	-0,0437
09.06.2006	-0,0153	-0,0386	-0,006	-0,0513	-0,0308	-0,0341
12.06.2006	-0,0137	-0,0079	-0,0061	0,01739	-0,0829	-0,0175
13.06.2006	-0,0584	-0,0656	-0,0848	-0,0351	-0,0703	-0,0482

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
14.06.2006	0,01548	0,0496	-0,0044	0,00889	-0,0133	0
15.06.2006	0,02218	0,016	0,03494	0,0848	0,06496	0,02439
16.06.2006	0,01243	0,0837	0,00855	0,01613	0,04909	-0,0182
19.06.2006	0,02207	0,07723	0,02521	-0,0161	0,04106	0
20.06.2006	-0,0059	0,03323	-0,0125	0	-0,0058	-0,0248
21.06.2006	-0,0246	-0,0888	-0,0255	-0,0415	-0,0234	-0,0063
22.06.2006	0,01374	0,02817	0,06265	0,01681	0,02339	-0,0192
23.06.2006	-0,0326	-0,0572	0,02004	-0,069	-0,0353	-0,0462
26.06.2006	-0,0363	-0,0375	0,01183	-0,0741	-0,0304	-0,0344
27.06.2006	0,01614	0,06645	0,05716	0,05609	0,0599	0,06759
28.06.2006	0,02243	0,00712	0,0274	0	0,06744	0,03216
29.06.2006	0,02451	0,04845	0	0,02691	0,05806	0,01258
30.06.2006	0,04094	0,02667	0,05264	0,1168	0,05972	0,07812
03.07.2006	8,9E-05	0,01954	-0,0172	-0,0079	-0,0294	0,05072
04.07.2006	0,02849	0,04417	0,05086	0,03125	0,00496	0,01093
05.07.2006	-0,0305	-0,0377	-0,0251	-0,0233	-0,02	-0,0054
06.07.2006	0,00883	0,00639	0,01681	0,02335	0,00504	0,01626
07.07.2006	0,01401	-0,0128	0,0083	-0,0155	-0,0152	0,03175
10.07.2006	-0,0015	0	-0,0083	0,02317	0,00509	0,01036
11.07.2006	-0,0053	0,01282	0,0083	-0,0389	-0,0257	0,01026
12.07.2006	-0,0039	0,01266	-0,0336	-0,0241	-0,0317	-0,0051
13.07.2006	-0,0227	-0,0127	0	-0,0331	-0,0272	-0,0207
14.07.2006	-0,0342	-0,0934	-0,0893	0	-0,0055	-0,0052
17.07.2006	-0,0339	-0,0502	-0,0094	-0,0517	-0,0572	-0,0053
18.07.2006	0,0276	0,0146	0,03704	0,05174	0,02899	0,01575
19.07.2006	-0,0019	-0,0146	0,00905	-0,0084	-0,0057	0,0026
20.07.2006	0,05103	0,05019	0,10265	0,0656	0,06669	0,0129
21.07.2006	-0,0092	-0,0141	-0,0247	0	-0,0108	-0,0051
24.07.2006	-0,0009	0	0,02469	-0,0405	-0,0054	-0,0156
25.07.2006	-0,0802	0,00707	-0,0164	0,00823	0,04279	-0,0052
26.07.2006	0,10912	0,02778	0,02449	0,03226	0,01558	0,01567
27.07.2006	0,02098	0,03367	0,00803	0,02353	0,01535	0
28.07.2006	-0,0177	-0,0337	-0,0243	-0,0476	0,0201	-0,0052
31.07.2006	-0,0009	-0,0138	0,00816	-0,0164	0,00496	-0,0157
01.08.2006	-0,0091	-0,0211	-0,0164	0	-0,0251	0,00528
02.08.2006	-0,0006	-0,0143	0	-0,0083	-0,0309	0,00525
03.08.2006	-0,0129	-0,0072	0,00823	-0,0253	-0,0052	0,00522
04.08.2006	0,02511	0,02857	0,01626	0,02532	0,00525	0,0155

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
07.08.2006	-0,0053	-0,0142	-0,0163	0	-0,0212	-0,0155
08.08.2006	0,01567	0,02817	0,03226	-0,0084	-0,0054	0,01036
09.08.2006	0,02774	0,06714	0,01575	0,04919	0,02128	0,04041
10.08.2006	-0,0046	-0,0131	-0,0078	0,02372	0,01047	0,00494
11.08.2006	0,00077	0,01307	-0,032	0,02317	0,01036	-0,0149
14.08.2006	0,00568	0	0	0,03008	0,00514	-0,0305
15.08.2006	0,00465	0,0129	0,01613	-0,0074	0,03774	-0,0052
16.08.2006	0,01645	0,00639	0,00797	0,07197	-0,0174	0,01542
17.08.2006	-0,0144	-0,0128	-0,0405	-0,007	0,01	-0,0154
18.08.2006	-0,0133	-0,0065	-0,0083	-0,0284	0,00496	-0,0104
21.08.2006	-0,0059	-0,0065	0,01653	-0,0145	-0,005	0,00522
22.08.2006	-0,0007	-0,0066	0	0,00727	-0,01	-0,0052
23.08.2006	-0,0005	0,00263	-0,0082	0,01439	-0,005	0,00522
24.08.2006	-0,0128	0,00393	0,0033	-0,0217	-0,0102	0,0026
25.08.2006	0,00572	0,02581	-0,0033	0,00727	-0,0051	0
28.08.2006	-0,0048	-0,0193	0,00823	-0,0146	0	0,00259
29.08.2006	0,00572	0,01929	0,00816	0,03611	0,01527	0,00517
31.08.2006	-0,165	0,02516	0,01613	0,00354	0,01005	-0,0052
01.09.2006	0,00411	0,00619	-0,0243	-0,0035	-0,0101	0,00517
04.09.2006	0,19396	0,03637	0,00816	0,01408	0,07303	0,00514
05.09.2006	0,00107	0	-0,0082	-0,0141	-0,0047	-0,0051
06.09.2006	-0,0129	-0,018	-0,0082	0,00707	0,00471	-0,0052
07.09.2006	-0,0062	0	0,01639	0,00702	0,03234	-0,0052
08.09.2006	-0,0028	-0,0122	-0,0331	0,02759	0,0113	-0,0052
11.09.2006	-0,0048	0,00612	0	0,00678	-0,0113	0
12.09.2006	0,01208	0	0,01667	0,01675	-0,0046	0,00261
13.09.2006	0,00398	0,00608	0	-0,01	0,02257	0,0078
14.09.2006	-0,1823	-0,0245	-0,0167	-0,0411	-0,018	-0,0052
15.09.2006	0,19206	0,03659	0,00837	0,02076	-0,0046	0,01036
18.09.2006	0,00267	-0,006	0,01653	-0,0138	-0,0231	-0,0104
19.09.2006	0,00259	-0,006	0,02429	0,06714	-0,0047	0
20.09.2006	-0,0018	-0,0245	0,00797	-0,0263	0,00468	0,00519
21.09.2006	-0,0127	-0,0062	-0,0323	-0,027	-0,0284	-0,0209
22.09.2006	-0,0378	-0,0382	-0,0418	-0,0069	-0,0697	-0,0544
25.09.2006	-0,0084	-0,033	-0,0086	0,00687	0,00514	0
26.09.2006	0,0096	0,01993	0,01709	0,00683	0,00512	-0,0112
27.09.2006	0,01055	0,02598	0	0,00678	0,04001	-0,0057
28.09.2006	0,01213	0,01905	0,02511	0,01342	0,00489	0,0113

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
29.09.2006	-0,00926	-0,0255	-0,0336	0,01325	0,01212	-0,0056
02.10.2006	0,001597	0,00643	0,01695	0,02598	-0,0073	0,01124
03.10.2006	-0,00416	0	0,00837	-0,0064	0,01446	0,00557
04.10.2006	-0,01204	-0,0326	-0,0253	0,01282	-0,0096	-0,0513
05.10.2006	0,014396	0,01967	0,01695	-0,0128	0,00482	0,04012
06.10.2006	-0,00488	-0,0131	-0,0255	0,02548	0,02375	0,0056
09.10.2006	0,004028	0,01307	0,00858	0,04909	0,03234	-0,0226
10.10.2006	0,015157	0,02564	0,00851	0,02367	0,02691	0,0057
11.10.2006	0,005622	0,00631	-0,0085	-0,0237	0,01754	-0,0057
12.10.2006	0,017283	0,01869	0,04185	0,0178	-0,0087	0,017
13.10.2006	0,004405	0,02439	-0,0082	-0,0118	0,03024	0,0056
16.10.2006	0,013212	0,00601	0,00823	0,00297	0,04167	0,04906
17.10.2006	-0,01397	-0,0242	-0,0333	-0,0455	-0,0248	-0,0435
18.10.2006	0,03292	0,03021	0,01681	0,01235	0,03697	0,03815
19.10.2006	0,002014	-0,006	0,03279	-0,0123	-0,0204	-0,0054
20.10.2006	-0,00453	-0,0181	-0,0245	-0,0125	0,00206	0,016
26.10.2006	0,023614	0,00608	0,06402	0,03704	0,01427	0,00528
27.10.2006	0,20212	0,00604	0,00772	0,00604	-0,0122	0
30.10.2006	-0,21476	-0,0182	-0,0392	-0,0121	-0,0207	-0,0213
31.10.2006	0,012418	0,01824	0	0,0241	0,00833	0,03694
01.11.2006	0,00048	0,00601	0,00797	-0,018	-0,0083	0,01031
02.11.2006	-0,02741	-0,0181	-0,7554	-0,0434	0,00418	-0,026
03.11.2006	-0,00515	-0,0123	-0,0344	-0,0256	0,00416	0,01567
06.11.2006	0,009491	0,01835	0,05444	0,01929	0,00414	0,03061
07.11.2006	0,012221	0,02395	0,03258	0,00635	0,05233	-0,0101
08.11.2006	-0,01069	0,0059	0,00639	0	-0,0278	0,03
09.11.2006	-0,02154	0,02326	-0,0128	0,00631	0,00402	0,01951
10.11.2006	0,018777	-0,0351	-0,013	0,00627	0,008	0,00482
13.11.2006	-0,01518	-0,018	-0,04	-0,0126	0,01581	-0,0569
14.11.2006	0,015882	0,01802	0,01351	0,00631	0,00976	0,01765
15.11.2006	0,000025	-0,012	0	0	-0,0396	-0,0151
16.11.2006	-0,00978	0	0,00335	-0,0255	-0,0476	-0,0102
17.11.2006	-0,0215	-0,0368	-0,0445	-0,0065	0,02511	-0,0313
20.11.2006	-0,00225	-0,0063	-0,0141	-0,0263	0,03252	0,01053
21.11.2006	0,004022	0,03096	-0,0215	0,00664	-0,008	0
22.11.2006	-0,02014	-0,0373	-0,0445	-0,0268	-0,0328	-0,0212
23.11.2006	0,009061	0,01881	0,00378	0,00678	0,00416	0,00533
24.11.2006	-0,01308	-0,0188	-0,0663	-0,0344	-0,0125	-0,027

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
27.11.2006	0,01732	0,04335	0,02391	0,02076	0,01253	0,01087
28.11.2006	-0,028	-0,0245	-0,0279	0,04027	-0,0167	-0,0274
29.11.2006	0,02347	0,02454	0,02795	0,00656	0,0084	0,0274
30.11.2006	0,00267	-0,0122	0,00393	0,00651	0,045	-0,0109
01.12.2006	0,00073	0,00612	-0,0118	0,00647	0,00995	0,00545
04.12.2006	-0,0143	-0,0061	-0,0323	0,00643	-0,02	-0,022
05.12.2006	0,01341	0,02424	0,02028	0,03155	0,03377	0,01105
06.12.2006	0,00057	-0,006	0,02772	-0,0062	0,00584	-0,0279
07.12.2006	0,04288	0,0413	0,06062	-0,0126	-0,0098	0,03334
08.12.2006	-0,0136	-0,0116	-0,0451	-0,0063	0,00976	-0,011
11.12.2006	0,00359	0,00583	0,01905	0,02516	-0,0098	0,01099
12.12.2006	-0,0063	-0,0117	-0,0346	-0,0031	0,00976	-0,011
13.12.2006	-0,0087	-0,0299	-0,0078	-0,0479	0,00388	0,00551
14.12.2006	0,01836	0,01802	0,03861	0,03216	-0,0136	0,00548
15.12.2006	0,01527	0,02353	0,00755	0,04335	0,00976	0,02696
18.12.2006	-0,0093	-0,0058	-0,0152	0,00604	-0,0336	0,02625
19.12.2006	-0,0193	-0,0118	-0,0232	0,00601	0,00201	-0,0316
20.12.2006	-0,0019	-0,0119	0,00778	0,00597	-0,0264	-0,0054
21.12.2006	0,00221	0,0178	-0,0235	-0,012	-0,0083	-0,0054
22.12.2006	0,00249	-0,0059	-0,008	0,03551	0,00414	0,00539
25.12.2006	-0,0122	0,0059	-0,0747	0,051	-0,0083	-0,0108
26.12.2006	0,00158	0,00587	-0,0218	0,00551	0	0,01081
27.12.2006	-0,004	-0,0118	-0,0405	0,05349	-0,0042	-0,0163
28.12.2006	0,01357	0,01176	0,02268	-0,0211	0,00833	0,01626
29.12.2006	-0,0005	0,00583	0,00893	-0,027	0,01646	-0,0108
04.01.2007	-0,0028	0	-0,0225	-0,0504	-0,0123	-0,0109
05.01.2007	-0,0147	-0,0176	-0,0323	0,00573	-0,0083	-0,0279
08.01.2007	-0,0158	-0,0119	-0,0334	-0,0115	-0,0084	-0,0287
09.01.2007	-0,02	-0,006	-0,0246	-0,0353	-0,0042	-0,0117
10.01.2007	-0,0123	-0,006	-0,0303	-0,012	0,01258	0
11.01.2007	0,02721	0,03572	0,03527	0,02985	0,0083	0,0117
12.01.2007	0,01314	0,01163	0,02445	0,05716	0,02045	0,0029
15.01.2007	0,02345	0,03967	0,02387	0,00554	0,00806	0,00866
16.01.2007	-0,004	-0,0112	-0,019	-0,0055	0,04323	-0,0116
17.01.2007	0,00844	0,01117	0,02375	-0,0112	-0,0097	0,0029
18.01.2007	0,02613	0,02198	0,03687	0,0056	0,06575	0,03699
19.01.2007	0,00111	-0,0054	-0,0137	0,01111	0,00905	-0,0112
22.01.2007	0,0232	0,04279	0,04923	0,01099	0,02667	0,02786

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
23.01.2007	0,0000761	0,01558	0,0087	-0,011	-0,0357	-0,0166
24.01.2007	0,018862	-0,0104	0,04238	0,02186	0	-0,0056
25.01.2007	0,002071	-0,0211	0,06038	-0,0219	0,00905	0,01671
26.01.2007	-0,006581	-0,0379	0,00778	-0,0167	-0,0182	-0,0167
29.01.2007	-0,010788	-0,0167	-0,0599	-0,0113	-0,0279	-0,017
30.01.2007	-0,000964	0,01671	-0,0083	0,02247	0,00939	-0,0115
31.01.2007	-0,004239	-0,0055	-0,0167	0,0274	0,0093	0,01149
01.02.2007	0,026819	0,0274	0,0534	0,01075	0,00922	0,01136
02.02.2007	0,01898	0,01075	0,02372	0,01064	0,07083	-0,0057
05.02.2007	-0,009603	0,01592	-0,0237	-0,0656	-0,0172	0,06062
06.02.2007	-0,004673	0,01047	0	0,01124	-0,0264	-0,0326
07.02.2007	-0,009513	-0,0157	-0,0121	-0,0056	0,00889	-0,0111
08.02.2007	-0,010838	-0,016	-0,067	0,00281	0,00177	-0,0169
09.02.2007	0,012889	0,00536	0,02564	-0,0028	-0,0018	0,03352
12.02.2007	-0,00379	0	-0,0127	0,0056	-0,0546	-0,011
13.02.2007	0,012431	0,01592	0,00426	0,04372	0,01852	0,01105
14.02.2007	0,016426	0,02598	0,00847	-0,0054	0,03604	0,02174
15.02.2007	0,012804	0,0102	0	-0,0054	0,03479	0,03175
16.02.2007	-0,00406	0	-0,0085	0,01075	-0,026	-0,0052
19.02.2007	0,014035	0,0201	-0,0043	0,01592	-0,0088	0,02073
20.02.2007	-0,004336	-0,005	-0,0043	-0,0213	-0,0546	-0,026
21.02.2007	-0,02698	0,00499	-0,0305	0,00536	-0,0094	-0,0321
22.02.2007	0,021693	0,0099	0,03479	0	0,02791	0,02151
23.02.2007	-0,005431	-0,0249	0	0,01064	0,01818	0
26.02.2007	0,003322	-0,0102	0,02948	-0,0106	0,00897	-0,0107
27.02.2007	-0,045916	-0,0311	-0,0555	-0,0493	-0,0551	-0,061
28.02.2007	-0,008245	-0,0213	0,00438	-0,0113	-0,0095	0
01.03.2007	-0,045497	-0,0217	-0,0584	-0,023	-0,0096	-0,0649
02.03.2007	0,024012	0,02174	0,00462	0,02299	0,01905	0,01212
05.03.2007	-0,020453	-0,044	-0,028	-0,0645	-0,0095	-0,0121
06.03.2007	0,012541	-0,0056	0,01878	0,01802	0	0,01813
07.03.2007	0,004359	0	0,01386	0,01183	0,00948	0,0119
08.03.2007	0,024455	0,02786	0,02268	0,0117	0,00939	0,03489
09.03.2007	0,015563	0,00548	0,00447	0,03429	0,00373	0
12.03.2007	-0,001856	-0,0055	-0,0226	-0,017	-0,0226	-0,0231
13.03.2007	-0,007469	-0,011	-0,0231	-0,0231	-0,0096	-0,0297
14.03.2007	-0,028337	-0,0282	-0,0141	-0,0418	-0,0194	-0,0306
15.03.2007	0,016974	0,0226	0,01412	0,0241	0,02899	0,01235

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
16.03.2007	0,01505	0,01662	0,0367	0,01183	0,00948	0,01824
19.03.2007	0,00244	0	0,00897	0,0117	-0,0287	0,01198
20.03.2007	-0,0025	0,00548	0,00445	-0,0058	0,00966	0,00297
21.03.2007	0,01429	0	0,00443	0	0	0,00886
22.03.2007	0,01916	0,01087	0,03479	0,02312	-0,0097	0
23.03.2007	0,0039	0,02139	0,00851	0,0057	0,05662	-0,0118
26.03.2007	-0,0267	0,00528	-0,0128	0,04987	0	0,0177
27.03.2007	0,01953	0,00525	-0,0217	-0,0219	-0,0279	0,01163
28.03.2007	-0,0004	-0,0319	-0,0132	-0,0167	-0,0287	0,00289
29.03.2007	0,01353	0,02139	0,03064	0,01117	0,00966	0,00288
30.03.2007	-0,0001	-0,016	0,0043	-0,0056	0,01905	0,01709
02.04.2007	-0,0027	-0,0054	0	0,0221	-0,0287	-0,0114
03.04.2007	0,01746	0,01609	0,05835	-0,011	0,02871	0,01136
04.04.2007	0,0079	-0,0053	-0,0041	-0,0055	0,00939	0,00282
05.04.2007	0,02331	0,03158	0,04763	0,01653	0,01852	0,00842
06.04.2007	0,00287	0,01031	0,00772	-0,0055	-0,0279	0,00557
09.04.2007	0,00096	-0,0103	0	0,00548	0,00939	-0,0056
10.04.2007	-0,0572	-0,0052	-0,0313	-0,0165	-0,0094	-0,0112
11.04.2007	0,06187	0,01036	0,00791	0,00554	0,00939	0,03334
12.04.2007	-0,0118	0,00514	-0,0079	-0,0337	0	0,01087
13.04.2007	0,01044	-0,0103	0,00791	0,01136	0,0093	0,01075
16.04.2007	0,01408	0,01542	0,03101	0,00563	0,11366	-0,0162
17.04.2007	-0,0016	-0,0051	0,01515	-0,0056	-0,0336	-0,0054
18.04.2007	-0,0214	-0,0103	-0,0228	-0,0114	-0,0172	-0,0165
19.04.2007	0,01466	0,01031	0,03031	-0,0057	0,02575	-0,0056
20.04.2007	0,02237	0,03031	0,03663	0,01709	0,05763	0,03297
24.04.2007	-0,0072	-0,01	-0,0292	-0,0229	-0,0161	0,04233
25.04.2007	0,02142	0,02971	0,0292	0,03409	0,03985	0,01031
26.04.2007	-0,0043	0,01453	-0,0218	-0,0169	-0,0317	-0,0155
27.04.2007	-0,0204	-0,0097	-0,0074	-0,023	0	-0,0264
30.04.2007	-0,0409	-0,0296	-0,0377	-0,0599	-0,0245	-0,0721
01.05.2007	-0,0329	-0,0408	-0,0313	-0,025	-0,0167	-0,0174
02.05.2007	0,01656	-0,0157	0,00791	0,025	0,04116	0,03449
03.05.2007	0,01839	-0,0053	0,00784	0,01835	0,00803	0,01124
04.05.2007	-0,0058	-0,0215	0	0	-0,008	0,00279
07.05.2007	-0,0031	-0,0054	0,00778	0,00604	-0,0163	-0,0084
08.05.2007	0,00059	0	-0,0078	-0,0306	-0,0165	-0,0056
09.05.2007	0,0088	0,00545	0,00778	0,01235	0,01653	-0,0114

APPENDIX-1 TABLE OF RETURN ON STOCKS AND ISE 100 INDEX (DAILY)

Date	Index100	Akbank	Dohol	Migros	Toasa	Vestel
10.05.2007	-0,001	-0,0109	-0,0078	-0,0062	-0,0249	0,0057
11.05.2007	-0,0052	0,00548	0,03832	-0,0187	-0,0255	0,00567
14.05.2007	0,00715	0	0,02231	0,0125	-0,0262	0
15.05.2007	-0,0054	0	0,00733	-0,0062	-0,0089	-0,0057
16.05.2007	0,0142	0,01087	0,01449	0,01242	0,05219	0,02247
17.05.2007	0,00701	0	0,00359	0,01227	0,01681	0,01105
18.05.2007	0,00464	-0,0054	0,0107	0,01212	0,0083	-0,0055
21.05.2007	0,00294	-0,0054	0,00707	0,08651	-0,1418	-0,0055
22.05.2007	0,00346	0,00545	0,00351	0,01644	0,13353	-0,0112
23.05.2007	0,0012	0,01081	-0,0035	0,05292	0,04879	0,0056
24.05.2007	-0,0041	-0,0054	0	0,00514	0,03892	-0,0169
25.05.2007	-0,0009	0,00539	0,00702	0,01527	0,0076	0,00567
28.05.2007	0,01575	0,016	0,01389	-0,0465	-0,0153	0,00563
29.05.2007	0,0016	-0,0106	-0,0069	-0,0106	-0,0077	-0,0113
30.05.2007	-0,0156	-0,0216	-0,007	-0,0162	-0,0395	-0,0114
31.05.2007	0,01728	0,01087	0,00697	0,02681	0,016	0,01143
01.06.2007	-0,0126	-0,0163	0,00692	-0,016	-0,016	-0,0114
04.06.2007	-0,0082	0	-0,0209	0,00536	-0,0245	-0,0471
05.06.2007	0,00736	0,01093	-0,0071	-0,0162	0,02449	0
06.06.2007	-0,0128	-0,0164	-0,0215	0,01617	-0,0081	-0,0182
07.06.2007	-0,0224	-0,0223	-0,022	-0,0108	-0,0082	-0,0123
08.06.2007	-0,0115	-0,0057	0	-0,0054	0	-0,0188
11.06.2007	0,01258	0,03352	0,00738	0,02681	0	0,00631
12.06.2007	-0,0117	-0,0166	-0,0223	-0,0053	-0,0249	-0,032
13.06.2007	0,00579	0,01111	0,00749	0,04167	-0,0084	0,00647
14.06.2007	0,00103	0	0,00372	0,02519	0,00844	-0,0065
15.06.2007	0,0286	0,02186	0,03291	0,01482	0,00837	0,01929
18.06.2007	0,00857	-0,0054	0,00717	0,03374	0,04082	0,01893
19.06.2007	-0,0029	0,01081	-0,0217	-0,0337	-0,008	-0,0189
20.06.2007	0,00042	-0,0054	-0,0073	0,00489	-0,0163	0,00635
21.06.2007	-0,0065	-0,0163	-0,0074	-0,0049	0,03226	-0,0192
22.06.2007	-0,0054	-0,0166	-0,0149	0,02899	0,01575	-0,0065
25.06.2007	-0,0063	-0,0169	-0,0305	0,01887	-0,0237	-0,0065
26.06.2007	0,01297	0,0169	0,02299	-0,0047	0,00797	0,01942
27.06.2007	-0,0186	-0,0112	-0,0308	-0,0142	-0,0488	-0,0194
28.06.2007	0,02233	-0,1994	0,03832	0,00948	0,03279	0,01299
29.06.2007	0,01956	0,00687	-0,0075	0,03704	0,02391	0,01282

APPENDIX-2 TABLE OF RETURN ON STOCKS (MONTHLY)

Date	Akbank	Dohol	Migros	Toasa	Vestel
31.01.2004	-0,1156	-0,0561	-0,092	-0,1774	-0,0678
29.02.2004	0,0692	0,2277	-0,0137	0,1569	0,0273
29.03.2004	0,0396	0,0242	0,1667	0,1102	0,0442
26.04.2004	-0,0571	-0,1732	-0,1548	-0,0229	-0,2119
31.05.2004	-0,0682	-0,0476	-0,0099	-0,2031	-0,0161
28.06.2004	0,1077	0,035	0,0435	0	-0,0055
31.07.2004	0,1101	0,1449	0,0903	0,2059	0,0714
29.08.2004	0,0579	0,0865	0,0318	0,065	0,1179
30.09.2004	0,0625	0,0485	0,0309	0,0992	0,0734
31.10.2004	-0,0221	-0,0148	0,0838	-0,0056	-0,0342
29.11.2004	0,0226	-0,0677	0,0221	-0,2458	-0,115
27.12.2004	0,2279	0,1532	0,2108	0,0148	0,04
31.01.2005	0	0,2587	-0,0714	0,1168	0,0288
28.02.2005	-0,0419	0,0278	0,0096	-0,0784	-0,0093
31.03.2005	-0,1531	-0,0486	-0,1048	-0,1241	0,0189
30.04.2005	0,0153	-0,1591	0,016	-0,2551	-0,1111
30.05.2005	0,0977	0,0608	0,1254	0,0634	-0,0125
30.06.2005	0,0548	0,0701	-0,0189	0,2011	0,0295
31.07.2005	0,1455	0,1488	0,0096	0,0426	0,0553
29.08.2005	0,0816	0,052	0,092	0	-0,0408
30.09.2005	0,128	-0,0309	-0,0087	0,1737	-0,0283
31.10.2005	-0,0615	-0,1011	0,0351	0	-0,0167
28.11.2005	0,2857	0,2249	0,1186	0,152	0,0424
31.12.2005	0,0185	0,0628	-0,0076	-0,0139	0,0203
28.01.2006	0,0455	0,1932	0,1145	0,4789	0,0458
27.02.2006	0,1652	0,3333	0,1918	0,0429	0,0952
31.03.2006	-0,1567	-0,1214	-0,0402	-0,0274	-0,0435
30.04.2006	-0,0265	0,0244	0,1018	-0,0047	-0,1309
29.05.2006	-0,13	-0,1482	-0,1875	-0,0664	-0,1464
30.06.2006	-0,0012	0,125	-0,0231	0,0725	-0,152
31.07.2006	-0,0526	0,0513	-0,0472	-0,0242	0,0925
31.08.2006	0,1111	0,0163	0,1653	-0,0099	0,0212
30.09.2006	-0,0313	-0,064	0,078	0,015	-0,0829
28.10.2006	0,071	0,0684	0,1053	0,1872	0,0904
30.11.2006	-0,0181	-0,1709	-0,0952	0,0373	-0,0518
31.12.2006	0,0552	-0,122	0,2039	-0,02	0,0055
29.01.2007	0,0465	0,0628	0,0109	0,0918	-0,0489
26.02.2007	0,0333	-0,0338	-0,0486	-0,0187	0

APPENDIX-2 TABLE OF RETURN ON STOCKS (MONTHLY)

Date	Akbank	Dohol	Migros	Toasa	Vestel
26.03.2007	0,0274	0,0131	0,017	0,0095	0,0114
30.04.2007	0,0753	0,1207	-0,095	0,1415	-0,0169
31.05.2007	-0,075	0,1077	0,1786	0,0587	0,0115
30.06.2007	-0,0135	-0,0833	0,164	0,0079	-0,108