

İSTANBUL TECHNICAL UNIVERSITY ★ INFORMATICS INSTITUTE

MULTIVARIATE GARCH MODELS

M. Sc. THESIS

Uğur EJDER

Department of Informatics

Computational Science and Engineering Programme

AUGUST 2011

İSTANBUL TECHNICAL UNIVERSITY ★ INFORMATICS INSTITUTE

MULTIVARIATE GARCH MODELS

M. Sc. THESIS

**Uğur EJDER
(702081011)**

Department of Informatics

Computational Science and Engineering Programme

Thesis Advisor : Prof.Dr. BURÇ ÜLENGİN

AUGUST 2011

İSTANBUL TEKNİK ÜNİVERSİTESİ ★ BİLİŞİM ENSTİTÜSÜ

ÇOK DEĞİŞKENLİ GARCH MODELLERİ

YÜKSEK LİSANS TEZİ

**Uğur EJDER
(702081011)**

Bilişim Anabilim Dalı

Hesaplamalı Bilim ve Mühendislik Programı

Tez Danışmanı : Prof.Dr. Burç ÜLENGİN

AĞUSTOS 2011

Uğur Ejder, a **M.Sc.** student of ITU **Informatics Institute** student ID **702081011**, successfully defended the **thesis** entitled “**MULTIVARIATE GARCH MODELS**”, which he prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Advisor : **Prof. Dr. Burç ÜLENGİN**

İstanbul Technical University

Jury Members : **Prof. Dr. M.Serdar ÇELEBİ**

İstanbul Technical University

Jury Members : **Assoc.Prof. Dr. Oktay TAŞ**

İstanbul Technical University

Date of Submission : 02 June 2011

Date of Defense : 08 August 2011

FOREWORD

I would like to thank Prof.Dr. Bur Ülengin for his guidance and advice In every single step of my research during my M.Sc study. It is his patience , care and energy which makes my studies a complete. I also have to express my greatest grantitude and apologize to my family, Prof.Dr. M.Serdar elebi, Prof .Dr.Metin Demiralp, Dr. Lale Tkenmez Ergene, Dr. F.Aylin Konuklar Ayhan Tokuri, Pervin Nasırlıel my friend Volkan Demir for their great help.

August 2011

Uğur Ejder

Mathematical Engineer

TABLE OF CONTENTS

Page

FOREWORD.....	vii
TABLE OF CONTENTS	iHata! Yer işareti tanımlanmamış.
ABBREVIATIONS.....	xi
LIST OF TABLES.....	xiii
LIST OF FIGURES.....	xv
SUMMARY	xviii
ÖZET	Hata! Yer işareti tanımlanmamış. xix
1. INTRODUCTION	1
2. LITERATURE SURVEY.....	3
2.1 Value at Risk - Garch	3
2.2 Computational Approach.....	15
3. VALUE AT RISK MODELS AND GARCH.....	25
3.1 VAR	25
3.1.1 Historical simulation.....	25
3.1.2 Variance-Covariance approach	27
3.1.3 Monte Carlo simulation.....	28
3.2 GARCH.....	30
3.2.1 Arch models	30
3.2.2 Garch models	33
3.2.3 QGarch models.....	34
3.2.4 EGarch models	34
3.3 VAR Risk with GARCH	34
4. EMPRICAL APPROACH	37
4.1 Obtaining of Data and Data Analysis	37
4.2 Garch Estimation	57
4.3 VAR Computational and Computational Problem.....	65
4.3.1 Historical simulation method	65
4.3.2 Variance-Covariance method	68
4.3.3 Monte Carlo simulation method	70
4.3.4 Computational problem	73
4.4 Comparision.....	76
5. CONCLUSION	79
REFERENCES	81
APPENDICES	83
RESUME.....	181

ABBREVIATIONS

GARCH	: Generalized Autoregressive Conditional Heteroskedacity
ARCH	: Autoregressive Conditional Heteroskedacity
VAR	: Value at Risk
SEC	: Security Exchange Comission
UNCR	: Uniform Net Capital Rule
PDF	: Probability Density Function
SD	: Standart Deviation
VC	: Variance – Covariance
SQL	: Structured Query Language
MCS	: Monte Carlo Simualation
LM	: Lagrange Multiplier
IMKB	: Istanbul Menkul K1ymetler Borsası.

LIST OF TABLES

	<u>Page</u>
Table 1.1 : Computing expected value and standart deviation	7
Table 4.1 : Market value of the company	37
Table 4.2 : Range of data set of IMKB_30	38
Table 4.3 : Statical value of IMKB30 stocks for 322 observation	39
Table 4.4 : Statical value of IMKB30 stocks for 600 observation	41
Table 4.5 : Statical value of IMKB30 stocks for 1400 observation	42
Table 4.6 : Market value of the 100 IMKB company.....	44
Table 4.7 : Range of data set of concerning 100 IMKB stock.....	46
Table 4.8 : Statical value of IMKB100 stocks for 322 observation	48
Table 4.9 : Statical value of IMKB100 stocks for 600 observation	51
Table 4.10 : Statical value of IMKB100 stocks for 1400 observation	54
Table 4.11 : Garch forecasts.....	63
Table 4.12 : Historical returns of 322 observation of IMKB 30	67
Table 4.13 : Optimum weight allocation table.....	74
Table 4.14 : Optimum portfolio values.....	74
Table 4.15 : Comparasion of var results	77
Table 4.16 : Comparasion of var results IMKB 30	77
Table 4.17 : Comparasion of var results of concerning 100 IMKB stock.....	77

LIST OF FIGURES

	<u>Page</u>
Figure 1.1 : Stock market price	6
Figure 1.2 : Sum of two dice.....	6
Figure 1.3 : Standart deviation values	11
Figure 2.1 : Expected risk and value	17
Figure 2.2 : Connection SQL database with Mathematica	19
Figure 2.3 : Composing of variace matrix	19
Figure 2.4 : Variance matrix	20
Figure 2.5 : Correlation matrix.....	20
Figure 3.1 : Historical data of dollar per Barrel.....	26
Figure 3.2 : Confidence level graph	27
Figure 3.3 : Monte-Carlo histogram.....	29
Figure 4.1 : Correlation matrix of portfolios stocks.....	63
Figure 4.2 : Portfolio weight vector.....	63
Figure 4.3 : Garch variance matrix.....	64
Figure 4.4 : Mathematica code of var.....	64
Figure 4.5 : Historical simulation normal distribution.....	66
Figure 4.6 : Graph of portfolio's historical returns.....	66
Figure 4.7 : Calculation of var with Variance-Covariance method.....	68
Figure 4.8 : Variance matrix of stocks.....	69
Figure 4.9 : Weight vector of portfolioCorrelation matrix.....	69
Figure 4.10 : Correlation matrix.....	70
Figure 4.11 : Sample Mathematica code of VCV method.....	70
Figure 4.12 : Graph of Monte Carlo simulation returns.....	72
Figure 4.13 : Graph of Monte Carlo simulation returns for IMKB 30 for 322,600,1400	77
Figure 4.14 : Graph of Monte Carlo simulation returns for 100IMKB for 322,600,1400.....	78

MULTIVARIATE GARCH MODELS

SUMMARY

In this study, the volatility forecasting performances of alternative volatility models are compared. Istanbul Stock Exchange 30 Index's stocks daily closing values are utilized to forecast return volatility using historical simulation, variance-covariance method, Monte Carlo Simulations and GARCH (1,1) Models. We compared well-known three methods versus GARCH models. In classical, error variance is assumed to be constant in well-known three established methods. The assumption of a constant variance (homoscedasticity) is not valid with Garch models. GARCH models allow to deal with heteroscedasticity. When we calculate the variance of each financial instrument, we use the Garch models. We compose the variance and covariance matrix's each of cell data with the Garch models. Thus we use the Garch models in our calculation problems. The volatilities and correlations are estimated from the data with mathematica program and E-view statisticals program. We study the performance of our approach in some Monte Carlo simulations. In this part we produce synthetic data set for 322,600, 1400 amount of data for portfolio which concern IMKB30 and 100 IMKB stocks for comparing result with real value. We produce correlated data for computing value at Risk with the correlations matrix. When we compose the variance and covariance matrix we solve the each value of the equation with the Cholesky decomposition method. So that we produce synthetic data set which is concern to each other to find each financial instrument's values. To protect portfolio against unexpected drop, We compose the variance-covariance matrix with Garch Model. To find an optimum allocation for the portfolio underlying given an expected return, we calculate the optimum weight functions for a minimum risk level. Our sampling model are developed to estimate risk of our linear equation of portfolio. We use mathematica programme to solve our computational problem. In conclusion part of our study we compare the results of variance values and find the result of each weight function to optimize the computational problem in a given boundary conditions.

ÇOK DEĞİŞKENLİ GARCH MODELLERİ

ÖZET

Bu çalışmada ,Risk hesaplamada kullanılan alternatif metodlar karşılaştırılmış ve IMKB 30 hisselerini içeren bir portföy belirli bir risk düzeyinde maximum getir sağlarnasın için portföy oluşturan hisse senetlerinin hangi oranda dağıtılması gerektiğinin hesaplaması yapılmıştır. Öncelikle Riske maruz değeri ve Garch modelleri ilgili literatür taraması yapılarak geçmiş dönemler olmuş olan kriz süreçleri ile ilgili bilgiler verilmiş dünya çapındaki büyük firmaların riske maruz değeri hesaplamaları sonucunda olarak firmaların kayıplarının önemi vurgulanmıştır.Bu kayıplar sonucunda riske maruz değerin hesaplanması gerekliliği ihtiyacı ve riske maruz değerin nasıl ortaya çıktığından bahsedilmiştir.Riske maruz değerin hesaplanmasına geçilmeden önce çalışmalarda sıkça kullanacağımız istatistiksel terimlerden bahsedilip riske maruz değerin hesaplanmasında kullanılacak terimlerle ilgili açıklamalar yapılmıştır.Burada standart sapma ve varyans terimleri ile riske maruz değeri arasındaki ilişkiden söz edilip hesaplamalara bu değerleri nasıl katacağımızı anlatacağız.Riske maruz değeri hesaplarken güven seviyesi,finansal enstrümanın güncel değeri,zaman dairesi gibi kavramların nasıl kullanıldığından bahsedilmiştir.Riske maruz değeri hesaplamada kullanacağımız yöntemlerle karşılaştıracığımız GARCH ile ilgili bilgiler verilmiştir.Açılımı genelleştirilmiş otoregresif koşullu değişen varyans modelidir.Klasik yöntemlerde hata terimini sabit kabul edilirken Garch modellerinde hata teriminin koşullu varyansının geçmiş dönemlere ait hata terimleri karelerine bağlı olması yanında koşullu varyansın kendi geçmiş değerlerine de bağlı olacak şekilde oluşturulmuştur.GARCH(p,q) olarak ifade edilmiştir.Burada p hata terimlerinin karelerinin gecikme uzunluğu, q ise koşullu varyansındır.Garch modelleri ile ilgili açıklamalardan sonra hesaplamalı yaklaşım problemimiz ile ilgili modellemeye geliştirmeleri yapılmıştır.Hesaplamalı yaklaşım problemimizde IMKB 30 hisselerini içeren bir portföy oluşturularak verilen bir sabit getiri düzeyinde riski minimize edecek ağırlıkları olan hisse senetlerinden oluşan portföydeki hisse senetlerinin ağırlıkları hesaplanmıştır.Burada sabit bir getiri μ ve risk değeri olarak $x^T Cx$ şeklinde gösterimler ve varsayımlar yapılmıştır. Bu çalışmada IMKB 30 hisse senetlerini içeren bir 30 X 30 'luk matris üzerinde çalışılmış olup $30(30+1)/2$ işlemsayısı kadar hücrede bulunan covarianceler hesaplanmıştır.Matris simetrik olup pozitif defnittir.Bu kısıtlar altında problemimizi çözerek hisselerine ait ağırlık fonksiyonlarının değerleri hesaplanmıştır.Matrisin herbir hücresindeki değeri hesaplanırken veriler veritabanında tutulmuş olup hesaplama işlemlerinde matematica programlama dili kullanılmıştır.Burada hesaplamalı problemde amaç belirli bir risk seviyesinde maksimum getiriyi elde edeceğimiz ağırlık fonksiyonlarını hesaplamaktır.Bu değeri probleminde 2 adet kısıtımız bulunmaktadır.1.si ağırlık fonksiyonlarının toplamının 1'e eşit olması diğer kısıtımız ise belirli bir getiri düzeyidir.Biz bu kısıtlara lagrange çarğınları demekteyiz.Problemimizin çözümü sırasında iteratif bir method olan Gauss Siedel metodu ile bulunmuştur.Burada bir referans başlangıç noktası alınarak iteratif olarak ilerleyen her iterasyon sonunda

bizim istediğimiz bir oran olan epsilon değeri adım aralıklarını kontrol etmekteyiz. Adım aralıkları istenilen düzeye geldiğinde ise iterasyondan çıkılmaktadır. İstanbul Menkul Kıymetler Borsası 30 bileşik endeksi ve 100 adet İstanbul Menkul Kıymetler Borsası senetlerinin günlük kapanış değerleriyle Tarihsel simülasyon, Varyans-covaryans methodu, Monte Carlo ve Garch (1,1) methodlarıyla volatilité tahmin edilmiştir. Methodlar birbirleri ile karşılaştırılmış değişik koşullardaki durumları incellenmiştir. Senetlerin günlük kapanış değerleri internet ortamından tek tek exceller halinde indirilip günlük işlenebilecek şekillere dönüştürülmüştür. Ham data işlendikten sonra datalar MS SQL veritabanı ortamında tutulup bu datalarla ilgili hesaplamalar matematica programlama ile yapılmıştır. Öncelikle Riske maruz değeri hesaplariken Tarihsel simülasyon ile karşılaştırmalar yapılmıştır. Tarihsel method ile geçmişteki datalar ile gelecekte riske maruz değeri tahmin edilmeye çalışılmıştır. Finansal enstrümanların günlük getirileri IMKB 30 hisseleri için 322 iş günü 100 Adet IMKB hisse senetleri için ise 159 iş günü için riske maruz değerler hesaplanmıştır. Çalışmalarımızda %95 güven aralığında çalışmalar yapılmıştır. Klasik yöntemlerde hatanın varyansı sabit kabul ediliyordu. Garch modelleri ile bu varsayım geçerliliğini yitirmiştir. Garch modelleri varyansın değişken olduğu durumuna izin vermiştir. Dataların volatilité ve covaryans tahminlerinde mathematica ve Eview istatistik programları kullanılmıştır. Burada IMKB 30 hisselerini içeren hisse topluluğu için 30 X 30'luk varyans-covaryans matrisi ile 100 adet IMKB hisselerini içeren hisse senetleri içinde 100 X 100'lük varyans kovaryans matrisi ile çalışılmıştır. Burada varyans kovaryans matrisi oluşturulurken öncelikle hisse senetlerinin varyanslarını içeren matris oluşturulmuştur. Varyans matrisi oluşturulurken hisse senetlerinin varyansları hesaplanmıştır. Kovaryans matrisin herbir hücresi için hisse senetleri arasındaki kovaryanslar hesaplanmıştır. Risk tahmini yaklaşımımız olan Monte Carlo Simülasyonunun performansı üzerinde çalışmalar yapılmıştır. Burada IMKB30 ve 100 adet IMKB borsası senetlerini içeren portföyler üzerinde sentetik data üretilerek data setlerinin 322,600,1400 adet data için sonuca yaklaşımları incelenmiştir. Risk hesaplamasını yaparken ilişkili veriler üretilmiştir. Burada en kritik durum birbiri ile ilişkili datalar üretmek olmuştur. Monte carlo simülasyonunda da Tarihsel simülasyonda olduğu gibi işlemler yapılmıştır. Buradaki fark Tarihsel simülasyonda gerçek datalar kullanılırken Monte carlo simülasyonunda sentetik datalar kullanılmıştır. Birbiri ile ilişkili senetler için birbiri ile ilişkili datalar üretilmiştir. Son methodumuz olan ile Portföyü piyasadaki ani düşüşlerden korumak için varyans-kovaryans matrisinin oluşumunda Garch metodlarından faydalanılmıştır. Garch modelleri ile varyansın değişken olduğu kabul edilmiştir. Hisse senetlerin varyansları garch modelleri ile hesaplanmıştır. Hesaplamalar yapılırken E-view istatistik program ile varyanslar hesaplanmıştır. Garch modelleri ile IMKB30 hisseleri ile 100 adet IMKB içeren hisse senetleri ile hesaplamalar yapılmıştır. Garch modelleri kullanılarak varyans kovaryans matrisleri oluşturulmuştur. Garch modelleri ile hisse senetlerinin varyansları hesaplanmıştır. Varyanslar ile matrisler oluşturulmuştur. Kovaryanslar ile varyans matrislerini kullanarak varyans kovaryans matrisleri oluşturulmuştur. Varyans kovaryans matris ile riske maruz değeri garch modelleri vasıtasıyla hesaplanmıştır. Son olarak IMKB 30 hisse senetlerini içeren bir portföy için verilen belirli bir getiri düzende minimum risk değeri için ağırlık fonksiyonları hesaplanmıştır. Örnek modelle portföyün riski tahmin edilmiştir. Burada portföyün riski $\sigma_p^2 = W' \Sigma W$ şekilden tanılanıp portföyün riski bu şekilde gösterilmiştir. Problemimizde riskin minimize edilişi ise

$Min \cdot \sum_{i=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij}$ şekilde gösterilip önceden tanımlanan varyans değerinin

türevinin alınıp sıfıra eşitlenmesi ile bu gösterim elde edilmiştir. Problemimizde iki adet kısıt bulunmaktadır. Bunlar sırası ile getiri değeri ve portföyde bulunan hisse senetlerinin getirilerinin toplamının ağırlık fonksiyonlarının toplamının birime eşit olmasıdır. Problemimiz aşağıdaki kısıtlar altında maksimum getiriye sağlayacak şekilde çözülmüştür.

$$f(akbank, arclk, ..., ykbnk, \lambda) = \sum_{i=1}^{30} x_i \mu_i - 2 \sum_{i=1}^{30} \sum_{j=1}^{30} x_i x_j \sigma_{ij} + \lambda (1 - \sum_{i=1}^{30} x_i)$$

Problemimizi çözdükten sonra karşılaştırmalar kısmında dört adet risk ölçüm modelinin karşılaştırmaları yapılmış ve her modelin hangi durumlar da avantajlı veya dezavantaj getirdiğinin hesabı yapılmıştır. Bu karşılaştırmalardan şu şekilde sonuçlar çıkarılmıştır. Tarihsel simülasyonda örnek modelin büyüklüğü bütün finansal enstürmanların aynı sayıda data içermesi zorunluluğunun olması data toplamının zorun ve zahmetli bir iş olması tarihsel simülasyonun dezavantajları olurken herhangi bir data dağılımı ile ilgili bir varsayım gerektirmemesi Tarihsel simülasyonun avantajlarında sayılmaktadır. Diğer bir metodumuz olan Monte carlo simülasyonunda data vektörleri arasından korele birbirine bağımlı olma zorunluluğu bir dezavantaj olmakla birlikte burada oluşan bu denklem takımını çözme gibi bir problemlerde karşılaşılmıştır. Fakat örnek data modelini istediğimiz kadar büyütme ve az hata çıkması durumları monte carlo simülasyonun avantajları arasında sayılmaktadır. Varyans kovaryans metodumuzda dataların normal dağıldığı varsayımı kabulü olması dezavantaj olmakla birlikte, hesaplanması kolay olması ve daha az tarihsel dataya ihtiyaç duyulması daha duyarlı ve doğru olması varyans kovaryans metodunun avantajlı yönleri olmuştur. Son olarak IMKB 30 hisselerinin oluşturduğu portföy ile iki kısıt altında hesaplamalı problem çözülmüş ve ağırlıklar hesaplanmıştır.

1. INTRODUCTION

The purpose of this study is to compare the Multivariate Garch Method with the three well-established methods for computing var , namely, historical simulation, variance - covariance method and Monte Carlo Simulation and to introduce refinements to modern portfolio theory in order to increase expected value who want their portfolio optimization efforts to improve investment results. The purpose of this study is to compare the Multivariate GARCH Method with the three well established methods for computing VaR , namely, historical simulation, variance-covariance method and Monte Carlo Simulation and to introduce refinements to modern portfolio theory in order to increase expected value who want their portfolio optimization exports to improve investment results.

In the Chapter 2 Value at Risk and Garch we mention about the VaR has become a universal risk metric used by banks and by non-financial corporations. A market risk metric is a single number that summarizing the portfolio's potential for deviations from a target and captures the uncertainty in a portfolio's risk. We explain why it is important to aggregate and disaggregate risks. We mention about empirical examples that happened in the past and expects. With multivariate garch models we survey the main developments of Modelling volatility in financial time series and introduction of the Autoregressive Conditional Heteroskedasticity. While we model volatility of the returns we understand that the comovements of financial returns. It is therefore important to extend the considerations to multivariate GARCH Models. In Chapter 3 we compare the well-known methods. These are historical simulation method , variance-covariance method, monte carlo simulation. Historical simulation , provides a critical introduction to the standard approach to measuring historical var. In this model requires relatively few assumptions about the statistical distributions of the underlying market factors. We compute the current portfolio value with the market factors experienced during the each of the last n days to here days. In our study using hypothetical market factors . We compute the daily VaR on 26.04.2011. We mention about the compute the daily VaR on 26.04.2011. We mention about the other method which is called variance covariance. We explain

how to improve the precision of var with this method. The important concept of this method is we have to have the same amount of data set for the each of the assets. You can imagine that a long position in Akbank stock and a short position in Arcelik Stocks is less risky than one leg only, because of a high probability that profits of one position will be mainly off-set by losses of another. After we compose the same conditions we illustrate variance and correlations between asset returns. Our last method is Monte carlo simulation method. Monte carlo methods are typically used to then estimate the var because the aggregation is a non-linear mapping of the assumed joint distribution of the underlying asset returns. Portfolio based approaches, on the other hand, only consider the aggregated portfolio loss and use Monte-Carlo methods to estimate the portfolio VaR. First we focus on building construction of the data. We generate 1000 sample data for the each the stock of IMKB30. We compare value at risk values for IMKB 30 stocks by using 322,600,1400 sample data for evaulating results. And then we apply same conditions for 100 IMKB stocks by using 322,600,1400 sample data for evaulating results .The most important point of in this approach, returns which we randomly generate, correlated to each other. At the end of the chapter we argue that multivariate Garch Models. First we mention about the arch model which is the autoregressive part of the garch model. The other part of the equation is conditional heteroskedasticity.

In the Chapter 4 how do we obtain data set and which operations we apply on the data set for computing VaR. How do we store this data set and give information about our portfolio's stock datas characteristic properties. We explain the reason why we obtain different results when the same historical data are used in the three fundamental types of var model, historical and monte carlo models variance covariance model. In the Conclusion part we compare the result of the four method which are Historical simulation, Variance Covariance, Monte carlo and Garch method. Solving our computational problem with the Gauss-Seidel method used to solve a linear system of equations. It can be applied to any matrix with non-zero elements on the diagonals

2. LITERATURE SURVEY

2. 1 Value at Risk - Garch

Risk Management has become a popular revolution in the last few years. It was started by value at risk. After the financial disasters were occurred a new method of measuring the financial risk was developed. Now var methodology has spread for many areas to change the way of approaching the risk. Now var is used to control and manage the risk activities. It is used not only in the financials area but also in the operational area. We can use var in many areas. Var is used for information reporting, controlling risk, managing risk, Financial institutions, Regulations, Non-financial corporation, Asset managers. Also var has directed implication for the recent years. One explanation is that the crisis was made by poor risk management of financial institutions. By focusing on potentially dangerous scenarios Var analysis would direct institutions to consider taking measures to reduce risk levels by asking themselves to report their var. Many banking and derivatives disasters could have been avoided if the reporting system had been more clear. Because of this markets accumulate their values for bringing attention to potential problems. Var asking What could happen under changes in market values. The other advantages of var probably lie in critically thinking about risk. Now I want to mention about a short history of var explication. Var was not used prior to the mid 1990s, the origin of the measure lies further back in time. Vars were developed in the terms of portfolio theory by Harry Markowitz and other economists, designing optimal portfolios for equity zero coupon bond. On this purpose, the focus on market risks and the effects of the common action in these risks are central to how var is computed. The calculating of var measures came from the crises that beset financial service firms over time. Because of the crisis, regulatory capital requirements for banks were enacted in the aftermath of the great depression. When the securities exchange act established the securities Exchange Commission and required banks to keep their borrowings below 2000 % of their equity capital. After then banks design risk measures to ensure that they met these amount of capital requirement. Increasing the derivative market risks and floating exchange rates in the early 1970s, SEC's

Uniform Net Capital Rule regulated and expanded capital requirements. UNCR categorized the financial assets that banks held into twelve classes. Bank reported on their capital calculation in quarterly statements that were titled Financial and Operating Combined Uniform Single reports. The first regulatory measures Value at Risk , were started in 1980. SEC defined the capital requirements of financial firms with 95 % confidence over a thirty day interval. Historical returns were used to compute these VAR. Because of the portfolios of investment and commercial banks were becoming more volatile and larger , the other problem has been occurred about more sophisticated and time risk control measures. In 1986 Ken Garbade at Banker's Trust showed sophisticated measures of Value at Risk for the firm's fixed income portfolios, depend on the covariance in yields on bonds of different maturities. In the early 1990s, many financial firms had developed simple measures of Value at Risk. After the numerous catastrophe losses associated with the use of derivatives and leverage between 1993 and 1995 Nick Leeson created unauthorized trading in Nikkei futures and options. Young trader in Singapore, firms were ready for more comprehensive risk measures. In 1995, J. P. Morgan allowed software makers to develop software to measure risk for providing them to access to asset classes's datas on variances and covariances This facility is called risk metrics. At first J. P. Morgan was established RiskMetrics for a daily report measuring and explaining the risks of his firm. Then in 1992 J. P. Morgan launched the RiskMetrics methodology to the market place for free to all market participants. Lately non-financial firms has begun to use value at risk. Now we talk about the measuring of the VaR. Value at Risk(VaR) is the answer of what is the most loss on the investment. And Value at Risk also measure the potencial loss in value of investment instrument or any kind of defined object over the specific time period over the confidence interval. For Example if your asset's Var is \$ 10 million at a specific time period, 90 % confidence level, means there is a only 10% chance of loosing more than \$ 10 million over a given specific time period. In my thesis we developed VaR for the portfolio. The market risk of a portfolio depends on possible loss of movements of financial instruments such as equites, shares. Market risk important for regulator assessing debt and to control the risk for the risk manager. The standard method for measuring market risk has confidence interval and forecast time horizons. This concepts are obvious reasons of the calculating of VAR. When we want to calculate the VAR, we need a probability distribution of changes in portfolio value.

We ask the question of how the portfolio function is approximated and how the state variables are modeled. We first review method for measuring var, then when we want to answer simple question about distribution of portfolio value. To measure risk we have to define the variable of interest which could be portfolio value, earning capital or any kind of cash flow. Financial risk is occurred by the affects of this financial factors. Risk needs to be defined carefully, that is on statistical foundation of portfolio which consist of many kind of financial instruments. Then we focus on how to use concept of probability distribution functions to compute the probability of a loss. After that probability of loss is discussed in terms of quantiles and loss size that is defined by on this quantile. Risk is measured by the standart deviation of unexpected outcomes, or $\sigma(\partial)$ called volatility. Risk is measured more correctly by short term volatility. This Figure show that volatility of stock market decreased sharply after 1930. As we mentioned about probability before that we explain some basic information. Probability distribution is described that number of times specific value can happen in an virtual testing. We explain probability distribution in a traditional die example. We classify all possibilities. Figure 1.2 show the all possible frequency distribution of total value of dice number which classify number of happenings of each value. Total number of dice combinations is 36. Suppose that x is a random variable of probability distribution function. This function takes 11 possible values x_i . Each possible values take frequency n_i . The sum of these frequencies equal to unity, we obtain the associated probability p_i . These probabilities are known that a probability distribution function (PDF). Sum of probabilities must equal to unity. PDF is known as a probability distribution function (PDF). Sum of probabilities must equal to unity. This below expression show us sum of these frequencies equal to unity

$$\sum_{i=1}^{11} P_i = 1 \quad (1.1)$$

This distribution is shaped by two variables, its means and its spread. The expected value is denoted by $E(X)$ or mean. The expected value is estimated by product of probability and possible values. It is shown with below formula.

$$E(x) = \sum_{i=1}^{11} P_i X_i = 1 \quad (1.2)$$

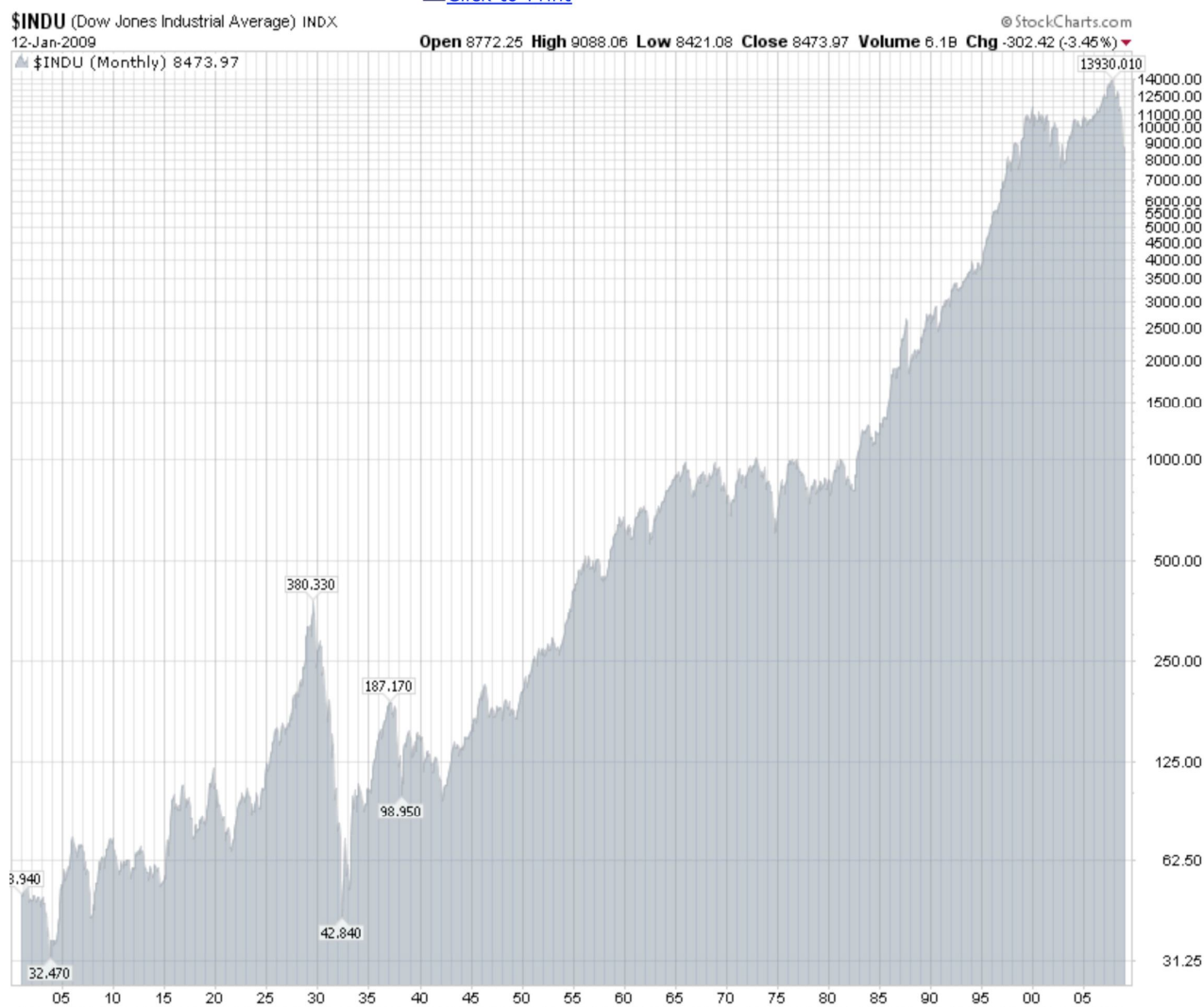


Figure 1.1 : Stock market price.

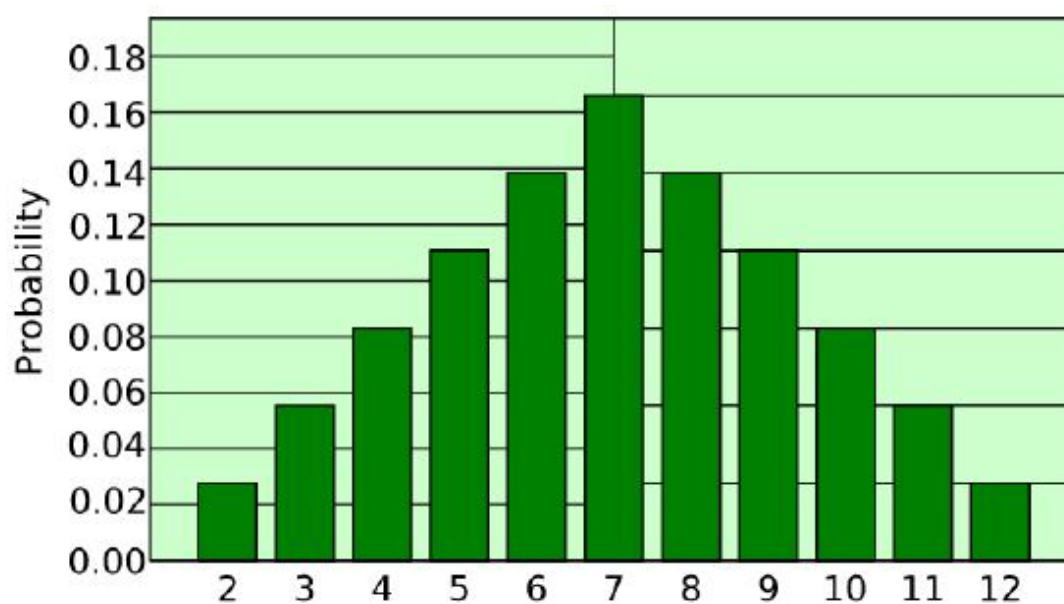


Figure 1.2 :Sum of two dice.

The mode is defined as the most frequently observed value. Dispersion is the spread of the data about the measurement. The most commonly used measures include the range, variance standard deviation. The Range is the difference between the highest and the lowest values of the variable. The variance is defined as the mean of the square of deviations around the mean. The standard deviation is defined as the root mean square of deviation around the mean.

$$V(x) = \sum_{i=1}^{11} p_i [x_i - E(x)]^2 \quad (1.3)$$

In this example sum of Expected value is 252/36.

Table 1.1 : Computing expected value and standart deviation.

Values(x_i)	2	3	4	5	6	7	8	9	10	11	12	Total
Frequency of occurence(n_i)	1	2	3	4	5	6	5	4	3	2	1	36
Pr obability of occurence (p_i)	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$	1
Computing $E(X)=$ $p_i x_i$	$\frac{2}{36}$	$\frac{6}{36}$	$\frac{12}{36}$	$\frac{20}{36}$	$\frac{30}{36}$	$\frac{42}{36}$	$\frac{40}{36}$	$\frac{36}{36}$	$\frac{30}{36}$	$\frac{22}{36}$	$\frac{12}{36}$	$\frac{252}{36}$
Computing $V(X)=p_i[x_i-E(X)]^2$	$\frac{25}{36}$	$\frac{32}{36}$	$\frac{27}{36}$	$\frac{16}{36}$	$\frac{5}{36}$	$\frac{1}{36}$	$\frac{5}{36}$	$\frac{16}{36}$	$\frac{27}{36}$	$\frac{32}{36}$	$\frac{25}{36}$	$\frac{210}{36}$

In our example outcome of $x_1 = 2$ probability is $1/36$ $(2 - 7)^2 = 25/36$ The sum of $V(X) = 210/36$. The variance is a measure of how scatter a data set is. Standard deviation Which is simply the square root of the variance.

$$SD(x) = \sqrt{v(x)} \quad (1.4)$$

Computing Expected Value and Standart Deviation

The Standart Deviation is written as σ

In our explanation standart deviation is $\sqrt{210/36} = 2.415$

The Standart Deviation show us a typical range of values around the mean. In our example Data set is involved a discrete set of data is called discrete probability distribution function. But in many outcomes returns on investment, set of outcomes is constant. In that situation we compose the function again. In the below representation $f(x)$ is shown as a cumulative distribution function. $f(x)$ takes all possible values from $-\infty$ to $+\infty$

$$\int_{-\infty}^{+\infty} f(x) dx = 1 \quad (1.5)$$

If we integrate cumulative distribution function in defined intervals.

$$F(x) = \int_{-\infty}^{+\infty} f(t) dt \quad (1.6)$$

We redefined the expected value and variance function by extended (1.2) and (1.3) equations.

$$E(x) = \int_{-\infty}^{+\infty} xf(x) dx \quad (1.7)$$

$$V(x) = \int_{-\infty}^{+\infty} [x_i - E(x)]^2 f(x) dx \quad (1.8)$$

If we define new random number for example $Y = a + bx$ a and b are the constants.

We insert new random number in equation (1.7) and (1.8)

$$\begin{aligned} E(a+bx) &= \int_{-\infty}^{+\infty} (a + bx) f(x) dx \\ &= a \int_{-\infty}^{+\infty} f(x) dx + b \int_{-\infty}^{+\infty} xf(x) dx \\ &= a + bE(x) \end{aligned} \quad (1.9)$$

by Equation (1.5) .

$$V(a+bx) = \int_{-\infty}^{+\infty} [a + bx_i - E(a + bx)]^2 f(x) dx$$

$$\begin{aligned}
&= \int_{-\infty}^{+\infty} [a + bx_i - a - bE(x)]^2 f(x) dx \\
&= \int_{-\infty}^{+\infty} b^2 [x_i - E(x)]^2 f(x) dx \\
&= b^2 V(x)
\end{aligned}$$

Volatility of Y is $\sigma(a + bx) = b\sigma(x)$. We can define the equation turn to linear combination of random variables. For example we suppose that $Y = x_1 + x_2$ and we redefine equation (1.7).

$$\int_2 f[x_1, x_2] dx_2 = f(x_1)$$

We use equation (1.9) and extension equation (1.7)

$$\begin{aligned}
E(x_1 + x_2) &= \int_1 \int_2 (x_1 + x_2) f(x_1 + x_2) dx_1 dx_2 \\
&= \int_1 \int_2 x_1 f(x_1, x_2) dx_1 dx_2 + \int_1 \int_2 x_2 f(x_1, x_2) dx_1 dx_2 \\
&= \int_1 x_1 \left[\int_2 f(x_1, x_2) dx_2 \right] dx_1 + \int_1 x_2 \left[\int_2 f(x_1, x_2) dx_1 \right] dx_2 \\
&= \int_1 x_1 f(x_1) dx_1 + \int_2 x_2 f(x_2) dx_2 \\
&= E(x_1 + x_2)
\end{aligned}$$

In this representation we understand that expectation is a linear operator. We apply the same transaction to the variance operator.

$$\begin{aligned}
V(x_1 + x_2) &= \int_1 \int_2 [x_1 + x_2 - E(x_1 + x_2)]^2 f(x_1, x_2) dx_1 dx_2 \\
&= \int_1 \int_2 \{ [x_1 - E(x_1)]^2 + [x_2 - E(x_2)]^2 + 2[x_1 - E(x_1)][x_2 - E(x_2)] \} f(x_1, x_2) dx_1 dx_2 \\
&= \int_1 [x_1 - E(x_1)]^2 f(x_1) dx_1 + \int_2 [x_2 - E(x_2)]^2 f(x_2) dx_2 \\
&\quad + 2 \int_1 \int_2 [x_1 - E(x_1)][x_2 - E(x_2)] f(x_1, x_2) dx_1 dx_2 \\
&= V(x_1) + V(x_2) + 2\text{cov}(x_1, x_2)
\end{aligned}$$

In this representation we understand that variance operator is a non linear operator. We called this $2\text{cov}(X_1, X_2)$ term cross-product term. This term is produced from the dependence of two related terms. If this terms are independent, we can write in this form.

$$\begin{aligned} f(x_1, x_2) &= f(x_1) \times f(x_2) \\ &= \int_1 [x_1 - E(x_1)]^2 f(x_1) dx_1 + \int_2 [x_2 - E(x_2)]^2 f(x_2) dx_2 \\ &\quad + 2 \int_1 \int_2 [x_1 - E(x_1)][x_2 - E(x_2)] f(x_1, x_2) dx_1 dx_2 \end{aligned}$$

this integral simplify to below form.

$$\begin{aligned} &= \int_1 \int_2 [x_1 - E(x_1)][x_2 - E(x_2)][f(x_1) \times f(x_2)] f(x_1, x_2) dx_1 dx_2 \\ &= \int_1 [x_1 - E(x_1)] f(x_1) dx_1 + \int_2 [x_2 - E(x_2)] f(x_2) dx_2 \\ &= 0 \end{aligned}$$

if two variables are independent of each other the variance is represented by

$$= V(x_1) + V(x_2)$$

The Normal distribution also known Gaussian distribution, plays important role in statistics because normal distribution which appears in a variety of statistical applications. This theorem tells us that sums of random variables are approximately normally distributed if the number of observations is large. The normal distribution has two parameters, the mean, or average, μ and the standard deviation σ . The normal distribution is represented with $N(\mu, \sigma^2)$. First sembol represent loaction and the second one represented dispersion.

The distribution function represent with below expression

$$f(x) = \theta(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{[-(1/2\sigma^2)(x-\mu)^2]} \quad (1.10)$$

This function is also the main part of the Black-Scholes option pricing model. If normal distribution with mean zero, unique variance, it is called standard normal distribution. And function shaped with this expression.

$$f(x) = \theta(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{[-(1/2\sigma^2)(x-\mu)^2]} \quad (1.11)$$

In Figure 1.3 there are some standard deviation values which represents us the graphics

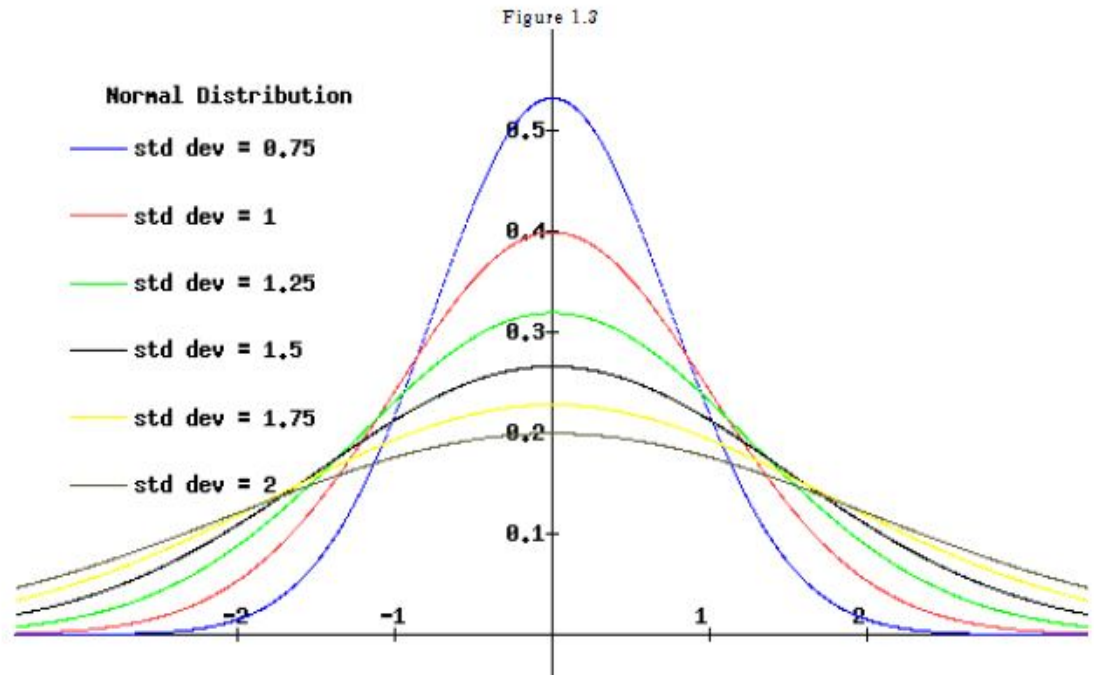


Figure 1.3 : Standard deviation values.

First symbol represent location and the second one represented dispersion. The normal distribution is explained with two parameters, mean and standard deviation. We also mention about two parameters more skewness and kurtosis. Skewness is a measure of the asymmetric properties of distribution function. If random numbers are continuous, it is defined

$$\gamma = \left\{ \int_{-\infty}^{+\infty} [x - E(x)]^3 f(x) dx \right\} \sqrt{\sigma^3} \quad (1.12)$$

If random numbers are not continuous, it is defined

$$\gamma = \frac{\sum_{i=1}^N [x_i - \bar{x}]^3}{(N-1)\sigma^3} \quad (1.13)$$

The skewness for a normal distribution is zero, and any symmetric random numbers have a skewness near zero. A negative skew indicates that the tail on the left side and positive skew indicates that the tail on the right side. The kurtosis describe the distribution of observed data around the mean. In normal distribution Kurtosis of normal distribution is 3. If random numbers are continuous, It is defined

$$\delta = \left\{ \int_{-\infty}^{+\infty} [x - E(x)]^4 f(x) dx \right\} \sqrt{\sigma^4} \quad (1.14)$$

If random numbers are not continuous, It is defined

$$\delta = \frac{\sum_{i=1}^N [x_i - \bar{x}]^4}{(N-1)\sigma^4} \quad (1.15)$$

When we calculate the Value at Risk, we use the term of quantile for measuring the risk. Quantile functions are used in statistical applications. In statistical applications, users want to know percentage of a given distribution. Quantiles are also known percentiles the value which represent a given probability c.

$$c = \text{prob} (X \geq q) = \int_q^{+\infty} f(x) dx = 1 - F(q) \quad (1.16)$$

VaR calculates the worst expected loss over a given time horizon at a given confidence level under normal conditions. Users want to find the percentage of standart deviation for a given confidence level. For example our target may be found VAR at the 95 percent confidence level.

Measuring Returns

Measuring of Value at Risk, outcomes are taken as the rate of return on financial instruments. For instance instruments are stock and the measurement horizon is 1 day. Returns are measured from the end of the previous day denoted by t-1, and to the end of current day denoted by t. The discrete rate of return is defined as capital gain plus coupon D divided by initial price. Rate of return is calculated by below expression.

$$r_t = \frac{P_t + D_t - P_{t-1}}{P_{t-1}} \quad (1.17)$$

r_t : Expected Value

P_t : Ending value of Financial Instrument

D_t : Coupon

P_{t-1} : Beginning value of Financial Instrument

Another alternative way of defining rate of return is geometric rate which is defined in terms of logarithm of price ratio. The discrete rate of return plus coupon D divided by initial price.

$$r_t = \ln \frac{P_t + D_t}{P_{t-1}} \quad (1.18)$$

r_t : Expected Value

P_t : Ending value of Financial Instrument

D_t : Coupon

P_{t-1} : Beginning value of Financial Instrument

Time Aggregation

Calculating the Value at Risk requires parameters. Time horizon is the one of this parameters that define calculating of Value At Risk. The Value at Risk depends on the time horizon in which the loss is expected to occur. Definition of a period which to calculate random numbers. random numbers follow a random walk. The time period is changed in terms of hours days, weeks or months. etc. In this assumption that no changes are made to the financial instruments during the forecast horizon. Normally shortest forecast horizon is one day. Using higher frequency data is generally more efficient. The Expected Value and Variance increase linearly with time. But volatility increase with the square root of time. $\mu = \mu_{annual}T$

$$\sigma = \sigma_{annual} T$$

VAR Calculating

Value at Risk (VaR) has become the standard measure of market risk. And its most important advantage is that it summarizes the risk in a single value. When we compute the VaR, we follow the following steps.

- Current value of financial instrument
- Measure the variability of the risk factors
- Defining the time Horizon
- Defining the confidence level
- Report the VaR

$$VaR(Mean) = W_0 \sigma \alpha \sqrt{\Delta t} \quad (1.19)$$

W_0 : Initial Value of Instrument

σ : Confidence Level

Δ_t : Time Horizon

α : Standard Deviation

Garch

In the ARCH models the conditional variances follow autoregressive processes. The variance of returns follows a predictable process. This model assumes the variance of the current error term to be a function of the previous time period's error terms. The variance is related to the squares of the previous error terms. The main centre of attention, modelling volatility of the returns has been understanding the comovements of financial returns. Now we explain the model of ARCH Model. We suppose that ε_t denote the error terms of the series.

ε_t are consisted of a stochastic piece Z_t and time-dependent standard deviation σ_t

$\varepsilon_t = Z_t \sigma_t$ where Z_t is a Gaussian distribution random variable at 0 with standard deviation equal to 1.

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_q \varepsilon_{t-q}^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 \quad (1.20)$$

we accept below principles for this equation.

$$\alpha_0 > 0, \alpha_i > 0, i > 0$$

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \dots + \alpha_q y_{t-q} = \alpha_0 + \sum_{i=1}^q \alpha_i y_{t-i} \quad (1.21)$$

The volatilities is estimated by Auto Regressive conditional Heteroskedastic (ARCH) Model. Bollerslev (1986) suggested the generalized ARCH (GARCH) models. The ARCH model assumes that the variance of returns follows a predictable return. Model assign weight funtions to the variances. The GARCH(p, q) model has two parameter p is the order of the GARCH terms σ^2 and q is the order of the ARCH terms ε^2

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_q \varepsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_p \sigma_{t-p}^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^p \beta_i \sigma_{t-i}^2 \quad (1.22)$$

We estimate the $\alpha_0, \alpha_i, \beta_i$ by using maximum likelihood method from return data. Assume that the returns are ε_t that are normally distributed and the mean of the returns are zero.

$$\alpha_0 > 0, \alpha_i > 0, \beta_i > 0$$

2. 2 Computational Approach

In this part we mention about portfolio theory and we develop a optimal portfolio for our computational problem. We calculate an optimum weight for each stock (comprising the Istanbul Stock Exchange 30 Index) in our portfolio with the objective that minimizes Value at Risk(VaR) for a given return level. Our Model includes x weighted function vector, C Variance - Covariance Matrix and 30 stocks. In our model expected value and variance(volatility) of portfolio, μ , and $x^T C x$

For computing Variance-Covariance Matrix we have to calculate $30(30+1)/2$ number of transaction. Let me explain the portfolio history and what do we do for developing optimal portfolio. A portfolio is a collection of assets. The purpose of construction portfolios using a variety of asset is to reduce risk ratios by diversification. For Portfolio Theory, Risk is defined by volatility. Portfolio Theory accept more risk (volatility) for higher return , and accept lower returns for a less volatile investment. The main purpose of portfolio theory is to assign your investment between financial instruments to maximize portfolio expected return for a given risk level or to provide the minimum risk for a given risk level of return. In Figure 2. 1 show us the selection level of the portfolio return In this figure A and C is at the same risk level but the expected return of the portfolio of A is higher than the portfolio of C. So that the investor wants to choose the portfolio A. In this figure A and D is so close Expected Return level but the Expected Risk of the portfolio of D is higher than the portfolio of A. So that the investor wants to choose the portfolio A. If the investor wants to avoid Expected Risk, Investor wants to choose B Level by carefully. A major issue for the portfolio theory is the selection of choosing financial instruments. Portfolio theory was first discovered and developed by Harry Markowitz in the 1950. In portfolio theory it is often assumed that returns are normally distributed over the time period. With this assumption portfolio efficiency is determined by expected returns and the standard deviations of the returns. Now we mention about basic information of portfolio theory. We can determine the expected return and the standard deviation of the portfolio as follows

$$R_p = w_1 R_1 + w_2 R_{21} + ... + w_n R_n + \sum_{i=1}^n w_i R_i \quad (2.1)$$

The expected return of the portfolio is sum of weighted average of the expected return of the individual assets. The standard deviation of a portfolio will get more complicated When the number of assets increases. We only look at a portfolio with two financial instruments. The standard deviation of the returns of a portfolio with with two financial instruments is determined below expression.

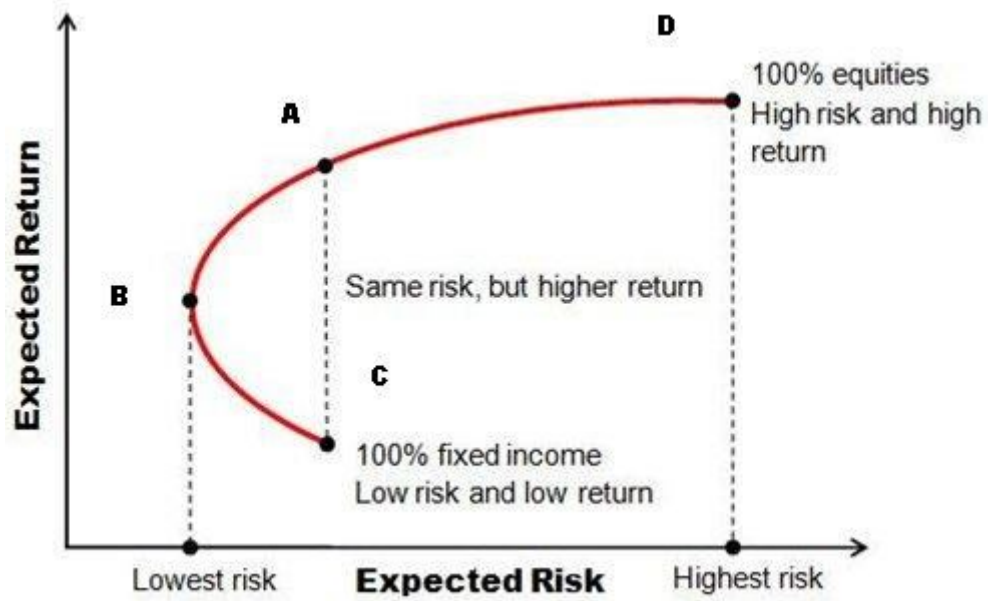


Figure 2. 1 : Expected risk and value.

$$\sigma_p = \sqrt{w_1 R_1 + w_2 R_2 + 2 w_1 w_2 \rho} \quad (2.2)$$

Sum of the weight functions must be unity. $w_1 + w_2 = 1$

It is possible to reduce the risk level of a portfolio by including more financial instrument in the portfolio. That means the risk of the portfolio is reduced by diversification. What is the factor that drives the effectiveness of the diversification of a particular portfolio? The risk formula of a portfolio as defined above, the effectiveness of the diversification of the portfolio depends on the correlation coefficient (ρ) of the two assets in the portfolio. The correlation coefficient shows us the relationship between two assets, and it changes between -1 and 1. The absolute value of the correlation coefficient indicates the strength of the relationship. The closer the number is to 1 the stronger the relationship, while the closer the number is to 0 the weaker the relationship. The signs of the correlation coefficient indicate the direction of the relationship. A positive sign means a positive relationship between the two assets. A negative sign means a negative relationship between the two assets. We summarize our discussions of the correlation coefficient as follows

* $\rho = 1$ means that there is an exact positive relationship between the two securities, i. e. the two move in the same direction.

* $\rho = 0$ means that there is no relationship between the two variables, i. e. the relationship is random.

* $\rho = -1$ means that there is an exact negative relationship between the two securities,

We compute the correlation value. The formula for the correlation is

$$\rho = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{(N \sum x^2 - (\sum x)^2)[N \sum y^2 - (\sum y)^2]}}$$

Where

N = Number of observation

$\sum xy$ = Sum of the product of x and y value

$\sum x$ = Sum of the x

$\sum y$ = Sum of the y

$\sum x^2$ = Sum of the square of x

$\sum y^2$ = Sum of the square of y

$$\rho_{x,y} = \text{corr}(x, y) = \frac{\text{cov}(x, y)}{\sigma_x \sigma_y} = \frac{E(X - \mu_x)(Y - \mu_y)}{\sigma_x \sigma_y} \quad (2.3)$$

Now show the Vector and Matrix notation of the portfolio's instruments.

$$\text{Expected Return Vector} = R = \begin{bmatrix} r1 \\ \vdots \\ rn \end{bmatrix} \quad \text{Weight Vector} = W = \begin{bmatrix} p1 \\ \vdots \\ pn \end{bmatrix}$$

$$\text{Expected value} \quad E(R) = W^T \times P \quad (2.4)$$

In our study the variance-covariance matrix each of the columns denoted financial instrument. The variance-covariance matrix computes the covariance between

financial instrument. The diagonal elements are the variances of the each of financial instrument. The Variance-Covariance matrix is symmetric matrix. Our main purpose of computational problem is to optimize the Variance-Covariance Istanbul Stock Exchange 30 Index and compute value of the weight functions for a given return level for computing minimum risk. Now we focus on the computing Variance-Covariance matrix methods. When we calculate the Variance-Covariance matrix we use mathematica programing language. We store Istanbul Stock Exchange 30 Index's share datas in SQL Database. We develop method for accessing database system with mathematica program. In Figure 2.2 explain the summarize of transaction which we follow for accessing database system.

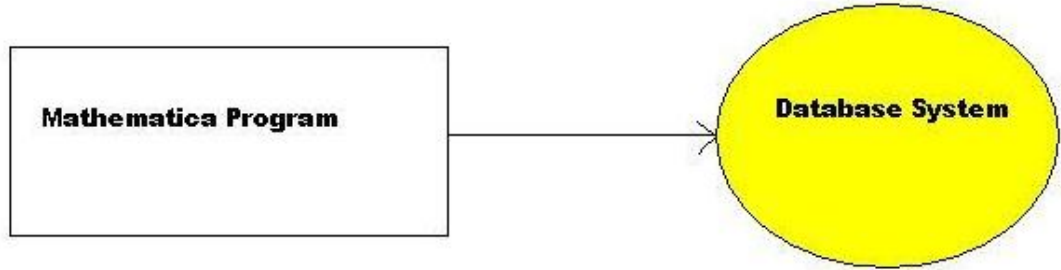


Figure 2.2 : Connection SQL database with Mathematica.

We compose the Variance-Covariance of Istanbul Stock Exchange 30 Index's share. We define the expected return level then compute the unknown weight function of each stock. Now we mention about some method of composing variance covariance matrix. One of the composing Variance-Covariance matrix is firstly each column of the matrix which is defined value of the each stock's value minus mean of the stock's value. This matrix is called A matrix. After we calculate the A matrix we product of transpose of A vector and divided the result number of observation. Variance-Covariance (V C) = $\frac{V^T V}{N}$. The other method for computing Variance-Covariance (VC) matrix is explained below expression. Figure 2. 4 is sample representation of the variance matrix.

$$V = \begin{bmatrix} r_{11} - \bar{r}_1 & r_{21} - \bar{r}_2 & \dots & \dots & r_{N1} - \bar{r}_N \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ r_{1N} - \bar{r}_1 & r_{2N} - \bar{r}_2 & \dots & \dots & r_{NN} - \bar{r}_N \end{bmatrix}$$

Figure 2.3 : Composing of variance matrix.

Figure 2.4 is sample representation of the variance matrix.

$$V = \begin{bmatrix} r_{1,1} & \dots & \dots & \dots & \dots \\ \dots & r_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & r_{n,n} \end{bmatrix}$$

Figure 2.4 : Variance matrix.

At first we have to compute variance matrix(V). It concerns standard deviation of the portfolio's stocks. On the diagonal elements are the variance of the rii elements. Correlation matrix is also included correlation between the each of two stocks. In figure 2. 4 show us correlation between the each of two stocks. On the diagonal elements are the correlation of the rii elements and it must be unique. In our computational problem we have considerably 30 variables(stocks). We estimate the relationships among all of our stock In this study , we have 435 unique correlations to estimate. We could do the computations 435 times to obtain the correlations. Or we develop computer program to automatically compute all 435. We developed program with Wolfram Mathematica. Computing of Variance-Covariance (VC) in this way We denote portfolio which contains N variable wiht symbol of $\sum$ Variance of the portfolio is shown below expression. $\sum = VCV$ Models of portfolio as a weighted combination of stocks. So that we have to define weight function. Models of portfolio as a weighted combination of stocks. So that we have to define weight function.

$$C = \begin{bmatrix} 1 & \rho_{1,2} & \dots & \dots & \rho_{1,n} \\ \rho_{2,1} & 1 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n,1} & \dots & \dots & \dots & 1 \end{bmatrix}$$

Figure 2.5 : Correlation matrix.

$$VC = \begin{bmatrix} r_{1,1} & \dots & \dots & \dots & \dots \\ \dots & r_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & r_{n,n} \end{bmatrix} \begin{bmatrix} 1 & \rho_{1,2} & \dots & \dots & \rho_{1,n} \\ \rho_{2,1} & 1 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n,1} & \dots & \dots & \dots & 1 \end{bmatrix}$$

$$\Sigma = \begin{bmatrix} r_{1,1} & \dots & \dots & \dots & \dots \\ \dots & r_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & r_{n,n} \end{bmatrix} \begin{bmatrix} 1 & \rho_{1,2} & \dots & \dots & \rho_{1,n} \\ \rho_{2,1} & 1 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n,1} & \dots & \dots & \dots & 1 \end{bmatrix} \begin{bmatrix} r_{1,1} & \dots & \dots & \dots & \dots \\ \dots & r_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & r_{n,n} \end{bmatrix}$$

$$\text{Weight Vector} = W = \begin{bmatrix} p_1 \\ \vdots \\ p_n \end{bmatrix}$$

In our study we denoted variance of the portfolio below expression.

$$\sigma_p^2 = W' \Sigma W$$

In our Computational Problem our main purpose for a given risk level we maximize the expected value. Our main function of this model is $W' \Sigma W$

$$\text{Max} \cdot \sum_{i=1}^N x_i \mu_i - 2 \sum_{x=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij}$$

In this mathematical expression. N is the number of assets, σ_{ij} is covariance between i and j. x_i is the stock variable. In our computational problem production portfolio selection we have two main boundry conditions. One of them is expected return level.

$$\sum_{i=1}^N x_i \mu_i = R$$

The other one is sum of the weight function is equal the unique.

$$\sum_{i=1}^N x_i = 1$$

When we gather together all conditions. And x_i stock variables are positive numbers.

$$Max \quad \sum_{i=1}^N x_i \mu_i - 2 \sum_{x=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij}$$

$$\sum_{i=1}^N x_i = 1$$

$$\sum_{i=1}^N x_i \mu_i = R$$

$$0 \leq x_i \leq 1 \quad i=1, 2, \dots, N$$

In our preferred model, we solve a set of linear equations using the Multivariate GARCH model, which is the most precise of the four methods discussed in this model. We compare the Multivariate garch method with the three well-established methods for computing VaR, namely, historical simulation, Variance-Covariance method and Monte Carlo Simulation. After we compute VAR with Multivariate GARCH model. We have a finite number of assets in which we can invest. We wish to consider fixed linear combinations of these assets with optimal asset allocations. Our problem is maximize the expected return which is defined as $f(x)$

$$f(x) = \mu x - x' \Sigma x$$

Take the derivative of this quadratic equation, set it equal to 0, and solve for x

$$f'(x) = x - 2 \Sigma x$$

In our quadratic equation we have 30 variables and we have constraint for sum of our variables is equal to 1. That means Our solution will involve maximizing a quadratic objective function of the portfolio weight variables subject to the assets constraint which says that the sum of the weights must equal 1. We use a standard technique called a Lagrange Multiplier to deal with the assets constraint. Now we illustrate the technique. Our function has 31 variables. Now this is set of 31 linear equation in 31 unknown which we can solve using linear algebra. Define vectors and matrices as follows. We solve the linear equation with the Gauss Siedel method.

$$f(akbank, arclk, ..., ykbnk, \lambda) = \sum_{i=1}^{30} x_i \mu_i - 2 \sum_{i=1}^{30} \sum_{j=1}^{30} x_i x_j \sigma_{ij} + \lambda (1 - \sum_{i=1}^{30} x_i)$$

$$\frac{\partial f}{\partial \mu_i} = \sum_{i=1}^{30} x_i \mu_i - 2 \sum_{i=1}^{30} \sum_{j=1}^{30} x_i x_j \sigma_{ij} + \lambda (1 - \sum_{i=1}^{30} x_i) = 0$$

$$\dots\dots\dots$$

$$\frac{\partial f}{\partial \sigma_{ij}} = \sum_{i=1}^{30} x_i \mu_i - 2 \sum_{i=1}^{30} \sum_{j=1}^{30} x_i x_j \sigma_{ij} + \lambda (1 - \sum_{i=1}^{30} x_i) = 0$$

$$\frac{\partial f}{\partial \lambda} = \sum_{i=1}^{30} x_i \mu_i - 2 \sum_{i=1}^{30} \sum_{j=1}^{30} x_i x_j \sigma_{ij} + \lambda (1 - \sum_{i=1}^{30} x_i) = 0$$

Now we mention about Gauss Siedel method. After we develop equation model we select the initial point to start the iteration. After we define the initial point we select convergence point to stop the iteration.

$$Ax=b$$

$$x_{akbank} = \frac{b_1 - a_{12}x_{arclk} - a_{1,3}x_{asybnk} - - a_{1,30}x_{ypbnk} - a_{1,31}x_{\lambda}}{a_{1,1}} \rightarrow 1.Equation$$

$$\dots\dots\dots$$

$$x_{ykbnk} = \frac{b_{30} - a_{30,1}x_{akbnk} - a_{30,2}x_{asybnk} - - a_{30,29}x_{\lambda}}{a_{30,30}} \rightarrow 30.Equation$$

$$x_{\lambda} = \frac{b_{31} - x_{akbnk} - x_{asybnk} - - x_{ykbnk}}{a_{31,31}} \rightarrow 31. Equation$$

Converge condition

$$|\varepsilon_a|_i = \frac{x_i^{new} - x_i^{old}}{x_i^{new}} \times 100 < \varepsilon_s$$

3. VALUE AT RISK MODELS AND GARCH

3. 1 Var

3. 1. 1 Historical simulation

The key assumption in historical simulation is representing what happened over a specific historical time. Historical simulation involves the set of financial instrument return changes over a historical time. For example, daily changes over the last two years. Historical simulations are the simplest way of estimating the Value at Risk for many portfolios. This method uses historical data for predicting future Value at risk. The market variables that affect the value of the asset. a time series of returns on the portfolio. Historical data is changed in each period. Historical data changes are stored in simulation scenarios. A simulation scenario is created for every risk condition. Historical Data for which risk is determined on this risk condition are changed in this scenario. The portfolio uses the simulation scenarios. Value at risk is determined on the result of profits and losses. We can use many financial instruments for computing Value at Risk. Examples of such variables are interest rates, exchange rates, equity prices. When we use a historical simulation we begin with time series data on financial instrument's historical data. In this method, we do not use the data to estimate variances and covariances, the changes in the portfolio over time, this historical information is used to compute the Value at Risk. We are going back in time such as last 250 days. And we apply the current weight functions to a time series which is occurred of historical datas. We show the return value of the historical data below expression.

$$R_{p,k} = \sum_{i=1}^N W_{i,k} R_{i,k} \quad k=1, 2, \dots, t$$

Each of the weight function keeps at their current value. This returns do not represent an actual portfolio. We reconstructs the history of a hypothetical portfolio using current position. This Figure 3.1 is the example of the daily historical data from 1992

to 1998 of Brent Crude Oil. The profits and losses are assumed that expected value of zero, distributed with normal distribution. The variance is determined using a statistical estimation. At the end of the transaction Value at Risk is determined by multiplying the variance by the confidence level in a given time horizon. In our model we use Istanbul Stock Exchange 30 Index's stocks and Istanbul Stock Exchange 100 stocks to compute the VaR. Now We describe historical simulation with following five steps.

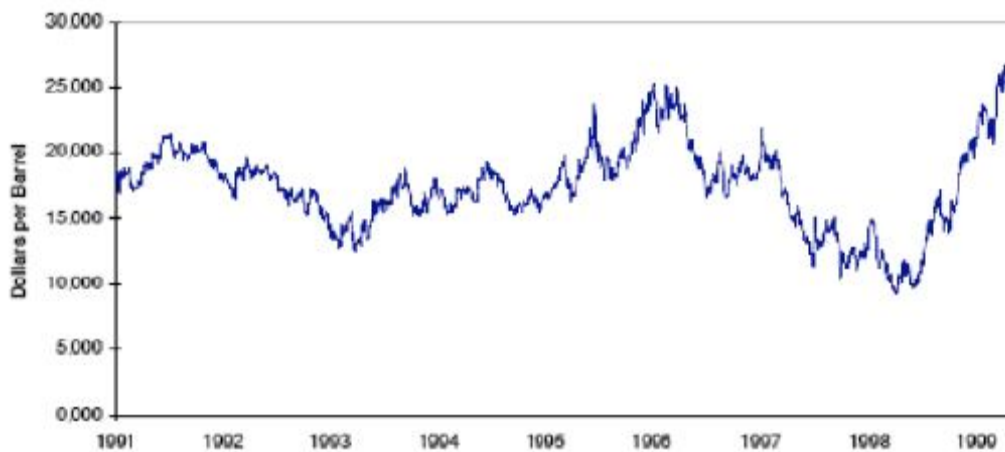


Figure 3.1 : Historical data of dollar per barrel.

1. The first step is to determine the market factors and obtain the mark-to-market value of the financial instruments.
2. The next step is to obtain the historical datas of the financial instruments which we add to portfolio, included last N periods.
3. In this step we calculate the daily profit and losses of the each of financial instrument recent last N periods.
4. The next step is to order the mark-to-market profits and losses from highest to lowest prices.
5. The end of the ordering we select a given confidence level for computing Value at Risk.

VaR is also computed by entire distrubution of hypothetical returns. This method is easy to implement. We collect daily historical mark-to-market datas. We can reuse same data for estiamting VaR. The main advantage of historical simulation is that it

makes no assumptions about risk factor changes being from a particular distribution. Another important advantage of historical simulation is that it does not involve the estimation of any statistical parameters. Disadvantages of historical simulation requires all risk factors to be available over a reasonably long historical period in order to give a good representation. If it doesn't collect all data, it will not represent good estimation.

3. 1. 2 Variance-Covariance approach

The variance-covariance method is the analytical method for estimating VaR. This approach assumes a normal distribution of portfolio returns, which requires estimating the expected return and standard deviation of portfolio. As the number of financial instruments in a portfolio increases, these calculations can become more complex and slow. This assumption has little effect on the outcome for short-term.

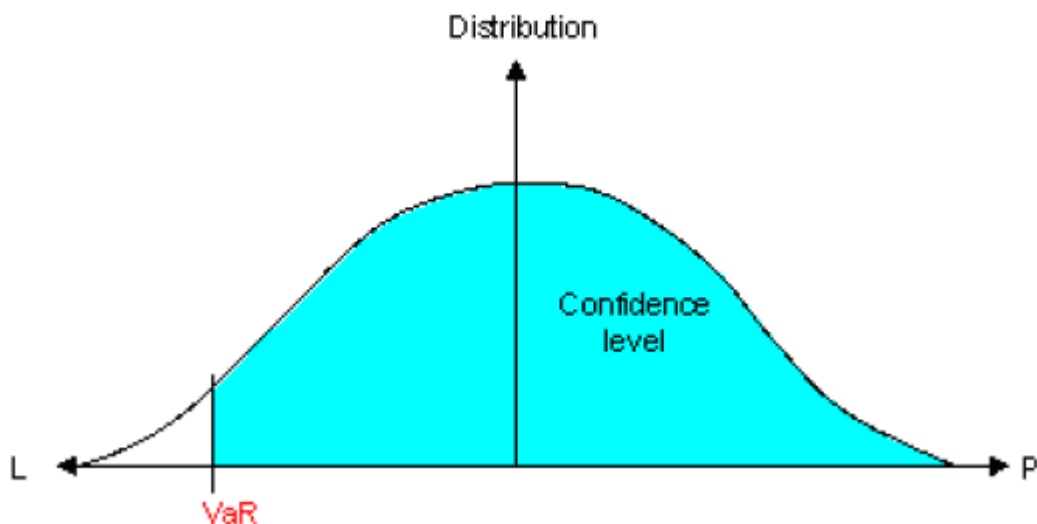


Figure 3.2 : Confidence level graph.

VaR calculations but is suitable for longer-term measures of VaR. The advantage of this method is its simplicity. The disadvantage is that the assumption of normal return distribution. In this method we use variance-covariance matrix for computing VaR. Variance and covariance are often displayed together in a variance-covariance matrix. The variances appear along the diagonal and covariances appear in the off-diagonal elements, as shown below.

$$VC = \begin{bmatrix} \sigma_{1,1} & \dots & \dots & \dots & \dots \\ \dots & \sigma_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \sigma_{n,n} \end{bmatrix} \begin{bmatrix} 1 & \rho_{1,2} & \dots & \dots & \rho_{1,n} \\ \rho_{2,1} & 1 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n,1} & \dots & \dots & \dots & 1 \end{bmatrix}$$

$$VC = \begin{bmatrix} \sigma_{1,1} & \rho_{1,2} & \dots & \dots & \rho_{1,n} \\ \rho_{2,1} & \sigma_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n,1} & \dots & \dots & \dots & \sigma_{n,n} \end{bmatrix}$$

Where

VC = is a n x n variance-covariance matrix.

r_{ii} = is the variance of i:th stock of the portfolio.

p_{ij} = is the covariance for elements from the i:th and j:th

stock of the portfolio.

N = is the number of stock of the portfolio.

3. 1. 3 Monte Carlo simulation

Monte Carlo simulation method is similar to historical method. Monte Carlo simulation techniques are the most flexible and powerful method. Monte Carlo simulations can be extended to apply over longer holding periods. It is possible for Monte Carlo Simulation to estimate credit risk. However, these techniques are the most expensive computationally. Main difference between historical simulation and Monte Carlo Simulation that the historical simulation model uses the real observed returns from the mark-to-market value of financial instruments over the last N periods to generate N hypothetical portfolio profits or losses, whereas in the Monte Carlo simulation produce pseudo numbers of hypothetical changes in the market. These new values are used to construct thousands of hypothetical profits and losses on the current portfolio, and the subsequent distribution of possible portfolio profit or loss. Finally, the VaR is determined from this distribution at a given confidence level. On this time after we compute the VaR similar ways of computing VaR with Historical simulation. Now We describe Monte Carlo simulation with following five steps.

1. The first step is scenario generation. We use the volatility and correlation estimates for the underlying assets in our portfolio, we produce a large number of pseudorandom numbers according to make up financial instruments returns.
2. The next step is to obtain the pseudorandom numbers of the financial instruments which we add to portfolio, included last N periods.
3. In this step we calculate the daily profit and losses of the each of financial instrument recent last N periods.
4. The next step is to order the mark-to-market profits and losses from highest to lowest prices.
5. The end of the ordering we select a given confidence level for computing

Value at Risk. In Figure 3.3 show us the life cycle of computing VaR with Monte Carlo simulation. Monte Carlo Simulation is the most powerful method for computing Value at Risk. Monte Carlo Method can compute for wide range of risk which include non-linear return price, volatility risk and it can include model risk. It is flexible for extreme scenario and fat tails. Risk factors models can be fitted using different distributional specifications, including non-normal distributions with Monte Carlo simulation

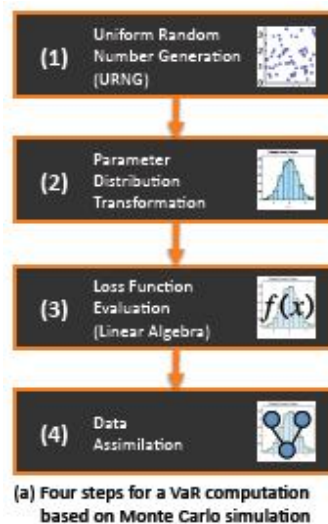


Figure 3.3: Monte Carlo histogram.

3. 2 GARCH

3. 2. 1 Arch models

For the financial institutions, today's global and highly volatile market's risk has become a very important factor. Because for the risk managers seeking to hold efficient portfolio is the main purpose, is correlation between the financial instruments to be included in the portfolio. Until recently, correlation and variance assumed that to be constant over time. However all of empirical studies that attempted to verify this finding, have failed to accept of this assumption. In fact, most experienced practitioners would accept that correlations increase in periods of high volatility and characteristic of correlation is affected by volatility. The financial instruments allocation decision entails, an assessment of the risks and returns of the various assets in the opportunity set. Choosing of an optimal portfolio requires a predict of the covariance matrix of the returns. Similarly, the calculation of the standard deviation of today's portfolio requires a covariance matrix of all financial instruments in the portfolio. These functions require estimation and forecasting of very large covariance matrices. Over the past 20 years, a considerable literature has been developed and the dynamics of the covariance of financial instruments have been explored although the primary focus has been on univariate volatilities and not on correlations (covariances). In fact, in the multivariate arch/garch literature one of the most relevant problems is represented by the high number of parameters. Recent developments in financial econometrics suggest the use of non-linear time series structures to model the risk and expected return. Bera and Higgins (1993, p. 315) remarked that a major contribution of the ARCH literature is the finding that apparent changes in the volatility of economic time series may be predictable and result from a specific type of non-linear dependence rather than exogenous structural changes in variables. The assumption base on constant volatility over specific period is statistically inefficient and inconsistent concept to use volatility on this acceptance when the series moves through time. In this case of financial returns, large returns are followed by more large returns, and small returns by more small returns. This suggests that returns are serially correlated to each other. Homoskedasticity is to be defined as the expected value of all error terms, when squared, is the same at any given point. But ARCH and GARCH models focus on the reverse assumption of this description. The returns in which the variances of the error terms are not equal, in

which the error terms may reasonably be expected to be larger for some points or ranges of the data than for others. This assumption is called heteroskedasticity. So that this assumption, arch and garch models treat heteroskedasticity as variance to be modeled. Model of prediction is computed for the variance of each error term. In generally prediction use in financial application. Now we explain two basic econometric models, the linear regression model and the autoregressive model, to illustrate the meaning of homoskedasticity or heteroskedasticity in each case. Linear regression represents a proportionality relationship between two variables.

$$y = \alpha + \beta x + \varepsilon \quad (3.1)$$

When we predict variable y is β times the expectation of the variable x plus a constant α . The relation between y and x is not exact. There is a differences between y and x . amount of ε . In standard regression theory, the error ε is assumed to have a zero mean and a constant standard deviation σ . We illustrate the standard deviation is the square root of the variance.

$$\sigma^2 = E(\varepsilon^2)$$

That means that measure of the error is positive. This homoskedastic assumption accept that size of error constant and does not depend on the size of the variable x . But heteroskedastic the assumption accept that size of the error term is not constant. In many cases, homoskedasticity is model reasonable assumption for the wide range of variable. Now we assume that $X_{(t)}$ the value of an economic time series at time t . We know that economic time series are considered to be realizations of stochastic processes. That means each point of an economic time series is a random variable. In particular, we can consider the distribution $f_{(t)}$ of each variable $X_{(t)}$ at each moment. We mention about arch/garch behavior, focusing on the error process. We assume that the conditional mean of the errors is zero. We write the error expression as

$$\varepsilon_t = Z_t \sigma_t$$

where σ_t is the conditional standard deviation and the Z_t terms are a sequence of independent, zero-mean, unit-variance, normally distributed variables. In financial and economic models. We estimate the future values with present and past value of variables. We express the autoregressive model:

$$x_{t+1} = \alpha_0 + \alpha_1 x_t + \dots + \alpha_q x_{t-n} + \varepsilon_{t+1} \quad (3.2)$$

ε_t is conditional term of the equation.

The other autoregressive model is random walk price model expression is

$$p_{t+1} = \mu_t + p_t + \varepsilon_t \quad (3.3)$$

In terms of returns, the random walk model is simply

$$r_t = \Delta p_t = \mu + \varepsilon_t \quad (3.4)$$

In two equation (3.3) and (3.4). We have introduced two different types of heteroskedasticity. In equation (3.3), Errors depend on the value of the independent variables. The average error is larger when the independent variable is larger. In equation (3.4), however, error terms are conditionally heteroskedastic because they vary with time and do not necessarily depend on the value of the process variables. Every model is characterized by a different specification of heteroskedasticity. So that arch / garch behavior of the error term depends on chosen of model. The other important concept of capture the time dependency of the variance is to use short given time horizon. One of the suggestion is deviation or variance could be calculated every day using the most recent month (22 business days) of data. This suggestion assumes that the variance of tomorrow's return model is an equally weighted average of the squared residuals of the last 22 days. In the ARCH model proposed by Engle (1982). Arch model forecasts the variance with below expression.

$$h_t = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 \quad (3.5)$$

In this model weight functions must be estimated. Arch model allows that compute the best weight function value for forecasting variance. We compute the coefficients α_i with the past through datas. We can form the errors with this expression. Where $z(t)$ are the independent variables, standard normal variables and We must be sure that in equation (3.5)

$$\varepsilon_t = \sqrt{h_t} z_t \quad (3.6)$$

Where $z(t)$ are the independent variables, standard normal variables and We must be sure that in equation (3.5) and variance is non negative.

$$\sum_{i=1}^q \alpha_i < 1$$

3. 2. 2 Garch models

A generalization of ARCH model is the GARCH parameterization introduced by Bollerslev (1986). And model shape in this form.

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_q \varepsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_p \sigma_{t-p}^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^p \beta_i \sigma_{t-i}^2 \quad (3.7)$$

where we estimate by using maximum likelihood method from return data.

Assume that the returns are ε_t^2 that are normally distributed, and the mean of the returns are zero.

$$\alpha_0 > 0, \alpha_i > 0, \beta_i > 0$$

For our computational problem we denoted the vector and the matrix representation of the Garch Models. We suppose that a stochastic vector process $\{r_t\}$ with dimension $N \times 1$ and $E r_t = 0$. F_{t-1} denote the information set generated by the observed series r_t up to and including time $t - 1$. We assume that r_t is conditionally heteroskedastic vector.

$$r_t = H_t^{1/2} \eta_t$$

given the information set F_{t-1} , where the $N \times N$ matrix $H_t = [h_{ij,t}]$ is the conditional covariance matrix of r_t and η_t is an iid vector error process such that $E \eta_t \eta_t' = I$. There is no linear dependence structure in $\{r_t\}$. R_t is a vector of log-returns of N assets. What remains to be specified is the matrix process H_t . Various parametric formulations will be reviewed in the following subsections. We modelled conditional covariance matrix H_t .

$$vech(H_t) = \alpha_0 + \sum_{i=1}^q A_i vech(r_{t-i} r_{t-i}') + \sum_{i=1}^p \beta_i vech(H_{t-i}) \quad (3.8)$$

Where conditions for H_t to be positive definite for all t α_0 is an $N(N + 1)/2 \times 1$ vector, and A_j and B_j are $N(N + 1)/2 \times N(N + 1)/2$ parameter matrices.

3. 2. 3 Qgarch models

Most of the time distribution of returns can be skewed. For example, for some stock market indices, returns are skewed to the left. This means that there are more negative returns than positive outcome observations. On this situation Garch model is not enough to estimate the volatility. For this reason a new modification is made for Garch models to compute for the skewed distribution. The Quadratic GARCH model (QGARCH) proposed by Engle and Ng (1993). And Quadratic GARCH (QGARCH) developed by Sentana (1995) is used to model symmetric effects of positive and negative shocks. In this model we formed the expression as follow:

$$\varepsilon_t = Z_t \sigma_t$$

where z_t independent identically distribution.

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_{t-1}^2 \sigma_{t-1}^2 + \phi \varepsilon_{t+1} \quad (3.9)$$

3. 2. 3 Egarch models

One of the advantages of Garch Models capture the thick tail returns and volatility clustering. But it is not well-established to capture the leverage effect. In equation (3.6) conditional variance is a function only of the magnitudes of the lagged residuals but not their signs. For this reason (1991) Nelson developed EGARCH(Exponential General AutoRegressive Conditional Heteroskedastic) models both for size and sign of the lagged residual. It is shown as:

$$\ln(\sigma_t^2) = w + \sum_{i=1}^q \beta_i g(z_{t-i}) + \sum_{i=1}^p \alpha_i \ln(\sigma_{t-i}^2) \quad (3.10)$$

3. 3 Var Risk with Garch

Multivariate GARCH models can also be used to estimate VaR. To estimate VaR using GARCH, obtain return of stocks for the portfolio and then fit the model to these returns. In this part we evaluate the performance of GARCH models for computing Value-at-Risk (VaR) of our diversified portfolios which include in the

Istanbul Stock Exchange 30 Index's stocks, using a number of distributional assumptions and sample sizes. We compute the return value of each stocks. The choice of return of stock's size is important for computing VaR, whereas the specification of the conditional mean in different distributions are able to produce better VaR forecasts. With model we first obtain the returns of the each of Istanbul Stock Exchange 30 Index's stocks. Obtaining of return is shown follow expression.

$$y_t = \ln(S_t / S_{t-1})$$

denote the return from time $t - 1$ to t We assume that the time series of interest

$$y_t = E(y_{t-1}) + \varepsilon_t$$

E is the conditional mean operator.

The conditional mean return is autoregressive process, $AR(q)$

$$E(y_t) = c_0 + \sum_{i=1}^q c_i y_{t-i}$$

ε_t can be expressed as an ARCH process in the following form.

$$\varepsilon_t = z_t \sigma_t$$

where $z(t)$ is independently and identically distributed random variables with mean zero and unit variance. σ_t is the conditional variance. As we mention before that Engle (1982) introduced the ARCH(q) model q .

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 \quad (3.11)$$

As we remember that the conditional variance to be positive and the parameters of equation (3.10) must satisfy $\alpha_0 > 0$, $\alpha_i > 0$, $i = 1, 2, \dots, q$ And again we remember that Bollerslev (1986) proposed the generalized ARCH or GARCH($p; q$), model.

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^p \beta_i \sigma_{t-i}^2 \quad (3.12)$$

where must satisfy $\alpha_0 > 0$, $\alpha_i > 0$, $i=1, 2, \dots, q$ and $\beta_i > 0$ $i=1, 2, \dots, q$

For computing VaR with Garch Model we obtain the return of each stocks. The Variance-Covariance matrix is modeled by returning of Garch Model results. After we modeled the Variance-Covariance matrix, we denoted below expression we apply same steps of computing of the variance-covariance method.

$$\Sigma = \begin{bmatrix} \sigma_{1,1} & \dots & \dots & \dots & \dots \\ \dots & \sigma_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \sigma_{n,n} \end{bmatrix} \begin{bmatrix} 1 & \rho_{1,2} & \dots & \dots & \rho_{1,n} \\ \rho_{2,1} & 1 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n,1} & \dots & \dots & \dots & 1 \end{bmatrix} \begin{bmatrix} \sigma_{1,1} & \dots & \dots & \dots & \dots \\ \dots & \sigma_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \sigma_{n,n} \end{bmatrix}$$

W is weighting function vector of each stock. In our study we denoted variance of the portfolio below expression

$$\sigma_p^2 = w' \Sigma w$$

After we compute the variance we apply classical steps to compute VaR.

$$VaR(Mean) = w_0 \sigma \alpha \sqrt{\Delta t} \quad (3.13)$$

w_0 : Initial Value of Instrument

σ : Confidence Level

Δ_t : Time Horizon

4. EMPRICAL APPROACH

4. 1 Obtaining of Data and Data Analysis

In this part, We mention about the our data set. The Istanbul Stock Exchange Index consists of National market , Second National market, New Economical Market, Funds Market, Watch List Market. National Market is the biggest market in this market. We classify National Market in three part IMKB100 Index, IMKB50 Index, IMKB30 Index. In our study we focus on the Istanbul Stock Exchange 30 Index's stock. In Table 4.1 show us the market value of each stock. We study with this

Table 4.1 : Market value of the company.

Stock Code	Stock Name	Value of Stock
AKBNK	Akbank	31.040.000.915 TL
ARCLK	Arçelik	5.378.794.905 TL
ASYAB	Asya Bank	2.339.999.914 TL
BIMAS	Bim Birleşik Mağazalar	7.893.600.000 TL
DOHOL	Doğan Holding	2.768.499.988 TL
DYHOL	Doğan Yayın Holding	1.480.000.019 TL
ECILC	Eczacıbaşı İlaç	1.293.770.882 TL
ENKAI	Enka İnşaat	13.507.999.706 TL
EREGL	Ereğli Demir Çelik	6.944.000.244 TL
GARAN	Garanti Bankası	30.828.000.640 TL
ISCTR	İş Bankası	23.399.843.141 TL
KRDMD	Kardemir D	54.1272.585 TL
KCHOL	Koç Holding	18.741.486.952 TL
KOZAA	Kozaa Anadolu Metal	956.617.166 TL
PETKM	Petkim	2.700.000.047 TL
SAHOL	Sabancı Holding	14.894.920.389 TL
SKBNK	Şeker Bank	1.200.000.017 TL
SISE	Şişe Cam	4.678.960.174 TL
HALKB	Halk Bankası	15.625.000.000 TL
TAVHL	TAVHavalimanları	2.695.545.047 TL
TKFEN	TekfenHolding	2.190.400.028 TL
TEBNK	Türk.EkonomiBankası	4.761.482.589 TL
TOASO	Tofaş Otomobil Fabrikası.	3.839.999.914 TL
TCELL	Turkcell	20.151.999.664 TL
TUPRS	Tüpraş	11.218.771.008 TL
THYAO	TürkHavaYolları	4.429.999.828 TL
TTKOM	TürkTelekom	27.720.000.267 TL
VAKBN	VakıflarBankası	9.750.000.238 TL
VESTL	Vestel	845.349.113 TL
YKBNK	YapıveKrediBank.	18.692.315.829 TL

Istanbul Stock Exchange 30 Index with AKBNK, ARCLK, ASYAB, BIMAS, DOHOL, DYHOL, ECILC, ENKAI, EREGL, GARAN, ISCTR, KRDM, KCHOL, KOZAA, PETKM, SAHOL, SKBNK, SISE, HALKB, TAVHL, TKFEN, TEBNK, TOASO, TCELL, TUPRS, THYAO, TTKOM, VAKBN, VESTL, YKBNK stocks code. Our observations are the daily returns of Istanbul Stock Exchange 30 Index's stocks from 1 January 2010 to 25 April 2011. In this section we compare some of the computing VaR models considered in previous sections by fitting them to the same data set. We simulate the same data set for composing the same conditions for calculating the VaR. In the first the raw data are the daily share price indices of the the Istanbul Stock Exchange 30 Index's stocks from 1 January 2010 to 25 April 2011. The day corresponding to Turkey public are removed from the series to avoid zero returns. The statical values of our portfolio is represented in the Table 4.3. Table 4.2 show us the range of the each of the IMKB 30 stock.

Table 4.2 : Range of data set of IMKB_30.

Stock Code	Stock Name	Begining date of stock	Ending date of stock
AKBNK	Akbank	01.01.2010	26.04.2011
ARCLK	Arçelik	01.01.2010	26.04.2011
ASYAB	Asya Bank	01.01.2010	26.04.2011
BIMAS	Bim Birleşik Mağazalar	01.01.2010	26.04.2011
DOHOL	Doğan Holding	01.01.2010	26.04.2011
DYHOL	Doğan Yayın Holding	01.01.2010	26.04.2011
ECILC	Eczacıbaşı İlaç	01.01.2010	26.04.2011
ENKAI	Enka İnşaat	01.01.2010	26.04.2011
EREG	Ereğli Demir Çelik	01.01.2010	26.04.2011
GARAN	Garanti Bankası	01.01.2010	26.04.2011
ISCTR	İş Bankası	01.01.2010	26.04.2011
KRDM	Kardemir D	01.01.2010	26.04.2011
KCHOL	Koç Holding	01.01.2010	26.04.2011
KOZAA	Kozaa Anadolu Metal	01.01.2010	26.04.2011
PETKM	Petkim	01.01.2010	26.04.2011
SAHOL	Sabancı Holding	01.01.2010	26.04.2011
SKBNK	Şeker Bank	01.01.2010	26.04.2011
SISE	Şişe Cam	01.01.2010	26.04.2011
HALKB	Halk Bankası	01.01.2010	26.04.2011
TAVHL	TAVHavalimanları	01.01.2010	26.04.2011
TKFEN	TekfenHolding	01.01.2010	26.04.2011
TEBNK	Türk.EkonomiBankası	01.01.2010	26.04.2011
TOASO	Tofaş Otomobil Fabrikası.	01.01.2010	26.04.2011
TCELL	Turkcell	01.01.2010	26.04.2011
TUPRS	Tüpraş	01.01.2010	26.04.2011
THYAO	TürkHavaYolları	01.01.2010	26.04.2011
TTKOM	TürkTelekom	01.01.2010	26.04.2011
VAKBN	VakıflarBankası	01.01.2010	26.04.2011
VESTL	Vestel	01.01.2010	26.04.2011
YKBNK	YapıveKrediBank.	01.01.2010	26.04.2011

All the data are collected on the same dates across the stock exchanges and there are 322 observations for each series are used to calculate the VaRs. Data are retrieved from the Finance data bank in www.hsbc.com.tr web site. And After we collected all the datas from www.hsbc.com.tr web site.

Table 4.3 : Statical value of IMKB30 stocks for 322 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
AKBNK	322	-8.99E-05	0.025573	-3.212610	36.89327	15966.33	0.000
ARCLK	322	0.001397	0.023063	0.020981	7.328381	251.3833	0.000
ASYAB	322	-0.000171	0.022400	-0.167915	4.744587	42.34790	0.000
BIMAS	322	0.001153	0.018279	0.017222	4.434271	27.61579	0.000
DOHOL	322	0.000748	0.021282	1.057628	8.941870	533.7167	0.000
DYHOL	322	0.001374	0.031333	1.692021	12.42066	1344.358	0.000
ECILC	322	0.000223	0.027475	0.715861	18.72354	3344.502	0.000
ENKAI	322	4.43E-06	0.028229	0.678956	35.96222	14602.06	0.000
EREGL	322	-0.000615	0.026418	-5.311612	52.23987	34043.68	0.000
GARAN	322	0.000906	0.022829	0.029698	3.397503	2.167283	0.000
ISCTR	322	0.000902	0.020934	0.144117	4.352587	25.66032	0.000
KRDMD	322	0.001331	0.023476	0.656007	5.708285	121.5038	0.000
KCHOL	322	0.001974	0.021025	0.486574	5.687251	109.5918	0.000
KOZAA	322	0.000503	0.020976	-0.239699	4.628636	38.67057	0.000
PETKM	322	0.001593	0.018877	1.103197	9.916655	707.1695	0.000
SAHOL	322	0.001180	0.020536	0.525089	5.616115	106.6213	0.000
SKBNK	322	0.000264	0.019976	-0.487506	4.755801	54.11592	0.000
SISE	322	0.002390	0.020160	0.187403	4.244442	22.66229	0.000
HALKB	322	0.000605	0.023959	0.641931	6.053466	147.2071	0.000
TAVHL	322	0.001716	0.021559	-0.257307	4.662014	40.61385	0.000
TKFEN	322	0.001062	0.022021	-0.207263	3.874464	12.56498	0.000
TEBNK	322	-0.000484	0.026157	1.033070	10.61020	834.3025	0.000
TOASO	322	0.002174	0.023690	-0.098426	4.951088	51.59373	0.000
TCELL	322	-0.000729	0.018345	-0.992201	6.459598	213.4145	0.000
TUPRS	322	0.001760	0.021422	-0.021013	4.223851	20.11935	0.000
THYAO	322	-0.000433	0.025047	-0.191530	10.19664	696.8401	0.000
TTKOM	322	0.001808	0.017383	-0.508617	4.515221	44.68637	0.000
VAKBN	322	0.001134	0.032514	1.854672	17.51020	3009.427	0.000
VESTL	322	0.000286	0.020802	0.377352	7.386384	265.7834	0.000
YKBNK	322	0.001515	0.021698	-0.050829	4.113361	16.76958	0.002

We compare data with other data source. Data are corrected by hedge fund online website. We download java matrix program and compare data with this application. Appendix A parts presents the time plot of the series, which fluctuate on a daily and longer term basis. Data are for the sample period between January 1, 2010 and April 26, 2011, amounting to 322 trading days. We show the daily return end of day The Istanbul Stock Exchange 30 Index's. Stock Value in Part of Appendix C. After we arrange data set we check the data set for our VaR computation case, We examine the mean, variance, skewness, and kurtosis of the returns. The mean, variance, skewness, and excess kurtosis of the returns are shown in the Table 4.3. In Appendix Part we illustrate the each of stocks histograms. The third moment of the normal distribution function is skewness. When referring to the shape of frequency or probability distributions, skewness refers to asymmetry of the distribution. The skewness value can be positive or negative, or even undefined. A distribution with an asymmetric tail extending out to the right is referred to as positively skewed or skewed to the right, while a distribution with an asymmetric tail extending out to the left is referred to as negatively skewed or skewed to the left. Skewness can range from minus infinity to positive infinity. While a distribution with a symmetric means, skewness of the distribution equals to zero. In our portfolio when we look at the Table 4.3 AKBNK, ASYAB, EREGL, KOZAA, SKBNK, TAVHL, TCELL, TOASO, TUPRS, TKFEN, THYAO, TTKOM, YKBNK stocks have negative skewed, skewed to the left and ARCLK, BIMAS, DOHOL DYHOL, ECILC, ENKAI, GARAN ISCTR, KRDMMD, KCHOL, PETKM, SAHOL, SISE, HALKB, TEBNK, VAKBN, VESTL stocks have positive skewed, skewed to the right. When we look at the Table 4.3, EREGL has the lowest skewness, and VAKBN has the highest skewness. BIMAS is the so close the value of the zero. That means BIMAS is so close to normal distribution. The fourth moment of the normal distribution function is kurtosis. The kurtosis describe the distribution of observed data around the mean. In normally Kurtosis of normal distribution is 3. When we look at the Table 4.3, we recognize that EREGL has the maximum value of kurtosis mean that if EREGL has a maximum risk. The other parameter which control the normal distribution function is Jargue-Bera coefficient (JB). When Jargue-Bera coefficient (JB) is bigger then three and probability coefficient is smaller than %1 that means Each of the stock series is appropriate for normal distribution. When we investigate the Table 4.3. We recognize that none

of the stock series is distributed normally. When we complete our controls we realise that the Istanbul Stock Exchange 30 Index's stock are not distributed normally for evaluating skewness and kurtosis values. 13 stocks skew to the left, 17 stocks skew to the right and we understand that none of the series are distributed normally for checking Jargue-Bera coefficient. We illustrated each of the stocks details in Appendix B. Our study is concern the comparing the IMKB 30 stocks which concern 322,600,1400 observation with the real value of the IMKB 30 Stocks. Table 4.4 and Table 4.5 is concerning 600 and 1400 statical values of IMKB 30.

Table 4.4 : Statical value of IMKB30 stocks for 600 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
AKBNK	600	-0.004452	0.015757	-0.400209	2.941307	0.724626	0.696064
ARCLK	600	-0.002220	0.028675	-0.289069	2.802560	0.419879	0.810633
ASYAB	600	0.005651	0.030577	-0.462106	2.510057	1.230989	0.540374
BIMAS	600	0.000103	0.014615	0.180825	4.222808	1.829305	0.400656
DOHOL	600	0.002868	0.040640	1.290026	5.719485	1.580881	0.000369
DYHOL	600	0.012593	0.054612	1.684005	7.608218	3.665157	0.000000
ECILC	600	0.001553	0.036517	1.426932	6.686063	2.444805	0.000005
ENKAI	600	-0.003607	0.020454	0.180230	2.156622	0.946371	0.623015
EREGL	600	-0.001156	0.019462	-0.619108	3.133382	1.744842	0.417939
GARAN	600	-0.002253	0.017837	-0.299380	2.204545	1.115170	0.572590
ISCTR	600	-0.001282	0.021177	-0.069387	2.721935	0.108651	0.947124
KRDMD	600	-0.002834	0.018929	-0.467374	3.022624	0.983551	0.611540
KCHOL	600	0.002085	0.024356	0.131739	2.020973	1.156404	0.560906
KOZAA	600	-0.003448	0.029694	-0.441156	2.459381	1.204588	0.547554
PETKM	600	0.005446	0.022075	-0.123184	2.372735	0.510928	0.774557
SAHOL	600	0.001138	0.019572	0.037776	3.534112	0.327357	0.849015
SKBNK	600	-0.004251	0.025445	-0.664558	2.956905	1.989457	0.369824
SISE	600	-0.000544	0.023022	-0.238862	3.954207	1.281072	0.527010
HALKB	600	-0.006370	0.022147	0.509136	2.713764	1.258662	0.532948
TAVHL	600	0.010336	0.026955	0.834544	3.491127	3.405441	0.182187
TKFEN	600	0.003686	0.029770	-0.062847	2801498	0.062103	0.969426
TEBNK	600	-0.008902	0.017934	-0.337632	2434889	0.872250	0.646537
TOASO	600	0.005678	0.026483	-0.287828	2868831	0.392158	0.821947
TCELL	600	-0.001167	0.022934	-0.727035	3657059	2864300	0.238795
TUPRS	600	-0.001219	0.027601	-0.236895	2828068	0.285793	0.866844
THYAO	600	-0.003525	0.021596	-0.089167	3272043	0.119036	0.942218
TTKOM	600	0.003029	0.020918	-0.101392	2411906	0.435348	0.804388
VAKBN	600	0.005398	0.049836	0.357955	4917740	4714036	0.094702
VESTL	600	-0.001904	0.030375	0.033281	3906335	0.929108	0.628415
YKBNK	600	0.000210	0.020832	-0.378942	3149103	0.671197	0.714910

Table 4.5 : Statical value of IMKB30 stocks for 1400 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
AKBNK	1400	-0.000918	0.036052	-3779531	3041770	3269183	0.000000
ARCLK	1400	0.001825	0.031924	0.186076	5618252	2826637	0.000001
ASYAB	1400	0.000254	0.027357	-0.519298	3878609	7479654	0.023758
BIMAS	1400	0.001044	0.021570	0.201478	4482919	9544087	0.008463
DOHOL	1400	0.001500	0.027431	1350040	8364169	1457616	0.000000
DYHOL	1400	0.001307	0.037232	1779692	1208822	3850289	0.000000
ECILC	1400	-0.000781	0.034520	0.997777	6109976	5518567	0.000000
ENKAI	1400	-0.002014	0.044353	0.736635	1974747	1142370	0.000000
EREGL	1400	-0.003391	0.032119	-5048079	4028900	6031791	0.000000
GARAN	1400	0.001145	0.027137	0.131654	3420422	0.994595	0.608172
ISCTR	1400	-0.000761	0.029845	1351080	6815618	8835329	0.000000
KRDMD	1400	0.001750	0.024191	0.270527	4139702	6432956	0.040096
KCHOL	1400	0.002440	0.026985	0.853976	5515884	3737238	0.000000
KOZAA	1400	-0.001672	0.028479	-0.159768	3527002	1535167	0.464133
PETKM	1400	7.28E-05	0.028646	0.886293	6110279	5179758	0.000000
SAHOL	1400	0.003443	0.026828	1183989	6799051	8099544	0.000000
SKBNK	1400	0.001314	0.024294	0.264547	4020376	5339482	0.069270
SISE	1400	-4.35E-05	0.021915	0.584275	4732091	1764450	0.000147
HALKB	1400	-0.001781	0.023078	-0.714444	3813902	1092931	0.004234
TAVHL	1400	0.002034	0.028604	-0.250673	3906893	4339953	0.114180
TKFEN	1400	-0.003135	0.021262	-0.905706	4437257	2161048	0.000020
TEBNK	1400	-0.002052	0.032563	0.198654	4643892	1156012	0.003089
TOASO	1400	-0.002175	0.031390	0.110707	1021064	2103378	0.000000
TCELL	1400	0.000164	0.027574	0.043239	2983403	0.031339	0.984453
TUPRS	1400	0.002120	0.026667	-0.702265	4429244	1622908	0.000299
THYAO	1400	0.000517	0.020177	-1027010	5444827	4120956	0.000000
TTKOM	1400	0.000211	0.024485	-0.175336	3681187	2372405	0.305379
VAKBN	1400	0.003983	0.052511	1350110	8228785	1399685	0.000000
VESTL	1400	-0.001223	0.028698	0.527426	5793408	3603485	0.000000
YKBNK	1400	0.002708	0.024886	0.253892	3539719	2219450	0.329650

In Table 4.6 show us the market value of each stock. We study with this concerning 100 Istanbul Stock Exchange with ACIBD ,ADANA ,ADBGR ,ADNAC ,ADEL ,SASA,AFMAS,AFYON,AKENR,AKYO,AKALT,AKBNK,AKCNS,AKFEN,ATE

KS,AKMGY,AKSA,AKSEN,AKGRT,AKSUE,TUPRS,ALCAR,ALGYO,ALARK,ALBRK,ALCTL,ALKA,ALKIM,ARFYO,ALNTF,ALYAG,ALTIN,AYCES,ANACM,AEFES,ANHYT,ASUZU,ANSGR,ANELE,ANELT,THYAO,ARCLK,ARENA,ARMDA,ARSAN,ASELS,ASLAN,ASYAB,ATAYO,AGYO,ATSYO,ATLAS,AVIVA,AVRSY,AYEN,AYGAZ,BAGFS,BAKAB,BANVT,BSKYO,BTCIM,BSOKE,DYHOL,BERDN,BJKAS,BIMAS,BRKO,BRMEN,BISAS,BOLUC,BROVA,BRSAN,BRYAT,BFREN,BOSSA,PETKM,BOYNR,BRISA,BSHEV,BUMYO,BURCE,BURVA,BUCIM,CARFA,CARFB,CEYLN,TTKOM,CCOLA,CRDFA,CBSBO,PRTAS,CLEBI,CELHA,CEMAS,CEMTS,CMBTN,CMENT,CIMSA,DARDL,DGATE

stocks code. Our observations are the daily returns of concerning 100 Istanbul Stock Exchange from 01. November .2010 to 25 April 2011 .All the data are collected on the same dates across the stock exchanges and there are 158 observations for each series are used to calculate theVaRs. Data are retrieved from the Finance data bank in [www. hsb. com. tr](http://www.hsb.com.tr) web site. And After we collected all the datas from [www. hsb. com. tr](http://www.hsb.com.tr) web site, We compare datas with other datasource. Datas are corrected by [hedefonline](http://hedefonline.com) website. We download java matrix program and compare datas with this application. Data are for the sample period between Nov 1, 2010 and April 26, 2011, amounting to 158 trading days. All the data are collected on the same dates across the stock exchanges and there are 158 observations for each series are used to compare theVaRs. Data are retrieved from the Finance data bank in [www. hsb. com. tr](http://www.hsb.com.tr) web site. And After we collected all the datas from [www. hsb. com. tr](http://www.hsb.com.tr) web site, We compare datas with other datasource. Datas are corrected by [hedefonline](http://hedefonline.com) website. We download java matrix program and compare datas with this application. Data are for the sample period between November 1, 2010 and April 26, 2011, amounting to 158 trading days. In Table 4.7 shows us the range of the data set which concern 100 IMKB Stocks. Some of the stocks are in the both IMKB 30 stocks and 100 IMKB stocks list. We use this same stocks in same list of tables. We use for this same share stocks in same range area. We use 322 trail day for IMKB 30 stocks and we use 158 trading days for 100 IMKB stocks. One of the most important thing that we use the same share stocks in the two portfolio we spend less time for gathering data. We use same data range in IMKB 30 and 100 IMKB stocks for calculating value at risk and computing computational problem.

Table 4.6 : Market value of the 100 IMKB company.

Stock Code	Stock Name	Value of Stock
ACIBD	Acıbadem Sağlık	1.800.000.000 TL
ADANA	Adana Çimento (A)	504.400.000.000 TL
ADBGR	Adana Çimento (B)	305.900.000.000 TL
ADEL	Adel Kalemcilik	205.500.000.000 TL
ADNAC	Adana Çimento (C)	160.400.000.000 TL
AEFES	Anadolu Efes	104.400.000.000 TL
AFMAS	AFM Film	217.900.000.000 TL
AFYON	Afyon Çimento	522.000.000.000 TL
AGYO	Atakule GMYO	119.3000.000.00 TL
AKALT	Akal Tekstil	793.000.000.000 TL
AKBNK	Akbank	3.216.000.000.000 TL
AKCNS	Akçansa	1489.500.000.000 TL
AKENR	Ak Enerji	1428.100.000.000 TL
AKFEN	Akfen Holding	1702.400.000.000 TL
AKGRT	Aksigorta	615.100.000.000 TL
TUPRS	Tüpraş	11.218.771.008 TL
AKMGY	Akmerkez GMYO	1116.600.000.000 TL
AKSA	Aksa	773.300.000.000 TL
AKSEN	Aksa Enerji	2.806.700.000.000 TL
AKSUE	Aksu Enerji	48.900.000.000 TL
AKYO	Ak Yat.Ort.	30.600.000.000 TL
ALARK	Alarko Holding	824.600.000.000 TL
ALBRK	Albaraka Türk	139.600.000.000 TL
ALCAR	Alarko Carrier	366.100.000.000 TL
ALCTL	Alcatel Lucent Teletaş	150.200.000.000 TL
ALGYO	Alarko GMYO	202.900.000.000 TL
ALKA	Alkim Kağıt	86.100.000.000 TL
ALKIM	Alkim Kimya	200.800.000.000 TL
ALNTF	AlternatifBank	498.000.000.000 TL
ALTIN	Altınıyıldız	664.00.000.000 TL
ALYAG	Altınyag	31.800.000.000 TL
ANACM	Anadolu Cam	1.305.4000.000.000 TL
ANELE	Anel Elektrik	246.400.000.000 TL
ANELT	Anel Telekom	70.500.000.000 TL
ANHYT	Anadolu Hayat Emek.	138.500.000.000 TL
ANSGR	Anadolu Sigorta	670.000.000.000 TL
THYAO	TürkHavaYolları	4.429.999.828 TL
ARCLK	Arçelik	5689,600.000.000 TL
ARENA	Arena Bilgisayar	100,500.000.000 TL
ARFYO	Alternatif Yat.Ort.	23.400.000.000 TL
ARMDA	Armada Bilgisayar	45.400.000.000 TL
ARSAN	Arsan Tekstil	101.600.000.000 TL
ASELS	Aselsan	2065.300.000.000 TL
ASLAN	Aslan Çimento	105.8500.000.000 TL
ASUZU	Anadolu Isuzu	258.000.000.000 TL
ASYAB	Asya Katılım Bankası	271.800.000.000 TL
ATAYO	Ata Yat.Ort.	9.600.000.000 TL
ATEKS	Akın Tekstil	112.100.000.000 TL
ATLAS	Atlas Yat. Ort.	5.700.000.000 TL
ATSYO	Atlantis Yat. Ort.	6.200.000.000 TL
AVIVA	Aviva Sigorta	975.000.000.000 TL

Table 4.6 (continue): Market value of the 100 IMKB company.

Stock Code	Stock Name	Value of Stock
AVRSY	Avrasya Yatırım Ortaklığı	10.000.000.000 TL
AYCES	Altinyunus Çeşme	227.100.000.000 TL
AYEN	Ayen Enerji	388.700.000.000 TL
AYGAZ	Aygaz	319.500.000.000 TL
BAGFS	Bagfaş	562.500.000.000 TL
BAKAB	Bak Ambalaj	75.200.000.000 TL
BANVT	Banvit	495.100.000. TL
DYHOL	Doğan Yayın Holding	1.480.000.019 TL
BERDN	Berdan Tekstil	3.300.000.000 TL
BFREN	Bosch Fren Sistemleri	537.500.000.000 TL
BIMAS	Bim Mağazalar	8045.400.000.000 TL
BISAS	Bisaş Tekstil	17.900.000.000 TL
BJKAS	Beşiktaş Futbol Yat.	402.000.000.000 TL
BOLUC	Bolu Çimento	262.100.000.000 TL
BOSSA	Bossa	303.500.000.000 TL
BOYNR	Boyrer Mağazacılık	383.000.000.000 TL
BRISA	Brisa	1354.400.000.000 TL
BRKO	Birko Mensucat	51.000.000.000 TL
BRMEN	Birlik Mensucat	22.100.000.000 TL
BROVA	Borova Yapı	34.700.000.000 TL
BRSAN	Borusan Mannesmann	609.500.000.000 TL
BRYAT	Borusan Yat. Paz.	296.700.000.000 TL
BSHEV	BSH Ev Aletleri	567.000.000.000 TL
BSKYO	Başkent Yat. Ort.	10.600.000.000 TL
BSOKE	Batisöke Çimento	145.700.000.000 TL
BTCIM	Batı Çimento	572.400.000.000 TL
BUCIM	Bursa Çimento	529.100.000.000 TL
BUMYO	Bumerang Yat.Ort.	8.000.000.000 TL
BURCE	Burçelik	162.000.000.000 TL
BURVA	Burçelik Vana	16.400.000.000 TL
PETKM	Petkim	2.700.000.047 TL
CARFA	Carrefoursa(A)	129.300.000.000 TL
CARFB	Carrefoursa(B)	1113.800.000.000 TL
CBSBO	Çbs Boya	10.600.000.000 TL
COLA	Coca Cola İçecek	5799.700.000.000 TL
CELHA	Çelik Halat	72.300.000.000 TL
CEMAS	Çemaş Döküm	171.600.000.000 TL
CEYLN	Ceylan Giyim	14.000.000.000 TL
CEMTS	Çemtaş	121.200.000.000 TL
CIMSA	Çimsa	1337.300.000.000 TL
CLEBI	Çelebi	697.400.000.000 TL
CMBTN	Çimbeton	95.600.000.000 TL
CMENT	Çimentaş	852.000.000.000 TL
CRDFA	Creditwest Faktoring	162.000.000.000 TL
TTKOM	TürkTelekom	27.720.000.267 TL
DARDL	Dardanel	61.200.000.000 TL
DGATE	Datagate Bilgisayar	39.100.000.000 TL
PRTAS	ÇBS Printaş	11.500.000.000 TL

Table 4.7 : Range of data set of concerning 100 IMKB stock.

Stock Code	Stock Name	Beginning date of stock	Ending date of Stock
ACIBD	Acıbadem Sağlık	01.11.2010	26.04.2011
ADANA	Adana Çimento (A)	01.11.2010	26.04.2011
ADBGR	Adana Çimento (B)	01.11.2010	26.04.2011
ADNAC	Adana Çimento (C)	01.11.2010	26.04.2011
ADEL	Adel Kalemcilik	01.11.2010	26.04.2011
SASA	Advansa Sasa	01.11.2010	26.04.2011
AFMAS	AFM Film	01.11.2010	26.04.2011
AFYON	Afyon Çimento	01.11.2010	26.04.2011
AKENR	Ak Enerji	01.11.2010	26.04.2011
AKYO	Ak Yat.Ort.	01.11.2010	26.04.2011
AKALT	Akal Tekstil	01.11.2010	26.04.2011
AKBNK	Akbank	01.11.2010	26.04.2011
AKCNS	Akçansa	01.11.2010	26.04.2011
AKFEN	Akfen Holding	01.11.2010	26.04.2011
ATEKS	Akın Tekstil	01.11.2010	26.04.2011
AKMGY	Akmerkez GMYO	01.11.2010	26.04.2011
AKSA	Aksa	01.11.2010	26.04.2011
AKSEN	Aksa Enerji	01.11.2010	26.04.2011
AKGRT	Aksigorta	01.11.2010	26.04.2011
AKSUE	Aksu Enerji	01.11.2010	26.04.2011
ALCAR	Alarko Carrier	01.11.2010	26.04.2011
ALGYO	Alarko GMYO	01.11.2010	26.04.2011
ALARK	Alarko Holding	01.11.2010	26.04.2011
ALBRK	Albaraka Türk	01.11.2010	26.04.2011
ALCTL	Alcatel Lucent Teletaş	01.11.2010	26.04.2011
ALKA	Alkim Kağıt	01.11.2010	26.04.2011
ALKIM	Alkim Kimya	01.11.2010	26.04.2011
ARFYO	Alternatif Yat.Ort.	01.11.2010	26.04.2011
ALNTF	AlternatifBank	01.11.2010	26.04.2011
ALYAG	Altınyag	01.11.2010	26.04.2011
ALTIN	Altınyıldız	01.11.2010	26.04.2011
AYCES	Altınyunus Çeşme	01.11.2010	26.04.2011
ANACM	Anadolu Cam	01.11.2010	26.04.2011
AEFES	Anadolu Efes	01.11.2010	26.04.2011
ANHYT	Anadolu Hayat Emek.	01.11.2010	26.04.2011
ASUZU	Anadolu Isuzu	01.11.2010	26.04.2011
ANSGR	Anadolu Sigorta	01.11.2010	26.04.2011
ANELE	Anel Elektrik	01.11.2010	26.04.2011
ANELT	Anel Telekom	01.11.2010	26.04.2011
ARCLK	Arçelik	01.11.2010	26.04.2011
ARENA	Arena Bilgisayar	01.11.2010	26.04.2011
ARMDA	Armada Bilgisayar	01.11.2010	26.04.2011
ARSAN	Arsan Tekstil	01.11.2010	26.04.2011
COLLA	Coca Cola İçecek	01.11.2010	26.04.2011
CRDFA	Creditwest Faktoring	01.11.2010	26.04.2011
DARDL	Dardanel	01.11.2010	26.04.2011
DGATE	Datagate Bilgisayar	01.11.2010	26.04.2011
DYHOL	Doğan Yayın Hol.	01.11.2010	26.04.2011

Table 4.7 (continue): Range of data set of concerning 100 IMKB stock.

Stock Code	Stock Name	Beginning date of stock	Ending date of Stock
ASELS	Aselsan	01.11.2010	26.04.2011
ASLAN	Aslan Çimento	01.11.2010	26.04.2011
ASYAB	Asya Katılım Bankası	01.11.2010	26.04.2011
ATAYO	Ata Yat.Ort.	01.11.2010	26.04.2011
AGYO	Atakule GMYO	01.11.2010	26.04.2011
ATSYO	Atlantis Yat. Ort.	01.11.2010	26.04.2011
ATLAS	Atlas Yat. Ort.	01.11.2010	26.04.2011
AVIVA	Aviva Sigorta	01.11.2010	26.04.2011
AVRSY	Avrasya Yatırım Ortaklığı	01.11.2010	26.04.2011
AYEN	Ayen Enerji	01.11.2010	26.04.2011
AYGAZ	Aygaz	01.11.2010	26.04.2011
BAGFS	Bagfaş	01.11.2010	26.04.2011
BAKAB	Bak Ambalaj	01.11.2010	26.04.2011
BANVT	Banvit	01.11.2010	26.04.2011
BSKYO	Başkent Yat. Ort.	01.11.2010	26.04.2011
BTCIM	Batı Çimento	01.11.2010	26.04.2011
BSOKE	Batisöke Çimento	01.11.2010	26.04.2011
BERDN	Berdan Tekstil	01.11.2010	26.04.2011
BJKAS	Beşiktaş Futbol Yat.	01.11.2010	26.04.2011
BIMAS	Bim Mağazalar	01.11.2010	26.04.2011
BRKO	Birko Mensucat	01.11.2010	26.04.2011
BRMEN	Birlik Mensucat	01.11.2010	26.04.2011
BISAS	Bisaş Tekstil	01.11.2010	26.04.2011
BOLUC	Bolu Çimento	01.11.2010	26.04.2011
BROVA	Borova Yapı	01.11.2010	26.04.2011
BRSAN	Borusan Mannesmann	01.11.2010	26.04.2011
BRYAT	Borusan Yat. Paz.	01.11.2010	26.04.2011
BFREN	Bosch Fren Sistemleri	01.11.2010	26.04.2011
BOSSA	Bossa	01.11.2010	26.04.2011
BOYNR	Boyner Mağazacılık	01.11.2010	26.04.2011
BRISA	Brisa	01.11.2010	26.04.2011
BSHEV	BSH Ev Aletleri	01.11.2010	26.04.2011
BUMYO	Bumerang Yat.Ort.	01.11.2010	26.04.2011
BURCE	Burçelik	01.11.2010	26.04.2011
BURVA	Burçelik Vana	01.11.2010	26.04.2011
BUCIM	Bursa Çimento	01.11.2010	26.04.2011
CARFA	Carrefoursa(A)	01.11.2010	26.04.2011
CARFB	Carrefoursa(B)	01.11.2010	26.04.2011
CBSBO	Çbs Boya	01.11.2010	26.04.2011
PRTAS	ÇBS Printaş	01.11.2010	26.04.2011
CLEBI	Çelebi	01.11.2010	26.04.2011
CELHA	Çelik Halat	01.11.2010	26.04.2011
CEMAS	Çemaş Döküm	01.11.2010	26.04.2011
CEMTS	Çemtaş	01.11.2010	26.04.2011
CCOLA	Coca Cola İçecek	01.11.2010	26.04.2011
CRDFA	Creditwest Faktoring	01.11.2010	26.04.2011
DARDL	Dardanel	01.11.2010	26.04.2011
DGATE	Datagate Bilgisayar	01.11.2010	26.04.2011
DYHOL	Doğan Yayın Hol.	01.11.2010	26.04.2011
PETKM	Petkim	01.11.2010	26.04.2011
TUPRS	Tüpraş	01.11.2010	26.04.2011

Table 4.8 : Statical value of IMKB100 stocks for 322 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
ACIBD	322	0.019701	0.036394	0.485403	1.980.90	1.403.221	0.495786
ADANA	322	0.003012	0.010862	-0.627311	2.278.50	1.483.696	0.476233
ADBGR	322	0.003686	0.012663	-0.699422	2.783.22	1.419.328	0.491809
ADEL	322	0.013104	0.028703	1.165.766	4.709.13	5.919.677	0.051827
ADNAC	322	0.008871	0.028391	0.999657	3.324.74	2.906.090	0.233857
AEFES	322	0.002129	0.011632	-0.168254	2.423.20	0.315871	0.853905
AFMAS	322	0.001986	0.016874	-0.873629	3.226.22	2.198.727	0.333083
AFYON	322	-0.001603	0.011556	-1.872.489	7.835.97	2.649.983	0.000002
AGYO	322	0.004935	0.019529	-0.625815	3.390.58	1.217.719	0.543971
AKALT	322	0.013395	0.030061	0.806865	2.397.44	2.101.769	0.349628
AKBNK	322	0.002435	0.020470	0.304563	3.580.82	0.501776	0.778110
AKCNS	322	0.003509	0.012984	-0.430711	3.274.24	0.578890	0.748679
AKENR	322	0.003665	0.026031	0.647194	3.323.12	1.260.729	0.532398
AKFEN	322	0.006631	0.022745	-0.865163	3.702.31	2.470.155	0.290812
AKGRT	322	0.000698	0.015181	-1.040.202	4.249.62	4.171.835	0.124193
TUPRS	322	0.001760	0. 21422	-0. 021013	4. 223851	20. 11935	0. 000
AKMGY	322	0.000169	0.019090	1.091.039	7.906.32	2.042.372	0.000037
AKSA	322	0.007378	0.019439	0.079747	1.848.15	0.957799	0.619465
AKSEN	322	0.001841	0.015890	-1.100.374	5.994.63	9.782.861	0.007511
AKSUE	322	0.006997	0.029351	0.733064	3.119.93	1.532.772	0.464689
AKYO	322	0.004444	0.016432	-1.647.092	7.042.53	1.926.220	0.000066
ALARK	322	0.002365	0.013522	-0.395715	3.615.56	0.712075	0.700446
ALBRK	322	0.002933	0.017157	-0.787509	3.136.42	1.770.331	0.412646
ALCAR	322	0.030925	0.065518	0.573691	2.626.87	1.031.125	0.597164
ALCTL	322	0.013356	0.042951	1.198.898	3.941.46	4.700.338	0.095353
ALGYO	322	0.008187	0.022452	0.307923	3.305.16	0.334609	0.845942
ALKA	322	0.004198	0.014961	-0.845767	3.149.57	2.042.595	0.360127
ALKIM	322	0.003661	0.012264	0.342511	3.927.58	0.941844	0.624426
ACIBD	322	0.008979	0.019014	0.265777	2.772.21	0.236893	0.888299
ADANA	322	0.013006	0.034655	0.557838	2.621.64	0.983084	0.611682
ALTIN	322 322	0.013006	0.034655	0.557838	2621646	0.983084	0.611682
ALYAG		-0.000225	0.024430	-0.630348	3205474	1155698	0.561104
ANACM	322	0.004684	0.016780	-0.950735	5152198	5842010	0.053880

Table 4.8 (continue): Statical value of IMKB100 stocks for 322 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
ANELE	322	-0.001842	0.021389	-0.933783	3495736	2644601	0.266521
ANELT	322	0.002305	0.019431	-0.662084	3056502	1244266	0.536798
ANHYT	322	0.004069	0.015278	0.195000	2016405	0.793021	0.672663
ANSGR	322	0.006110	0.013757	0.121130	2156865	0.545109	0.761432
THYAO	322	-0. 000433	0. 025047	-0. 191530	10. 19664	696. 8401	0. 000
ARCLK	322	0.008548	0.015872	0.135366	2040276	0.704342	0.703160
ARENA	322	0.010720	0.022658	0.052786	2108742	0.570553	0.751806
ARFYO	322	0.001870	0.018417	-1490491	4497043	7881900	0.019430
ARMDA	322	0.015347	0.038047	0.990410	3428526	2909325	0.233479
ARSAN	322	0.006975	0.026752	0.907071	2615874	2435721	0.295863
ASELS	322	0.001936	0.018816	-0.044535	3880174	0.554369	0.757915
ASLAN	322	-0.004391	0.056254	2372937	9486529	4575718	0.000000
ASUZU	322	0.009582	0.040547	1186016	3834743	4479025	0.106510
ASYAB	322	-0.001745	0.018906	-0.249574	3430756	0.307912	0.857310
ATAYO	322	0.001745	0.024145	1740635	6898272	1934867	0.000063
ATEKS	322	0.009407	0.028874	0.399026	3461652	0.602090	0.740044
ATLAS	322	0.004818	0.040349	0.650049	4502380	2796078	0.247081
ATSYO	322	0.002539	0.021976	-0.642993	5257361	4780854	0.091591
AVIVA	322	0.005314	0.014505	-0.228741	2521324	0.310548	0.856180
AVRSY	322	0.005348	0.034370	1333651	4978086	7811019	0.020131
AYCES	322	0.004297	0.023279	2183948	7417268	2733513	0.000001
AYEN	322	0.000265	0.013333	-0.134029	2342698	0.356930	0.836553
AYGAZ	322	0.004189	0.016137	-0.631709	2986203	1130794	0.568135
BAGFS	322	0.002062	0.017630	-1439249	5894683	1180433	0.002734
BAKAB	322	0.004319	0.022099	-0.555435	3720292	1241605	0.537513
BANVT	322	0.001463	0.017227	-0.643652	3236785	1213531	0.545111
DYHOL	322	0. 001374	0. 031333	1. 692021	12. 42066	1344. 358	0. 000
BIMAS	322	-0.000733	0.014036	-0.446984	4077450	1388388	0.499477
BISAS	322	-0.003274	0.018924	-0.533197	4279252	1964691	0.374432
BJKAS	322	-6.53E-05	0.022256	1768750	6343805	1678391	0.000227
BOLUC	322	0.004821	0.016705	1247949	4521773	6052921	0.048487
BOSSA	322	0.010524	0.031566	0.802000	2849953	1838360	0.398846
BOYNR	322	0.003389	0.020128	0.757753	2769203	1664603	0.435047
BERDN	322	0.004749	0.043594	0.420172	4364735	1819482	0.402628
BFREN	322	0.004444	0.019483	-1090325	4745103	5525439	0.063120
BIMAS	322	-0.000733	0.014036	-0.446984	4077450	1388388	0.499477
BISAS	322	-0.003274	0.018924	-0.533197	4279252	1964691	0.374432

Table 4.8 (continue): Statical value of IMKB100 stocks for 322 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
BOSSA	322	0.010524	0.031566	0.802000	2849953	1838360	0.398846
BOYNR	322	0.003389	0.020128	0.757753	2769203	1664603	0.435047
BRISA	322	0.000728	0.012821	-1196728	5411152	8175785	0.016775
BRKO	322	0.008677	0.033082	1920745	6072023	1713768	0.000190
BRMEN	322	0.005103	0.024084	-0.158549	2455608	0.281147	0.868860
BROVA	322	0.003724	0.026676	-0.854288	4182416	3058116	0.216740
BRSAN	322	0.014276	0.053089	1851567	7466320	2384337	0.000007
BSHEV	322	0.000268	0.010267	-0.414374	2900515	0.493510	0.781332
BSKYO	322	0.003814	0.021493	2633181	1052575	5976317	0.000000
BRYAT	322	0.007044	0.039962	0.811349	6173253	8997730	0.011122
BTCIM	322	0.002898	0.011379	0.773514	3125770	1706457	0.426037
BUCIM	322	0.003199	0.019451	-0.628403	3279717	1174278	0.555916
BSOKE	322	0.005765	0.012945	-0.033240	2159501	0.503525	0.777429
BUMYO	322	-0.00342	0.030101	0.07341	4882793	2526247	0.282769
BURCE	322	0.018184	0.063414	-0.53356	3187561	0.831515	0.65984
BURVA	322	0.003543	0.036052	1853532	7275649	2268331	0.000012
PETKM	322	0.001593	0.018877	1.103197	9.916655	707.1695	0.000
CARFA	322	-0.00167	0.01828	-0.5957	3266574	1055777	0.589849
CARFB	322	-0.00023	0.022982	-0.42256	2490676	0.689665	0.708339
CBSBO	322	0.008766	0.062854	0.452856	1967548	1336108	0.512705
CCOLA	322	0.007945	0.02108	0.108064	2189446	0.498461	0.7794
CELHA	322	0.00014	0.017143	-1788379	7102576	2098390	0.000028
BERDN	322	-0.01697	0.059628	0.720644	3743227	1862704	0.394021
BFREN	322	0.008096	0.021187	-0.37299	2613398	0.500052	0.77878
CEYLN	322	0.035756	0.048557	-0.87484	3622441	2442910	0.294801
CIMSA	322	-0.00204	0.024324	-1751402	6900215	1946593	0.000059
CLEBI	322	0.007344	0.016907	0.794222	3337778	1868052	0.392969
CIMSA	322	-0.00204	0.024324	-1751402	6900215	1946593	0.000059
CLEBI	322	0.007344	0.016907	0.794222	3337778	1868052	0.392969
CMBTN	322	-0.00074	0.035378	-0.94776	3471748	2702692	0.258892
CMENT	322	0.001528	0.011733	0.219204	2142985	0.656396	0.72022
CRDFA	322	0.010902	0.021227	0.731001	4571422	3263163	0.19562
TTKOM	322	0.01808	0.17383	-0.50862	4.15221	44.8637	0.000
DARDL	322	0.006027	0.029795	1406049	4979278	8376347	0.015174
DGATE	322	0.004552	0.019211	0.342925	2866091	0.345896	0.841181
PRTAS	322	0.011055	0.077053	-0.17779	1997637	0.801244	0.669903
BJKAS	322	-6.53E-05	0.022256	1768750	6343805	1678391	0.000227
BOLUC	322	0.004821	0.016705	1247949	4521773	6052921	0.048487

Table 4.9 : Statical value of IMKB100 stocks for 600 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
ACIBD	600	0.024183	0.041595	0.029783	1573734	0.594354	0.742913
ADANA	600	0.005214	0.009931	-1021478	3181527	1226931	0.541471
ADBGR	600	0.005674	0.007809	-0.742665	2466530	0.726483	0.695419
ADEL	600	0.009634	0.013254	0.879385	2239477	1070903	0.585405
ADNAC	600	0.011729	0.023374	1181777	3277776	1651869	0.437826
AEFES	600	0.005434	0.015261	-0.545465	2072115	0.598237	0.741472
AFMAS	600	0.007623	0.009704	0.416177	1350706	0.995454	0.607911
AFYON	600	0.000426	0.008064	0.380674	1732209	0.637858	0.726927
AGYO	600	0.004379	0.012935	0.311543	1397762	0.861992	0.649861
AKALT	600	0.001866	0.008867	-0.542145	2115789	0.570942	0.751660
AKBNK	600	0.012056	0.026422	-0.283271	2398475	0.199151	0.905222
AKCNS	600	-0.001873	0.013982	-0.664258	2597282	0.562081	0.754998
AKENR	600	0.009816	0.035478	0.437748	1913657	0.567768	0.752854
AKFEN	600	0.008774	0.019225	0.059679	1751095	0.459086	0.794897
AKGRT	600	0.000791	0.013219	-0.253506	1739682	0.538260	0.764044
TUPRS	600	-0.001219	0.027601	-0.236895	2828068	0.285793	0.866844
AKMGY	600	-0.000877	0.002325	0.461305	2107492	0.480602	0.786391
AKSA	600	0.009547	0.019577	0.083377	2081360	0.254247	0.880625
AKSEN	600	0.004261	0.013418	1313027	3710618	2158666	0.339822
AKSUE	600	0.004957	0.016807	0.357838	1568264	0.747267	0.688229
AKYO	600	0.001809	0.004750	-0.451303	2091223	0.478501	0.787218
ALARK	600	0.000447	0.010162	0.274946	2232300	0.260092	0.878055
ALBRK	600	0.001287	0.017759	0.156693	1432263	0.745503	0.688836
ALCAR	600	0.007214	0.020233	1093209	3387312	1438044	0.487228
ALCTL	600	0.001513	0.019038	0.460236	2544115	0.307737	0.857385
ALGYO	600	0.006771	0.010178	-0.004577	2042669	0.267332	0.874882
ALKA	600	0.001910	0.010980	-1125364	2961507	1477951	0.477603
ALKIM	600	0.000769	0.007344	-0.843450	2791078	0.842707	0.656158

Table 4.9 (continue): Statical value of IMKB100 stocks for 600 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
ALTIN	600	0.015553	0.028320	0.756198	2958788	0.667636	0.716184
ALYAG	600	-0.007343	0.022318	-0.697403	1939978	0.895162	0.639172
ANACM	600	0.006877	0.011708	0.458018	3149415	0.251255	0.881943
ANELE	600	-0.006096	0.020181	-1.195819	3647764	1790696	0.408466
ANELT	600	3.86E-05	0.009392	0.029126	2380622	0.112882	0.945122
ANHYT	600	0.000669	0.016721	0.520284	2866640	0.320999	0.851718
ANSGR	600	0.010417	0.016350	-0.264534	1953535	0.401042	0.818304
THYAO	600	-0.003525	0.021596	-0.089167	3272043	0.119036	0.942218
ARCLK	600	0.011064	0.014005	0.499078	1856915	0.671696	0.714732
ARENA	600	0.014281	0.022855	-0.205536	1619976	0.604755	0.739059
ARFYO	600	0.005563	0.010961	0.197355	1733817	0.513046	0.773737
ARMDA	600	0.021080	0.038302	1856212	4750364	4913376	0.085718
ARSAN	600	0.006129	0.027206	1292464	3369645	1988728	0.369959
ASELS	600	0.006354	0.015340	0.465943	1791957	0.678936	0.712149
ASLAN	600	-0.008973	0.021800	0.259577	1736207	0.544452	0.761682
ASUZU	600	-0.007190	0.019310	-0.157310	1783396	0.460574	0.794306
ASYAB	600	-0.005460	0.017255	0.878422	2435071	0.993313	0.608562
ATAYO	600	0.005224	0.033040	1738842	4605513	4279323	0.117695
ATEKS	600	0.013713	0.013058	0.308936	1455560	0.807060	0.667958
ATLAS	600	0.012976	0.056326	0.314847	2812759	0.125876	0.939002
ATSYO	600	0.001457	0.009029	-0.268857	1490740	0.748709	0.687733
AVIVA	600	0.003646	0.013739	0.072629	2247369	0.171370	0.917883
AVRSY	600	0.012877	0.052791	0.621456	2052579	0.712378	0.700340
AYCES	600	0.008687	0.032169	1777549	4511673	4352798	0.113449
AYEN	600	0.000507	0.012478	-1025554	3417753	1277955	0.527832
AYGAZ	600	-0.000697	0.019742	-0.416378	2419875	0.300425	0.860525
BAGFS	600	0.006250	0.012917	-0.118427	1669611	0.532593	0.766212
BAKAB	600	0.002219	0.008729	-0.711528	1828942	0.990636	0.609377
BANVT	600	0.002740	0.015759	-0.011352	1347756	0.796374	0.671536
DYHOL	600	0.012593	0.054612	1.684.005	7.608.218	3.665.157	0.000000
CEYLN	600	0.038213	0.044526	0.401951	1413862	0.922276	0.630566
CIMSA	600	-0.011034	0.031640	-1606267	4161222	3403403	0.182373
CLEBI	600	0.007250	0.014940	0.936935	2766360	1040076	0.594498
CMBTN	600	0.019641	0.018015	0.252663	3001196	0.074478	0.963446
CMENT	600	0.008224	0.009864	-0.158407	1655887	0.556212	0.757217

Table 4.9 (continue): Statical value of IMKB100 stocks for 600 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
BERDN	600	0.011459	0.069339	-0.014700	1933982	0.331700	0.847173
BFREN	600	0.006093	0.017523	0.422499	2076859	0.456812	0.795801
BIMAS	600	-0.002506	0.020063	-0.310842	2471196	0.194287	0.907426
BISAS	600	-0.003541	0.016523	0.959930	2369728	1190907	0.551313
BJKAS	600	0.000421	0.031845	1632748	4190003	3523210	0.171769
BOLUC	600	3.29E-05	0.008975	-0.294919	1786996	0.530626	0.766966
BOSSA	600	0.026463	0.043574	-0.270692	1679337	0.594197	0.742971
BOYNR	600	0.002704	0.020959	1027032	2997942	1230596	0.540480
BRISA	600	0.000810	0.006503	-0.349471	3300537	0.168829	0.919050
BRKO	600	0.012011	0.044709	1621517	4277098	3543240	0.170057
BRMEN	600	0.011889	0.016566	0.058695	1797154	0.426014	0.808151
BROVA	600	0.007030	0.017837	0.236530	1551788	0.676989	0.712843
BRSAN	600	0.008041	0.029028	0.877319	3110953	0.901561	0.637131
BRYAT	600	0.003637	0.011742	0.696397	1745003	1025178	0.598943
BSHEV	600	0.001096	0.009403	-0.138623	1949675	0.344180	0.841903
BSKYO	600	0.001299	0.006157	-0.116457	2374401	0.129974	0.937080
BSOKE	600	0.004217	0.006549	-0.198056	1853376	0.429232	0.806851
BTCIM	600	-0.000343	0.008240	-0.584057	1834750	0.794004	0.672333
BUCIM	600	0.004189	0.008516	-0.456703	1854462	0.626082	0.731220
BUMYO	600	-0.002869	0.020087	-0.974432	3349377	1143373	0.564573
BURCE	600	0.022146	0.046991	-1897555	4849099	5198092	0.074344
BURVA	600	-0.005789	0.016845	-1144815	2830902	1537374	0.463621
PETKM	600	0.005446	0.022075	-0.123184	2.372.735	0.510928	0.774557
CARFA	600	0.001840	0.007986	1207807	3378764	1743774	0.418162
CARFB	600	0.003403	0.024642	-0.123372	1418243	0.747494	0.688151
CBSBO	600	0.019967	0.084513	0.063563	1237570	0.910677	0.634233
COLLA	600	-0.005677	0.017881	0.689621	3015698	0.554912	0.757709
CELHA	600	-0.000631	0.007292	0.051046	1570499	0.599053	0.741169
CRDFA	600	0.007064	0.008416	0.907629	3237428	0.977532	0.613383
TTKOM	600	0.003029	0.020918	-0.101392	2411906	0.435348	0.804388
DARDL	600	0.013447	0.037099	1511397	3802230	2852751	0.240178
DGATE	600	0.004069	0.020548	0.887055	3118373	0.922097	0.630622
PRTAS	600	0.014343	0.095815	-0.278920	1511721	0.736796	0.691842

Table 4.10 : Statical value of IMKB100 stocks for 1400 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
ACIBD	1400	0.019701	0.036394	0.485403	1.980.90	1.403.221	0.495786
ADANA	1400	0.003012	0.010862	-0.627311	2.278.50	1.483.696	0.476233
ADBGR	1400	0.003686	0.012663	-0.699422	2.783.22	1.419.328	0.491809
ADEL	1400	0.013104	0.028703	1.165.766	4.709.13	5.919.677	0.051827
ADNAC	1400	0.008871	0.028391	0.999657	3.324.74	2.906.090	0.233857
AEFES	1400	0.002129	0.011632	-0.168254	2.423.20	0.315871	0.853905
AFMAS	1400	0.001986	0.016874	-0.873629	3.226.22	2.198.727	0.333083
AFYON	1400	-0.001603	0.011556	-1.872.489	7.835.97	2.649.983	0.000002
AGYO	1400	0.004935	0.019529	-0.625815	3.390.58	1.217.719	0.543971
AKALT	1400	0.013395	0.030061	0.806865	2.397.44	2.101.769	0.349628
AKBNK	1400	0.002435	0.020470	0.304563	3.580.82	0.501776	0.778110
AKCNS	1400	0.003509	0.012984	-0.430711	3.274.24	0.578890	0.748679
AKENR	1400	0.003665	0.026031	0.647194	3.323.12	1.260.729	0.532398
AKFEN	1400	0.006631	0.022745	-0.865163	3.702.31	2.470.155	0.290812
AKGRT	1400	0.000698	0.015181	-1.040.202	4.249.62	4.171.835	0.124193
TUPRS	1400	0.002120	0.026667	-0.702265	4429244	1622908	0.000299
AKMGY	1400	0.000169	0.019090	1.091.039	7.906.32	2.042.372	0.000037
AKSA	1400	0.007378	0.019439	0.079747	1.848.15	0.957799	0.619465
AKSEN	1400	0.001841	0.015890	-1.100.374	5.994.63	9.782.861	0.007511
AKSUE	1400	0.006997	0.029351	0.733064	3.119.93	1.532.772	0.464689
AKYO	1400	0.004444	0.016432	-1.647.092	7.042.53	1.926.220	0.000066
ALARK	1400	0.002365	0.013522	-0.395715	3.615.56	0.712075	0.700446
ALBRK	1400	0.002933	0.017157	-0.787509	3.136.42	1.770.331	0.412646
ALCAR	1400	0.030925	0.065518	0.573691	2.626.87	1.031.125	0.597164
ALCTL	1400	0.013356	0.042951	1.198.898	3.941.46	4.700.338	0.095353
ALGYO	1400	0.008187	0.022452	0.307923	3.305.16	0.334609	0.845942
ALKA	1400	0.004198	0.014961	-0.845767	3.149.57	2.042.595	0.360127

Table 4.10 (continue) : Statical value of IMKB100 stocks for 1400 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
ALTIN	1400	0.013006	0.034655	0.557838	2.621.64	0.983084	0.611682
ALYAG	1400	-0.000225	0.024430	-0.630348	3.205.47	1.155.698	0.561104
ANACM	1400	0.004684	0.016780	-0.950735	5.152.19	5.842.010	0.053880
ANELE	1400	-0.001842	0.021389	-0.933783	3.495.73	2.644.601	0.266521
ANELT	1400	0.002305	0.019431	-0.662084	3.056.50	1.244.266	0.536798
ANHYT	1400	0.004069	0.015278	0.195000	2.016.40	0.793021	0.672663
ANSGR	1400	0.006110	0.013757	0.121130	2.156.86	0.545109	0.761432
THYAO	1400	0.000517	0.020177	-1027010	5444827	4120956	0.000000
ARCLK	1400	0.008548	0.015872	0.135366	2.040.27	0.704342	0.703160
ARENA	1400	0.010720	0.022658	0.052786	2.108.74	0.570553	0.751806
ARFYO	1400	0.001870	0.018417	-1.490.491	4.497.04	7.881.900	0.019430
ARMDA	1400	0.015347	0.038047	0.990410	3.428.52	2.909.325	0.233479
ARSAN	1400	0.006975	0.026752	0.907071	2.615.87	2.435.721	0.295863
ASELS	1400	0.001936	0.018816	-0.044535	3.880.17	0.554369	0.757915
ASLAN	1400	-0.004391	0.056254	2.372.937	9.486.52	4.575.718	0.000000
ASUZU	1400	0.009582	0.040547	1.186.016	3.834.74	4.479.025	0.106510
ASYAB	1400	-0.001745	0.018906	-0.249574	3.430.75	0.307912	0.857310
ATAYO	1400	0.001745	0.024145	1.740.635	6.898.27	1.934.867	0.000063
ATEKS	1400	0.009407	0.028874	0.399026	3.461.65	0.602090	0.740044
ATLAS	1400	0.004818	0.040349	0.650049	4.502.38	2.796.078	0.247081
ATSYO	1400	0.002539	0.021976	-0.642993	5.257.36	4.780.854	0.091591
AVIVA	1400	0.005314	0.014505	-0.228741	2.521.32	0.310548	0.856180
AVRSY	1400	0.005348	0.034370	1.333.651	4.978.08	7.811.019	0.020131
AYCES	1400	0.004297	0.023279	2.183.948	7.417.26	2.733.513	0.000001
AYEN	1400	0.000265	0.013333	-0.134029	2.342.69	0.356930	0.836553
AYGAZ	1400	0.004189	0.016137	-0.631709	2.986.20	1.130.794	0.568135
BAGFS	1400	0.002062	0.017630	-1.439.249	5.894.68	1.180.433	0.002734
BAKAB	1400	0.004319	0.022099	-0.555435	3.720.29	1.241.605	0.537513
BANVT	1400	0.001463	0.017227	-0.643652	3.236.78	1.213.531	0.545111
DYHOL	1400	0.001307	0.037232	1779692	1208822	3850289	0.000000

Table 4.10 (continue): Statical value of IMKB100 stocks for 1400 observation.

Stock Code	Count	Mean	Std	Skewness	Kurtosis	Jargue-Bera	Probability
BERDN	1400	0.004749	0.043594	0.420172	4.364.73	1.819.482	0.402628
BFREN	1400	0.004444	0.019483	-1.090.325	4.745.10	5.525.439	0.063120
BIMAS	1400	-0.000733	0.014036	-0.446984	4.077.45	1.388.388	0.499477
BISAS	1400	-0.003274	0.018924	-0.533197	4.279.25	1.964.691	0.374432
BJKAS	1400	-6.53E-05	0.022256	1.768.750	6.343.80	1.678.391	0.000227
BOLUC	1400	0.004821	0.016705	1.247.949	4.521.77	6.052.921	0.048487
BOSSA	1400	0.010524	0.031566	0.802000	2.849.95	1.838.360	0.398846
BOYNR	1400	0.003389	0.020128	0.757753	2.769.20	1.664.603	0.435047
BRISA	1400	0.000728	0.012821	-1.196.728	5.411.15	8.175.785	0.016775
BRKO	1400	0.008677	0.033082	1.920.745	6.072.02	1.713.768	0.000190
BRMEN	1400	0.005103	0.024084	-0.158549	2.455.60	0.281147	0.868860
BROVA	1400	0.003724	0.026676	-0.854288	4.182.41	3.058.116	0.216740
BRSAN	1400	0.014276	0.053089	1.851.567	7.466.32	2.384.337	0.000007
BRYAT	1400	0.007044	0.039962	0.811349	6.173.25	8.997.730	0.011122
BSHEV	1400	0.000268	0.010267	-0.414374	2.900.51	0.493510	0.781332
BSKYO	1400	0.003814	0.021493	2.633.181	1.052.57	5.976.317	0.000000
BSOKE	1400	0.005765	0.012945	-0.033240	2.159.50	0.503525	0.777429
BTCIM	1400	0.002898	0.011379	0.773514	3.125.77	1.706.457	0.426037
BUCIM	1400	0.003199	0.019451	-0.628403	3.279.71	1.174.278	0.555916
CLEBI	0.00734	0.016907	0.794222	3.337.778	1.868.05	0.392969	0.007344
CMBTN	-0.00074	0.035378	-0.947763	3.471.748	2.702.69	0.258892	-0.000741
CMEN	0.00152	0.011733	0.219204	2.142.985	0.656396	0.720220	0.001528
CEYLN	0.03575	0.048557	-0.874840	3.622.441	2.442.91	0.294801	0.035756
CRDFA	0.01090	0.021227	0.731001	4.571.422	3.263.16	0.195620	0.010902
TTKOM	1400	0.000211	0.024485	-0.175336	3681187	2372405	0.305379
PRTAS	0.01105	0.077053	-0.177790	1.997.637	0.801244	0.669903	0.011055
DGATE	0.00455	0.019211	0.342925	2.866.091	0.345896	0.841181	0.004552
DARDL	0.00602	0.029795	1.406.049	4.979.278	8.376.34	0.015174	0.006027
CIMSA	-0.00203	0.024324	-1.751.40	6.900.215	1.946.59	0.000059	-0.002039
BUMYO	1400	-0.003415	0.030101	0.073410	4.882.79	2.526.247	0.282769
BURCE	1400	0.018184	0.063414	-0.533555	3.187.56	0.831515	0.659840
BURVA	1400	0.003543	0.036052	1.853.532	7.275.64	2.268.331	0.000012
PETKM	1400	7.28E-05	0.028646	0.886293	6110279	5179758	0.000000
CARFA	1400	-0.001668	0.018280	-0.595703	3.266.57	1.055.777	0.589849
CARFB	1400	-0.000228	0.022982	-0.422562	2.490.67	0.689665	0.708339
CBSBO	1400	0.008766	0.062854	0.452856	1.967.54	1.336.108	0.512705
CCOLA	1400	0.007945	0.021080	0.108064	2.189.44	0.498461	0.779400
CELHA	1400	0.000140	0.017143	-1.788.379	7.102.57	2.098.390	0.000028

4. 2 Garch Estimation

In this part of our study we use the GARCH Method to estimate the 5 % confidence level value at risk of a portfolio on April 26, 2011. Our portfolio consists of The Istanbul Stock Exchange 30 Index's stock. These are AKBANK, ARCELIK, ASYA BANK, BIM MARKETS DOGAN HOLING, DYHOL , ECILC, ENKAI, EREGL, GARAN, ISCTR , KRDMD , KCHOL , KOZAA , PETKM, SAHOL, SKBNK, SISE, HALKB, TAVHL, TKFEN, TEBNK, TOASO, TCELL, TUPRS, THYAO, TTKOM , VAKBN, VESTL. Let us to show you vech representations of our portfolio.

$$H_t = \begin{bmatrix} \sigma_{11,t}^2 & \sigma_{12,t} & \dots & \dots & \sigma_{1n,t} \\ \sigma_{21,t} & \sigma_{22,t}^2 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \sigma_{n1,t} & \dots & \dots & \dots & \sigma_{nn,t}^2 \end{bmatrix}$$

$$\sigma_{ij,t}^2 = \alpha_i + \sum_{i=1}^p \alpha_{i,j} \varepsilon_{t-i}^2 + \sum_{i=1}^q \beta_{i,j} \sigma_{t-1}^2 \quad i=1, \dots, n$$

$$\sigma_{ij,t} = \rho_{i,j} \sigma_{i,t} \sigma_{j,t} \quad i, j=1, \dots, n \quad i \neq j$$

where must satisfy $\alpha_0 > 0$, $\alpha_i > 0$, $i=1, 2, \dots, p$ and $\beta_i > 0$ $i=1, 2, \dots, q$

The main important of our model is the assumption of constant correlation among the variables. We control the variance covariance matrix with correlation matrix. Now we compute the VaR with below expression.

$$H_t = \underbrace{\begin{bmatrix} \sigma_{1,1} & \dots & \dots & \dots & \dots \\ \dots & \sigma_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \sigma_{n,n} \end{bmatrix}}_{\text{Variance}} \underbrace{\begin{bmatrix} 1 & \rho_{1,2} & \dots & \dots & \rho_{1,n} \\ \rho_{2,1} & 1 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \rho_{n,1} & \dots & \dots & \dots & 1 \end{bmatrix}}_{\text{Correlation}} \underbrace{\begin{bmatrix} \sigma_{1,1} & \dots & \dots & \dots & \dots \\ \dots & \sigma_{2,2} & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \sigma_{n,n} \end{bmatrix}}_{\text{Variance}}$$

Variance matrix represent a diagonal matrix with the given elements. On the diagonal elements of the variance matrix are computed with Garch method. We

compute Variance with Garch Models with Eviews statistics program. When we compute the variance of the stocks we assume that the error distribution is normal distribution. We explain the computation of each of the garch model. In Eviews we compose the equations with below expression.

AKBANK

Sample (adjusted). 1/03/2010 . 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 18 iterations

=====

$$\text{GARCH} = 0.000254464869444 + 0.558541428316 \varepsilon_t^2 + 0.0614616959 \text{GARCH}_1$$

ARCLK

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 9 iterations

=====

$$\text{GARCH} = 0.0000089449 + 0.0665485225772 \varepsilon_t^2 + 0.917257033601 \text{GARCH}_1$$

ASYAB

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 10 iterations

=====

$$\text{GARCH} = 0.0000619192 + 0.149153905 \varepsilon_t^2 + 0.72917736 \text{GARCH}_1$$

BIMAS

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 12 iterations

=====

$$\text{GARCH} = 0.0001608554 + 0.351545340 \varepsilon_t^2 + 0.194098619 \text{GARCH}_1$$

DOHOL

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 12 iterations

=====

$$\text{GARCH} = 0.000427823 + 0.11654364 \varepsilon_t^2 + 0.7973220 \text{GARCH}_1$$

DYHOL

Sample (adjusted): 1/03/2010 4/25/2011

Included observations: 321 after adjustments
Convergence achieved after 36 iterations

=====

$$\text{GARCH} = 0.0000905 + 0.068976 \varepsilon_t^2 + 0.843856 \text{GARCH}_1$$

ECILC

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 79 iterations

=====

$$\text{GARCH} = 0.000243 + 0.300329 \varepsilon_t^2 + 0.406215 \text{ GARCH}_1$$

ENKAI

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 22 iterations

=====

$$\text{GARCH} = 0.00000909 + 0.135856 \varepsilon_t^2 + 0.886649 \text{ GARCH}_1$$

EREGLI

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 22 iterations

=====

$$\text{GARCH} = 0.00000909 + 0.135856 \varepsilon_t^2 + 0.886649 \text{ GARCH}_1$$

GARANTI

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 16 iterations

=====

$$\text{GARCH} = 0.0000521 + 0.067372 \varepsilon_t^2 + 0.834064 \text{ GARCH}_1$$

HALKB

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 23 iterations

=====

$$\text{GARCH} = 0.000464 + 0.235292 \varepsilon_t^2 + 0.020255 \text{ GARCH}_1$$

ISCTR

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 17 iterations

=====

$$\text{GARCH} = 0.0000694 + 0.058047 \varepsilon_t^2 + 0.783998 \text{ GARCH}_1$$

KCHOL

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 17 iterations

=====

$$\text{GARCH} = 0.0000526 + 0.144555 \varepsilon_t^2 + 0.739088 \text{ GARCH}_1$$

KOZAD

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 17 iterations

$$\text{GARCH} = 0.0000217 + 0.156150 \varepsilon_t^2 + 0.795271 \text{ GARCH}_1$$

KRDMD

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 12 iterations

$$\text{GARCH} = 0.000160 + 0.201710 \varepsilon_t^2 + 0.525311 \text{ GARCH}_1$$

PETKM

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 12 iterations

$$\text{GARCH} = 0.00000569 + 0.057716 \varepsilon_t^2 + 0.924681 \text{ GARCH}_1$$

SAHOL

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 13 iterations

$$\text{GARCH} = 0.000218 + 0.368508 \varepsilon_t^2 + 0.181311 \text{ GARCH}_1$$

SISE

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 7 iterations

$$\text{GARCH} = 0.0000959 + 0.127216 \varepsilon_t^2 + 0.644575 \text{ GARCH}_1$$

SKBNK

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 38 iterations

$$\text{GARCH} = 0.0000543 + 0.136867 \varepsilon_t^2 + 0.731065 \text{ GARCH}_1$$

TAV HL

Sample (adjusted). 1/03/2010. 4/25/2011
Included observations. 321 after adjustments
Convergence achieved after 16 iterations

$$\text{GARCH} = 0.0000390 + 0.095164 \varepsilon_t^2 + 0.815533 \text{ GARCH}_1$$

TCELL

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 20 iterations

$$\text{GARCH} = 0.0000652 + 0.071667 \varepsilon_t^2 + 0.7346110.135867 \text{ GARCH}_1$$

TEBNK

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 6 iterations

$$\text{GARCH} = 0.000243 + 0.024800 \varepsilon_t^2 + 0.683289 \text{ GARCH}_1$$

THY AO

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 21 iterations

$$\text{GARCH} = 0.0000258 + 0.055626 \varepsilon_t^2 + 0.907279 \text{ GARCH}_1$$

TKFEN

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 8 iterations

$$\text{GARCH} = 0.0000258 + 0.055626 \varepsilon_t^2 + 0.907279 \text{ GARCH}_1$$

TOASO

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 17 iterations

$$\text{GARCH} = 0.000288 + 0.237003 \varepsilon_t^2 + 0.272820 \text{ GARCH}_1$$

TTKOM

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 14 iterations

$$\text{GARCH} = 0.0000971 + 0.077036 \varepsilon_t^2 + 0.601231 \text{ GARCH}_1$$

TUPRS

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 19 iterations

$$\text{GARCH} = 0.000269 + 0.042148 \varepsilon_t^2 + 0.373334 \text{ GARCH}_1$$

VAKFN

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 13 iterations

$$\text{GARCH} = 0.0000631 + 0.126427 \varepsilon_t^2 + 0.829704 \text{GARCH}_1$$

VESTL

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 7 iterations

$$\text{GARCH} = 0.000103 + 0.167852 \varepsilon_t^2 + 0.573998 \text{GARCH}_1$$

Y KBNK

Sample (adjusted). 1/03/2010. 4/25/2011

Included observations. 321 after adjustments

Convergence achieved after 9 iterations

$$\text{GARCH} = 0.0000709 + 0.166283 \varepsilon_t^2 + 0.687358 \text{GARCH}_1$$

After we compute the each of the stock's variance with Garch Model, we compose the variance covariance matrixes with this values. This method is known as constant conditional correlation GARCH. We can write the Diagonal Matrix where std represents with the given elements. In Table 4.11 summarize the result of the calculations.

Table 4.11 : Garch forecasts.

Stock	Variance	STD	Stock	Variance	STD
AKBNK	0.00267165	0.051688	PETKM	0.00370808	0.060894
ARCLK	0.0030498	0.055225	SAHOL	0.00264494	0.051429
ASYAB	0.00331569	0.057582	SISE	0.00302786	0.055026
BIMAS	0.00340146	0.058322	SKBNK	0.00318875	0.056469
DOHOL	0.00369275	0.060768	TAVHL	0.00338038	0.058141
DYHOL	0.00400157	0.063258	TCELL	0.00407299	0.063820
ECILC	0.0689015	0.064380	TEBNK	0.0034665	0.058877
ENKAI	0.00201188	0.044854	THYAO	0.00369725	0.060805
EREGL	0.00060285	0.024553	TKFEN	0.00330223	0.057465
GARAN	0.00301884	0.054944	TOASO	0.00247108	0.049710
HALKB	0.0030128	0.054889	TTKOM	0.00323056	0.056838
ISCTR	0.00356122	0.059676	TUPRS	0.00322204	0.056763
KCHOL	0.00288455	0.053708	VAKBN	0.00365783	0.060480
KOZAA	0.00298695	0.054653	VESTL	0.00326075	0.057103
KRDMD	0.00362982	0.060248	YKBNK	0.00325311	0.057036

In Figure 4.2 show us the variance matrix which involves standart deviation of the each of the stock multiply with correlation matrix. We multiply the result

(0.599168)	(0.599168)	(0.54465)	(0.238065)	(0.243491)	(0.304697)	(0.22041)	(0.509708)	(0.598753)	(0.654536)
(0.599168)	(1.)	(0.521539)	(0.296621)	(0.217395)	(0.281275)	(0.303039)	(0.444423)	(0.42742)	(0.603121)
(0.54465)	(0.521539)	(1.)	(0.313219)	(0.386816)	(0.356701)	(0.347979)	(0.468704)	(0.423081)	(0.615564)
(0.238065)	(0.296621)	(0.313219)	(1.)	(0.24948)	(0.256068)	(0.16119)	(0.203566)	(0.132788)	(0.296163)
(0.243491)	(0.217395)	(0.386816)	(0.24948)	(1.)	(0.640519)	(0.226549)	(0.183089)	(0.206277)	(0.325155)
(0.304697)	(0.281275)	(0.356701)	(0.256068)	(0.640519)	(1.)	(0.207857)	(0.253114)	(0.299079)	(0.293339)
(0.22041)	(0.303039)	(0.347979)	(0.16119)	(0.226549)	(0.207857)	(1.)	(0.238322)	(0.230471)	(0.302186)
(0.509708)	(0.444423)	(0.468704)	(0.203566)	(0.183089)	(0.253114)	(0.238322)	(1.)	(0.398256)	(0.423139)
(0.598753)	(0.42742)	(0.423081)	(0.132788)	(0.206277)	(0.299079)	(0.230471)	(0.398256)	(1.)	(0.405101)
(0.654536)	(0.603121)	(0.615564)	(0.296163)	(0.325155)	(0.293339)	(0.302186)	(0.423139)	(0.405101)	(1.)
(0.646956)	(0.59749)	(0.649076)	(0.331874)	(0.357128)	(0.352329)	(0.266327)	(0.458273)	(0.388325)	(0.759964)
(0.351778)	(0.410131)	(0.432467)	(0.25109)	(0.299931)	(0.289963)	(0.350288)	(0.375703)	(0.300651)	(0.438399)
(0.48979)	(0.579275)	(0.523351)	(0.299536)	(0.348037)	(0.295875)	(0.287936)	(0.442987)	(0.309746)	(0.589019)
(0.434473)	(0.449146)	(0.480492)	(0.337638)	(0.336333)	(0.329343)	(0.260961)	(0.33139)	(0.276211)	(0.518897)
(0.316287)	(0.386863)	(0.448609)	(0.306949)	(0.274342)	(0.253971)	(0.319483)	(0.253043)	(0.298583)	(0.437482)
(0.369928)	(0.337449)	(0.423869)	(0.2509)	(0.158697)	(0.212306)	(0.188616)	(0.352547)	(0.253944)	(0.436945)
(0.482058)	(0.465584)	(0.638321)	(0.336881)	(0.37105)	(0.346068)	(0.298266)	(0.355034)	(0.339141)	(0.596778)
(0.371647)	(0.419035)	(0.439277)	(0.224149)	(0.267252)	(0.293975)	(0.299742)	(0.450795)	(0.279821)	(0.437621)
(0.603073)	(0.524398)	(0.616329)	(0.337768)	(0.355177)	(0.349721)	(0.287523)	(0.445881)	(0.386515)	(0.689828)
(0.416437)	(0.502481)	(0.563962)	(0.299097)	(0.266448)	(0.345242)	(0.2658)	(0.391497)	(0.403131)	(0.460371)
(0.496397)	(0.585567)	(0.574863)	(0.285389)	(0.352326)	(0.320771)	(0.349689)	(0.440331)	(0.419074)	(0.576549)
(0.459046)	(0.395063)	(0.484238)	(0.276217)	(0.23815)	(0.246545)	(0.298207)	(0.464565)	(0.353641)	(0.495816)
(0.419422)	(0.370464)	(0.523817)	(0.252557)	(0.297038)	(0.256843)	(0.170435)	(0.475237)	(0.361478)	(0.446574)
(0.325549)	(0.375621)	(0.452677)	(0.237596)	(0.21712)	(0.242316)	(0.204418)	(0.224066)	(0.278084)	(0.406037)
(0.411067)	(0.385215)	(0.408692)	(0.170372)	(0.171133)	(0.188812)	(0.0361718)	(0.414151)	(0.275208)	(0.412909)
(0.579995)	(0.544789)	(0.479049)	(0.200319)	(0.246778)	(0.268798)	(0.255528)	(0.55327)	(0.474224)	(0.560148)
(0.351856)	(0.405618)	(0.338498)	(0.212909)	(0.158309)	(0.104755)	(0.161161)	(0.407675)	(0.272722)	(0.297827)
(0.372964)	(0.541519)	(0.533453)	(0.258942)	(0.214594)	(0.202301)	(0.204338)	(0.44389)	(0.202681)	(0.555375)
(0.341145)	(0.511069)	(0.590379)	(0.337119)	(0.370698)	(0.358753)	(0.330211)	(0.317376)	(0.228185)	(0.529487)
(0.527618)	(0.575573)	(0.647098)	(0.325079)	(0.3772)	(0.289173)	(0.288169)	(0.369542)	(0.331585)	(0.697812)

[illegible]
$$\sigma_p^2 = W'VCVW = 0.00129399$$

$$\sigma_p = \sqrt{W'VCVW} = 0.0359721$$

63

4. 3 VAR Computation and Computational Problem

4. 3. 1 Historical simulation

In this part of our study We explain detail the three method of computing Value at Risk. These methods are Historical simulation, variance-covariance Method, Monte Carlo methods. The first explanation of computing value at Risk is Historical Simulation for our portfolio . In this study our portfolio contains 30 financial instruments which consists of The Istanbul Stock Exchange 30 Index's stock. These are AKBANK, ARCELIK, ASYA BANK, BIM MARKET, DOGAN HOLING, DYHOL, ECILC, ENKAI, EREGL, GARAN, ISCTR, KRDM, KCHOL, KOZAA, PETKM, SAHOL, SKBNK, SISE, HALKB, TAVHL, TKFEN, TEBNK, TOASO, TCELL, TUPRS, THYAO, TTKOM, VAKBN VESTL . Now we calculate VaR under the historical simulation for single portfolio. I would show you portfolio assets. This is intuitive way to estimate value at risk. For illustration our portfolio as we mention about it before our portfolio contains 30 assets. Let say we have 30000 \$ evenly invested in equally distributed to each of the Istanbul Stock Exchange 30 Index's stock . Evenly we invested in each of stock 1000\$. I sorted daily period return in a Table in Appendix C. Then we determine the daily periodically stocks. The idea with a simulation for a portfolio is that we take the current portfolio or portfolio weight, we remembered that this is the invesment that i have today. We assume that what if i held today's portfolio and experience with the historical returns. For example when we look at the Table in Appendix C. In a case of 25.04.2011 if i have 1000\$ invested in AKBANK one day. One day dropped - 0,7407407%, i would lost 7,407407\$ daily return. Similarly In a case of 25.04.2011 if I have 1000\$ invested in ARCLK one day. One day rose 1,937046 %, i would earn 19,37046\$ daily return. With this allocation our portfolio's return on 25.04.2011, When we want to compute the portfolio's amount, the sum of the each of the our asset's amount is the portfolio's amount. We do that each days in our historical table. Again we held same amount in our this allocation. Having done that operation , we have found series of simulated historical portfolio gains and loses. Then we plotted histogram. We can see the plot histogram in Figure 4.5. This is the simulated loses for the portfolio. We can see that peak near the zero as we would expect daily returns. And we can ask ourself what would be the confidence level. In

our study we chose the confidence level % 95. We compute the VaR on the 95 % confidence level. We cut off the 5 % percent of left side of the x-axis. We compute the VaR of our portfolio with Excel Programming Language . In Table 4.5 we can see the order of the our portfolio's daily returns. The sample size of our portfolio is 323 observation of daily return. In 5 % confidence level 17 th order of the series is our VaR value. Using historical data from 01.01.2010 to 26.04.2011 , we obtained the daily prices in Portfolio and graphed out the returns in Figure 4.6. In Table 4.5 we recognize that 17 th order of daily return series is -0,024541327. The value at risk of 2,4541327% was determined by using the of past changes in the market factors.

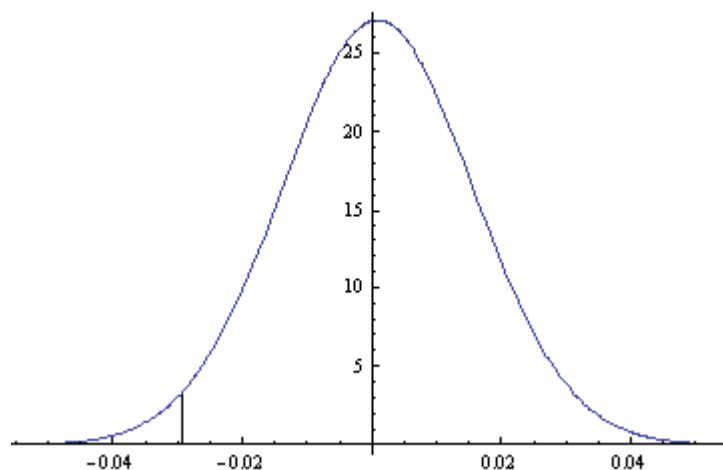


Figure 4.5 : Historical simulation normal distribution.

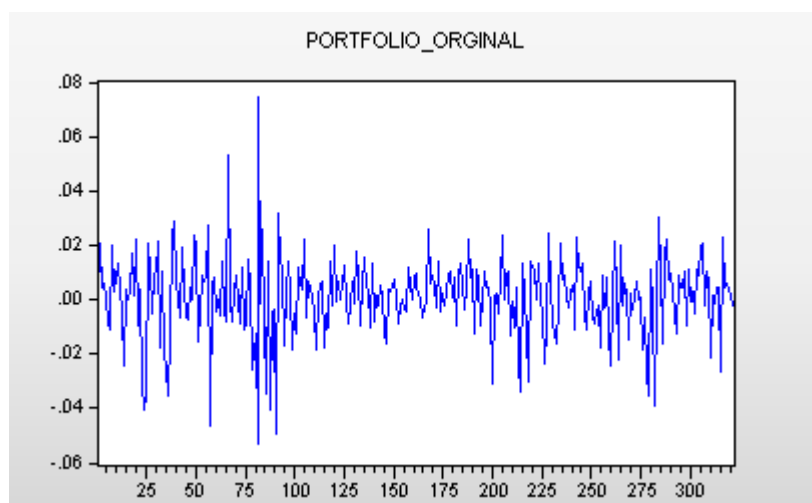


Figure 4. 6 : Graph of portfolio's historical returns.

Table 4.12 : Historical Returns of 322 observation of IMKB 30.

Date	Return of Porfolio
06.05.10	-0.05334044
24.05.10	-0.049050938
25.03.10	-0.046357971
04.02.10	-0.040699453
18.05.10	-0.040590015
28.02.11	-0.040301589
29.03.10	-0.040199453
30.05.10	-0.040090015
28.02.11	-0.039301589
05.02.10	-0.036040259
23.02.10	-0.035662183
23.02.11	-0.035344068
13.05.10	-0.034823315
22.11.10	-0.033669139
03.02.10	-0.031255136
26.10.10	-0.030670985
26.11.10	-0.030164276
22.02.11	-0.026686694
15.04.11	-0.026496926
30.04.10	-0.026021145
22.02.10	-0.024776242
27.01.11	-0.024571012
.....	
.....	
.....	
.....	
20.12.10	0.02092344
31.01.11	0.021612922
16.02.10	0.021772553
08.03.11	0.021900838
08.10.10	0.022066423
29.01.10	0.022135615
11.06.10	0.022503649
31.12.10	0.022535407
18.04.11	0.023002067
25.02.10	0.023271254
15.03.10	0.023414794
03.11.10	0.023923768
10.12.10	0.024616669
11.05.10	0.025575604
10.09.10	0.026105309
24.03.10	0.027447231
26.02.10	0.028718744
02.03.11	0.029899075
25.05.10	0.031417838
13.04.10	0.05320486
07.05.10	0

4. 3. 2 Variance-Covariance Method

The second method of computing VaR is Variance-Covariance Method. This is based on the assumption underlying the portfolio values are normal. With this assumption we determine the distribution of portfolio profits and loses which is normal. This distribution has a mean of zero, Which is reasonable because the change in portfolio value over a short holding period is almost close to zero. When we calculate the variance- covariance matrix we use mathematica programming language. We store Istanbul Stock Exchange 30 Index's stocks datas in SQL database. We develop method for accessing database system with mathematica Program. We denote portfolio which contains N variable with symbol of Σ

Variance of the portfolio is shown below expression.

$$\Sigma = VCV$$

Variance of the Our portfolio is computed with below expression.

$$\sigma_p^2 = W'VCVW$$

$$\sigma_p = \sqrt{W'VCVW}$$

V =The Variance Matrix that involve the standart deviation of the portfolio's stock.

C =The Correlation Matrix that involve the correlation between two stock.

W =The weight function of the each stock in the portfolio.

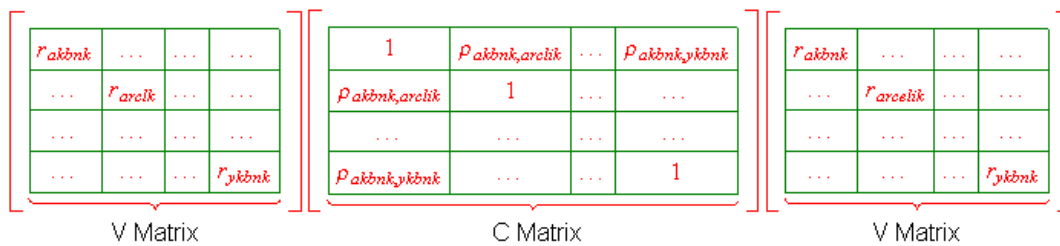


Figure 4.7 : Calculation of var with Variance-Covariance method.

```
VarianceMatrix =  
[[{0.025613, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0.023098, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0.022435, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0.018307, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0.021315, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0.031382, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0.027518, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0.028273, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0.026460, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0.022864, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.023996, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.020967, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.021058, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.021009, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.023513, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.018906, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.020568, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.020192, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.020007, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.021592, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.018373, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.026198, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.025087, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.022056, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.023726, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.017410, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.021455, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.032564, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.020835, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},  
 {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0.021732}]]
```

At this time we develop Mathematica Programming Codes for Correlation Matrix. and result of the Correlation Matrix are in Appendix E part. Figure 4.11 show us the result of the Mathematica Program. In our study Istanbul Stock Exchange 30 Index's stocks are distributed equally. And our weight function vector's elements have only unique values. It is shown in Figure 4.10.

Figure 4.9: Weight vector of portfolio.

(1.)	(0.599168)	(0.54465)	(0.238065)	(0.243491)	(0.304697)	(0.22041)	(0.509708)	(0.598753)	(0.654536)
(0.599168)	(1.)	(0.521539)	(0.296621)	(0.217395)	(0.281275)	(0.303039)	(0.444423)	(0.42742)	(0.603121)
(0.54465)	(0.521539)	(1.)	(0.313219)	(0.386816)	(0.356701)	(0.347979)	(0.468704)	(0.423081)	(0.615564)
(0.238065)	(0.296621)	(0.313219)	(1.)	(0.24948)	(0.256068)	(0.16119)	(0.203566)	(0.132788)	(0.296163)
(0.243491)	(0.217395)	(0.386816)	(0.24948)	(1.)	(0.640519)	(0.226549)	(0.183089)	(0.206277)	(0.325155)
(0.304697)	(0.281275)	(0.356701)	(0.256068)	(0.640519)	(1.)	(0.207857)	(0.253114)	(0.299079)	(0.293339)
(0.22041)	(0.303039)	(0.347979)	(0.16119)	(0.226549)	(0.207857)	(1.)	(0.238322)	(0.230471)	(0.302186)
(0.509708)	(0.444423)	(0.468704)	(0.203566)	(0.183089)	(0.253114)	(0.238322)	(1.)	(0.398256)	(0.423139)
(0.598753)	(0.42742)	(0.423081)	(0.132788)	(0.206277)	(0.299079)	(0.230471)	(0.398256)	(1.)	(0.405101)
(0.654536)	(0.603121)	(0.615564)	(0.296163)	(0.325155)	(0.293339)	(0.302186)	(0.423139)	(0.405101)	(1.)
(0.646956)	(0.59749)	(0.649076)	(0.331874)	(0.357128)	(0.352329)	(0.266327)	(0.458273)	(0.388325)	(0.759964)
(0.351778)	(0.410131)	(0.432467)	(0.25109)	(0.299931)	(0.289963)	(0.350288)	(0.375703)	(0.300651)	(0.438399)
(0.48979)	(0.579275)	(0.523351)	(0.299536)	(0.348037)	(0.295875)	(0.287936)	(0.442987)	(0.309746)	(0.589019)
(0.434473)	(0.449146)	(0.480492)	(0.337638)	(0.336333)	(0.329343)	(0.260961)	(0.33139)	(0.272611)	(0.518897)
(0.316287)	(0.386863)	(0.448609)	(0.306949)	(0.274342)	(0.253971)	(0.319483)	(0.253043)	(0.298583)	(0.437482)
(0.369928)	(0.337449)	(0.423869)	(0.2509)	(0.158697)	(0.212306)	(0.188616)	(0.352547)	(0.253944)	(0.436945)
(0.482058)	(0.465584)	(0.638321)	(0.336881)	(0.37105)	(0.346068)	(0.298266)	(0.355034)	(0.339141)	(0.596778)
(0.371647)	(0.419035)	(0.439277)	(0.224149)	(0.267252)	(0.293975)	(0.299742)	(0.450795)	(0.279821)	(0.437621)
(0.603073)	(0.524398)	(0.616329)	(0.337768)	(0.355177)	(0.349721)	(0.287523)	(0.445881)	(0.386515)	(0.689828)
(0.416437)	(0.502481)	(0.563962)	(0.299097)	(0.266448)	(0.345242)	(0.2658)	(0.391497)	(0.403131)	(0.460371)
(0.496397)	(0.585567)	(0.574863)	(0.285389)	(0.352326)	(0.320771)	(0.349689)	(0.440331)	(0.419074)	(0.576549)
(0.459046)	(0.395063)	(0.484238)	(0.276217)	(0.23815)	(0.246545)	(0.298207)	(0.464565)	(0.353641)	(0.495816)
(0.419422)	(0.370464)	(0.523817)	(0.252557)	(0.297038)	(0.256843)	(0.170435)	(0.475237)	(0.361478)	(0.446574)
(0.325549)	(0.375621)	(0.452677)	(0.237596)	(0.21712)	(0.242316)	(0.204418)	(0.224066)	(0.278084)	(0.406037)
(0.411067)	(0.385215)	(0.408692)	(0.170372)	(0.171133)	(0.188812)	(0.0361718)	(0.414151)	(0.275208)	(0.412909)
(0.579995)	(0.544789)	(0.479049)	(0.200319)	(0.246778)	(0.268798)	(0.255528)	(0.55327)	(0.474224)	(0.560148)
(0.351856)	(0.405618)	(0.338498)	(0.212909)	(0.158309)	(0.104755)	(0.161161)	(0.407675)	(0.272722)	(0.297827)
(0.372964)	(0.541519)	(0.533453)	(0.258942)	(0.214594)	(0.202301)	(0.204338)	(0.44389)	(0.202681)	(0.555375)
(0.341145)	(0.511069)	(0.590379)	(0.337119)	(0.370698)	(0.358753)	(0.330211)	(0.317376)	(0.228185)	(0.529487)
(0.527618)	(0.575573)	(0.647098)	(0.325079)	(0.3772)	(0.289173)	(0.288169)	(0.369542)	(0.331585)	(0.697812)

Figure 4.10 : Correlation matrix.

```

VC = VarianceMatrix.CorrelationMatrix
(* VC is the Variance-Covariance.We multiplyate the variance and
   covariance matrixes.*)
vcv = VC.VarianceMatrix
(* We multiplyate VC matrix with Variance Matrix again*)
SqrtVar = Sqrt[vcv]
(* Square Root of the vcv matrix*)
wvcvw = w.SqrtVar.w
(*Standart Deviation of the our portfolio.*)

```

Figure 4.11: Sample mathematica code of VCV method.

$$\sigma_p^2 = W'VCVW = 0.000217762$$

$$\sigma_p = \sqrt{W'VCVW} = 0.0147568$$

4. 3. 3 Monte Carlo simulation

The Monte Carlo Method is similar to the historical simulation method, except that conjectural changes in return of the financial instruments are created by randomly instead of sampled from historical returns. In our portfolio When we estimate results by statistically. Portfolio involve a parameter space with a thousand of returns for the

each stock. In the portfolio we evaluate Istanbul Stock Exchange 30 Index's stocks and 100 Stocks of IMKB . We have the 30 and 100 stock price returns were dependent. Stock returns exhibit correlation. Stock returns often exhibit a high degree of correlation. We therefore need to be able to simulate correlated random returns. In our study we generate randomly vectors which compose the portfolio.

Portfolio = $(x_{akbank}, x_{arclk}, \dots, x_{ykbmk})$ where

Suppose now that $X = (x_1, \dots, x_{30})$ is a random vector.

Σ the covariance matrix of X

1. It is symmetric so that $\Sigma^T = \Sigma$
2. The diagonal elements satisfy $\Sigma_{i,i} \geq 0$
3. It is positive semi-definite so that $X^T \Sigma X \geq 0$ for all $X \in \mathbb{R}^T$

Now we generate random $X = (x_1, \dots, x_{30})$ where

$X \approx MN(0, \Sigma)$ and we suppose that $Z_i \approx MN(0, \Sigma)$ and IID for $i = 1, \dots, n$ then Z_i

is the linear combination of normal random variables

$$c_1 Z_1 + \dots + c_n Z_n \approx N(0, \sigma^2)$$

Where $c_1 + \dots + c_n = \sigma^2$

We suppose that C is (n x n) matrix and $Z = (Z_1 + \dots + Z_{30})^T$

then $C^T Z \approx MN(0, C^T C)$ we have to solve $C^T C = \Sigma$

requires us to compute the Cholesky Decomposition of Σ . Our simulation modeling We compute the Cholesky Decomposition of a symmetric positive definite matrix in Mathematica using the Cholesky Decomposition Method. When we generate the random X vectors we develop mathematica codes. In the below expression we show

the process of the mathematica code. At first we define Σ variance-covariance matrix of our portfolio. Σ be a $(n \times n)$ and C be Σ 's Cholesky decomposition. If $X \approx MN(0, \Sigma)$ then we can generate random samples of X in Mathematica Program. We developed program as follows in Appendix F. Returns of the Data from Mathematica are irregular form and we arrange datas with C Sharp programming language. We can see that program codes and interface in appendix G. After we simulate Financial Model. We compose the matrix which has random vectors, size is a (30×322) , (30×600) , (30×1400) and (100×322) , (100×600) , (100×1400) . That means We have 30 vectors (Istanbul Stock Exchange 30 Index's stocks) and 100 vectors (100 IMKB Stocks). And Each vector has 322,600,1400 daily return. Figure 4. 12 is instance that we show the graph of the daily return of the Portfolio of Monte Carlo Simulation for IMKB 30 Stocks. Our Portfolio's standart devaiton(σ) is 0, 023343788 and mean(μ) is -0, 000022629

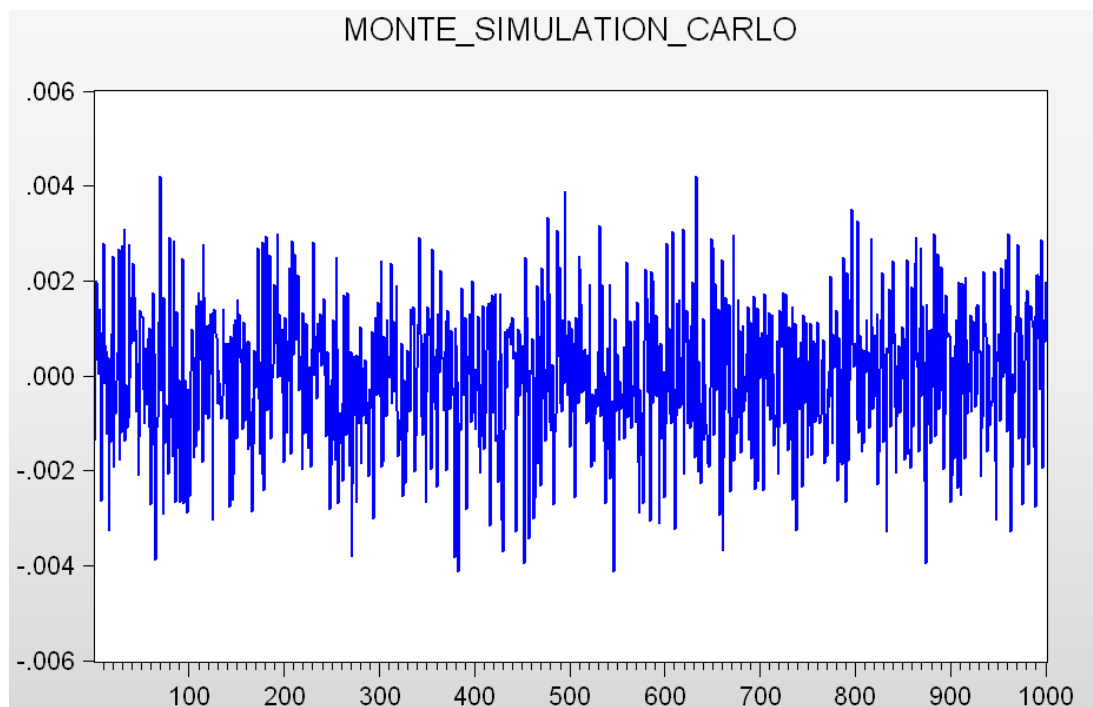


Figure 4.12 : Graph of Monte Carlo simulation returns for IMKB 30.

This is the simulated losses for the portfolio. We sort the values of Monte Carlo Simulation. We ask ourself what would be the confidence level. In our study we chose the confidence level % 95. We compute the VaR on the 95 % confidence level. We cut off the 5 % percent of left side of the x-axis. We compute the VaR of our portfolio with Excel Programming Language. We can sort the order of the our

portfolio's daily returns. The sample size of our portfolio is 1000 observation of daily return. In 5 % confidence level 50th order of the simulation is our VaR value. VaR is -0.023343788.

4. 3. 4 Computational problem

As we mention about before given a set of 30 instruments AKBANK, ARCELIK , ASYA BANK , BIM MARKETS, DOGAN HOLING, DYHOL, ECILC, ENKAI, EREGL, GARAN, ISCTR, KRDMD, KCHOL, KOZAA, PETKM, SAHOL, SKBNK, SISE, HALKB, TAVHL, TKFEN, TEBNK, TOASO, TCELL, TUPRS, THYAO, TTKOM, VAKBN, VESTL with with possibly uncertain returns. Our target is to select a portfolio of the instruments so as to maximize utility or minimize the risk. We remember our portfolio model. In our study we denoted variance of the portfolio below expression.

$$\sigma_p^2 = W' \Sigma W$$

In our Computational Problem our main purpose for a given expected level we minimize the risk or for given risk level maximize the expected return. Our main function of this model is $W' \Sigma W$

$$Min \cdot \sum_{i=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij}$$

In our computational problem production portfolio selection we have two main boundry conditions. One of them is expected return level

$$\sum_{i=1}^N x_i \mu_i = R$$

The other one is sum of the weight function is equal the unique.

$$\sum_{i=1}^N x_i = 1$$

When we gather together all conditions. And x_i stock variables are positive numbers.

$$\text{Min} \quad \sum_{i=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij}$$

$$\sum_{i=1}^N x_i \mu_i = R$$

$$\sum_{i=1}^N x_i = 1$$

$$0 \leq x_i \leq 1 \quad i=1, 2, \dots, N$$

After this reminder we modeled our computational problem in mathematical terms.

We multiply our instruments with variance covariance matrix.

$$\text{Max} \quad \sum_{i=1}^N x_i \mu_i - 2 \sum_{i=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij} + \lambda \left(1 - \sum_{j=1}^{30} x_j\right)$$

Our Main function has boundary.

Table 4.13 : Optimum weight allocation table.

Stock	Weigth amount	Stock	Weigth amount
AKBNK	0.000150847	PETKM	0.000998978
ARCLK	0.00127314	SAHOL	0.00343884
ASYAB	0.000188671	SISE	0.131067
BIMAS	0.00138958	SKBNK	0.00249817
DOHOL	0.568946	TAVHL	0.00202509
DYHOL	0.0000215359	TCELL	0.000457831
ECILC	0.000313728	TEBNK	0.000185003
ENKAI	0.000240805	THYAO	0.0990112
EREGL	0.000174969	TKFEN	0.000165194
GARAN	0.000559545	TOASO	0.000179095
HALKB	0.000244828	TTKOM	0.0197131
ISCTR	0.000343028	TUPRS	0.143687
KCHOL	0.0192195	VAKBN	0.00111143
KOZAA	0.000296735	VESTL	0.000242831
KRDMD	0.000404367	YKBNK	0.00145192

Table 4.14 : Optimum portfolio values.

Expected Value	0.0013286
Variance	0.000007550
Standart Deviation	0.000868959

$$\begin{aligned}
f(akbank, arclk, ..., ykbnk, \lambda) &= \sum_{i=1}^{30} x_i \mu_i - 2 \sum_{i=1}^{30} \sum_{j=1}^{30} x_i x_j \sigma_{ij} + \lambda (1 - \sum_{i=1}^{30} x_i) \\
&= -0,000902x_{akbank} + 0,001401x_{asyab} + \dots + 0,00152x_{yapikredi} \\
&\quad 0.000653x_{akbank}^2 + 2*0.000353x_{akbank}x_{arclk} + \dots + 2*0.000292x_{akbank}x_{yapikredi} \\
&\quad \dots + 0.000531x_{arclk}^2 + \dots + 2*0.000292x_{arclk}x_{yapikredi} \\
&\quad \dots \\
&\quad \dots + \\
&\quad 0.000470x_{yapikredi}^2 \\
&\quad + \lambda(1 - (x_{akbank} + x_{arclk} + x_{asyab} + \dots + x_{yapikredi})) \\
&\quad + -0,000902x_{akbank} + 0,001401x_{asyab} + \dots + 0,00152x_{yapikredi} \\
\frac{\partial f}{\partial akbank} &= -0,000902 + 2*0.000653x_{akbank} + 0.000353x_{arclk} + \dots \\
&\quad + 2*0.000292x_{yapikredi} = 0 \\
&\quad \dots \\
&\quad \dots \\
\frac{\partial f}{\partial yapikredi} &= 0,00152 + 2*0.000470x_{yapikredi} + 2*0.000353x_{arclk} + \dots \\
&\quad + 2*0.000292x_{yapikredi} = 0 \\
\frac{\partial f}{\partial \lambda} &= (1 - (x_{akbank} + x_{arclk} + x_{asyab} + \dots + x_{yapikredi}))
\end{aligned}$$

This above diagram shows us how to model computational problem under the two boundry. We use these boundaries which are called Lagrange multiplier for computing computational problem. We have 32 equations and 2 boundry. We derivative each of the equation equalize them to the zero for calculating optimum points for the equation system.

4. 4 Comparision

In this section we illustrate and compare the performance of the four risk measurement models. Every model has advantages and disadvantages for measuring value at risk. First method of computing value at risk is Historical method. The historical VaR model assumes that all possible future variations have been experienced in the past. The main limitations of historical VaR stem from the constraints imposed by the sample size. The number of data points used to construct the historical distribution must be equal to number of observations on each financial instrument's returns. Our Sample size contains of total 322 observations. We select our sample size number as large as possible. Gathering such data can be a difficult and time consuming task. We spend some much time when we collect the data set. On the other hand, one great advantage of historical VaR is that it makes few distributional assumptions. There is no assumption of the return distribution. The other method of computing VaR is Monte Carlo simulation. Monte Carlo VaR model uses the same assumptions as Historical Simulation that the risk factor returns are independent identically distributed. But these independent identically distributed vectors transformed to correlated multivariate normal vectors with cholesky decomposition. With this conversion one for each simulated vector of correlated risk factor returns. To reduce the sampling error we generate a very large number of simulations. In our example we generate 1000 simulation for our each financial instrument. We spent some much time when we modelled monte carlo simulation. And it is needed high performance computer programming when we modelled it. The other method for measuring the VaR is Variance-Covariance Method. The variance-covariance method is based on the assumption that the underlying market factors have a normal distribution. With this assumption it is possible that determine the VaR. When we compare the VaR for one day later. Historical and Monte Carlo is so closed to on 30. 04. 2011 value. Garch Models compute the high VaR. Reason of the high volaility is for the Garch models large returns are followed by more large returns. When we compute the VaR, last 11 iteration of returns of asset's value is too high. After this season returns of asset's become normal market values.

Table 4.15 : Comparasion of var results.

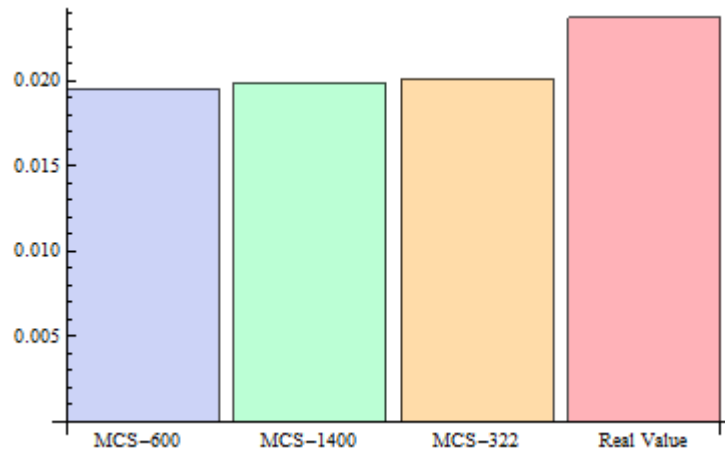
Model	Standart Deviation	Variance
Historical Simulation	0.024541327	0.00060228
Variance Covariance	0.0147568	0.00021776
Monte Carlo simulation	0.023343788	0.000544932
Garch(1.1)	0.0359721	0.00129399
Real Value(30.04.2011)	0.023673567	0.000560438

Table 4.16 : Comparasion of var results IMKB 30.

Model	Standart Deviation	Variance
Monte Carlo simulation 322	0.0201	0.0000040401
Monte Carlo simulation 600	0.01949968	0.0000038024
Monte Carlo simulation 1400	0.0198583	0.0000039435
Real Value (30.04.2011)	0.023673567	0.000560438

Table 4.17 : Comparasion of var results of concerning 100 IMKB stock.

Model	Standart Deviation	Variance
Monte Carlo simulation 322	-0.001531272	0.0000023448
Monte Carlo simulation 600	-0.001511556	0.0000022848
Monte Carlo simulation 1400	-0.001679334	0.0000028202
Real Value(30.04.2011)	-0.001506800	0.0000022704

**Figure 4.13 :** Graph of Monte Carlo simulation returns for IMKB 30 for 322,600,1400.

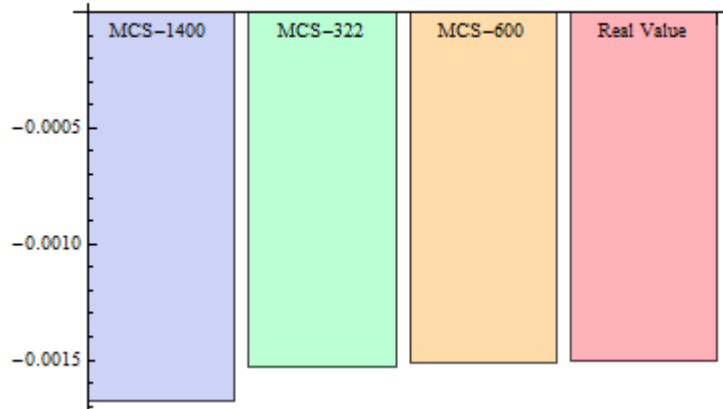


Figure 4.14 : Graph of Monte Carlo simulation returns for 100IMKB for 322,600,1400.

5. CONCLUSION

Financial crisis has a disastrous effect on the global economy, These crises can and will be avoided, but only when financial risk managers acquire the knowledge , skills and framework they really need to operate effectively in their profession. Proprietary trading by banks increases liquidity, but it may also increase volatility. Traditionally, banks are short volatility because investors want to be long volatility. It is an excellent diversification instrument. One of the main target of risk management is to protect an institution against unacceptable losses. Value at risk has become as a risk assessment tool at banks and other financial service firms in recently years. And the concept and use of value at risk is recent. Value at risk was first used by major financial firms in the late 1980's to measure the risks of portfolios. Its usage in these firms has been driven by the failure of the risk tracking systems used until the early 1990s to detect dangerous risk taking on the part of traders and it offered a key benefit a measure of capital at risk under extreme conditions in trading portfolios that could be updated on a regular basis. In this paper, we studied the problem of detecting multiple change points in individual parameters of a GARCH model and we present the performance of the VaR estimation engine and demonstrate in three areas: 1) Historical Simulation 2) Variance-Covariance and 3) Monte Carlo Simulation. At the end of the estimation we have shown how a quantitative theory for portfolio management can be developed using the expected return to model risk. We apply value at risk model on the portfolio which contains Istanbul Stock Exchange 30 Index's stocks. We compare the result of the VaR. Results are so close to each other and Real Value of the VaR. The Monte Carlo Method has a great performance to quantify risk. But it takes so much time that is why we can't choose this model. Garch techniques has a greater risk value than Real and variance Covariance risk value. The Reason of this situation Garch Methods focus on the last n iteration and last n returns effect the results more the historical returns. Large returns are followed by more large returns. The returns of the stock data considered in this study are normally distributed during Monte Carlo, Historical, Garch Methods. Last stage of our study we calculate the

optimum allocation of our portfolio's stock. Our expected value is 0.0013286 and standard deviation is 0.000868959 on optimum allocation level. In this level in Table 4.7 show us distribution level of each stock. Our main target is to compute the minimum risk underlying a given expected return level. Our main function has a one boundary. Volatilities of the assets are computed by Garch Methods. Expected value is 0.0013286 and standard deviation is 0.000868959. On the other hand we compare the approximation of VaR with different data size. We compute VaR with Monte Carlo simulation in different data size. We produce synthetic data set for 322,600, 1400 amount of data for portfolio which concern IMKB30 and 100 IMKB stocks for comparing result with real value. In table 4.16 and Table 4.17 results of VaR is shown. When we decrease sample of the data size we notice that result of synthetic data close to real value.

REFERENCES

- Alexander, Carol** Alexander, C. (2008) Market Risk Analysis, Volume IV: Value at Risk Models.
- Angelidis, Timotheos Alexandros Benos and Stavros Degiannakis** 2007 The Use of GARCH Models in VaR Estimation
- Bengtsson, Mattias and Viktor Olsbo**, 2003: Value at Risk Using Stochastic Volatility Models.
- Billioa, Monica Massimiliano Caporinb, and Michele Gobbo** 2006 Flexible Dynamic Conditional Correlation multivariate GARCH models for asset allocation.
- Bohdalová, Maria** 2007 A comparison of Value-at-Risk methods for measurement of the financial risk
- Burns, Patrick** 2000 The Quality of Value at Risk via Univariate GARCH
- CHUL GYU PARK and DONG WAN SHIN**, 2004 An Algorithm for generating correlated Random variables in a class of infinitely divisible distributions
- Dixon, Matthew Jake Chong, Kurt Keutzer , Jake Chong** 2009: Acceleration of Market Value-at-Risk Estimation
- Guochun Li, Bogdan** 2004 Value at Risk Models for a Nonlinear Hedged Portfolio
- Haugh, Martin** 2004: The Monte Carlo Framework, Examples from Finance and Generating Correlated Random Variables Monte Carlo Simulation
- Irina N. Khindanova And Svetlozar T. Rachev Santa Barbara** 2001
VALUE AT RISK RECENT ADVANCES
- JI-CHUN LIU**, 2009: Stationarity of a family of GARCH processes .
School of Mathematical Science, Xiamen University, Xiamen, 361005, PR China
- Jorion - Mcgraw-Hill**, 1997: Value At Risk The New Benchmark For Managing Financial Risk
- Korkmaz ,Turhan, Pekkaya , Mehmet** 2008 Excel Uygulamalı Finans Matematiği
- ÖZBEY ,Fela** 2005 Çok Değişkenli GARCH Modelleri ve bir uygulama Türkiye’de Belirsizliğin enflasyon ve çıktıdaki büyüme üzerine etkisi
- Norstad, John** 2002: - An Introduction to Portfolio Theory Paul J. Atzberger
Portfolio Optimization Unconstrained Portfolios
- Pedro Galeano and Ruey S. Tsay** 2009 Shifts in Individual Parameters of a GARCH Model
- ROBERT F. ENGLE, SERGIO M. FOCARDI, FRANK J. FABOZZI, Michael Armellino** 2007 ARCH/GARCH Models in Applied.
- Perrelli , Roberto** 2001 - Introduction to ARCH & GARCH models
- Terasvirta, Timo T. G. Andersen, R. A. Davis, J. -P. Kreiss and T. Mikosch**

2007 Multivariate GARCH models

To appear in T. G. Andersen, R. A. Davis, J. -P. Kreiss and T. Mikosch,
2009 Multivariate GARCH models.

Ulucan, Aydın 2000: Kuadratik Programlama Modelinin Portföy Optimizasyonu.

Url-1 [http://en.wikipedia.org/wiki/File:Dice_Distribution_\(bar\).svg](http://en.wikipedia.org/wiki/File:Dice_Distribution_(bar).svg) 02. 26. 2011

Url-2 <http://www.stattucino.com/berrie/normal.html> 17. 03. 2011

Url-3 <http://www.investopedia.com/articles/04/092904.asp> 02. 04. 2011

Url-4 http://en.wikipedia.org/wiki/Autoregressive_conditional_heteroskedasticity

APPENDICES

APPENDIX A. 1 : Plot Graph of the Portfolio's stock return series.

APPENDIX A. 2 : Histogram and Statics of Portfolio's Stock

APPENDIX A. 3 : Daily Return End of Day Portfolio's Stock Value and
Daily

Return End of 100 Stocks of IMKB

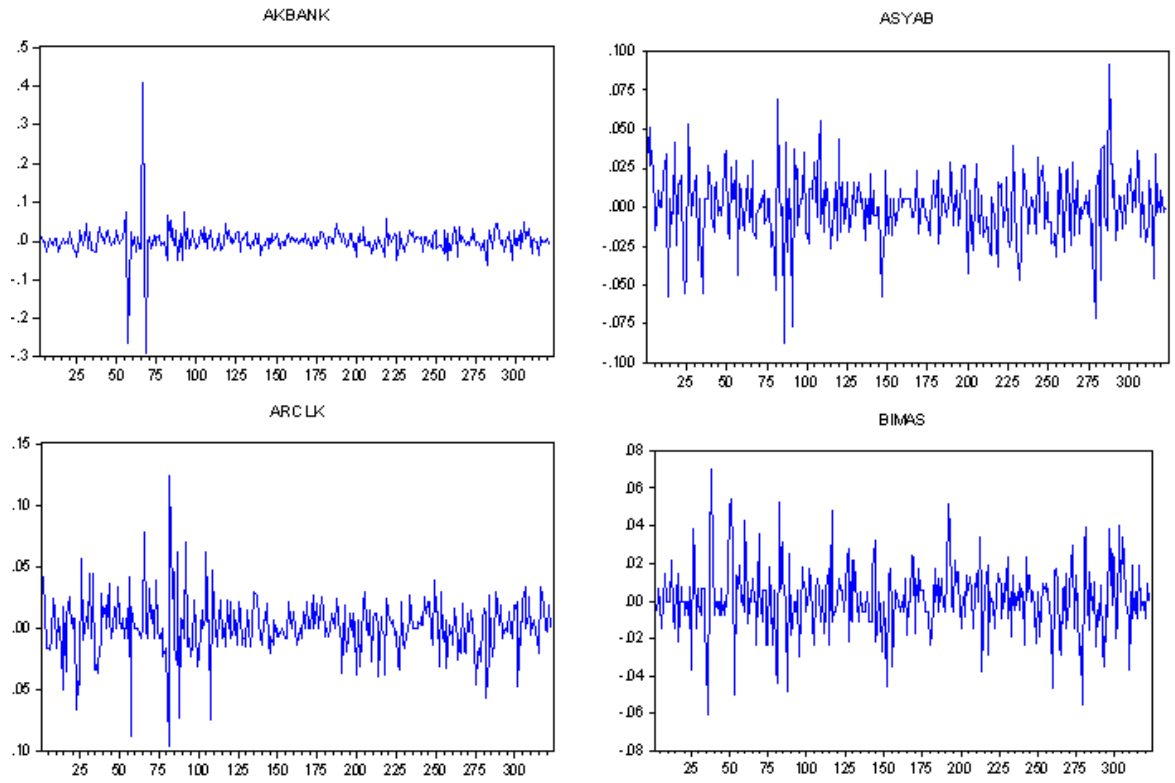
APPENDIX A. 4 : Composing Variance Matrix with Mathematica Codes

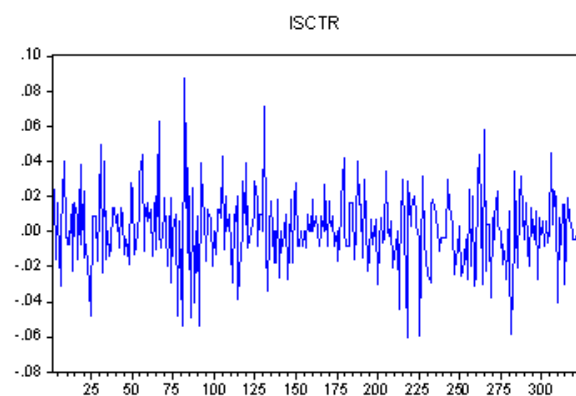
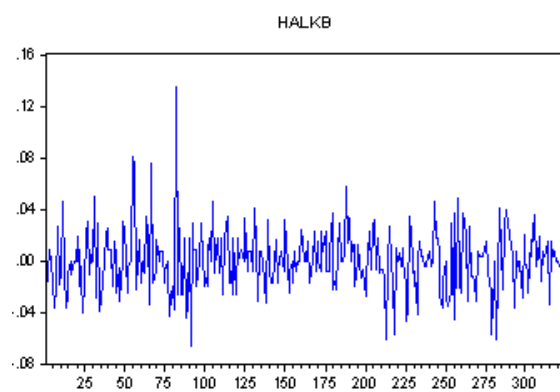
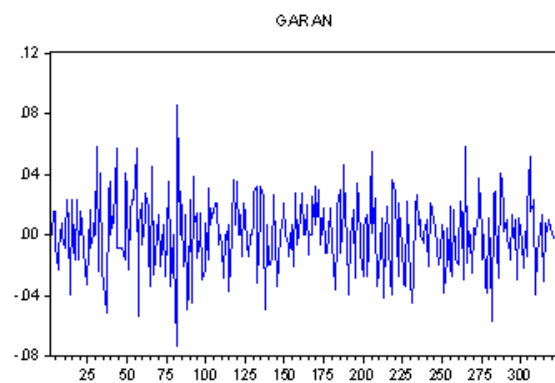
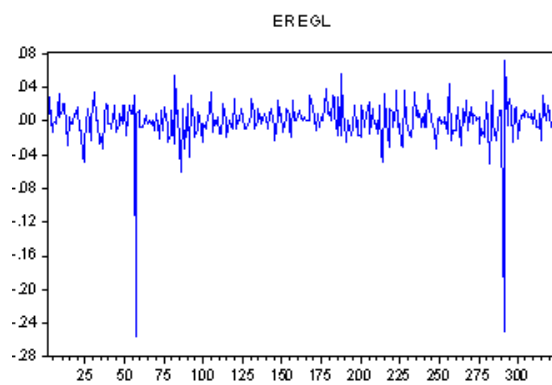
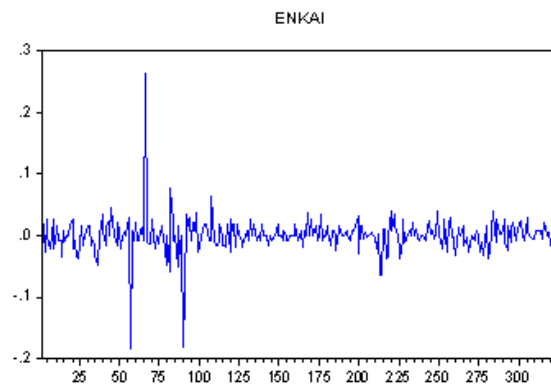
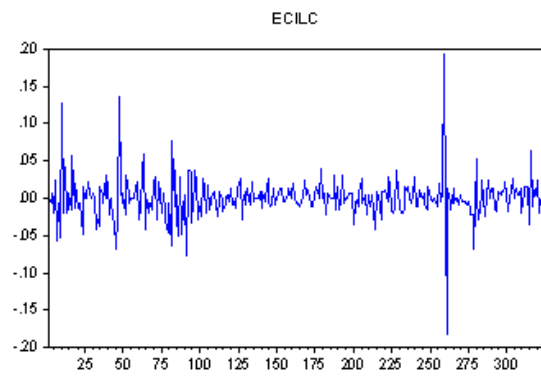
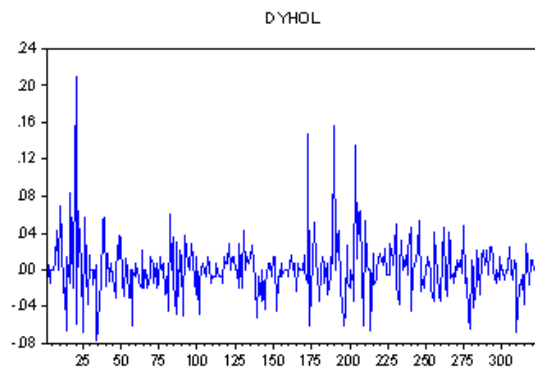
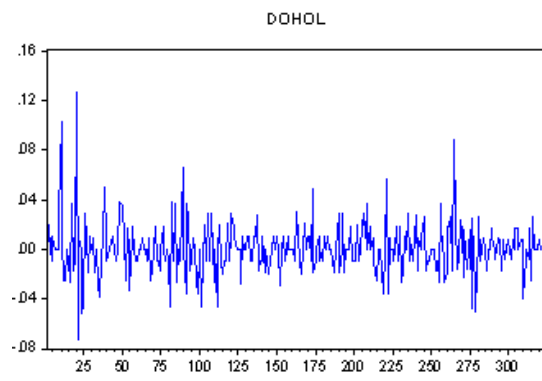
APPENDIX A. 5 : Composing Correlation Matrix with Mathematica Codes

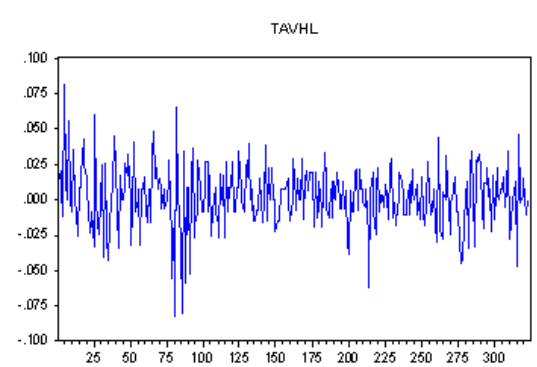
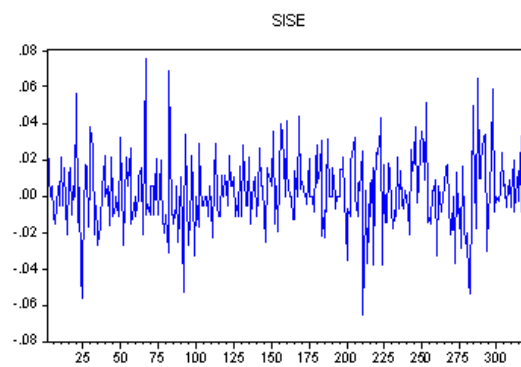
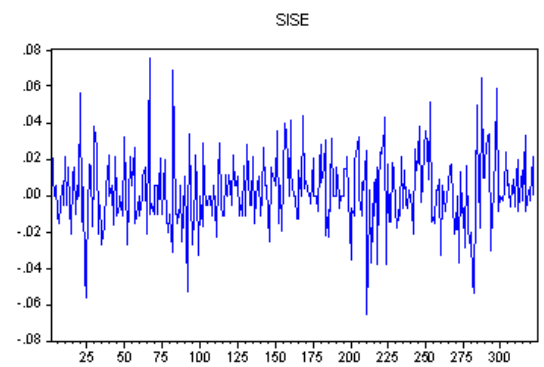
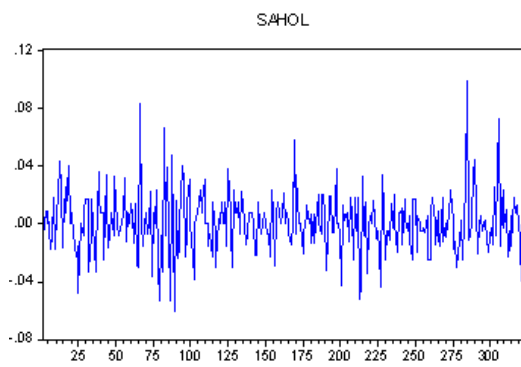
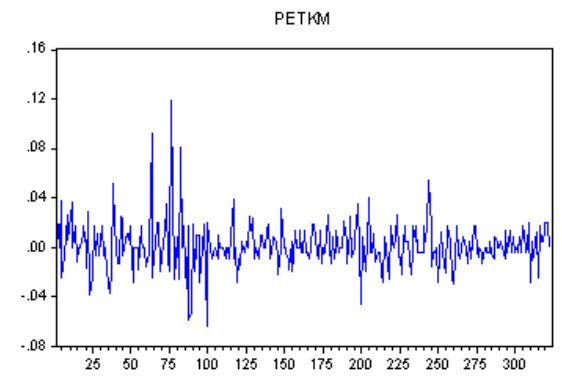
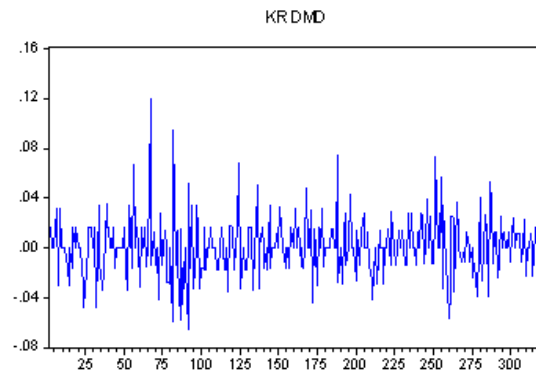
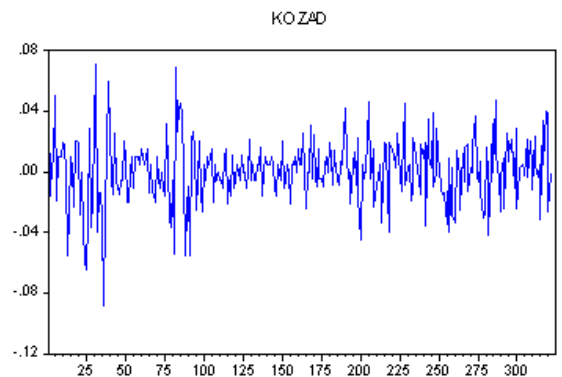
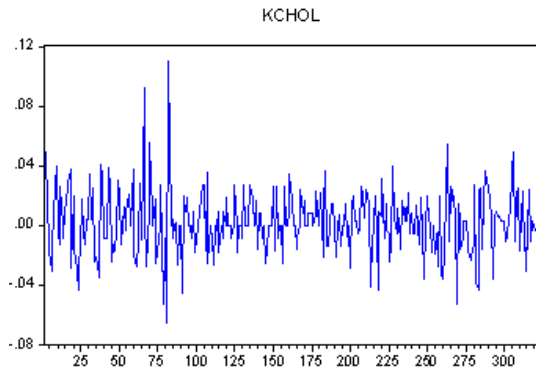
APPENDIX A. 6 : Composing Monte Carlo Simulation With Mathematica

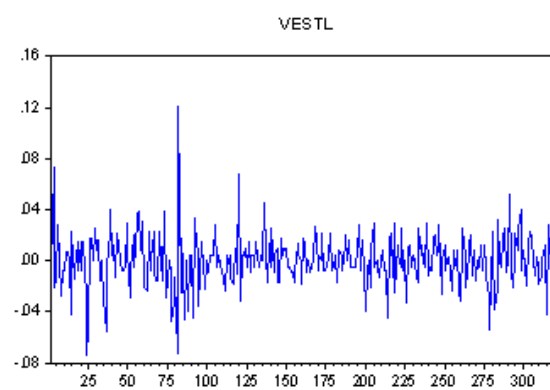
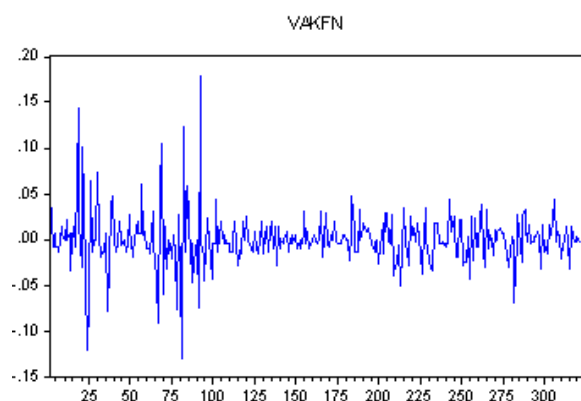
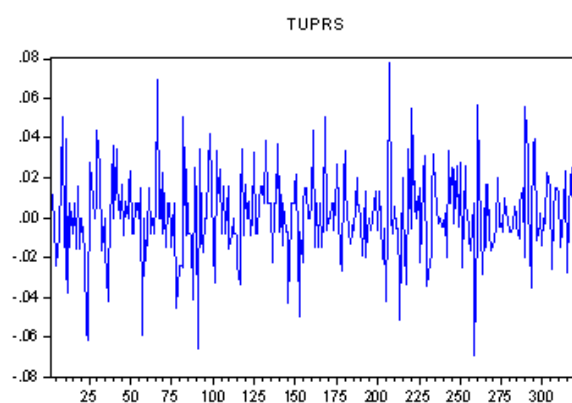
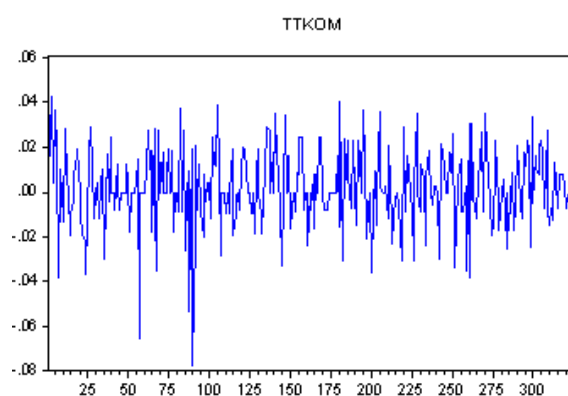
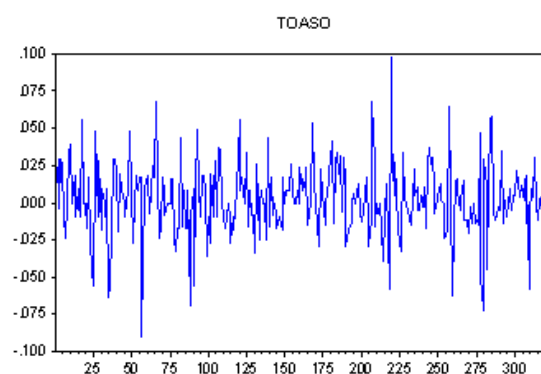
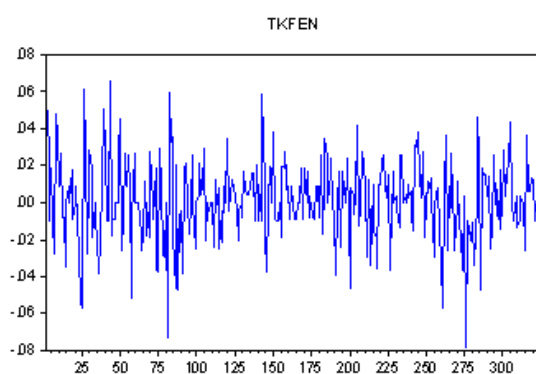
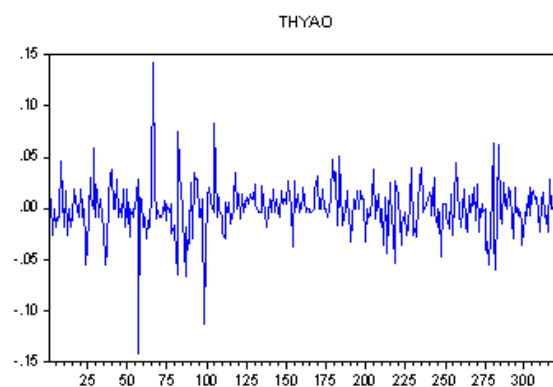
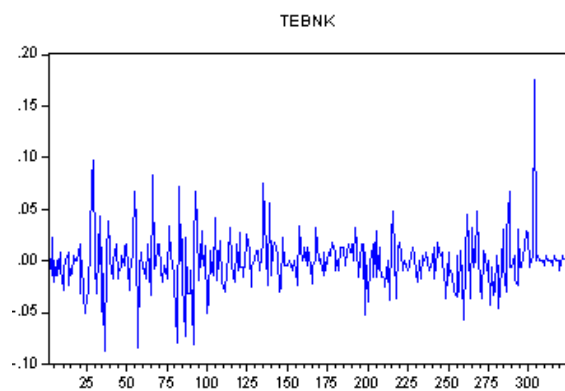
APPENDIX A. 7 : Developing C# codes and interface for arranging form of data
range

APPENDIX A.1 : Plot Graph of the Portfolio's stock return series









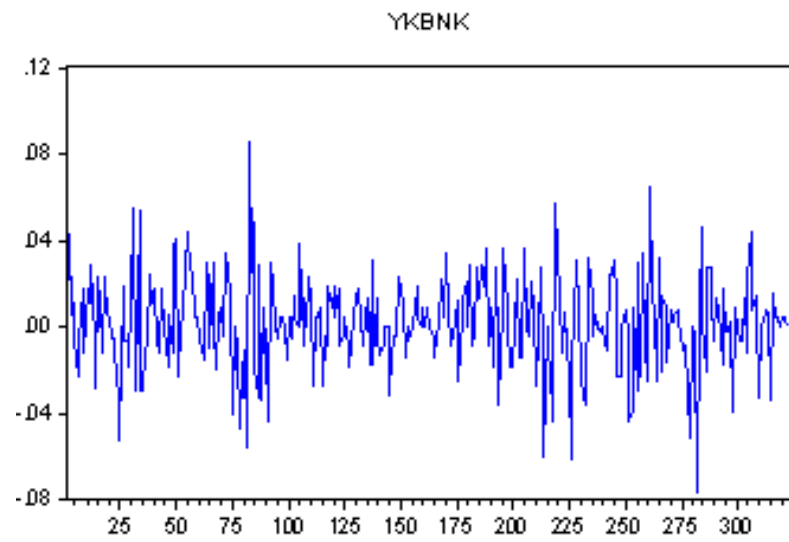
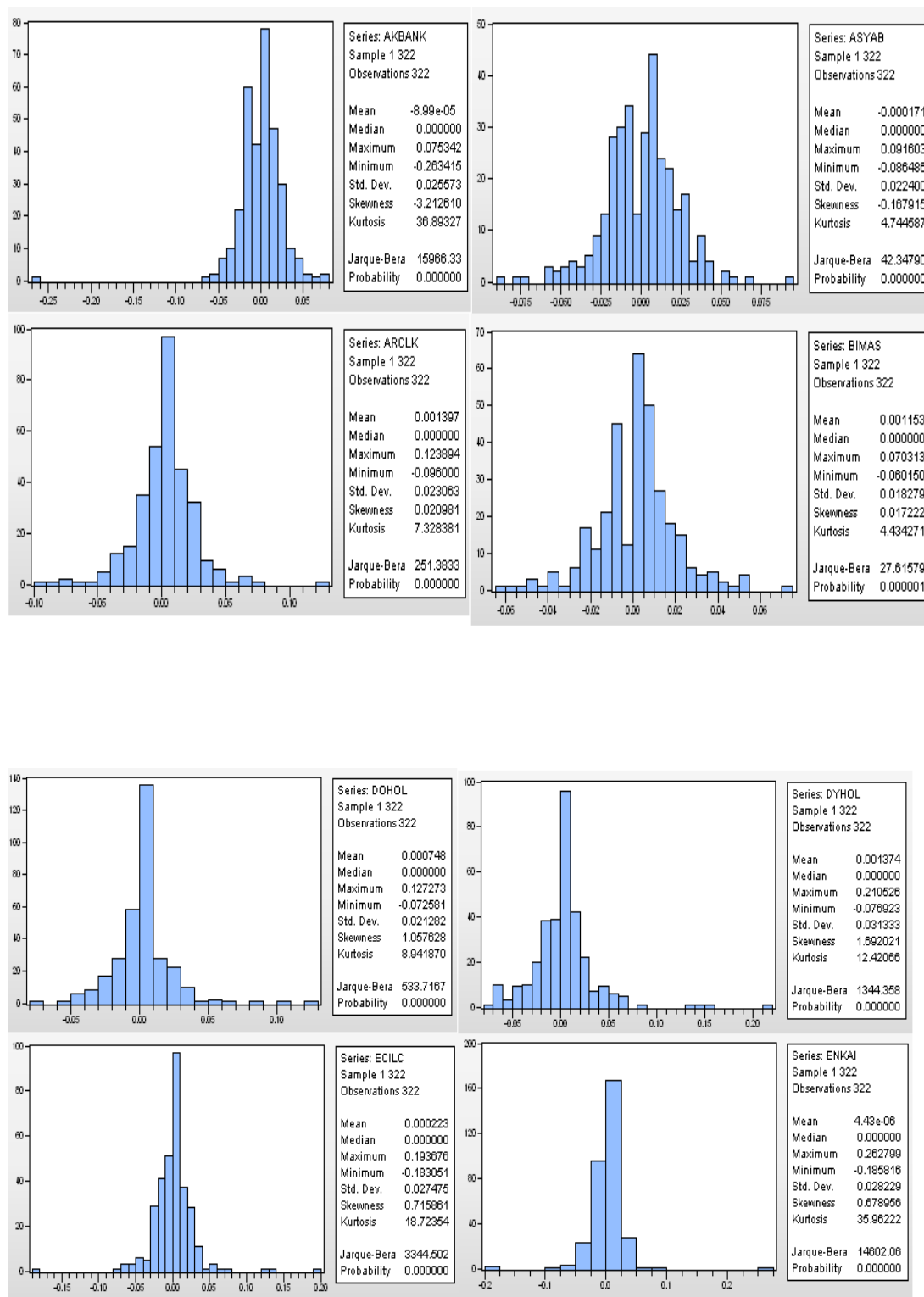
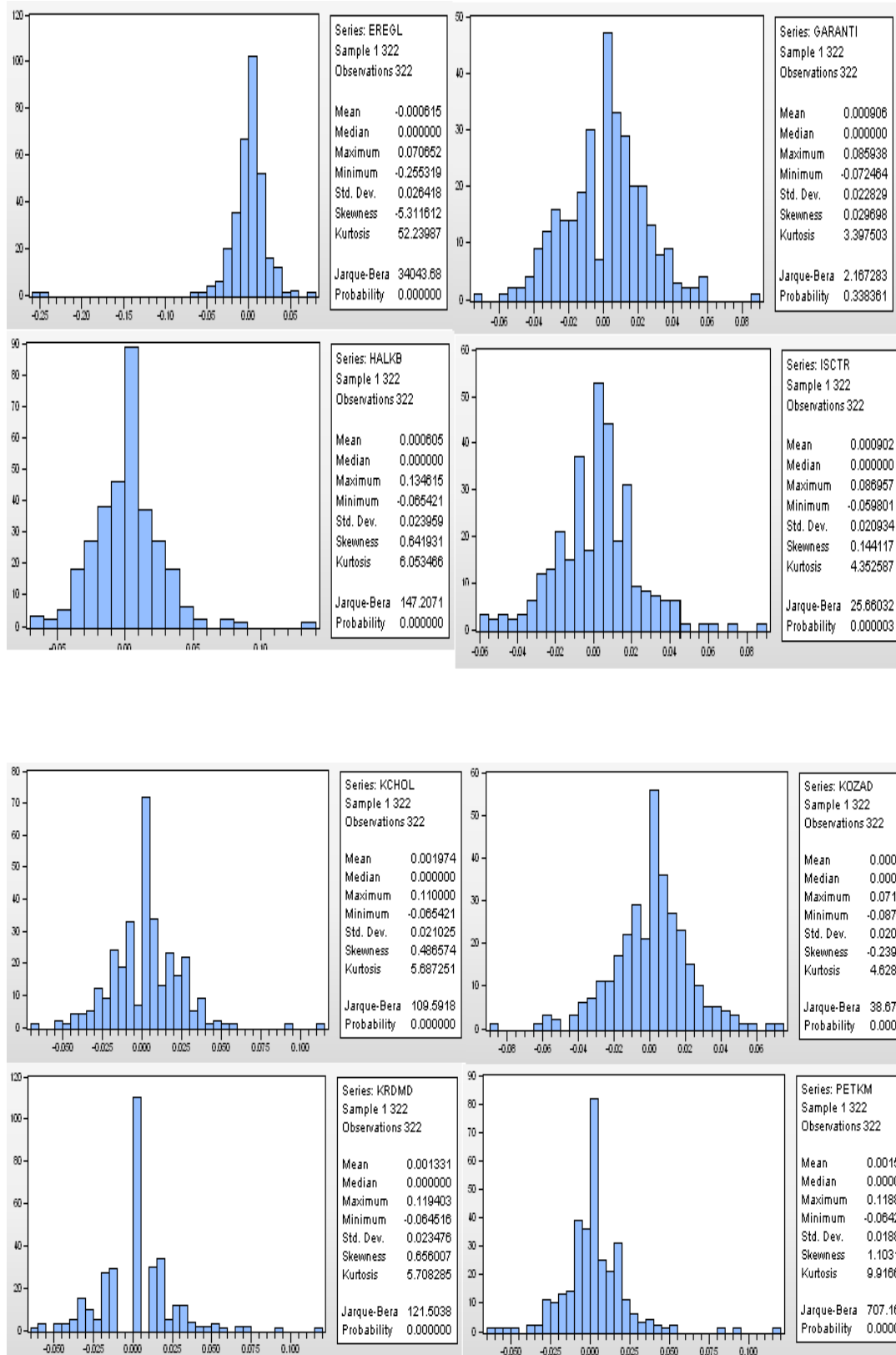
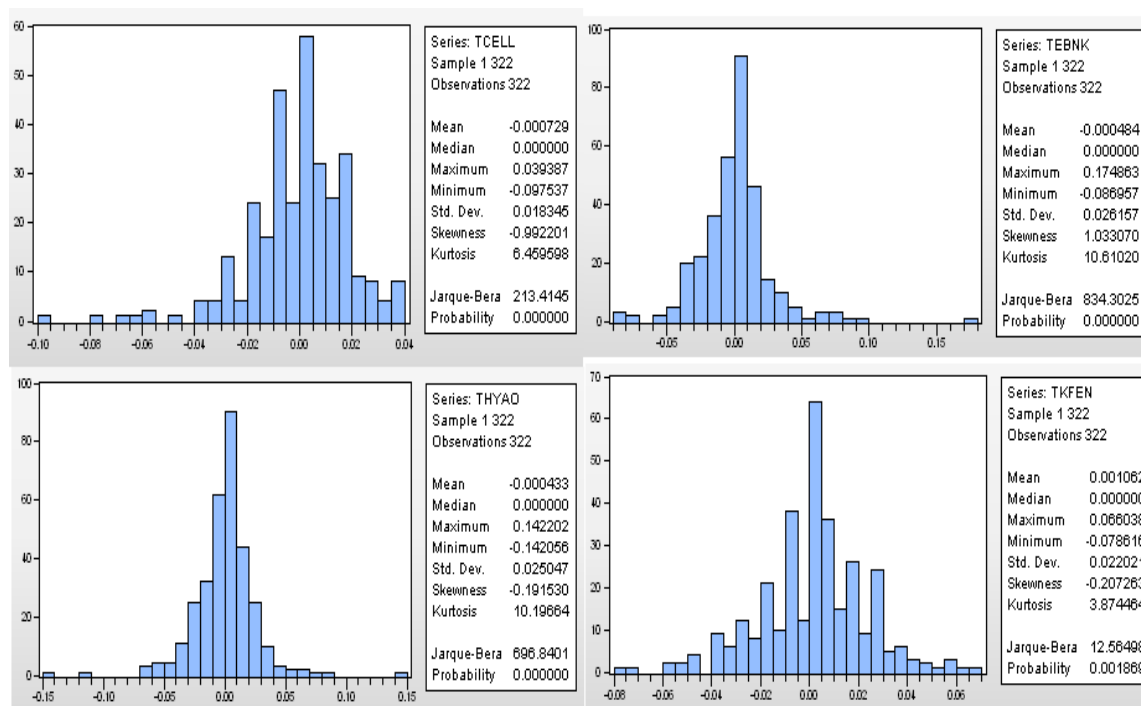
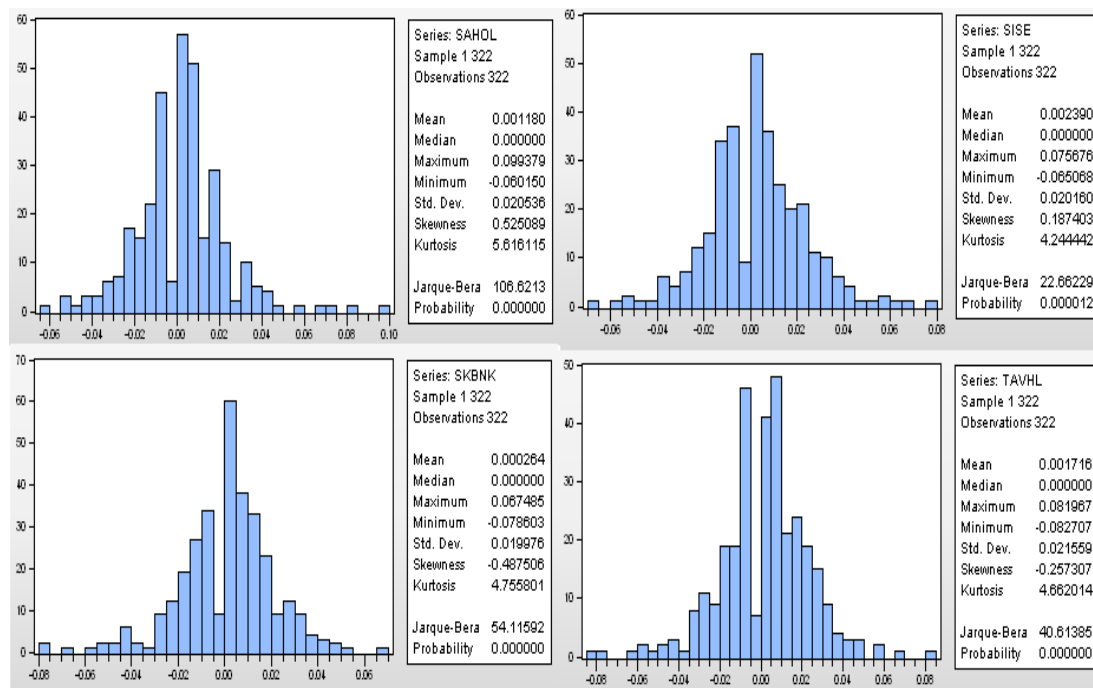


Figure A.1 : Plot Graph of the Portfolio's stock return series.

APPENDIX A.2 : Histogram and Statics of Portfolio's Stock







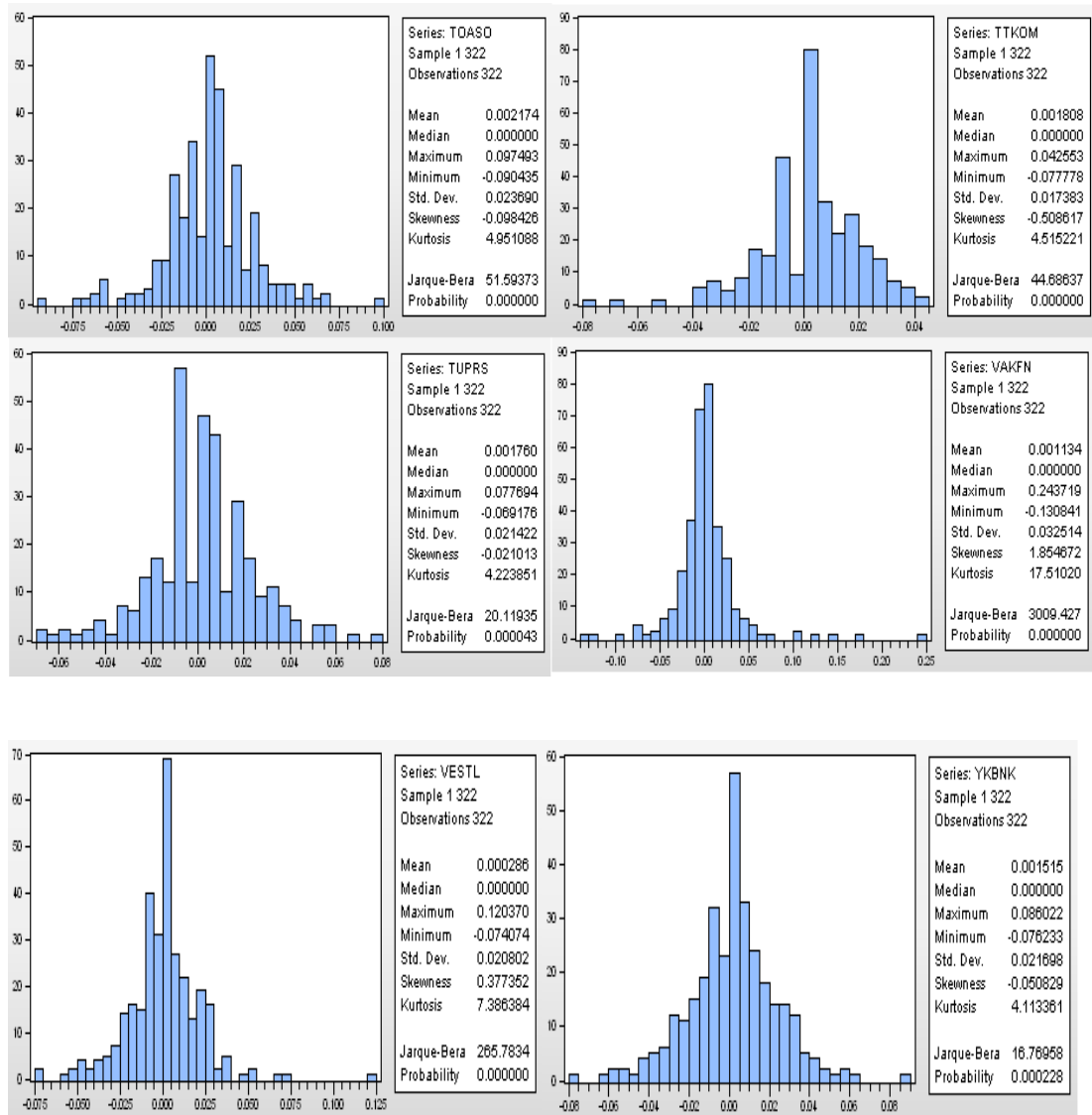


Figure A.2 : Histogram and Statics of Portfolio's Stock

APPENDIX A.3 : Daily Return End of Day Portfolio's Stock Value and Daily Return End of 100 Stocks of IMKB

Table A.3: Daily Return End of Day Portfolio's Stock Value

AKBANK	ARCLK	ASYAB	BIMAS	DOHOL	DYHOL	Tarih
0.010582	0.017094	0.028902	-0.00719	-0.00971	-0.00719	03.01.10
0.015707	0.042017	0.050562	-0.00725	0.019608	0.014493	04.01.10
-0.00515	0.016129	0.026738	0	0	-0.01429	05.01.10
-0.00518	-0.01587	0.036458	0.007299	-0.00962	0	06.01.10
-0.00521	-0.01613	0	0	0.009709	0	07.01.10
-0.02618	-0.01639	-0.01508	-0.01449	0	0	08.01.10
-0.00538	-0.00833	-0.0102	0	0	0.007246	11.01.10
0.005405	0.02521	0.010309	0.014706	0	0.043165	12.01.10
0	0.016393	0	0	0.028846	0	13.01.10
-0.01075	-0.01613	0	0	0.102804	0.068966	14.01.10
0.005435	0.008197	0.020408	0	0.008475	0.032258	18.01.10
0.005405	0.00813	0.035	0.021739	-0.02521	-0.025	19.01.10
-0.02688	-0.01613	0.004831	-0.00709	-0.02586	-0.01923	20.01.10
-0.01657	-0.04918	-0.05769	-0.01429	0	-0.06536	21.01.10
-0.00562	0.017241	0.005102	-0.00725	-0.00885	0.013986	22.01.10
0.00565	-0.0339	-0.01015	0.014599	-0.02679	-0.01379	25.01.10
-0.00562	0.008772	0	-0.02158	0.036697	0.083916	26.01.10
0	0.026087	0.041026	0.007353	-0.0177	-0.01935	27.01.10
-0.00565	0.016949	-0.02463	0	-0.00901	0	28.01.10
0.022727	0	0.015152	0	0.127273	0.210526	29.01.10
-0.00556	0.008333	0.014925	-0.0073	-0.07258	-0.05978	01.02.10
0	0.008264	0.019608	0	0.008696	0.063584	02.02.10
-0.02793	-0.06557	-0.03846	-0.00735	0	0.027174	03.02.10
-0.02874	-0.04386	-0.055	0.007407	-0.05172	0.010582	04.02.10
-0.04142	-0.04587	-0.04233	-0.03676	-0.04545	-0.06806	05.02.10
0.006173	0.057692	0.044199	0.038168	0.028571	0.05618	08.02.10
0.02454	-0.00909	0.05291	0.022059	0.009259	0	09.02.10
-0.01198	0	-0.00503	-0.01439	-0.01835	-0.03723	11.02.10
-0.01212	0.009174	0.005051	0.007299	0.009346	0.016575	12.02.10
0.006135	0	0.015075	0	0	0	15.02.10
0.042683	0.045455	0.019802	-0.00725	0.009259	0	16.02.10
-0.01754	-0.0087	-0.03398	0.007299	-0.01835	-0.0163	17.02.10
0.02381	0.04386	0.005025	0.007246	0	0.005525	18.02.10
-0.02326	-0.03361	-0.015	-0.01439	-0.02804	-0.07692	19.02.10
-0.02381	-0.02609	-0.05584	-0.0292	-0.03846	-0.06548	22.02.10
-0.03049	-0.03571	-0.03226	-0.06015	-0.01	-0.02548	23.02.10
-0.03145	-0.02778	0.005556	0.024	0.010101	-0.01961	24.02.10
0.012987	-0.00952	0.005525	0.070313	0.05	0.053333	25.02.10
0.038462	0.028846	0.027473	0.021898	0.009524	0.056962	26.02.10
0.012346	0.009346	0.010695	-0.00714	-0.00943	-0.01796	01.03.10
0.012195	0.018519	-0.00529	0	0	0.018293	02.03.10
-0.00602	0	-0.01596	0	0	-0.01198	03.03.10
0.024242	0.036364	0.010811	-0.00719	0.009524	0.006061	04.03.10
0.029586	0.008772	0.016043	0.007246	0.009434	-0.00602	05.03.10
0.017241	-0.0087	-0.00526	-0.00719	0	-0.00606	09.03.10
-0.0113	0	0	0	-0.00935	-0.03049	10.03.10
0	0.017544	-0.00529	-0.00725	0	0	11.03.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

AKBANK	ARCLK	ASYAB	BIMAS	DOHOL	DYHOL	Tarih
-0.00571	0	0.005319	0.007299	0.037736	0.037736	12.03.10
0.022989	0.034483	0.031746	0.014493	0.036364	0.012121	15.03.10
0.02809	0.008333	0.035897	0.05	0.035088	0.035928	16.03.10
-0.00546	0	-0.01485	0.054422	0.008475	-0.01156	17.03.10
0	0.008264	-0.0201	0.025806	-0.02521	-0.02924	18.03.10
0.005495	-0.0082	0.025641	-0.05031	0.017241	0.012048	19.03.10
0.010929	0.008264	0.005	0.013245	0	0	22.03.10
0.032432	-0.0082	0.004975	0.006536	-0.0339	-0.02976	23.03.10
0.073298	0.041322	0.029703	0.019481	0.008772	0	24.03.10
-0.26341	-0.0873	-0.04327	0	0.017391	-0.06135	25.03.10
0.023841	0.017391	0.015075	0.006302	0	0	01.04.10
0.019405	0	0.009901	-0.00626	-0.00855	-0.00654	02.04.10
-0.01015	0	-0.0098	0.043358	-0.00862	0.006579	05.04.10
0.010256	0	-0.01485	0	0	-0.00654	06.04.10
-0.02792	0	-0.01005	-0.01184	0	-0.01316	07.04.10
0.009138	-0.00855	0.020305	0.005868	0.008696	-0.02	08.04.10
-0.0194	-0.00862	-0.00995	0	0	0.020408	09.04.10
-0.01847	0	-0.00503	0.011911	0	-0.02	12.04.10
0.041129	0.078261	0.030303	0	-0.00862	0	13.04.10
0	0	-0.01471	0	0.008696	-0.0068	14.04.10
-0.01847	-0.00806	-0.0199	-0.02353	-0.02586	-0.02055	15.04.10
-0.00671	0.03252	-0.00508	0.036145	-0.0177	-0.00699	16.04.10
0.006757	0.007874	0	0.005814	0	0.014085	19.04.10
-0.02013	0.015625	0.005102	-0.01156	0.018018	0.006944	20.04.10
-0.00685	-0.00769	0	0.005848	-0.00885	-0.01379	21.04.10
0.013793	0.03876	0.010152	0.005814	-0.00893	0.006993	23.04.10
-0.01361	0	-0.01005	-0.02312	-0.01802	-0.02083	26.04.10
0.006897	-0.00746	-0.00508	-0.02367	0	-0.01418	27.04.10
0.006849	-0.00752	0.005102	0.018182	0.018349	0.014388	28.04.10
0.013605	0	0.005076	0	0	0	29.04.10
-0.01342	-0.02273	-0.02525	-0.02381	-0.00901	0.007092	30.04.10
-0.0068	-0.0155	-0.01554	0.006098	0	-0.02817	04.05.10
0	-0.01575	-0.05263	-0.03636	-0.00909	-0.00725	05.05.10
-0.04795	-0.096	-0.04444	-0.04403	-0.04587	-0.0438	06.05.10
0.064748	0.123894	0.069767	0.052632	0.038462	0.061069	07.05.10
0.006757	0.023622	0.01087	0.00625	-0.00926	0	10.05.10
0.053691	0.046154	-0.00538	0.031056	0.037383	0.035971	11.05.10
0.012739	-0.01471	0	0.012048	-0.02703	-0.01389	12.05.10
-0.01258	-0.02985	-0.08649	0	0	-0.0493	13.05.10
0.025478	0.061538	0.04142	-0.00595	0	0.02963	17.05.10
-0.04969	-0.07246	-0.02841	-0.0479	-0.00926	-0.02878	18.05.10
-0.01307	0.007813	0.011696	0.025157	0.065421	0.022222	20.05.10
0.019868	0.007752	-0.01156	-0.0184	0	0.014493	21.05.10
-0.05195	-0.00769	-0.07602	-0.0125	-0.03509	-0.05	24.05.10
0.075342	0.069767	0.037975	0	0.036364	0.037594	25.05.10
-0.01911	-0.01449	0.018293	-0.00588	0.026316	0.021739	26.05.10
0.032468	-0.00735	0.023952	0.005917	-0.01709	0.007092	27.05.10
-0.01887	-0.02222	-0.0117	-0.02941	-0.0087	0	28.05.10
-0.01282	-0.01515	0.005917	-0.00606	0.008772	0.028169	31.05.10
0.025974	0.023077	0.005882	0.018293	0	0.013699	01.06.10
0.012658	0	0.035088	0.011976	-0.02609	0.006757	02.06.10
-0.0125	-0.03008	-0.01695	0.005917	-0.03571	-0.02685	03.06.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

AKBANK	ARCLK	ASYAB	BIMAS	DOHOL	DYHOL	Tarih
-0.01899	-0.02326	-0.01724	-0.00588	0	0.013793	04.06.10
-0.00645	0	-0.02339	0.005917	-0.0463	-0.04762	07.06.10
0	0.015873	0.011976	0.017647	-0.00971	-0.01429	08.06.10
0.025974	0	0.011834	0.011561	0.019608	0	09.06.10
0	0.007813	0.005848	-0.01143	-0.00962	0.007246	10.06.10
0.037975	0.062016	0.02907	-0.02312	0.029126	0	11.06.10
-0.01829	-0.0146	-0.00565	0.005917	-0.00943	-0.00719	15.06.10
0.006211	0.007407	0.022727	0.011765	0.028571	0.014493	16.06.10
0.006173	-0.07353	0.055556	0.005814	0.027778	0.007143	17.06.10
0.02454	0.047619	-0.01053	-0.01156	-0.02703	-0.01418	18.06.10
-0.01198	0.015152	0.010638	0.005848	0	-0.00719	21.06.10
-0.02424	-0.01493	-0.01579	-0.01744	-0.0463	-0.00725	22.06.10
-0.01863	-0.00758	0.016043	-0.00592	0	-0.0073	23.06.10
-0.00633	0.007634	0	0.005952	0.019417	0.007353	24.06.10
0.019108	0.022727	0	0.017751	-0.00952	-0.0073	27.06.10
-0.025	-0.00741	-0.02632	-0.02326	-0.01923	-0.00735	28.06.10
-0.01923	0	-0.01081	0.047619	-0.0098	-0.00741	29.06.10
-0.01899	-0.02326	-0.01724	-0.00588	0	0.013793	04.06.10
-0.00645	0	-0.02339	0.005917	-0.0463	-0.04762	07.06.10
0	0.015873	0.011976	0.017647	-0.00971	-0.01429	08.06.10
0.025974	0	0.011834	0.011561	0.019608	0	09.06.10
0	0.007813	0.005848	-0.01143	-0.00962	0.007246	10.06.10
0.037975	0.062016	0.02907	-0.02312	0.029126	0	11.06.10
-0.01829	-0.0146	-0.00565	0.005917	-0.00943	-0.00719	15.06.10
0.006211	0.007407	0.022727	0.011765	0.028571	0.014493	16.06.10
0.006173	-0.07353	0.055556	0.005814	0.027778	0.007143	17.06.10
0.02454	0.047619	-0.01053	-0.01156	-0.02703	-0.01418	18.06.10
-0.01198	0.015152	0.010638	0.005848	0	-0.00719	21.06.10
-0.02424	-0.01493	-0.01579	-0.01744	-0.0463	-0.00725	22.06.10
-0.01863	-0.00758	0.016043	-0.00592	0	-0.0073	23.06.10
-0.00633	0.007634	0	0.005952	0.019417	0.007353	24.06.10
0.019108	0.022727	0	0.017751	-0.00952	-0.0073	27.06.10
-0.025	-0.00741	-0.02632	-0.02326	-0.01923	-0.00735	28.06.10
-0.01923	0	-0.01081	0.047619	-0.0098	-0.00741	29.06.10
-0.01307	-0.01493	-0.00546	-0.01136	-0.0099	-0.01493	30.06.10
0.046358	0.022727	0.016484	-0.00575	0.02	0.015152	01.07.10
0.006329	0	-0.02162	-0.00578	-0.0098	0.007463	02.07.10
0.025157	0.022222	0.044199	0	0.009901	0.007407	05.07.10
0	-0.00725	-0.01587	0.011628	0.029412	0.029412	06.07.10
0.006135	0	0.016129	0.005747	0.019048	0	07.07.10
-0.0061	0.014599	-0.01058	0.005714	0.009346	0.014286	08.07.10
0.006135	-0.01439	-0.00535	-0.00568	0	0.014085	09.07.10
0.018293	0.021898	0.016129	0.005714	0	0	12.07.10
0.023952	0.014286	-0.01587	0.022727	0	0	13.07.10
-0.02924	-0.01408	-0.01075	0.027778	-0.02778	-0.02083	14.07.10
0	-0.00714	0	-0.02162	0.009524	0.028369	15.07.10
0.012048	-0.00719	0.016304	0.022099	0	-0.02069	16.07.10
0.005952	-0.01449	-0.00535	-0.01081	0	-0.00704	19.07.10
0.023669	0.014706	0.010753	0.021858	0.009434	0.042553	20.07.10
-0.01156	0	0.015957	0.010695	0.009346	0	21.07.10
-0.00585	-0.01449	0.005236	0	-0.00926	0.013605	22.07.10
-0.01765	0	0	-0.01058	-0.00935	0.006711	23.07.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

AKBANK	ARCLK	ASYAB	BIMAS	DOHOL	DYHOL	Tarih
0	0.029412	0.005208	0.005348	0.009434	0.013333	26.07.10
-0.01198	0.028571	-0.02073	-0.00532	0.009346	0.026316	27.07.10
0.018182	0.027778	0.005291	-0.00535	0.027778	0.00641	28.07.10
-0.00595	0.006757	-0.01053	-0.00538	-0.01802	-0.01274	29.07.10
0.017964	-0.00671	0.021277	0.005405	-0.00917	-0.05161	30.07.10
-0.03529	-0.01351	-0.01042	-0.00538	-0.00926	-0.0068	02.08.10
-0.01829	0.006849	0.010526	-0.01081	0.009346	-0.00685	03.08.10
-0.01242	0.006803	-0.00521	-0.01093	-0.01852	-0.03448	04.08.10
-0.01258	0.02027	-0.00524	0.016575	0	0	05.08.10
0.006369	-0.01325	0	0.032609	-0.01887	-0.04286	06.08.10
0.006329	-0.02013	0	-0.02105	-0.01923	-0.01493	09.08.10
-0.01887	-0.00685	-0.05789	-0.01613	-0.0098	-0.00758	10.08.10
0.019231	-0.01379	-0.03911	0.005464	0	0.007634	11.08.10
0	0.006993	-0.01163	-0.00543	0.009901	0.007576	12.08.10
0.006289	-0.00694	0.023529	-0.02732	0	-0.00752	13.08.10
0.01875	0	-0.00575	0	0.009804	0.015152	16.08.10
0	-0.00699	-0.01734	-0.01685	0	0.014925	17.08.10
-0.0184	0	0.005882	-0.04571	-0.02913	-0.04412	18.08.10
-0.00625	0	-0.01754	0.011976	0	-0.00769	19.08.10
0	-0.00704	0.005952	0.017751	0.01	-0.00775	20.08.10
-0.01258	-0.00709	-0.01183	-0.00581	-0.0099	0.007813	23.08.10
-0.01274	-0.00714	-0.00599	-0.03509	-0.01	-0.00775	24.08.10
0.012903	0.021583	0	0.006061	0.010101	0	25.08.10
0.019108	0.007042	0.012048	0.006024	0	0	26.08.10
0	0	0	0	0	0	27.08.10
0.0125	0.013986	0.005952	0	0	-0.00781	28.08.10
0.006173	0	0.005917	-0.00599	0	0.007874	31.08.10
0	-0.01379	0.005882	0	-0.01	0.015625	01.09.10
0.006135	-0.00699	0.005848	-0.00602	0.030303	0	02.09.10
-0.0061	0	0.005814	0.012121	0.009804	0.007692	03.09.10
0	-0.00704	-0.00578	-0.01796	-0.00971	-0.0229	06.09.10
0.006135	0.014184	-0.00581	0	-0.01961	0.007813	07.09.10
0	0	0	0	0	0	08.09.10
0.018293	0.020979	0.023392	0.02439	0.02	0	10.09.10
-0.00599	0	-0.01143	0.02381	0	0	13.09.10
0.006024	0	-0.01734	-0.01744	0.009804	0.015504	14.09.10
0.005988	0	0.005882	0.011834	0.009709	0	15.09.10
-0.01786	0.027397	0.005848	0	-0.00962	-0.01527	16.09.10
0.012121	0	-0.00581	0.017544	0.048544	0.147287	17.09.10
-0.01198	0.006667	-0.00585	0.005747	-0.01852	-0.06081	20.09.10
0.012121	0.019868	-0.00588	0.005714	-0.00943	-0.02158	21.09.10
-0.01198	0	-0.01775	0.005682	0	0.007353	22.09.10
0.012121	0.012987	-0.00602	-0.00565	0.009524	0.051095	23.09.10
0.023952	0.025641	0.012121	-0.00568	-0.00943	0.006944	24.09.10
0.017544	0	0.017964	-0.00571	0	0	27.09.10
0.011494	-0.00625	0	-0.02299	-0.00952	-0.03448	28.09.10
0.005682	0	0.023529	-0.01765	0.009615	0	29.09.10
-0.0226	-0.00629	-0.02299	0	0	0.014286	30.09.10
0.011561	0	0	0.017964	0.009524	0.007042	01.10.10
0.005714	0.012658	0.011765	0	0	-0.01399	04.10.10
0	0.00625	0.005814	0.011765	0	0.007092	05.10.10
-0.00568	0	0	-0.00581	-0.00943	-0.02817	06.10.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

AKBANK	ARCLK	ASYAB	BIMAS	DOHOL	DYHOL	Tarih
0.017143	0.024845	-0.00578	0.011696	-0.01905	-0.00725	07.10.10
0.044944	0.012121	0.011628	0.00578	0	0.014599	08.10.10
0.016129	0.005988	0.028736	0	0	0.007194	11.10.10
0.015873	-0.0119	0.01676	-0.00575	0.029126	0.157143	12.10.10
-0.00521	-0.03614	-0.01099	0.011561	-0.01887	0	13.10.10
0.015707	0.01875	0.005556	0.051429	0	0.037037	14.10.10
-0.00515	0	0.01105	0.038043	0.028846	0.041667	15.10.10
-0.01554	-0.0184	-0.01093	0	-0.01869	-0.02286	18.10.10
-0.01053	0.00625	-0.00552	-0.00524	0	-0.03509	19.10.10
0.015957	0.012422	0.022222	0.021053	0	-0.06061	20.10.10
0.015707	-0.00613	0.027174	0.010309	0	-0.04516	21.10.10
-0.01546	0.012346	0.026455	0.015306	0.019048	0.027027	22.10.10
-0.00524	0	-0.01546	0.01005	-0.00935	-0.01316	25.10.10
-0.04211	-0.03659	-0.04188	-0.01493	-0.00943	-0.02	26.10.10
-0.01099	0.006329	0.010929	-0.00505	-0.00952	0	27.10.10
0.015556	-0.03145	-0.01892	0.005076	0.019231	-0.01361	28.10.10
-0.00219	-0.00779	-0.02755	-0.00808	-0.00943	-0.03448	01.11.10
0.002193	0.018325	0.008499	0.014257	0	0.135714	02.11.10
0.037199	0.030848	0.02809	0.006024	0.019048	0.012579	03.11.10
-0.01055	0.002494	-0.00273	0.012974	0.028037	0.062112	04.11.10
-0.00853	-0.00498	-0.01644	0.004926	0.009091	0.064327	05.11.10
0	0.015	0.008357	-0.01471	0.036036	0	08.11.10
-0.00215	-0.02709	-0.01934	0.004975	0	-0.06044	09.11.10
-0.03233	0.007595	-0.0169	0.014851	0.017391	0.052632	10.11.10
-0.02227	0.012563	-0.01433	0	0	0.005556	11.11.10
0.002278	0.012407	-0.00581	0.034146	0.008547	0	12.11.10
-0.02273	0	-0.02924	0	-0.00847	0	15.11.10
0.006977	-0.03922	-0.03012	-0.03774	-0.01709	-0.0663	22.11.10
0	0.010204	0.006211	0.004902	-0.02609	0.017751	23.11.10
-0.01617	0	-0.00617	0.004878	0	-0.01744	24.11.10
-0.01878	-0.00505	-0.00621	0.019417	0	-0.01183	25.11.10
-0.03828	-0.03807	-0.0375	-0.02857	-0.01786	0	26.11.10
0.057214	0.023747	0.016234	0.004902	-0.03636	0.011976	29.11.10
-0.01176	0.015464	0.01278	0	0	0.017751	30.11.10
0.014286	0.007614	0.015773	0	0.056604	0.011628	01.12.10
0	0.002519	-0.01242	-0.01463	-0.03571	0.005747	02.12.10
0.004695	0.007538	0	0.00495	0.009259	0.022857	03.12.10
0.021028	-0.00499	0.018868	0.014778	0	-0.00559	06.12.10
0.01373	-0.00251	-0.01852	0.009709	0	-0.00562	07.12.10
-0.0474	-0.02764	-0.02516	0.009615	-0.00917	-0.00565	08.12.10
-0.01422	-0.03359	-0.01935	-0.00952	0	0.028409	09.12.10
0.024038	0.02139	0.039474	0.009615	0.018519	0.01105	10.12.10
-0.00469	-0.01047	0.006329	0	-0.00909	0.005464	13.12.10
-0.03066	-0.01587	-0.02516	0.02381	0.018349	0.048913	14.12.10
-0.0219	-0.00538	-0.03226	-0.0093	-0.02703	-0.01554	15.12.10
-0.00498	-0.0027	-0.04667	0.004695	-0.01852	-0.03684	16.12.10
0.005	0.00813	-0.02448	-0.01869	0.009434	0	17.12.10
0.027363	0.026882	0.02509	0.014286	0	0.032787	20.12.10
0.014528	0	0.020979	-0.00469	0.028037	0	21.12.10
0.02148	0	0.003425	0	-0.00909	0.005291	22.12.10
0	0	-0.00341	0.004717	0.009174	0.015789	23.12.10
0.011682	0	-0.01712	-0.00469	-0.00909	-0.00518	24.12.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

AKBANK	ARCLK	ASYAB	BIMAS	DOHOL	DYHOL	Tarih
0.006928	0.005236	0.006969	0.009434	0.009174	0.020833	27.12.10
0.004587	0.002604	0.00346	0	0.027273	0.045918	28.12.10
0.006849	0.01039	-0.00345	0.004673	-0.0177	-0.0439	29.12.10
-0.02721	0.002571	-0.0173	-0.02326	0.009009	0	30.12.10
0.011655	0.025641	0.03169	0.02381	0	0.005102	31.12.10
0.006912	0.0125	-0.00341	0.004651	0.008929	0.010152	03.01.11
-0.01373	0.022222	0.017123	0.013889	0.026549	0.020101	04.01.11
0.00232	0.021739	0.026936	0	0.017241	0.054187	05.01.11
-0.01389	-0.00236	0.006557	0.004566	-0.01695	-0.02336	06.01.11
-0.02113	-0.01422	-0.01303	-0.00455	-0.00862	-0.00957	07.01.11
0.009592	0.038462	0.009901	-0.02283	-0.0087	-0.01932	10.01.11
0.026128	0.013889	-0.0098	0.004673	0	0.004926	12.01.11
-0.02083	0.013699	-0.0099	-0.01395	0	0.004902	13.01.11
-0.01418	-0.03153	-0.02333	-0.01887	0	0.014634	14.01.11
-0.01199	0.030233	-0.02048	0.009615	-0.01754	0	17.01.11
-0.01214	-0.00677	-0.01742	0.009524	-0.00893	-0.01923	18.01.11
-0.0344	-0.01136	-0.03191	0.004717	-0.02703	-0.03431	19.01.11
0.025445	0.006897	0.025641	0.00939	0.037037	0.040609	20.01.11
-0.04715	-0.03196	-0.00357	0.004651	0.017857	0.014634	21.01.11
0.020833	0.002358	0.021505	-0.00463	-0.00877	0	25.01.11
-0.02296	0	-0.01053	-0.0093	-0.02655	-0.02885	26.01.11
-0.0235	-0.00471	-0.02837	-0.04695	-0.01818	-0.03465	27.01.11
0.005348	-0.01418	0.021898	0.016749	0.018519	0.015385	28.01.11
0.034574	0.016787	0.025	0.017442	0.018182	0.045455	31.01.11
0.023136	-0.00943	-0.00697	0.009524	0.026786	-0.01449	01.02.11
-0.0402	-0.02619	-0.02456	-0.02358	-0.01739	-0.02941	02.02.11
0.036649	-0.00244	0.028777	-0.02899	0.088496	0.040404	03.02.11
-0.00505	-0.01961	-0.01748	0.006965	0.02439	0.024272	04.02.11
0.007614	0.02	0.007117	-0.01186	-0.01587	-0.00948	07.02.11
0.002519	-0.01716	0.017668	0.015	-0.00806	-0.00478	08.02.11
-0.01256	-0.01995	-0.01736	-0.01478	0.02439	-0.01442	09.02.11
-0.00254	0.012723	0	0	0.015873	0.009756	10.02.11
-0.0102	-0.00251	-0.00353	0.005	-0.02344	0	11.02.11
0.010309	0.015113	0	0.0199	0.016	0.004831	14.02.11
0.005102	0.004963	0.007092	0.029268	-0.01575	0.009615	15.02.11
0.032995	-0.01235	-0.00352	-0.01422	0	-0.00476	16.02.11
-0.01229	-0.045	0.010601	0.014423	0.016	0.047847	17.02.11
-0.00498	-0.02094	-0.02448	-0.00474	-0.04724	-0.0137	18.02.11
-0.0075	-0.01604	-0.01075	-0.02857	0.024793	-0.00926	21.02.11
-0.02267	-0.02717	-0.02899	-0.02451	-0.03226	-0.0514	22.02.11
-0.0232	0.005587	-0.0709	-0.05528	-0.05	-0.06404	23.02.11
0.002639	0.016667	0.012048	0.029787	0.008772	0.010526	24.02.11
-0.01579	0.013661	0.02381	0.039256	0.026087	0	25.02.11
-0.06417	-0.0566	-0.04651	0.013917	-0.00847	-0.04167	28.02.11
-0.02	-0.02286	0.036585	-0.01569	0	-0.01087	01.03.11
0.026239	0.026316	0.039216	0.015936	0.008547	0.021978	02.03.11
0.008523	-0.00855	-0.00377	0.004902	0	0.005376	03.03.11
-0.01972	-0.02299	-0.01515	-0.00488	-0.01695	-0.02674	04.03.11
0.020115	-0.01176	0.007692	0.009804	0	0.016484	07.03.11
0.04507	0.029762	0.091603	-0.02427	0	0.021622	08.03.11
0.043127	0.020231	0.006993	-0.00498	0.017241	0.005263	09.03.11
0.01292	0.002833	0.027778	-0.01	0.008475	0.020942	10.03.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

AKBANK	ARCLK	ASYAB	BIMAS	DOHOL	DYHOL	Tarih
-0.00765	0.019774	-0.01014	0.008081	0	-0.00513	11.03.11
0.002571	-0.00831	-0.02048	-0.02405	-0.0084	0.025773	14.03.11
-0.03077	-0.00279	-0.01045	-0.03491	0.008475	0.025773	15.03.11
-0.00794	0	0.007042	-0.00213	0.008403	0.015075	16.03.11
0.010667	-0.0028	0.006993	-0.02132	0.008333	0	17.03.11
0.002639	0.014045	-0.01389	0.028322	-0.01653	-0.01485	18.03.11
0.023684	0	0.007042	0.038136	0.008403	0	21.03.11
-0.05141	-0.00831	-0.01049	-0.00204	-0.00833	-0.01005	22.03.11
0.0271	0.019553	0.014134	0.02454	0	0.015228	23.03.11
-0.01319	0.013699	0.017422	0.022954	0.008403	0	24.03.11
0.005348	0.021622	0.023973	-0.01951	0	0	25.03.11
-0.01064	-0.04762	-0.00334	-0.00995	-0.00833	-0.01	28.03.11
0.026882	0.005556	0.010067	0.040201	0.008403	0	29.03.11
-0.01832	-0.01381	0	0.004831	0	0	30.03.11
0.032	0.022409	0.036545	0.033654	0.016667	0.025253	31.03.11
0.049096	0.032877	0.025641	0.023256	0.016393	0	01.04.11
0.004926	0	-0.01875	0	0	-0.00985	04.04.11
0.031863	0.013263	0.009554	-0.00455	0.008065	0.00995	05.04.11
0.026128	0.026178	-0.00631	-0.00913	0.008	0.004926	06.04.11
-0.03241	-0.0051	-0.02222	-0.03687	-0.03968	-0.06863	07.04.11
0	0.002564	-0.01623	0.019139	-0.00826	-0.01579	08.04.11
0.004785	0.007673	-0.0099	-0.00939	0	-0.02139	11.04.11
-0.00476	-0.00254	0.016667	0.004739	-0.00833	-0.00546	12.04.11
0	-0.00763	-0.00328	-0.00472	0.016807	-0.00549	13.04.11
-0.03589	-0.02051	-0.04605	-0.00948	-0.02479	-0.03867	15.04.11
0.012407	0.034031	0.034483	0.019139	0.025424	0.028736	18.04.11
-0.0049	0.027848	-0.00333	-0.00469	0	0.011173	19.04.11
-0.00246	0.019704	0.006689	0	0	-0.01657	20.04.11
-0.00494	0	-0.00332	0	0	0.011236	21.04.11
0.004963	-0.00242	0.01	-0.00943	0.008264	0.011111	22.04.11
-0.00741	0.01937	-0.0033	0.009524	0	0	25.04.11
0	0	0	0	0	0	26.04.11

Table A.3 (continue): Daily Return End of Day Portfolio's Stock Value

ECILC	ENKAI	EREGL	GARAN	ISCTR	KRDMD	Tarih
0.021818	0	-0.01333	0.007874	0	0	03.01.10
0	0.034965	0.027027	0	0.02381	0.015625	04.01.10
-0.00712	-0.02703	0	0.015625	-0.0155	0	05.01.10
0.007168	0.027778	-0.01316	0.015385	0.015748	0	06.01.10
-0.02135	0	-0.00444	-0.00758	0.007752	0	07.01.10
0.025455	-0.02027	0	-0.0229	-0.03077	0.030769	08.01.10
-0.05674	-0.02069	-0.00446	-0.00781	0	-0.02985	11.01.10
-0.00752	0.028169	0.03139	0.007874	0.039683	0.030769	12.01.10
-0.05303	-0.02055	0.004348	0	0	0	13.01.10
0.128	0.006993	0.012987	-0.00781	-0.00763	0	14.01.10
-0.02128	0.013889	0.021368	0	0	0	18.01.10
0.043478	-0.00685	0.020921	0.023622	-0.00769	0	19.01.10
-0.02083	-0.0069	-0.0041	0.007692	0.015504	-0.01493	20.01.10
-0.01418	-0.03472	-0.02881	-0.03817	-0.0229	-0.0303	21.01.10
0.007194	0.007194	0.004237	0.02381	0.015625	0	22.01.10

Table A.3 (continue): Daily Return End of Day Portfolio's Stock Value

ECILC	ENKAI	EREGL	GARAN	ISCTR	KRDMD	Tarih
-0.01429	-0.00714	-0.00422	-0.00775	0.007692	-0.01563	25.01.10
0.057971	0	-0.00424	-0.01563	-0.01527	0.015873	26.01.10
-0.0137	0	0.008511	0.02381	0.03876	0	27.01.10
0.020833	0.014388	0.008439	-0.0155	-0.00746	0.015625	28.01.10
-0.01361	0.028369	0.016736	0.015748	0.022556	0	29.01.10
-0.0069	-0.02069	-0.01235	0.007752	-0.01471	0	01.02.10
-0.00694	-0.00704	-0.0125	-0.00769	-0.00746	0	02.02.10
-0.04895	-0.03546	-0.04219	-0.02326	-0.03008	-0.03077	03.02.10
0.014706	-0.03676	-0.04846	-0.03175	-0.03101	-0.04762	04.02.10
0	-0.01527	-0.02315	-0.03279	-0.048	-0.03333	05.02.10
0	0.015504	0.014218	0.016949	0.008403	0	08.02.10
0.021739	-0.01527	0.014019	-0.00833	0.008333	0.017241	09.02.10
0.007092	0	-0.02304	0	0.008264	0.016949	11.02.10
0	0.007752	0.004717	0.008403	-0.01639	0.016667	12.02.10
0.007042	0.015385	0.014085	0	0.016667	0	15.02.10
0	0.015152	0.032407	0.058333	0.04918	0.016393	16.02.10
-0.04196	-0.01493	0	-0.02362	-0.02344	-0.04839	17.02.10
-0.0292	-0.00758	0	0.040323	0.04	0.033898	18.02.10
-0.03759	-0.01527	-0.02691	-0.02326	-0.01538	-0.01639	19.02.10
0.015625	-0.03101	-0.01843	-0.03175	0	-0.01667	22.02.10
0.007692	-0.048	-0.03286	-0.04098	-0.01389	-0.0339	23.02.10
-0.00763	0	0.004854	-0.05128	-0.00939	-0.01754	24.02.10
0.030769	0.016807	0.019324	0.027027	0.014218	0.035714	25.02.10
0	0.033058	0.018957	0.035088	0.014019	0.017241	26.02.10
0.022388	0.008	-0.00465	0	0.004608	0.016949	01.03.10
-0.0219	-0.01587	-0.00467	0.016949	0.009174	0	02.03.10
0	0.016129	-0.00939	0.008333	-0.00909	0	03.03.10
-0.02985	0.02381	0.014218	0.057851	0.013761	0.016667	04.03.10
-0.03077	0	0.018692	-0.00781	0.00905	-0.01639	05.03.10
-0.06746	0.046512	-0.01376	-0.00787	-0.01345	0	09.03.10
-0.02553	0	-0.00465	-0.00794	-0.00455	0	10.03.10
0.135371	0	0.009346	-0.008	-0.00913	0	11.03.10
0.015385	-0.01481	-0.00463	-0.01613	-0.01843	0	12.03.10
-0.00758	0.022556	0.018605	0.040984	0.028169	0	15.03.10
0.007634	0.007353	0.018265	0.031496	0.022831	0.016667	16.03.10
-0.02273	-0.0219	-0.01794	-0.0229	-0.01339	-0.01639	17.03.10
0.031008	0	0.004566	0.015625	-0.00905	-0.03333	18.03.10
0.007519	0.007463	0.018182	0.023077	0	0.034483	19.03.10
-0.00746	0	0.008929	0.022556	0.009132	0.016667	22.03.10
0	0.014815	0.00885	0.036765	0.031674	-0.01639	23.03.10
0	0.029197	0.030702	0.056738	0.04386	0.066667	24.03.10
0	-0.18582	-0.25532	-0.05369	-0.0105	0	25.03.10
0.015038	0.006969	0.008571	0.007092	0.004246	0.015625	01.04.10
0.022222	-0.00692	0.011331	0.021127	0.016913	0	02.04.10
-0.02899	0.020906	-0.0084	-0.0069	0.006237	-0.03077	05.04.10
-0.01493	-0.00683	-0.00847	0.0125	0.012397	0.015873	06.04.10
0.037879	-0.00687	-0.00855	0.027435	-0.01429	0	07.04.10
0.058394	0.00692	0.005747	0.018692	0.012422	0.015625	08.04.10
-0.04138	0.013746	0.002857	-0.00786	0.02045	-0.01538	09.04.10
0.007194	-0.00678	-0.00285	-0.03303	-0.01002	0	12.04.10
-0.02143	0.262799	0	0.045082	0.062753	0.046875	13.04.10
-0.0073	-0.00676	-0.0042	-0.02614	0	0.119403	14.04.10

Table A.3 (continue): Daily Return End of Day Portfolio's Stock Value

ECILC	ENKAI	EREGL	GARAN	ISCTR	KRDMD	Tarih
-0.00735	-0.01361	0	-0.01342	-0.00952	-0.01333	15.04.10
-0.01481	-0.01379	-0.01266	0	0.009615	0.013514	16.04.10
0.022556	0.027972	0.008547	0.013605	0.019048	-0.01333	19.04.10
0.029412	0	-0.00424	-0.02013	-0.01869	0	20.04.10
-0.02857	-0.02041	-0.02128	-0.00685	-0.01905	-0.04054	21.04.10
0.022059	0	0.013043	0.006897	0.019417	0.028169	23.04.10
0.007194	-0.01389	-0.01288	-0.0274	-0.02857	-0.0137	26.04.10
-0.02143	-0.00704	0.017391	0	0	-0.01389	27.04.10
0.007299	0.014184	0.004274	0.035211	0.009804	0.014085	28.04.10
-0.01449	0.006993	-0.00426	-0.01361	0.009709	0	29.04.10
-0.02941	0	-0.02564	-0.03448	-0.04808	-0.02778	30.04.10
-0.04545	-0.04861	-0.01754	0	0.006061	-0.02857	04.05.10
-0.00794	0	0.013393	-0.01429	-0.0241	0	05.05.10
-0.064	-0.05839	-0.02643	-0.07246	-0.0535	-0.05882	06.05.10
0.076923	0.077519	0.054299	0.085938	0.086957	0.09375	07.05.10
-0.0119	0.021583	-0.00858	0	-0.012	-0.01429	10.05.10
0.036145	-0.00704	0.012987	0.028777	0.036437	0.014493	11.05.10
-0.02326	0	-0.02991	0.013986	0.005859	-0.01429	12.05.10
-0.05159	-0.04965	-0.06167	-0.02069	-0.04854	-0.05797	13.05.10
0.029289	0.014925	0.014085	0.014085	0.02449	0.015385	17.05.10
-0.04878	-0.02941	-0.03241	-0.04861	-0.03984	-0.04545	18.05.10
-0.01282	0	-0.00957	-0.0365	-0.0083	0	20.05.10
0.004329	-0.18182	0.019324	0.022727	0.008368	-0.01587	21.05.10
-0.07759	-0.09259	-0.04265	-0.04444	-0.05394	-0.06452	24.05.10
0.023364	0.032653	0.029703	0.03876	0.039474	0.051724	25.05.10
0.03653	0.007905	0.019231	0.007463	0.016878	-0.01639	26.05.10
0.035242	0.029412	0	0.014815	0.012448	0.033333	27.05.10
-0.03404	-0.00952	-0.01887	-0.0146	-0.01639	-0.03226	28.05.10
0.022026	0.019231	-0.00962	0	0.0125	0	31.05.10
0.038793	0.009434	0.009709	0.014815	0.00823	0.033333	01.06.10
0.024896	0.037383	0.004808	-0.0292	0.008163	0.016129	02.06.10
-0.02834	-0.02703	-0.02392	-0.02256	-0.02024	-0.03175	03.06.10
-0.0125	-0.01852	-0.0049	0.007692	0	-0.01639	04.06.10
-0.02532	0	-0.00985	-0.01527	-0.0124	-0.01667	07.06.10
0.025974	0.009434	-0.00498	0.031008	0.012552	0.016949	08.06.10
0.016878	0.018692	0.005	0.007519	0.012397	-0.01667	09.06.10
-0.02075	0.018349	0.00995	0.014925	0.008163	0	10.06.10
0.016949	0.009009	0.034483	0.014706	0.04251	0	11.06.10
-0.01667	-0.00893	-0.01429	0.021739	-0.00971	0.016949	15.06.10
-0.00424	-0.00901	0	0.021277	0.019608	0	16.06.10
0	0.063636	-0.00483	-0.00694	0	0	17.06.10
0.008511	-0.00855	0.004854	0	0.009615	0	18.06.10
-0.00844	-0.01724	-0.01449	-0.00699	-0.00952	-0.01667	21.06.10
-0.02553	-0.01754	-0.01471	-0.02817	-0.02885	-0.01695	22.06.10
0	-0.00893	0.004975	0	0.009901	0	23.06.10
0.008734	0.018018	0.019802	-0.00725	0	0.017241	24.06.10
0	0	0	0.007299	0.019608	0	27.06.10
-0.01732	-0.0177	-0.01942	-0.03623	-0.03846	-0.01695	28.06.10
-0.00881	-0.01802	0	0	-0.01	0	29.06.10
0	-0.01835	0	0.007519	-0.00202	-0.03448	30.06.10
0.004444	0.018692	-0.00495	0.037313	0.02834	0.017857	01.07.10
-0.00442	-0.02752	-0.00995	0.007194	0.003937	0.017544	02.07.10

Table A.3 (continue): Daily Return End of Day Portfolio's Stock Value

ECILC	ENKAI	EREGL	GARAN	ISCTR	KRDMD	Tarih
0.013333	0.028302	0.025126	0.035714	0.039216	0.017241	05.07.10
-0.00877	0	-0.0098	0	-0.00943	-0.01695	06.07.10
-0.00442	0.018349	0	0.013793	0	0	07.07.10
-0.01333	-0.01802	0	-0.01361	0	0.017241	08.07.10
0.013514	0.018349	0.014851	0.02069	0.009524	0.067797	09.07.10
0.017778	0	0.004878	0.013514	0.028302	-0.03175	12.07.10
0.026201	-0.00901	-0.00971	-0.00667	0.018349	-0.01639	13.07.10
-0.02979	-0.01818	-0.0098	-0.01342	-0.00901	0	14.07.10
-0.00877	-0.00926	-0.00495	0	0.009091	-0.01667	15.07.10
0.00885	0	0	0	0.009009	-0.01695	16.07.10
-0.00877	0.009346	0.004975	0.006803	0	0	19.07.10
0.013274	-0.00926	0.024752	0.027027	0.071429	0.017241	20.07.10
0	0.028037	0.009662	0.032895	-0.00833	0.016949	21.07.10
-0.00873	0	-0.00957	-0.03185	-0.03361	-0.03333	22.07.10
0.022026	0.018182	0	0.013158	0	0	23.07.10
-0.00431	0.008929	0.014493	0.032468	0.017391	0.017241	26.07.10
0	-0.00885	-0.00476	0.025157	-0.01709	0.050847	27.07.10
0	0	0.004785	0.006135	0	-0.03226	28.07.10
0	-0.00893	0	-0.04878	-0.01739	0	29.07.10
0.008658	0.018018	0.009524	0.00641	0.017699	0.016667	30.07.10
-0.01288	0	0.004717	-0.01911	-0.02609	0	02.08.10
0.008696	0	-0.00939	-0.01948	0	-0.01639	03.08.10
-0.00431	0	0.009479	-0.01325	-0.00893	0	04.08.10
0	-0.0177	0.014085	0.026846	0	-0.01667	05.08.10
0.025974	0	0	-0.00654	0.009009	0.033898	06.08.10
-0.00422	-0.00901	-0.00463	-0.02632	-0.02679	-0.01639	09.08.10
-0.01271	-0.00909	-0.02326	-0.03378	-0.00917	0	10.08.10
-0.00858	0	0.004762	0	0.018519	0	11.08.10
0.012987	0	0.023697	0	-0.01818	0	12.08.10
-0.00855	0.018349	0	0.013986	0.018519	0.016667	13.08.10
0	0	0.009259	0.02069	0.027273	0	16.08.10
0.00431	0	-0.01376	0	-0.00885	0.032787	17.08.10
0.012876	-0.00901	0.004651	-0.00676	-0.00893	0	18.08.10
0.012712	0.009091	0.013889	-0.01361	0	0	19.08.10
-0.00418	0	0.009132	0.006897	-0.00901	-0.01587	20.08.10
-0.0042	-0.00901	-0.00905	0	0	0	23.08.10
-0.00422	-0.00909	-0.01826	-0.02055	-0.00909	0	24.08.10
0.004237	0	0.023256	0.027972	0.009174	-0.01613	25.08.10
0.012658	0	0	-0.0068	0	0.016393	26.08.10
0	0	0	0	0	0	27.08.10
0.008333	0.018349	0.004545	0.013699	0.018182	0	28.08.10
0.020661	0.009009	0.013575	0.027027	0	0.032258	31.08.10
0	-0.00893	0.004464	0	0.008929	0	01.09.10
-0.0081	0	0	0	0	0.015625	02.09.10
-0.00816	0.009009	0.004444	0.019737	-0.00885	-0.01538	03.09.10
-0.01235	-0.01786	0	-0.0129	0	0	06.09.10
-0.00417	0.009091	0	0	0.008929	-0.01563	07.09.10
0	0	0	0	0	0	08.09.10
0.025105	0.036036	0.030973	0.026144	0.026549	0.047619	10.09.10
0.004082	0	0.017167	0.006369	-0.00862	0	13.09.10
0.012195	0.026087	0.016878	0.031646	0.017391	0	14.09.10
0.012048	0	0.004149	0.01227	0.008547	0.030303	15.09.10

Table A.3 (continue): Daily Return End of Day Portfolio's Stock Value

ECILC	ENKAI	EREGL	GARAN	ISCTR	KRDMD	Tarih
-0.00794	0.008475	-0.0124	0.030303	0	-0.04412	16.09.10
-0.012	0.016807	0.008368	-0.00588	0.008475	0.015385	17.09.10
-0.01215	-0.00826	-0.0083	0.005917	-0.0084	0	20.09.10
0.004098	0	0.004184	0.017647	0	-0.0303	21.09.10
0.016327	0.033333	0	-0.01156	-0.01695	0.015625	22.09.10
0.012048	-0.00806	0.016667	-0.0117	0.008621	0	23.09.10
0	0	0.036885	0	0.017094	0.030769	24.09.10
0.039683	0	0.007905	0.017751	0.042017	-0.01493	27.09.10
0	0.01626	0.009804	-0.00581	0	0	28.09.10
0.007634	0.008	0	-0.01754	-0.00806	0	29.09.10
-0.02273	-0.01587	0.029126	-0.03571	-0.00813	0	30.09.10
0.007752	0.008065	0.028302	0	0.016393	0	01.10.10
0.007692	0.008	0.009174	0.018519	0.016129	0.015152	04.10.10
0	0	-0.01818	0.030303	0.015873	0.014925	05.10.10
0	-0.02381	0.027778	-0.01176	-0.01563	0	06.10.10
0	0.00813	-0.01802	0.017857	0	0	07.10.10
0.030534	0.016129	0.055046	0.046784	0.039683	0.073529	08.10.10
-0.01481	0	0.008696	0.011173	0.015267	-0.0274	11.10.10
0.015038	0	0	0	0.015038	0	12.10.10
-0.01481	0	-0.02586	-0.03867	-0.01481	-0.02817	13.10.10
-0.00752	0.007937	0	0	0.030075	0.014493	14.10.10
0.030303	0	-0.00885	0.005747	0.007299	0.028571	15.10.10
-0.00735	-0.00787	-0.01786	0.017143	-0.02174	-0.01389	18.10.10
0	-0.00794	-0.00909	-0.02809	-0.01481	0	19.10.10
0	0.008	0.018349	0.034682	0.007519	0.042254	20.10.10
0.007407	0.007937	-0.00901	0.022346	-0.00746	0	21.10.10
0.007353	0.015748	0	-0.00546	0	0	22.10.10
0.007299	0.031008	-0.01818	-0.01099	0.007519	0	25.10.10
-0.03623	-0.03008	-0.01852	-0.02778	-0.02985	-0.02703	26.10.10
-0.00752	0.015504	0.018868	0.005714	-0.00769	0.013889	27.10.10
-0.00379	0.016794	-0.0037	0.013636	0.007752	-0.0137	28.10.10
-0.01141	-0.00601	-0.00743	-0.02691	-0.00615	0.013889	01.11.10
0.007692	0.006042	0.007491	-0.00922	-0.0031	0.013699	02.11.10
0.026718	-0.003	0.022305	0.054651	0.034161	0.027027	03.11.10
-0.00743	0	-0.01455	0.001103	0	0	04.11.10
0.003745	0.003012	0.01476	0.024229	-0.003	0	05.11.10
0.003731	0.006006	0.007273	0.008602	0.006024	0.013158	08.11.10
-0.0223	0	-0.00361	-0.03412	-0.02096	-0.01299	09.11.10
0.003802	-0.00299	-0.00362	-0.02428	-0.01223	-0.02632	10.11.10
-0.01136	-0.02096	-0.01455	-0.00905	-0.00929	-0.04054	11.11.10
0.003831	0.003058	0.01845	0.011416	0	0	12.11.10
-0.01527	-0.06402	-0.03623	-0.04063	-0.04375	0	15.11.10
-0.04264	-0.06515	-0.04887	-0.00235	-0.01961	-0.02817	22.11.10
0.008097	0.010453	0.031621	0.018868	0.03	0.014493	23.11.10
0.004016	0.010345	0	-0.00463	0	0	24.11.10
-0.012	-0.03754	-0.01533	-0.02791	-0.02589	0	25.11.10
-0.02834	-0.03546	-0.03113	-0.03828	-0.0598	-0.02857	26.11.10
0.008333	0	0.014056	0.037313	0.028269	0	29.11.10
0.008264	0.040441	0.009901	0.028777	0.003436	0	30.11.10
0.012295	0.007067	-0.00784	0.02331	0.013699	0.014706	01.12.10
-0.00405	0.035088	0.01581	-0.02733	0.02027	-0.01449	02.12.10
0.028455	0.016949	0.035019	0.021077	0.009934	0.029412	03.12.10

Table A.3 (continue): Daily Return End of Day Portfolio's Stock Value

ECILC	ENKAI	EREGL	GARAN	ISCTR	KRDMD	Tarih
0.019763	0	-0.00752	0.002294	0.003279	0.014286	06.12.10
-0.0155	-0.02333	-0.00379	-0.00458	-0.00327	0	07.12.10
-0.01969	-0.03754	-0.02662	-0.03218	-0.05902	-0.01408	08.12.10
-0.01606	-0.00709	-0.03125	-0.03325	-0.01742	0	09.12.10
0.036735	0.025	0.03629	0.022113	0.031915	0.014286	10.12.10
0.011811	-0.01045	0	-0.00721	-0.00687	0	13.12.10
-0.01167	-0.00704	-0.00778	-0.02663	-0.02422	0.014085	14.12.10
-0.01969	0.003546	-0.01569	-0.04478	-0.02482	0	15.12.10
-0.02008	0.010601	-0.01992	-0.02604	-0.02909	-0.01389	16.12.10
-0.01639	0	-0.00203	0.018717	0.014981	-0.01408	17.12.10
0.016667	0.020979	0.032587	0.026247	0.01845	0.028571	20.12.10
0.008197	0	0.005917	0.007673	0.01087	0	21.12.10
0.01626	0.010274	0.003922	0.010152	0.007168	0.027778	22.12.10
0	-0.00339	0.011719	0	0.003559	0	23.12.10
-0.008	-0.0068	0	-0.00503	-0.01064	0	24.12.10
0.004032	0	-0.00772	0	-0.00358	-0.01351	27.12.10
0.028112	0	0.007782	0.010101	-0.0036	0.013699	28.12.10
-0.01172	-0.00342	-0.00772	-0.0025	-0.00361	0	29.12.10
-0.01186	-0.01031	-0.00778	-0.02005	-0.00362	0.027027	30.12.10
0.012	0.017361	0.031373	0.02046	0.029091	0.026316	31.12.10
0.003953	0.023891	0.019011	0.017544	0.014134	-0.01282	03.01.11
0	0.003333	0	0.009852	0.010453	0	04.01.11
0.007874	0.009967	-0.00373	0.007317	0.003448	0.038961	05.01.11
-0.00781	-0.00658	-0.01124	-0.00969	-0.02405	0	06.01.11
-0.01575	0	-0.03409	-0.01956	-0.01408	0.025	07.01.11
0.016	0.039735	0	-0.01247	-0.01071	-0.0122	10.01.11
0	-0.00318	0.003922	0.007576	0.00361	-0.01235	12.01.11
-0.00394	-0.00639	-0.00391	0	-0.02518	0.025	13.01.11
-0.00395	-0.02251	0	-0.03759	-0.02214	0.073171	14.01.11
0	0.009868	-0.00392	-0.01563	-0.01509	0	17.01.11
-0.00397	0.026059	0.003937	0.005291	-0.00383	0	18.01.11
-0.01195	-0.02857	-0.01569	-0.02368	-0.02692	0.056818	19.01.11
0.020161	0.019608	0.011952	0.018868	0.023715	-0.03226	20.01.11
-0.00395	0.028846	0.043307	-0.02646	-0.01931	0.033333	21.01.11
0.003968	-0.00312	-0.02264	0.016304	0.019685	-0.01075	25.01.11
0.193676	0.009375	-0.01158	-0.01604	-0.03089	-0.03261	26.01.11
-0.02318	-0.03096	-0.01172	-0.01902	-0.0239	-0.05618	27.01.11
-0.18305	-0.03195	-0.00395	-0.01108	0.028571	-0.03571	28.01.11
0.012448	0.013201	0.015873	0.022409	0.043651	0.024691	31.01.11
-0.0041	0.003257	-0.01172	0.010959	0.011407	0.024096	01.02.11
-0.01646	0	-0.02767	-0.02981	-0.03008	-0.03529	02.02.11
0.012552	0.016234	0.014228	0.058659	0.05814	0.036585	03.02.11
-0.00826	-0.01597	-0.002	-0.01847	-0.02198	0.011765	04.02.11
0	-0.00649	0.024096	0.002688	0.003745	0	07.02.11
0	-0.00327	-0.01176	0	0.003731	-0.01163	08.02.11
-0.00833	-0.02623	0.003968	-0.02413	-0.03717	-0.01176	09.02.11
0.004202	-0.01684	0.01581	0.005495	0.007722	0	10.02.11
-0.00418	0	-0.00389	0	-0.00383	-0.0119	11.02.11
-0.0042	-0.00685	0.007813	0.002732	0.007692	0.012048	14.02.11
-0.00422	0	0.003876	0.013624	0.022901	0	15.02.11
-0.00847	0.006897	0	0.037634	0.003731	-0.0119	16.02.11
-0.00427	0	0.003861	0.002591	0	0	17.02.11

Table A.3 (continue): Daily Return End of Day Portfolio's Stock Value

ECILC	ENKAI	EREGL	GARAN	ISCTR	KRDMD	Tarih
-0.01288	-0.0274	-0.02692	-0.0155	-0.01859	-0.0241	18.02.11
-0.02174	-0.01056	-0.00988	0	-0.00758	-0.01235	21.02.11
-0.02222	-0.03203	-0.01397	-0.0315	-0.01908	-0.0375	22.02.11
-0.06818	-0.00735	-0.02024	-0.03794	-0.02724	-0.03896	23.02.11
0.053659	0.014815	0.022727	0.011268	0.012	0.040541	24.02.11
0	-0.0365	-0.00202	-0.01393	-0.01581	0	25.02.11
-0.02778	-0.02652	-0.05061	-0.0565	-0.05823	-0.02597	28.02.11
0.004762	0.007782	0.002132	0.026946	-0.00426	0	01.03.11
0.023697	0.03861	0.03617	0.029155	0.034261	0.026667	02.03.11
0	0.007435	-0.00411	0.008499	0.00207	0.012987	03.03.11
-0.02315	-0.01107	-0.02268	-0.02809	-0.02066	-0.03846	04.03.11
0.004739	0.026119	-0.00211	0.040462	0.016878	0.053333	07.03.11
0.023585	0.003636	0.012685	0.036111	0.03112	0.037975	08.03.11
0	0.003623	0.012526	0.013405	0.01006	-0.0122	09.03.11
0.013825	0.00722	0.010309	0.002646	-0.00398	0.012346	10.03.11
0.013636	0.02509	-0.24898	0.010554	0.016	0.012195	11.03.11
-0.01345	-0.01049	0.070652	-0.00261	-0.00787	-0.0241	14.03.11
-0.01818	-0.02473	-0.00508	-0.01047	-0.01984	-0.01235	15.03.11
0.009259	0.014493	0.017857	-0.01587	0.01417	0.025	16.03.11
0.004587	-0.01071	0.025063	0.013441	0.001996	0	17.03.11
0.009132	0.01083	0.01467	-0.00265	-0.00398	0.012195	18.03.11
0.004525	0.021429	-0.0241	0.010638	0.012	0	21.03.11
0.013514	-0.00699	0.014815	-0.02895	-0.02767	0	22.03.11
0.022222	-0.00352	0.017032	0.01084	0.00813	0.012048	23.03.11
0.008696	0.017668	-0.02153	0.005362	-0.00202	-0.0119	24.03.11
-0.01724	0.020833	-0.00489	-0.00533	0.006061	0.012048	25.03.11
0	0.02381	0.004914	-0.02145	-0.00803	0.02381	28.03.11
0.008772	0	0.007335	0.00274	0.006073	0	29.03.11
0.026087	-0.00997	0.004854	-0.01366	-0.00604	0.011628	30.03.11
0	0.030201	0.012077	0.01662	0	0.011494	31.03.11
0.012712	0.006515	0.00716	0.051771	0.044534	0.011364	01.04.11
0.004184	0.003236	0.004739	0.015544	0.003876	-0.01124	04.04.11
0.004167	-0.00323	0.002358	0.020408	0.023166	0	05.04.11
0.012448	-0.00647	0.007059	0.0225	0.018868	0.022727	06.04.11
-0.02049	-0.00651	-0.00234	-0.03912	-0.04074	-0.02222	07.04.11
0.008368	0.009836	0.01171	-0.01018	0.007722	0	08.04.11
0.016598	0.006494	-0.00694	-0.00514	-0.00766	0	11.04.11
0.016327	0.006452	-0.00932	0.01292	0.015444	0.011364	12.04.11
0.016064	0.00641	0.007059	0.002551	0.015209	0	13.04.11
-0.03557	-0.00637	-0.02336	-0.03053	-0.02996	-0.02247	15.04.11
0.065574	0.022436	0.028708	0.007874	0.019305	0.011494	18.04.11
-0.01154	0.012539	0.011628	0.002604	0.007576	0.022727	19.04.11
0.011673	0	0	0.01039	0.003759	0.011111	20.04.11
0.003846	0.006192	0.018391	0.005141	0	0.010989	21.04.11
0.022989	-0.01231	0.009029	0.002558	-0.00375	0	22.04.11
-0.01873	-0.01869	-0.00895	-0.00255	-0.00376	-0.02174	25.04.11
0	0	0	0	0	0	26.04.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

KCHOL	KOZAD	PETKM	SAHOL	SKBNK	SISE	Tarih
0.0181	0.041494	0.047945	-0.0087	0.015504	0.032086	03.01.10
0.048889	-0.01594	0.026144	0	0.030534	0.010363	04.01.10
0.012712	0.004049	0	0.008772	-0.00741	0	05.01.10
-0.00837	0.008065	0.038217	0	0.022388	0.005128	06.01.10
-0.01688	0.05	-0.02454	0.008696	0.014599	-0.0102	07.01.10
-0.03004	-0.01905	-0.00629	-0.01724	-0.01439	-0.01546	08.01.10
-0.01327	0.009709	-0.00633	-0.00877	-0.0146	-0.00524	11.01.10
0.026906	0.009615	0.025478	0.017699	0.014815	0.005263	12.01.10
0.039301	0.009524	0.006211	-0.01739	0	-0.00524	13.01.10
-0.0042	0.018868	0.024691	0.00885	-0.0146	0.021053	14.01.10
-0.01266	0.018519	0.036145	0.017544	0	-0.00515	18.01.10
0.025641	0	0	0.043103	0	0.015544	19.01.10
0	-0.05455	0.017442	0.024793	0.007407	-0.0051	20.01.10
-0.00833	-0.02885	0.017143	-0.01613	-0.04412	-0.02051	21.01.10
0.008403	0.009901	-0.01124	-0.0082	0	0.010471	22.01.10
0.025	0.003922	0	0.024793	0.007692	0.015544	25.01.10
0.028455	-0.02344	0	0.008065	-0.01527	-0.0102	26.01.10
0.037549	0.02	0.011364	0.04	0.015504	0.005155	27.01.10
-0.02857	0.019608	0.016854	0	-0.00763	0	28.01.10
0.019608	0.019231	0	0.007692	0.038462	0.05641	29.01.10
-0.01923	-0.0283	-0.01657	-0.00763	-0.02222	-0.01456	01.02.10
-0.01961	0	0.02809	-0.00769	0.015152	0.004926	02.02.10
-0.044	-0.03883	-0.03825	-0.02326	-0.04478	-0.04412	03.02.10
-0.0251	-0.05859	-0.03409	-0.01587	-0.05078	-0.05641	04.02.10
-0.01717	-0.06438	-0.02353	-0.04839	-0.06584	-0.03804	05.02.10
0.017467	-0.03211	0.018072	0	-0.01762	0.016949	08.02.10
-0.00429	0.028436	-0.00592	0	0.022422	0.016667	09.02.10
-0.01293	-0.03687	0.011905	-0.00847	0.013158	-0.01639	11.02.10
0.004367	-0.01914	-0.00588	0.008547	0.025974	0.011111	12.02.10
0.004348	0.029268	0.005917	0.016949	0.004219	0.038462	15.02.10
0.034632	0.07109	0.017647	0.016667	0.012605	0.026455	16.02.10
0.004184	-0.03982	-0.00578	-0.03279	0.004149	-0.02062	17.02.10
0.025	-0.01382	0	-0.00847	0.004132	-0.00526	18.02.10
-0.02439	-0.01402	-0.01744	0.017094	-0.02058	-0.02116	19.02.10
-0.02083	-0.02844	-0.02959	0	-0.04622	-0.02703	22.02.10
-0.02553	-0.0878	-0.03659	-0.03361	-0.02643	-0.01667	23.02.10
-0.03493	-0.02674	-0.01899	-0.01739	-0.00452	0.00565	24.02.10
0.040724	0.016484	0.051613	0.035398	0.027273	0.011236	25.02.10
0.034783	0.059459	0.018405	0.017094	0.030973	0.022222	26.02.10
-0.0084	0.02551	0	0.008403	0	0	01.03.10
-0.00847	-0.00498	-0.01205	0.008333	0.004292	0.005435	02.03.10
-0.00855	-0.015	-0.0122	-0.02479	-0.00855	-0.01622	03.03.10
0.038793	0.025381	0.024691	0.033898	0.021552	0.021978	04.03.10
0.024896	-0.00495	0.024096	0.016393	-0.00422	0	05.03.10
-0.02429	-0.00995	-0.00588	-0.01613	-0.00424	-0.01075	09.03.10
-0.01245	-0.01508	0.005917	-0.0082	-0.01277	-0.00543	10.03.10
-0.01681	-0.0051	0.011765	0.008264	-0.00431	0	11.03.10
-0.00427	-0.00513	0.005814	-0.0082	-0.00866	-0.01093	12.03.10
0.030043	0.020619	0.017341	0.033058	0.030568	0.027624	15.03.10
0.020833	0.010101	0.011364	0.016	0.016949	0.032258	16.03.10
-0.01224	-0.02	-0.02809	0	-0.02083	-0.02083	17.03.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

KCHOL	KOZAD	PETKM	SAHOL	SKBNK	SISE	Tarih
0	-0.02041	0	-0.00787	-0.01702	-0.0266	18.03.10
0.012397	0	0	0	0.030303	0.021858	19.03.10
-0.00408	0.010417	0	0	0.008403	0.005348	22.03.10
0.008197	-0.01031	-0.01734	0.007937	0.008333	0.005319	23.03.10
0.020325	0.010417	0.017647	0.031496	0.028926	0.026455	24.03.10
0.003984	0.010309	0.005814	-0.01221	0	-0.01546	25.03.10
0	0.010204	0	0.007728	0	-0.01047	01.04.10
0.037698	0.005051	0	0	0.017964	0	02.04.10
-0.01912	0.015075	-0.01587	0.013804	-0.02353	-0.01058	05.04.10
-0.02729	0.009901	-0.00538	0.007564	0.018072	0	06.04.10
-0.01002	0.004902	0	-0.01351	-0.01775	0.010695	07.04.10
0.02834	0.009756	0.091892	0.013699	0.006024	0.015873	08.04.10
-0.00787	0.014493	-0.02475	-0.02853	0	-0.02083	09.04.10
-0.00992	-0.01429	-0.00508	-0.02937	-0.02395	-0.01596	12.04.10
0.092184	0.004831	0	0.082803	0	0.075676	13.04.10
0.009174	-0.01442	0.020408	0	0.015748	-0.01005	14.04.10
-0.02727	-0.01463	0.02	-0.01471	0.007752	-0.00508	15.04.10
0.009346	-0.0198	-0.01961	0	0.007692	-0.0102	16.04.10
0.055556	0.010101	-0.01	0.007463	-0.00763	0.005155	19.04.10
0.008772	-0.005	0.005051	-0.00741	0	0.005128	20.04.10
0	-0.01005	0.01005	0	-0.01538	-0.0102	21.04.10
0.017391	0	0.034826	0.022388	0	0.020619	23.04.10
-0.02564	-0.01015	-0.00962	-0.0365	0	0.005051	26.04.10
-0.01754	-0.01538	-0.01942	0.007576	-0.01563	-0.01005	27.04.10
0	0.03125	0.118812	0	0.015873	0.020305	28.04.10
0.026786	0.005051	0.044248	0.022556	0.007813	0.004975	29.04.10
-0.0087	-0.03015	-0.02542	-0.02941	-0.03876	-0.0099	30.04.10
-0.05263	-0.03627	-0.0087	-0.05303	-0.00403	-0.02	04.05.10
-0.00926	-0.00538	0.008772	-0.008	-0.00405	-0.0102	05.05.10
-0.06542	-0.05405	-0.02609	-0.03226	-0.02846	-0.03093	06.05.10
0.11	0.068571	0.080357	0.066667	0.046025	0.069149	07.05.10
0	0.026738	0	-0.00781	-0.028	-0.00995	10.05.10
0.018018	0.041667	0.016529	0.03937	0.041152	-0.00503	11.05.10
-0.00885	0.045	-0.01626	-0.00758	-0.01186	-0.01515	12.05.10
0	0.038278	-0.03306	-0.05344	-0.024	-0.00513	13.05.10
0.001838	0	0.017094	0.024194	0.004098	0.005155	17.05.10
-0.02679	-0.0553	-0.05882	0.047244	-0.05306	-0.02564	18.05.10
0	-0.02439	-0.05357	-0.06015	-0.00431	-0.01053	20.05.10
0	-0.01	0.018868	0.016	-0.00866	0.010638	21.05.10
-0.04587	-0.05556	-0.01852	-0.02362	-0.0786	-0.05263	24.05.10
0.019231	0.02139	0	-0.01613	0.023697	-0.02222	25.05.10
0.009434	0.026178	0.009434	0	0.013889	0.034091	26.05.10
0.018692	0.015306	0.009346	0.040984	0.013699	0	27.05.10
0	-0.02513	-0.02778	0.031496	-0.04054	-0.02747	28.05.10
0	-0.00515	0	-0.0229	0.018779	0.00565	31.05.10
-0.00917	0.020725	0.019048	-0.00781	0.018433	0.022472	01.06.10
0.009259	-0.01523	0.018692	0.015748	0	0.005495	02.06.10
-0.01835	-0.02577	-0.06422	0.031008	-0.00452	-0.03279	03.06.10
-0.00935	0.005291	0.019608	0	-0.01364	0	04.06.10
0	-0.00526	0	-0.02256	0.004608	-0.01695	07.06.10
0.009434	0.010582	0	-0.03846	0.009174	0.028736	08.06.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

KCHOL	KOZAD	PETKM	SAHOL	SKBNK	SISE	Tarih
0.018692	0.005236	-0.00962	0	0	0.005587	09.06.10
0.027523	0.010417	0	0.008	-0.01364	-0.00556	10.06.10
0.026786	0.015464	0	0.007937	0.023041	-0.00559	11.06.10
-0.01739	-0.0203	-0.00971	0.023622	-0.01351	0	15.06.10
0.035398	0.005181	0.009804	0.007692	0	0	16.06.10
-0.02564	-0.00515	0	0.015267	0.018265	-0.01124	17.06.10
0	0	0	0.030075	-0.00448	0.005682	18.06.10
-0.00877	-0.00518	0	0	0.022523	-0.00565	21.06.10
-0.02655	-0.00521	-0.00971	0	0	-0.02273	22.06.10
0	-0.01047	0	-0.0146	0.008811	0.011628	23.06.10
-0.00909	0.010582	0	-0.00741	0.026315	0.028736	24.06.10
0.009174	0.015707	-0.0098	-0.02239	0.026316	-0.00559	27.06.10
-0.01818	-0.02062	0.009901	0.015267	-0.01923	-0.01124	28.06.10
0	-0.00526	0.039216	-0.00752	-0.02614	-0.01136	29.06.10
-0.00926	-0.01587	-0.00943	-0.0303	0.013423	0.011494	30.06.10
0.009346	0.010753	0	-0.00781	0.006623	0	01.07.10
0	-0.01064	-0.02804	0.007874	0.013158	0.011364	02.07.10
0.018519	-0.00538	-0.00962	0	0.019481	0.005618	05.07.10
0	0.005405	-0.01456	0.015625	0.006369	-0.00559	06.07.10
0	0	0.004926	0	0	0.022472	07.07.10
-0.00909	-0.00538	0	0.015385	0	0.005495	08.07.10
0	0.010811	-0.0049	-0.01515	0.006329	0.005464	09.07.10
0.027523	0	0.004926	0.038462	0.012579	0.01087	12.07.10
0	0	0	0.007407	-0.00621	-0.01075	13.07.10
-0.01786	-0.0107	0.02451	-0.00735	-0.0125	-0.00543	14.07.10
0	0	0.014354	-0.02963	0.006329	-0.01093	15.07.10
0	0.021622	0.023585	0.022901	-0.00629	0.016575	16.07.10
-0.00909	-0.00529	-0.00922	0.007463	-0.00633	-0.01087	19.07.10
0.027523	0.005319	0	0.007407	0.031847	0.027473	20.07.10
0	-0.00529	-0.00465	0.014706	0	0.010695	21.07.10
0	-0.00532	-0.00935	-0.00725	-0.02469	-0.00529	22.07.10
0	0.005348	0.009434	0.021898	0.006329	-0.00532	23.07.10
0.026786	0.005319	0.009346	0.014286	0.031447	0.02139	26.07.10
0.017391	0.015873	0	0	0.018293	-0.01571	27.07.10
0.017094	-0.01563	0	-0.01408	-0.00599	0	28.07.10
0	0	0.013889	-0.00714	-0.01807	0.005319	29.07.10
0.016807	0.010582	0.018265	0.007194	0.018405	0.010582	30.07.10
-0.01653	0.005236	-0.00448	0.007143	-0.01205	-0.01047	02.08.10
0.008403	0.005208	-0.00901	0.007092	0	0	03.08.10
0.008333	0.005181	0.004545	0	-0.0122	0.026455	04.08.10
-0.00826	0.010309	0.00905	-0.02113	0	0.005155	05.08.10
0	0.005102	0.004484	-0.02158	0.012346	0.005128	06.08.10
-0.025	-0.01015	-0.00893	0.014706	-0.0122	-0.0102	09.08.10
-0.01709	-0.01538	-0.02252	0	-0.01852	-0.02577	10.08.10
0	0.005208	0	-0.00725	0	0.015873	11.08.10
0	0	0.032258	0	0	0.010417	12.08.10
0	-0.00518	0	0.007299	0	0.010309	13.08.10
0.026087	0.020833	0.004464	0	0.006289	0.005102	16.08.10
-0.01695	-0.0102	-0.00444	-0.00725	-0.00625	0.035533	17.08.10
0.025862	-0.00515	-0.00893	-0.0073	-0.01258	-0.01471	18.08.10
-0.0084	0.005181	-0.01802	-0.02206	-0.01274	0.004975	19.08.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

KCHOL	KOZAD	PETKM	SAHOL	SKBNK	SISE	Tarih
0	0	0.004587	0.022556	0	-0.0198	20.08.10
0	-0.02062	-0.01826	0.007353	-0.01935	0.010101	23.08.10
-0.02542	0.005263	-0.0093	-0.0292	-0.00658	0.04	24.08.10
0.026087	0.005236	0.014085	0.007519	0.02649	0.033654	25.08.10
0	0.010417	0	0.014925	-0.0129	0.018605	26.08.10
0	0	0	0.007353	0	0	27.08.10
0.008475	0.015464	0.013889	0	0.006536	0.041096	28.08.10
0.033613	0.005076	-0.00457	0.007299	0.019481	0.013158	31.08.10
0.01626	0.005051	-0.00459	0.021739	0	0	01.09.10
0	0.025126	0.013825	0	0	0	02.09.10
0	0	-0.00455	0.007092	-0.00637	-0.01299	03.09.10
-0.016	-0.02451	-0.00457	0	0.012821	-0.01316	06.09.10
-0.00813	0	-0.00917	-0.00704	-0.01266	0.013333	07.09.10
0	0	0	-0.01418	0	0	08.09.10
0.02459	0.030151	0.018519	0	0.025641	0.04386	10.09.10
0.008	-0.00488	0.018182	0.057554	0.0125	0.004202	13.09.10
0.015873	0.02451	0.008929	-0.0068	0.037037	0.008368	14.09.10
0	-0.00478	-0.00442	0.034247	0	0.008299	15.09.10
0	-0.00962	-0.00889	0	-0.00595	0	16.09.10
0.007813	0.014563	0.013453	0	0	0	17.09.10
0.007752	-0.00478	-0.01327	0	0.005988	-0.00412	20.09.10
0.007692	-0.00481	0	-0.01987	0.005952	0.020661	21.09.10
0	-0.00966	-0.00448	-0.00676	0	0	22.09.10
0.007634	0.004878	0.009009	0.006803	-0.01183	0	23.09.10
0.022727	0.009709	0.026786	0.013514	0.005988	-0.0081	24.09.10
0	0	0	0	0.005952	0.016327	27.09.10
0	0.019231	-0.01304	0.006667	0	0.028112	28.09.10
0.022222	0.009434	0.008811	-0.01325	0.005917	0.007813	29.09.10
-0.02174	-0.00935	-0.00873	0.006711	-0.01765	0.015504	30.09.10
0.014815	0.014151	0	-0.01333	0.005988	0.030534	01.10.10
0.036496	0.009302	0.013216	0	0.011905	-0.02222	04.10.10
-0.01408	-0.00461	-0.00435	0.02027	-0.00588	-0.00758	05.10.10
-0.01429	-0.00926	0	0	-0.01775	-0.0229	06.10.10
0	0.004673	0	-0.00662	0.012048	0.03125	07.10.10
0.014493	0.009302	0.017467	0.02	0.011905	0	08.10.10
0.014286	0.004608	0.021459	0.019608	0.041176	0	11.10.10
0	0.041284	0.004202	0.00641	-0.00565	0	12.10.10
-0.02113	0.008811	-0.01255	-0.03185	-0.01136	0.015152	13.10.10
0	-0.00437	0.012712	0.013158	0.005747	0	14.10.10
0.007194	0	0.025105	0.019481	0.017143	-0.00746	15.10.10
-0.01429	-0.02193	-0.00816	0.019108	-0.00562	0	18.10.10
0	0.004484	0	-0.00625	0.016949	0	19.10.10
0	0.013393	0.00823	-0.00629	0.027778	0.015038	20.10.10
0.014493	-0.00881	0.032653	0.037975	0.005405	0.014815	21.10.10
-0.00714	0.022222	0.035573	0	0.010753	0.021898	22.10.10
0	-0.01739	0	0	0.015957	0	25.10.10
-0.02878	-0.04425	-0.0458	-0.0061	-0.05759	-0.03571	26.10.10
0.014815	0.00463	0.008	-0.04294	0.011111	-0.00741	27.10.10
0.018978	-0.00461	-0.01984	0.012821	0.016484	-0.01119	28.10.10
0.002865	0.00463	-0.01215	0.002532	0	0.018868	01.11.10
0.002857	0	0	0.005051	-0.01081	0.022222	02.11.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

KCHOL	KOZAD	PETKM	SAHOL	SKBNK	SISE	Tarih
-0.0057	0.046083	0.040984	0.007538	0.054645	0.032609	03.11.10
-0.00287	-0.00441	-0.00394	-0.01247	-0.01036	0	04.11.10
0.025862	0.002212	-0.00395	0.017677	0	-0.01053	05.11.10
0.022409	0.015453	0.011905	0.007444	-0.00524	0.007092	08.11.10
0.005479	-0.02391	-0.01176	-0.02463	-0.04211	0.003521	09.11.10
0.024523	-0.00891	-0.00794	0.017677	0.016484	0.024561	10.11.10
0.021277	-0.00449	-0.004	-0.00496	-0.01622	-0.06507	11.11.10
0.013021	0.004515	-0.00402	0.017456	0.016484	-0.00733	12.11.10
-0.04113	-0.01573	-0.02016	-0.05147	-0.01622	0.00369	15.11.10
-0.03485	-0.03425	-0.02881	-0.04393	-0.03297	-0.03676	22.11.10
0.002778	0.018913	0.008475	0.032432	0.022727	0.007634	23.11.10
0.019391	0.018561	0	-0.00785	0	-0.01136	24.11.10
-0.00543	-0.01595	-0.01261	0.015831	-0.01667	0.015326	25.11.10
-0.04372	-0.03935	-0.02553	-0.03377	-0.02825	-0.03774	26.11.10
0.008571	0.019277	0.017467	-0.00269	0.011628	0.003922	29.11.10
0.005666	0.014184	0.004292	0.005391	0.011494	0.023438	30.11.10
0.030986	0.011655	0	0	0.005682	0.022901	01.12.10
-0.0082	0.002304	0.008547	0.016086	-0.01695	0.037313	02.12.10
0.013774	0.018391	0.025424	0.005277	0.005747	0.043165	03.12.10
-0.00272	0.024831	-0.00826	-0.0105	0.011429	-0.03793	06.12.10
-0.00545	-0.0022	-0.00833	-0.00531	-0.00565	0.017921	07.12.10
-0.02466	-0.01325	-0.02101	-0.01867	0	-0.01408	08.12.10
-0.01404	-0.00447	-0.01288	-0.04348	0.011364	-0.01429	09.12.10
0.039886	0.044944	0.017391	0.034091	0.02809	0.018116	10.12.10
0.005479	-0.0086	0.004274	0.010989	-0.01093	0.014235	13.12.10
-0.00545	0.002169	0.004255	-0.02446	0.016575	-0.00702	14.12.10
0.010959	0.004329	-0.00847	-0.00557	-0.00543	-0.01767	15.12.10
-0.01084	-0.0194	-0.02137	-0.0056	-0.00546	-0.0036	16.12.10
-0.01644	-0.01319	-0.00437	-0.01127	-0.04396	-0.01083	17.12.10
0.016713	0.022272	0.017544	0.014245	0.034483	0.021898	20.12.10
0.00274	0.010893	0.00431	-0.00281	-0.00556	-0.00714	21.12.10
0.010929	0	0.017167	0.019718	0.005587	0.014388	22.12.10
0.002703	0.002155	-0.00422	0	0	-0.00355	23.12.10
0.021563	-0.01505	-0.00424	-0.01934	0.011111	-0.00712	24.12.10
-0.00528	0.017467	-0.00426	0.008451	-0.01099	0.003584	27.12.10
0.007958	0.008584	-0.00427	0.00838	-0.00556	0	28.12.10
-0.00526	0.019149	0.017167	0.01108	0	-0.00714	29.12.10
-0.00529	-0.03549	0.004219	-0.0137	-0.01117	-0.02158	30.12.10
0.013298	0.034632	0.016807	0.016667	0.011299	0.025735	31.12.10
0	0.01046	0.053719	0.002732	0.005587	0.014337	03.01.11
-0.01312	0.00207	0.015686	-0.00545	0.011111	0.021201	04.01.11
0.018617	0.039256	-0.01544	0.005479	-0.00549	0.038062	05.01.11
-0.00261	-0.00994	-0.00392	-0.0109	0	-0.00333	06.01.11
-0.03665	0	-0.00394	-0.02479	-0.01657	0.006689	07.01.11
0	0.028112	0	0.016949	0.011236	0.026578	10.01.11
0.019022	0	-0.02767	0.016667	0	0.035599	12.01.11
0.005333	-0.00781	-0.00813	-0.01913	-0.01111	0.028125	13.01.11
0	-0.01181	0.012295	0.005571	-0.00562	0.009119	14.01.11
-0.01857	-0.01594	-0.00405	0	-0.0226	0.051205	17.01.11
0	-0.01417	-0.0122	-0.00554	-0.01156	-0.01433	18.01.11
-0.01892	-0.03491	-0.02058	-0.00557	-0.02339	-0.01163	19.01.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

KCHOL	KOZAD	PETKM	SAHOL	SKBNK	SISE	Tarih
-0.00551	0.008511	0.016807	-0.0028	0.011976	-0.01471	20.01.11
-0.0277	-0.04008	0.012397	-0.00562	-0.02959	0.002985	21.01.11
0.019943	0.002198	0.004082	0.00565	0.006098	0.002976	25.01.11
-0.03352	-0.02851	-0.02439	-0.02528	-0.00606	0.008902	26.01.11
-0.03613	-0.03386	-0.02917	-0.0245	-0.02439	-0.03235	27.01.11
-0.01949	0.011682	-0.00858	0.007386	0.03125	0.006079	28.01.11
0.024465	0.013857	0.017316	0.017595	0.036364	0	31.01.11
0.053731	-0.00228	-0.00426	0	-0.01754	-0.00906	01.02.11
-0.01133	-0.02511	-0.00855	-0.01441	-0.02976	0	02.02.11
0.025788	0.01171	0	0.008772	0.02454	0.006098	03.02.11
0.01676	-0.00694	0.008621	-0.0087	-0.01198	0.015152	04.02.11
0.024725	0.016317	0.004274	-0.01462	0.006061	0.01791	07.02.11
0.008043	0.018349	0	0.017804	0	-0.00293	08.02.11
-0.05319	-0.01351	-0.01277	-0.01166	-0.00602	-0.02059	09.02.11
0.014045	0.002283	0.00431	0	-0.00606	-0.01802	10.02.11
0.00277	0	-0.00429	-0.00885	0	0	11.02.11
-0.01657	0.015945	-0.00862	0	0.006098	-0.0367	14.02.11
-0.00843	0.035874	0.017391	0.005952	0.006061	0.012698	15.02.11
0.002833	-0.00216	0.017094	0.023669	0	-0.0094	16.02.11
0.002825	-0.00651	-0.0042	0.00289	0.006024	-0.00633	17.02.11
-0.01127	0.00655	-0.00844	-0.01729	-0.01796	-0.02866	18.02.11
-0.01709	-0.01302	0	-0.01173	-0.0122	0.016393	21.02.11
-0.02319	-0.03077	-0.00426	-0.02967	-0.03704	-0.01613	22.02.11
-0.02077	-0.02721	-0.01282	-0.02141	-0.02564	-0.02623	23.02.11
-0.01212	0.016317	0	0	0.026316	-0.0202	24.02.11
0.027607	0	0	0.003125	0.00641	-0.04811	25.02.11
-0.03881	-0.04128	-0.00433	-0.02492	-0.07643	-0.05415	28.02.11
-0.04348	0.004785	-0.00435	0.003195	0.013793	0	01.03.11
0.022727	0.030952	0.004367	0.025478	0.040816	0.049618	02.03.11
0.025397	0	-0.00435	0.099379	0.045752	0.036364	03.03.11
-0.01548	0.046189	-0.00873	-0.0113	-0.00625	-0.01754	04.03.11
0.015723	0.011038	0.008811	-0.00857	0.025157	0.064286	07.03.11
0.037152	-0.00437	0.004367	0.002882	0.067485	0.010067	08.03.11
0.029851	-0.02632	0	0.034483	0	0.009967	09.03.11
0.026087	-0.00225	0	0.044444	-0.00575	0.019737	10.03.11
0.016949	0.009029	0.004348	0.010638	0	0.032258	11.03.11
0.005556	-0.02461	0	-0.02105	-0.0289	0.034375	14.03.11
-0.03591	0.025229	-0.00866	0	-0.02381	-0.03021	15.03.11
0.005731	0.006711	0.0131	0.005376	0.036585	-0.00623	16.03.11
0.008547	0.02	-0.00431	-0.00535	-0.02353	-0.01254	17.03.11
0.00565	0.013072	0.004329	0	-0.00602	0.022222	18.03.11
0.005618	0.021505	0.012931	0.002688	0.012121	0.059006	21.03.11
0.002793	-0.01053	-0.00426	-0.01072	-0.00599	-0.0088	22.03.11
0.002786	0.02766	0.008547	-0.01897	0.012048	0	23.03.11
0.002778	-0.02484	-0.00424	-0.00829	0	0	24.03.11
-0.01108	0	0	-0.00279	0.005952	-0.00296	25.03.11
-0.0084	0.002123	-0.00426	-0.01397	-0.00592	0.002967	28.03.11
0.00565	0.004237	0.008547	0.025496	0.005952	0.023669	29.03.11
0.008427	0.00211	-0.00424	-0.00829	0.023669	0.00578	30.03.11
0.036212	-0.00211	0.017021	0.038997	0.034682	0.011494	31.03.11
0.048387	0.021097	0.012552	0.072386	0.005587	-0.00568	01.04.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

KCHOL	KOZAD	PETKM	SAHOL	SKBNK	SISE	Tarih
-0.01026	-0.00413	-0.00413	-0.015	0	-0.00286	04.04.11
0.020725	0.020747	0	0.01269	0.011111	0.008596	05.04.11
0.025381	0.002033	0.020747	0.022556	0.010989	-0.00568	06.04.11
-0.01733	-0.01217	-0.02846	-0.00245	-0.04348	0	07.04.11
0.007557	0.022587	0.004184	0.009828	0.011364	0.02	08.04.11
0.0225	0.004016	-0.00833	-0.0219	0	-0.0084	11.04.11
-0.01711	-0.004	0.004202	-0.01493	0.011236	0.008475	12.04.11
-0.01493	0.004016	0.012552	0.005051	0	0.014006	13.04.11
-0.0303	-0.032	-0.02479	-0.01508	-0.05	-0.00276	15.04.11
0.023438	0.033058	0.016949	0.017857	0.02924	0.033241	18.04.11
-0.01018	0.004	0.004167	0.007519	0	-0.00804	19.04.11
0.002571	0.039841	0.004149	0.012438	0.017045	0.002703	20.04.11
0	0.038314	0.012397	0	0	-0.0027	21.04.11
0	-0.02583	0.020408	0.004914	0	0	22.04.11
-0.00513	0	0.02	-0.03912	-0.00559	0.021622	25.04.11
0	0	0	0	0	0	26.04.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

HALKB	TAVHL	TKFEN	TEBNK	TOASO	TCELL	Tarih
-0.02521	0.012658	0.004082	-0.00714	0.008475	0.018868	03.01.10
-0.00862	0.020833	0.056911	0.007194	0.029412	0.037037	04.01.10
0.008696	0.008163	0.028846	-0.01429	-0.00408	0.017857	05.01.10
0	-0.01215	-0.00935	0.021739	0.028689	0.017544	06.01.10
-0.01724	0.081967	0.018868	-0.02128	0.025896	-0.01724	07.01.10
-0.03509	0.013258	-0.00926	0	-0.00971	-0.01754	08.01.10
-0.01818	0	-0.02804	-0.01449	-0.02353	0.008929	11.01.10
0.027778	0.056075	0.048077	0.007353	0	0.017699	12.01.10
-0.01802	0	0.036697	-0.0073	0.034137	0.008696	13.01.10
-0.00917	-0.00885	0.00885	-0.02941	0.038835	-0.02586	14.01.10
0.046296	0.035714	0.026316	-0.00758	0	0.035398	18.01.10
-0.00885	0	-0.00855	0	0.009346	-0.00855	19.01.10
-0.03571	-0.00862	-0.00862	0.007634	0.018519	-0.00862	20.01.10
-0.02778	-0.02609	-0.03478	-0.02273	-0.00909	0	21.01.10
-0.00952	0.008929	0	-0.00775	0.009174	0	22.01.10
0	0.00885	0.009009	-0.01172	0	0	25.01.10
-0.00962	0.017544	0	0.003953	-0.00909	-0.01739	26.01.10
0	0.043103	0.017857	0	0.055046	-0.0354	27.01.10
0	0.024793	-0.00877	0	0	0.009174	28.01.10
0.019417	0.016129	0	0.015748	0	0.018182	29.01.10
-0.01905	0.007937	0.00885	-0.03101	-0.01739	-0.00893	01.02.10
0.009709	-0.02362	-0.00877	0	0.017699	0	02.02.10
-0.03846	-0.01613	-0.02655	-0.032	-0.02609	-0.03604	03.02.10
-0.04	-0.0082	-0.05455	-0.04959	-0.04464	-0.06542	04.02.10
-0.01563	-0.03306	-0.05769	-0.03478	-0.05607	0.01	05.02.10
0.021164	0.059829	0.061224	-0.03153	0.029703	0.019802	08.02.10
0.031088	0	0.028846	0.018605	0.048077	-0.00971	09.02.10
-0.01005	-0.01613	-0.02804	0.077626	-0.00917	-0.03922	11.02.10
0.005076	-0.02459	0.009615	0.097458	0.027778	0.010204	12.02.10
0	0	0.028571	-0.00386	-0.01802	0.010101	15.02.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

HALKB	TAVHL	TKFEN	TEBNK	TOASO	TCELL	Tarih
0.050505	0.02521	0.018519	-0.03101	0.009174	-0.005	16.02.10
-0.02885	-0.04098	-0.01818	0.008	0	-0.01005	17.02.10
0.029703	0.025641	0	0.043651	-0.00909	0.015228	18.02.10
-0.03846	-0.025	-0.00926	-0.04943	0.009174	-0.01	19.02.10
-0.03	-0.04274	-0.01869	0.012	-0.06364	-0.0101	22.02.10
-0.01546	-0.01786	-0.0381	-0.08696	-0.05631	-0.02551	23.02.10
0	0	-0.0198	0.004329	-0.02058	-0.02618	24.02.10
0.020942	0.009091	0.010101	0.038793	0.029412	-0.02688	25.02.10
0.025641	0.045045	0.05	0.012448	0.028571	0.022099	26.02.10
0.01	0.025862	0.028571	0	0.021825	0.010811	01.03.10
0.009901	-0.0084	-0.00926	-0.01639	-0.01942	0	02.03.10
-0.01961	-0.0339	-0.00935	0	0.019802	-0.02674	03.03.10
0.015	0.017544	0.066038	0.016667	0.009709	0.016484	04.03.10
0.004926	0	-0.0177	-0.01639	0.009615	0.021622	05.03.10
-0.02451	0	-0.00901	-0.0125	0	0	09.03.10
-0.00503	0.008621	-0.00909	-0.00422	-0.00952	-0.01058	10.03.10
-0.0303	0.025641	0	0.004237	0	-0.0107	11.03.10
0	0.016667	0	-0.00422	0.009615	0.016216	12.03.10
0.03125	0.032787	0.027523	0.012712	0.047619	0.015957	15.03.10
0.025253	0	0.044643	0.016736	0.009091	-0.00524	16.03.10
-0.02463	-0.03175	-0.02564	-0.02881	-0.02703	-0.02105	17.03.10
-0.00505	-0.0082	-0.00877	-0.01271	0	0.005376	18.03.10
0	0.041322	0.026549	0.008584	0.018519	-0.01604	19.03.10
0.005076	-0.00794	0.008621	0.017021	0.009091	0.005435	22.03.10
0.080808	0	0.025641	0.066946	0.018018	-0.02703	23.03.10
0.074766	0.008	0.008333	0.035294	0.017699	0.016667	24.03.10
-0.02261	-0.03175	-0.05124	-0.08333	-0.09043	-0.01858	25.03.10
0	0.008197	-0.00871	-0.00826	0.00956	0	01.04.10
0.016904	0.00813	0.026362	0.008333	0.00947	0.005568	02.04.10
-0.01662	0.016129	0	-0.00826	0.018762	-0.00554	05.04.10
0	-0.00794	0	-0.00833	0.016575	0.016704	06.04.10
-0.0089	-0.016	0	-0.01681	-0.00725	-0.00548	07.04.10
0.035009	0.00813	-0.01712	0.017094	0.007299	0	08.04.10
0.025152	-0.01613	-0.02613	-0.0084	0.025362	0	09.04.10
0.050505	0.02521	0.018519	-0.03101	0.009174	-0.005	16.02.10
-0.03299	0.032787	-0.01789	-0.0339	0.017668	-0.00551	12.04.10
0.076115	0.047619	0.010929	0.083333	0.067708	-0.01802	13.04.10
-0.01626	0.015152	-0.01802	-0.0081	0.01626	-0.01802	14.04.10
-0.01653	0.022388	0	-0.00408	-0.024	-0.00917	15.04.10
-0.0084	0.007299	-0.01835	0.016393	-0.01639	0.009259	16.04.10
0.016949	0.014493	0.028037	0.016129	0.016667	0.009174	19.04.10
0	0.007143	0	-0.00794	0.008197	-0.01818	20.04.10
0.008333	-0.00709	-0.00909	-0.02	-0.00813	-0.01852	21.04.10
0.008264	0.007143	0.018349	-0.00408	0	0	23.04.10
-0.01639	-0.00709	-0.03604	-0.0082	0	0.015789	26.04.10
-0.00833	0	-0.03738	-0.01653	0	0	27.04.10
0	0.014286	0.029126	0.033613	0.016393	0.005291	28.04.10
-0.0084	0.028169	0.009434	0.004065	0.016129	0.015789	29.04.10
-0.04237	-0.0274	-0.02804	0.004049	-0.02381	-0.01036	30.04.10
-0.02655	-0.05634	-0.02885	-0.0121	-0.03252	-0.00524	04.05.10
-0.01818	-0.00746	0	-0.02041	-0.01681	-0.03158	05.05.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

HALKB	TAVHL	TKFEN	TEBNK	TOASO	TCELL	Tarih
-0.03704	-0.08271	-0.07327	-0.07917	-0.01709	-0.05978	06.05.10
0.134615	0.065574	0.059829	0.072398	0.043478	0.028902	07.05.10
-0.02542	0	0.032258	0	-0.01667	-0.00562	10.05.10
0.026087	-0.00769	0.035156	0.021097	0.008475	0.011299	11.05.10
-0.02542	-0.03101	-0.01887	-0.02066	-0.01681	0.011173	12.05.10
-0.02609	-0.08	-0.04615	-0.07173	-0.01709	-0.07735	13.05.10
0.017857	0.034783	0.020161	0.022727	0.008696	-0.00599	17.05.10
-0.04386	-0.05882	-0.04743	-0.03111	-0.06897	-0.06024	18.05.10
-0.0367	0.008929	-0.0083	-0.03211	-0.00926	0.019231	20.05.10
0.019048	0.00885	-0.00418	-0.00948	0.009346	0.031447	21.05.10
-0.06542	-0.05263	-0.03782	-0.08134	-0.05556	-0.01829	24.05.10
0.03	0.018519	0.017467	0.010417	0.009804	0.024845	25.05.10
0.009709	0.036364	0.021459	0.06701	0.048544	0.006061	26.05.10
0.009615	-0.02632	0	0.033816	0.009259	0.03012	27.05.10
-0.01905	-0.01802	-0.01681	-0.01869	-0.00917	-0.00585	28.05.10
0	-0.00917	0	0.028571	0.018519	-0.00588	31.05.10
0.029126	0.027778	0.025641	0.009259	0.018182	-0.00592	01.06.10
0.028302	0.009009	0	-0.00459	0.008929	0.011905	02.06.10
-0.01835	-0.00893	-0.025	0.013825	-0.0354	0.017647	03.06.10
-0.00935	-0.00901	0	-0.05	-0.00917	0.011561	04.06.10
-0.01887	0.009091	0.004274	-0.03828	-0.02778	-0.02857	07.06.10
0.009615	0.027027	0.021277	0.00995	0.019048	0.005882	08.06.10
0.019048	0.026316	0.004167	-0.00985	-0.00935	-0.00585	09.06.10
0	-0.00855	0.008299	-0.01493	0.009434	0.005882	10.06.10
0.046729	0.017241	0.028807	0.040404	0.028037	0	11.06.10
-0.00893	-0.02542	-0.02	-0.01942	-0.00909	-0.00585	15.06.10
0.009009	-0.0087	0	0	0.036697	-0.00588	16.06.10
0.017857	0.008772	-0.00408	0.019802	0.035398	-0.00592	17.06.10
-0.00877	-0.0087	0	-0.01942	0	0.005952	18.06.10
0.017699	-0.01754	0	-0.02475	-0.00855	-0.00592	21.06.10
-0.02609	-0.02679	-0.02459	-0.03046	-0.01724	-0.0119	22.06.10
0.017857	0.018349	0.012605	-0.01047	-0.00877	0.012048	23.06.10
0.026316	0	-0.00415	0.005291	0	0	24.06.10
0.034188	0.018018	0.008333	0.031579	-0.00885	0.005952	27.06.10
-0.01653	-0.02655	-0.02479	0	-0.02679	-0.00592	28.06.10
-0.0084	0.027273	-0.00424	-0.01531	-0.00917	-0.01786	29.06.10
-0.02542	-0.00885	-0.02128	-0.02073	-0.01852	-0.0303	30.06.10
0.017391	0.008929	0.008696	0.015873	0.009434	0.0125	01.07.10
-0.02564	0.00885	0	-0.01042	0.009346	0.012346	02.07.10
0.017544	0.026316	0.034483	0.026316	0.055556	0	05.07.10
0	-0.00855	-0.00417	-0.00513	0.008772	-0.0061	06.07.10
0.008621	-0.00862	0.004184	-0.00515	0.017391	0.018405	07.07.10
0.008547	0.008696	0.0125	-0.01554	0.008547	-0.01807	08.07.10
0	0.008621	0.00823	0.015789	0	0.01227	09.07.10
0.033898	0.034188	0.004082	0.025907	0.033898	0	12.07.10
-0.0082	0.008264	-0.00407	0.010101	-0.01639	-0.01212	13.07.10
0.008264	0	-0.02041	-0.025	0.008333	-0.00613	14.07.10
0.008197	-0.0082	-0.00417	-0.00513	-0.00826	-0.00617	15.07.10
0.00813	0.024793	0	0	-0.00833	0	16.07.10
-0.00806	0.016129	-0.00837	0	-0.03361	-0.00621	19.07.10
0.04065	0.039683	0.016878	0.010309	0.017391	-0.00625	20.07.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

HALKB	TAVHL	TKFEN	TEBNK	TOASO	TCELL	Tarih
0.015625	0.022901	0.008299	0.010204	0.025641	0.025157	21.07.10
-0.03077	-0.00746	0.004115	-0.0101	-0.025	0.006135	22.07.10
0.007937	0.007519	0.004098	0.020408	0	0.02439	23.07.10
0.007874	-0.01493	0.008163	0.075	0.008547	0.035714	26.07.10
0	-0.01515	0.016194	0.009302	0	0.011494	27.07.10
-0.01563	-0.00769	0.015936	0.009217	0	0.006135	28.07.10
-0.03175	-0.00775	-0.0098	-0.02283	-0.02542	0	29.07.10
0.032787	0.015625	0.019802	0.056075	0.043478	-0.01093	30.07.10
-0.00794	0	-0.00971	-0.01327	-0.01667	0	02.08.10
-0.016	-0.01538	0.009804	0.013453	0.016949	0	03.08.10
-0.01626	0	-0.00971	0.017699	-0.00833	0.016667	04.08.10
0	0.039063	0.058824	0.013043	0	0	05.08.10
0.016529	-0.01504	0.009259	0.004292	-0.0084	-0.01093	06.08.10
-0.01626	0.022901	-0.01835	-0.02991	-0.01695	0	09.08.10
-0.00826	0	-0.03738	-0.02643	-0.00862	-0.00552	10.08.10
0.008333	0.022388	0	0.022624	-0.0087	-0.01667	11.08.10
0.008264	0	0.019417	-0.00442	-0.01754	0.011299	12.08.10
-0.0082	0	0	-0.00444	0.017857	0.011173	13.08.10
0.033058	-0.0219	0.038095	-0.00446	0	-0.01105	16.08.10
0.016	-0.01493	-0.00917	0	0.008772	0	17.08.10
-0.02362	-0.01515	-0.00926	-0.00448	0.008696	0	18.08.10
-0.00806	0.007692	-0.00935	-0.00901	0.008621	0.01676	19.08.10
0	0.007634	0	0	0.025641	0.021978	20.08.10
-0.01626	0.007576	-0.01887	-0.00909	0.008333	-0.01075	23.08.10
0.008264	0.007519	0.019231	-0.02294	0	0	24.08.10
-0.0082	0.007463	0.018868	0.032864	0	0.005435	25.08.10
0	0.014815	0.027778	0.013636	0.008264	0.037838	26.08.10
0	0	0	0	0	0	27.08.10
0.024793	-0.0146	0.009009	0.004484	0.02459	0.005208	28.08.10
0.016129	0	-0.00893	0.013393	0.008	0.005181	31.08.10
0	0.02963	0.009009	-0.00441	0.015873	0.010309	01.09.10
0	0	0	0.013274	0.007813	0.015306	02.09.10
0.015873	-0.00719	-0.00893	-0.00437	0.023256	-0.01005	03.09.10
-0.01563	0.014493	-0.00901	-0.02193	-0.01515	0.005076	06.09.10
-0.00794	0	0	-0.00448	-0.00769	-0.00505	07.09.10
0	0	0	0	0	0	08.09.10
0.024	0.028571	0.018182	0.031532	0.054264	0.015228	10.09.10
-0.00781	-0.01389	-0.00893	0	0.014706	0.01	13.09.10
0.015748	0.014085	0.018018	0.004367	0	-0.0099	14.09.10
0	0.020833	0.017699	0	-0.01449	-0.01	15.09.10
-0.00775	0.006803	0	-0.01304	-0.02941	0.015152	16.09.10
0.023438	0.02027	0.017391	0.008811	0.022727	-0.00498	17.09.10
0.007634	0.019868	-0.00855	-0.00873	0.007407	0.005	20.09.10
0.022727	0.019481	0	0	0.007353	-0.00498	21.09.10
-0.00741	-0.01911	-0.00862	0.008811	-0.0146	0	22.09.10
-0.00746	0.019481	-0.0087	0.004367	0	-0.005	23.09.10
0.007519	-0.01274	0.008772	0.017391	0.014815	-0.01005	24.09.10
0.037313	-0.00645	0.008696	0.008547	0.021898	0	27.09.10
-0.02158	0.012987	-0.00862	-0.00847	0.028571	-0.02538	28.09.10
-0.01471	-0.00641	0.026087	0	0.041667	0.015625	29.09.10
-0.02239	-0.01935	-0.01695	-0.00855	-0.01333	0.015385	30.09.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

HALKB	TAVHL	TKFEN	TEBNK	TOASO	TCELL	Tarih
0.007634	0.032895	0.008621	0.012931	0.027027	0	01.10.10
0.030303	0.012739	0.034188	0.012766	0.032895	0.005051	04.10.10
0	-0.00629	0.024793	0.012605	0.019108	0.035176	05.10.10
0	-0.01266	0	-0.00415	0.03125	0.029126	06.10.10
0.007353	-0.00641	0.016129	0.008333	-0.00606	-0.01887	07.10.10
0.058394	0.012903	0.02381	0.016529	0.030488	-0.00962	08.10.10
0.013793	-0.01274	0	0.00813	0.017751	0.029126	11.10.10
0.034014	0.012903	-0.00775	0.016129	-0.02907	0.018868	12.10.10
0	0	-0.03906	0	-0.01796	0	13.10.10
0.013158	0.019108	0	0.031746	-0.01829	0.009259	14.10.10
0.012987	0	0.01626	0.015385	-0.01242	-0.00917	15.10.10
-0.01923	-0.00625	-0.024	-0.01515	0	-0.00926	18.10.10
0	-0.00629	0.016393	0	0.006289	-0.00935	19.10.10
0.013072	0.012658	0.008065	0.015385	0	0.018868	20.10.10
-0.0129	-0.00625	0	0.015152	0.00625	0.018519	21.10.10
-0.00654	0.006289	0.016	-0.05224	0.012422	-0.03636	22.10.10
-0.00658	-0.03125	0.023622	0.007874	-0.00613	0	25.10.10
-0.02649	-0.03871	-0.04615	-0.03906	-0.01235	-0.04717	26.10.10
-0.01361	0.006711	0.008065	0	-0.00625	0.029703	27.10.10
0.024138	-0.008	0.0048	0.004065	0.006289	-0.00962	28.10.10
0.023569	-0.00806	-0.00637	0.016194	0.0175	0.004854	01.11.10
-0.00658	0.01897	0.003205	-0.01594	-0.0172	0.004831	02.11.10
0.02649	0.021277	0.041534	0.02834	-0.03	0.033654	03.11.10
0.032258	-0.00781	-0.01227	-0.01575	-0.01031	0	04.11.10
-0.00625	0.020997	-0.00311	0.012	0.067708	0.004651	05.11.10
0.018868	0.007712	0.028037	-0.00395	0.026829	0.032407	08.11.10
-0.00926	0.007653	0.021212	-0.01587	-0.01663	-0.03139	09.11.10
-0.00623	-0.00253	0.008902	-0.01613	0	0.00463	10.11.10
-0.00627	-0.00508	-0.02941	-0.02459	-0.00725	0.009217	11.11.10
-0.01262	0.007653	0.012121	0	0	0.004566	12.11.10
-0.0607	-0.02532	-0.01796	-0.0042	-0.01703	-0.05909	15.11.10
0	-0.06234	-0.03354	-0.03797	-0.0396	-0.00966	22.11.10
0.027211	0.00554	0.009464	0.02193	-0.00773	0.029268	23.11.10
0	0.019284	-0.01563	0.04721	0.012987	0	24.11.10
-0.01656	-0.00811	-0.01905	-0.03689	-0.02308	-0.00474	25.11.10
-0.05724	-0.02452	-0.0356	-0.03404	-0.05774	-0.00952	26.11.10
0.010714	0.00838	0.010067	0.013216	0.097493	-0.01923	29.11.10
0	0.022161	0.009967	0.017391	0.043147	0.014706	30.11.10
0.007067	-0.00813	0.023026	0.008547	0.004866	-0.01932	01.12.10
-0.00351	0.002732	0.025723	-0.00847	0.026634	-0.00985	02.12.10
0.010563	0.002725	0.009404	0	-0.01651	0.0199	03.12.10
0	-0.00543	0.003106	-0.00427	-0.01679	0	06.12.10
-0.01742	0.010929	0.01548	-0.00858	-0.02683	-0.01951	07.12.10
-0.0461	0.002703	-0.03659	-0.00433	-0.03258	0.00995	08.12.10
-0.03717	-0.01348	-0.03165	0.004348	0.033679	-0.01478	09.12.10
0.034749	0.021858	0.01634	0.012987	0.002506	0.035	10.12.10
0.022388	0.029412	0	0.004274	0	0.004831	13.12.10
-0.01825	-0.01299	0.003215	-0.01277	-0.005	-0.02885	14.12.10
-0.00743	-0.00263	-0.00321	-0.02155	-0.01005	0	15.12.10
-0.0412	-0.01847	-0.01286	0	-0.01523	0	16.12.10
0	-0.00538	0.026059	-0.01762	0.002577	0.009901	17.12.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

HALKB	TAVHL	TKFEN	TEBNK	TOASO	TCELL	Tarih
0.015625	0	0.025397	0.004484	0.023136	0.019608	20.12.10
0.003846	0.018919	0	0	0.005025	0	21.12.10
0.003831	0.013263	0.003096	0.004464	0.01	0.024038	22.12.10
-0.00382	0.002618	0	0.008889	-0.00495	-0.00469	23.12.10
-0.00383	-0.01044	0.009259	-0.00881	-0.00498	0.014151	24.12.10
0.003846	-0.01055	0.003058	-0.00444	0.005	-0.01395	27.12.10
0.007663	-0.00267	0.006098	0	-0.00249	0.009434	28.12.10
-0.0038	0.010695	-0.00606	0.013393	0.009975	0.009346	29.12.10
0	-0.01058	-0.01524	-0.01762	-0.01728	-0.02315	30.12.10
0.045802	0.02139	0.03096	0.008969	0.027638	0.018957	31.12.10
0.018248	0.005236	0.03003	0.017778	0.036675	0.004651	03.01.11
0.017921	0	0.037901	0.004367	0.025943	0.013889	04.01.11
0.007042	0.010417	0.014045	0.008696	0.029885	-0.00913	05.01.11
-0.02797	-0.01031	0.00277	0	0.013393	0	06.01.11
-0.03597	-0.0026	0.027624	-0.02586	-0.00661	0	07.01.11
-0.01493	-0.01305	-0.01882	-0.0354	0.002217	0.004608	10.01.11
0	0.015873	0	0.009174	0.004425	0	12.01.11
-0.02652	-0.01042	0.010959	-0.01364	0.013216	-0.03211	13.01.11
-0.03502	-0.01842	0.00542	-0.00922	0.002174	0	14.01.11
-0.02419	-0.00268	0.013477	-0.01395	0	-0.01896	17.01.11
0.028926	0.026882	0.00266	-0.0283	-0.02386	-0.00483	18.01.11
-0.04418	0.005236	-0.02918	-0.03398	-0.02222	0.004854	19.01.11
0.037815	-0.01042	-0.00273	0.005025	-0.01818	-0.02899	20.01.11
-0.02024	-0.00789	0.005479	-0.03	0.064815	0.00995	21.01.11
0.049587	0.007958	0.008174	0.010309	0.006522	-0.00985	25.01.11
-0.01575	-0.01842	-0.01351	-0.01531	-0.06263	0.004975	26.01.11
-0.024	-0.02949	-0.03288	-0.05699	-0.01728	-0.01584	27.01.11
0.036885	0.044199	-0.05666	0	0.01524	-0.01207	28.01.11
0.031621	-0.02116	0.009009	0.043956	0.016166	0.01833	31.01.11
0.019157	-0.02162	0.035714	0.015789	0.009091	0.01	01.02.11
-0.03008	-0.02762	-0.02586	-0.03627	-0.0045	-0.00495	02.02.11
0.027132	0.005682	0.00885	0.032258	0.002262	-0.00498	03.02.11
-0.01132	0	-0.00292	-0.00521	0.015801	-0.004	04.02.11
-0.01145	0.031073	0.026393	0	-0.01111	0.004016	07.02.11
-0.01544	0.010959	-0.01714	0.04712	-0.01124	0.015	08.02.11
-0.03137	-0.02439	-0.02616	0.01	-0.01136	-0.00985	09.02.11
0.008097	-0.00278	0	-0.02475	-0.02069	0.006965	10.02.11
0.004016	0.005571	0.01194	-0.03553	-0.00235	-0.00198	11.02.11
0.004	0.00831	-0.0118	0.010526	-0.01412	0.009901	14.02.11
0.003984	0.016484	-0.01791	0.005208	0	-0.0049	15.02.11
0.003968	-0.00811	-0.03647	-0.01036	-0.01432	0.024631	16.02.11
0.01581	-0.00817	0.003155	0	-0.01211	0.014423	17.02.11
-0.00389	-0.02747	-0.07862	-0.04188	-0.01471	-0.01896	18.02.11
-0.00781	-0.0452	-0.01024	-0.00546	0.047264	-0.00966	21.02.11
-0.02362	-0.04142	-0.01379	-0.03297	-0.04988	-0.00976	22.02.11
-0.05645	-0.01852	-0.02098	-0.02841	-0.0725	-0.09754	23.02.11
-0.00855	0.003145	-0.01071	0.005848	0.02965	-0.01747	24.02.11
0	0.012539	-0.03249	-0.01163	0.010471	-0.00444	25.02.11
-0.06034	-0.03406	-0.03358	-0.04706	-0.04404	-0.02679	28.02.11
-0.01376	0.022436	0	-0.00617	0.01084	-0.01606	01.03.11
0.04186	0.034483	0.046332	0.031056	0.0563	0.016317	02.03.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

HALKB	TAVHL	TKFEN	TEBNK	TOASO	TCELL	Tarih
0.008929	0.00303	0.02583	-0.00602	0.058376	0.025229	03.03.11
-0.02212	-0.03323	-0.04676	-0.0303	-0.0048	-0.00447	04.03.11
0.027149	0.028125	0.018868	0.025	-0.01205	0.020225	07.03.11
0.039648	0.024316	0.014815	0.067073	-0.00976	0.004405	08.03.11
0.029661	0.032641	0.014599	-0.00571	-0.00246	-0.00439	09.03.11
0.020576	0.022989	0.003597	-0.00575	-0.00494	-0.01322	10.03.11
0.012097	-0.00843	0.014337	0.00578	0.034739	0.011161	11.03.11
0.003984	-0.01983	-0.02473	-0.01724	-0.01439	-0.00221	14.03.11
-0.03571	0.011561	-0.01449	-0.02339	0.004866	-0.00221	15.03.11
0.00823	0.011429	0.025735	0.02994	-0.00726	0.002217	16.03.11
0.004082	0.022599	0.017921	-0.00581	-0.00976	0.002212	17.03.11
-0.00813	-0.00552	-0.00704	-0.00585	0.009852	0.006623	18.03.11
0	0.008333	0.007092	0.005882	0.004878	0.037281	21.03.11
-0.02869	-0.02204	-0.01408	0.011696	-0.00485	-0.00423	22.03.11
0.021097	0.016901	0.017857	0.028902	0.004878	0.021231	23.03.11
0	-0.01385	-0.00702	0.02809	0.004854	-0.00624	24.03.11
-0.00826	0.022472	0.028269	-0.00546	0.021739	-0.00418	25.03.11
-0.025	0.002747	0.003436	0	0.014184	-0.02311	28.03.11
0.017094	0	0.017123	0.005495	0.004662	-0.00215	29.03.11
0.004202	0.008219	0.020202	0.174863	0.011601	-0.01509	30.03.11
0.025105	0.008152	0.042904	0	0.004587	0.039387	31.03.11
0.036735	0.016173	0	0.004651	0.015982	0.010526	01.04.11
-0.00394	-0.00531	-0.00949	0	-0.01348	-0.00208	04.04.11
0.01581	0.008	-0.00319	0	0.018223	-0.00835	05.04.11
0.019455	0.034392	0.003205	0	-0.05817	-0.00211	06.04.11
-0.01527	-0.02813	-0.01278	-0.00463	-0.00238	-0.02954	07.04.11
0.007752	-0.01579	-0.00971	0.004651	0.014286	-0.00652	08.04.11
0.003846	0	0.003268	0	0.004695	-0.01532	11.04.11
0.007663	0.005348	0	0	0.030374	-0.00222	12.04.11
0.015209	0.013298	0	0	0	-0.00223	13.04.11
-0.03371	-0.04724	-0.02606	-0.00463	-0.01134	-0.02902	15.04.11
0.015504	0.046832	0.036789	0.004651	0.002294	0.025287	18.04.11
0.003817	0	0.006452	0	0.004577	0.015695	19.04.11
0.007605	-0.00263	0.00641	0	-0.00683	0.013245	20.04.11
0	0.002639	0.012739	0	-0.00229	0	21.04.11
0	0.015789	0.012579	-0.00926	-0.0046	-0.02397	22.04.11
-0.00377	-0.01036	-0.00932	0.004673	0.002309	0	25.04.11
0	0	0	0	0	0	26.04.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

TUPRS	THYAO	TTKOM	VAKFN	VESTL	YKBNK	Tarih
0.042017	0	0.004386	0.007519	0.053846	0	03.01.10
0.016129	0.008772	0.026201	0.052239	-0.0073	0.042683	04.01.10
0	-0.02609	0.042553	-0.00709	0.073529	0.005848	05.01.10
0	0	0.004082	0.007143	-0.02055	0.011628	06.01.10
-0.02381	-0.01786	0.036585	-0.00709	-0.01399	-0.00575	07.01.10
-0.01626	-0.00909	0.019608	-0.00714	0.028369	-0.02312	08.01.10
-0.00826	-0.00917	-0.03846	-0.01439	0	-0.00592	11.01.10
0.05	0.046296	0.01	0.014599	-0.02759	0.017857	12.01.10
0.031746	0.00885	0	0.007194	-0.00709	-0.0117	13.01.10
-0.03077	-0.01754	-0.01386	0	-0.00714	0.017751	14.01.10
0.039683	0.017857	0.028112	0.021429	0.007194	0.011628	18.01.10
-0.03817	-0.02632	0.005859	0	0.007143	0.028736	19.01.10
0.007937	0	0	0.006993	0	-0.00559	20.01.10
0	-0.01802	-0.01942	-0.03472	-0.04255	-0.02809	21.01.10
-0.00787	-0.00917	-0.0099	0	0.022222	0.023121	22.01.10
0.007937	0.018519	-0.004	0.014388	-0.01449	0.011299	25.01.10
-0.01575	0.009091	0.008032	-0.00709	-0.00735	-0.01117	26.01.10
0.016	0	0.015936	0.142857	0.014815	0.022599	27.01.10
-0.01575	-0.00901	0.019608	0.01875	-0.0073	0.005525	28.01.10
0	0.018182	0	-0.03067	0.014706	0.005495	29.01.10
-0.008	-0.00893	-0.00962	0.101266	-0.00725	-0.00546	01.02.10
-0.01613	0.009009	-0.01942	0.045977	0.014599	-0.00549	02.02.10
-0.05738	-0.02679	-0.02178	-0.04396	-0.02878	-0.02762	03.02.10
-0.06087	-0.05505	-0.03644	-0.12069	-0.07407	-0.02841	04.02.10
0.027778	-0.03883	-0.01261	-0.0719	-0.056	-0.05263	05.02.10
0.018018	0.030303	0.017021	0.06338	0.016949	0.018519	08.02.10
0.00885	0.009804	0.029289	-0.01325	0.016667	-0.00606	09.02.10
0	0	0.012195	0	0	-0.0061	11.02.10
0.008772	0.058252	-0.01205	0	0.02459	-0.0184	12.02.10
0.043478	-0.00917	0	0.073826	0.008	0.0125	15.02.10
0.025	0.018519	0.004065	0.00625	0.015873	0.055556	16.02.10
-0.01626	-0.00909	-0.01215	-0.01863	-0.01563	-0.02924	17.02.10
-0.00826	0.009174	0.004098	-0.01266	0	0.054217	18.02.10
0	-0.00909	0.010204	-0.01282	-0.03175	-0.02857	19.02.10
-0.01667	-0.01835	-0.0303	0.006494	-0.02869	-0.02941	22.02.10
-0.04237	-0.05607	-0.00417	-0.07742	-0.05485	-0.01212	23.02.10
-0.02655	-0.0396	0.016736	-0.02797	-0.00446	-0.00613	24.02.10
0.018182	0.010309	-0.00412	0.035971	0.022422	0.024691	25.02.10
0.035714	0.032653	0.024793	0.048611	0.039474	0.012048	26.02.10
0	0.037549	0	0	0.004219	0.017857	01.03.10
0.034483	0	0	-0.01325	0.012605	-0.00585	02.03.10
0.016667	0	-0.00806	-0.00671	-0.01245	-0.01176	03.03.10
0	0.028571	0.012195	0.02027	0.021008	0.017857	04.03.10
0	-0.00926	0.004016	0	0.012346	0	05.03.10
0.016393	0	-0.008	-0.00662	0	0	09.03.10
-0.00806	-0.00935	0	0	-0.00813	-0.01754	10.03.10
0.00813	0.018868	0	-0.01333	-0.0082	0.005952	11.03.10
0	-0.01852	0	-0.00676	-0.00413	-0.01183	12.03.10
0.016129	0	0.012097	0.027211	0.029046	0.035928	15.03.10
0.02381	0.018868	0.005976	0.013245	0.008065	0.040462	16.03.10
-0.00775	-0.02778	-0.01782	-0.01961	-0.028	-0.02222	17.03.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

TUPRS	THYAO	TTKOM	VAKFN	VESTL	YKBNK	Tarih
-0.00781	0	0	-0.01333	-0.00823	0	18.03.10
0.007874	-0.00952	0	0.013514	0.020747	0.005682	19.03.10
0.007813	0	0	0.02	-0.00407	0.028249	22.03.10
0	0	0.004032	0.006536	0.008163	0.043956	23.03.10
0.015504	0.028846	0.014056	0.006494	0.036437	0.026316	24.03.10
-0.05893	-0.14206	-0.06535	0.059677	0.039063	0.025641	25.03.10
0	0.010893	0	0.004926	0.007519	0.005	01.04.10
-0.02109	0.008621	0	0.009804	0.029851	0.004975	02.04.10
-0.00795	-0.01923	0	-0.00971	-0.02174	-0.00495	05.04.10
0.015369	-0.00871	0.010593	-0.0098	-0.02222	-0.00995	06.04.10
-0.00757	-0.02857	0.027254	-0.01485	-0.02273	-0.01508	07.04.10
0	-0.01131	0.010204	0.030151	0.023256	0.030612	08.04.10
-0.00763	-0.01831	0.018182	-0.00976	-0.00758	0.019802	09.04.10
0.007685	0.016317	-0.01786	-0.0197	0	-0.00971	12.04.10
0.069297	0.142202	0.028283	0.243719	0.022901	0.029412	13.04.10
0	0.024096	-0.00877	-0.09091	-0.00746	0	14.04.10
0.023256	-0.0098	-0.0354	0.057778	-0.01504	-0.01905	15.04.10
-0.00758	-0.00198	0.027523	0.105042	-0.01527	0.004854	16.04.10
0.022901	-0.00794	0	-0.05894	0.023256	0.009662	19.04.10
-0.01493	-0.008	0.017857	0.014141	0	-0.00478	20.04.10
0.007576	-0.00403	0	-0.03187	-0.01515	0.033654	21.04.10
0.007519	0.008097	0	0	0.038462	0.027907	23.04.10
-0.00746	-0.01205	0.00823	-0.00412	-0.02963	0.013575	26.04.10
-0.01504	0.004065	0.018692	-0.02066	-0.01527	-0.04018	27.04.10
0.007634	-0.00405	0	0.004219	0	0	28.04.10
0.007576	0.004065	0.018349	-0.01261	-0.00775	-0.0093	29.04.10
-0.04511	-0.02429	-0.01802	-0.0766	-0.04688	-0.04695	30.04.10
-0.02362	-0.0166	0	0.02765	-0.03279	-0.0197	04.05.10
-0.02419	-0.0211	0	-0.04036	-0.01271	-0.01005	05.05.10
-0.02479	-0.06466	-0.00917	-0.13084	-0.07296	-0.05584	06.05.10
0.050847	0.073733	0.037037	0.123656	0.12037	0.086022	07.05.10
-0.00806	0.008584	-0.00893	-0.01435	-0.02479	0.024752	10.05.10
0.02439	0.025532	0.027027	0.058252	0.016949	0.048309	11.05.10
-0.00794	-0.0083	-0.02632	0.027523	-0.00417	-0.01843	12.05.10
-0.008	-0.06695	0	-0.02679	-0.04603	-0.03286	13.05.10
-0.00806	-0.01794	0.009009	-0.00459	0	0.029126	17.05.10
-0.04065	-0.0411	-0.05357	-0.04608	-0.03947	-0.03302	18.05.10
0.025424	-0.02857	0.018868	-0.00966	0.004566	0.009756	20.05.10
0.008264	0.02451	-0.07778	0	0.004545	-0.00966	21.05.10
-0.06557	-0.02871	-0.02008	-0.07317	-0.04525	-0.0439	24.05.10
0.035088	0.034483	0.020492	0.178947	0.033175	0.030612	25.05.10
-0.00847	0.028571	-0.00803	-0.00446	0.027523	0.019802	26.05.10
-0.01709	0.027778	0.012146	-0.01794	0.004464	0	27.05.10
0	-0.00901	-0.008	-0.04566	-0.03556	-0.00485	28.05.10
0	-0.00909	-0.02016	0.023923	0.013825	0.004878	31.05.10
0.026087	0.009174	0.00823	-0.00467	0.009091	0.004854	01.06.10
0.042373	-0.11364	-0.00408	0	0	0	02.06.10
0.01626	-0.04103	0.004098	-0.04225	-0.02252	-0.01449	03.06.10
-0.016	0.010695	0.004082	-0.0049	0	0.004902	04.06.10
-0.03252	0.021164	-0.0122	-0.00493	-0.00922	-0.00488	07.06.10
0.033613	0.010363	0.024691	0.044554	0.004651	0.014706	08.06.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

TUPRS	THYAO	TTKOM	VAKFN	VESTL	YKBNK	Tarih
0.00813	0.005128	0.012048	-0.01422	0.00463	0.004831	09.06.10
0.024194	-0.0051	0.011905	0.019231	0.004608	0	10.06.10
-0.00787	0.082051	0.039216	0.014151	0.027523	0.038462	11.06.10
0.015873	-0.00948	0.009434	-0.00465	-0.00446	-0.00926	15.06.10
-0.00781	0.009569	-0.02804	0.004673	0	0.014019	16.06.10
-0.00787	0	0	-0.00465	0.004484	0	17.06.10
0.015873	-0.00948	0	-0.00467	-0.00893	0.023041	18.06.10
-0.01563	-0.02392	-0.00962	-0.01408	-0.01351	0.013514	21.06.10
-0.00794	-0.02941	0	-0.01429	-0.02283	-0.02667	22.06.10
0	0.005051	-0.00971	0	0.004673	0.004566	23.06.10
-0.008	-0.00503	0	0.019324	-0.00465	0.004545	24.06.10
-0.00806	0.005051	0.019608	-0.00474	0.004673	0.00905	27.06.10
-0.02439	-0.01508	-0.01923	-0.02857	-0.01395	-0.02691	28.06.10
-0.03333	0	-0.0098	-0.0049	-0.01887	-0.00461	29.06.10
0.008621	0.010204	-0.00198	-0.01478	-0.01442	-0.00926	30.06.10
0.034188	0.035354	0	0.02	0.009756	0.018692	01.07.10
-0.00826	0	-0.00794	0	-0.00966	0.009174	02.07.10
0.016667	0.014634	0.01	0.02451	0.068293	0.018182	05.07.10
0	-0.00962	0.019802	0	-0.03196	0.004464	06.07.10
0.008197	0.014563	0.019417	-0.00478	0.004717	0.017778	07.07.10
-0.00813	-0.00478	0.009524	-0.00962	0.004695	-0.00873	08.07.10
0	0.004808	0	-0.01456	0.009346	-0.00441	09.07.10
0.032787	0.009569	0	0.009852	-0.00463	0.004425	12.07.10
-0.00794	0.004739	-0.00943	-0.00976	0.013953	-0.00881	13.07.10
-0.008	0.014151	0	-0.01478	-0.00917	-0.01778	14.07.10
0.008065	0.009302	-0.01905	0	0.00463	-0.00905	15.07.10
0.016	0.009217	0.009709	0.02	0.004608	0.004566	16.07.10
0.015748	0.022831	0.019231	-0.01471	-0.00459	0.013636	19.07.10
0.007752	0.004464	0	0.004975	0.013825	0.017937	20.07.10
0.038462	-0.00444	-0.00943	0.014851	0.004545	0.004405	21.07.10
0.007407	-0.00446	-0.01905	-0.01463	-0.00452	-0.00877	22.07.10
0.007353	-0.00448	0.009709	0.009901	0.004545	0.004425	23.07.10
0.007299	0.022523	0.028846	0.019608	0	0.013216	26.07.10
-0.02174	-0.00441	0.028037	-0.00962	0.045249	-0.01739	27.07.10
0.007407	-0.0177	0.027273	0.014563	0.004329	0.030973	28.07.10
0.007353	-0.01802	0	-0.02871	-0.01724	-0.01717	29.07.10
0.036496	0.009174	0.017699	0.014778	0.013158	0.0131	30.07.10
-0.00704	0.004545	0	-0.00971	-0.00433	-0.00431	02.08.10
0.021277	-0.00452	0.034783	0	0.026087	-0.01299	03.08.10
-0.01389	0.018182	0.016807	-0.0049	-0.00847	-0.00877	04.08.10
0.007042	-0.00446	0.008264	0	0.004274	0	05.08.10
-0.00699	0.008969	-0.0082	0.009852	0.008511	0	06.08.10
-0.00704	-0.00444	-0.03306	-0.01463	-0.01688	-0.03097	09.08.10
-0.04255	-0.00893	0	-0.0099	-0.01717	-0.0137	10.08.10
0	0.018018	0.034188	0.005	0.017467	-0.00463	11.08.10
0.007407	0.004425	0	-0.00498	0.004292	-0.00465	12.08.10
0.007353	0.008811	0.016529	0.005	0.008547	0.023364	13.08.10
0.014599	0.004367	-0.01626	0.004975	0.008475	0.018265	16.08.10
0.021583	0.026087	-0.00826	-0.0099	-0.0042	0.008969	17.08.10
-0.0493	0.008475	0	0	-0.00422	-0.01333	18.08.10
-0.00741	0.004202	-0.00833	-0.01	-0.00847	0	19.08.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

TUPRS	THYAO	TTKOM	VAKFN	VESTL	YKBNK	Tarih
-0.02239	-0.03766	0.008403	0.005051	-0.00855	-0.0045	20.08.10
0.007634	0.026087	0.008333	0.030151	-0.01724	0	23.08.10
0.015152	-0.00424	0.024793	-0.00488	-0.00877	0	24.08.10
0.014925	0.012766	0.024194	0.009804	0.013274	0.0181	25.08.10
0	-0.0042	-0.00787	-0.00971	0.004367	0.004444	26.08.10
0	0	0	0	0	0	27.08.10
0.007353	0.012658	0	0	-0.01739	0.00885	28.08.10
0.043796	0.020833	-0.02381	0.004902	0.017699	0	31.08.10
-0.01399	-0.00408	0	0	0.013043	0.008772	01.09.10
0.007092	0	-0.00813	-0.00488	-0.00858	0	02.09.10
-0.01408	0	0.008197	0	0	-0.00435	03.09.10
0.007143	-0.0041	-0.01626	0.029412	-0.00866	-0.0131	06.09.10
-0.01418	-0.00412	0.008264	-0.01905	-0.00437	-0.00442	07.09.10
0	0	0	0	0	0	08.09.10
0.05036	0.016529	0.02459	0.029126	0.026316	0.022222	10.09.10
-0.00685	0.03252	0.024	-0.00472	0.017094	0.004348	13.09.10
0	0.023622	0	-0.00948	-0.0084	0.034632	14.09.10
0	0	-0.00781	0.004785	0.004237	0.008368	15.09.10
0.006897	0	-0.00787	0	0	-0.0083	16.09.10
0.006849	0.019231	-0.00794	0.019048	0.021097	-0.00418	17.09.10
-0.0068	0	0	0	-0.00826	-0.0042	20.09.10
0.020548	0	0	-0.00467	-0.00833	0.012658	21.09.10
0.026846	-0.00943	0	-0.00469	-0.0042	-0.025	22.09.10
-0.01961	0	0	-0.00472	0.004219	0.004274	23.09.10
-0.02667	0.009524	0	0.004739	0.021008	0.012766	24.09.10
0.020548	0.04717	0.016	0.004717	-0.00823	0.021008	27.09.10
0.033557	0.027027	-0.01575	0	-0.00415	0	28.09.10
0.012987	0.035088	0.04	0	0.004167	0.028807	29.09.10
-0.00641	-0.01695	-0.03077	-0.02347	-0.0166	-0.008	30.09.10
-0.00645	0.017241	0.02381	0.009615	0.004219	-0.00403	01.10.10
-0.01299	0.050847	0	0.047619	0.008403	0.02834	04.10.10
0	-0.01613	0.023256	0.013636	0.004167	0.01378	05.10.10
-0.00658	-0.01639	0.007576	-0.01345	-0.0083	0.029126	06.10.10
0.019868	0	-0.00752	-0.01364	0.012552	0.018868	07.10.10
0.006494	0.016667	-0.00758	0.032258	0.020661	0.037037	08.10.10
0.006452	0.008197	0.022901	0	0	-0.00893	11.10.10
0	-0.02439	0	0.013393	0.016194	0.009009	12.10.10
-0.01923	-0.03333	-0.01493	0.017621	-0.00398	-0.01786	13.10.10
0.013072	0.008621	0.022727	0.008658	-0.004	0.027273	14.10.10
-0.01935	0	0.014815	0.008584	-0.00402	-0.00885	15.10.10
-0.00658	0	0	0.012766	-0.00403	-0.03571	18.10.10
0	0.017094	0.036496	-0.0042	0.008097	0.009259	19.10.10
-0.00662	0	0.014085	-0.00422	0.028112	0.036697	20.10.10
0	0.016807	-0.02083	-0.01271	-0.00781	0.00885	21.10.10
0.006667	0.008264	-0.00709	-0.00429	0.015748	0	22.10.10
0.013245	0.008197	0	0	-0.00775	-0.01754	25.10.10
-0.00654	-0.03252	-0.03571	-0.02586	-0.03906	-0.01786	26.10.10
0.013158	0	-0.00741	-0.00885	-0.00813	0	27.10.10
0	-0.0084	0.008955	0.017857	0	0.021818	28.10.10
-0.02078	-0.00678	-0.01479	-0.01535	-0.02049	-0.01423	01.11.10
-0.00531	0.010239	0	0.028953	0.008368	-0.01444	02.11.10

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

TUPRS	THYAO	TTKOM	VAKFN	VESTL	YKBNK	Tarih
-0.0424	0.037162	0.036036	0.028139	0.029046	0.03663	03.11.10
0	-0.00977	0.002899	0	-0.00403	0	04.11.10
0.077694	0.003289	0	-0.00421	0	-0.00353	05.11.10
0	0.013115	0	0.027484	-0.00405	0.021277	08.11.10
-0.00775	-0.01294	0.00289	-0.03909	-0.0122	0.010417	09.11.10
0.005208	0	-0.01153	-0.02784	0	-0.02749	10.11.10
-0.00518	-0.03607	0.020408	-0.02643	0.00823	-0.00353	11.11.10
-0.00521	0.010204	-0.01429	-0.00679	-0.00816	0.028369	12.11.10
-0.03141	-0.02357	-0.02319	-0.05011	-0.00823	-0.01379	15.11.10
-0.05135	-0.04483	-0.01187	-0.01199	-0.04564	-0.05944	22.11.10
0.019943	0.025271	-0.003	0.033981	0.017391	0	23.11.10
0.002793	0.014085	0	-0.00469	0.021368	-0.00743	24.11.10
-0.03343	-0.02431	-0.00602	-0.01179	-0.01255	-0.03745	25.11.10
0.017291	-0.05338	-0.01818	-0.02864	0.029661	-0.0428	26.11.10
0.033994	0.026316	-0.03086	0.02457	-0.02469	0.056911	29.11.10
-0.00548	0.014652	0.028662	0.004796	0.012658	0.034615	30.11.10
0.055096	0.01083	-0.00929	0.011933	0.004167	0.01487	01.12.10
0.002611	-0.03571	0.015625	-0.00236	-0.00415	-0.01099	02.12.10
0.018229	-0.01481	0.009231	0.018913	0.025	0.007407	03.12.10
0	-0.01128	0	0.00232	-0.00813	-0.00735	06.12.10
0.015345	-0.0038	-0.00915	-0.0162	0	-0.02222	07.12.10
-0.02267	-0.02672	-0.03077	-0.03765	-0.03279	-0.06061	08.12.10
-0.00515	-0.01961	0.003175	-0.02689	0.008475	-0.01815	09.12.10
0.020725	0.008	0.03481	0.035176	0.012605	0.030801	10.12.10
0.030457	0.039683	0	0	-0.00415	0.007968	13.12.10
-0.03448	-0.02672	-0.00917	-0.02184	0.004167	-0.02174	14.12.10
-0.02806	-0.01961	0.012346	-0.03226	0	-0.03232	15.12.10
-0.01837	-0.028	0.006098	-0.03333	-0.01245	-0.03549	16.12.10
0.010695	0.004115	-0.02424	0.013263	-0.01681	0.021645	17.12.10
0.031746	0.028689	0.006211	0.018325	0.025641	0.03178	20.12.10
0.015385	0.039841	0.018519	0.017995	0.004167	0.014374	21.12.10
0.005051	0.007663	0.015152	0.017677	0.012448	-0.00405	22.12.10
-0.00251	-0.0038	0	-0.00496	0	0.006098	23.12.10
0	0.003817	-0.00597	-0.00499	-0.0041	0	24.12.10
-0.00504	0.007605	0.003003	-0.00251	0.028807	-0.00202	27.12.10
-0.00506	0.015094	0.002994	-0.00754	-0.012	0	28.12.10
0.002545	0.011152	0	-0.00506	-0.00405	-0.00607	29.12.10
-0.0203	-0.00735	-0.02985	-0.00509	-0.00813	-0.01018	30.12.10
0.033679	0.02963	0.021538	0.043478	0.016393	0.024691	31.12.10
0.007519	-0.0036	0.018072	0.009804	0.020161	0.024096	03.01.11
0.024876	-0.01805	0.011834	0.024272	0.003953	0.031373	04.01.11
0.024272	0	0	0.014218	0.007874	0.015209	05.01.11
-0.00237	-0.00368	0	-0.01869	0.027344	-0.02247	06.01.11
0.026128	-0.04797	0.017544	-0.01905	-0.02662	-0.02299	07.01.11
-0.00463	0.003876	0.008621	0.021845	0	0	10.01.11
0.027907	0.003861	0.025641	0.021378	0.011719	0.007843	12.01.11
-0.02489	-0.00769	-0.01944	-0.02791	-0.00772	-0.00389	13.01.11
-0.0232	-0.01163	-0.03399	-0.02392	0	-0.04297	14.01.11
0.026128	-0.01961	0.002933	-0.02451	0.003891	-0.03878	17.01.11
0.006944	0.014	0.005848	0.002513	-0.00775	0.008493	18.01.11
-0.0046	-0.02564	0.014535	-0.04261	-0.02344	-0.02947	19.01.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

TUPRS	THYAO	TTKOM	VAKFN	VESTL	YKBNK	Tarih
-0.00924	0.008097	-0.0086	0.026178	0.008	0.030369	20.01.11
-0.01632	0.044177	-0.00867	-0.02296	-0.00397	-0.02316	21.01.11
0.007109	0.019231	0.002915	0.023499	0.007968	0.034483	25.01.11
-0.06918	-0.00377	-0.03488	-0.00765	-0.02372	-0.00833	26.01.11
-0.0048	-0.01894	0.03012	-0.00771	-0.03239	-0.02521	27.01.11
0.056642	0	-0.03801	0.023316	0.012552	0.064655	28.01.11
0.021635	0.019305	0.030395	0.037975	0.024793	0.017058	31.01.11
-0.00471	-0.01894	-0.00295	-0.01463	0.004032	0.006135	01.02.11
-0.02837	-0.02317	-0.00592	-0.0297	-0.02008	-0.02429	02.02.11
0.017032	0.011858	-0.0119	0.033163	0.004098	0.031447	03.02.11
-0.01435	0	0.006024	-0.00988	0.012245	-0.02033	04.02.11
0.01699	-0.00391	0.011976	0.004988	0.020161	0.014523	07.02.11
-0.00716	0.019608	0.026627	0	-0.01186	0.010225	08.02.11
-0.01683	-0.01154	-0.00865	-0.01737	0.008	-0.01619	09.02.11
-0.01467	0.023346	0.034884	0.010101	-0.01587	0.00823	10.02.11
-0.00993	-0.02281	0.019663	0	0	0.002041	11.02.11
-0.00501	-0.01556	0.008264	0.0075	-0.00403	0.00611	14.02.11
0.020151	0.003953	-0.00546	0.012407	0.012146	0.008097	15.02.11
-0.00494	-0.00394	-0.01923	0.007353	-0.008	0.002008	16.02.11
-0.00248	0	-0.01401	0.007299	0.012097	-0.01002	17.02.11
-0.00746	-0.03953	0.011364	-0.00483	-0.00398	-0.01012	18.02.11
0.010025	-0.03292	0.022472	-0.00485	-0.012	-0.00818	21.02.11
0.002481	-0.05532	-0.00549	-0.02927	-0.02834	-0.02887	22.02.11
0	-0.02477	-0.01657	-0.02764	-0.05417	-0.05096	23.02.11
-0.00743	0.064665	0	0.002584	0.022026	0	24.02.11
-0.00748	-0.0282	0	-0.00258	0.008621	-0.00224	25.02.11
-0.00503	-0.06027	0.005618	-0.06977	-0.03846	-0.07623	28.02.11
0.005051	-0.00238	-0.02514	-0.00278	-0.02222	0.007282	01.03.11
0.002513	0.061905	0	0.027855	0.031818	0.045783	02.03.11
-0.00501	-0.00673	-0.01719	0.01355	0	0.002304	03.03.11
-0.01008	-0.0158	-0.00292	-0.02406	-0.00441	-0.02069	04.03.11
0.007634	0.025229	0.008772	0.024658	0.017699	0.028169	07.03.11
0.015152	0.006711	-0.01739	0.032086	0.026087	0.027397	08.03.11
-0.0199	0	-0.0059	0.012953	-0.00847	0.013333	09.03.11
0.055838	0.02	0.020772	-0.00256	0	-0.00658	10.03.11
0.03125	0.017429	0.008721	0.015385	0.051282	0.013245	11.03.11
0.006993	-0.01285	-0.00576	-0.00505	-0.00813	0.008715	14.03.11
-0.03472	-0.03037	-0.01159	-0.00254	-0.02049	-0.01728	15.03.11
-0.0048	0.020134	0.017595	0.002545	0	0.017582	16.03.11
0.036145	0.006579	0.011527	0.002538	0.020921	-0.00216	17.03.11
0.039535	-0.00654	0.022792	0.007595	0.008197	-0.00216	18.03.11
-0.01119	0	0.019499	0.002513	0.02439	0.002169	21.03.11
-0.00226	-0.01096	-0.02459	-0.03258	0.039683	-0.03896	22.03.11
0.002268	-0.03548	0.033613	0.015544	-0.00763	0.009009	23.03.11
-0.01357	-0.02299	-0.00542	-0.01276	0.007692	0	24.03.11
0	0.004706	0.016349	-0.00775	-0.00382	-0.0067	25.03.11
-0.00229	-0.00703	0.010724	-0.01563	-0.01916	-0.00674	28.03.11
0.022989	0.021226	0.007958	0.015873	0.011719	0.013575	29.03.11
0.020225	-0.00693	0.021053	0.005208	0.023166	-0.01116	30.03.11
0.015419	0.013953	0.023196	0.020725	0.018868	0.022573	31.03.11
-0.02603	0.016055	0.017632	0.043147	0	0.04415	01.04.11

Table A.3(continue): Daily Return End of Day Portfolio's Stock Value

TUPRS	THYAO	TTKOM	VAKFN	VESTL	YKBNK	Tarih
0.002227	0.009029	-0.00743	-0.00243	-0.01111	0.008457	04.04.11
0.015556	0.011186	0.027431	0.009756	0.003745	0.014675	05.04.11
0.015317	-0.00442	-0.00728	0.004831	-0.00373	0.008264	06.04.11
0.012931	-0.02222	-0.01467	-0.02163	-0.01873	-0.03279	07.04.11
-0.01489	0.006818	-0.00744	-0.00491	-0.01145	0	08.04.11
-0.00648	0.015801	-0.0125	-0.00247	0	0.002119	11.04.11
0.004348	-0.00889	0.012658	0.014851	0.011583	0.008457	12.04.11
0.02381	-0.00673	0.005	-0.00244	0.007634	0.006289	13.04.11
-0.02748	-0.02257	-0.00746	-0.03178	-0.04167	-0.03333	15.04.11
0.002174	0.027714	0.007519	0.015152	0.027668	0.015086	18.04.11
0.019523	0	0.007463	0.004975	0.007692	0.004246	19.04.11
0.025532	0	0.007407	-0.00248	0.003817	0.004228	20.04.11
-0.00415	0.002247	0.002451	-0.00248	0	0	21.04.11
0.010417	0.011211	-0.00733	0.002488	0.007605	0.004211	22.04.11
0.004124	-0.00665	-0.00246	-0.00248	0.003774	0.004193	25.04.11
0	0	0	0	0	0	26.04.11

Table A.3: Daily Return End of Day IMKB 100's Stock Value

ACIBD	ADANA	ADBGR	ADNAC	ADEL	SASA	Tarih
-0,00797	0,01145	0,00310	0,00000	0,00748	0,00725	01.11.2010
0,00400	0,01158	0,01893	0,05556	0,03351	0,06154	02.11.2010
-0,00398	-0,04074	-0,03939	-0,06494	-0,06954	-0,06475	03.11.2010
-0,04198	-0,03571	-0,04899	-0,04938	-0,02570	0,00000	04.11.2010
-0,01132	-0,01408	-0,01420	-0,02410	-0,00926	-0,01418	05.11.2010
-0,00749	-0,02740	-0,00845	-0,01190	-0,00917	0,00714	08.11.2010
-0,00373	0,02098	0,00852	0,01205	-0,00457	0,02941	09.11.2010
-0,01471	-0,01718	-0,00283	0,01220	-0,00228	0,00741	10.11.2010
0,03030	-0,01356	-0,00282	-0,01205	0,01620	-0,04255	11.11.2010
-0,00377	0,08456	0,03812	0,01220	0,00000	0,11024	12.11.2010
-0,01119	-0,02158	-0,00292	0,00000	-0,03356	0,04098	15.11.2010
0,00752	0,01460	0,01183	0,00000	0,03712	0,03390	22.11.2010
-0,00375	-0,01083	0,00000	0,00000	-0,01373	0,00855	23.11.2010
-0,00743	0,00000	0,00297	0,01235	-0,00682	0,00862	24.11.2010
0,01509	0,01095	0,00298	0,01250	0,02564	0,00870	25.11.2010
0,00379	-0,01083	0,00000	0,00000	0,01179	0,01770	26.11.2010
-0,01124	-0,01071	0,00000	0,02564	0,02169	0,02727	29.11.2010
-0,01111	-0,01060	-0,01176	-0,03704	-0,02582	-0,04348	30.11.2010
0,00000	-0,00352	0,00890	-0,01220	0,00235	0,00000	01.12.2010
0,00372	-0,00351	0,00597	0,03797	0,01675	0,01770	02.12.2010
-0,02536	-0,00350	-0,00888	-0,01250	-0,00476	0,01802	03.12.2010
-0,01075	-0,01038	-0,03429	-0,03614	-0,04545	-0,05128	06.12.2010
0,03261	-0,00342	-0,00571	-0,01149	-0,01099	0,00000	07.12.2010
0,01845	0,00000	-0,00285	0,01163	0,00887	-0,02419	08.12.2010
-0,01455	0,00000	-0,00847	0,00000	-0,00221	0,01639	09.12.2010
0,02230	-0,01017	-0,00840	-0,01149	-0,01739	0,00826	10.12.2010
0,02281	0,00340	0,01133	0,01163	0,06729	0,00833	13.12.2010
-0,00383	-0,01356	-0,00567	-0,01149	-0,01157	-0,00806	14.12.2010
0,00000	0,02076	0,01437	0,00000	0,00465	0,04202	15.12.2010
0,00000	0,00000	0,00000	0,02353	-0,00232	0,08182	16.12.2010
-0,00382	0,01404	0,00870	0,01190	0,01651	-0,04348	17.12.2010
0,00769	0,00707	0,00000	-0,01176	-0,00469	-0,04167	20.12.2010
-0,01887	0,00355	0,00000	-0,01163	-0,00930	-0,01639	21.12.2010
-0,01119	-0,00704	-0,00289	0,00000	-0,00463	-0,00813	22.12.2010
0,05098	0,00353	0,00000	-0,01149	-0,00917	0,00000	23.12.2010
0,00791	-0,00352	0,00000	0,00000	0,04808	0,01653	24.12.2010
-0,00394	0,01068	0,00581	0,01163	0,01217	0,03419	27.12.2010
0,00395	0,00000	0,00880	0,02381	0,01985	0,04464	28.12.2010
-0,00784	0,00717	0,00000	0,00000	0,00750	0,00901	29.12.2010
0,02823	0,00360	0,00590	0,00000	0,00000	0,00000	30.12.2010
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	31.12.2010
-0,00800	-0,00714	0,00000	-0,02326	-0,00249	-0,02632	03.01.2011
0,00402	0,01449	0,00296	0,01176	-0,02433	0,00885	04.01.2011
-0,00797	-0,00361	-0,01170	0,01190	0,02494	0,05607	05.01.2011
-0,00397	0,00727	0,01183	0,03704	0,04427	0,03883	06.01.2011

Table A.3: Daily Return End of Day IMKB 100's Stock Value

ACIBD	ADANA	ADBGR	ADNAC	ADEL	SASA	Tarih
0,00800	0,00000	-0,00588	0,01250	0,01587	0,00980	07.01.2011
-0,00794	0,00733	0,00000	0,01266	-0,00264	-0,01923	10.01.2011
0,01613	0,00738	0,00592	0,02597	0,02156	0,00000	12.01.2011
-0,00402	-0,02166	0,00595	0,00000	-0,00802	0,01961	13.01.2011
-0,01190	0,00000	-0,00885	-0,02532	-0,01058	-0,03774	14.01.2011
-0,00787	-0,00717	0,00296	-0,01250	0,00800	0,00000	17.01.2011
-0,00392	0,00000	-0,00880	0,00000	-0,01055	-0,00935	18.01.2011
-0,00778	0,00722	0,00590	0,02564	0,00000	0,07000	19.01.2011
0,00784	-0,00717	0,01194	0,00000	0,00531	0,03093	20.01.2011
-0,01544	-0,00712	-0,00298	-0,01266	-0,01823	-0,01020	21.01.2011
0,00000	-0,00707	-0,01176	0,00000	-0,01031	0,03158	25.01.2011
0,00778	-0,00352	-0,01163	-0,01250	0,00000	0,10465	26.01.2011
0,00391	0,01068	0,01176	0,00000	0,00000	-0,01149	27.01.2011
0,00392	0,01812	0,01190	0,00000	0,01305	0,07407	28.01.2011
-0,01163	-0,01075	0,00299	0,00000	0,02681	-0,01220	31.01.2011
0,00781	0,00722	0,00904	-0,01235	0,01913	0,02500	01.02.2011
0,00787	0,01838	0,01220	0,02532	0,01385	0,00000	02.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	03.02.2011
0,00794	0,00369	0,00613	0,02597	0,01404	0,03896	04.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	07.02.2011
-0,01563	-0,01812	-0,01212	-0,04938	-0,02997	-0,02532	08.02.2011
-0,01916	-0,01429	-0,00901	-0,01220	-0,01609	-0,01250	09.02.2011
-0,00382	-0,00709	0,00000	0,02500	-0,00267	0,00000	10.02.2011
0,01946	0,01075	0,00604	0,01266	0,02186	0,01266	11.02.2011
-0,03383	0,00360	-0,00601	-0,04819	-0,05426	0,01282	14.02.2011
-0,01115	0,04511	0,01216	-0,02353	-0,03250	-0,03704	15.02.2011
-0,00738	0,03101	0,01231	0,03659	0,01266	0,01250	16.02.2011
0,02264	-0,01901	-0,01515	-0,02381	0,01023	0,00000	17.02.2011
-0,00376	0,00000	-0,00602	-0,02326	0,01823	-0,01235	18.02.2011
-0,01481	-0,02952	-0,04323	-0,07527	-0,00518	0,00000	21.02.2011
-0,00369	0,00743	0,03892	0,10714	-0,00771	0,00000	22.02.2011
0,00370	-0,00738	-0,01765	-0,01176	-0,01018	0,01250	23.02.2011
-0,00369	0,00000	-0,00293	-0,05556	-0,01008	-0,01235	24.02.2011
-0,00369	0,00000	-0,00293	-0,05556	-0,01008	-0,01235	25.02.2011
0,00370	-0,00738	-0,01765	-0,01176	-0,01018	0,01250	28.02.2011
-0,00369	0,00743	0,03892	0,10714	-0,00771	0,00000	01.03.2011
-0,01481	-0,02952	-0,04323	-0,07527	-0,00518	0,00000	02.03.2011
-0,00376	0,00000	-0,00602	-0,02326	0,01823	-0,01235	02.03.2011
0,02264	-0,01901	-0,01515	-0,02381	0,01023	0,00000	03.03.2011
0,01946	0,01075	0,00604	0,01266	0,02186	0,01266	04.03.2011
-0,00382	-0,00709	0,00000	0,02500	-0,00267	0,00000	07.03.2011
-0,01916	-0,01429	-0,00901	-0,01220	-0,01609	-0,01250	08.03.2011
-0,01563	-0,01812	-0,01212	-0,04938	-0,02997	-0,02532	09.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	10.03.2011
0,00794	0,00369	0,00613	0,02597	0,01404	0,03896	11.03.2011

Table A.3: Daily Return End of Day IMKB 100's Stock Value

ACIBD	ADANA	ADBGR	ADNAC	ADEL	SASA	Tarih
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	14.03.2011
0,00787	0,01838	0,01220	0,02532	0,01385	0,00000	15.03.2011
0,00781	0,00722	0,00904	-0,01235	0,01913	0,02500	16.03.2011
-0,01163	-0,01075	0,00299	0,00000	0,02681	-0,01220	17.03.2011
0,00392	0,01812	0,01190	0,00000	0,01305	0,07407	18.03.2011
0,00391	0,01068	0,01176	0,00000	0,00000	-0,01149	21.03.2011
0,00778	-0,00352	-0,01163	-0,01250	0,00000	0,10465	22.03.2011
0,00000	-0,00707	-0,01176	0,00000	-0,01031	0,03158	23.03.2011
-0,01544	-0,00712	-0,00298	-0,01266	-0,01823	-0,01020	24.03.2011
-0,00778	0,00722	0,00590	0,02564	0,00000	0,07000	28.03.2011
-0,00392	0,00000	-0,00880	0,00000	-0,01055	-0,00935	29.03.2011
-0,00787	-0,00717	0,00296	-0,01250	0,00800	0,00000	30.03.2011
-0,01190	0,00000	-0,00885	-0,02532	-0,01058	-0,03774	31.03.2011
-0,00402	-0,02166	0,00595	0,00000	-0,00802	0,01961	04.04.2011
0,01613	0,00738	0,00592	0,02597	0,02156	0,00000	05.04.2011
-0,00794	0,00733	0,00000	0,01266	-0,00264	-0,01923	06.04.2011
0,00800	0,00000	-0,00588	0,01250	0,01587	0,00980	07.04.2011
-0,00397	0,00727	0,01183	0,03704	0,04427	0,03883	08.04.2011
-0,00797	-0,00361	-0,01170	0,01190	0,02494	0,05607	11.04.2011
0,00402	0,01449	0,00296	0,01176	-0,02433	0,00885	12.04.2011
-0,00800	-0,00714	0,00000	-0,02326	-0,00249	-0,02632	13.04.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	14.04.2011
0,02823	0,00360	0,00590	0,00000	0,00000	0,00000	15.04.2011
-0,00784	0,00717	0,00000	0,00000	0,00750	0,00901	18.04.2011
0,00395	0,00000	0,00880	0,02381	0,01985	0,04464	19.04.2011
-0,00394	0,01068	0,00581	0,01163	0,01217	0,03419	20.04.2011
0,00791	-0,00352	0,00000	0,00000	0,04808	0,01653	21.04.2011
0,05098	0,00353	0,00000	-0,01149	-0,00917	0,00000	22.04.2011
-0,01119	-0,00704	-0,00289	0,00000	-0,00463	-0,00813	25.04.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AFMAS	AFYON	AKENR	AKYO	AKALT	AKBNK	Tarih
0,03041	-0,01504	0,01786	-0,00610	0,00000	-0,00219	01.11.2010
0,04594	0,07838	-0,01060	0,00613	0,02963	0,00219	02.11.2010
-0,08117	-0,07731	-0,05980	-0,00610	-0,04930	0,03720	03.11.2010
-0,04050	-0,03140	-0,03834	-0,04094	-0,03401	-0,01055	04.11.2010
0,01262	-0,02358	-0,01262	0,00588	-0,02000	-0,00853	05.11.2010
-0,02761	-0,00469	-0,00938	-0,01734	-0,00662	0,00000	08.11.2010
-0,02102	-0,04270	0,03896	0,00581	0,00667	-0,00215	09.11.2010
-0,01770	0,07488	-0,01282	-0,01149	0,00671	-0,03233	10.11.2010
0,02108	0,00242	-0,03106	0,00578	-0,00667	-0,02227	11.11.2010
-0,04046	0,00000	0,00000	0,00000	-0,00662	0,00228	12.11.2010
-0,01983	-0,01667	-0,00617	-0,00575	-0,00658	-0,02273	15.11.2010
-0,00563	0,00719	0,01567	0,00000	0,00662	0,00698	22.11.2010
-0,01389	-0,01882	-0,00932	-0,01136	-0,00658	0,00000	23.11.2010

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AFMAS	AFYON	AKENR	AKYO	AKALT	AKBNK	Tarih
-0,04509	-0,00235	0,00625	0,01734	0,00662	-0,01617	24.11.2010
0,02446	0,01914	0,00946	0,00000	0,02027	-0,01878	25.11.2010
0,04249	0,06633	-0,01246	-0,01705	-0,01333	-0,03828	26.11.2010
0,00000	0,01554	0,00943	0,00571	0,00000	0,05721	29.11.2010
-0,03815	-0,03741	-0,00625	-0,02778	-0,00662	-0,01176	30.11.2010
0,00000	-0,00496	-0,01235	0,01124	-0,00658	0,01429	01.12.2010
-0,02394	0,02806	0,04180	0,02299	0,02013	0,00000	02.12.2010
0,05618	-0,01754	-0,01893	-0,02793	-0,02614	0,00469	03.12.2010
0,01425	-0,06557	-0,03647	-0,01648	-0,01923	0,02103	06.12.2010
0,02755	0,00232	0,00000	-0,00535	-0,01887	0,01373	07.12.2010
0,03714	-0,00920	-0,02017	-0,02094	-0,00625	-0,04740	08.12.2010
-0,01685	0,02353	0,01166	0,01058	0,00000	-0,01422	09.12.2010
0,07879	-0,01620	-0,02557	-0,02073	0,01266	0,02404	10.12.2010
0,05769	-0,02703	-0,01401	-0,01026	-0,01250	-0,00469	13.12.2010
0,00332	-0,00659	-0,00551	-0,00508	0,03896	-0,03066	14.12.2010
-0,01311	-0,03397	-0,01359	0,00510	0,00654	-0,02190	15.12.2010
0,01329	0,04900	0,00546	0,00000	0,00000	-0,00498	16.12.2010
0,01347	0,13671	0,00274	0,00000	0,00658	0,00500	17.12.2010
-0,00669	0,00509	0,00000	0,00513	0,02013	0,02736	20.12.2010
-0,01967	-0,00758	-0,02145	-0,02010	0,00676	0,01453	21.12.2010
-0,01294	0,02591	-0,00533	0,00000	-0,01333	0,02148	22.12.2010
0,00000	0,00000	0,01351	0,00505	0,02041	0,00000	23.12.2010
0,02318	-0,03980	-0,00538	0,00508	0,00000	0,01168	24.12.2010
0,00667	-0,00248	0,01639	0,00510	-0,00676	0,00693	27.12.2010
-0,00332	0,04404	0,01385	0,00513	0,02069	0,00459	28.12.2010
0,00000	-0,01279	-0,00824	0,00000	0,00000	0,00685	29.12.2010
0,01007	0,04826	-0,00546	-0,01015	-0,01361	-0,02721	30.12.2010
0,00000	0,00000	0,00000	0,00000	0,00000	0,01166	31.12.2010
0,00337	-0,03618	0,00274	0,00510	0,02797	0,00691	03.01.2011
-0,01329	-0,03250	-0,00545	0,02083	0,00000	-0,01373	04.01.2011
-0,01311	0,10803	-0,00542	0,01053	0,00000	0,00232	05.01.2011
0,00993	0,00557	0,01096	-0,01042	0,01418	-0,01389	06.01.2011
0,02027	0,01700	0,00551	0,01053	0,00714	-0,02113	07.01.2011
0,00000	0,00000	-0,00275	0,00529	0,00719	0,00959	10.01.2011
0,00339	0,01437	0,02825	-0,01047	0,02206	0,02613	12.01.2011
-0,03909	-0,01136	-0,00282	0,00000	0,00000	-0,02083	13.01.2011
-0,00325	-0,00845	-0,01934	0,00000	-0,01449	-0,01418	14.01.2011
-0,01597	-0,03005	-0,01362	-0,01546	-0,01429	-0,01199	17.01.2011
0,00321	0,00549	-0,00272	-0,00513	-0,01408	-0,01214	18.01.2011
0,00645	0,02247	-0,00271	0,00515	0,00000	-0,03440	19.01.2011
0,00977	0,02006	0,01653	0,07182	-0,00699	0,02545	20.01.2011
0,00000	0,00000	-0,01090	-0,02162	-0,01379	-0,04715	21.01.2011
-0,04658	-0,02514	-0,01872	-0,02632	-0,00685	0,02083	25.01.2011
0,04207	0,00000	0,01630	-0,02062	0,00690	-0,02296	26.01.2011
0,02318	0,00562	0,00000	0,04865	0,01399	-0,02350	27.01.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AFMAS	AFYON	AKENR	AKYO	AKALT	AKBNK	Tarih
0,01684	0,00850	0,00822	0,01093	0,00000	0,00535	28.01.2011
0,03846	0,00857	0,00275	-0,01613	0,00704	0,03457	31.01.2011
0,00351	-0,03581	0,00275	0,01087	0,01429	0,02314	01.02.2011
0,01064	0,08683	0,00833	0,02793	0,00000	-0,04020	02.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,03665	03.02.2011
0,00714	0,01212	0,00559	0,00000	0,01449	-0,00505	04.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00761	07.02.2011
-0,01408	-0,02077	-0,00556	-0,02717	-0,02128	0,00252	08.02.2011
0,01068	-0,01749	-0,00277	0,01099	0,00000	-0,01256	09.02.2011
-0,01748	0,00882	-0,00824	0,01111	0,00000	-0,00254	10.02.2011
0,00704	-0,00585	0,00831	-0,01099	0,01439	-0,01020	11.02.2011
-0,06579	-0,03933	-0,05497	-0,02674	-0,04138	0,01031	14.02.2011
-0,02564	-0,01385	-0,00779	-0,01579	-0,02685	0,00510	15.02.2011
-0,00319	0,00000	0,00522	-0,00524	0,00000	0,03299	16.02.2011
0,00321	-0,00276	-0,00777	-0,01036	-0,01325	-0,01229	17.02.2011
0,00322	-0,00822	-0,01026	-0,00515	-0,01307	-0,00498	18.02.2011
-0,01270	-0,01351	-0,01515	0,00000	-0,00649	-0,00750	21.02.2011
-0,03670	-0,00270	-0,00252	0,00000	0,00654	-0,02267	22.02.2011
0,05145	-0,00536	0,00253	-0,01523	-0,03165	-0,02320	23.02.2011
-0,00321	-0,01583	0,00000	-0,01005	-0,03067	0,00264	24.02.2011
-0,00321	-0,01583	0,00000	-0,01005	-0,03067	-0,01579	25.02.2011
0,05145	-0,00536	0,00253	-0,01523	-0,03165	-0,06417	28.02.2011
-0,03670	-0,00270	-0,00252	0,00000	0,00654	-0,02000	01.03.2011
-0,01270	-0,01351	-0,01515	0,00000	-0,00649	0,02624	02.03.2011
0,00322	-0,00822	-0,01026	-0,00515	-0,01307	0,00852	02.03.2011
0,00321	-0,00276	-0,00777	-0,01036	-0,01325	-0,01972	03.03.2011
-0,00319	0,00000	0,00522	-0,00524	0,00000	0,02011	04.03.2011
-0,02564	-0,01385	-0,00779	-0,01579	-0,02685	0,04507	07.03.2011
-0,06579	-0,03933	-0,05497	-0,02674	-0,04138	0,04313	08.03.2011
0,00704	-0,00585	0,00831	-0,01099	0,01439	0,04313	09.03.2011
-0,01748	0,00882	-0,00824	0,01111	0,00000	0,01292	10.03.2011
0,01068	-0,01749	-0,00277	0,01099	0,00000	-0,00765	11.03.2011
-0,01408	-0,02077	-0,00556	-0,02717	-0,02128	0,00257	14.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	-0,03077	15.03.2011
0,00714	0,01212	0,00559	0,00000	0,01449	-0,00794	16.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,01067	17.03.2011
0,01064	0,08683	0,00833	0,02793	0,00000	0,00264	18.03.2011
0,00351	-0,03581	0,00275	0,01087	0,01429	0,02368	21.03.2011
0,03846	0,00857	0,00275	-0,01613	0,00704	-0,05141	22.03.2011
0,01684	0,00850	0,00822	0,01093	0,00000	0,02710	23.03.2011
0,02318	0,00562	0,00000	0,04865	0,01399	-0,01319	24.03.2011
0,04207	0,00000	0,01630	-0,02062	0,00690	0,00535	25.03.2011
-0,04658	-0,02514	-0,01872	-0,02632	-0,00685	-0,01064	28.03.2011
0,00000	0,00000	-0,01090	-0,02162	-0,01379	0,02688	29.03.2011
0,00977	0,02006	0,01653	0,07182	-0,00699	-0,01832	30.03.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AFMAS	AFYON	AKENR	AKYO	AKALT	AKBNK	Tarih
0,00645	0,02247	-0,00271	0,00515	0,00000	0,03200	31.03.2011
0,00321	0,00549	-0,00272	-0,00513	-0,01408	0,04910	04.04.2011
-0,01597	-0,03005	-0,01362	-0,01546	-0,01429	0,00493	05.04.2011
-0,00325	-0,00845	-0,01934	0,00000	-0,01449	0,03186	06.04.2011
-0,03909	-0,01136	-0,00282	0,00000	0,00000	0,02613	07.04.2011
0,00339	0,01437	0,02825	-0,01047	0,02206	-0,03241	08.04.2011
0,00000	0,00000	-0,00275	0,00529	0,00719	0,00000	11.04.2011
0,02027	0,01700	0,00551	0,01053	0,00714	0,00478	12.04.2011
0,00993	0,00557	0,01096	-0,01042	0,01418	-0,00476	13.04.2011
-0,01311	0,10803	-0,00542	0,01053	0,00000	0,00000	14.04.2011
-0,01329	-0,03250	-0,00545	0,02083	0,00000	-0,03589	15.04.2011
0,00337	-0,03618	0,00274	0,00510	0,02797	0,01241	18.04.2011
0,00000	0,00000	0,00000	0,00000	0,00000	-0,00490	19.04.2011
0,01007	0,04826	-0,00546	-0,01015	-0,01361	-0,00246	20.04.2011
0,00000	-0,01279	-0,00824	0,00000	0,00000	-0,00494	21.04.2011
-0,00332	0,04404	0,01385	0,00513	0,02069	0,00496	22.04.2011
0,00667	-0,00248	0,01639	0,00510	-0,00676	-0,00741	25.04.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AKCNS	AKFEN	ATEKS	AKMGY	AKSA	AKSEN	Tarih
-0,00292	-0,01914	0,00590	0,02239	-0,00811	0,01518	01.11.2010
0,03003	0,00000	0,01802	0,01515	0,00543	0,04063	02.11.2010
-0,02915	-0,04128	-0,05666	-0,01493	-0,04663	-0,04113	03.11.2010
-0,03380	-0,00909	-0,01671	-0,03943	-0,02525	-0,01911	04.11.2010
-0,01389	0,00457	-0,01644	0,00360	0,01020	-0,03285	05.11.2010
-0,00826	-0,04783	-0,02145	-0,01418	-0,04623	-0,01616	08.11.2010
0,00554	0,00877	0,01359	-0,00704	0,05656	-0,00202	09.11.2010
-0,00551	-0,01299	-0,04167	-0,01389	-0,01519	-0,00800	10.11.2010
-0,01892	0,01316	-0,02290	0,06273	0,02332	-0,00398	11.11.2010
0,00271	-0,01299	-0,02723	-0,01812	0,03485	-0,00397	12.11.2010
-0,01337	0,00000	0,01253	0,00364	-0,00533	-0,00787	15.11.2010
0,00000	0,00000	0,02308	-0,00722	0,00806	0,00000	22.11.2010
0,00000	-0,00858	0,02094	-0,03484	-0,01847	-0,01167	23.11.2010
-0,00532	-0,01271	0,00792	-0,00347	0,01882	0,00784	24.11.2010
0,00535	-0,02075	0,01882	-0,00690	0,01087	0,00394	25.11.2010
-0,01579	-0,02429	0,00000	-0,02027	0,00272	-0,00392	26.11.2010
0,00796	0,00407	0,01087	-0,02310	-0,00811	0,00000	29.11.2010
0,01344	0,00000	0,00546	-0,03195	-0,02116	-0,00778	30.11.2010
-0,00268	-0,00806	0,02235	-0,01572	-0,00787	-0,00772	01.12.2010
0,00539	-0,00402	0,02286	0,03583	0,00528	0,03600	02.12.2010
-0,00536	0,00403	0,00865	-0,01603	0,01609	-0,00398	03.12.2010
-0,03117	-0,01195	-0,02528	-0,04878	-0,04604	-0,00791	06.12.2010
0,00510	0,02439	0,01705	0,00300	0,00521	0,00000	07.12.2010
-0,00254	0,00408	0,00860	-0,00597	0,01319	-0,00395	08.12.2010
-0,00758	0,00410	-0,00852	0,01824	0,00531	0,00000	09.12.2010
-0,02941	-0,00813	-0,01676	-0,03801	-0,00789	-0,00784	10.12.2010

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AKCNS	AKFEN	ATEKS	AKMGY	AKSA	AKSEN	Tarih
-0,00244	-0,00405	0,00000	-0,05000	-0,02062	0,00394	13.12.2010
0,00730	-0,00403	-0,02710	-0,00920	0,00779	-0,01938	14.12.2010
-0,01439	0,01224	0,00272	-0,00306	0,00260	-0,01149	15.12.2010
0,04511	-0,00407	0,02507	0,00000	-0,00518	-0,00760	16.12.2010
0,00758	-0,00806	-0,01102	-0,00608	0,03485	0,00382	17.12.2010
-0,00252	0,00000	-0,02419	0,00000	-0,00533	-0,00758	20.12.2010
-0,00501	-0,00402	-0,01064	-0,00604	-0,01316	0,01149	21.12.2010
0,01786	-0,00400	-0,01053	0,00303	-0,03553	-0,00760	22.12.2010
0,01031	0,00806	0,01604	0,01852	-0,00253	0,01154	23.12.2010
-0,00513	0,00000	0,00268	-0,02115	-0,00253	-0,00383	24.12.2010
0,02094	0,00000	-0,00267	0,00915	-0,00252	0,00000	27.12.2010
0,01326	-0,00800	-0,06500	-0,00606	0,07008	0,03162	28.12.2010
-0,00265	0,00806	0,00000	0,01852	0,00542	0,00000	29.12.2010
0,00532	-0,00402	0,03093	-0,04142	-0,02381	0,00000	30.12.2010
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	31.12.2010
0,00267	0,00403	-0,03242	0,04644	0,01887	0,00397	03.01.2011
-0,00266	-0,00402	0,10468	-0,01824	0,00270	-0,00395	04.01.2011
-0,00265	0,00000	-0,03968	-0,00303	0,06628	-0,01172	05.01.2011
0,00266	0,00000	0,14894	-0,02367	-0,01700	0,00392	06.01.2011
0,00267	0,00000	-0,00303	-0,04789	0,09627	0,00000	07.01.2011
-0,00531	0,00810	-0,02941	0,03198	0,01577	-0,00391	10.01.2011
0,01344	0,01230	-0,00875	-0,07527	0,02589	0,01587	12.01.2011
-0,02105	-0,00813	0,03939	0,10059	0,03000	0,00800	13.01.2011
-0,00262	0,00820	0,02484	0,14576	0,00334	-0,01186	14.01.2011
-0,00781	-0,00813	0,11419	0,01375	-0,00993	-0,01938	17.01.2011
0,00261	-0,01205	-0,01027	0,08989	-0,00658	-0,01901	18.01.2011
0,02957	-0,00400	0,03915	-0,05986	0,00662	0,02335	19.01.2011
0,00541	0,02041	0,01079	0,02899	0,02373	0,01581	20.01.2011
-0,00538	-0,01210	-0,01767	-0,01075	-0,00338	-0,00784	21.01.2011
-0,00535	-0,01976	-0,00352	0,17227	-0,02951	-0,00778	25.01.2011
-0,00796	0,01200	0,00353	0,11215	0,00000	0,01984	26.01.2011
-0,00265	0,00000	-0,00702	0,01422	-0,01294	0,00599	27.01.2011
0,01887	0,00806	0,00707	0,00476	0,02318	0,00602	28.01.2011
0,01923	-0,00402	0,00712	-0,00474	0,01342	-0,00797	31.01.2011
-0,00274	0,00403	0,00357	0,00957	0,02759	-0,00397	01.02.2011
0,02528	0,00813	0,01818	-0,00286	0,02113	0,00599	02.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	03.02.2011
0,01425	0,00820	-0,00362	0,09853	0,00353	0,01417	04.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	07.02.2011
-0,02228	-0,02008	-0,00719	0,03247	-0,01736	-0,02372	08.02.2011
-0,01374	-0,00797	-0,01068	-0,01282	-0,02041	-0,01556	09.02.2011
0,01961	0,00000	0,00357	0,03769	0,01379	0,01381	10.02.2011
0,00281	-0,01953	0,00719	0,02268	0,01754	0,00996	11.02.2011
-0,04558	-0,00775	-0,01767	-0,03289	-0,02730	-0,01953	14.02.2011
-0,00533	-0,01149	0,00355	-0,01085	-0,01347	-0,03759	15.02.2011
0,00536	0,00385	-0,00353	-0,00647	-0,01329	-0,00746	16.02.2011
0,00000	0,00000	-0,02414	0,00651	-0,05047	0,00000	17.02.2011
0,00539	-0,00763	0,00694	-0,00216	-0,02160	0,01515	18.02.2011
-0,02368	-0,00758	-0,02041	-0,02119	0,00310	-0,01493	21.02.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AKCNS	AKFEN	ATEKS	AKMGY	AKSA	AKSEN	Tarih
-0,00524	0,00380	-0,00339	0,00426	0,00623	-0,00741	22.02.2011
-0,00779	0,01938	0,00000	0,00000	-0,00311	-0,02527	23.02.2011
-0,02284	0,00000	0,00683	-0,01879	-0,00617	0,03745	24.02.2011
-0,02284	0,00000	0,00683	-0,01879	-0,00617	0,03745	25.02.2011
-0,00779	0,01938	0,00000	0,00000	-0,00311	-0,02527	28.02.2011
-0,00524	0,00380	-0,00339	0,00426	0,00623	-0,00741	01.03.2011
-0,02368	-0,00758	-0,02041	-0,02119	0,00310	-0,01493	02.03.2011
0,00539	-0,00763	0,00694	-0,00216	-0,02160	0,01515	02.03.2011
0,00000	0,00000	-0,02414	0,00651	-0,05047	0,00000	03.03.2011
0,00536	0,00385	-0,00353	-0,00647	-0,01329	-0,00746	04.03.2011
-0,00533	-0,01149	0,00355	-0,01085	-0,01347	-0,03759	07.03.2011
-0,04558	-0,00775	-0,01767	-0,03289	-0,02730	-0,01953	08.03.2011
0,00281	-0,01953	0,00719	0,02268	0,01754	0,00996	09.03.2011
0,01961	0,00000	0,00357	0,03769	0,01379	0,01381	10.03.2011
-0,01374	-0,00797	-0,01068	-0,01282	-0,02041	-0,01556	11.03.2011
-0,02228	-0,02008	-0,00719	0,03247	-0,01736	-0,02372	14.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	15.03.2011
0,01425	0,00820	-0,00362	0,09853	0,00353	0,01417	16.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	17.03.2011
0,02528	0,00813	0,01818	-0,00286	0,02113	0,00599	18.03.2011
-0,00274	0,00403	0,00357	0,00957	0,02759	-0,00397	21.03.2011
0,01923	-0,00402	0,00712	-0,00474	0,01342	-0,00797	22.03.2011
0,01887	0,00806	0,00707	0,00476	0,02318	0,00602	23.03.2011
-0,00265	0,00000	-0,00702	0,01422	-0,01294	0,00599	24.03.2011
-0,00796	0,01200	0,00353	0,11215	0,00000	0,01984	25.03.2011
-0,00535	-0,01976	-0,00352	0,17227	-0,02951	-0,00778	28.03.2011
-0,00538	-0,01210	-0,01767	-0,01075	-0,00338	-0,00784	29.03.2011
0,00541	0,02041	0,01079	0,02899	0,02373	0,01581	30.03.2011
0,02957	-0,00400	0,03915	-0,05986	0,00662	0,02335	31.03.2011
0,00261	-0,01205	-0,01027	0,08989	-0,00658	-0,01901	04.04.2011
-0,00781	-0,00813	0,11419	0,01375	-0,00993	-0,01938	05.04.2011
-0,00262	0,00820	0,02484	0,14576	0,00334	-0,01186	06.04.2011
-0,02105	-0,00813	0,03939	0,10059	0,03000	0,00800	07.04.2011
0,01344	0,01230	-0,00875	-0,07527	0,02589	0,01587	08.04.2011
-0,00531	0,00810	-0,02941	0,03198	0,01577	-0,00391	11.04.2011
0,00267	0,00000	-0,00303	-0,04789	0,09627	0,00000	12.04.2011
0,00266	0,00000	0,14894	-0,02367	-0,01700	0,00392	13.04.2011
-0,00265	0,00000	-0,03968	-0,00303	0,06628	-0,01172	14.04.2011
-0,00266	-0,00402	0,10468	-0,01824	0,00270	-0,00395	15.04.2011
0,00267	0,00403	-0,03242	0,04644	0,01887	0,00397	18.04.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	19.04.2011
0,00532	-0,00402	0,03093	-0,04142	-0,02381	0,00000	20.04.2011
-0,00265	0,00806	0,00000	0,01852	0,00542	0,00000	21.04.2011
0,01326	-0,00800	-0,06500	-0,00606	0,07008	0,03162	22.04.2011
0,02094	0,00000	-0,00267	0,00915	-0,00252	0,00000	25.04.2011
-0,00524	0,00380	-0,00339	0,00426	0,00623	-0,00741	22.02.2011
-0,00779	0,01938	0,00000	0,00000	-0,00311	-0,02527	23.02.2011
-0,02284	0,00000	0,00683	-0,01879	-0,00617	0,03745	24.02.2011
-0,02284	0,00000	0,00683	-0,01879	-0,00617	0,03745	25.02.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AKGRT	AKSUE	TUPRS	ALCAR	ALGYO	ALARK	Tarih
-0,00521	-0,02170	-0,02078	0,05249	0,01187	0,00926	01.11.2010
0,02128	0,01603	-0,00531	0,03815	0,05313	0,01887	02.11.2010
-0,08738	-0,03668	-0,04240	-0,09158	-0,07781	-0,04505	03.11.2010
-0,03286	-0,00385	0,00000	-0,07126	-0,05707	-0,02632	04.11.2010
-0,04054	-0,01515	0,07769	-0,00911	-0,01075	-0,00292	05.11.2010
-0,04721	-0,00752	0,00000	-0,00903	0,05682	-0,01153	08.11.2010
-0,02101	-0,01115	-0,00775	0,00000	0,02624	0,00000	09.11.2010
-0,00418	0,00373	-0,00518	-0,00449	-0,00580	0,00000	10.11.2010
0,01271	0,00752	-0,00521	0,01367	0,00583	0,00580	11.11.2010
0,01288	-0,01481	-0,03141	-0,00679	-0,00867	-0,00576	12.11.2010
-0,02917	-0,00735	-0,05135	0,00227	-0,00575	-0,01140	15.11.2010
0,03448	0,00369	0,01994	0,00915	0,01163	0,01445	22.11.2010
0,00870	-0,00733	0,00279	0,00691	-0,00290	-0,01143	23.11.2010
0,00000	-0,00727	-0,03343	-0,01810	0,00291	0,00287	24.11.2010
-0,03361	0,00000	0,01729	0,02791	0,00880	0,00287	25.11.2010
0,07207	0,02996	0,03399	0,01896	-0,00292	-0,00571	26.11.2010
0,00909	0,01136	-0,00548	0,00716	0,00293	0,00865	29.11.2010
-0,03084	-0,00377	0,05510	-0,01643	-0,02571	-0,01977	30.11.2010
-0,02155	-0,00749	0,00261	0,00948	0,00287	0,00568	01.12.2010
0,04505	-0,00743	0,01823	0,03686	0,01749	0,00860	02.12.2010
0,01370	-0,02536	0,00000	0,00494	-0,02557	-0,01133	03.12.2010
-0,03097	0,02985	0,01535	-0,03341	-0,06133	-0,02755	06.12.2010
0,00901	0,02692	-0,00515	0,01923	0,05962	0,00546	07.12.2010
0,02304	-0,02256	0,02073	0,09474	0,00820	0,00549	08.12.2010
0,02358	0,00377	0,03046	0,00000	0,02235	0,01393	09.12.2010
-0,01852	-0,01487	-0,03448	-0,00783	-0,01377	-0,02446	10.12.2010
-0,02262	0,00000	-0,02806	-0,00777	-0,00548	-0,00271	13.12.2010
-0,01316	-0,01087	0,01070	-0,00270	0,05691	0,01374	14.12.2010
0,00000	0,06154	0,03175	-0,01070	0,01653	0,01111	15.12.2010
0,02242	0,00775	0,01539	0,00000	0,00833	0,00559	16.12.2010
0,03241	0,02789	0,00505	0,00000	0,00279	0,02286	17.12.2010
-0,00917	-0,00791	-0,00251	0,00538	-0,00829	-0,00285	20.12.2010
-0,08017	-0,00784	0	-0,00535	0,00836	-0,00567	21.12.2010
-0,00837	-0,01544	-0,00504	-0,00267	0,01127	-0,00282	22.12.2010
0,00844	0,01969	-0,00506	-0,01055	-0,02740	0,00855	23.12.2010
-0,00420	0,00395	0,002545	0,01882	0,06725	0,02632	24.12.2010
0,01709	0,01606	-0,0203	0,00541	0,01484	-0,00581	27.12.2010
0,02183	0,01220	0,033679	-0,00270	0,01506	0,03303	28.12.2010
-0,01717	-0,00606	0,007519	0,00000	0,00000	-0,00597	29.12.2010
-0,03320	0,00610	0,024876	0,00542	0,00302	0,00904	30.12.2010
0,00000	0,00000	0,024272	0,00000	0,00000	0,00000	31.12.2010
0,02119	-0,00405	-0,00237	-0,00270	0,00000	-0,00300	03.01.2011
0,00855	-0,01594	0,026128	0,00271	0,00303	-0,01187	04.01.2011
-0,00847	-0,01181	-0,00463	-0,00270	-0,00302	-0,02035	05.01.2011
0,02165	-0,00392	0,027907	-0,00538	-0,01194	-0,01714	06.01.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AKGRT	AKSUE	TUPRS	ALCAR	ALGYO	ALARK	Tarih
0,00873	0,04508	-0.02489	0,01639	0,02761	0,00000	07.01.2011
0,02691	-0,00611	-0.0232	0,01385	0,00929	-0,01685	10.01.2011
0,01364	0,02720	0.026128	0,02266	0,00311	0,02299	12.01.2011
0,00000	-0,00417	0.006944	-0,01944	0,00312	0,06748	13.01.2011
-0,01345	-0,01437	-0.0046	-0,02703	-0,00311	0,00929	14.01.2011
-0,00446	-0,00815	-0.00924	0,00271	-0,00923	0,00000	17.01.2011
-0,01322	-0,00203	-0.01632	-0,01072	0,00619	-0,01524	18.01.2011
-0,00439	0,00408	0.007109	0,02473	0,01572	0,02500	19.01.2011
0,01786	0,01031	-0.06918	0,03116	0,03247	0,01911	20.01.2011
0,02752	-0,01822	-0.0048	0,02023	-0,00324	-0,00633	21.01.2011
-0,02679	-0,00403	0.056642	-0,01983	-0,00323	-0,01250	25.01.2011
-0,03030	-0,00800	0.021635	0,00857	-0,00641	0,00000	26.01.2011
0,03125	0,00604	-0.00471	0,00865	0,02632	-0,00312	27.01.2011
0,02752	0,00811	-0.02837	0,00289	0,00330	-0,00311	28.01.2011
0,00461	-0,00805	0.017032	-0,00288	-0,00980	-0,00617	31.01.2011
-0,00459	0,00607	-0.01435	0,02059	0,00990	0,00935	01.02.2011
0,02830	0,00203	0.01699	0,00592	0,01338	0,01582	02.02.2011
0,00000	0,00000	-0.00716	0,00000	0,00000	0,00000	03.02.2011
0,03415	0,01232	-0.01683	0,00297	0,01356	-0,00629	04.02.2011
0,00000	0,00000	-0.01467	0,00000	0,00000	0,00000	07.02.2011
-0,02381	-0,01016	-0.00993	-0,01462	-0,02640	-0,00935	08.02.2011
-0,00943	0,00000	-0.00501	-0,01441	-0,01942	0,01262	09.02.2011
0,01923	0,02287	0.020151	0,01760	-0,00643	-0,00938	10.02.2011
-0,00478	-0,01837	-0.00494	0,00888	0,00323	0,00000	11.02.2011
-0,03241	-0,00810	-0.00248	-0,03977	-0,04025	-0,02736	14.02.2011
-0,02703	-0,01200	-0.00746	-0,00283	-0,01223	-0,02663	15.02.2011
0,00000	-0,00398	0.010025	0,00284	0,00000	0,00297	16.02.2011
-0,02632	-0,00791	0.002481	-0,01124	0,00000	-0,00882	17.02.2011
0,01786	-0,02317	0	0,02006	-0,00305	-0,00293	18.02.2011
-0,01322	0,00778	-0.00743	-0,01966	-0,00304	-0,00583	21.02.2011
0,01339	-0,01154	-0.00748	0,01136	0,00612	0,01180	22.02.2011
-0,01322	-0,00763	-0.00503	-0,00565	0,00307	0,00296	23.02.2011
-0,00439	0,00769	0.005051	-0,00282	-0,01212	-0,01458	24.02.2011
-0,00439	0,00769	0.002513	-0,00282	-0,01212	-0,01458	25.02.2011
-0,01322	-0,00763	-0.00501	-0,00565	0,00307	0,00296	28.02.2011
0,01339	-0,01154	-0.01008	0,01136	0,00612	0,01180	01.03.2011
-0,01322	0,00778	0.007634	-0,01966	-0,00304	-0,00583	02.03.2011
0,01786	-0,02317	0.015152	0,02006	-0,00305	-0,00293	02.03.2011
-0,02632	-0,00791	-0.0199	-0,01124	0,00000	-0,00882	03.03.2011
0,00000	-0,00398	0.055838	0,00284	0,00000	0,00297	04.03.2011
-0,02703	-0,01200	0.03125	-0,00283	-0,01223	-0,02663	07.03.2011
-0,03241	-0,00810	-0.03472	-0,03977	-0,04025	-0,02736	08.03.2011
-0,00478	-0,01837	-0.0048	0,00888	0,00323	0,00000	09.03.2011
0,01923	0,02287	0.036145	0,01760	-0,00643	-0,00938	10.03.2011
-0,00943	0,00000	-0.03472	-0,01441	-0,01942	0,01262	11.03.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

AKGRT	AKSUE	TUPRS	ALCAR	ALGYO	ALARK	Tarih
-0,02381	-0,01016	-0.0048	-0,01462	-0,02640	-0,00935	14.03.2011
0,00000	0,00000	0.036145	0,00000	0,00000	0,00000	15.03.2011
0,03415	0,01232	0.039535	0,00297	0,01356	-0,00629	16.03.2011
0,00000	0,00000	-0.01119	0,00000	0,00000	0,00000	17.03.2011
0,02830	0,00203	-0.00226	0,00592	0,01338	0,01582	18.03.2011
-0,00459	0,00607	0.002268	0,02059	0,00990	0,00935	21.03.2011
0,00461	-0,00805	-0.01357	-0,00288	-0,00980	-0,00617	22.03.2011
0,02752	0,00811	0	0,00289	0,00330	-0,00311	23.03.2011
0,03125	0,00604	-0.00229	0,00865	0,02632	-0,00312	24.03.2011
-0,03030	-0,00800	0.022989	0,00857	-0,00641	0,00000	25.03.2011
-0,02679	-0,00403	0.020225	-0,01983	-0,00323	-0,01250	28.03.2011
0,02752	-0,01822	0.015419	0,02023	-0,00324	-0,00633	29.03.2011
0,01786	0,01031	-0.02603	0,03116	0,03247	0,01911	30.03.2011
-0,00439	0,00408	0.002227	0,02473	0,01572	0,02500	31.03.2011
-0,01322	-0,00203	0.015556	-0,01072	0,00619	-0,01524	04.04.2011
-0,00446	-0,00815	0.015317	0,00271	-0,00923	0,00000	05.04.2011
-0,01345	-0,01437	0.012931	-0,02703	-0,00311	0,00929	06.04.2011
0,00000	-0,00417	-0.01489	-0,01944	0,00312	0,06748	07.04.2011
0,01364	0,02720	-0.00648	0,02266	0,00311	0,02299	08.04.2011
0,02691	-0,00611	0.004348	0,01385	0,00929	-0,01685	11.04.2011
0,00873	0,04508	0.02381	0,01639	0,02761	0,00000	12.04.2011
0,02165	-0,00392	-0.02748	-0,00538	-0,01194	-0,01714	13.04.2011
-0,00847	-0,01181	0.002174	-0,00270	-0,00302	-0,02035	14.04.2011
0,00855	-0,01594	0.019523	0,00271	0,00303	-0,01187	15.04.2011
0,02119	-0,00405	0.025532	-0,00270	0,00000	-0,00300	18.04.2011
0,00000	0,00000	-0.00415	0,00000	0,00000	0,00000	19.04.2011
-0,03320	0,00610	0.010417	0,00542	0,00302	0,00904	20.04.2011
-0,01717	-0,00606	0.004124	0,00000	0,00000	-0,00597	21.04.2011
0,02183	0,01220	-0.03472	-0,00270	0,01506	0,03303	22.04.2011
0,01709	0,01606	-0.03472	0,00541	0,01484	-0,00581	25.04.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ALBRK	ALCTL	ALKA	ALKIM	ARFYO	ALNTF	Tarih
0,07317	0,00993	0,00000	0,01575	-0,03000	0,00000	01.11.2010
0,03015	0,01342	0,02703	0,03252	0,07527	0,00709	02.11.2010
-0,05687	-0,04792	-0,04516	-0,05141	-0,07000	-0,01399	03.11.2010
-0,06637	0,00000	-0,03125	-0,03234	-0,01961	-0,02721	04.11.2010
-0,02165	-0,00949	-0,00621	-0,02899	-0,03774	-0,02000	05.11.2010
-0,02532	-0,01863	0,00000	0,04282	-0,00935	-0,01316	08.11.2010
-0,00837	0,00312	0,00000	0,01276	-0,00926	0,01333	09.11.2010
-0,00417	-0,00926	0,00625	0,02887	-0,00917	-0,00662	10.11.2010
-0,00415	0,02208	0,00000	0,00263	0,00926	0,00000	11.11.2010
0,00417	-0,00314	0,01266	0,00264	-0,00917	0,00667	12.11.2010
-0,02041	-0,04505	-0,01250	0,01609	0,00000	0,02041	15.11.2010
-0,00810	-0,04585	0,00000	0,00000	-0,00909	-0,00676	22.11.2010

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ALBRK	ALCTL	ALKA	ALKIM	ARFYO	ALNTF	Tarih
-0,01594	0,05758	0,00629	-0,00798	0,00000	-0,02632	23.11.2010
0,02449	0,01852	-0,01242	0,00804	0,00000	0,01333	24.11.2010
0,04255	-0,00613	0,00000	-0,00533	0,02804	-0,04459	25.11.2010
-0,00844	-0,00306	0,00625	0,01078	-0,00926	-0,01258	26.11.2010
-0,00420	0,04808	0,01266	0,00815	0,01887	0,01274	29.11.2010
-0,02058	-0,01577	-0,01863	-0,01075	0,00000	-0,00633	30.11.2010
0,01250	-0,00314	0,00000	0,00541	0,00000	-0,01250	01.12.2010
0,00840	0,01923	0,00000	0,01370	0,00952	0,01266	02.12.2010
-0,00833	-0,01266	0,00625	-0,01084	-0,01869	0,01935	03.12.2010
-0,02041	-0,05672	-0,03030	-0,03403	-0,03604	-0,01899	06.12.2010
-0,00402	0,03593	0,00000	0,00000	0,00000	0,00621	07.12.2010
-0,01969	-0,05114	-0,00599	-0,02284	0,00901	-0,04734	08.12.2010
0,01195	-0,01950	0,01212	0,00000	0,00000	0,04321	09.12.2010
-0,03462	0,03161	-0,01786	-0,00756	0,00000	-0,02410	10.12.2010
-0,01141	0,05775	0,00599	-0,00501	0,00000	-0,02353	13.12.2010
-0,00373	0,02484	0,00508	-0,00595	-0,00885	-0,01176	14.12.2010
0,00000	-0,00923	-0,00253	0,00000	0,00893	0,00592	15.12.2010
-0,00741	0,00619	0,02332	0,01205	0,00000	0,00000	16.12.2010
-0,01099	0,00623	0,00521	0,01220	0,00000	0,01807	17.12.2010
0,00000	-0,01231	0,00000	-0,00606	-0,00885	-0,01190	20.12.2010
-0,00727	-0,01216	-0,00260	-0,02367	-0,00877	-0,01176	21.12.2010
0,00365	0,00000	0,00000	-0,01744	0,00000	0,00000	22.12.2010
0,00000	0,00305	0,00522	0,02994	-0,00870	-0,01163	23.12.2010
0,01107	-0,00906	0,00789	0,01212	0,01770	0,02994	24.12.2010
-0,00368	0,00303	0,00529	0,00610	-0,01739	0,01212	27.12.2010
0,00741	0,01538	0,01070	0,01235	0,02679	0,00610	28.12.2010
0,01504	-0,00612	-0,00267	0,00000	-0,01754	0,00000	29.12.2010
-0,01115	0,01553	0,00000	-0,00613	0,00000	-0,02381	30.12.2010
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	31.12.2010
0,00373	-0,01227	0,00000	-0,01212	0,00000	0,01818	03.01.2011
0,01132	0,04823	-0,00266	0,02484	0,02703	0,00610	04.01.2011
-0,02214	-0,00955	-0,00265	0,00000	-0,00893	0,00613	05.01.2011
-0,00368	0,00965	0,03005	0,02548	0,00901	-0,00610	06.01.2011
0,00000	0,00000	0,00274	-0,00633	0,00909	0,01863	07.01.2011
-0,00366	0,02303	0,00551	0,01282	0,00917	0,00000	10.01.2011
0,02247	0,01333	0,02833	0,03311	0,01869	0,02548	12.01.2011
-0,00743	-0,01639	-0,00563	0,00000	0,00000	-0,01875	13.01.2011
-0,02182	-0,02244	-0,01389	-0,02581	0,00000	-0,00621	14.01.2011
-0,01434	-0,01266	-0,00277	0,01307	-0,03604	0,00625	17.01.2011
-0,03125	-0,00315	-0,00276	-0,01290	-0,00893	-0,00621	18.01.2011
0,01408	0,00635	-0,00275	-0,01274	0,00901	-0,00617	19.01.2011
0,01429	0,01286	0,01114	0,03974	0,00000	0,00000	20.01.2011
0,00000	0,02303	-0,01374	-0,00658	0,00909	0,01250	21.01.2011
-0,01754	-0,01935	-0,01355	-0,02564	-0,01786	-0,00621	25.01.2011
0,02518	0,00000	-0,00539	-0,00637	-0,00885	-0,01829	26.01.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ALBRK	ALCTL	ALKA	ALKIM	ARFYO	ALNTF	Tarih
-0,02456	0,00977	-0,00536	0,00641	-0,00877	0,01235	27.01.2011
0,01064	0,00656	0,00000	0,01299	0,04587	0,01250	28.01.2011
0,01805	0,00993	-0,01323	-0,00645	-0,00909	-0,01235	31.01.2011
0,00362	0,00667	-0,01305	0,00649	0,00917	0,01887	01.02.2011
0,00000	0,01010	0,01323	0,01316	0,00926	-0,00625	02.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	03.02.2011
0,02985	0,02062	0,00532	0,00662	0,00935	0,01911	04.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	07.02.2011
-0,04965	-0,02676	-0,00792	-0,02581	-0,04464	-0,02484	08.02.2011
-0,03754	-0,00664	-0,01044	0,01307	-0,00885	0,01258	09.02.2011
0,00342	0,00669	-0,00519	-0,00649	-0,00877	-0,00625	10.02.2011
0,01389	0,02048	0,01583	0,00654	0,02703	0,01911	11.02.2011
-0,01031	-0,04560	-0,02320	-0,03774	-0,02632	-0,04268	14.02.2011
-0,01356	-0,02848	-0,02267	-0,03049	-0,01724	-0,00606	15.02.2011
-0,00338	-0,00629	-0,00998	-0,01205	-0,01695	-0,01198	16.02.2011
0,00680	-0,02154	-0,00496	-0,03488	0,03509	-0,01765	17.02.2011
-0,01010	-0,01216	-0,00983	0,01775	0,01786	0,00000	18.02.2011
-0,00669	-0,01201	-0,01691	-0,01170	-0,00885	-0,00585	21.02.2011
-0,00333	-0,01187	0,00242	0,00588	0,01802	-0,01156	22.02.2011
0,00334	-0,01462	-0,00242	-0,01163	-0,01770	0,00581	23.02.2011
-0,00993	-0,01156	0,00000	0,00000	0,00893	-0,01149	24.02.2011
-0,00993	-0,01156	0,00000	0,00000	0,00893	-0,01149	25.02.2011
0,00334	-0,01462	-0,00242	-0,01163	-0,01770	0,00581	28.02.2011
-0,00333	-0,01187	0,00242	0,00588	0,01802	-0,01156	01.03.2011
-0,00669	-0,01201	-0,01691	-0,01170	-0,00885	-0,00585	02.03.2011
-0,01010	-0,01216	-0,00983	0,01775	0,01786	0,00000	02.03.2011
0,00680	-0,02154	-0,00496	-0,03488	0,03509	-0,01765	03.03.2011
-0,00338	-0,00629	-0,00998	-0,01205	-0,01695	-0,01198	04.03.2011
-0,02703	-0,01200	0,00000	-0,00283	-0,01223	-0,02663	07.03.2011
-0,03241	-0,00810	0,00000	-0,03977	-0,04025	-0,02736	08.03.2011
-0,00478	-0,01837	0,00000	0,00888	0,00323	0,00000	09.03.2011
0,01923	0,02287	0,00000	0,01760	-0,00643	-0,00938	10.03.2011
-0,00943	0,00000	0,00000	-0,01441	-0,01942	0,01262	11.03.2011
-0,02381	-0,01016	0,00000	-0,01462	-0,02640	-0,00935	14.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	15.03.2011
0,03415	0,01232	0,00000	0,00297	0,01356	-0,00629	16.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	17.03.2011
0,02830	0,00203	0,00000	0,00592	0,01338	0,01582	18.03.2011
-0,00459	0,00607	0,00000	0,02059	0,00990	0,00935	21.03.2011
0,00461	-0,00805	0,00000	-0,00288	-0,00980	-0,00617	22.03.2011
0,02752	0,00811	0,00000	0,00289	0,00330	-0,00311	23.03.2011
0,03125	0,00604	0,00000	0,00865	0,02632	-0,00312	24.03.2011
-0,03030	-0,00800	0,00000	0,00857	-0,00641	0,00000	25.03.2011
-0,02679	-0,00403	0,00000	-0,01983	-0,00323	-0,01250	28.03.2011
0,02752	-0,01822	0,00000	0,02023	-0,00324	-0,00633	29.03.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ALBRK	ALCTL	ALKA	ALKIM	ARFYO	ALNTF	Tarih
0,01786	0,01031	0,00000	0,03116	0,03247	0,01911	30.03.2011
-0,00439	0,00408	0,00000	0,02473	0,01572	0,02500	31.03.2011
-0,01322	-0,00203	0,00000	-0,01072	0,00619	-0,01524	04.04.2011
-0,00446	-0,00815	0,00000	0,00271	-0,00923	0,00000	05.04.2011
-0,01345	-0,01437	0,00000	-0,02703	-0,00311	0,00929	06.04.2011
0,00000	-0,00417	0,00000	-0,01944	0,00312	0,06748	07.04.2011
0,01364	0,02720	0,00000	0,02266	0,00311	0,02299	08.04.2011
0,02691	-0,00611	0,00000	0,01385	0,00929	-0,01685	11.04.2011
0,00873	0,04508	0,00000	0,01639	0,02761	0,00000	12.04.2011
0,02165	-0,00392	0,00000	-0,00538	-0,01194	-0,01714	13.04.2011
-0,00847	-0,01181	0,00000	-0,00270	-0,00302	-0,02035	14.04.2011
0,00855	-0,01594	0,00000	0,00271	0,00303	-0,01187	15.04.2011
0,02119	-0,00405	0,00000	-0,00270	0,00000	-0,00300	18.04.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	19.04.2011
-0,03320	0,00610	0,00000	0,00542	0,00302	0,00904	20.04.2011
-0,01717	-0,00606	0,00000	0,00000	0,00000	-0,00597	21.04.2011
0,02183	0,01220	0,00000	-0,00270	0,01506	0,03303	22.04.2011
0,01709	0,01606	0,00000	0,00541	0,01484	-0,00581	25.04.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ALYAG	ALTIN	AYCES	ANACM	AEFES	ANHYT	Tarih
0,00943	0,00826	-0,00424	-0,01329	0,02370	-0,01532	01.11.2010
0,02913	0,14692	0,01288	0,03436	0,01442	-0,00218	02.11.2010
-0,05505	-0,08658	-0,03719	-0,01356	-0,02804	-0,04979	03.11.2010
-0,04386	-0,04545	0,00833	-0,03595	0,00000	-0,03984	04.11.2010
-0,00870	0,04310	-0,06977	-0,01923	-0,01835	-0,01953	05.11.2010
-0,00862	-0,02521	-0,01527	-0,00637	0,01869	-0,01158	08.11.2010
-0,00855	0,00000	-0,02602	-0,00317	0,00469	-0,00766	09.11.2010
-0,01681	-0,02058	-0,01825	-0,01563	0,00948	-0,00382	10.11.2010
-0,05556	-0,05078	0,00735	-0,01538	-0,00706	0,01158	11.11.2010
0,12500	-0,06227	0,05426	-0,00612	0,01918	-0,00385	12.11.2010
-0,01754	0,01111	-0,02642	0,04140	0,01460	-0,00763	15.11.2010
-0,01724	-0,01099	-0,00376	0,00965	0,02239	0,00383	22.11.2010
0,03571	-0,03191	0,00000	-0,01893	-0,01229	-0,01136	23.11.2010
0,00901	-0,00353	-0,02564	-0,00627	-0,00245	0,01538	24.11.2010
0,00000	0,00000	0,00368	0,00949	0,00246	0,01563	25.11.2010
0,00000	0,05597	-0,01805	0,00000	0,00743	0,00787	26.11.2010
0,02778	0,02290	0,01465	0,00317	0,01508	-0,01550	29.11.2010
-0,02703	0,06504	0,00738	-0,02477	-0,02689	-0,03008	30.11.2010
0,00000	0,04681	0,02264	0,00623	0,00491	0,00000	01.12.2010
0,02778	-0,02083	0,01533	0,00943	0,02519	0,01141	02.12.2010
-0,01818	0,02128	0,04819	-0,00935	-0,02457	0,00000	03.12.2010
-0,04348	-0,01261	-0,02734	-0,03313	-0,02864	-0,01866	06.12.2010
0,00855	0,00000	-0,07023	0,03040	0,00463	0,00741	07.12.2010
-0,00847	-0,02439	-0,00333	-0,00303	-0,04000	-0,02527	08.12.2010
0,00000	-0,03529	0,02041	-0,00302	-0,03017	-0,00360	09.12.2010

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ALYAG	ALTIN	AYCES	ANACM	AEFES	ANHYT	Tarih
-0,00840	-0,00391	0,01379	-0,03499	0,00216	-0,01767	10.12.2010
-0,00833	-0,00775	0,00000	0,00000	0,00871	0,00000	13.12.2010
-0,01626	0,00778	-0,00683	0,00000	-0,00648	0,00351	14.12.2010
-0,00806	-0,01154	0,00000	0,00587	0,00652	-0,01724	15.12.2010
-0,00800	-0,02622	0,01736	-0,00872	0,00656	0,02113	16.12.2010
0,00806	0,00755	0,00699	0,00880	-0,02141	0,01429	17.12.2010
0,01639	0,02317	0,00000	-0,01729	0,00647	0,00358	20.12.2010
0,02500	-0,01103	-0,03344	0,00000	0,00214	0,01429	21.12.2010
0,00000	0,05837	0,06786	0,00290	-0,01266	0,01083	22.12.2010
-0,00826	0,02390	0,05263	-0,01146	0,03268	-0,00360	23.12.2010
0,00000	0,01619	0,03906	-0,01690	-0,04175	0,01832	24.12.2010
-0,00820	-0,00403	0,01186	0,07576	0,02350	0,01866	27.12.2010
0,00000	0,00000	0,03689	-0,00302	0,00862	0,01132	28.12.2010
-0,01613	0,00813	0,00000	0,00303	-0,01277	0,00760	29.12.2010
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	30.12.2010
0,05085	0,06494	0,00000	0,01538	0,00642	0,01544	31.12.2010
0,00000	-0,01282	0,01245	0,01563	-0,00426	-0,00766	03.01.2011
-0,00840	0,04933	0,03879	0,00000	0,01735	-0,01509	04.01.2011
0,03478	-0,00446	0,01754	-0,01840	-0,00860	0,00379	05.01.2011
-0,01709	-0,03030	0,00885	0,01558	0,01974	0,01149	06.01.2011
0,01739	-0,00431	0,00893	0,01905	0,02703	-0,00760	07.01.2011
0,02679	-0,00429	0,00000	-0,00631	-0,00671	0,03137	10.01.2011
-0,00885	0,02193	0,00000	0,01929	-0,05696	-0,01163	12.01.2011
-0,01739	0,02242	-0,01322	-0,02508	0,03720	-0,00386	13.01.2011
-0,00862	-0,02193	-0,01304	0,00631	-0,01082	-0,00766	14.01.2011
-0,00855	0,00000	0,00437	0,02589	0,00654	-0,02247	17.01.2011
0,00862	-0,01299	0,00439	0,01645	0,02227	-0,00743	18.01.2011
0,00000	0,00435	0,01333	0,02703	0,02511	0,01128	19.01.2011
-0,03333	0,01770	0,00446	-0,01003	-0,03736	-0,01845	20.01.2011
0,06195	-0,01310	0,00000	0,00336	0,00664	-0,00368	21.01.2011
-0,02586	0,03620	0,00448	-0,00667	0,01345	-0,00366	25.01.2011
0,00870	0,02315	0,00000	0,00334	-0,00889	0,00738	26.01.2011
0,00877	0,00000	0,00000	0,01014	0,01810	-0,00368	27.01.2011
0,01786	-0,01370	0,00450	0,02069	0,02791	0,00369	28.01.2011
0,00000	0,00000	0,00452	0,00000	0,03614	0,00000	31.01.2011
0,00901	0,01389	0,01376	0,02837	0,00000	0,01119	01.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	02.02.2011
0,00909	-0,00917	0,02830	0,00356	0,00242	0,03077	03.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	04.02.2011
-0,00901	0,01395	-0,01852	-0,00707	-0,00481	-0,01515	07.02.2011
-0,01770	0,05911	-0,00461	-0,00702	-0,01422	-0,01859	08.02.2011
0,00893	-0,00295	-0,00459	0,00000	-0,00706	-0,01103	09.02.2011
0,01818	0,08994	0,01869	-0,00350	-0,03846	0,00369	10.02.2011
-0,03509	-0,02708	-0,01382	-0,01379	-0,03704	-0,01812	11.02.2011
-0,02564	0,01053	-0,01364	0,02837	0,00879	-0,01075	14.02.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ALYAG	ALTIN	AYCES	ANACM	AEFES	ANHYT	Tarih
0,00000	-0,02863	0,00000	-0,00353	0,00887	-0,01761	15.02.2011
-0,00847	0,02947	0,00457	-0,05667	-0,00442	0,00709	16.02.2011
-0,01667	-0,02464	0,00000	0,01010	0,00221	0,01805	17.02.2011
-0,00826	0,01247	-0,01351	-0,01000	0,01119	-0,01071	18.02.2011
0,00000	0,09318	0,00452	0,00334	0,00224	0,00358	21.02.2011
0,00000	0,00457	0,00455	-0,01320	-0,00889	-0,02448	22.02.2011
-0,00820	0,00229	0,00000	0,00664	-0,00222	-0,01038	23.02.2011
-0,00820	0,00229	0,00000	0,00664	-0,00222	-0,01038	24.02.2011
0,00000	0,00457	0,00455	-0,01320	-0,00889	-0,02448	25.02.2011
0,00000	0,09318	0,00452	0,00334	0,00224	0,00358	28.02.2011
-0,00826	0,01247	-0,01351	-0,01000	0,01119	-0,01071	01.03.2011
-0,01667	-0,02464	0,00000	0,01010	0,00221	0,01805	02.03.2011
-0,00847	0,02947	0,00457	-0,05667	-0,00442	0,00709	02.03.2011
0,00000	-0,02863	0,00000	-0,00353	0,00887	-0,01761	03.03.2011
-0,02564	0,01053	-0,01364	0,02837	0,00879	-0,01075	04.03.2011
0,00893	-0,00295	-0,00459	0,00000	-0,00706	-0,01103	07.03.2011
-0,01770	0,05911	-0,00461	-0,00702	-0,01422	-0,01859	08.03.2011
-0,00901	0,01395	-0,01852	-0,00707	-0,00481	-0,01515	09.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	10.03.2011
0,00909	-0,00917	0,02830	0,00356	0,00242	0,03077	11.03.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	14.03.2011
0,00901	0,01389	0,01376	0,02837	0,00000	0,01119	15.03.2011
0,00000	0,00000	0,00452	0,00000	0,03614	0,00000	16.03.2011
0,01786	-0,01370	0,00450	0,02069	0,02791	0,00369	17.03.2011
0,00877	0,00000	0,00000	0,01014	0,01810	-0,00368	18.03.2011
0,00870	0,02315	0,00000	0,00334	-0,00889	0,00738	21.03.2011
-0,02586	0,03620	0,00448	-0,00667	0,01345	-0,00366	22.03.2011
0,06195	-0,01310	0,00000	0,00336	0,00664	-0,00368	23.03.2011
-0,03333	0,01770	0,00446	-0,01003	-0,03736	-0,01845	24.03.2011
0,00000	0,00435	0,01333	0,02703	0,02511	0,01128	25.03.2011
0,00862	-0,01299	0,00439	0,01645	0,02227	-0,00743	28.03.2011
-0,00855	0,00000	0,00437	0,02589	0,00654	-0,02247	29.03.2011
-0,00862	-0,02193	-0,01304	0,00631	-0,01082	-0,00766	30.03.2011
-0,01739	0,02242	-0,01322	-0,02508	0,03720	-0,00386	31.03.2011
-0,00885	0,02193	0,00000	0,01929	-0,05696	-0,01163	04.04.2011
0,02679	-0,00429	0,00000	-0,00631	-0,00671	0,03137	05.04.2011
0,01739	-0,00431	0,00893	0,01905	0,02703	-0,00760	06.04.2011
-0,01709	-0,03030	0,00885	0,01558	0,01974	0,01149	07.04.2011
0,03478	-0,00446	0,01754	-0,01840	-0,00860	0,00379	08.04.2011
-0,00840	0,04933	0,03879	0,00000	0,01735	-0,01509	11.04.2011
0,00000	-0,01282	0,01245	0,01563	-0,00426	-0,00766	12.04.2011
0,05085	0,06494	0,00000	0,01538	0,00642	0,01544	13.04.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	14.04.2011
-0,01613	0,00813	0,00000	0,00303	-0,01277	0,00760	15.04.2011
0,00000	0,00000	0,03689	-0,00302	0,00862	0,01132	18.04.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ASUZU	ANSGR	ANELE	ANELT	THYAO	ARCLK	Tarih
0,13873	0,02344	0,03297	0,01460	-0,01163	-0,00779	01.11.2010
0,02976	0,00000	-0,01087	0,00000	-0,01961	0,01832	02.11.2010
-0,00592	-0,03759	-0,01429	0,00000	0,01400	0,03085	03.11.2010
0,01807	0,00000	0,00719	-0,01439	-0,02564	0,00249	04.11.2010
0,01220	-0,02206	0,00361	-0,00714	0,00810	-0,00498	05.11.2010
0,01548	-0,01449	0,01838	-0,00709	0,04418	0,01500	08.11.2010
0,01254	0,03759	0,03422	0,01439	0,01923	-0,02709	09.11.2010
-0,00313	-0,01481	0,01544	0,00000	-0,00377	0,00759	10.11.2010
-0,01235	-0,02878	-0,00385	-0,00714	-0,01894	0,01256	11.11.2010
0,00935	-0,01418	-0,00383	-0,01408	0,00000	0,01241	12.11.2010
0,01262	0,00000	-0,01136	-0,00699	0,01931	0,00000	15.11.2010
0,00000	-0,00704	0,02326	0,02143	-0,01894	-0,03922	22.11.2010
-0,00314	0,00709	0,00781	0,00000	-0,02317	0,01020	23.11.2010
0,00000	-0,00704	0,00787	0,00000	0,01186	0,00000	24.11.2010
0,00952	0,01429	-0,00781	0,02941	0,00000	-0,00505	25.11.2010
0,00000	0,00000	0,00000	0,00000	-0,00391	-0,03807	26.11.2010
0,01942	0,02190	0,02400	0,00741	0,01961	0,02375	29.11.2010
0,00000	0,00000	0,00000	0,00000	-0,01154	0,01546	30.11.2010
-0,02830	-0,01439	-0,03101	-0,01460	0,02335	0,00761	01.12.2010
-0,01242	-0,02797	-0,00386	0,00000	-0,02281	0,00252	02.12.2010
0,01899	-0,00694	-0,00385	-0,00725	-0,01556	0,00754	03.12.2010
0,00637	-0,08861	0,02767	0,02222	0,00395	-0,00499	06.12.2010
-0,03086	0,09722	-0,01556	-0,06250	-0,00394	-0,00251	07.12.2010
-0,01818	-0,05263	-0,01533	-0,03356	0,00000	-0,02764	08.12.2010
-0,00901	-0,03185	0,03162	-0,01974	-0,03953	-0,03359	09.12.2010
0,00000	0,05369	0,02429	0,00000	-0,03292	0,02139	10.12.2010
-0,01479	0,11194	0,00000	0,00000	-0,05532	-0,01047	13.12.2010
-0,03152	0,00000	-0,02372	-0,01935	-0,02477	-0,01587	14.12.2010
0,01749	0,00752	0,00397	-0,00641	0,06467	-0,00538	15.12.2010
-0,00291	0,00758	0,03491	0,00645	-0,02820	-0,00270	16.12.2010
0,00585	-0,02222	0,00412	0,00000	-0,06027	0,00813	17.12.2010
0,00585	-0,02222	0,00412	0,00000	0,00000	0,02688	20.12.2010
-0,00291	0,00758	0,03491	0,00645	0,00000	0,00000	21.12.2010
0,01749	0,00752	0,00397	-0,00641	0,00000	0,00000	22.12.2010
-0,03152	0,00000	-0,02372	-0,01935	0,00000	0,00000	23.12.2010
-0,01479	0,11194	0,00000	0,00000	0,00000	0,00000	24.12.2010
0,00000	0,05369	0,02429	0,00000	0,00000	0,00524	27.12.2010
-0,00901	-0,03185	0,03162	-0,01974	0,00000	0,00260	28.12.2010
-0,01818	-0,05263	-0,01533	-0,03356	0,00000	0,01039	29.12.2010
-0,03086	0,09722	-0,01556	-0,06250	0,00000	0,00257	30.12.2010
0,00637	-0,08861	0,02767	0,02222	0,00000	0,02564	31.12.2010
0,01899	-0,00694	-0,00385	-0,00725	0,00000	0,01250	03.01.2011
-0,01242	-0,02797	-0,00386	0,00000	0,00000	0,02222	04.01.2011
-0,02830	-0,01439	-0,03101	-0,01460	0,00000	0,02174	05.01.2011
0,00000	0,00000	0,00000	0,00000	0,00000	-0,00236	06.01.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ASUZU	ANSGR	ANELE	ANELT	THYAO	ARCLK	Tarih
0,01942	0,02190	0,02400	0,00741	0,00000	-0,01422	07.01.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,03846	10.01.2011
0,00952	0,01429	-0,00781	0,02941	0,00000	0,01389	12.01.2011
0,00000	-0,00704	0,00787	0,00000	0,00000	0,01370	13.01.2011
-0,00314	0,00709	0,00781	0,00000	0,00000	-0,03153	14.01.2011
0,00000	-0,00704	0,02326	0,02143	0,00000	0,03023	17.01.2011
0,01262	0,00000	-0,01136	-0,00699	0,00000	-0,00677	18.01.2011
0,00935	-0,01418	-0,00383	-0,01408	0,00000	-0,01136	19.01.2011
-0,01235	-0,02878	-0,00385	-0,00714	0,00000	0,00690	20.01.2011
-0,00313	-0,01481	0,01544	0,00000	0,00000	-0,03196	21.01.2011
0,01254	0,03759	0,03422	0,01439	0,00000	0,00236	25.01.2011
0,01548	-0,01449	0,01838	-0,00709	0,00000	0,00000	26.01.2011
0,01220	-0,02206	0,00361	-0,00714	0,00000	-0,00471	27.01.2011
0,01807	0,00000	0,00719	-0,01439	0,00000	-0,01418	28.01.2011
-0,00592	-0,03759	-0,01429	0,00000	0,00000	0,01679	31.01.2011
0,02976	0,00000	-0,01087	0,00000	0,00000	-0,00943	01.02.2011
0,13873	0,02344	0,03297	0,01460	0,00000	-0,02619	02.02.2011
-0,01269	0,00763	0,00709	0,02158	0,00000	-0,00244	03.02.2011
-0,01285	0,02273	-0,01408	0,00000	0,00000	-0,01961	04.02.2011
0,03385	0,00741	0,00714	0,00704	0,00000	0,02000	07.02.2011
0,02519	-0,00735	-0,01064	-0,01399	0,00000	-0,01716	08.02.2011
0,01720	0,03704	-0,57885	0,02128	0,00000	-0,01995	09.02.2011
0,01449	0,00714	-0,02128	0,01389	0,00000	0,01272	10.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	-0,00251	11.02.2011
-0,00952	-0,01418	0,00870	0,00000	0,00000	0,01511	14.02.2011
0,00000	-0,02158	0,05172	-0,00685	0,00000	0,00496	15.02.2011
-0,02163	0,03676	0,02869	0,01379	0,00000	-0,01235	16.02.2011
0,00491	0,00709	-0,02789	-0,00680	0,00000	-0,04500	17.02.2011
0,00733	-0,00704	0,01230	0,00685	0,00000	-0,02094	18.02.2011
-0,00243	0,02128	0,04049	0,01361	0,00000	-0,01604	21.02.2011
-0,00730	-0,00694	0,02724	-0,00671	0,00000	-0,02717	22.02.2011
-0,00735	-0,04196	-0,01515	-0,00676	0,00000	0,00559	23.02.2011
-0,02222	-0,00730	0,01154	0,00000	0,00000	0,01667	24.02.2011
0,00253	0,00735	-0,00760	-0,00680	0,00000	0,01366	25.02.2011
-0,00504	0,00730	0,02299	0,01370	0,00000	-0,05660	28.02.2011
-0,00253	-0,01449	0,06367	0,00000	0,00000	-0,02286	01.03.2011
-0,00254	0,00000	-0,01056	0,00676	0,00000	0,02632	02.03.2011
0,00252	-0,01481	-0,03147	0,00000	0,00000	-0,00855	02.03.2011
0,01508	0,00000	-0,01083	-0,02013	0,00000	-0,02299	03.03.2011
0,05693	0,01504	0,00365	0,00000	0,00000	-0,02299	04.03.2011
-0,00730	-0,00694	0,02724	-0,00671	0,00000	-0,01176	07.03.2011
-0,00735	-0,04196	-0,01515	-0,00676	0,00000	0,02976	08.03.2011
-0,02222	-0,00730	0,01154	0,00000	0,00000	0,02023	09.03.2011
0,00253	0,00735	-0,00760	-0,00680	0,00000	0,00283	10.03.2011
-0,00504	0,00730	0,02299	0,01370	0,00000	0,01977	11.03.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ASUZU	ANSGR	ANELE	ANELT	THYAO	ARCLK	Tarih
-0,00253	-0,01449	0,06367	0,00000	0,00000	-0,00831	14.03.2011
-0,00254	0,00000	-0,01056	0,00676	0,00000	-0,00279	15.03.2011
0,00252	-0,01481	-0,03147	0,00000	0,00000	0,00000	16.03.2011
0,01508	0,00000	-0,01083	-0,02013	0,00000	-0,00280	17.03.2011
0,05693	0,01504	0,00365	0,00000	0,00000	0,01404	18.03.2011
0,10304	-0,01481	-0,01455	0,00000	0,00000	0,00000	21.03.2011
-0,02123	0,00000	0,03321	0,01370	0,00000	-0,00831	22.03.2011
-0,04677	-0,03008	-0,02545	-0,04138	0,00000	0,01955	23.03.2011
0,03972	0,03101	-0,02985	-0,02158	0,00000	0,01370	24.03.2011
-0,00674	0,00752	0,00769	0,01471	0,00000	0,02162	25.03.2011
0,00226	0,02239	0,00000	0,00725	0,00000	-0,04762	28.03.2011
-0,00226	-0,00730	0,00000	-0,03597	0,00000	0,00556	29.03.2011
0,00905	0,00000	0,03053	0,02239	0,00000	-0,01381	30.03.2011
0,02018	0,01471	0,02222	0,00000	0,00000	0,02241	31.03.2011
0,03516	-0,00725	-0,01087	0,00730	0,00000	0,03288	04.04.2011
-0,01486	0,00000	0,00366	0,00000	0,00000	0,00000	05.04.2011
-0,03017	0,00000	-0,01460	-0,00725	0,00000	0,01326	06.04.2011
-0,01556	0,02190	0,02963	0,00000	0,00000	0,02618	07.04.2011
0,01354	-0,02143	-0,01079	-0,00730	0,00000	-0,00510	08.04.2011
-0,07127	0,00000	0,00000	0,00735	0,00000	0,00256	11.04.2011
0,00719	0,00000	-0,00727	0,00730	0,00000	0,00767	12.04.2011
-0,00238	0,00000	-0,03663	-0,00725	0,00000	-0,00254	13.04.2011
0,00000	0,00000	0,00000	0,00000	0,00000	-0,00763	14.04.2011
-0,01671	0,00730	0,00000	-0,00730	0,00000	-0,02051	15.04.2011
-0,00728	-0,00725	-0,09125	-0,00735	0,00000	0,03403	18.04.2011
-0,00489	-0,02920	-0,00837	-0,00741	0,00000	0,02785	19.04.2011
-0,02948	-0,03759	-0,02954	-0,03731	0,00000	0,01970	20.04.2011
-0,09367	-0,08594	0,01304	-0,10078	0,00000	0,00000	21.04.2011
0,03911	0,02564	-0,01288	0,03448	0,00000	-0,00242	22.04.2011
0,01613	0,00833	-0,04783	0,00833	0,00000	0,01937	25.04.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ARENA	ARMDA	ARSAN	ASELS	ASLAN	ASYAB	Tarih
0,00719	-0,01038	-0,00813	0,00238	0,01712	-0,02755	01.11.2010
0,01091	-0,00687	0,00820	0,00239	-0,00341	0,00850	02.11.2010
0,01103	0,01394	-0,10949	0,01699	0,03169	0,02809	03.11.2010
0,00000	-0,01034	0,06202	-0,00483	-0,01730	-0,00273	04.11.2010
-0,00366	-0,02027	0,04878	-0,00241	-0,00345	-0,01644	05.11.2010
0,00000	0,00000	0,00000	0,00000	0,00000	0,00836	08.11.2010
-0,00365	0,07246	0,02075	-0,00718	0,00346	-0,01934	09.11.2010
-0,00364	0,00364	0,01261	0,00240	0,00697	-0,01690	10.11.2010
-0,01079	0,00733	-0,00833	-0,00239	-0,01712	-0,01433	11.11.2010
0,01091	0,03409	0,00000	0,00481	-0,00341	-0,00581	12.11.2010
0,00733	0,00763	0,11111	-0,00240	0,00342	-0,02924	15.11.2010
-0,00727	-0,01504	0,00465	-0,01418	0,02098	-0,03012	22.11.2010
0,02996	0,04314	0,01896	0,04187	0,02509	0,00621	23.11.2010
-0,00373	-0,00778	0,00476	-0,00246	-0,02448	-0,00617	24.11.2010
-0,02545	0,00000	-0,02326	-0,01214	-0,04667	-0,00621	25.11.2010
-0,02482	-0,00388	-0,00463	-0,03059	-0,03226	-0,03750	26.11.2010
-0,00704	-0,01527	0,00000	0,01190	-0,02516	0,01623	29.11.2010
0,00709	-0,00758	0,00465	-0,00709	0,00633	0,01278	30.11.2010
0,01075	0,00380	0,00467	0,02421	0,03947	0,01577	01.12.2010
-0,01064	0,00766	0,00943	-0,01667	-0,01935	-0,01242	02.12.2010
-0,01742	-0,01880	-0,03636	-0,02326	-0,02516	0,00000	03.12.2010
-0,00692	-0,00746	0,00000	0,01415	-0,01852	0,01887	06.12.2010
0,00697	-0,00741	0,01382	0,02663	0,01887	-0,01852	07.12.2010
0,00000	-0,00369	0,00463	0,02228	0,00000	-0,02516	08.12.2010
0,00350	-0,01095	-0,01370	0,00748	-0,01242	-0,01935	09.12.2010
0,00000	0,09600	0,04286	0,01008	0,01577	0,03947	10.12.2010
0,00000	0,04603	0,00962	0,03117	0,01278	0,00633	13.12.2010
0,00000	0,00000	0,00000	0,00000	0,00000	-0,02516	14.12.2010
0,03249	0,02137	0,01961	0,01050	0,01623	-0,03226	15.12.2010
0,00000	0,00000	0,00000	0,00000	0,00000	-0,04667	16.12.2010
-0,03147	-0,02092	-0,01449	-0,02806	-0,03750	-0,02448	17.12.2010
0,01779	-0,02449	-0,01429	-0,02244	-0,00621	0,02509	20.12.2010
0,04074	-0,00407	0,01449	0,00754	-0,00617	0,02098	21.12.2010
0,00372	0,07424	0,04020	0,02842	0,00621	0,00342	22.12.2010
-0,02182	-0,03376	-0,00500	-0,04914	-0,03012	-0,00341	23.12.2010
-0,03169	0,00000	-0,01961	-0,03783	-0,02924	-0,01712	24.12.2010
0,01429	0,03947	0,00000	-0,00236	-0,00581	0,00697	27.12.2010
-0,00356	0,00441	0,00000	-0,02975	-0,01433	0,00346	28.12.2010
-0,01056	-0,01732	0,00000	0,00460	-0,01690	-0,00345	29.12.2010
-0,00351	-0,02532	-0,03774	-0,01136	-0,01934	-0,01730	30.12.2010
-0,00350	-0,00837	-0,01395	0,00457	0,00836	0,03169	31.12.2010
-0,00348	-0,04016	0,00000	0,00459	-0,01644	-0,00341	03.01.2011
-0,00347	0,08261	-0,01376	-0,00683	-0,00273	0,01712	04.01.2011
-0,00347	0,08261	-0,01376	-0,00683	-0,00273	0,02694	05.01.2011
-0,00348	-0,04016	0,00000	0,00459	-0,01644	0,00656	06.01.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ARENA	ARMDA	ARSAN	ASELS	ASLAN	ASYAB	Tarih
-0,00350	-0,00837	-0,01395	0,00457	0,00836	-0,01303	07.01.2011
-0,00351	-0,02532	-0,03774	-0,01136	-0,01934	0,00990	10.01.2011
-0,01056	-0,01732	0,00000	0,00460	-0,01690	-0,00980	12.01.2011
-0,00356	0,00441	0,00000	-0,02975	-0,01433	-0,00990	13.01.2011
0,01429	0,03947	0,00000	-0,00236	-0,00581	-0,02333	14.01.2011
-0,03169	0,00000	-0,01961	-0,03783	-0,02924	-0,02048	17.01.2011
-0,02182	-0,03376	-0,00500	-0,04914	-0,03012	-0,01742	18.01.2011
0,00372	0,07424	0,04020	0,02842	0,00621	-0,03191	19.01.2011
0,04074	-0,00407	0,01449	0,00754	-0,00617	0,02564	20.01.2011
0,01779	-0,02449	-0,01429	-0,02244	-0,00621	-0,00357	21.01.2011
-0,03147	-0,02092	-0,01449	-0,02806	-0,03750	0,02151	25.01.2011
0,00000	0,00000	0,00000	0,00000	0,00000	-0,01053	26.01.2011
0,03249	0,02137	0,01961	0,01050	0,01623	-0,02837	27.01.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,02190	28.01.2011
0,00000	0,04603	0,00962	0,03117	0,01278	0,02500	31.01.2011
0,00000	0,09600	0,04286	0,01008	0,01577	-0,00697	01.02.2011
0,00350	-0,01095	-0,01370	0,00748	-0,01242	-0,02456	02.02.2011
0,00000	-0,00369	0,00463	0,02228	0,00000	0,02878	03.02.2011
0,00697	-0,00741	0,01382	0,02663	0,01887	-0,01748	04.02.2011
-0,00692	-0,00746	0,00000	0,01415	-0,01852	0,00712	07.02.2011
-0,01742	-0,01880	-0,03636	-0,02326	-0,02516	0,01767	08.02.2011
-0,01064	0,00766	0,00943	-0,01667	-0,01935	-0,01736	09.02.2011
0,01075	0,00380	0,00467	0,02421	0,03947	0,00000	10.02.2011
0,00709	-0,00758	0,00465	-0,00709	0,00633	-0,00353	11.02.2011
-0,00704	-0,01527	0,00000	0,01190	-0,02516	0,00000	14.02.2011
-0,02482	-0,00388	-0,00463	-0,03059	-0,03226	0,00709	15.02.2011
-0,02545	0,00000	-0,02326	-0,01214	-0,04667	-0,00352	16.02.2011
-0,00373	-0,00778	0,00476	-0,00246	-0,02448	0,01060	17.02.2011
0,02996	0,04314	0,01896	0,04187	0,02509	-0,02448	18.02.2011
-0,00727	-0,01504	0,00465	-0,01418	0,02098	-0,01075	21.02.2011
0,00733	0,00763	0,11111	-0,00240	0,00342	-0,02899	22.02.2011
0,01091	0,03409	0,00000	0,00481	-0,00341	-0,07090	23.02.2011
-0,01079	0,00733	-0,00833	-0,00239	-0,01712	0,01205	24.02.2011
-0,00364	0,00364	0,01261	0,00240	0,00697	0,02381	25.02.2011
-0,00365	0,07246	0,02075	-0,00718	0,00346	-0,04651	28.02.2011
0,00000	0,00000	0,00000	0,00000	0,00000	0,03659	01.03.2011
-0,00366	-0,02027	0,04878	-0,00241	-0,00345	0,03922	02.03.2011
0,00000	-0,01034	0,06202	-0,00483	-0,01730	-0,00377	02.03.2011
0,01103	0,01394	-0,10949	0,01699	0,03169	-0,01515	03.03.2011
0,01091	-0,00687	0,00820	0,00239	-0,00341	-0,01515	04.03.2011
0,00714	0,09059	-0,00826	-0,00234	0,00656	0,00769	07.03.2011
-0,00355	-0,05112	-0,05000	-0,02108	-0,01303	0,09160	08.03.2011
-0,00712	-0,02020	0,00877	-0,00718	0,01320	0,00699	09.03.2011
0,00000	0,00687	-0,00870	0,00723	-0,00326	0,02778	10.03.2011
0,00000	0,02048	0,02193	0,00957	-0,00980	-0,01014	11.03.2011

Table A.3(continue): Daily Return End of Day IMKB 100's Stock Value

ARENA	ARMDA	ARSAN	ASELS	ASLAN	ASYAB	Tarih
0,00000	0,01338	0,01288	-0,00237	-0,00990	-0,02048	14.03.2011
-0,00358	-0,02640	-0,02542	-0,00713	-0,02333	-0,01045	15.03.2011
0,01079	0,00000	0,01327	-0,01193	0,00000	0,00704	16.03.2011
-0,01423	-0,02712	-0,02620	-0,01449	0,07944	0,00699	17.03.2011
0,00361	0,00348	-0,01345	0,01471	0,03030	-0,01389	18.03.2011
-0,01079	-0,01042	-0,02727	-0,00483	-0,04202	0,00704	21.03.2011
0,00000	0,00702	0,00000	0,00000	-0,02632	-0,01049	22.03.2011
-0,03321	-0,02158	-0,03333	-0,01463	-0,03830	0,01413	23.03.2011
-0,02290	-0,02206	-0,04433	-0,01733	0,00000	0,01742	24.03.2011
0,01172	0,01504	0,06186	0,01008	0,01327	0,02397	25.03.2011
0,00772	-0,01481	0,02913	-0,00998	-0,00437	-0,00334	28.03.2011
-0,03065	-0,01880	-0,05189	-0,02015	-0,02632	0,01007	29.03.2011
0,01186	0,00383	0,01990	0,01028	0,03604	0,00000	30.03.2011
0,01563	0,00763	0,00000	0,01018	0,20870	0,03654	31.03.2011
0,01154	0,01136	0,00976	0,01008	-0,10791	0,02564	04.04.2011
0,00380	0,00000	-0,01449	0,00499	0,00000	-0,01875	05.04.2011
-0,01136	-0,01498	-0,01471	-0,00744	0,00806	0,00955	06.04.2011
0,00766	0,04563	0,00995	0,00250	0,00000	-0,00631	07.04.2011
-0,00760	0,12727	-0,00985	0,02494	0,02400	-0,02222	08.04.2011
-0,01149	0,03226	-0,00498	-0,01460	-0,00781	-0,01623	11.04.2011
0,00775	-0,00938	0,00500	-0,00247	0,05512	-0,00990	12.04.2011
0,00769	-0,00631	0,00498	0,00743	-0,01493	0,01667	13.04.2011
0,00000	0,00000	0,00000	0,00000	0,00000	-0,00328	14.04.2011
-0,00763	0,00317	-0,00990	-0,00491	-0,06818	-0,04605	15.04.2011
-0,02308	-0,00949	-0,02000	-0,00741	0,00813	0,03448	18.04.2011
-0,01969	-0,00639	-0,03061	-0,00746	-0,03226	-0,00333	19.04.2011
-0,04016	-0,06109	-0,07895	-0,02757	-0,04167	0,00669	20.04.2011
-0,09205	-0,09589	-0,10286	-0,05928	-0,11304	-0,00332	21.04.2011
0,03687	0,05682	0,07643	0,03562	0,16667	0,01000	22.04.2011
0,00000	0,01434	0,00592	-0,00529	0,05042	-0,00330	25.04.2011
0,00000	0,01338	0,01288	-0,00237	-0,00990	-0,02048	14.03.2011
-0,00358	-0,02640	-0,02542	-0,00713	-0,02333	-0,01045	15.03.2011
0,01079	0,00000	0,01327	-0,01193	0,00000	0,00704	16.03.2011
-0,01423	-0,02712	-0,02620	-0,01449	0,07944	0,00699	17.03.2011
0,00361	0,00348	-0,01345	0,01471	0,03030	-0,01389	18.03.2011
-0,01079	-0,01042	-0,02727	-0,00483	-0,04202	0,00704	21.03.2011
0,00000	0,00702	0,00000	0,00000	-0,02632	-0,01049	22.03.2011
-0,03321	-0,02158	-0,03333	-0,01463	-0,03830	0,01413	23.03.2011
-0,02290	-0,02206	-0,04433	-0,01733	0,00000	0,01742	24.03.2011
0,01172	0,01504	0,06186	0,01008	0,01327	0,02397	25.03.2011
0,00772	-0,01481	0,02913	-0,00998	-0,00437	-0,00334	28.03.2011
-0,03065	-0,01880	-0,05189	-0,02015	-0,02632	0,01007	29.03.2011
0,01186	0,00383	0,01990	0,01028	0,03604	0,00000	30.03.2011
0,01563	0,00763	0,00000	0,01018	0,20870	0,03654	31.03.2011
0,01154	0,01136	0,00976	0,01008	-0,10791	0,02564	04.04.2011

APPENDIX A.4 : Composing Variance Matrix with Mathematica Codes

```

(* Parametric Form of Code
In this part of our study We compute Variance-Covariance
matrix. We connect to SQL Server DataBase System and we
get our portfolio's stocks which are the Istanbul Stock
Exchange 30 Index's stock. Select the Daily Return of each
stock. Then comprise the Variance-Covariance Matrix.

*)

Correlation
Needs["DatabaseLink`"];
ToFileName[{$DatabaseLinkDirectory}, "Examples"]
conn = OpenSQLConnection[JDBC["odbc", "IMKB_30"]];
SQLTableNames[conn]
StockList[[1]] = SQLExecute[conn, "Select AKBNK from IMKB30_Transpose"]
StockList[[2]] = SQLExecute[conn, "Select ARCLK from IMKB30_Transpose"]
StockList[[3]] = SQLExecute[conn, "Select ASYAB from IMKB30_Transpose"]
StockList[[4]] = SQLExecute[conn, "Select BIMAS from IMKB30_Transpose"]
StockList[[5]] = SQLExecute[conn, "Select DOHOL from IMKB30_Transpose"]
StockList[[6]] = SQLExecute[conn, "Select DYHOL from IMKB30_Transpose"]
StockList[[7]] = SQLExecute[conn, "Select ECILC from IMKB30_Transpose"]
StockList[[8]] = SQLExecute[conn, "Select ENKAI from IMKB30_Transpose"]
StockList[[9]] = SQLExecute[conn, "Select EREGL from IMKB30_Transpose"]
StockList[[10]] = SQLExecute[conn, "Select GARAN from IMKB30_Transpose"]
StockList[[11]] = SQLExecute[conn, "Select HALKB from IMKB30_Transpose"]
StockList[[12]] = SQLExecute[conn, "Select ISCTR from IMKB30_Transpose"]
StockList[[13]] = SQLExecute[conn, "Select KCHOL from IMKB30_Transpose"]
StockList[[14]] = SQLExecute[conn, "Select KOZAD from IMKB30_Transpose"]
StockList[[15]] = SQLExecute[conn, "Select KRDM from IMKB30_Transpose"]
StockList[[16]] = SQLExecute[conn, "Select PETKM from IMKB30_Transpose"]
StockList[[17]] = SQLExecute[conn, "Select SAHOL from IMKB30_Transpose"]
StockList[[18]] = SQLExecute[conn, "Select SISE from IMKB30_Transpose"]
StockList[[19]] = SQLExecute[conn, "Select SKBNK from IMKB30_Transpose"]
StockList[[20]] = SQLExecute[conn, "Select TAVHL from IMKB30_Transpose"]
StockList[[21]] = SQLExecute[conn, "Select TCELL from IMKB30_Transpose"]
StockList[[22]] = SQLExecute[conn, "Select TEBNK from IMKB30_Transpose"]
StockList[[23]] = SQLExecute[conn, "Select THYAO from IMKB30_Transpose"]
StockList[[24]] = SQLExecute[conn, "Select TKFEN from IMKB30_Transpose"]
StockList[[25]] = SQLExecute[conn, "Select TOASO from IMKB30_Transpose"]
StockList[[26]] = SQLExecute[conn, "Select TTKOM from IMKB30_Transpose"]
StockList[[27]] = SQLExecute[conn, "Select TUPRS from IMKB30_Transpose"]
StockList[[28]] = SQLExecute[conn, "Select VAKBN from IMKB30_Transpose"]
StockList[[29]] = SQLExecute[conn, "Select VESTL from IMKB30_Transpose"]
StockList[[30]] = SQLExecute[conn, "Select YKBNK from IMKB30_Transpose"]
MatrixForm[Table[a[i, j] = Covariance[StockList[[i]], StockList[[j]]], {i, 30}, {j, 30}]]

```

APPENDIX A.5 : Composing Correlation Matrix with Mathematica Codes

```

(* Parametric Form of Code

In this part of our study We compute Variance-Covariance
matrix. We connect to SQL Server DataBase System and we
get our portfolio's stocks which are the Istanbul Stock
Exchange 30 Index's stock. Select the Daily Return of each
stock. Then comprise the Variance-Covariance Matrix.

*)

Correlation
Needs["DatabaseLink`"];
ToFileName[{$DatabaseLinkDirectory}, "Examples"]
conn = OpenSQLConnection[JDBC["odbc", "IMKB_30"]];
SQLTableNames[conn]
StockList[[1]] = SQLExecute[conn, "Select Akbnk from IMKB30_Transpose"]
StockList[[2]] = SQLExecute[conn, "Select ARCLK from IMKB30_Transpose"]
StockList[[3]] = SQLExecute[conn, "Select ASYAB from IMKB30_Transpose"]
StockList[[4]] = SQLExecute[conn, "Select BIMAS from IMKB30_Transpose"]
StockList[[5]] = SQLExecute[conn, "Select DOHOL from IMKB30_Transpose"]
StockList[[6]] = SQLExecute[conn, "Select DYHOL from IMKB30_Transpose"]
StockList[[7]] = SQLExecute[conn, "Select ECILC from IMKB30_Transpose"]
StockList[[8]] = SQLExecute[conn, "Select ENKAI from IMKB30_Transpose"]
StockList[[9]] = SQLExecute[conn, "Select EREGL from IMKB30_Transpose"]
StockList[[10]] = SQLExecute[conn, "Select GARAAN from IMKB30_Transpose"]
StockList[[11]] = SQLExecute[conn, "Select HALKB from IMKB30_Transpose"]
StockList[[12]] = SQLExecute[conn, "Select ISCTR from IMKB30_Transpose"]
StockList[[13]] = SQLExecute[conn, "Select KCHOL from IMKB30_Transpose"]
StockList[[14]] = SQLExecute[conn, "Select KOZAD from IMKB30_Transpose"]
StockList[[15]] = SQLExecute[conn, "Select KRDMO from IMKB30_Transpose"]
StockList[[16]] = SQLExecute[conn, "Select PETKM from IMKB30_Transpose"]
StockList[[17]] = SQLExecute[conn, "Select SAHOL from IMKB30_Transpose"]
StockList[[18]] = SQLExecute[conn, "Select SISE from IMKB30_Transpose"]
StockList[[19]] = SQLExecute[conn, "Select SKBNK from IMKB30_Transpose"]
StockList[[20]] = SQLExecute[conn, "Select TAVHL from IMKB30_Transpose"]
StockList[[21]] = SQLExecute[conn, "Select TCELL from IMKB30_Transpose"]
StockList[[22]] = SQLExecute[conn, "Select TEBNK from IMKB30_Transpose"]
StockList[[23]] = SQLExecute[conn, "Select THYAO from IMKB30_Transpose"]
StockList[[24]] = SQLExecute[conn, "Select TKFEN from IMKB30_Transpose"]
StockList[[25]] = SQLExecute[conn, "Select TOASO from IMKB30_Transpose"]
StockList[[26]] = SQLExecute[conn, "Select TTKOM from IMKB30_Transpose"]
StockList[[27]] = SQLExecute[conn, "Select TUPRS from IMKB30_Transpose"]
StockList[[28]] = SQLExecute[conn, "Select VAKBN from IMKB30_Transpose"]
StockList[[29]] = SQLExecute[conn, "Select VESTL from IMKB30_Transpose"]
StockList[[30]] = SQLExecute[conn, "Select YKBNK from IMKB30_Transpose"]
MatrixForm[Table[a[i, j] = Correlation[StockList[[i]], StockList[[j]], {i, 30}, {j, 30}]]

```

APPENDIX A.6 : Composing Monte Carlo Simulation With Mathematica

```

Needs["DatabaseLink`"];
ToFileName[{DatabaseLinkDirectory}, "Examples"]
conn = OpenSQLConnection[JDBC["odbc", "IMKB_30"]];
SQLTableNames[conn]
StockList = SQLExecute[conn, "Select Hisse_Kodu from Hisse_Bilgileri where Hisse_Group ='IMKB30'"]
StockList[[1]] = SQLExecute[conn, "Select AKBNK from IMKB30_Transpose"]
StockList[[2]] = SQLExecute[conn, "Select ARCLK from IMKB30_Transpose"]
StockList[[3]] = SQLExecute[conn, "Select ASYAB from IMKB30_Transpose"]
StockList[[4]] = SQLExecute[conn, "Select BIMAS from IMKB30_Transpose"]
StockList[[5]] = SQLExecute[conn, "Select DOHOL from IMKB30_Transpose"]
StockList[[6]] = SQLExecute[conn, "Select DYHOL from IMKB30_Transpose"]
StockList[[7]] = SQLExecute[conn, "Select ECILC from IMKB30_Transpose"]
StockList[[8]] = SQLExecute[conn, "Select ENKAI from IMKB30_Transpose"]
StockList[[9]] = SQLExecute[conn, "Select EREGL from IMKB30_Transpose"]
StockList[[10]] = SQLExecute[conn, "Select GARAN from IMKB30_Transpose"]
StockList[[11]] = SQLExecute[conn, "Select HALKB from IMKB30_Transpose"]
StockList[[12]] = SQLExecute[conn, "Select ISCTR from IMKB30_Transpose"]
StockList[[13]] = SQLExecute[conn, "Select KCHOL from IMKB30_Transpose"]
StockList[[14]] = SQLExecute[conn, "Select KOZAD from IMKB30_Transpose"]
StockList[[15]] = SQLExecute[conn, "Select KRMDM from IMKB30_Transpose"]
StockList[[16]] = SQLExecute[conn, "Select PETKM from IMKB30_Transpose"]
StockList[[17]] = SQLExecute[conn, "Select SAHOL from IMKB30_Transpose"]
StockList[[18]] = SQLExecute[conn, "Select SISE from IMKB30_Transpose"]
StockList[[19]] = SQLExecute[conn, "Select SKBNK from IMKB30_Transpose"]
StockList[[20]] = SQLExecute[conn, "Select TAVHL from IMKB30_Transpose"]
StockList[[21]] = SQLExecute[conn, "Select TCELL from IMKB30_Transpose"]
StockList[[22]] = SQLExecute[conn, "Select TEBNK from IMKB30_Transpose"]
StockList[[23]] = SQLExecute[conn, "Select THYAO from IMKB30_Transpose"]
StockList[[24]] = SQLExecute[conn, "Select TKFEN from IMKB30_Transpose"]
StockList[[25]] = SQLExecute[conn, "Select TOASO from IMKB30_Transpose"]
StockList[[26]] = SQLExecute[conn, "Select TTKOM from IMKB30_Transpose"]
StockList[[27]] = SQLExecute[conn, "Select TUPRS from IMKB30_Transpose"]
StockList[[28]] = SQLExecute[conn, "Select VAKBN from IMKB30_Transpose"]
StockList[[29]] = SQLExecute[conn, "Select VESTL from IMKB30_Transpose"]
StockList[[30]] = SQLExecute[conn, "Select YKBNK from IMKB30_Transpose"]
(*First step of our program is to determine Covariance-Variance.
Let C be its Cholesky Decomposition of Covariance-Variance Matrix
we convert C matrix to Transpose of C Matrix.
We generate the random Z vectors which mean are zero and
standart deviation is unique.We generate 1000 unit of vector.
We multiplate transpose of C matrix with this random z vectors
we get ans[30,1000] matrix.That mean we get 1000 unit of
30 variable(stocks).*)
CovarianceVariance = MatrixForm[Table[CovarianceArray[i, j] =
Covariance[StockList[[i]], StockList[[j]], {i, 30}, {j, 30}]]
choleskyVariance = CholeskyDecomposition[CovarianceVariance]
TransCholeskyVariance = Transpose[choleskyVariance]
Z = RandomReal[NormalDistribution[0, 1], {30, 1000}]
ans = TransCholeskyVariance.Z
MatrixForm[ans]

```

APPENDIX A.7 : Developing C# codes and interface for arranging form of data range

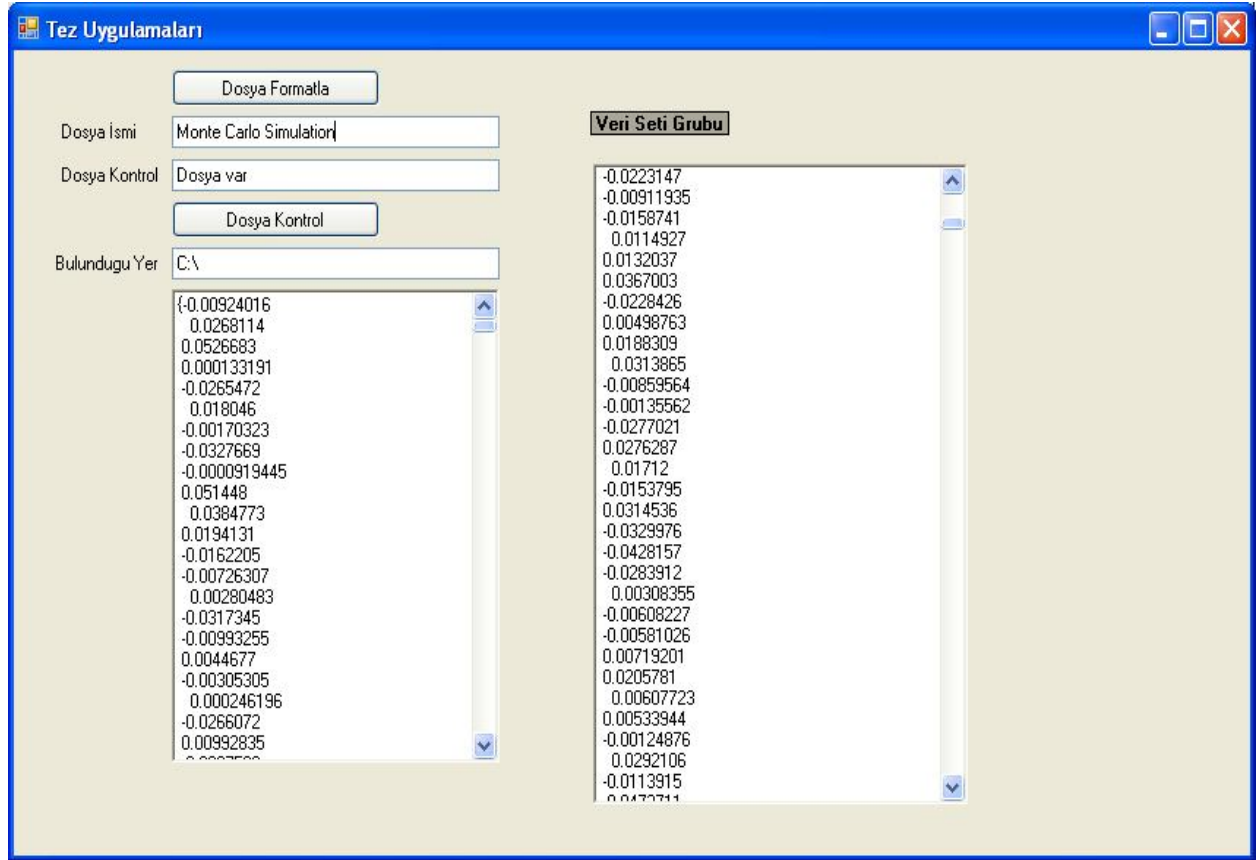


Figure A.7 : Arranging of Data Set Interface

```

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using System.IO;
namespace WindowsFormsApplication1
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }
        private void Form1_Load(object sender, EventArgs e)
        {
            string activeDir = @"C:\";
            string activeDirectory;
            string newPath = System.IO.Path.Combine(activeDir, "mySubDir");
            System.IO.Directory.CreateDirectory(newPath);
            string newFileName = "Monte_Carlo_Simulation.txt";
            newPath = System.IO.Path.Combine(newPath, newFileName);
            System.IO.Directory.SetCurrentDirectory(activeDir);
            activeDirectory = System.IO.Directory.GetCurrentDirectory();
            FileLocationTxt.Text = activeDirectory;
        }
        private void button2_Click(object sender, EventArgs e)
        {
            var SomeFile = new FileInfo("testFile.txt");

            if (SomeFile.Exists == true)
            { FileInfoTxt.Text = "Dosya var"; }
            else
            { FileInfoTxt.Text = "Dosya yok"; }
        }
        private void button1_Click_1(object sender, EventArgs e)
        {
            StringBuilder newFile = new StringBuilder();
            string temp = "";
            StreamReader sr = new StreamReader(@"C:\testFile.txt");
            string text =
                System.IO.File.ReadAllText(@"C:\testFile.txt");
            string[] lines =
                System.IO.File.ReadAllLines(@"C:\testFile.txt");
            foreach (string line in lines)
            {
                temp = line.Replace(",","\\n");
                newFile.Append(temp);
            }
            monteCarloList.Text = newFile.ToString();
        }
    }
}

```


RESUME

He was born in Istanbul in 1981. He was completed his high school education at Yeni Lise. Between 2001 and 2005 he had been in Mathematical Engineering in YildizTechnical University. Between 2006 and 2010 he had been in Finansbank it department. And Between 2010 and 2011 he had been in Akbank software department.