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TECHNICAL ANALYSIS: TESTING MACD WITH USING BIST30 INDEX

MASTER'S THESIS

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ABSTRACT

Towards the end of the eighteenth century the financial information about stocks was scarce and the available information was generally unreliable. Thus technical analysis method due to these factors has emerged to understand the stock price movements and by this way to forecast the future prices of stocks.

In technical analysis method past price movements and trading volume are drawn into the charts and possible future price movements are predicted.

In this study firstly the purpose and field activity of Borsa Istanbul are described, the milestones and the markets in Borsa Istanbul are mentioned. Afterwards fundamental analysis and technical analysis are shortly explained as analysis methods in stock exchange and efficient market hypothesis which don't accept the assumptions of these methods and is a criticism against these methods are shortly mentioned. In the next process charts, trends, formations and indicators used in technical analysis method are described in detail with examples.

Finally a retrospective simulation regarding to MACD indicator which is one of the most used indicator at the present time, is made. A system is clarified and the system traded when MACD give the buy and sell signals. After getting the results, MACD returns and stock returns are compared annually and as a whole in the tested 5 years with using 24 stocks in BIST30 Index. As a conclusion of the study it is obtained that except for a few stocks and in general the MACD returns is less than the stock returns.

ÖZET

Teknik analiz metodu 18. Yüzyılın sonlarına doğru hisse senetleri hakkında finansal bilgilerin kısıtlı olması ve piyasalarda bulunan mevcut bilgilerin de güvenilir olmamasından dolayı, hisse senetlerinin nasıl hareket ettiklerini öğrenmek ve böylece fiyatların gelecekte nasıl oluşabileceğine dair tahminde bulunabilmek amacıyla ortaya çıkmıştır.

Teknik analiz metodunda geçmiş fiyat hareketleri ve işlem hacmi gibi veriler grafiklere aktarılır ve gelecekte oluşması muhtemel fiyat hareketleri tahmin edilmeye çalışılır.

Bu çalışmada ilk olarak Borsa İstanbul'un amacı ve faaliyet alanı açıklanmış, tarihindeki önemli noktalara değinilmiş ve Borsa İstanbul'daki piyasalar kısaca açıklanmıştır. Borsada yaygın olarak kullanılan temel analiz ve teknik analiz metodları açıklanmış ve bu metodların varsayımlarını kabul etmeyen ve bir eleştirisi olan etkin piyasa hipotezine kısaca değinilmiştir. Sonraki süreçte teknik analiz metodunda kullanılan grafikler, trendler, formasyonlar ve indikatörler detaylı bir şekilde örnekler kullanılarak anlatılmıştır.

Son olarak günümüzde en çok kullanılan indikatörlerden biri olan MACD göstergesi ile ilgili olarak bir uygulama yapılmıştır. Uygulamada, BIST30 endeksine dahil olan 24 adet hisse senedinin getirisi 01.01.2011 ve 31.12.2015 tarih aralığında yıl yıl ve bir bütün olarak saptanmış ve hisse senedi getirileri sadece MACD göstergesinin ürettiği al ve sat sinyalleri kullanılarak yapılan alım-satımlardan elde edilen getiri ile karşılaştırılmıştır. Yapılan çalışmanın sonucunda birkaç hisse senedi dışında sadece MACD göstergesi kullanılarak yapılan alım-satımlarda hisse performanslarından daha az getiri elde edildiği saptanmıştır.

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LIST OF ABBREVIATIONS

BIST30 Index	Borsa Istanbul 30 Index
CCI	Commodity Channel Index
IMKB	Istanbul Stock Exchange
MACD	Moving Average Convergence and Divergence
RSI	Relative Strength Index

INTRODUCTION

At the present time the information and data can be reached easily and their number is infinite however infinite information and data cause chaos among investors. On the other hand most of the investors take their buy and sell decisions from hearsay or the movement of market prices of stocks, the news and the comments affect their decisions. To avoid this kind of chaos there are two common methods to evaluate the stocks. First one is fundamental analysis and second one is technical analysis.

Fundamental analysis requires many factors both financial statement analysis of companies and sectoral and macro-economic analysis. Thus due to the number and scope of the data, fundamental analysis requires a considerable degree of financial knowledge and time. On the other hand technical analysis states that every data is already reflected in prices and therefore technical analysis seems the examination of market prices is enough to evaluate a stock. Rather than analyzing the infinite number of data focusing only the prices provides a significant advantage in terms of technical analysis to make quick decisions.

Nevertheless technical analysis is still a complex analysis method. Because using technical analysis correctly and objective takes months or even years. Most of the investors don't know technical analysis in a detailed way and in the strict sense. Their emotions affect their decisions and they get late to take correct decisions in the correct time.

Therefore the main purpose of this study is to transform technical analysis to a very simple method with using the buy and sell signals of Moving Convergence and Divergence (MACD) indicator and to conclude can higher profit be obtained or not as compared to stock returns.

In the first part of this study, the field activity and purpose of Borsa Istanbul, the milestones and the markets in Borsa Istanbul is explained. Afterwards fundamental analysis and technical analysis is explained generally. In general Efficient Market Hypothesis is illustrated in the nature of a criticism of these two methods.

In the second part charts, chart types and chart periods which are the tools for technical analysis are explained. Afterwards basic principles of the Dow Theory which is known as the oldest technical analysis method, trend lines and trend channels, trends classification in terms of direction and time, support and resistance points, price gaps and retracement levels of W.D. Gann and Fibonacci are explained. Then main continuation and reversal formations which are the specific pictures of price movements are explained. Lastly in the second part main indicators which are the tools to see the extreme sell and buy areas and to see the divergences, are explained with examples.

In the final part a study regarding to MACD indicator which is one of the most widely used indicator, is made. The MACD returns and stock returns are compared annually and as a whole in the tested 5 years with using 24 stocks in BIST30 Index.

1. BORSA ISTANBUL AND COMMON ANALYSIS METHODS IN STOCK EXCHANGE

In this part Borsa Istanbul is explained shortly. Afterwards general information about common analysis methods in stock exchange is given and they are compared with each other.

1.1. Borsa Istanbul and Borsa Istanbul History

The main purpose and field of activity of Borsa Istanbul is described as follows: To ensure that foreign currencies, capital markets instruments, gems and precious metals are traded in a secure and facile manner, in an efficient, competitive, transparent, stable and fair environment; to establish, develop, create, manage and/or operate markets, sub-markets, platforms, systems and other organized market places.[1]

In the below milestones in Borsa Istanbul are explained:[2]

- 1985: Inauguration of the İstanbul Menkul Kıymetler Borsası.
- 1989: Issuance of Decree 32 which allows foreign investors to trade in all kinds of securities in Turkey.
- 1991: Bills and bonds market was initiated.
- 1992: Corporate bonds started to be traded in bills and bonds market.
- 1993: Computerized trading system started with 50 stocks.
- 1994: Initiation of computerized trading system with all stocks.
- 1995: IMKB moved into the new building in Istinye.
- 1999: IMKB 100 Index began to be calculated on Euro basis.
- 2009: Public Disclosure Platform (KAP) was launched.
- 2012: Derivatives Market (VIOP) was launched.
- 2013: Istanbul Gold Exchange and Istanbul Menkul Kıymetler Borsası were terminated and these two institutions merged under the name of Borsa Istanbul.

[1] Borsa Istanbul, About Us, from http://www.borsaistanbul.com/en/corporate/about-borsa-istanbul/about-us, (Retrieved April 26, 2016)

[2] Borsa Istanbul, Milestones in Borsa Istanbul History, from http://www.borsaistanbul.com/en/corporate/about-borsa-istanbul/milestones-in-borsa-istanbul-history, (Retrieved April 23, 2016)

BIST-100 Index reached the all-time high level at 93,178.87.

A strategic partnership agreement was signed between Borsa Istanbul and NASDAQ OMX.

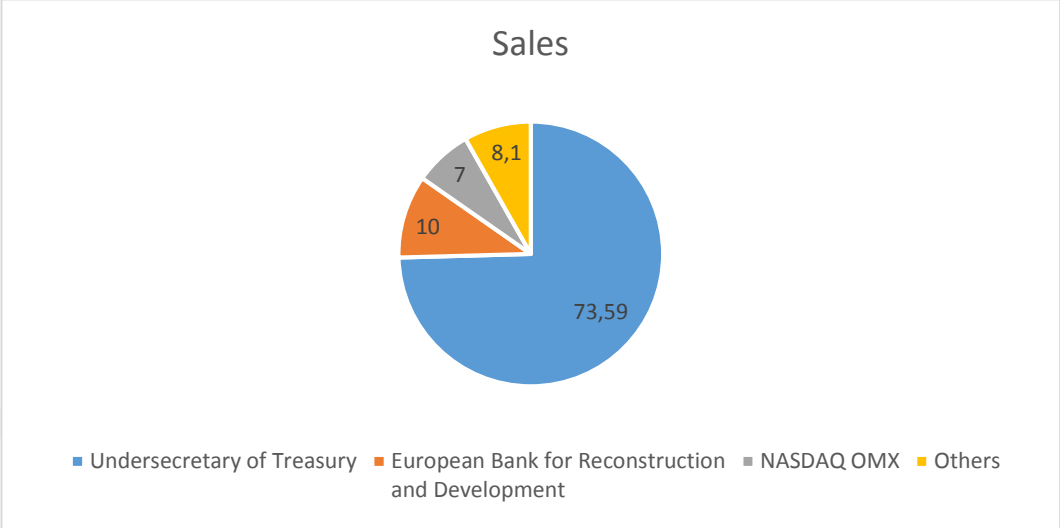

Figure 1: Shareholder Structure of Borsa Istanbul

Furthermore Borsa Istanbul is a joint and private company. Undersecretary of Treasury has almost 75% of Borsa Istanbul. European Bank has 10%, NASDAQ OMX has 7% and others has 8% of Borsa Istanbul.

1.1.2. The Markets in Borsa Istanbul

Mainly there are four markets in Borsa Istanbul. These are equity market, debt securities market, derivatives market and precious metals and diamond markets.

A: Equity Market and Debt Securities Market

Exchange traded funds, equities of companies from various sectors, certificates and warrants are traded in Borsa Istanbul Equity Market. Borsa Istanbul Equity Market offers for both domestic and foreign investors a transparent, liquid and secure trading environment.[3]

On the Debt Securities Market debt securities, securitized assets and income backed debt securities, lease certificates, liquidity bills issued by the Central Bank of the Republic of Turkey, which are denominated in TRY and foreign currency can be traded.[4] Debt Securities Market has the highest volume in comparison with other markets in Borsa Istanbul.

[3] Borsa Istanbul, Equity Market, from http://www.borsaistanbul.com/en/products-and-markets/markets/equity-market (Retrieved April 23, 2016)

[4] Borsa Istanbul, Debt Securities Market, from http://www.borsaistanbul.com/en/products-and-markets/markets/debt-securities-market (Retrieved April 23, 2016,)

B: Derivatives Market and Precious Metals and Diamond Markets

Derivatives Market (VIOP) consists of 13 main markets. These are Equity Options Main Board, Equity Futures Main Board, Equity Index Options Main Board, Equity Index Futures Main Board, FX Futures Main Board, FX Options Main Board, Precious Metals Futures Main Board, Commodity Futures Main Board, Power Futures Main Board, Foreign Indices Futures Main Board, Metal Futures Main Board, ETF Futures Main Board, Overnight Repo Rate Futures Board.[5]

Precious Metals and Diamond Markets has three sub-markets which are Precious Metals Market, Precious Metals Lending Market and Diamond and Precious Stone Market.[6]

1.2. Common Analysis Methods in Stock Exchange

Predicting the future direction of stock prices and timing when to sell or buy a stock, has been one of the most persistent efforts for investors. As a result of these efforts several methods have emerged. Some of these methods which have the common goal to estimate the future stock prices, are Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis.[7]

1.2.1. Fundamental Analysis

Benjamin Graham is known as a founder of fundamental analysis. At 1934 he published a book which name is Security Analysis and it is known as the first book about fundamental analysis. Graham identified the intrinsic value as a true worth of a company.[8]

Simply fundamental analysis is the process of calculating the intrinsic value of a stock. Each stock has both an intrinsic value and a market value. Additionally fundamental analysis is based on the comparison of the intrinsic value and the market value of stocks.[9] When the market value of a stock is lower than its intrinsic value, the fundamental analyst would decide to buy the stock because it is underpriced and the

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[5] Borsa Istanbul, Derivatives Market, from http://www.borsaistanbul.com/en/products-and-markets/markets/derivatives-market-viop (Retrieved April 23, 2016)

[6] Borsa Istanbul, Precious Metals and Diamond Markets, from http://www.borsaistanbul.com/en/products-and-markets/markets/precious-metals-and-diamond-markets (Retrieved April 23, 2016)

[7] Mehmet Kılıç, Teknik Analiz Yöntemi ve Simulasyon Modeli ile İMKB'de Uygulanması, **Master's Thesis**, Sakarya University, June 2008, p. 19.

[8] Titus Suciu, Elements of Stock Market Analysis, **Bulletin of the Transylvania University of Brasov. Series V: Economic Sciences**, 2013 Vol. 6 Issue 2, from http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=2&sid=d84c14ee-df72-45ae-9154-9496b7c36b29%40sessionmgr105&hid=120, (Retrieved April 14, 2016), p 154.

[9] Fatih Apaydın, Teknik Analizde Optimizasyon Uygulaması ve Bu Uygulamanın İMKB Üzerinde Test Edilmesi, **Master's Thesis**, Marmara University, Istanbul, 2009, p. 5.

price of a stock is expected to move higher to catch up on its intrinsic value. Conversely, if the market value of a stock is higher than its intrinsic value, the fundamental analyst would decide to sell the stock because it is overvalued and the price of a stock is expected to fall until its intrinsic value.[10]

Fundamental analysis has 3 phases. These are economy analysis, sector analysis and company analysis.

a) Economy Analysis

Stock prices are affected by firstly economic conditions. That's why the first stage of fundamental analysis is the economy analysis. The likelihood of success of equity investments is higher in a strong and growing economy. Simply if the economy steadily grows, investing a stock will be more profitable. On the contrary if the economy is static or decreases, investing a stock will be illogical and risky. To analyze the economy economic indicators are used. The important ones are gross domestic product, per capita income, inflation rate, interest rates, public financial instruments, fiscal policies, economic growth and unemployment rate.[11] For instance in Turkey interest rates fluctuate between 12% and 8% for years. And when the interest rates are at 12% or near it, Istanbul Stock Exchange are at its depth or near its depth. Conversely when the interest rates are at 8% or near it, Istanbul Stock Exchange are at its peak or near its peak. Thus the fluctuation of interest rates can be used to decide when to buy or sell a stock in Istanbul Stock Exchange. Interest rates and the level of Istanbul Stock Exchange can be thought as both ends of a scale.

b) Sectoral Analysis

If fundamental analyst decides the economy is positive and investable, he has to identify which sector or sectors should be invested as a second stage of fundamental analysis. To make this decision, past sales and profits, continuity, labor status, competitive conditions, government policies and business price-earnings ratio etc. are used.[12]

The other thing is that industry life cycle analysis. While the introduction and growth stages commit high risk and return, the maturity stage is available for investors who

[10] Suresh, A.S., A Study on Fundamental and Technical Analysis, **International Journal of Marketing, Financial Services & Management Research**, 2013, Vol 2, No. 5, from http://indianresearchjournals.com/pdf/IJMFSMR/2013/May/6.pdf (Retrieved February 10, 2016), p. 44.
[11] Fatih Apaydın, op. cit., p. 6.
[12] Mehmet Kılıç, op. cit., p. 22.

want less risky investments. At last an industry which is at its decline stage, attracts least attention by investors.[13]

c) Company Analysis

The last and third stage of fundamental analysis is company analysis. To analyze a company financial aspects and non-financial aspects are used.

Analysis of financial aspects is made with using the balance sheets and the income statements of a company. Sales, profitability, earnings per share etc. are the numbers to analyze of financial aspects of a company. Furthermore there is four techniques to do financial statement analysis. These are financial ratio analysis, trend analysis, common size analysis and index analysis, cash flow analysis. In addition analysis of non-financial aspects includes the quality of management, corporate image, product quality, dividend policy, competitiveness etc.[14]

1.2.2. Technical Analysis

In the exchange markets, prices are emerged by the end result of a battle between the forces of supply and demand. In other words prices are emerged by the number of investors who wants to buy and who wants to sell.[15]

Technical analysis is a graphically examination of past price movements to predict the future direction of stock markets and stocks. Therefore technical analysis is used to forecast the future trend of prices and to make sell or buy decisions.[16] Technical analysis is based on graphical analysis for this reason technical analysts are called as chartists too.

Technical analysis has three key principles. These are explained below.[17]

a) Prices take into account all factors.

Technical analysis supposes that prices already include all available information and that's why analyzing the political- and economic factors, or other factors which affect the prices is not necessary. Technical analysts should study only the past price movements.

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[13] Fatih Apaydın, op. cit., p. 6.
[14] Suresh, A.S., op. cit., p. 46.
[15] Titus Suciu, op. cit., p. 155.
[16] Dilaysu Çınar, Technical Analysis Method for Stock Valuation: An Application in the Istanbul Stock Exchange, Retrieved February 2, 2016, **Master's Thesis**, Dokuz Eylül University, 2011, p. 38.
[17] Darko Vukovic, Zoran Grubusic, Ana Jovanovic, The Use of Moving Averages in Technical Analysis of Securities, **Megatrend Review**, 2012, Vol. 9 Issue 1, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=84763ba9-eb41-4f1a-a6e4-256e8597dc93%40sessionmgr4003&vid=0&hid=4208 (Retrieved February 2, 2016), p. 305.

b) Prices follow the trends.

"Prices follow the trends" is the most important term of technical analysis. Technical analysis supposed that prices move in trends and technical analysts try to evaluate and find the price trends. If someone denies prices follow the trends, technical analysis will be not useful for him.

c) History repeats itself.

The investing decisions controlled by a fear or enthusiasm of investors therefore denying that will be irrational. For instance there is volatility index (VIX) which measures the fear of investors. With analyzing the volatility index some technical analysts try to predict the depths and peaks. Human behavior is so much repetitive thus mankind's actions on markets will also be repetitive. Such as at the peaks there will be so much enthusiasm and at the depths there will be so much fear. These feelings of mankind repeat their selves all the time that's why technical analysis assumes that history repeats itself.

1.2.3. The Comparison Between Fundamental Analysis and Technical Analysis

While technical analysis use only past market prices and is based on graphics only, fundamental analysis use various financial and non- financial information. In addition fundamental analysis requires high financial literacy level however technical analysis doesn't require a financial literacy. That's why it can be said that technical analysis is simpler than fundamental analysis.

Another difference between fundamental analysis and technical analysis is that fundamental analysis is a long-term analysis method, on the contrary technical analysis is a mid-term or a short-term analysis method. The basic principle of fundamental analysis is to find an undervalued stock and keep it until its market value reaches its intrinsic value. Therefore fundamental analysis makes necessary a long-term approach. Conversely technical analysis is used to make a profit by taking advantage of short-term price movements.[18]

Technical analysis isn't 100% correct method. There might be traps on price movements to mislead technical analysts.

A common point of technical analysis and fundamental analysis is that they are both subjective methods. For instance different investors have different discount rates. Thus their estimated value for the same stock, will be different. And different technical

[18] Fatih Apaydın, op. cit., p. 10.

analysts can see different formations, can define support and resistance levels at different prices for the same stock. That's why their estimated price for the same stock, will be different too. For these reasons both technical analysis and fundamental analysis cause different investment decisions even for the same stock.[19]

1.2.4. Efficient Market Hypothesis

Efficient market hypothesis, which is one of the most well-known and accepted financial theory, states that analyzing the past and present market movements cannot help investors to predict future price. Furthermore random walk theory is the touchstone of efficient market hypothesis thus the information which comes into market, comes randomly and the coming information is unpredictable. That's why efficient market hypothesis states that price movements emerge randomly.[20]

The information which comes into market, can be positive so it can affect the market positively. On the contrary the information which comes into market, can be negative so it can affect the market negatively. And efficient market hypothesis states that prices are adjusted quickly on the arrival of new market information. For this reason analyzing all information which is into market already, will not help investors to profit more than the market average.

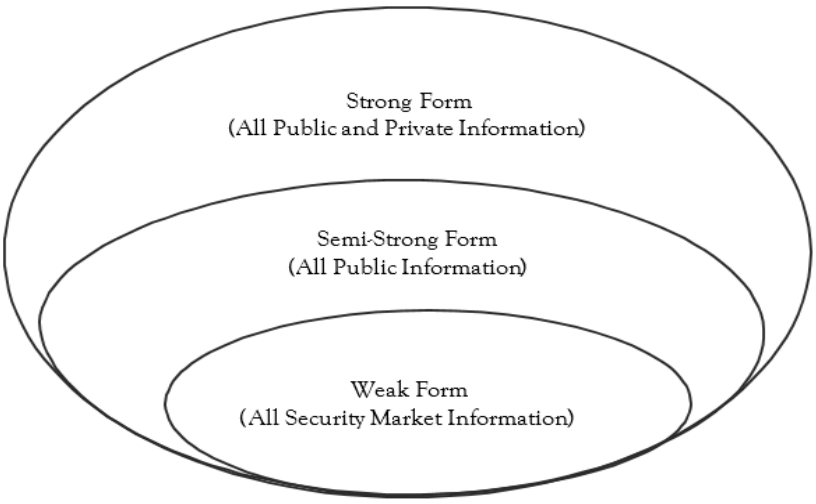

Figure 2: Forms of Efficient Market Hypothesis

Source: Mehwish Naseer, Yasir Bin Tariq, **The Efficient Market Hypothesis: A Critical Review of the Literature**, 2015, p. 50

[19] Dilaysu Çınar, op. cit., p. 31.

[20] Mehwish Naseer, Yasir Bin Tariq, The Efficient Market Hypothesis: A Critical Review of the Literature, **IUP Journal of Financial Risk Management**, 2015 Vol. 12 Issue 4, http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=5&sid=d84c14ee-df72-45ae-9154-9496b7c36b29%40sessionmgr105&hid=120 (Retrieved April 25, 2016), p. 49.

Efficient market hypothesis has three sub-groups to classify the information set. As it can be seen from the above figure 1, these are weak form, semi-strong form and strong form. Weak form is concerned with only the past price movements. Semi-strong form is concerned with all information which is public such as dividend or earning announcements, interest rate changes, political or economic events etc. Strong form is concerned with all public and private information such as incorporate information.[21]

a) Weak Form Efficient Market Hypothesis

As it was told before, the advent of new information into market is completely random. Therefore weak form efficient market hypothesis states that using past data or past information cannot help investors to gain more than the average market return.[22]

Technical analysts use past price movements to forecast the future prices and weak form efficient market hypothesis states that investors cannot gain more than the market average with analyzing past price movements. Therefore weak form efficient market hypothesis is kind of a criticism against technical analysis.

b) Semi-Strong Form Efficient Market Hypothesis

Semi-strong form efficient market hypothesis incorporates the terms of the weak form efficient market hypothesis. In addition it is concerned with all publicly information such as earnings announcement, dividends announcement, capital expenditures, price/earnings ratio of stocks or interest rates, inflation rates and growth rates etc. And these all publicly information is fully reflected in stock prices. Therefore this hypothesis defends that investors cannot gain from information once it is public.[23]

Semi-strong form efficient market hypothesis is a criticism against fundamental analysis. Because fundamental analysts use publicly financial and non-financial information to predict future prices.

c) Strong Form Efficient Market Hypothesis

If the market reflects all public and private information, in other words all public and private information contains into market, then it can be said that there is strong form efficient market. Consequently even those who take insider information, cannot gain more than the average market return.[24]

[21] Dilaysu Çınar, op. cit., p. 22.
[22] Fatih Apaydın, op. cit., p. 13.
[23] Mehwish Naseer, Yasir Bin Tariq, p. 52.
[24] Fatih Apaydın, op. cit., p. 14.

2. TECHNICAL ANALYSIS

In this part charts which are the main tools of technical analysis, the Dow Theory which is known as the oldest technical analysis method, basic concepts of technical analysis, formations which are the specific patterns and shows the possible destination of prices and finally indicators which are constructed by moving averages will be explained in detail.

2.1. Charts

As it mentioned before technical analysis is formed of charts and records past price movements on charts. Closing- and opening prices, maximum- and minimum prices are shown on these charts. To examine and analyze the prices these information have to be known.

Horizontal axis shows the time on charts and their interval between each other is always equal. Vertical axis shows the price on charts but the interval between prices is not equal always on the contrary of horizontal axis. [25]

In this section charts which are plotted by the method of arithmetic and logarithmic scales, chart periods and chart types will be explained. Furthermore in the given charts daily period is used and in addition green and red colors are used. Green color occurs when the closing price is higher than the opening price. Red color occurs when the closing price is lower than the opening price. Green and red colors are used in this study because they are the most widely used colors by technical analysts.

2.1.1. Arithmetic versus Logarithmic Scale

Charts are plotted by the method of arithmetic or logarithmic price scales.

a) Arithmetic Scale

The distance between all unit prices is equal on arithmetic scales. For instance the distance between 5 and 6 is equal with the distance between 1 and 2.

Most of the technical analysts use arithmetic charts. Because on arithmetic charts price movements at last periods can be seen in a detailed way. On long-term arithmetic charts

[25] Dilaysu Çınar, op. cit., p. 47.

the details of the past prices cannot be seen in a detailed way. That's why arithmetic chart is not suitable for long-term analysis which is generally more than 5 years.

The below chart is plotted on arithmetic scale. It contains BIST 100 data between 2000 and 2016 years. Recent past data is more clear than the further past data.

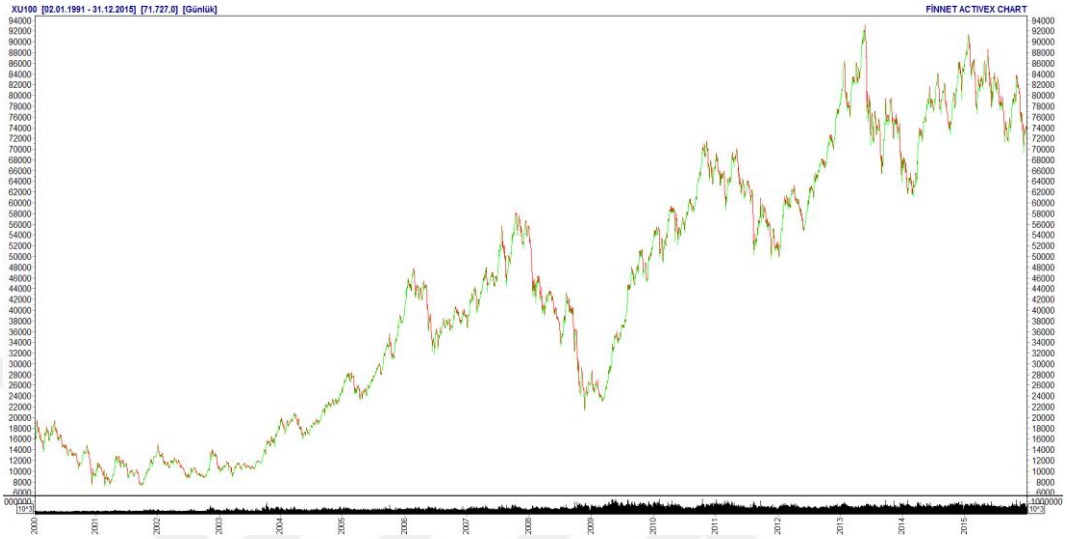

Figure 3: Arithmetic Scale

b) Logarithmic Scale

The distance between unit prices is not equal on the logarithmic scale. It means that, the distance between each unit price is shown as percentage. For example, difference between 1 and 2 will be two times longer than the difference between 2 and 3. Counter to arithmetic scale, logarithmic scale is used usually for long-term analysis, which is generally more than 5 years. Because the historical data can be seen in a more detailed way.[26]

Figure 4 shows the same data as Figure 3. The difference between them is obvious. Distant past on Figure 3 is seen in a more detailed way than Figure 3.

[26] John J. Murphy, **Technical Analysis of the Financial Markets**, New York Institute of Finance, 1999, p. 40.

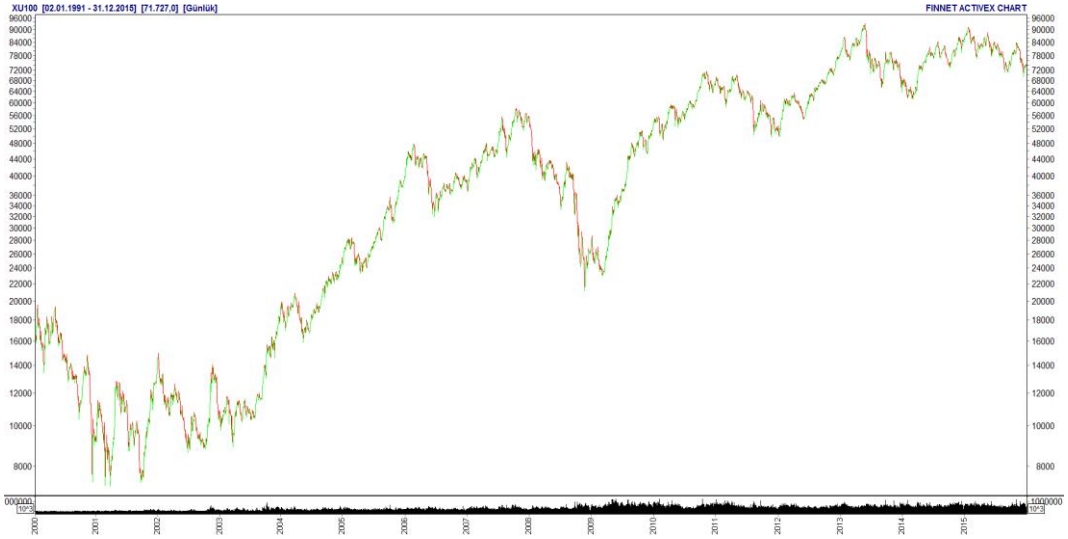

Figure 4: Logarithmic Scale

2.1.2. Chart Periods

Charts can be constructed for any time period. The most used period of charts is daily period for a stock or a market valuation. On the other hand, charts can be constructed for longer times than daily period such as weekly, monthly, even yearly. On a monthly chart a month represents a single bar, on a weekly chart a week represents a single bar etc. Weekly, monthly, even yearly charts are used to determine the major trends or to invest for a long-term which is not less than one year long. Additionally hourly, half hourly, even 5 minutes charts are used too. These chart periods are used to determine very-short term trends for a lot of trade possibility but for less profit. Technical analysts who use short-term chart periods have an expectation to benefit from short-term price fluctuations.[27]

2.1.3. Chart Types

The commonly used charts are as follows:

- Line Charts
- Bar Charts
- Candlestick Charts

a) Line Charts

Line charts are simple charts which is drawn by plotting the closing prices only. Line charts don't show the highs and lows of prices. They give a limited information on price movements thus they are not preferred generally by technical analysts. Nevertheless for

[27] John J. Murphy, op. cit., p. 45-46.

some technical analysts like Charles Dow closing prices are the most critical prices which refuse the fluctuations in the chosen period.[28]

Figure 5: Line Chart

b) Bar Charts

Bar charts are the most used chart type by technical analysts. The top of the vertical line shows the maximum price reached in the chosen period, the bottom of the vertical line shows the minimum price reached in the chosen period. The horizontal line to the left represents the opening price in the chosen period, the horizontal line to the right represents the closing price in the chosen period. As compared with the line charts, bar charts give more information about the past price movements.[29]

[28] Suresh, A.S., op. cit., p. 54.

[29] M. Siminica, Daniel Circiumaru, The Use of Charts for the Technical Analysis of the Share Quoted on the Stock Exchange, **Annals of the University of Oradea, Economic Science Series**, 2008, Vol. 17 Issue 3, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=8&sid=1632291f-975a-4998-9ab0-61b77ddffc29%40sessionmgr198&hid=121 (Retrieved February 4, 2016), p. 528.

Figure 6: Bar Chart

c) Candlestick Charts

Candlestick chart is the Japanese version of charts. Candles have two elements and these are called as "shadow" and "body". If the body is black, that means closing price is smaller than the opening price and prices fell in the chosen period. If the body is white, that means closing price is higher than the opening price and prices rose in the chosen period. Shadows represent the highest- and lowest prices.[30]

Figure 7: Candlestick Chart

2.2. Basic Principles of the Dow Theory

Towards the end of the eighteenth century financial information about stocks was scarce and the available information was generally unreliable. Thus Charles Dow, who is the founder of the Wall Street Journal, thought that if investors knew how stock prices were

[30] M. Siminica, Daniel Circiumaru, op. cit., p. 528.

performing, they might be able to forecast the future prices. These ideas gave rise to Dow Theory which is known as the oldest technical analysis method. In spite of high technology that we have now, the ideas of Charles Dow are still the touchstone and bedrock of technical analysis.[31]

That's why before entering the depths of technical analysis clarifying the basic principles of Dow Theory will be more meaningful.

There is 6 basic principles of the Dow Theory. They are mentioned as follow.

a) The Averages discount everything

The first principle of the Dow Theory agrees one of the key principles of technical analysis which is mentioned before. Prices take into account all factors such as financial information, natural disasters like earthquakes, floods, hurricanes, fear and greed of investors, political issues, policies of central banks etc. Thus every information is adjusted already in prices.[32]

b) Trends Are Divided Into Three Types

Dow determined a trend has three parts and these are primary, secondary and minor trend which he contrast to the tide, waves and ripples of the ocean or the sea. The primary trend is a tide, the secondary trend symbolizes waves which form a tide and the minor trend represents the ripples on a wave.[33]

According to Dow the primary trend or the major trend lasts from at least a year to several years. The secondary trend or the intermediate trend are the declines at the primary trend. Moreover the secondary trend lasts from three weeks to three months. The minor trend continues from a week to at most six weeks and it is in the same direction of a primary trend however in the opposite direction of a secondary trend. Thus a minor trend can be called as fluctuations at the secondary trend. Plus minor trends have no value for longer-term investors.[34]

c) Primary Trends Have Three Stages

According to Dow Theory primary trends have three stages and primary trends are divided into two groups. These are an uptrend also known as a bull market and a downward trend also known as a bear market.

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[31] Titus Suciu, op. cit., p. 155.

[32] Ketan Shah, The Dow Theory, **Aweshkar Research Journal**, 2012, Vol. 13 Issue 1, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=9aaabc8e-d7b8-49b9-a75e-093ec38341dc%40sessionmgr4002&vid=0&hid=4208 (Retrieved January 24, 2016), p. 77.

[33] John J. Murphy, op. cit., p. 25.

[34] Martin J. Pring, **Technical Analysis Explained**, McGraw-Hill Education, 2014, p. 31.

Bull market or uptrend has accumulation stage, attendance stage and speculation stage;

- The first stage of a bull market is an accumulation stage. At this stage after a downward trend prices move between a narrow price levels. At accumulation stage bad financial statements are seen due to the bad market conditions and the stock prices. Thus at this stage only astute investors buy stocks because they think all bad things were experienced.[35]
- The second stage is the attendance stage. At this stage; prices start to climb up, economic conditions and expectations start to improve and company profits begin to rise. Large mass, which is not found to reassure coming purchase from recovery stage, participate to the market due to this rapid rise. Moreover public attendance is seen at this stage.[36]
- The third stage is speculation stage. Prices go up very fast at this stage and it's the last stage of an upward trend. For instance from March 2013 to Mai 2013 Istanbul Stock Exchange (BIST 100) rose very fast and saw its peak in its' history. At Mai 2013 everybody, especially the speakers in economy channels were saying that Istanbul Stock Exchange (BIST 100) is going to 100.000 in Turkish Lira. But so far the peak which was reached at Mai 2013, couldn't pass over.

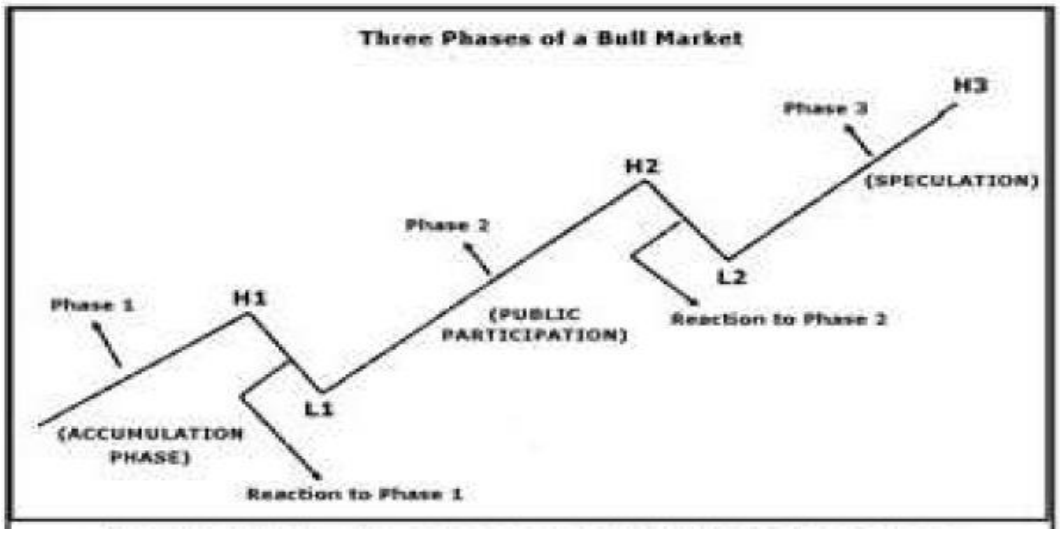

Figure 8: Three Phases of a Bull Market

Source: Ketan Shah, **The Dow Theory**, 2012, p. 80

[35] Ketan Shah, op. cit., p. 80.
[36] Dilaysu Çınar, op. cit., p. 44.

Bear market or downtrend has three stages. These are distribution stage, pessimistic stage and panic stage.[37]

- Distribution stage is the first stage of a downtrend. In the beginning of the distribution stage most investors don't have an idea a downtrend has begun. They think it is the correction of an uptrend because they are still optimistic about the market. At the distribution stage only informed and astute investors sell their stocks and liquidate their positions.
- The second stage of a bear market is the pessimistic stage. At the pessimistic stage selling pressure overrides the buying desire. Thus prices go down. The reported balance sheets of publicly traded companies are going worse.
- The last stage of a bear market is the panic stage. Financial statements of companies and the economic indicators are very bad at the panic stage. Market is in panic and most of the investors sell their portfolio and liquidate their positions. The fall is accelerated and the angle of decrease increases.

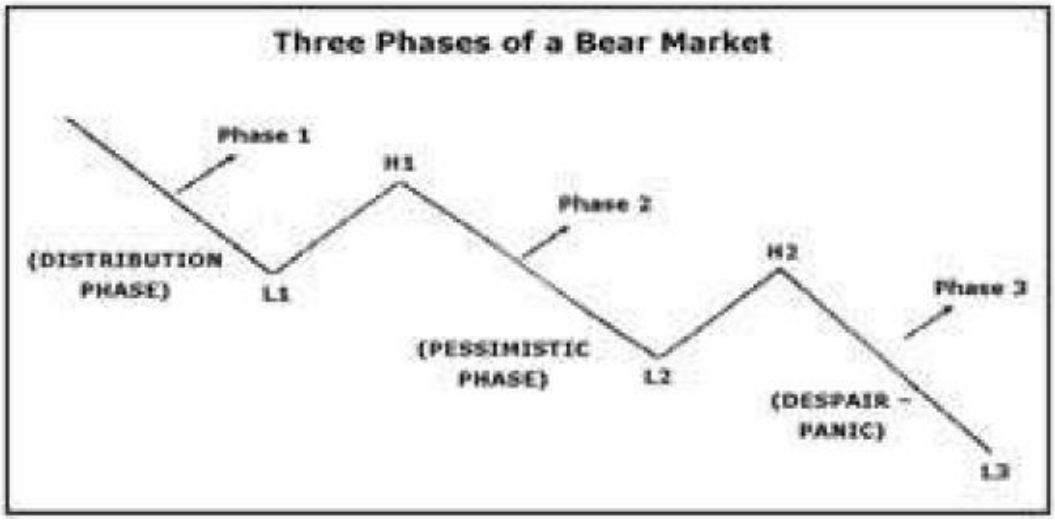

Figure 9: Three Phases of a Bear Market

Source: Ketan Shah, **The Dow Theory**, 2012, p. 81

d) The Averages must confirm Each Other

This principle is the most questioned principle in Dow Theory's principle. Dow means in this principle that one average alone cannot produce a signal of trend change. At least two averages must confirm the trend change.[38]

[37] Ketan Shah, op. cit., p. 81.
[38] Robert D. Edwards, **Technical analysis of stock trends**, CRC Press, 2001, p. 19.

e) Volume Confirms the Trend

According to Dow volume should expand on rallies and decrease on declines. If volume declines on rallies and expands on declines, it alerts the current trend may soon be reversed.[39]

f) The Current Trend is Valid until the Turn Signal

Turn signal must be received to say the current trend is finished. For instance at an upward trend rising peaks and rising bottoms must occur. If a new bottom occurs under the last bottom point at an upward trend, it can be said that the rising trend is over and a downward trend has begun. Until the turn signal is received, the current trend is valid.[40]

g) The Advantages and Disadvantages of Dow Theory

The advantages of Dow Theory;

- Dow Theory focuses long-term trends and refuses short-term fluctuations. Focusing long-term trends can help technical analysts to not miss probable big profits and can reduce the probable big losses.

The disadvantages of Dow Theory;

- Dow Theory doesn't give any signal at the top or at the depth. It gives signal sometime after when the trend begins.
- Dow Theory is not suitable for short- and medium-term investors. Because it overlooks short-term movements. Thus it's not usable for traders who invest for short-term.

2.3. Basic Concepts of Technical Analysis

A trend represents the direction which prices go in that direction. The direction of prices doesn't move in a straight line. It advances in a zigzag manner. For instance an upward direction occurs when higher peaks and higher bottoms are seen. On the contrary a downward direction occurs when lower peaks and lower bottoms are seen. Moreover prices don't rise and don't fall always. Sometimes prices move within a limited range which is named as horizontal trend or trendless.[41]

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[39] Martin J. Pring, op. cit., p. 32.
[40] Dilaysu Çınar, op. cit., p. 46.
[41] Snezana Radukic, Milica Radovic, Long Term Trend Analysis in the Capital Market – The Case of Serbia, **Journal of Central Banking Theory and Practice**, 2014, 3, from http://www.cbcg.me/repec/cbk/journl/vol3no3-1.pdf (Retrieved February 6, 2016), p. 7.

2.3.1. Support and Resistance Points

As it's seen in the previous figures prices don't rise and don't fall always. They hang around some prices, rebound from some prices and pull back from some prices. These prices are called as 'resistance points' and 'support points'.

The peak price of a stock or a market is called as 'resistance point'. Resistance points are the levels to which prices rise and then fall again and again. Moreover prices advance repeatedly until resistance points but can't break through. Because at resistance points selling pressure is higher than the buying desire. The low price of a stock or a market is called the support point. Support points are the levels to which prices fall and bottom out recurrently then rebound up again. At support points buying desire is higher than selling pressure or in other words when prices fall until support points, buying desire becomes higher than selling pressure.[42]

Furthermore when support points are broken, they become resistance points. And when resistance points are cut up, they become support points. It is called role reversal between support and resistance points.

Figure 10: Support and Resistance Points

2.3.2. Trend Classifications in Terms of Direction and Time

Trends are divided into three both in terms of direction and time. In terms of direction trends are divided as an uptrend, downtrend and sideways trend. In terms of time which it is mentioned before at the basic principles of Dow Theory's chapter, trends are divided as primary, secondary and minor trend.

[42] Suresh, A.S., op. cit., p. 55.

Trend classification in the way of direction:[43]

- An upward trend or in other words an uptrend consists of higher peaks and higher bottoms. Each new peak point is higher than the last peak point and each bottom point is higher than the last bottom point. Furthermore when an uptrend is seen in markets, it is named as 'bullish market'.
- Downtrend is the opposite trend of an uptrend. At the downtrend selling pressure is higher than the buying desire thus prices fall continuously. Downtrend is known as "bear market" among the investors. To draw a downtrend at least two peak points are needed. In addition at a downtrend declining bottoms and declining peaks are seen.
- Sideways trend is a trend which price movements fluctuate at a certain price range. There is a horizontal price movement and this is called congestion period on the market. At sideways trend demand and supply are equal. In addition horizontal price movement shows the market as uncertain. Furthermore sideways trend is named as "trendless".

Trend classification in the way of time:[44]

- The primary trend lasts generally more than a year or at least a year. At prevailing primary trend obvious price corrections are seen.
- These price corrections during a primary trend are called as secondary trends and it continues at least 3 weeks and at most 3 months.
- The smallest trends are called as minor trends. These trends are the corrections of secondary trends and they are in the same direction of primary trends.

2.3.3. Trend Lines and Trend Channels

Trend lines are the simplest tools of technical analysis perhaps. A trend line is a straight line which connects at least two peak points at a downward trend and which connects at least two bottom points at an upward trend. The other thing which have to be explained is that trend lines can be plotted in a horizontal line too.[45]

Figure 11 points a down trend line of BIST 100 during the whole 2015 year. The prices keep making new bottoms under the down trend line.

[43] Dilaysu Çınar, op. cit., p. 60.
[44] Snezana Radukic, Milica Radovic, op. cit., p. 8.
[45] Martin J. Pring, op. cit., p. 70.

Figure 11: Down Trend line

Trend channels are plotted with drawing parallel lines to the trend lines. In an uptrend channel line is plotted to the top of peak points and in a downtrend channel line is plotted to the series of bottom points. Using the channels lines are important because of two ways. First one is that they represent support and resistance points. Second one is crossing the channel lines represents trend reversal at the current trend. For instance crossing up the channel line at a downtrend signals the beginning of an uptrend.[46] Also according to our acknowledgments, breaking up a rising trend channel signals prices will rise in a faster way and an acceleration will occur.

Channel lines have measuring implications. Once a breakout occurs from an existing price channel, prices usually travel a distance equal to the width of the channel. Therefore, the technical analyst has to simply measure the width of the channel and then project that amount from the point at which either trend line is broken.[47]

Figure 12 is a good example of a trend channel. Lower channel line served as a support point 4 times. Upper channel line served as a resistance point 3 times. After the breakage of upper channel line to the upward, prices pulled back until upper channel line and kept rising so far. This kind of pull backs are named as an ‘approve’.

[46] Martin J. Pring, op. cit., p. 91.
[47] John J. Murphy, op. cit., p. 85.

Figure 12: Trend Channel

2.3.4. Understanding the Decisive Breakouts

Decisive breakouts represent the changing of the prevailing trend. Generally two types of rules are used by technical analysts to examine the decisive breakouts. These are explained below:[48]

- First criteria is 3% penetration rule. For instance let's say price is at 100 and an upward trend line or a support point passes at 100. If prices break down 100 point, and keep falling until 97, then technical analysts who use 3% penetration rule, sell the stock. Vice-versa.
- Second criteria is two days rule. Prices must close beyond the up- or down trend lines and support or resistance points for two successive days. After two successive days technical analysts who use two days rule as a criteria to determine a decisive breakout, sell or buy the stock.

If there is a need to compare these criteria, the first criteria is more reliable because technical analysts know their probable loss percentage. Waiting two days can cause higher losses, prices can rise or can fall rapidly in two days after breakage happens.

2.3.5. Reversal Days

Reversal days occur either at a peak or at a bottom. The basic definition of a top reversal day is that at an uptrend setting a new high followed by a lower close on the one day. The basic definition of a bottom reversal day is that at a downtrend setting a

[48] John J. Murphy, op. cit., p. 122.

new lot followed by a higher close on the same day. If a reversal day is seen, it signals the prevailing trend will change its direction.[49]

Reversal days are valid on weekly or monthly charts too. In fact if they are seen on weekly or monthly charts, they are more reliable. For instance figure 13 shows the data of BIST100 and its period is monthly. A reversal day was seen at Mai 2013 and then prices fell around 25% in a successive 3 months.

Figure 13: Reversal day

2.3.6. Price Gaps

Gaps mean the space between the last closing price and the opening price on the next day.

Gaps are divided into three which are breakaway gap, runaway gap and exhaustion gap. These are told below:[50]

- Breakaway gaps are the most profitable gaps if they can be caught by technical analysts. Generally they are longer than the other types of gaps. They signal a trend begins. For instance if breakaway gaps occur to the down, a downtrend is at its first stage.
- Runaway gaps comprise during a trend and runaway gaps are most seen gap type. They signal the current trend will last more for a while.

[49] John J. Murphy, op. cit., p. 91.

[50] Julie R. Dahlquist, Richard J. Bauer, Analyzing Gaps for Profitable Trading Strategies, **Journal of Technical Analysis**, 2013, Issue 67, http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=4&sid=6fb6f724-a455-42b4-ae91-71fd0dd499a7%40sessionmgr107&hid=122 (Retrieved February 6, 2016), p. 5.

- Exhaustion gaps occur at the end of current trends. After exhaustion gaps are seen technical analysts should avoid trading in the same way of current trend. In addition exhaustion gaps are generally filled during the next days.

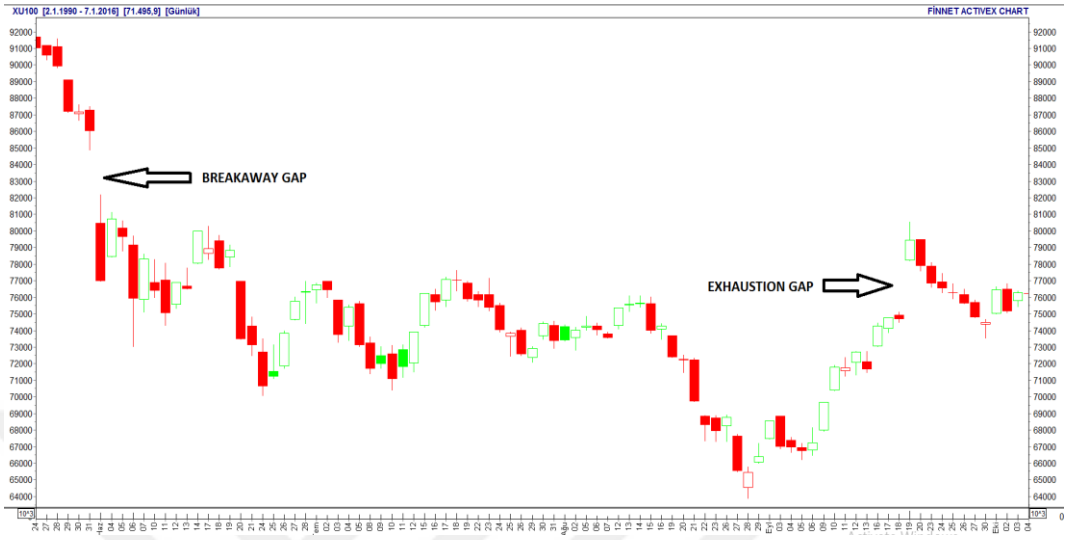

Figure 14: Price Gaps

2.3.7. Time- and Retracement Analysis with using Fibonacci Numbers

Fibonacci numbers are the series of some numbers in sequence and named after the founder of Fibonacci. Fibonacci found these numbers in the 13th century. These numbers are 1,1,2,3,5,8,13,21,34,55,89 etc. Each number is calculated by the sum of two last numbers. For instance, 8=5+3, 55=34+21. Furthermore after the first 4 numbers of Fibonacci numbers, the ratio between a number and a number earlier that number equals to 1,618 or 0,618. These ratios are named as "golden ratio".[51]

There are two methods which is mostly used with the help of Fibonacci numbers. These are explained below.[52]

- When a trend continues longer than then a Fibonacci number, it is assumed that same trend will continue until the number of next Fibonacci number. For example, if the trend continues for 9 days, it is assumed to continue at least until 13th day. If it lasts for 55 days, it is interpreted to last at least 89 days.

[51] Rattana Charussaengsuriya, Tawewan Tharnpipat, Technical Analysis of Stock Prices Using Elliot Wave Theory and Fibonacci Number, **The Empirical Econometrics and Quantitative Economics Letters**, 2012, Volume 1, Number, from mailto:http://www.jyoungeconomist.com/images/stories/EEQEL_V1_N1_March_2012_pp_091_102_Charussaengsuriya_Tharnpipat(1).pdf (Retrieved February 6, 2016), p. 95.

[52] Czeslaw Giryn, Adam Kozubski, Fibonacci Numbers as a Tool for Technical Analysis in the Forex Market - The Attempt of Application, **Studies & Proceedings Polish Association for Knowledge Management**, 2012, Issue 61, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=b454dac2-7465-4459-86ab-bcf0de0e562b%40sessionmgr4005&vid=0&hid=4208 (Retrieved January 17, 2016), p. 57.

- Retracement Analysis: The most used retracement values are 23,60%, 38,20%, 50,00% and 61,80%. For instance, if prices rose to 10 from 5, 50% retracement level will be at 7.5.

The problem is to determine which retracement level will work as a support or resistance point. The trick is knowing which retracement levels will work. On the other hand 2 criteria which are 3% penetration rule and 2 days rule can be used to determine decisive breakage of retracement levels.

The other problem is that from which points Fibonacci retracement levels will be drawn. To determine these points the major trend changing peak and depth points can be used to draw Fibonacci retracement levels.

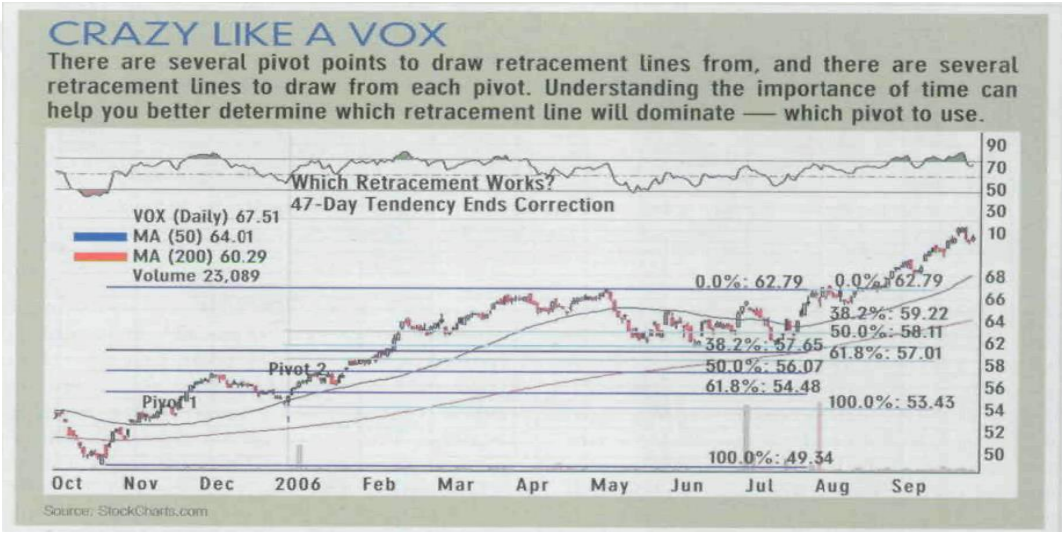

Figure 15: Fibonacci Retracement

Source: Jeff Greenblatt, **Trading Stocks with Fibonacci and Lucas**, 2007, p. 33

"Crazy like a Vox" is a chart which shows the telecom sector. In this example there are two different pivots from where Fibonacci retracement levels are drawn. First one on October 19, 2005 and second one is on January 3, 2006. The October pivot is lower than the February pivot. At June prices fell beyond the 38,20% retracement level of the January pivot but stopped and continued an uptrend after touching the 38,20% retracement level of the October pivot.[53]

[53] Jeff Greenblatt, Trading Stocks with Fibonacci and Lucas, **Futures (Cedar Falls, Iowa)**, 2007, Vol. 36 Issue 6, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=0a4a51d6-9d41-4745-a29d-61a2f86bc303%40sessionmgr4001&vid=0&hid=4208 (Retrieved January 17, 2016), p. 33.

Figure 16: Fibonacci Retracement (2)

Figure 16 shows how Fibonacci retracement levels worked very well. These are plotted from the peak point to bottom point of a downtrend. After a downward trend 38,20% retracement level which is showed on figure as "A" point, worked as a resistance point in the beginning of an uptrend. 61,80% retracement levels which are shown as "B" point and "F" point, worked as resistance points. Prices took support from "C" and "D" points which are at 50% retracement levels at an upward trend. Moreover after prices touched "E" point in other words 38,20% retracement level, they rose in a successful way.

2.3.8. W. D. Gann Fan and Retracement Levels

William Delbert Gann believed there are principles which governed nature and time. In addition he applied these same principles to the markets. These principles rely on geometric proportions and impeccable relationships.[54]

William Delbert Gann was a successful trader at stock markets and founded geometric angles as technical analysis tools. These geometric angles are divisions of time and price. Furthermore these are used to determine support and resistance points. When these geometric angles are drawn in groups, they build up Gann fan. Gann fan is like the combination of trend lines however in definite angles. In addition the most used angles are 26.25 degree, 45 degree and 63.75 degree. The most significant degree of a trend line is the 45 degree because the 45 degree angle represents one-to-one correlation between time and price. For instance 63.75 degree represents one-by-two relationship

[54] Linda Raschke, It's All the Timing, **Futures (Cedar Falls, Iowa)**, 1999, Vol. 28 Issue 6, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=11&sid=7d90a192-d511-491d-9975-9a71c0306cb9%40sessionmgr4002&hid=4208 (Retrieved January 24, 2016), p. 40.

between price and time which means time moves by one unit and prices move by two units. Moreover a trend line which is greater than the 45 degree won't be sustainable and incline to fall back to the 45 degree. On the contrary a trend line which is slower than the 45 degree won't be sustainable too and prices tend to go up until the 45 degree trend line.[55]

Gann founded secondly some retracement levels and used them such as Elliott did with using Fibonacci numbers. As regards to Gann the most significant retracement levels are 37,5%, 50% and 62.5%. These are very close retracement levels to Fibonacci numbers which is mentioned in the last chapter. Additionally technical analyst can combine Gann fan and Gann's retracement levels to take a more reliable signal.[56]

Figure 17: Gann Fan

Source: Steven B. Achelis, **Gann Angles**

Above chart is an example of a Gann fan and shows how two-by-one Gann angle worked twice as a support point at a bullish trend.

2.4. Main Reversal and Continuation Formations

Price formations are the precise pictures which have foresight value and they are divided into two. These are reversal formations and continuation formations.

In this chapter as main reversal formations head and shoulders and inverse head and shoulders, double top and double bottom formations will be explained. As main

[55] Kent Kofoed, Fanning Profits with W.D. Gann, **Futures (Cedar Falls, Iowa)**, 2012, Vol. 41 Issue 12, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=a8f9b5de-1224-4bef-9409-6483564fd6b6%40sessionmgr4003&vid=0&hid=4208 (Retrieved January 24, 2016), p. 20.
[56] Kent Kofoed, op. cit., p. 31.

continuation formations rectangles, triangles, flags and pennants, falling wedges and rising wedges formations will be explained.

Moreover two criteria which were explained before to determine the decisive breakout is used for all kinds of formations.

2.4.1. Head and Shoulders

Head and shoulders formation represents a reversal of an uptrend and is seen at the end of an uptrend. Head and shoulders formation consists of two shoulders and one head. The left shoulder is seen on the heaviest volume followed by a decline of prices. The head is seen on lighter volume after the decline and reaches higher prices than the left shoulder. Head is followed by decline of prices too. The right shoulder occurs when the prices rise again after the decline but lower point than the head. Moreover the right shoulder occurs on the lowest volume.[57]

The line which unifies the decline points is called the neckline. Furthermore the neckline of head and shoulders formation doesn't have to be exactly symmetrical. The neckline can have some angle, in other words can slope up or down. A sloping neckline doesn't alter the signals provided by head and shoulders formation.

Measuring technique of head and shoulders: Calculate the vertical distance from head to the neckline and project the distance to the lower from the breakage point.

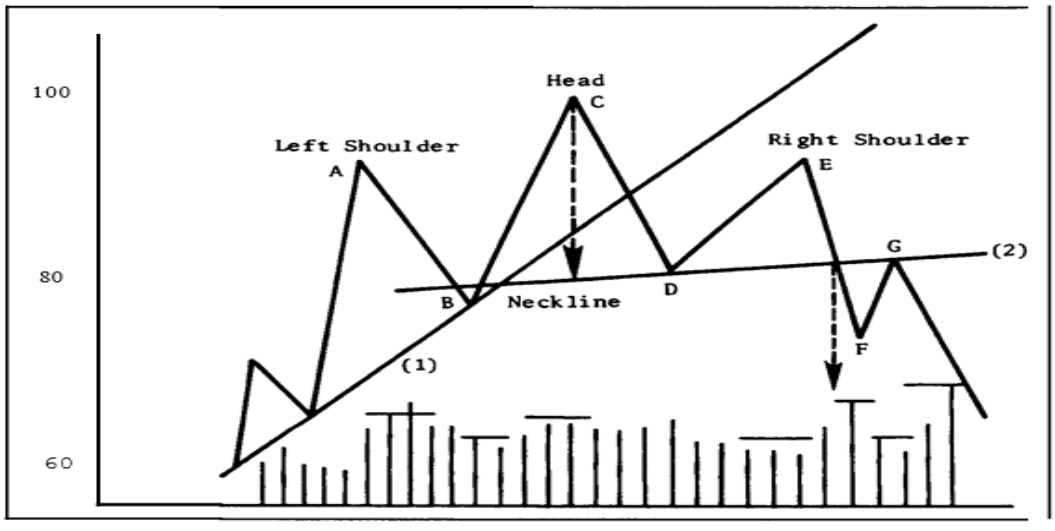

Figure 18: Head and Shoulders

Source: John J. Murphy, **Technical Analysis of the Financial Markets**, 1999, p. 104

[57] Suresh, A.S., op. cit., p. 57.

2.4.2. Inverse Head and Shoulders

Inverse head and shoulders has the same principles with head and shoulders however it is reversed formation of head and shoulders. It occurs at the end of a downtrend. A decline takes place and it creates the left shoulder. An advance occurs after the left shoulder and is followed by another decline. Second decline ends at lower prices than the first decline and therefore head is created. After head prices increase and this advance ends at the area of the previous advance. Then the final decline is seen. This last decline ends at the area of the point where left shoulder is and is called as right shoulder. The left shoulder has the highest volume and the right shoulder is seen on the lowest volume during inverse head and shoulders.[58]

Measuring technique of reverse head and shoulders: Measure the vertical distance between head and the neckline, then measure the same distance from the breakout point to the up.

Figure 19: Inverse Head and Shoulders

Source: Investopedia, **Inverse Head and Shoulders**

2.4.3. Double Tops

Two peaks occur at double top formations. Second peak can be a bit lower than the first peak. A bit lower second peak shows the market is reluctance for new peaks which gives more reliable signal for the reverse formation. Also second peak can be a bit upper than the first peak. A bit upper second peak is not problematic. The main

[58] Gerald Appel, **Technical Analysis**, Pearson Education, 2005, p. 75.

characteristic of double top formation is that the second peak must have less volume than the first peak.[59]

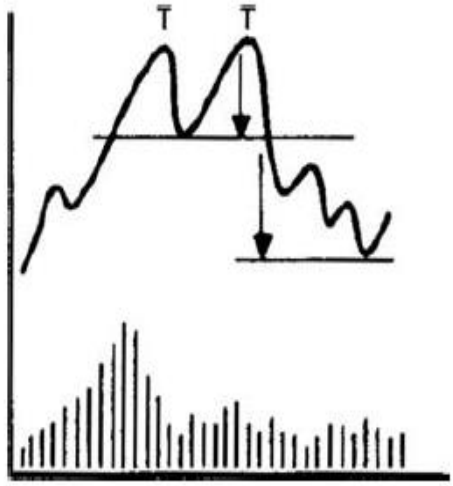

Figure 20: Double Top

Source: Martin J. Pring, **Technical Analysis Explained**, 2014, p. 149

Measuring technique of double top: Calculate the vertical distance from the first peak point to the neckline and project the same distance from the breakage point.

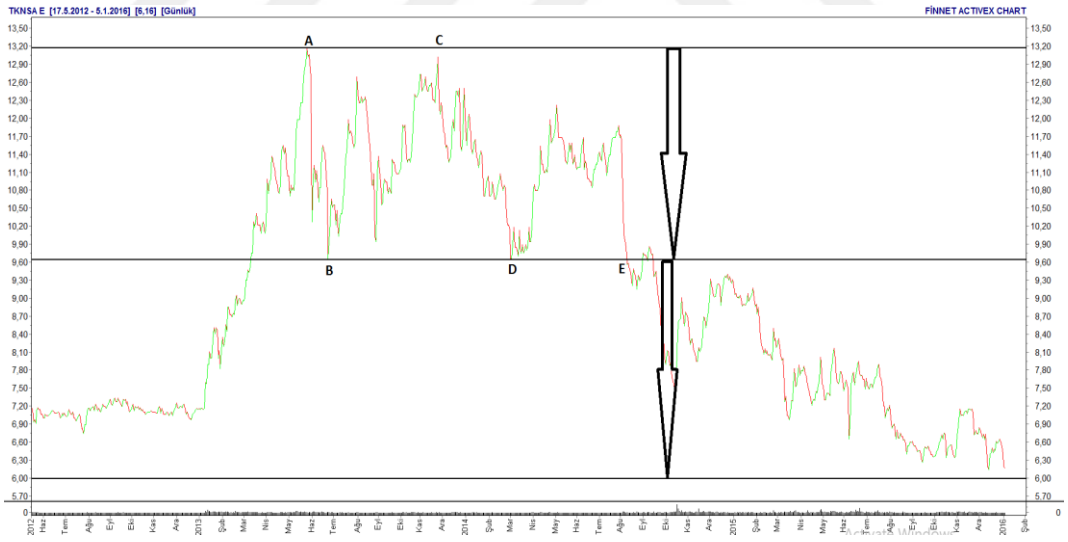

Figure 21: Double Top (2)

Above chart is an example of double top. ‘A’ is the first peak at 13,20. After ‘A’ prices fall until 9,60 which is shown on chart as ‘B’. ‘B’ becomes a support point and prices rise until ‘C’ which is at 13,00. ‘C’ represents the second peak. Now there is a potential double top. When prices fall until ‘D’, they rebound again but this time weaker. ‘B’ and ‘D’ is horizontal and their line named as a ‘neckline’. At ‘E’ prices break down the

[59] Martin J. Pring, op. cit., p. 149.

horizontal line. Now our potential double top is valid. 'E' is called as 'breakout point'. There is an invasion but it happens for a few days only and couldn't mislead 3% penetration rule thus stays as a 'bear trap'.

2.4.4. Double Bottoms

Double bottom is reverse of the double top and is seen at the end of downward trend. At double bottom formation the second bottom point is supported by largely more volume. The second bottom point can be a bit higher than the first bottom point. It is not troubled. Actually it is better because it gives a strong signal which buying desire becomes higher than selling pressure after a down trend. Moreover second decline can be a bit lower than the first bottom. It is not problematic too.[60]

Measuring technique of double bottom formation: Calculate the vertical distance between the first bottom and the neckline, then project the same distance from the breakage point to the upper.

On the other hand during double top formations and during double bottom formations neckline doesn't have to be exactly horizontal. It can be slope up or down.

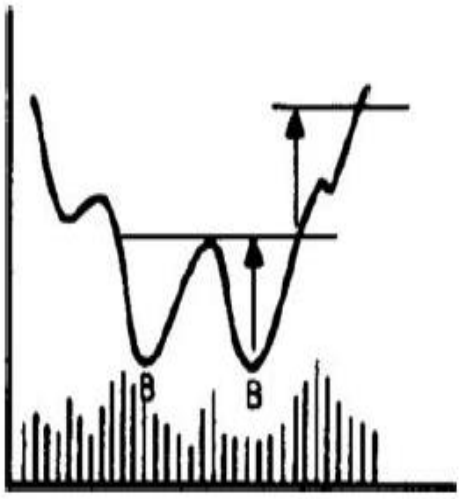

Figure 22: Double Bottom

Source: Martin J. Pring, **Technical Analysis Explained**, 2014, p. 151

[60] Suresh, A.S., op. cit., p. 58.

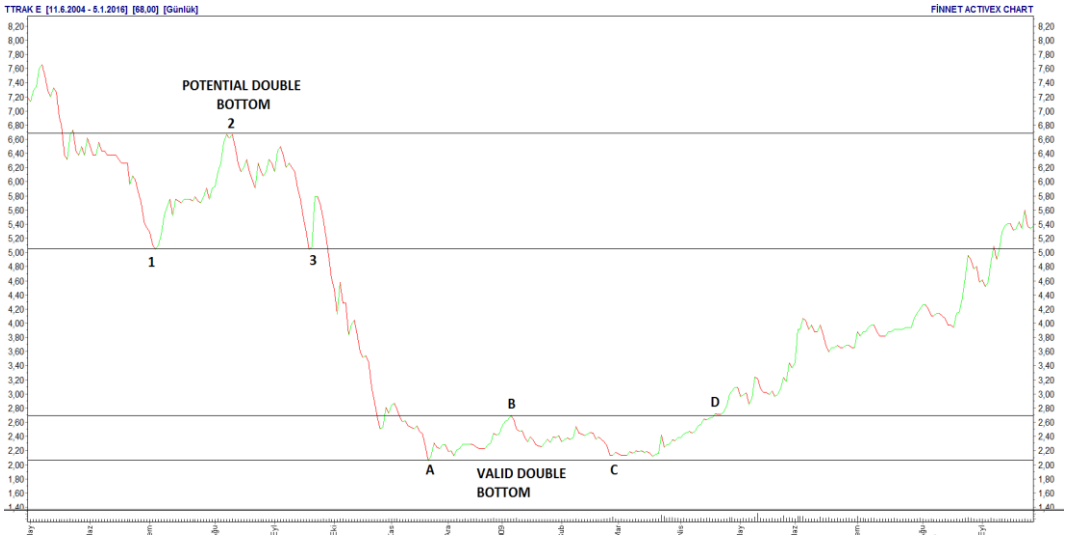

Figure 23: Double Bottom (2)

Figure 23 shows potential double bottom and valid double bottom. Potential double bottom couldn't turn valid double bottom because double bottom line broke down and the peak of potential double bottom couldn't break up. Valid double bottom in figure 23 consists of 'A' and 'C' as support points, and 'B' as resistance point. 'B' is named as the neckline. After breaking up the neckline, double bottom formation is confirmed or in other words it is valid now and then prices rose.

2.4.5. Rectangles

Rectangles represents a break in the prevailing trend which prices fluctuate between two horizontal lines. Rectangle formation is sometimes known as a congestion area which buying desire and selling pressure is at the same level. In addition it represents a consolidation period in the current trend and is usually a continuation formation of the current trend.[61]

Measuring technique of rectangles: Measure the vertical distance from top point to bottom point and project the same distance from the breakout point.

[61] John J. Murphy, op. cit., p. 149.

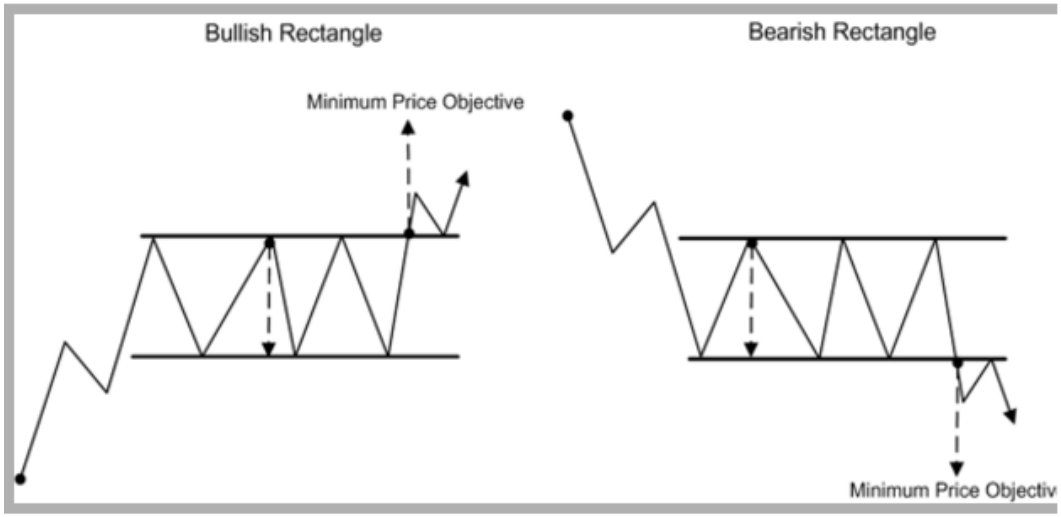

Figure 24: Rectangle Formation

Source: 4exanalysis, **Basic Patterns**

In figure 25, the vertical distance between top and bottom is 14. Top of rectangle is at 57 and bottom of rectangle is at 43. After breaking up the rectangle, prices pulled back two times down to the top line of rectangle and it did its duty as a support line. In other words prices took approve then prices went to 57+14=71 and returned back from there.

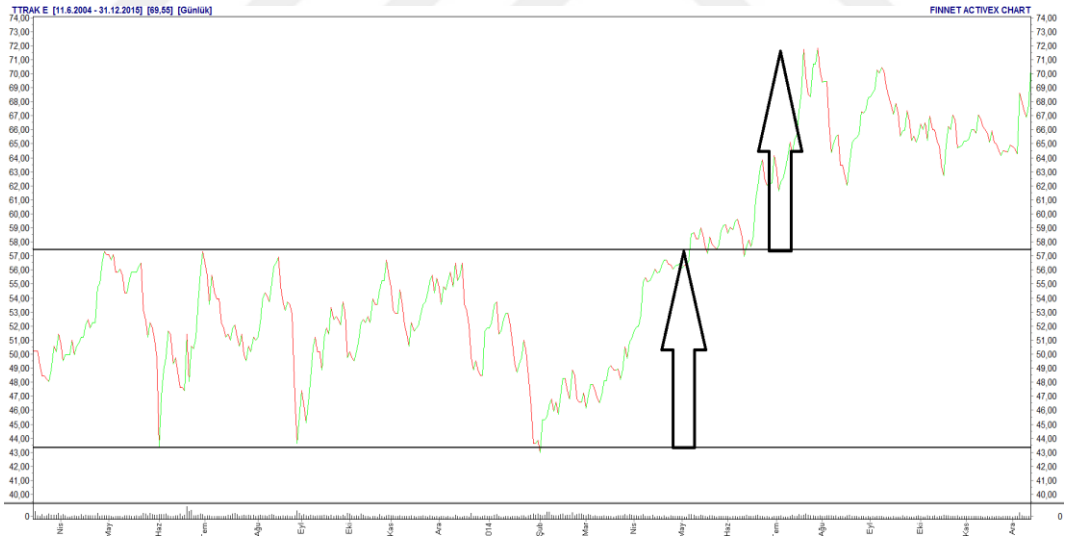

Figure 25: Rectangle Formation (2)

2.4.6. Triangles

Triangles fall into one of three parts. These are symmetrical triangles, ascending triangles and descending triangles.

a) Symmetrical Triangles

The symmetrical triangle is generally a continuation formation. For all continuation formations too, symmetrical triangle represents a hesitation for a while at the current trend.

It is mentioned before, two points are needed to draw a trend line. Consequently to draw a symmetrical triangle four converging points, two from peak points and two from bottom points, are needed. [62]

Symmetrical triangles are also named as "coils". Because volume and the fluctuations in price drop off during these formations until the breakage. During breakages volume should numerously increase. On the other hand if prices touch the converging lines of symmetrical triangles more than twice, these lines will have more significance and their breakages will be more viable.[63]

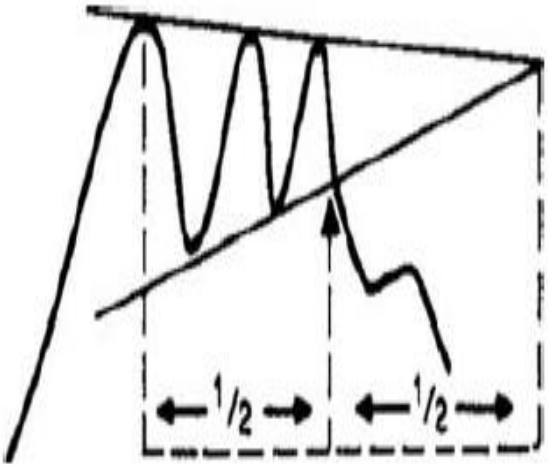

Figure 26: Symmetrical Triangle

Source: Martin J. Pring, **Technical Analysis Explained**, 2014, p. 159

b) Ascending Triangles

An ascending triangle is made up of one trend line which unifies the horizontal peak points and a second trend line connects higher low points which slope up. An ascending triangle is created when at least two horizontal peak points and at least two higher low

[62] John J. Murphy, op. cit., p. 132.
[63] Martin J. Pring, op. cit., p. 159.

points occur. An ascending triangle is also a continuation formation formed during an uptrend as a consolidation period.[64]

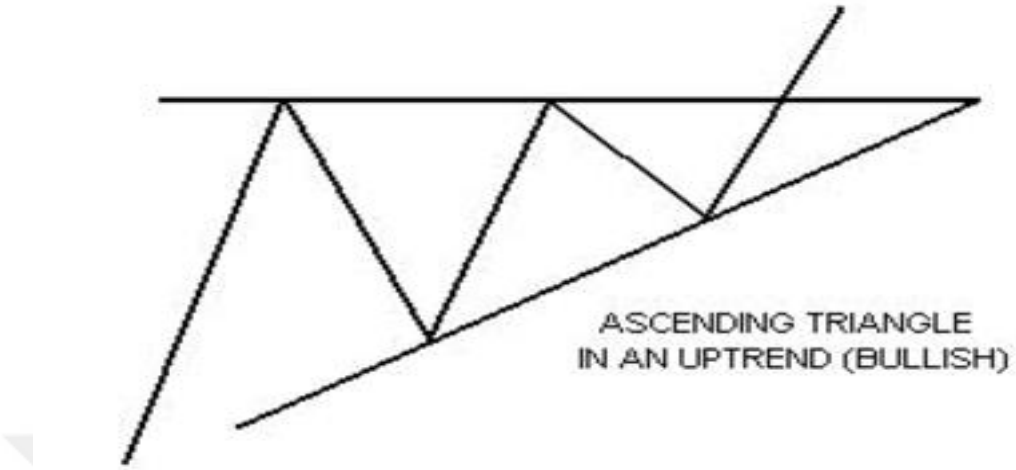

Figure 27: Ascending Triangle

Source: Chartpatterns, **Ascending Triangles**

c) Descending Triangles

Descending triangles foreshadow the decline of prices on the contrary ascending triangles. A descending triangle is formed by a horizontal line integrates the low points and by a downward trend line unifies peak points. At least four points are needed to draw a descending triangle too. Moreover it usually indicates a bearish market will be seen after the breaking down the horizontal line.[65]

[64] Bramesh Bhandari, Trading Stocks with Triangles, **Futures (Cedar Falls, Iowa)**, 2012, Vol. 41 Issue 6, from http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=2&sid=6fb6f724-a455-42b4-ae91-71fd0dd499a7%40sessionmgr107&hid=122 (Retrieved February 15, 2016), p. 35.
[65] Dilaysu Çınar, op. cit., p. 94.

Figure 28: Descending Triangle

Source: Investopedia, **Descending Triangle**

Measuring technique of triangles: Measure the vertical distance of the widest part in triangles and project the same distance from the penetration point.

2.4.7. Flags and Pennants

Flags and pennants are usually continuation formations and rarely produce an inverse trend. During flags and pennants the volume decrease dramatically and the volume suddenly increase during the breakage.[66]

Flags have two parallel trend lines however pennants have two converging trend lines. In other words when the trend lines converge, it is a pennant and when the trend lines are parallel, it is a flag. Both of them occur after fast price movements and represent a pause during current trends. They are usually seen in the opposite direction of the current trend. They occur usually shorter than three weeks.[67]

[66] John J. Murphy, op. cit., p. 142.
[67] Thomas N. Bulkowski, **Getting Started in Chart Patterns,** John Wiley & Sons, Inc., 2006, p. 152.

Figure 29: Flag

Source: Chad Langager, Casey Murphy, **Analyzing Chart Patterns: Flags and Pennants**

Figure 30: Pennant

Source: Chad Langager, Casey Murphy, **Analyzing Chart Patterns: Flags and Pennants**

2.4.8. Wedges

Wedge formations are divided into two. These are falling wedge and rising wedge. After breakage of wedge formations the opposite trend is seen usually. In other words rising wedge carries bearish implications and falling wedge carries bullish implications. Falling wedge occurs when two converging lines are constructed. In a falling wedge upper line which combines the peak points has higher angle than the lower line which

combines the bottom points. Furthermore falling wedge represents a break during a rising trend.[68]

Figure 31: Falling Wedge

Source: Chad Langager, Casey Murphy, **Analyzing the Chart Pattern: The Wedge**

Rising wedge is created when the prices rise in a converging channel. The angle of the line which unifies the higher peak points is less than the angle of the line which unifies the higher bottom points. Moreover during rising wedge formation volume decreases at the development of formation. Rising wedge tells that selling pressure increases urgently and buying desire remains notably constant.[69]

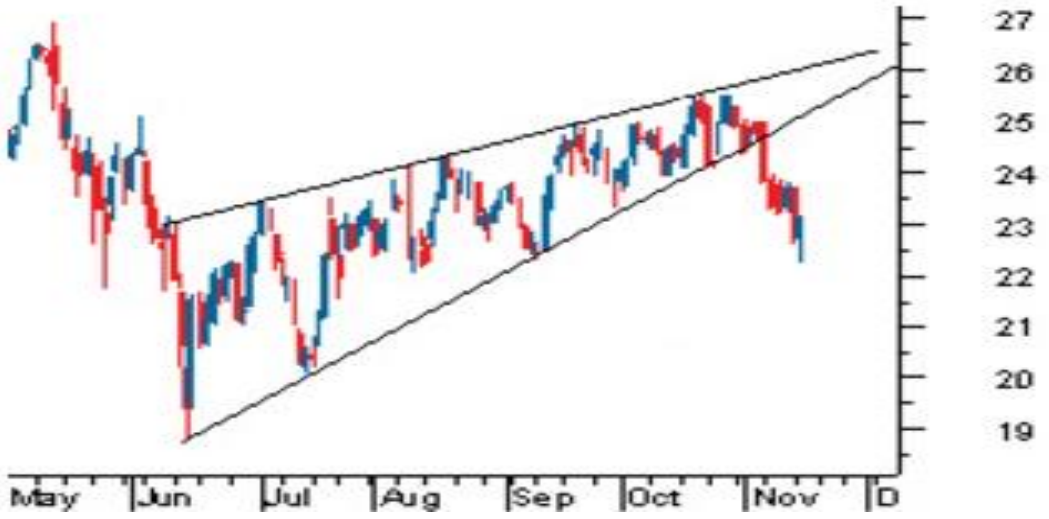

Figure 32: Rising Wedge

Source: Chad Langager, Casey Murphy, **Analyzing the Chart Pattern: The Wedge**

[68] Martin J. Pring, op. cit., p. 169.
[69] Gerald Appel, op. cit., p. 70.

Measuring technique of wedge formations: Measure the height of the vertical line at the widest part of the wedges and project that distance from the breakout point.

2.5. Main Indicators

Indicators are tools which are constructed by moving averages of prices and help technical analysts to buy or sell decisions with showing extreme areas, divergences or sell or buy areas.

There are three ways when the indicator is most useful. These three ways are used for most types of indicators.[70]

- The indicator is most useful when it reaches in its extreme areas. Most of the indicators have extreme areas which signal overbought and oversold areas. In such cases indicators warn technical analysts the current trend is outrageous and the direction of the current trend will change.
- The second most useful way is finding the divergence between the indicator and the price movements. For instance if the price makes new bottoms on the contrary the indicator doesn't, it is a signal that prices will begin rising. If the price makes new highs on the contrary the indicator doesn't, the indicator says the rising trend will end and a downward trend will begin.
- Lastly using the crossing of the zero or midpoints as a buy or sell signal is one of the most useful way. For instance if an indicator is higher than its zero or midpoint, it is in buying area and if an indicator is lower than its zero or midpoint, it is in selling area.

Furthermore it is very important to say that most indicator buy signals work best in bullish trends and sell signals work best in bearish trends. At bearish trend negative divergences are seen usually between the price and the indicator. Quite the contrary at bullish trend positive divergences are seen usually between the price and the indicator.

2.5.1. Moving Averages

Before explaining main indicators one by one moving averages should be mentioned because the source of indicators are moving averages and moving averages are another tool for technical analysts.

Moving averages are generally used technical indicators and calculate the average price in the chosen period. Moving averages calculate the average prices thus they are not affected by price fluctuations and help to see the direction of trends easier. For instance

[70] John J. Murphy, op. cit., p. 227.

technical analyst chose 50 day moving average. The calculation is very simple. Divide the last 50 days closing prices into 50.[71]

The usage of moving averages is divided mainly into two. These are explained at the below;

- The easiest way of using moving averages as a technical indicator is choosing only one moving average. If the prices are above the chosen moving average, it is assumed that prices will move higher and if the prices are below the moving average, it is assumed the direction of trend is down. For example technical analyst chose 100 day moving average and prices are above 100 day moving average. Then investor assume that the direction of prices is upward. Breaking up 100 day moving average will be interpreted a bullish trend begins. On the contrary breaking down 100 day moving average will be interpreted a bearish trend begins.
- The second way of using moving averages is choosing two moving averages in different time periods. Technical analyst choose a short-term moving average and a long-term moving average. If the short-term moving average is above the long-term moving average, technical analyst assume the trend is up. Conversely if the short-term moving average is below the long-term moving average, it is assumed that the trend is down. For instance when 50 day moving average is below 200 day moving average, it is interpreted that the direction of prices is downward.[72]

The mainly used moving averages are: 50 day moving average, 100 day moving average and 200 day moving average. Moreover using short-term moving averages would cause technical analysts to trade more frequently however they will have chance to liquidate their positions very close to the peaks and to buy stocks very close to the depths with the help of using short-term moving averages. Because short-term moving averages alert technical analysts early before the change of major trend. Nevertheless

[71] Darko Vukovic, Zoran Grubusic, Ana Jovanovic, op. cit., p. 306.

[72] Steven D. Dolvin, The Efficacy of Trading Based on Moving Average Indicators: An Extension, **Journal of Wealth Management**, 2014, Vol. 17 Issue 1, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=1ea1cc9d-2537-49fc-8d74-fdd908f2838d%40sessionmgr4003&vid=0&hid=4208 (Retrieved February 2, 2016), p. 52.

long-term moving averages are more stable. Therefore they signal less frequently than shorter-term moving averages which means more reliable signals however late signals.[73] Moreover three types of moving averages are mainly used by technical analysts. These are, simple moving average, weighted moving average and exponential moving average.

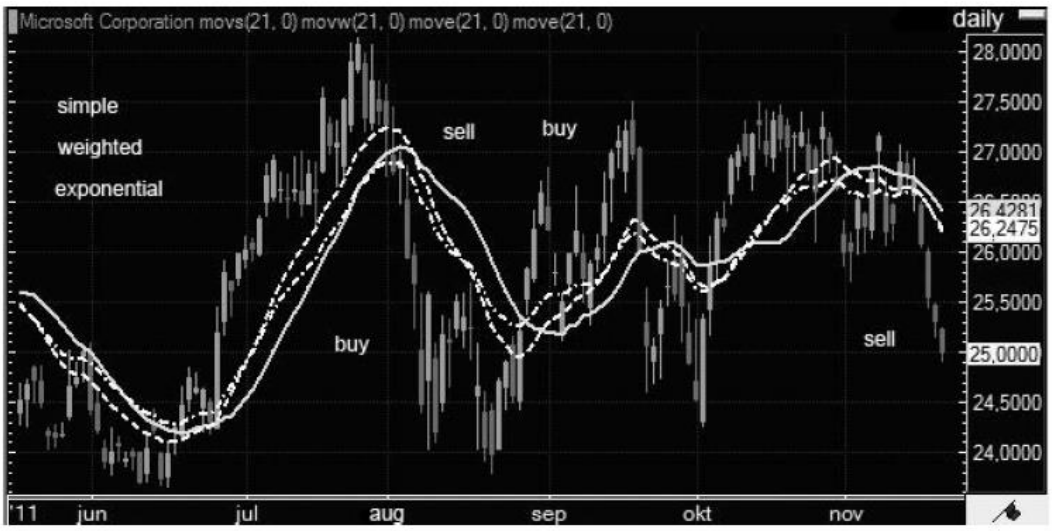

Figure 33: Moving Averages

Source: Darko Vukovic, Zoran Grubusic, Ana Jovanovic, **The Use of Moving Averages in Technical Analysis of Securities,** 2012, p. 309

Figure 33 clearly shows the differences between the simple-, weighted- and exponential moving averages. The chosen time period on figure 33 is 21 days for every type of moving average. The simple moving average is the furthest moving average from prices because it is an arithmetic calculation and every single day is calculated in same weight by the simple moving average. The weighted moving average is closer to prices than the simple moving average. Because the close data has more weight than the farther data in the calculation of the weighted moving average. As it can be seen that the closest moving average to prices is the exponential moving average because the close data is the weightiest data in the calculation of the exponential moving average. Thus the exponential moving average is the fastest moving average which gives signals in the fastest way and gives more signals than the other moving average types and it can lead more false signals.[74]

[73] Jerry A. Miccolis, Marina Goodman, Dynamic Asset Allocation: Using Momentum to Enhance Portfolio Risk Management, **Journal of Financial Planning**, 2012, Vol. 25 Issue 2, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=7ca8ea83-3732-45cf-a298-0c74e9a0a0db%40sessionmgr4001&hid=4105 (Retrieved February 5, 2016), p. 38.
[74] Darko Vukovic, Zoran Grubusic, Ana Jovanovic, op. cit., p. 309.

It is very important to say that an investor should examine the historical data while choosing the type of moving averages and the period of moving averages and decide which moving average type and period works best on analyzed stock or market.

2.5.2. Momentum

Momentum is the most basic indicator. Momentum measures the speed of price movements. Simply to build a 20 day momentum line, subtract the closing price 20 days ago from the last closing price. There will be negative or positive value and it will be plotted around the midpoint. Momentum's formula is:[75]

$$M = V - V^x$$

Where V is the latest closing price and Vx is the closing price x days ago.

The most used time period and default value is 10 day for momentum. However shorter time period such as 5 day can be used to determine shorter price fluctuations. 5 day momentum will be more sensitive than 10 day momentum and will give signals more frequently. Plus to avoid short price fluctuations longer time period such as 20 day can be used by technical analysts. 20 day momentum period fluctuates less than shorter time periods and is more stable however alerts later than shorter-time periods.

The midpoint of momentum indicator is at 100. Many technical analysts use the midpoint of momentum to take buy and sell decisions. Crossing above the midpoint is a buy signal and crossing below the midpoint is a sell signal. However technical analysts should know that crossing above the midpoint works best when the trend is up. When the trend is down, crossing above the midpoint can lead false signals. Plus when the trend is down, only sell decisions should be taken on crossing below the midpoint.[76]

Momentum indicator has one problem. It doesn't have high and low points in other words extremities. To solve this problem some technical analysts use visual inspection. They check the history of momentum on charts and determine low and high points by their selves. Pointing high and low points is the simplest way to see the extremities.

On the other hand divergence between price and momentum is another way to use momentum indicator. When prices reach new peaks though momentum indicator goes down, it signals negative divergence between momentum indicator and prices. It is overbought signal and early warning that prices will start falling. Conversely when prices fall new bottoms though momentum indicator goes up, there is a positive

[75] John J. Murphy, op. cit., p. 228.
[76] John J. Murphy, op. cit., p. 231.

divergence between momentum and prices. Thus positive divergences can be an opportunity to buy stock or market from depths.

Figure 34: Momentum

There is 10 day momentum and 20 day momentum on figure 34. The upper and lower momentum boundaries were drawn individually. As it can be seen that there is some divergences which momentum changed its' direction before prices did. Namely momentum alerted that the direction of trend will change before prices changed their direction. Moreover 20 day momentum is less volatile than 10 day momentum which means 20 day momentum reaches its extreme areas in longer time and less than 10 day momentum.

2.5.3. Commodity Channel Index (CCI):

The Commodity Channel Index (CCI) is an indicator designed to be effective at inconsistent trends or in other words at sideways trend. There is no need to confuse why it constitutes commodity in its name. CCI is used by technical analysts to determine the possible future trends on stocks too. Moreover CCI is popularized by Donald Lambert.[77] Although 20 day time period is the common period for CCI, the technical analyst can use shorter or longer time period to find the appropriate period on analyzed stock or market.

Generally it is assumed that the extreme areas of CCI are above +100 and below -100. One of the most used way of CCI at trading is that when CCI reaches its extremities buy or sell decisions are taken.

[77] Bramesh Brandari, Channeling Trends in Stocks, **Futures (Cedar Falls, Iowa)**, 2013, Vol. 42 Issue 1, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=5&sid=c0476118-3d41-4f85-908b-d49c005ae982%40sessionmgr4004&hid=4211 (Retrieved February 5, 2016), p. 16.

CCI is an indicator which has zero line too. And zero line is used to buy or sell signal. If the indicator crosses up the zero line, it is a buy signal. If indicator crosses down the zero line, it is a sell signal.

Divergence is used on CCI too like on all indicators. The divergence between prices and CCI indicator at overbought and oversold areas can give early signals that ongoing trend will change. If there is a need to explain again what is divergence, negative divergence occurs when the prices make new highs however the indicator doesn't. And positive divergence occurs when the prices make new bottoms however the indicator doesn't. Divergences between prices and indicators are the signals that give ongoing trend will change its direction.

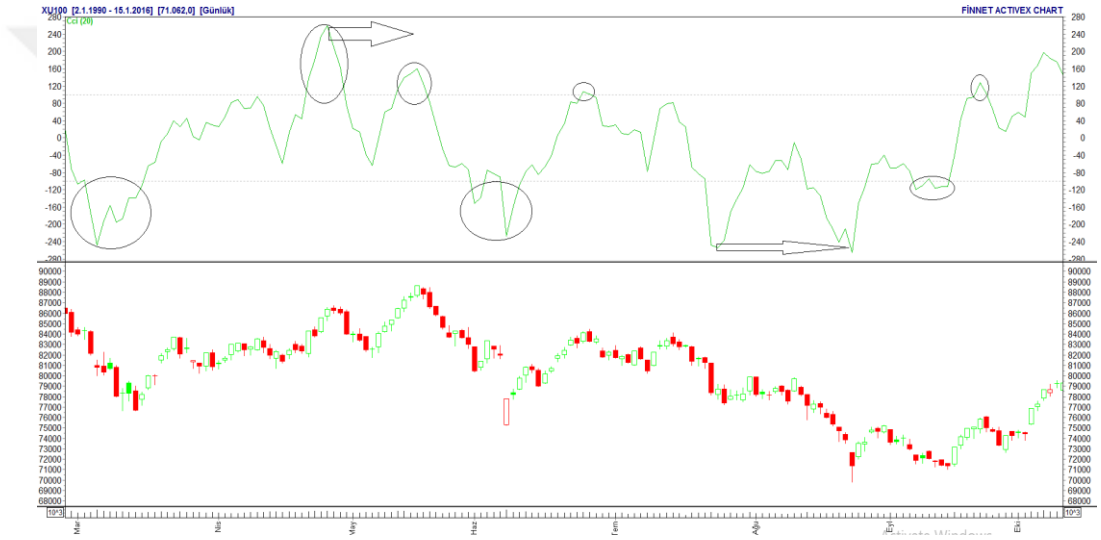

Figure 35: Commodity Channel Index

Figure 35 shows some overbought and oversold areas which prices changed their direction after these areas. On the other hand there is two divergences on the chart which occurred in extreme areas. After these divergences it can be seen that prices changed their direction.

2.5.4. Relative Strength Index (RSI):

Relative strength index was constructed by J. Welles Wilder. RSI indicator range from 0 to 100. Movements above 70 are thought as overbought, movements below 30 are interpreted as oversold. Furthermore RSI has midpoint which is at 50. The most used time period and default period on RSI is 14 day time period. In addition according to

technical analyst time period can be used at shorter or longer time period. Shorter time period will be more sensitive, longer time period will be more static and reliable.[78]

The actual formula is calculated as follows:[79]

RSI= 100 - (100/ 1+ RS)

RS= Average of *x* days' up closes/ Average of *x* days' down closes

Divergence between prices and RSI is used to determine possible trend changes and they are most useful warning before trend changes.

Furthermore some technical analysts use 50 value on RSI as a buy signal or sell signal. Below 50 is a sell signal, above 50 is a buy signal.

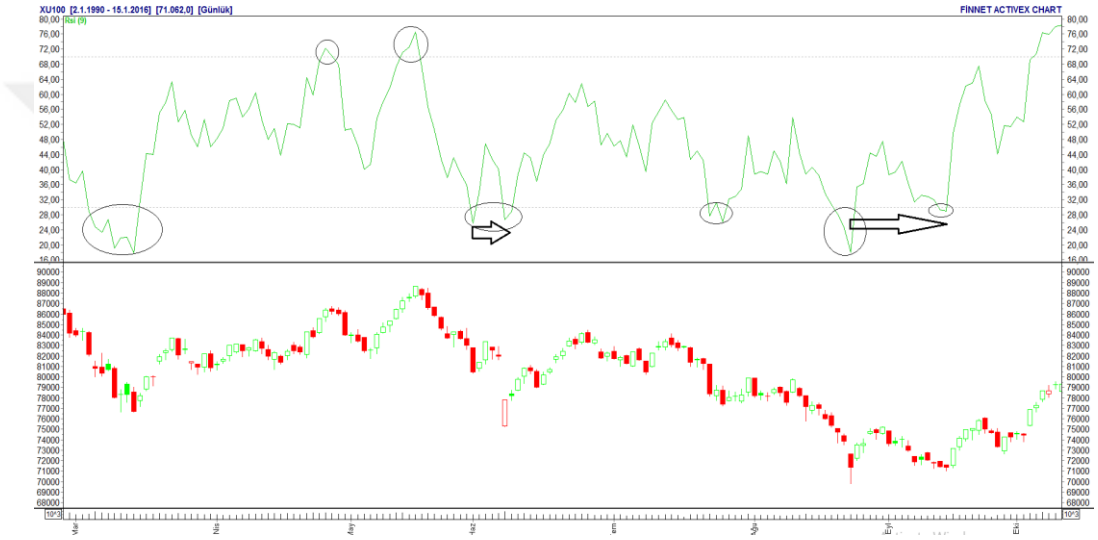

Figure 36: Relative Strength Index

9 day time period of RSI is used at figure 36. There is two positive divergences which happened at oversold areas and after those prices changed their direction, started moving up. Furthermore after overbought areas of RSI it can be seen that the prices fell.

2.5.5. Moving Average Convergence/Divergence (MACD):

The Moving Average Convergence/Divergence (MACD) indicator was constructed by Gerald Appel and MACD indicates buy and sell signals based on two moving averages of prices. Finding the correct time of entering to the market and exiting from the market is the most important question for technical analysts.[80]

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[78] Martin J. Pring, op. cit., p. 281.

[79] Murphy, John J. op. cit., p. 240.

[80] V. Subramanian, K. P. Balakrishnan, Efficacy of Refined MACD Indicators: Evidence from Indian Stock Markets, **IUP Journal of Applied Finance**, 2014, Vol. 20 Issue 1, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=9491a753-189c-47aa-8cc5-455ce7bdc8f4%40sessionmgr4003&hid=4110 (Retrieved February 5, 2016), p. 78.

MACD is constructed by a longer time moving average and a shorter time moving average. Most of the technical analysts use 12 day moving average for the fast line and 26 day moving average for the slow line. A positive MACD, in other words a bullish market is seen when the fast MACD line is above than the slow MACD line. When the slow MACD line is above than the fast MACD line, it is assumed that a bearish market is seen.[81]

On the other hand MACD has zero line. Crossing the zero line by slow MACD is assumed buy or sell signal.

A positive divergence occurs when prices reach lower depths however MACD advances. A negative divergence occurs when prices reach higher peaks however MACD declines. Probably divergences between prices and indicators are the most reliable signals and are the least common signals.

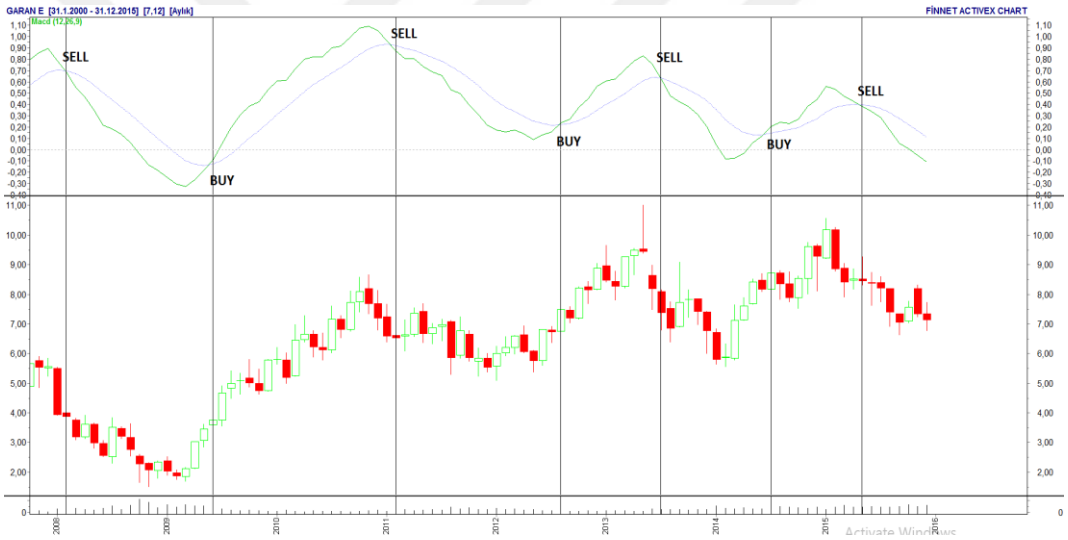


Figure 37: Moving Average Convergence and Divergence

Figure 37 represents monthly MACD and buy/sell signals. As it can be seen that on the monthly MACD signals don't come at the peaks or at the depths. However when the signal comes, it is powerful and reliable signal that trend will continue. Thus longer time period is stronger signal. Shorter time period is more insecure alert.

2.5.6. Bollinger Bands

Bollinger Bands were popularized by John Bollinger. Bollinger Bands can be thought as "volatility bands" plotted below and above a moving average. Bollinger Bands have three bands. These are the middle, the upper and the lower band. Default and optimal

[81] Bramesh Bhandari, Trading Stocks with MACD, **Futures (Cedar Falls, Iowa)**, 2011, Vol. 40 Issue 12, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=4fbb4cce-7322-4f49-9176-8b42123c2ab9%40sessionmgr102&hid=120 (Retrieved February 5, 2016), p. 32.

parameter of the middle band is 20 day time period of simple moving average. Lower and upper bands are charted two standard deviations from the middle band.[82]

There is generally two approaches to use Bollinger Bands by technical analysts. First one is that upper band is assumed as resistance point and lower band is assumed as support point. Thus technical analysts buy stocks when prices reach the lower band and they liquidate their positions when prices reach the upper band. Second approach is that technical analysts buy when prices cross up the upper band and they sell when prices cross down the lower band.[83]

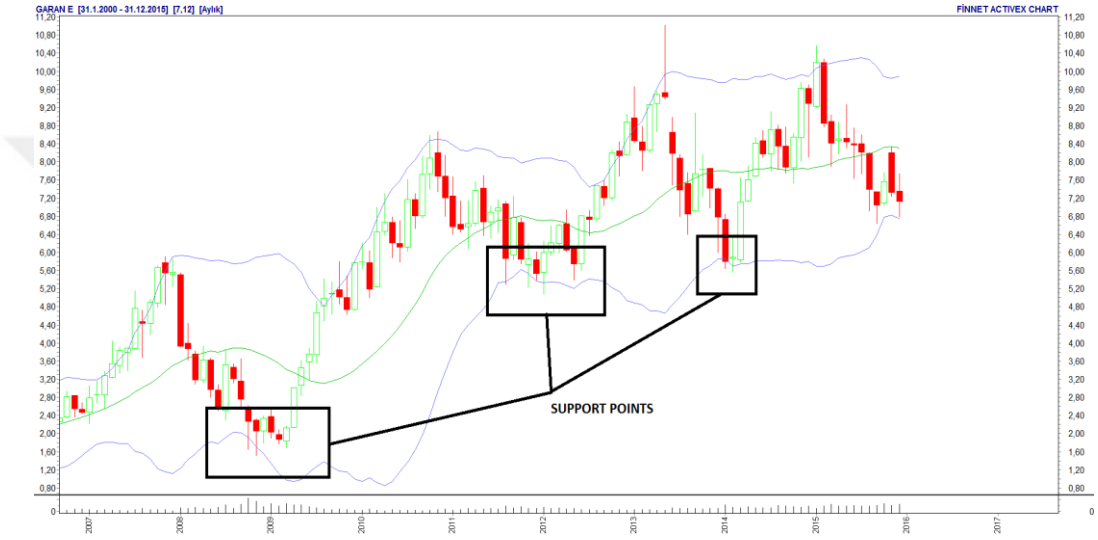


Figure 38: Bollinger Bands

From figure 38 it can be seen that monthly lower Bollinger band worked very well as a support point for years. And in a bullish market prices crossed up the upper Bollinger Band for successive months.

[82] Bramesh Bhandari, Trading with Bollinger Bands, **Modern Trader**, 2016, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=107f20cc-3164-49a6-b7ae-09b7cd8fe9b1%40sessionmgr198&hid=119 (Retrieved February 5, 2016), p. 52.

[83] Audrius Kabasinskas, Ugulus Macys, Calibration of Bollinger Bands Parameters for Trading Strategy Development in the Baltic Stock Market, **Engineering Economics**, 2010 Vol. 21 Issue 3, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=5&sid=107f20cc-3164-49a6-b7ae-09b7cd8fe9b1%40sessionmgr198&hid=119 (Retrieved February 5, 2016), p. 246.

3. TESTING MACD WITH USING BIST30 INDEX

3.1. Purpose of the Study

Even though technical analysis is simpler than fundamental analysis, technical analysis is still a complex analysis method. Because establishing which formations and which indicators work best for each stock and which chart period and which chart type should be analyzed for each stock, takes months or even years.

In addition there are many formations and many indicators, which should be examined one by one, to predict the future trend of stock.

Therefore the main purpose of this study is to transform technical analysis to a very simple method with using only the buy and sell signals of Moving Average Convergence Divergence (MACD) indicator which is one of the most used indicator. The retrospective/past data is tested whether higher profit can be obtained or not by using MACD as compared to stock returns.

3.2. Content of the Study

The stocks included BIST30 Index are being changed quarterly. In other words some stocks are taken into BIST30 Index and some stocks are removed from BIST30 Index quarterly.

Therefore in this study stocks which were traded permanently at BIST30 Index during the period between 01.01.2011 and 31.12.2015, are tested. Totally 24 stocks are tested and total period of tested data is 5 years long.

Company names within the study content and their stock codes are shown in the following table.

Table 1: Stock Codes and Company Names

	STOCK CODE	COMPANY NAME
1	AKBNK	AKBANK
2	ARCLK	ARÇELİK
3	BIMAS	BİM BİRLEŞİK MAĞAZALAR A.Ş.
4	EKGYO	EMLAK KONUT GAYRİMENKUL YAT. ORT.
5	ENKAI	ENKA İNŞAAT VE SANAYİ A.Ş.
6	EREGL	EREĞLİ DEMİR ÇELİK
7	FROTO	FORD OTOMOTİV SANAYİ
8	GARAN	T. GARANTİ BANKASI
9	HALKB	T. HALK BANKASI A.Ş.
10	ISCTR	T. İŞ BANKASI
11	KCHOL	KOÇ HOLDİNG
12	KOZAL	KOZA ALTIN İŞLETMELERİ A.Ş.
13	KRDMD	KARDEMİR D GRUBU
14	PETKM	PETKİM A.Ş.
15	SAHOL	HACI ÖMER SABANCI HOLDİNG
16	SISE	T. ŞİŞE VE CAM FABRİKALARI A.Ş.
17	TAVHL	TAV HAVALİMANLARI A.Ş.
18	TCELL	TURKCELL İLETİŞİM HİZMETLERİ A.Ş.
19	THYAO	TÜRK HAVA YOLLARI A.Ş.
20	TOASO	TOFAŞ TÜRK OTOMOTİV FABRİKASI A.Ş.
21	TTKOM	TÜRK TELEKOMÜNİKASYON A.Ş.
22	TUPRS	TÜPRAŞ TÜRKİYE PETROL A.Ş.
23	VAKBN	TÜRKİYE VAKIFLAR BANKASI
24	YKBNK	YAPI VE KREDİ BANKASI A.Ş.

3.4. Method and Assumptions of the Study

As it is mentioned before the usage of Moving Convergence and Divergence (MACD) indicator is divided into two and these both two methods are tested during this study. ‘Matriks Veri Terminali’ program and System Tester application is used to test the data in this study. In the following figures the codes of buy and sell signals can be seen.

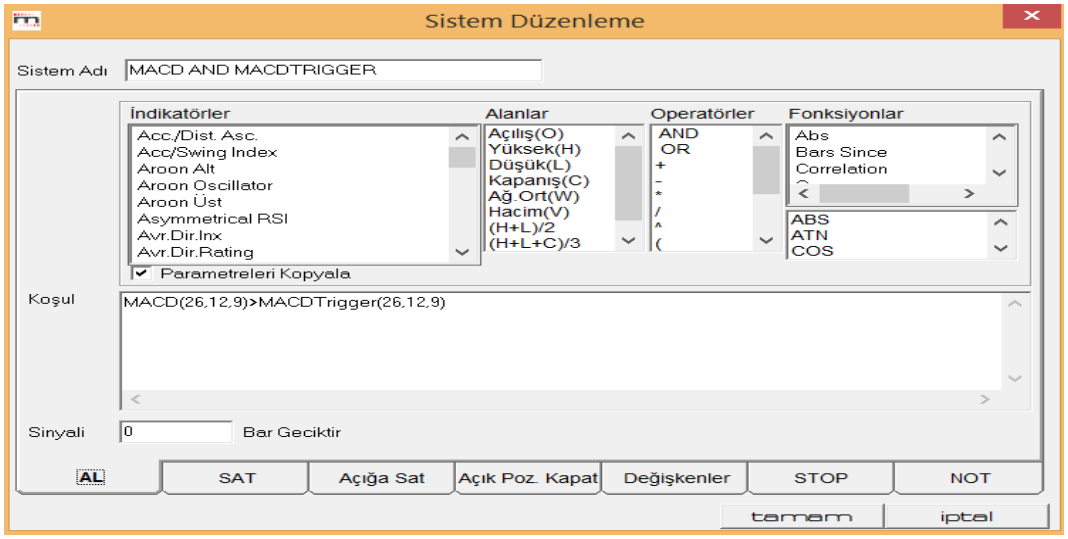


Figure 39: The Buy Formula of Crossing MACD Line and MACD Trigger Line

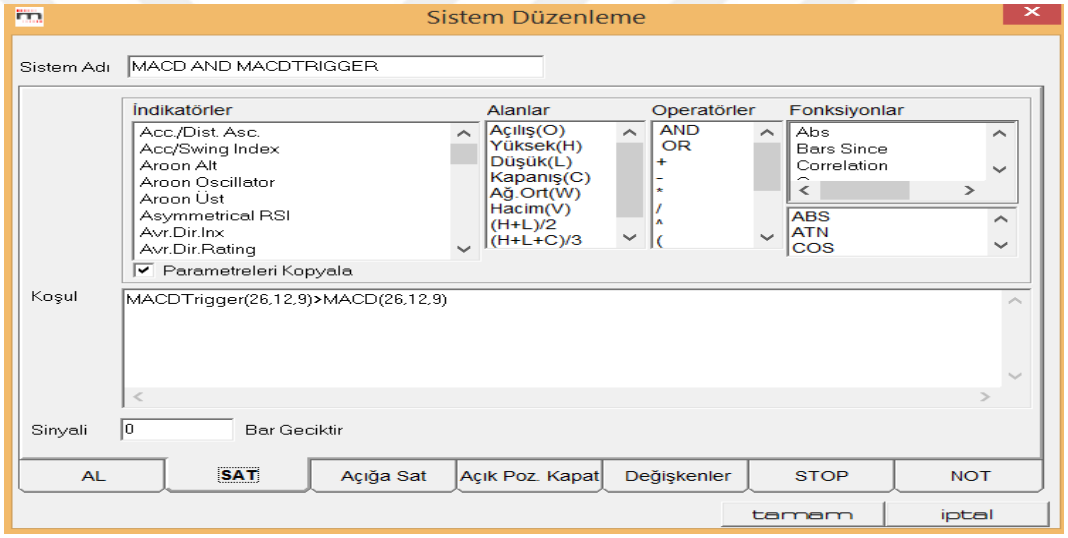


Figure 40: The Sell Formula of Crossing MACD Line and MACD Trigger Line

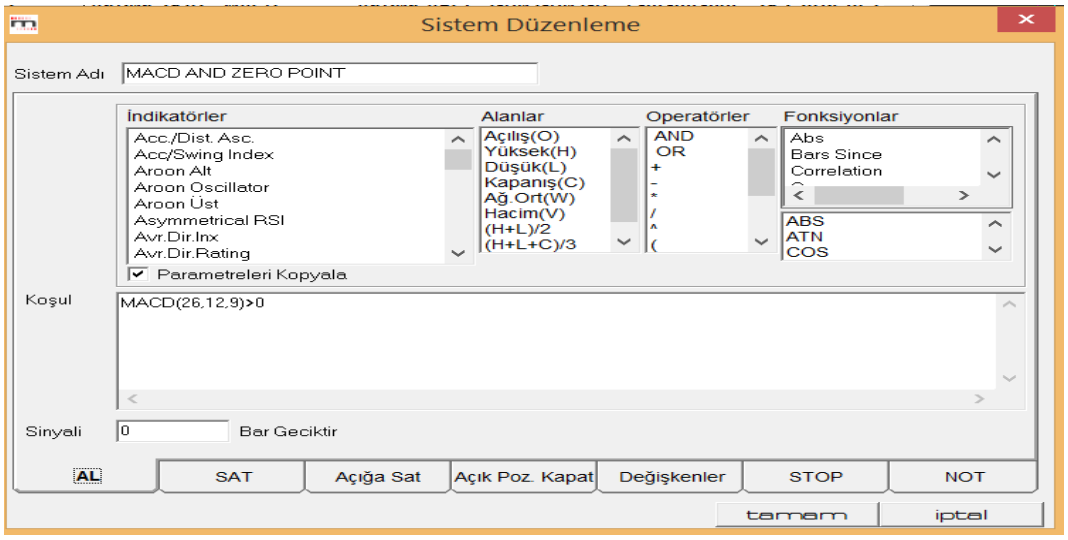


Figure 41: The Buy Formula of Crossing the Zero Line and MACD Line

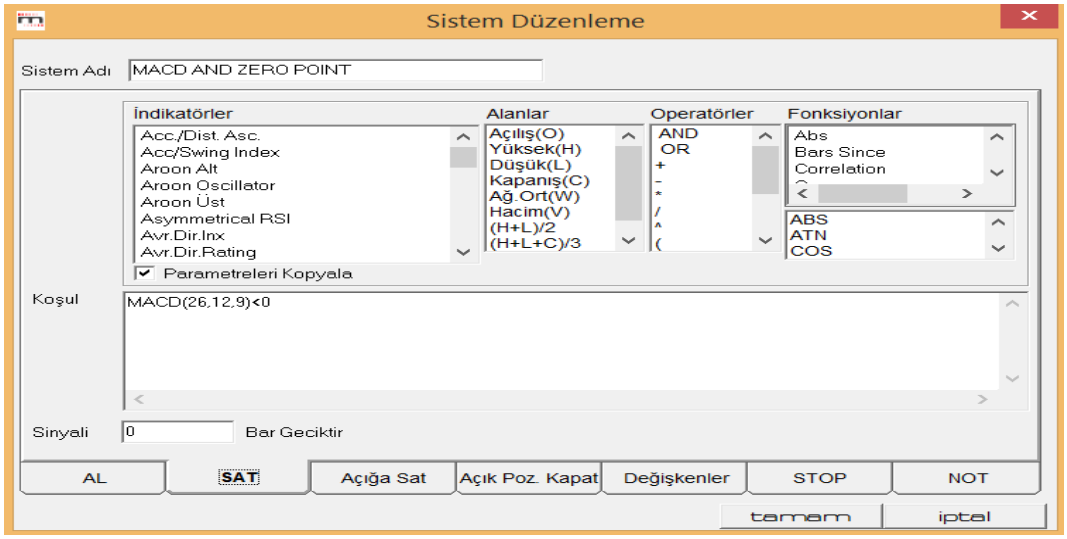


Figure 42: The Sell Formula of Crossing the Zero Line and MACD Line

Figure 39 and Figure 40 shows the buy and sell formulas of crossing the MACD line and MACD Trigger line. The system buys when MACD line crosses up MACD Trigger line and the system sells when MACD line crosses down the MACD Trigger line.

Figure 41 and Figure 42 shows the buy and sell formulas of crossing the MACD line and zero line. The system buys when MACD line crosses up the zero line and the system sells when MACD line crosses down the zero line.

The tested data is in daily period because daily period is the most used time period.

The evaluation of findings has two phases. Firstly the findings is evaluated year by year to see how the performance of MACD in different market conditions is and secondly the findings of the total 5 years is evaluated as a whole to see the big picture.

The assumptions of this study are listed as follows:

- Generally brokerage firms take 0,06-0,08 commission rate and investment banks take 0,16-0,18 commission rate for any trade. Thus it is assumed that 0,1% commission rate is paid for all purchase and sale transactions.
- It is assumed that in every buy signal, the purchase is made with the all capital and in every sell signal, the sale is made with the all capital.
- All positions are closed at the last trading day of tested time.
- Buy and sell signals are taken on the closing price of days. It is assumed that when sell signal came, the sale is made on the same day's closing price and when buy signal came, the purchase is made on the same day's closing price.

Furthermore two points should be clarified. These are explained below:

- At the end there are figures which show the findings and stock-based profits or losses by testing both two methods of MACD. On these figures it can be seen that the dates start before than the first trading day of each year. Because MACD line needs 26 trading day to form and MACD Trigger line needs 35 trading day to form.

  Thus to test the MACD line between the first trading of year and the last trading day of year, the dates were started to be tested 26 trading day before the first trading day of each year and to test MACD Trigger line, the dates were started to be tested 35 trading day before the first trading day of each year.
- Graphs belonging to the stock of Garanti Bankası which show where the sell and buy signals came, are given as samples at the end too.

3.5. The Findings

In the following tables opening price represents opening price in the first trading day of each year (01.01.2011, 01.01.2012 etc.) and closing price represents closing price in the last trading day of each year (31.12.2011, 31.12.2012 etc.). Stock returns represents the percentage change of stock's prices.

Finally MACD (1) returns shows how much returns were occurred by testing the sell and buy signals of crossing MACD line and MACD Trigger line and MACD (2) returns shows how much returns were occurred by testing the sell and buy signals of crossing MACD line and zero line.

3.5.1. The Results of the Year 2011

When the table and figure is examined, it can be seen that the average stock returns is at -12,06%, the average MACD (1) returns is at -11,21% and the average MACD (2) returns is at -10,48%.

So the average fall ratio of stock's are a bit higher than the average MACD (1) and MACD (2). Therefore it can be said that at 2011 both two methods of MACD showed a bit better performance than stocks however both two methods of MACD are still negative.

Table 2: The Results of the Year 2011

STOCK CODE	OPENING PRICE	CLOSING PRICE	STOCK RETURNS	MACD(1) RETURNS	MACD(2) RETURNS
AKBNK	7,94	5,64	-28,97%	-19,74%	-9,17%
ARCLK	6,29	5,15	-18,12%	29,92%	-7,89%
BIMAS	24	24,53	2,21%	-30,57%	-34,53%
EKGYO	1,72	1,73	0,58%	-0,69%	4,66%
ENKAI	2,87	2,33	-18,82%	-5,16%	-15,35%
EREGL	1,63	1,51	-7,36%	-10,28%	-27,06%
FROTO	9,9	12,75	28,79%	3,41%	39,74%
GARAN	7,24	5,52	-23,76%	-30,09%	-24,47%
HALKB	11,93	9,23	-22,63%	-25,65%	-16,33%
ISCTR	4,84	2,99	-38,22%	-28,27%	-19,41%
KCHOL	6,5	5,05	-22,31%	-24,94%	-8,50%
KOZAL	17,4	21,13	21,44%	-7,16%	-26,35%
KRDMD	0,51	0,51	0,00%	-12,84%	-4,81%
PETKM	1,52	1,25	-17,76%	-14,85%	-16,02%
SAHOL	6,78	5,15	-24,04%	-18,55%	-1,88%
SISE	1,6	1,91	19,38%	42,75%	19,21%
TAVHL	6,59	7,08	7,44%	-10,64%	-6,87%
TCELL	9,16	7,71	-15,83%	-32,22%	-10,83%
THYAO	3,86	1,81	-53,11%	-31,86%	-18,29%
TOASO	5,85	4,56	-22,05%	-23,12%	-2,29%
TTKOM	4,58	5,31	15,94%	34,27%	6,20%
TUPRS	29,78	32,74	9,94%	-6,21%	-12,25%
VAKBN	3,8	2,38	-37,37%	-23,18%	-29,27%
YKBNK	4,61	2,54	-44,90%	-23,39%	-29,78%
AVERAGE RETURNS			-12,06%	-11,21%	-10,48%

MACD (1): Crossing MACD line and MACD Trigger line
MACD (2): Crossing MACD line and zero line

3.5.2. The Results of the Year 2012

From table and figure it is seen that at 2012 stocks increased at 64,96% however MACD (1) returns remained at 32,07% and MACD (2) returns remained at 40,41%. There was precisely an uptrend at 2012 but both two methods of MACD represented very lower performance than stocks' performances.

Table 3: The Results of the Year 2012

STOCK CODE	OPENING PRICE	CLOSING PRICE	STOCK RETURNS	MACD(1) RETURNS	MACD(2) RETURNS
AKBNK	5,66	8,36	47,70%	33,03%	41,43%
ARCLK	5,17	10,42	101,55%	41,13%	55,02%
BIMAS	24,18	41,51	71,67%	11,83%	43,63%
EKGYO	1,73	2,82	63,01%	25,29%	46,18%
ENKAI	2,4	3,45	43,75%	35,91%	23,67%
EREGL	1,52	1,73	13,82%	25,88%	8,67%
FROTO	12,75	19,65	54,12%	22,01%	34,87%
GARAN	5,56	8,88	59,71%	40,35%	45,59%
HALKB	9,23	16,66	80,50%	59,93%	51,47%
ISCTR	2,99	5,73	91,64%	55,38%	61,41%
KCHOL	5,05	8,81	74,46%	50,55%	65,84%
KOZAL	21,22	36,88	73,80%	-6,89%	4,54%
KRDMD	0,51	0,91	78,43%	41,82%	57,57%
PETKM	1,26	1,82	44,44%	32,73%	27,44%
SAHOL	5,15	9,49	84,27%	15,83%	52,18%
SISE	1,91	2,22	16,23%	16,78%	-8,23%
TAVHL	7,06	8,23	16,57%	-5,84%	-0,65%
TCELL	7,71	10,02	29,96%	10,48%	31,32%
THYAO	1,82	5,35	193,96%	92,00%	134,33%
TOASO	4,6	8,61	87,17%	60,73%	66,89%
TTKOM	5,3	5,67	6,98%	11,86%	-9,97%
TUPRS	32,5	46,22	42,22%	-4,45%	8,27%
VAKBN	2,37	4,5	89,87%	47,25%	67,53%
YKBNK	2,54	4,91	93,31%	56,12%	60,92%
AVERAGE RETURNS			64,96%	32,07%	40,41%

MACD (1): Crossing MACD line and MACD Trigger line
MACD (2): Crossing MACD line and zero line

3.5.3. The Results of the Year 2013

At 2013 there was almost a horizontal trend. The average stock returns is at -2,52%, the average MACD (1) returns is at -5,04% and the average MACD (2) returns is at -6,61%. In light of these findings the following results are occurred. Both two methods of MACD showed worse performance than stocks at 2013.

Table 4: The Results of the Year 2013

STOCK CODE	OPENING PRICE	CLOSING PRICE	STOCK RETURNS	MACD(1) RETURNS	MACD(2) RETURNS
AKBNK	8,46	6,47	-23,52%	-35,47%	-11,96%
ARCLK	10,6	11,29	6,51%	41,89%	-19,55%
BIMAS	41,75	41,96	0,50%	-12,17%	-24,24%
EKGYO	2,82	1,95	-30,85%	-10,54%	-20,09%
ENKAI	3,47	4,55	31,12%	2,33%	5,55%
EREGL	1,75	2,19	25,14%	9,41%	12,19%
FROTO	19,7	21,54	9,34%	18,13%	-11,25%
GARAN	8,97	6,76	-24,64%	-15,94%	-18,88%
HALKB	16,8	11,8	-29,76%	-16,63%	-7,14%
ISCTR	5,79	4,41	-23,83%	-12,24%	-6,98%
KCHOL	8,84	8,51	-3,73%	11,40%	-11,32%
KOZAL	37,14	19,56	-47,33%	-25,05%	-8,04%
KRDMD	0,92	0,92	0,00%	-0,82%	10,65%
PETKM	1,84	1,79	-2,72%	-15,05%	11,75%
SAHOL	9,49	8,45	-10,96%	-3,38%	-1,20%
SISE	2,24	2,18	-2,68%	-3,50%	-28,09%
TAVHL	8,26	14,4	74,33%	-14,26%	-2,02%
TCELL	10,07	9,85	-2,18%	-2,88%	-27,13%
THYAO	5,41	6,44	19,04%	-7,45%	0,84%
TOASO	8,61	11,97	39,02%	12,72%	-0,23%
TTKOM	5,7	5,31	-6,84%	-7,18%	4,37%
TUPRS	46,45	41,39	-10,89%	-2,99%	-18,25%
VAKBN	4,55	3,76	-17,36%	-20,86%	32,19%
YKBNK	4,96	3,56	-28,23%	-10,32%	-19,69%
AVERAGE RETURNS			-2,52%	-5,04%	-6,61%

MACD (1): Crossing MACD line and MACD Trigger line
MACD (2): Crossing MACD line and zero line

3.5.4. The Results of the Year 2014

The average stock returns are at 36,10% thus there was an uptrend at 2014. Moreover the average MACD (1) returns are at 16,81% and the average MACD (2) returns are at 21,01%. It is understood that over again occurred profit of stocks is higher than occurred profit of MACD.

Table 5: The Results of the Year 2014

STOCK CODE	OPENING PRICE	CLOSING PRICE	STOCK RETURNS	MACD(1) RETURNS	MACD(2) RETURNS
AKBNK	6,37	8,5	33,44%	-1,66%	11,35%
ARCLK	11,19	14,48	29,40%	-1,70%	7,92%
BIMAS	41,57	49,17	18,28%	18,62%	11,95%
EKGYO	1,94	2,68	38,14%	17,93%	10,62%
ENKAI	4,52	4,62	2,21%	1,64%	-29,91%
EREGL	2,17	4,09	88,48%	47,55%	48,90%
FROTO	21,16	31,45	48,63%	30,15%	43,60%
GARAN	6,72	9,27	37,95%	1,94%	20,43%
HALKB	11,7	13,72	17,26%	-4,55%	6,21%
ISCTR	4,41	6,56	48,75%	15,80%	44,24%
KCHOL	8,42	12,21	45,01%	31,50%	38,80%
KOZAL	19,56	15,05	-23,06%	-4,86%	6,02%
KRDMD	0,93	1,92	106,45%	41,63%	82,82%
PETKM	1,77	2,63	48,59%	9,34%	41,85%
SAHOL	8,37	10,04	19,95%	6,70%	4,57%
SISE	2,13	3,21	50,70%	21,20%	38,59%
TAVHL	14,22	18,41	29,47%	-6,69%	-7,73%
TCELL	9,89	12,41	25,48%	6,25%	15,12%
THYAO	6,4	9,63	50,47%	61,36%	22,46%
TOASO	12,06	15,02	24,54%	22,97%	30,19%
TTKOM	5,31	6,77	27,50%	17,12%	3,60%
TUPRS	41,01	55,3	34,85%	27,88%	28,07%
VAKBN	3,78	4,84	28,04%	12,91%	11,30%
YKBNK	3,52	4,78	35,80%	30,35%	13,26%
AVERAGE RETURNS			36,10%	16,81%	21,01%

MACD (1): Crossing MACD line and MACD Trigger line
MACD (2): Crossing MACD line and zero line

3.5.5. The Results of the Year 2015

Stocks fell average -11,13% at 2015. MACD (1)'s average performance is at -12,08% and MACD (2)'s average performance is at -8,36%. At 2015 MACD (2) pointed better performance than stocks unlike MACD (1). However both MACD returns are negative.

Table 6: The Results of the Year 2015

STOCK CODE	OPENING PRICE	CLOSING PRICE	STOCK RETURNS	MACD(1) RETURNS	MACD(2) RETURNS
AKBNK	8,46	6,7	-20,80%	-16,57%	-17,94%
ARCLK	14,52	13,97	-3,79%	-11,17%	-17,14%
BIMAS	49,17	51,35	4,43%	1,07%	8,23%
EKGYO	2,67	2,6	-2,62%	-11,68%	-1,85%
ENKAI	4,62	4,52	-2,16%	-11,69%	6,79%
EREGL	4,13	3,04	-26,39%	-16,01%	-2,39%
FROTO	31,4	30,28	-3,57%	-1,52%	-17,30%
GARAN	9,21	7,12	-22,69%	-20,75%	-16,68%
HALKB	13,67	10,39	-23,99%	-16,37%	-15,74%
ISCTR	6,37	4,6	-27,79%	-22,45%	-19,84%
KCHOL	12,16	10,93	-10,12%	-9,50%	-16,90%
KOZAL	15,14	12,28	-18,89%	-26,67%	50,43%
KRDMD	1,92	1,09	-43,23%	-26,29%	-12,93%
PETKM	2,63	3,06	16,35%	6,04%	-1,95%
SAHOL	9,99	8,28	-17,12%	3,43%	-11,01%
SISE	3,22	3,19	-0,93%	13,15%	-12,37%
TAVHL	18,85	18,19	-3,50%	-25,27%	-6,84%
TCELL	12,37	9,9	-19,97%	-15,10%	-13,62%
THYAO	9,6	7,39	-23,02%	-11,96%	-27,42%
TOASO	14,97	18,95	26,59%	1,23%	-21,52%
TTKOM	6,74	5,46	-18,99%	-16,94%	-15,48%
TUPRS	55,3	69,6	25,86%	-14,50%	8,61%
VAKBN	4,82	3,83	-20,54%	-13,70%	-12,09%
YKBNK	4,72	3,29	-30,30%	-26,61%	-13,79%
AVERAGE RETURNS			-11,13%	-12,08%	-8,36%

MACD (1): Crossing MACD line and MACD Trigger line
MACD (2): Crossing MACD line and zero line

3.5.6. The Results between the Years 2011 and 2015

Table 7: The Results between the Years 2011 and 2015

STOCK CODE	01.01.2011 OPENING PRICE	31.12.2015 CLOSING PRICE	STOCK RETURNS	MACD(1) RETURNS	The Difference	MACD(2) RETURNS	The Difference
AKBNK	7,94	6,7	-15,62%	-44,54%	-28,92%	4,40%	20,02%
ARCLK	6,29	13,97	122,10%	133,11%	11,01%	7,59%	-114,51%
BIMAS	24	51,35	113,96%	-17,09%	-131,05%	-16,08%	-130,04%
EKGYO	1,72	2,6	51,16%	3,22%	-47,94%	22,51%	-28,65%
ENKAI	2,87	4,52	57,49%	20,07%	-37,42%	-14,66%	-72,15%
EREGL	1,63	3,04	86,50%	52,50%	-34,00%	35,70%	-50,80%
FROTO	9,9	30,28	205,86%	78,86%	-127,00%	107,93%	-97,93%
GARAN	7,24	7,12	-1,66%	-28,09%	-26,43%	-7,87%	-6,21%
HALKB	11,93	10,39	-12,91%	-16,17%	-3,26%	6,87%	19,78%
ISCTR	4,84	4,6	-4,96%	-13,07%	-8,11%	36,27%	41,23%
KCHOL	6,5	10,93	68,15%	54,07%	-14,08%	56,92%	-11,23%
KOZAL	17,4	12,28	-29,43%	-53,18%	-23,75%	16,50%	45,93%
KRDMD	0,51	1,09	113,73%	32,09%	-81,64%	167,99%	54,26%
PETKM	1,52	3,06	101,32%	11,67%	-89,65%	67,87%	-33,45%
SAHOL	6,78	8,28	22,12%	1,36%	-20,76%	38,54%	16,42%
SISE	1,6	3,19	99,38%	135,67%	36,30%	-0,85%	-100,23%
TAVHL	6,59	18,19	176,02%	-50,04%	-226,06%	-23,54%	-199,56%
TCELL	9,16	9,9	8,08%	-34,66%	-42,74%	-18,64%	-26,72%
THYAO	3,86	7,39	91,45%	52,62%	-38,83%	73,63%	-17,82%
TOASO	5,85	18,95	223,93%	76,24%	-147,69%	59,03%	-164,90%
TTKOM	4,58	5,46	19,21%	53,16%	33,95%	-13,57%	-32,78%
TUPRS	29,78	69,6	133,71%	-2,32%	-136,03%	7,32%	-126,39%
VAKBN	3,8	3,83	0,79%	-7,49%	-8,28%	64,79%	64,00%
YKBNK	4,61	3,29	-28,63%	13,74%	42,37%	-10,42%	18,21%
AVERAGE RETURNS			66,74%	18,82%	-47,92%	27,84%	-38,90%

MACD (1): Crossing MACD line and MACD Trigger line
MACD (2): Crossing MACD line and zero line

There is positive difference between MACD (1) and stock returns in only 4 stocks when the period is examined from the beginning of 2011 and to the last of 2015 years. These are ARCLK, SISE, TTKOM and YKBNK. However there is negative difference between MACD (1) and stock returns in 20 stocks.

AKBNK, HALKB, ISCTR, KOZA, KRDMD, SAHOL, VAKBN and YKBNK have positive difference between MACD (2) and stock returns. Surprisingly all banks besides GARAN have positive difference between MACD (2) and stock returns. The reason of

it is that in tested 5 years all tested bank returns are negative. In addition there is negative difference in 16 stocks between MACD (2) and stock returns.

When the average returns of stocks, MACD (1) and MACD (2) is examined, it can be seen that both two methods of MACD represented very lower performance than stocks. Between 2011 and 2015 years the average returns of stocks is at 66,74%, the average returns of MACD (1) is at 18,82% and lastly the average returns of MACD (2) is at 27,84%.

3.6. The Evaluation of Findings

In annually tested 5 years there was a downtrend for 2 years, there was an uptrend for 2 years and lastly there was an almost horizontal trend for 1 year. In 2 years that have an uptrend, returns of MACD were very lower than the average returns of stocks. In 2 years that have a downtrend, returns of MACD were a bit better than the average returns of stocks. However returns of MACD were not in positive area. And in 1 year that has almost horizontal trend, returns of MACD were lower than the average returns of stocks.

In tested 5 years, the average return of stocks is very higher than the average returns of MACD either.

Nevertheless positive points should also be clarified in this study. In tested 5 years the returns of MACD (1) in stocks that ARCLK, SISE, TTKOM and YKBNK, are higher than the returns of stocks. And in tested 5 years the returns of MACD (2) in stocks that AKBNK, HALKB, ISCTR, KOZA, KRDMD, SAHOL, VAKBN and YKBNK are higher than the returns of stocks.

CONCLUSION and SUGGESTIONS

At the present time there are thousands of domestic and international stocks to invest and their number increases day after day. For instance in Istanbul Stock Exchange there are 440 stocks being traded. But sometimes the preponderance of stocks causes chaos among investors. Investors buy and stocks frequently without having enough information or without correct analysis methods. Accordingly it results with extensive losses for investors.

On the other hand news and reviews in visual and written media such as TV, exchange forums, money web-sites, etc., analysis reports, expert opinions and the abundance of data lead chaos among investors too. There are so many information and idea about markets and reaching to these by investors is very easy thanks to high technology that we have now. However these are the factors which lead hesitant investors to take wrong investment decisions. Therefore looking objectively to the market, taking rational decisions and having a disciplined and systematic investment strategy are the main factors for investors to be successful and to profit continuously.

When technical analysis is used correctly, it can provide significant answers to these problems faced by investors. Because technical analysis can be used not only on stock exchanges but also on most of the capital market instruments such as bills, bonds, futures, options etc. and technical analysis gives clear signals what and when to buy or sell.

On the other hand using technical analysis correctly takes months or even years. A technical analyst must examine thousands of charts and have to be patient and decided to become a specialist on technical analysis. Because a technical analyst must determine to use which chart period and type, to take into account which indicators and when to use. And finally these factors must be established in each different stocks one by one. In addition some of the technical analysts take sell or buy decisions with their emotions and they cannot learn to overlook their emotions.

Therefore the aim of this study was to transform technical analysis easier method. For this reason both methods of MACD indicator’s buy and sell signals were simulated with using the past data and MACD returns were compared with stock returns.

Stocks that have been placed in BIST-30 Index have been used in this study. 24 stocks were measured between 01.01.2011 and 31.12.2015. Furthermore the comparison was made annually to compare returns of MACD and returns of stocks in different market conditions and 5 years to compare returns of MACD and returns of stocks in a long-term.

Referring to the general MACD average performance occurred very lower than the average performance of stocks. That's why technical analysts should not use only the signals of MACD as a primary tool to take buy and sell decisions.

For conclusion, simplification of technical analysis and getting a higher return than average has failed. Even though, successful results might be achieved on future studies with comparing returns and testing different indicators.

APPENDICES

Appendix 1: Buy and Sell Signals of Crossing MACD Line and MACD Trigger Line at 2011

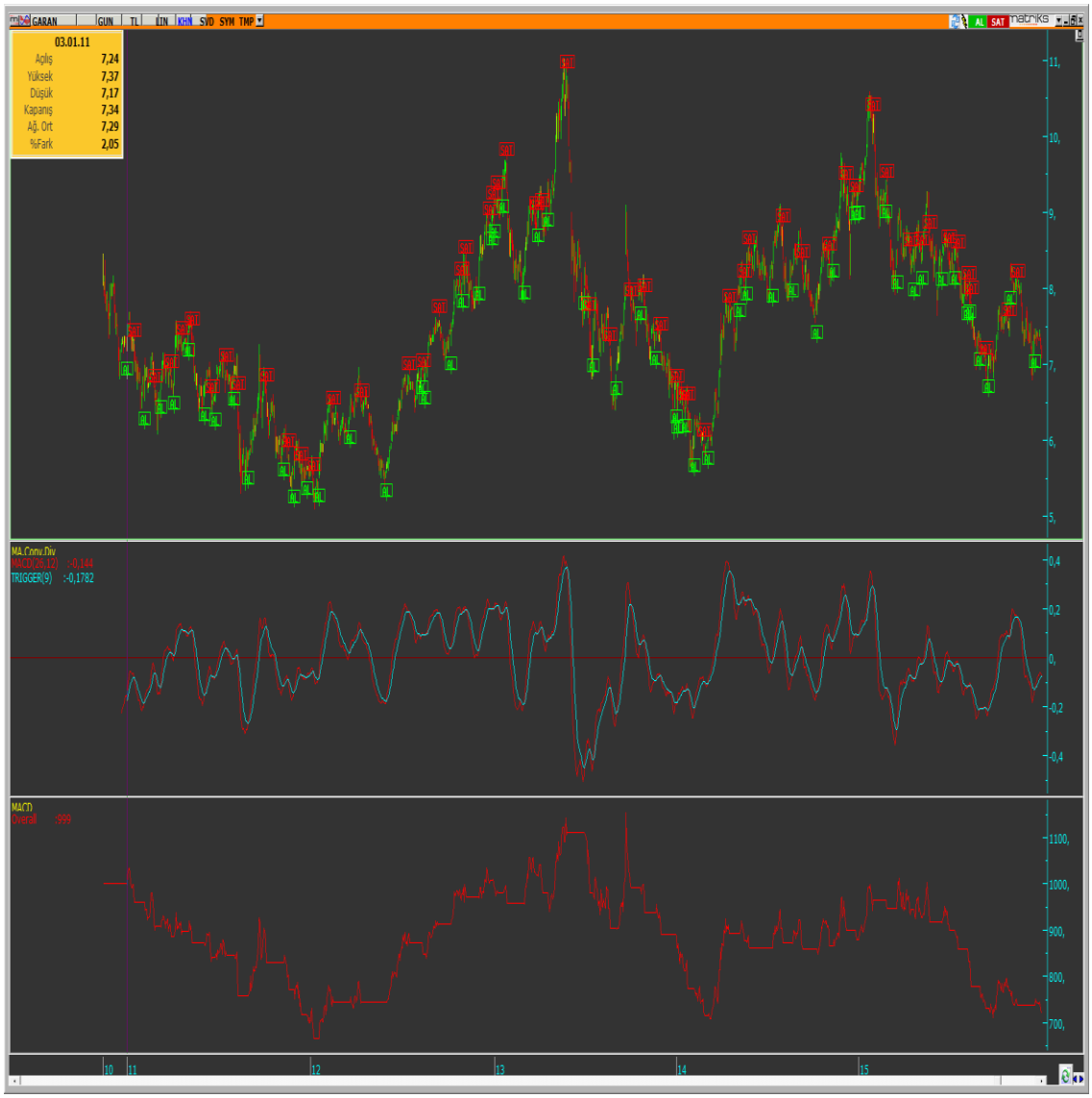
Appendix 2: Buy and Sell Signals of Crossing MACD Line and MACD Trigger Line at 2012

Appendix 3: Buy and Sell Signals of Crossing MACD Line and MACD Trigger Line at 2013

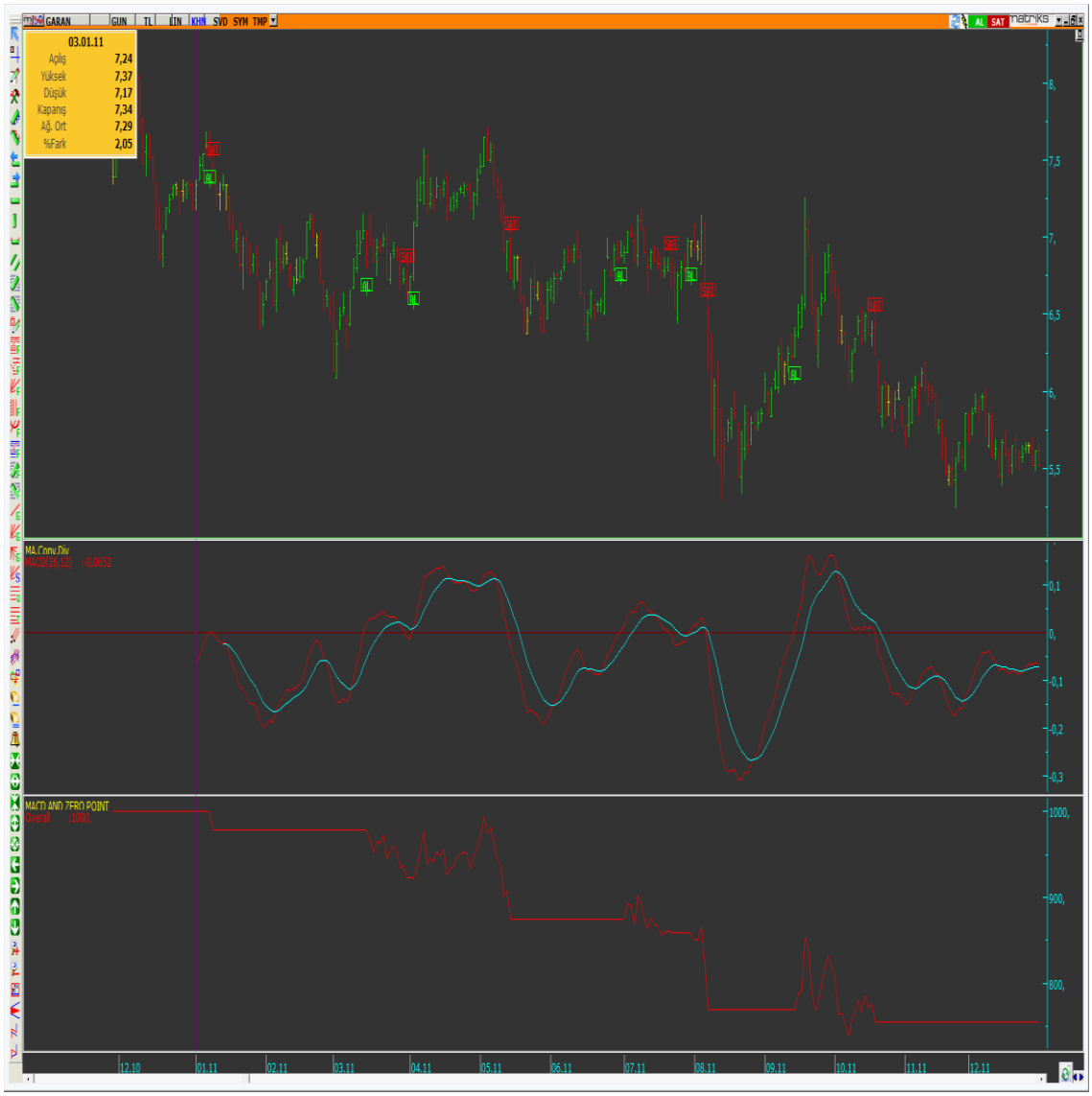
Appendix 4: Buy and Sell Signals of Crossing MACD Line and MACD Trigger Line at 2014

Appendix 5: Buy and Sell Signals of Crossing MACD Line and MACD Trigger Line at 2015

Appendix 6: Buy and Sell Signals of Crossing MACD Line and MACD Trigger Line between 2011 and 2015



Appendix 7: Buy and Sell Signals of Crossing MACD Line and Zero Line at 2011



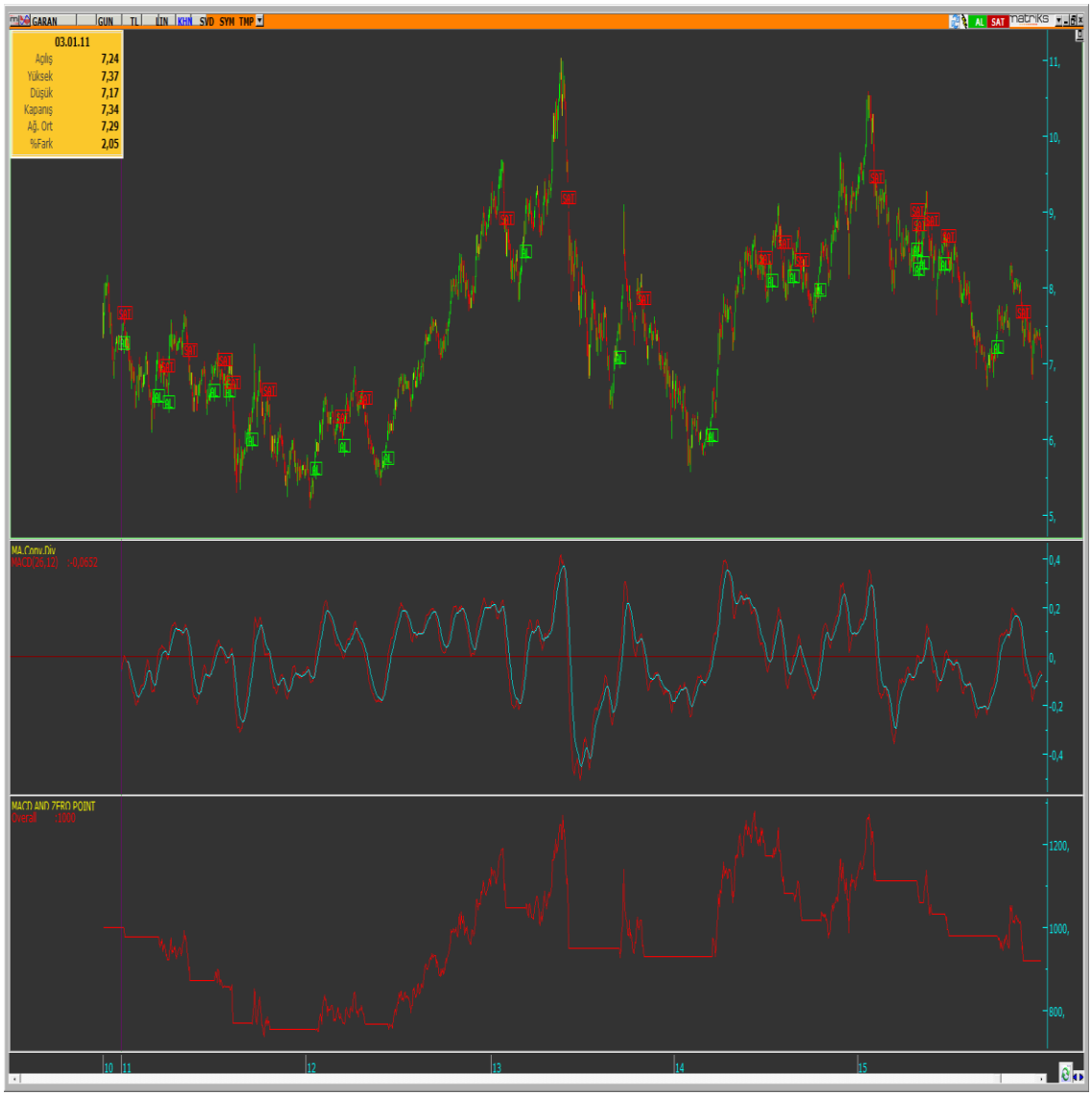
Appendix 8: Buy and Sell Signals of Crossing MACD Line and Zero Line at 2012

Appendix 9: Buy and Sell Signals of Crossing MACD Line and Zero Line at 2013

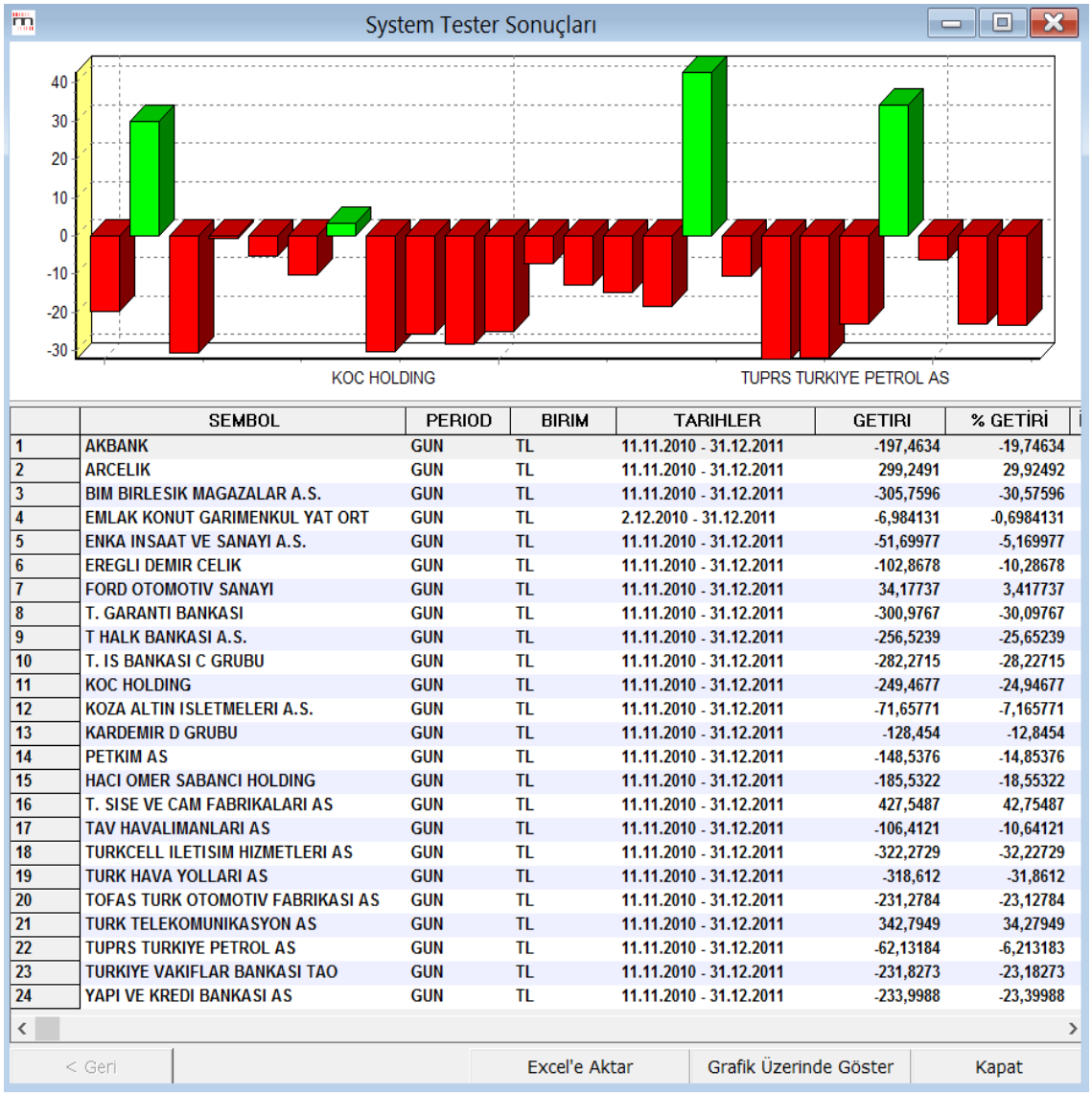
Appendix 10: Buy and Sell Signals of Crossing MACD Line and Zero Line at 2014

Appendix 11: Buy and Sell Signals of Crossing MACD Line and Zero Line at 2015

Appendix 12: Buy and Sell Signals of Crossing MACD Line and Zero Line between 2011 and 2015



Appendix 13: Buy and Sell Signals' Results of Crossing MACD Line and MACD Trigger Line at 2011



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ
1	AKBANK	GUN	TL	11.11.2010 - 31.12.2011	-197,4634	-19,74634
2	ARCELIK	GUN	TL	11.11.2010 - 31.12.2011	299,2491	29,92492
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	11.11.2010 - 31.12.2011	-305,7596	-30,57596
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	2.12.2010 - 31.12.2011	-6,984131	-0,6984131
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	11.11.2010 - 31.12.2011	-51,69977	-5,169977
6	EREGLI DEMIR CELIK	GUN	TL	11.11.2010 - 31.12.2011	-102,8678	-10,28678
7	FORD OTOMOTIV SANAYI	GUN	TL	11.11.2010 - 31.12.2011	34,17737	3,417737
8	T. GARANTI BANKASI	GUN	TL	11.11.2010 - 31.12.2011	-300,9767	-30,09767
9	T HALK BANKASI A.S.	GUN	TL	11.11.2010 - 31.12.2011	-256,5239	-25,65239
10	T. IS BANKASI C GRUBU	GUN	TL	11.11.2010 - 31.12.2011	-282,2715	-28,22715
11	KOC HOLDING	GUN	TL	11.11.2010 - 31.12.2011	-249,4677	-24,94677
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	11.11.2010 - 31.12.2011	-71,65771	-7,165771
13	KARDEMIR D GRUBU	GUN	TL	11.11.2010 - 31.12.2011	-128,454	-12,8454
14	PETKIM AS	GUN	TL	11.11.2010 - 31.12.2011	-148,5376	-14,85376
15	HACI OMER SABANCI HOLDING	GUN	TL	11.11.2010 - 31.12.2011	-185,5322	-18,55322
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	11.11.2010 - 31.12.2011	427,5487	42,75487
17	TAV HAVALIMANLARI AS	GUN	TL	11.11.2010 - 31.12.2011	-106,4121	-10,64121
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	11.11.2010 - 31.12.2011	-322,2729	-32,22729
19	TURK HAVA YOLLARI AS	GUN	TL	11.11.2010 - 31.12.2011	-318,612	-31,8612
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	11.11.2010 - 31.12.2011	-231,2784	-23,12784
21	TURK TELEKOMUNIKASYON AS	GUN	TL	11.11.2010 - 31.12.2011	342,7949	34,27949
22	TUPRS TURKIYE PETROL AS	GUN	TL	11.11.2010 - 31.12.2011	-62,13184	-6,213183
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	11.11.2010 - 31.12.2011	-231,8273	-23,18273
24	YAPI VE KREDI BANKASI AS	GUN	TL	11.11.2010 - 31.12.2011	-233,9988	-23,39988

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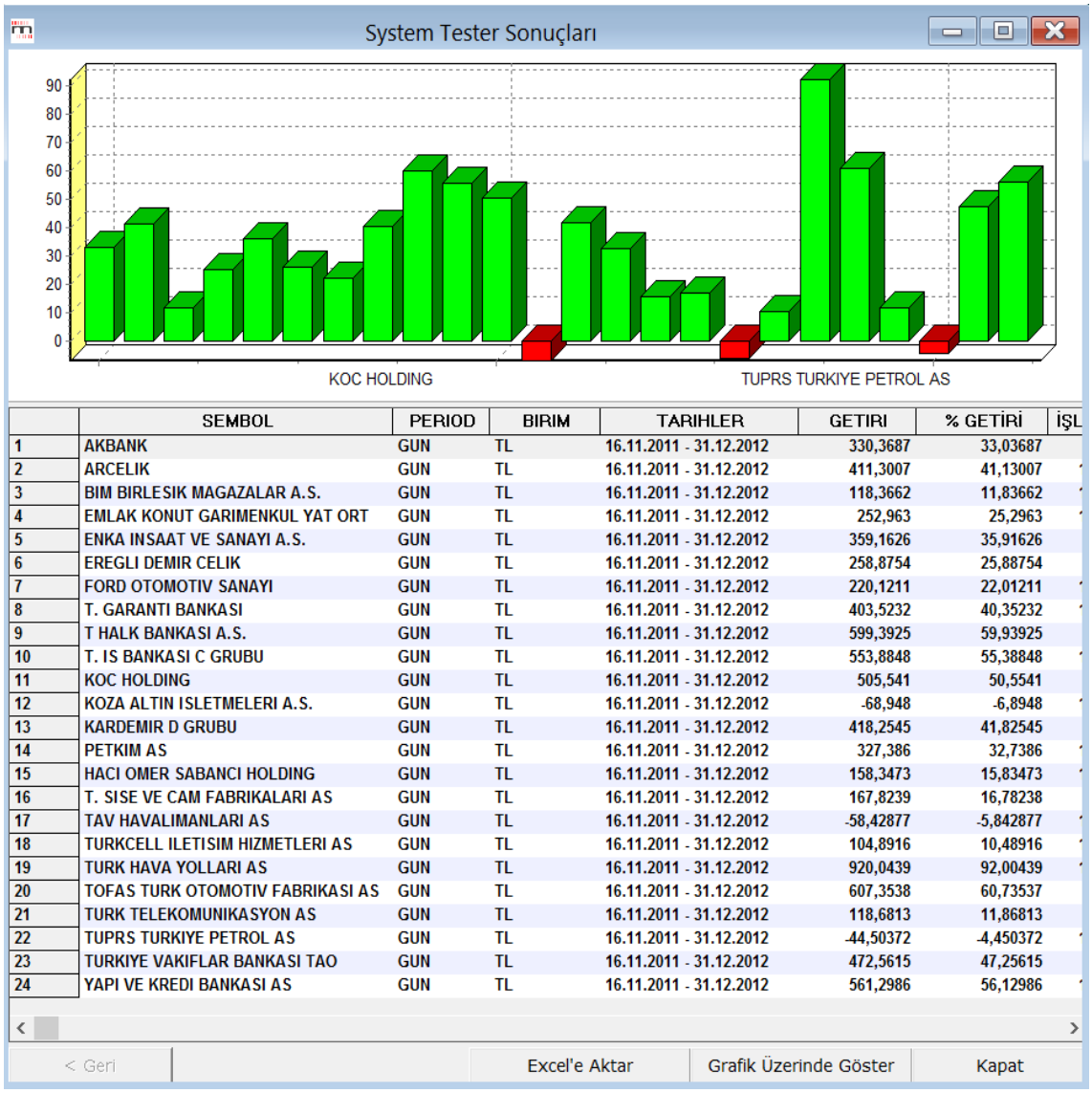
Appendix 14: Buy and Sell Signals' Results of Crossing MACD Line and MACD Trigger Line at 2012



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ	İŞL
1	AKBANK	GUN	TL	16.11.2011 - 31.12.2012	330,3687	33,03687	
2	ARCELIK	GUN	TL	16.11.2011 - 31.12.2012	411,3007	41,13007	
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	16.11.2011 - 31.12.2012	118,3662	11,83662	
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	16.11.2011 - 31.12.2012	252,963	25,2963	
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	16.11.2011 - 31.12.2012	359,1626	35,91626	
6	EREGLI DEMIR CELIK	GUN	TL	16.11.2011 - 31.12.2012	258,8754	25,88754	
7	FORD OTOMOTIV SANAYI	GUN	TL	16.11.2011 - 31.12.2012	220,1211	22,01211	
8	T. GARANTI BANKASI	GUN	TL	16.11.2011 - 31.12.2012	403,5232	40,35232	
9	T HALK BANKASI A.S.	GUN	TL	16.11.2011 - 31.12.2012	599,3925	59,93925	
10	T. IS BANKASI C GRUBU	GUN	TL	16.11.2011 - 31.12.2012	553,8848	55,38848	
11	KOC HOLDING	GUN	TL	16.11.2011 - 31.12.2012	505,541	50,5541	
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	16.11.2011 - 31.12.2012	-68,948	-6,8948	
13	KARDEMIR D GRUBU	GUN	TL	16.11.2011 - 31.12.2012	418,2545	41,82545	
14	PETKIM AS	GUN	TL	16.11.2011 - 31.12.2012	327,386	32,7386	
15	HACI OMER SABANCI HOLDING	GUN	TL	16.11.2011 - 31.12.2012	158,3473	15,83473	
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	16.11.2011 - 31.12.2012	167,8239	16,78238	
17	TAV HAVALIMANLARI AS	GUN	TL	16.11.2011 - 31.12.2012	-58,42877	-5,842877	
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	16.11.2011 - 31.12.2012	104,8916	10,48916	
19	TURK HAVA YOLLARI AS	GUN	TL	16.11.2011 - 31.12.2012	920,0439	92,00439	
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	16.11.2011 - 31.12.2012	607,3538	60,73537	
21	TURK TELEKOMUNIKASYON AS	GUN	TL	16.11.2011 - 31.12.2012	118,6813	11,86813	
22	TUPRS TURKIYE PETROL AS	GUN	TL	16.11.2011 - 31.12.2012	-44,50372	-4,450372	
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	16.11.2011 - 31.12.2012	472,5615	47,25615	
24	YAPI VE KREDI BANKASI AS	GUN	TL	16.11.2011 - 31.12.2012	561,2986	56,12986	

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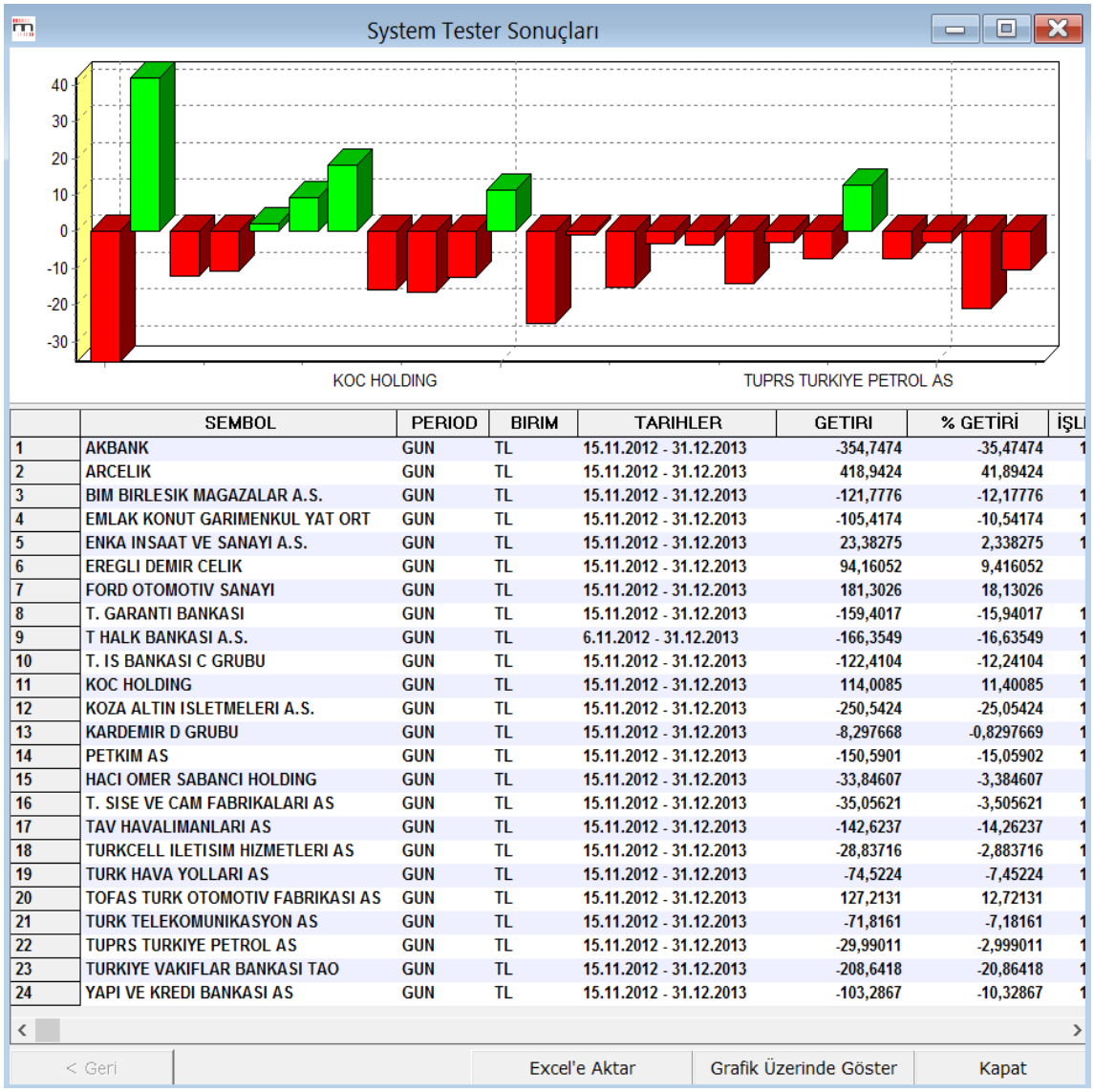
Appendix 15: Buy and Sell Signals' Results of Crossing MACD Line and MACD Trigger Line at 2013



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ	İŞLI
1	AKBANK	GUN	TL	15.11.2012 - 31.12.2013	-354,7474	-35,47474	1
2	ARCELIK	GUN	TL	15.11.2012 - 31.12.2013	418,9424	41,89424	
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	15.11.2012 - 31.12.2013	-121,7776	-12,17776	1
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	15.11.2012 - 31.12.2013	-105,4174	-10,54174	1
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	15.11.2012 - 31.12.2013	23,38275	2,338275	1
6	EREGLI DEMIR CELIK	GUN	TL	15.11.2012 - 31.12.2013	94,16052	9,416052	
7	FORD OTOMOTIV SANAYI	GUN	TL	15.11.2012 - 31.12.2013	181,3026	18,13026	
8	T. GARANTI BANKASI	GUN	TL	15.11.2012 - 31.12.2013	-159,4017	-15,94017	1
9	T HALK BANKASI A.S.	GUN	TL	6.11.2012 - 31.12.2013	-166,3549	-16,63549	1
10	T. IS BANKASI C GRUBU	GUN	TL	15.11.2012 - 31.12.2013	-122,4104	-12,24104	1
11	KOC HOLDING	GUN	TL	15.11.2012 - 31.12.2013	114,0085	11,40085	1
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	15.11.2012 - 31.12.2013	-250,5424	-25,05424	1
13	KARDEMIR D GRUBU	GUN	TL	15.11.2012 - 31.12.2013	-8,297668	-0,8297669	1
14	PETKIM AS	GUN	TL	15.11.2012 - 31.12.2013	-150,5901	-15,05902	1
15	HACI OMER SABANCI HOLDING	GUN	TL	15.11.2012 - 31.12.2013	-33,84607	-3,384607	
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	15.11.2012 - 31.12.2013	-35,05621	-3,505621	1
17	TAV HAVALIMANLARI AS	GUN	TL	15.11.2012 - 31.12.2013	-142,6237	-14,26237	1
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	15.11.2012 - 31.12.2013	-28,83716	-2,883716	1
19	TURK HAVA YOLLARI AS	GUN	TL	15.11.2012 - 31.12.2013	-74,5224	-7,45224	1
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	15.11.2012 - 31.12.2013	127,2131	12,72131	
21	TURK TELEKOMUNIKASYON AS	GUN	TL	15.11.2012 - 31.12.2013	-71,8161	-7,18161	1
22	TUPRS TURKIYE PETROL AS	GUN	TL	15.11.2012 - 31.12.2013	-29,99011	-2,999011	1
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	15.11.2012 - 31.12.2013	-208,6418	-20,86418	1
24	YAPI VE KREDI BANKASI AS	GUN	TL	15.11.2012 - 31.12.2013	-103,2867	-10,32867	1

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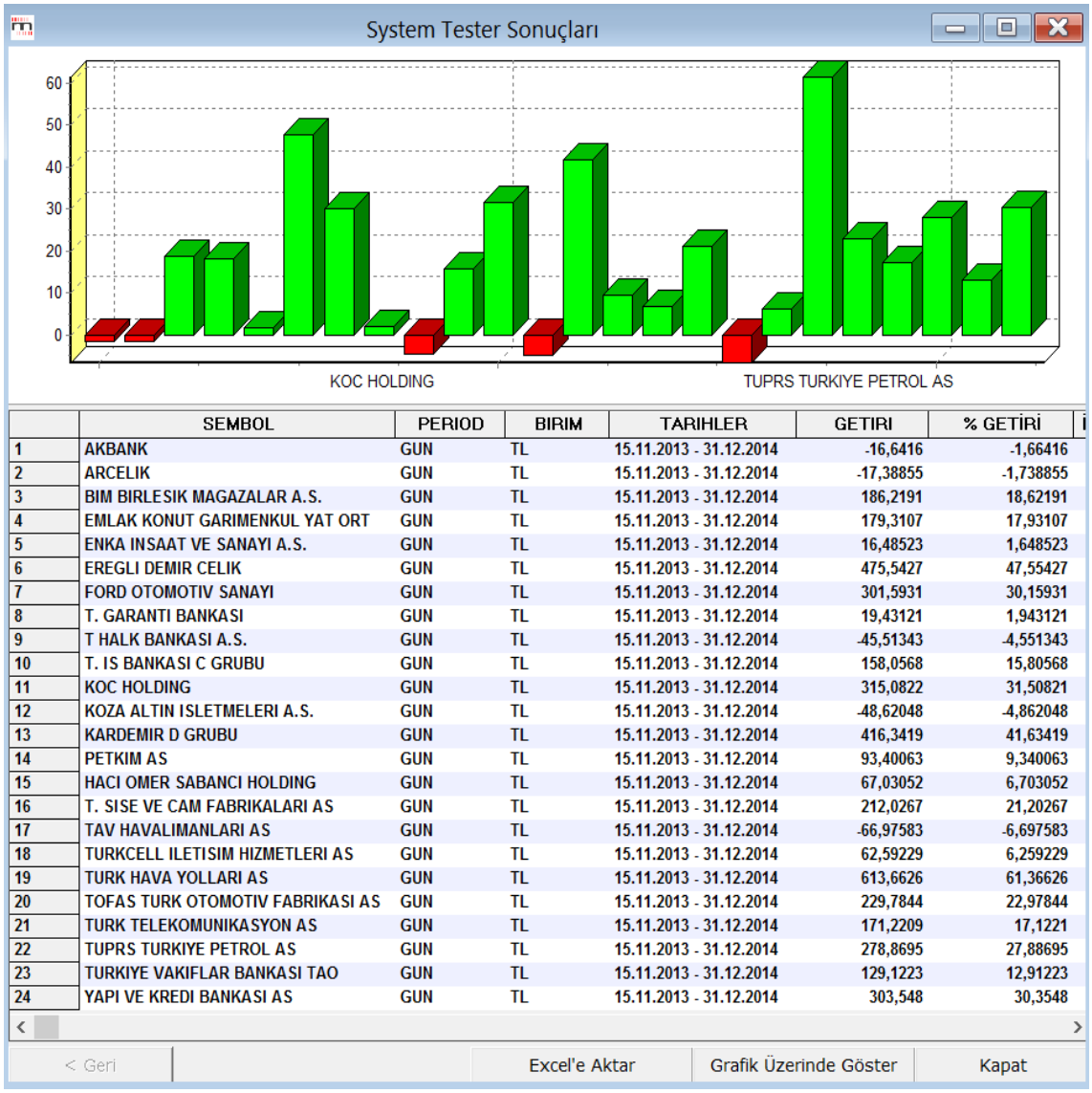
Appendix 16: Buy and Sell Signals' Results of Crossing MACD Line and MACD Trigger Line at 2014



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ
1	AKBANK	GUN	TL	15.11.2013 - 31.12.2014	-16,6416	-1,66416
2	ARCELIK	GUN	TL	15.11.2013 - 31.12.2014	-17,38855	-1,738855
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	15.11.2013 - 31.12.2014	186,2191	18,62191
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	15.11.2013 - 31.12.2014	179,3107	17,93107
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	15.11.2013 - 31.12.2014	16,48523	1,648523
6	EREGLI DEMIR CELIK	GUN	TL	15.11.2013 - 31.12.2014	475,5427	47,55427
7	FORD OTOMOTIV SANAYI	GUN	TL	15.11.2013 - 31.12.2014	301,5931	30,15931
8	T. GARANTI BANKASI	GUN	TL	15.11.2013 - 31.12.2014	19,43121	1,943121
9	T HALK BANKASI A.S.	GUN	TL	15.11.2013 - 31.12.2014	-45,51343	-4,551343
10	T. IS BANKASI C GRUBU	GUN	TL	15.11.2013 - 31.12.2014	158,0568	15,80568
11	KOC HOLDING	GUN	TL	15.11.2013 - 31.12.2014	315,0822	31,50821
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	15.11.2013 - 31.12.2014	-48,62048	-4,862048
13	KARDEMIR D GRUBU	GUN	TL	15.11.2013 - 31.12.2014	416,3419	41,63419
14	PETKIM AS	GUN	TL	15.11.2013 - 31.12.2014	93,40063	9,340063
15	HACI OMER SABANCI HOLDING	GUN	TL	15.11.2013 - 31.12.2014	67,03052	6,703052
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	15.11.2013 - 31.12.2014	212,0267	21,20267
17	TAV HAVALIMANLARI AS	GUN	TL	15.11.2013 - 31.12.2014	-66,97583	-6,697583
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	15.11.2013 - 31.12.2014	62,59229	6,259229
19	TURK HAVA YOLLARI AS	GUN	TL	15.11.2013 - 31.12.2014	613,6626	61,36626
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	15.11.2013 - 31.12.2014	229,7844	22,97844
21	TURK TELEKOMUNIKASYON AS	GUN	TL	15.11.2013 - 31.12.2014	171,2209	17,1221
22	TUPRS TURKIYE PETROL AS	GUN	TL	15.11.2013 - 31.12.2014	278,8695	27,88695
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	15.11.2013 - 31.12.2014	129,1223	12,91223
24	YAPI VE KREDI BANKASI AS	GUN	TL	15.11.2013 - 31.12.2014	303,548	30,3548

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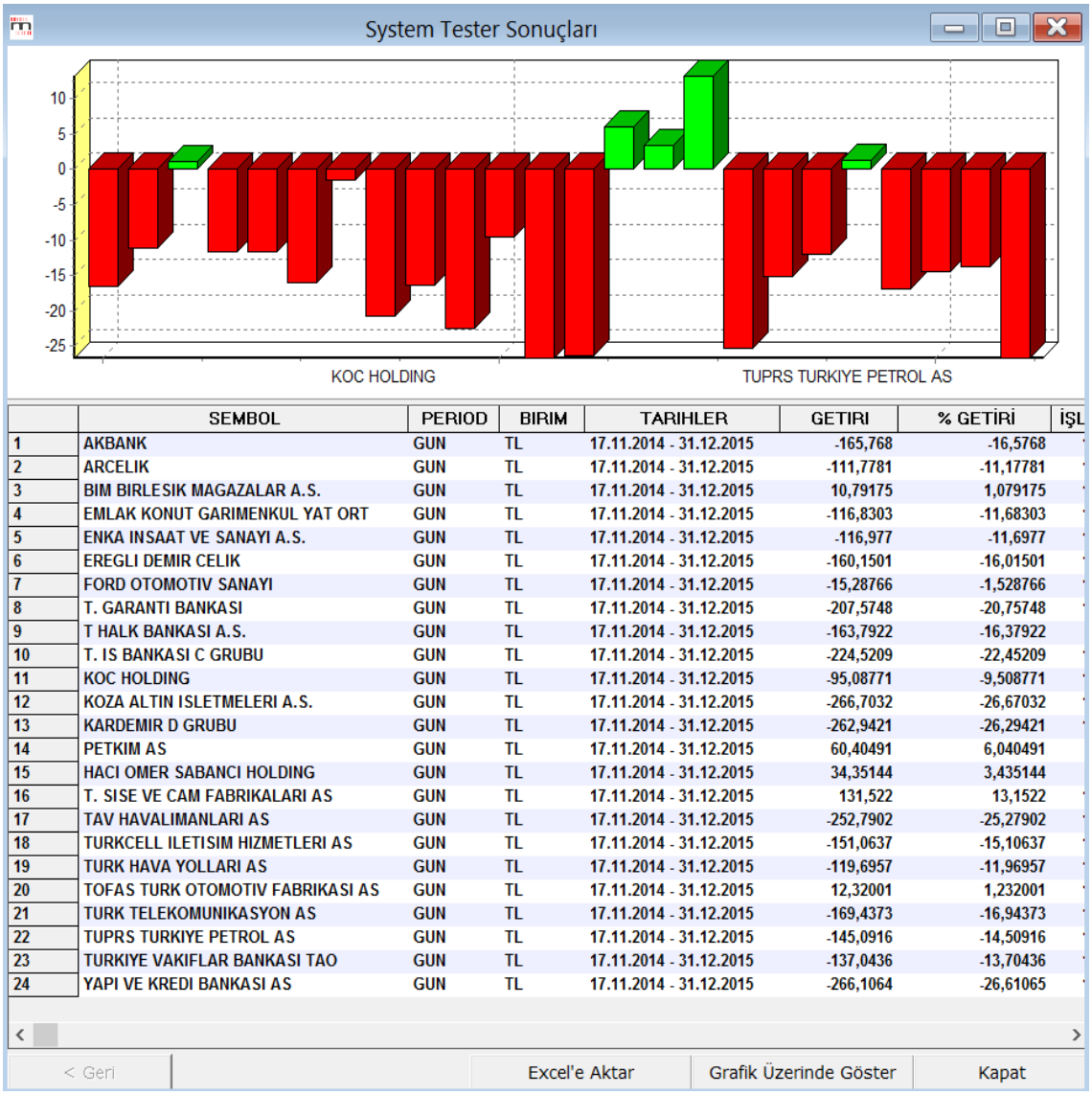
Appendix 17: Buy and Sell Signals' Results of Crossing MACD Line and MACD Trigger Line at 2015



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ	İŞL
1	AKBANK	GUN	TL	17.11.2014 - 31.12.2015	-165,768	-16,5768	
2	ARCELIK	GUN	TL	17.11.2014 - 31.12.2015	-111,7781	-11,17781	
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	17.11.2014 - 31.12.2015	10,79175	1,079175	
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	17.11.2014 - 31.12.2015	-116,8303	-11,68303	
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	17.11.2014 - 31.12.2015	-116,977	-11,6977	
6	EREGLI DEMIR CELIK	GUN	TL	17.11.2014 - 31.12.2015	-160,1501	-16,01501	
7	FORD OTOMOTIV SANAYI	GUN	TL	17.11.2014 - 31.12.2015	-15,28766	-1,528766	
8	T. GARANTI BANKASI	GUN	TL	17.11.2014 - 31.12.2015	-207,5748	-20,75748	
9	T HALK BANKASI A.S.	GUN	TL	17.11.2014 - 31.12.2015	-163,7922	-16,37922	
10	T. IS BANKASI C GRUBU	GUN	TL	17.11.2014 - 31.12.2015	-224,5209	-22,45209	
11	KOC HOLDING	GUN	TL	17.11.2014 - 31.12.2015	-95,08771	-9,508771	
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	17.11.2014 - 31.12.2015	-266,7032	-26,67032	
13	KARDEMIR D GRUBU	GUN	TL	17.11.2014 - 31.12.2015	-262,9421	-26,29421	
14	PETKIM AS	GUN	TL	17.11.2014 - 31.12.2015	60,40491	6,040491	
15	HACI OMER SABANCI HOLDING	GUN	TL	17.11.2014 - 31.12.2015	34,35144	3,435144	
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	17.11.2014 - 31.12.2015	131,522	13,1522	
17	TAV HAVALIMANLARI AS	GUN	TL	17.11.2014 - 31.12.2015	-252,7902	-25,27902	
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	17.11.2014 - 31.12.2015	-151,0637	-15,10637	
19	TURK HAVA YOLLARI AS	GUN	TL	17.11.2014 - 31.12.2015	-119,6957	-11,96957	
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	17.11.2014 - 31.12.2015	12,32001	1,232001	
21	TURK TELEKOMUNIKASYON AS	GUN	TL	17.11.2014 - 31.12.2015	-169,4373	-16,94373	
22	TUPRS TURKIYE PETROL AS	GUN	TL	17.11.2014 - 31.12.2015	-145,0916	-14,50916	
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	17.11.2014 - 31.12.2015	-137,0436	-13,70436	
24	YAPI VE KREDI BANKASI AS	GUN	TL	17.11.2014 - 31.12.2015	-266,1064	-26,61065	

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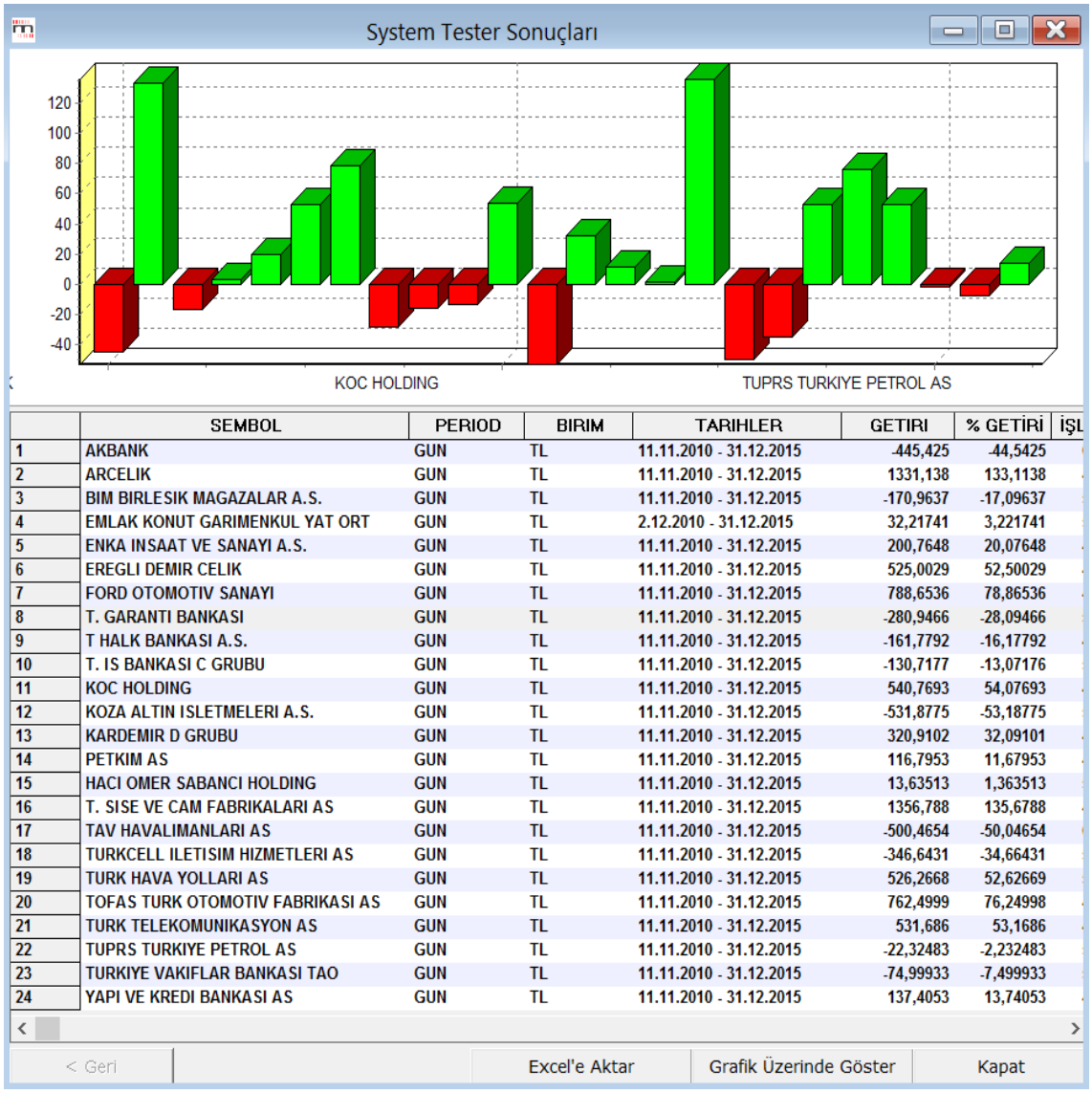
Appendix 18: Buy and Sell Signals' Results of Crossing MACD Line and MACD Trigger Line between 2011 and 2015



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ	İŞL
1	AKBANK	GUN	TL	11.11.2010 - 31.12.2015	-445,425	-44,5425	
2	ARCELIK	GUN	TL	11.11.2010 - 31.12.2015	1331,138	133,1138	
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	11.11.2010 - 31.12.2015	-170,9637	-17,09637	
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	2.12.2010 - 31.12.2015	32,21741	3,221741	
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	11.11.2010 - 31.12.2015	200,7648	20,07648	
6	EREGLI DEMIR CELIK	GUN	TL	11.11.2010 - 31.12.2015	525,0029	52,50029	
7	FORD OTOMOTIV SANAYI	GUN	TL	11.11.2010 - 31.12.2015	788,6536	78,86536	
8	T. GARANTI BANKASI	GUN	TL	11.11.2010 - 31.12.2015	-280,9466	-28,09466	
9	T HALK BANKASI A.S.	GUN	TL	11.11.2010 - 31.12.2015	-161,7792	-16,17792	
10	T. IS BANKASI C GRUBU	GUN	TL	11.11.2010 - 31.12.2015	-130,7177	-13,07176	
11	KOC HOLDING	GUN	TL	11.11.2010 - 31.12.2015	540,7693	54,07693	
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	11.11.2010 - 31.12.2015	-531,8775	-53,18775	
13	KARDEMIR D GRUBU	GUN	TL	11.11.2010 - 31.12.2015	320,9102	32,09101	
14	PETKIM AS	GUN	TL	11.11.2010 - 31.12.2015	116,7953	11,67953	
15	HACI OMER SABANCI HOLDING	GUN	TL	11.11.2010 - 31.12.2015	13,63513	1,363513	
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	11.11.2010 - 31.12.2015	1356,788	135,6788	
17	TAV HAVALIMANLARI AS	GUN	TL	11.11.2010 - 31.12.2015	-500,4654	-50,04654	
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	11.11.2010 - 31.12.2015	-346,6431	-34,66431	
19	TURK HAVA YOLLARI AS	GUN	TL	11.11.2010 - 31.12.2015	526,2668	52,62669	
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	11.11.2010 - 31.12.2015	762,4999	76,24998	
21	TURK TELEKOMUNIKASYON AS	GUN	TL	11.11.2010 - 31.12.2015	531,686	53,1686	
22	TUPRS TURKIYE PETROL AS	GUN	TL	11.11.2010 - 31.12.2015	-22,32483	-2,232483	
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	11.11.2010 - 31.12.2015	-74,99933	-7,499933	
24	YAPI VE KREDI BANKASI AS	GUN	TL	11.11.2010 - 31.12.2015	137,4053	13,74053	

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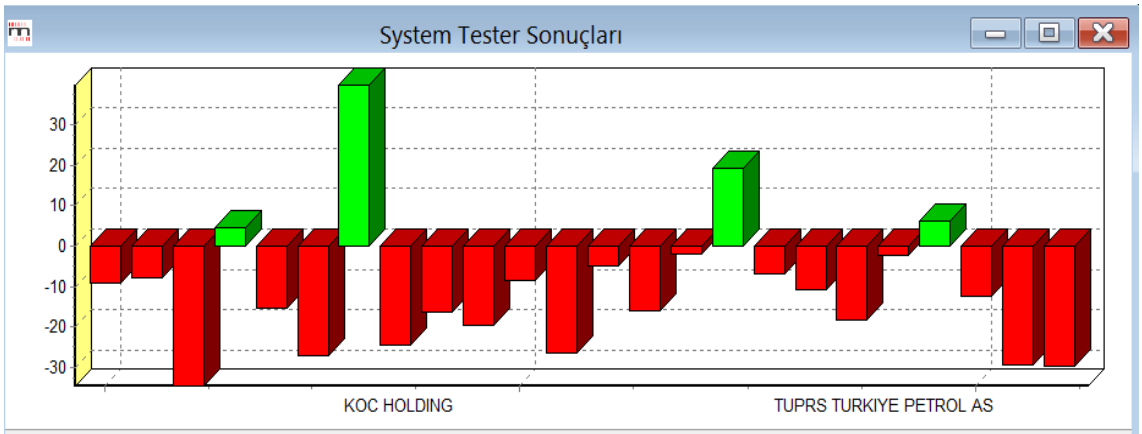
Appendix 19: Buy and Sell Signals' Results of Crossing MACD Line and Zero Line at 2011



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ
1	AKBANK	GUN	TL	29.11.2010 - 31.12.2011	-91,75226	-9,175226
2	ARCELIK	GUN	TL	29.11.2010 - 31.12.2011	-78,98438	-7,898438
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	29.11.2010 - 31.12.2011	-345,3889	-34,53889
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	2.12.2010 - 31.12.2011	46,63733	4,663733
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	29.11.2010 - 31.12.2011	-153,5286	-15,35286
6	EREGLI DEMIR CELIK	GUN	TL	29.11.2010 - 31.12.2011	-270,6096	-27,06096
7	FORD OTOMOTIV SANAYI	GUN	TL	29.11.2010 - 31.12.2011	397,4727	39,74726
8	T. GARANTI BANKASI	GUN	TL	29.11.2010 - 31.12.2011	-244,7499	-24,47499
9	T HALK BANKASI A.S.	GUN	TL	29.11.2010 - 31.12.2011	-163,3069	-16,33069
10	T. IS BANKASI C GRUBU	GUN	TL	29.11.2010 - 31.12.2011	-194,1354	-19,41354
11	KOC HOLDING	GUN	TL	29.11.2010 - 31.12.2011	-85,07666	-8,507666
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	29.11.2010 - 31.12.2011	-263,5238	-26,35238
13	KARDEMIR D GRUBU	GUN	TL	29.11.2010 - 31.12.2011	-48,14514	-4,814514
14	PETKIM AS	GUN	TL	29.11.2010 - 31.12.2011	-160,268	-16,0268
15	HACI OMER SABANCI HOLDING	GUN	TL	29.11.2010 - 31.12.2011	-18,80432	-1,880432
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	29.11.2010 - 31.12.2011	192,1014	19,21014
17	TAV HAVALIMANLARI AS	GUN	TL	29.11.2010 - 31.12.2011	-68,72882	-6,872882
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	29.11.2010 - 31.12.2011	-108,3176	-10,83176
19	TURK HAVA YOLLARI AS	GUN	TL	29.11.2010 - 31.12.2011	-182,9747	-18,29747
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	29.11.2010 - 31.12.2011	-22,95538	-2,295538
21	TURK TELEKOMUNIKASYON AS	GUN	TL	29.11.2010 - 31.12.2011	62,05347	6,205347
22	TUPRS TURKIYE PETROL AS	GUN	TL	29.11.2010 - 31.12.2011	-122,5916	-12,25916
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	29.11.2010 - 31.12.2011	-292,7888	-29,27888
24	YAPI VE KREDI BANKASI AS	GUN	TL	29.11.2010 - 31.12.2011	-297,8853	-29,78853

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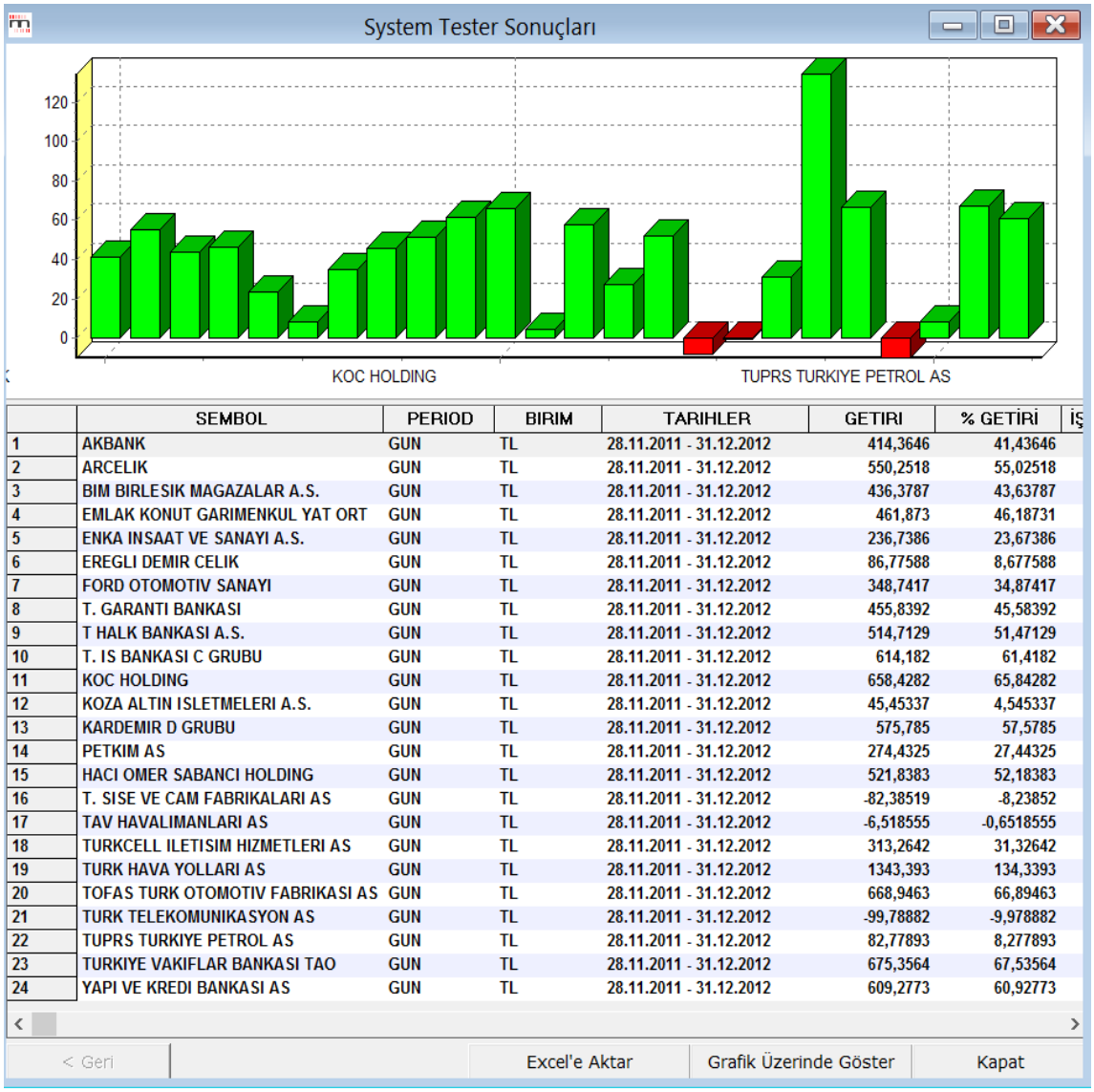
Appendix 20: Buy and Sell Signals' Results of Crossing MACD Line and Zero Line at 2012



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ	İŞ
1	AKBANK	GUN	TL	28.11.2011 - 31.12.2012	414,3646	41,43646	
2	ARCELIK	GUN	TL	28.11.2011 - 31.12.2012	550,2518	55,02518	
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	28.11.2011 - 31.12.2012	436,3787	43,63787	
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	28.11.2011 - 31.12.2012	461,873	46,18731	
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	28.11.2011 - 31.12.2012	236,7386	23,67386	
6	EREGLI DEMIR CELIK	GUN	TL	28.11.2011 - 31.12.2012	86,77588	8,677588	
7	FORD OTOMOTIV SANAYI	GUN	TL	28.11.2011 - 31.12.2012	348,7417	34,87417	
8	T. GARANTI BANKASI	GUN	TL	28.11.2011 - 31.12.2012	455,8392	45,58392	
9	T HALK BANKASI A.S.	GUN	TL	28.11.2011 - 31.12.2012	514,7129	51,47129	
10	T. IS BANKASI C GRUBU	GUN	TL	28.11.2011 - 31.12.2012	614,182	61,4182	
11	KOC HOLDING	GUN	TL	28.11.2011 - 31.12.2012	658,4282	65,84282	
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	28.11.2011 - 31.12.2012	45,45337	4,545337	
13	KARDEMIR D GRUBU	GUN	TL	28.11.2011 - 31.12.2012	575,785	57,5785	
14	PETKIM AS	GUN	TL	28.11.2011 - 31.12.2012	274,4325	27,44325	
15	HACI OMER SABANCI HOLDING	GUN	TL	28.11.2011 - 31.12.2012	521,8383	52,18383	
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	28.11.2011 - 31.12.2012	-82,38519	-8,23852	
17	TAV HAVALIMANLARI AS	GUN	TL	28.11.2011 - 31.12.2012	-6,518555	-0,6518555	
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	28.11.2011 - 31.12.2012	313,2642	31,32642	
19	TURK HAVA YOLLARI AS	GUN	TL	28.11.2011 - 31.12.2012	1343,393	134,3393	
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	28.11.2011 - 31.12.2012	668,9463	66,89463	
21	TURK TELEKOMUNIKASYON AS	GUN	TL	28.11.2011 - 31.12.2012	-99,78882	-9,978882	
22	TUPRS TURKIYE PETROL AS	GUN	TL	28.11.2011 - 31.12.2012	82,77893	8,277893	
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	28.11.2011 - 31.12.2012	675,3564	67,53564	
24	YAPI VE KREDI BANKASI AS	GUN	TL	28.11.2011 - 31.12.2012	609,2773	60,92773	

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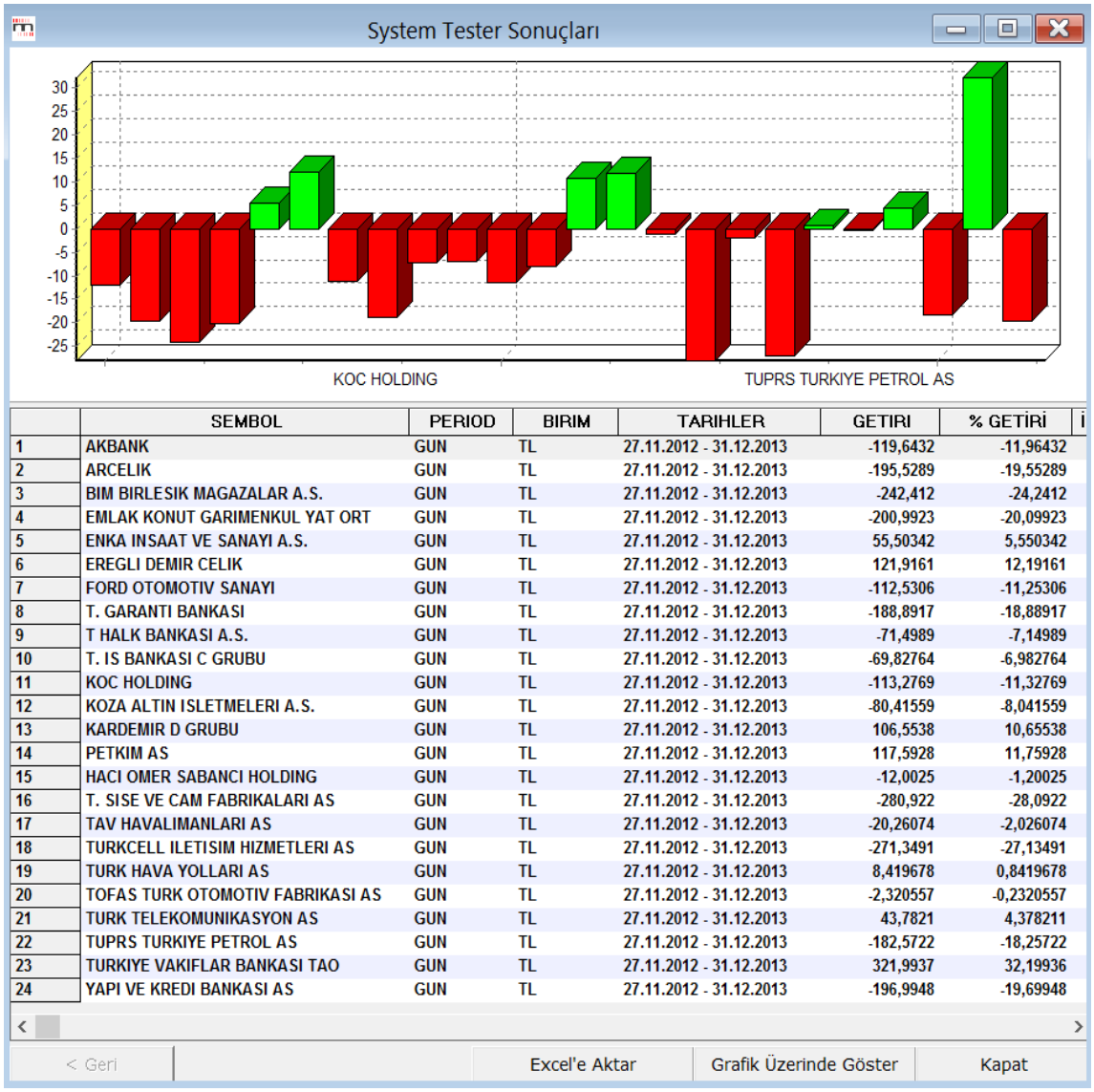
Appendix 21: Buy and Sell Signals' Results of Crossing MACD Line and Zero Line at 2013



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ
1	AKBANK	GUN	TL	27.11.2012 - 31.12.2013	-119,6432	-11,96432
2	ARCELIK	GUN	TL	27.11.2012 - 31.12.2013	-195,5289	-19,55289
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	27.11.2012 - 31.12.2013	-242,412	-24,2412
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	27.11.2012 - 31.12.2013	-200,9923	-20,09923
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	27.11.2012 - 31.12.2013	55,50342	5,550342
6	EREGLI DEMIR CELIK	GUN	TL	27.11.2012 - 31.12.2013	121,9161	12,19161
7	FORD OTOMOTIV SANAYI	GUN	TL	27.11.2012 - 31.12.2013	-112,5306	-11,25306
8	T. GARANTI BANKASI	GUN	TL	27.11.2012 - 31.12.2013	-188,8917	-18,88917
9	T HALK BANKASI A.S.	GUN	TL	27.11.2012 - 31.12.2013	-71,4989	-7,14989
10	T. IS BANKASI C GRUBU	GUN	TL	27.11.2012 - 31.12.2013	-69,82764	-6,982764
11	KOC HOLDING	GUN	TL	27.11.2012 - 31.12.2013	-113,2769	-11,32769
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	27.11.2012 - 31.12.2013	-80,41559	-8,041559
13	KARDEMIR D GRUBU	GUN	TL	27.11.2012 - 31.12.2013	106,5538	10,65538
14	PETKIM AS	GUN	TL	27.11.2012 - 31.12.2013	117,5928	11,75928
15	HACI OMER SABANCI HOLDING	GUN	TL	27.11.2012 - 31.12.2013	-12,0025	-1,20025
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	27.11.2012 - 31.12.2013	-280,922	-28,0922
17	TAV HAVALIMANLARI AS	GUN	TL	27.11.2012 - 31.12.2013	-20,26074	-2,026074
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	27.11.2012 - 31.12.2013	-271,3491	-27,13491
19	TURK HAVA YOLLARI AS	GUN	TL	27.11.2012 - 31.12.2013	8,419678	0,8419678
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	27.11.2012 - 31.12.2013	-2,320557	-0,2320557
21	TURK TELEKOMUNIKASYON AS	GUN	TL	27.11.2012 - 31.12.2013	43,7821	4,378211
22	TUPRS TURKIYE PETROL AS	GUN	TL	27.11.2012 - 31.12.2013	-182,5722	-18,25722
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	27.11.2012 - 31.12.2013	321,9937	32,19936
24	YAPI VE KREDI BANKASI AS	GUN	TL	27.11.2012 - 31.12.2013	-196,9948	-19,69948

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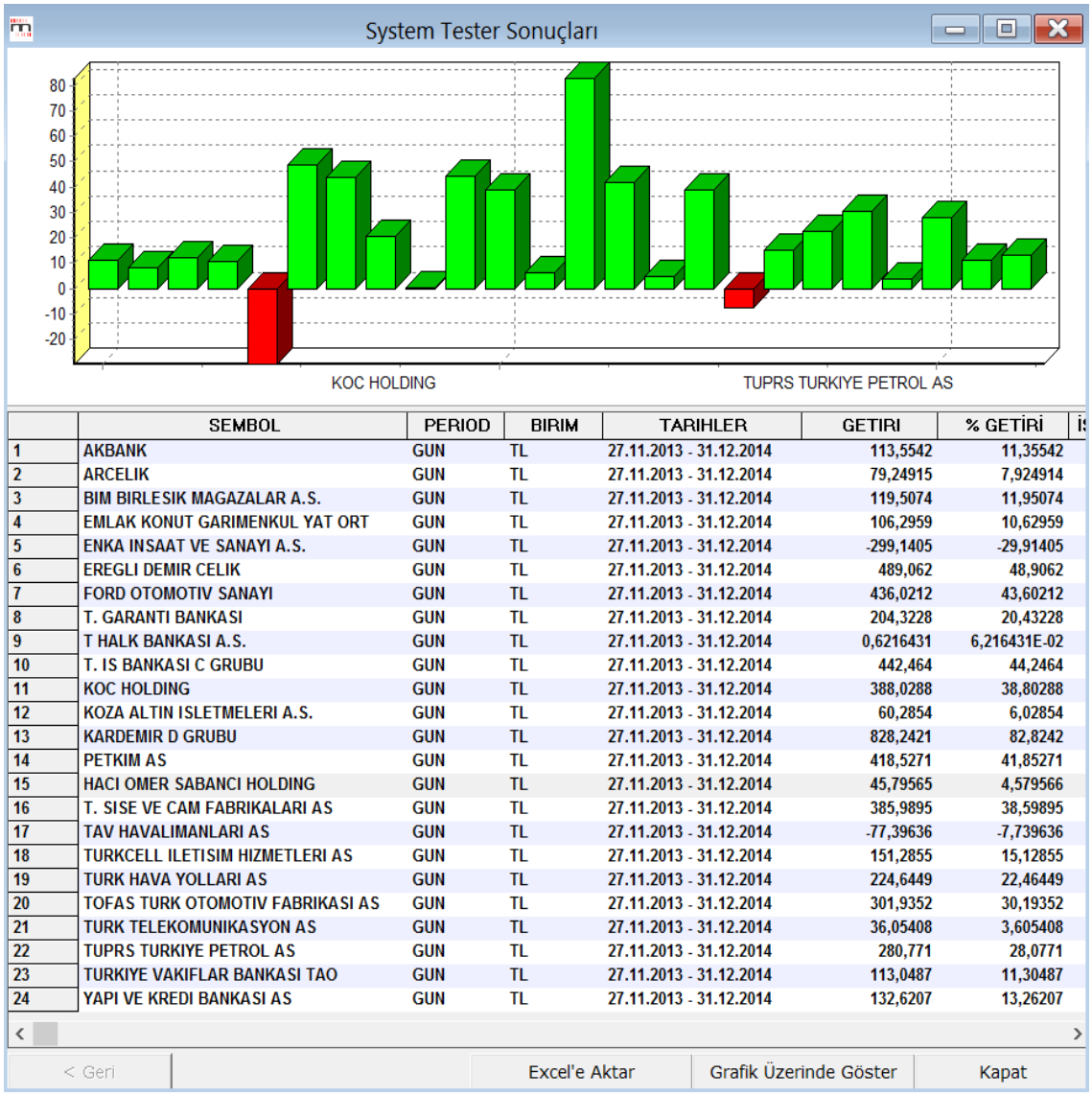
Appendix 22: Buy and Sell Signals' Results of Crossing MACD Line and Zero Line at 2014



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ
1	AKBANK	GUN	TL	27.11.2013 - 31.12.2014	113,5542	11,35542
2	ARCELIK	GUN	TL	27.11.2013 - 31.12.2014	79,24915	7,924914
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	27.11.2013 - 31.12.2014	119,5074	11,95074
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	27.11.2013 - 31.12.2014	106,2959	10,62959
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	27.11.2013 - 31.12.2014	-299,1405	-29,91405
6	EREGLI DEMIR CELIK	GUN	TL	27.11.2013 - 31.12.2014	489,062	48,9062
7	FORD OTOMOTIV SANAYI	GUN	TL	27.11.2013 - 31.12.2014	436,0212	43,60212
8	T. GARANTI BANKASI	GUN	TL	27.11.2013 - 31.12.2014	204,3228	20,43228
9	T HALK BANKASI A.S.	GUN	TL	27.11.2013 - 31.12.2014	0,6216431	6,216431E-02
10	T. IS BANKASI C GRUBU	GUN	TL	27.11.2013 - 31.12.2014	442,464	44,2464
11	KOC HOLDING	GUN	TL	27.11.2013 - 31.12.2014	388,0288	38,80288
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	27.11.2013 - 31.12.2014	60,2854	6,02854
13	KARDEMIR D GRUBU	GUN	TL	27.11.2013 - 31.12.2014	828,2421	82,8242
14	PETKIM AS	GUN	TL	27.11.2013 - 31.12.2014	418,5271	41,85271
15	HACI OMER SABANCI HOLDING	GUN	TL	27.11.2013 - 31.12.2014	45,79565	4,579566
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	27.11.2013 - 31.12.2014	385,9895	38,59895
17	TAV HAVALIMANLARI AS	GUN	TL	27.11.2013 - 31.12.2014	-77,39636	-7,739636
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	27.11.2013 - 31.12.2014	151,2855	15,12855
19	TURK HAVA YOLLARI AS	GUN	TL	27.11.2013 - 31.12.2014	224,6449	22,46449
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	27.11.2013 - 31.12.2014	301,9352	30,19352
21	TURK TELEKOMUNIKASYON AS	GUN	TL	27.11.2013 - 31.12.2014	36,05408	3,605408
22	TUPRS TURKIYE PETROL AS	GUN	TL	27.11.2013 - 31.12.2014	280,771	28,0771
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	27.11.2013 - 31.12.2014	113,0487	11,30487
24	YAPI VE KREDI BANKASI AS	GUN	TL	27.11.2013 - 31.12.2014	132,6207	13,26207

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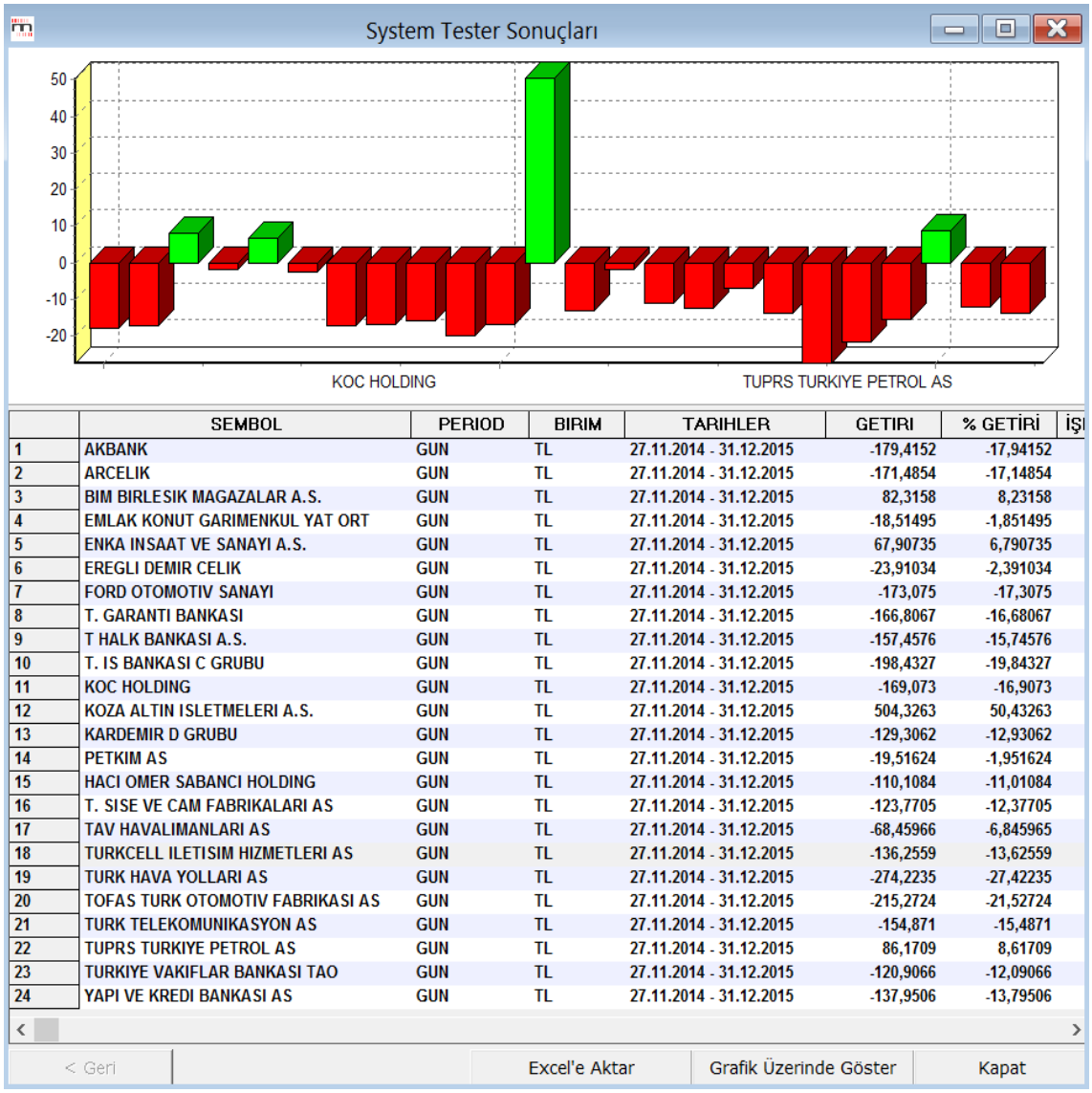
Appendix 23: Buy and Sell Signals' Results of Crossing MACD Line and Zero Line at 2015



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ	İŞ
1	AKBANK	GUN	TL	27.11.2014 - 31.12.2015	-179,4152	-17,94152	
2	ARCELIK	GUN	TL	27.11.2014 - 31.12.2015	-171,4854	-17,14854	
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	27.11.2014 - 31.12.2015	82,3158	8,23158	
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	27.11.2014 - 31.12.2015	-18,51495	-1,851495	
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	27.11.2014 - 31.12.2015	67,90735	6,790735	
6	EREGLI DEMIR CELIK	GUN	TL	27.11.2014 - 31.12.2015	-23,91034	-2,391034	
7	FORD OTOMOTIV SANAYI	GUN	TL	27.11.2014 - 31.12.2015	-173,075	-17,3075	
8	T. GARANTI BANKASI	GUN	TL	27.11.2014 - 31.12.2015	-166,8067	-16,68067	
9	T HALK BANKASI A.S.	GUN	TL	27.11.2014 - 31.12.2015	-157,4576	-15,74576	
10	T. IS BANKASI C GRUBU	GUN	TL	27.11.2014 - 31.12.2015	-198,4327	-19,84327	
11	KOC HOLDING	GUN	TL	27.11.2014 - 31.12.2015	-169,073	-16,9073	
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	27.11.2014 - 31.12.2015	504,3263	50,43263	
13	KARDEMIR D GRUBU	GUN	TL	27.11.2014 - 31.12.2015	-129,3062	-12,93062	
14	PETKIM AS	GUN	TL	27.11.2014 - 31.12.2015	-19,51624	-1,951624	
15	HACI OMER SABANCI HOLDING	GUN	TL	27.11.2014 - 31.12.2015	-110,1084	-11,01084	
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	27.11.2014 - 31.12.2015	-123,7705	-12,37705	
17	TAV HAVALIMANLARI AS	GUN	TL	27.11.2014 - 31.12.2015	-68,45966	-6,845965	
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	27.11.2014 - 31.12.2015	-136,2559	-13,62559	
19	TURK HAVA YOLLARI AS	GUN	TL	27.11.2014 - 31.12.2015	-274,2235	-27,42235	
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	27.11.2014 - 31.12.2015	-215,2724	-21,52724	
21	TURK TELEKOMUNIKASYON AS	GUN	TL	27.11.2014 - 31.12.2015	-154,871	-15,4871	
22	TUPRS TURKIYE PETROL AS	GUN	TL	27.11.2014 - 31.12.2015	86,1709	8,61709	
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	27.11.2014 - 31.12.2015	-120,9066	-12,09066	
24	YAPI VE KREDI BANKASI AS	GUN	TL	27.11.2014 - 31.12.2015	-137,9506	-13,79506	

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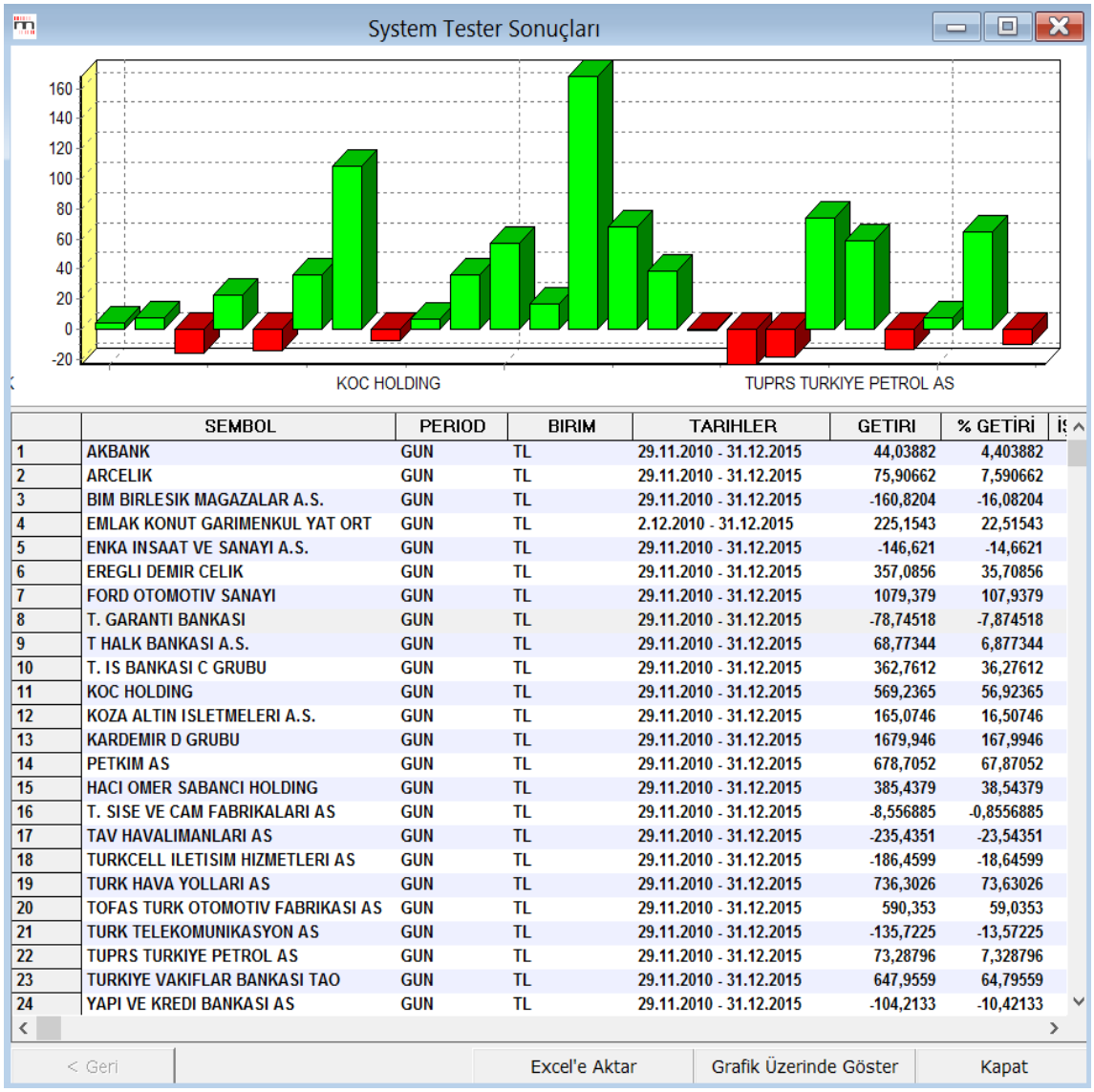
Appendix 24: Buy and Sell Signals' Results of Crossing MACD Line and Zero Line between 2011 and 2015



	SEMBOL	PERIOD	BIRIM	TARIHLER	GETIRI	% GETİRİ	İ
1	AKBANK	GUN	TL	29.11.2010 - 31.12.2015	44,03882	4,403882	
2	ARCELIK	GUN	TL	29.11.2010 - 31.12.2015	75,90662	7,590662	
3	BIM BIRLESIK MAGAZALAR A.S.	GUN	TL	29.11.2010 - 31.12.2015	-160,8204	-16,08204	
4	EMLAK KONUT GARIMENKUL YAT ORT	GUN	TL	2.12.2010 - 31.12.2015	225,1543	22,51543	
5	ENKA INSAAT VE SANAYI A.S.	GUN	TL	29.11.2010 - 31.12.2015	-146,621	-14,6621	
6	EREGLI DEMIR CELIK	GUN	TL	29.11.2010 - 31.12.2015	357,0856	35,70856	
7	FORD OTOMOTIV SANAYI	GUN	TL	29.11.2010 - 31.12.2015	1079,379	107,9379	
8	T. GARANTI BANKASI	GUN	TL	29.11.2010 - 31.12.2015	-78,74518	-7,874518	
9	T HALK BANKASI A.S.	GUN	TL	29.11.2010 - 31.12.2015	68,77344	6,877344	
10	T. IS BANKASI C GRUBU	GUN	TL	29.11.2010 - 31.12.2015	362,7612	36,27612	
11	KOC HOLDING	GUN	TL	29.11.2010 - 31.12.2015	569,2365	56,92365	
12	KOZA ALTIN ISLETMELERI A.S.	GUN	TL	29.11.2010 - 31.12.2015	165,0746	16,50746	
13	KARDEMIR D GRUBU	GUN	TL	29.11.2010 - 31.12.2015	1679,946	167,9946	
14	PETKIM AS	GUN	TL	29.11.2010 - 31.12.2015	678,7052	67,87052	
15	HACI OMER SABANCI HOLDING	GUN	TL	29.11.2010 - 31.12.2015	385,4379	38,54379	
16	T. SISE VE CAM FABRIKALARI AS	GUN	TL	29.11.2010 - 31.12.2015	-8,556885	-0,8556885	
17	TAV HAVALIMANLARI AS	GUN	TL	29.11.2010 - 31.12.2015	-235,4351	-23,54351	
18	TURKCELL ILETISIM HIZMETLERI AS	GUN	TL	29.11.2010 - 31.12.2015	-186,4599	-18,64599	
19	TURK HAVA YOLLARI AS	GUN	TL	29.11.2010 - 31.12.2015	736,3026	73,63026	
20	TOFAS TURK OTOMOTIV FABRIKASI AS	GUN	TL	29.11.2010 - 31.12.2015	590,353	59,0353	
21	TURK TELEKOMUNIKASYON AS	GUN	TL	29.11.2010 - 31.12.2015	-135,7225	-13,57225	
22	TUPRS TURKIYE PETROL AS	GUN	TL	29.11.2010 - 31.12.2015	73,28796	7,328796	
23	TURKIYE VAKIFLAR BANKASI TAO	GUN	TL	29.11.2010 - 31.12.2015	647,9559	64,79559	
24	YAPI VE KREDI BANKASI AS	GUN	TL	29.11.2010 - 31.12.2015	-104,2133	-10,42133	

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REFERENCES

Books

Appel, G., **Technical Analysis**, Pearson Education, 2005.

Bulkowski, T. N., **Getting Started in Chart Patterns,** John Wiley & Sons, Inc., 2006.

Edwards, Robert D., **Technical analysis of stock trends**, CRC Press, 2001.

Murphy, John J., **Technical Analysis of the Financial Markets**, New York Institute of Finance, 1999.

Pring, Martin J., **Technical Analysis Explained**, McGraw-Hill Education, 2014.

Thesis

Apaydın, F., Teknik Analizde Optimizasyonu Uygulaması ve Bu Uygulamanın İMKB Üzerinde Test Edilmesi, **Master's Thesis**, Marmara University, Istanbul 2009.

Çınar, D., Technical Analysis Method for Stock Valuation: An Application in the Istanbul Stock Exchange, **Master's Thesis**, Dokuz Eylül University, 2011.

Kılıç, M., Teknik Analiz Yöntemi ve Simulasyon Modeli ile İMKB'de Uygulanması, **Master's Thesis**, Sakarya University, June 2008.

Web Sources

Achelis, S. B., Gann Angles, **Metastock** from http://www.metastock.com/customer/resources/taaz/?c=3&p=60 (Retrieved May 5, 2016).

Bhandari, B., Trading with Bollinger Bands, **Modern Trader**, 2016, p. 52-54, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=107f20cc-3164-49a6-b7ae-09b7cd8fe9b1%40sessionmgr198&hid=119 (Retrieved February 5, 2016).

Bhandari, B., Channeling Trends in Stocks, **Futures (Cedar Falls, Iowa)**, 2013, Vol. 42 Issue 1, p. 16-18, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=5&sid=c0476118-3d41-4f85-908b-d49c005ae982%40sessionmgr4004&hid=4211 (Retrieved February 5, 2016).

Bhandari, B., Trading Stocks with Triangles, **Futures (Cedar Falls, Iowa)**, 2012, Vol. 41 Issue 6, p34-37, from http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=2&sid=6fb6f724-a455-42b4-ae91-71fd0dd499a7%40sessionmgr107&hid=122 (Retrieved February 15, 2016).

Bhandari, B., Trading Stocks with MACD, **Futures (Cedar Falls, Iowa)**, 2011, Vol. 40 Issue 12, p32-35, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=4fbb4cce-7322-4f49-9176-8b42123c2ab9%40sessionmgr102&hid=120 (Retrieved February 5, 2016).

Borsa Istanbul, http://www.borsaistanbul.com/en/home-page (Retrieved April, 23).

Charussaengsuriya, R. Tharnpipat, T., Technical Analysis of Stock Prices Using Elliot Wave Theory and Fibonacci Number, **The Empirical Econometrics and Quantitative Economics Letters**, 2012, Volume 1, Number, p91-102, from mailto:http://www.jyoungeconomist.com/images/stories/EEQEL_V1_N1_March_2012_pp_091_102_Charussaengsuriya_Tharnpipat(1).pdf (Retrieved February 6, 2016).

Dahlquist, Julie R., Bauer, Richard J., Analyzing Gaps for Profitable Trading Strategies, **Journal of Technical Analysis**, 2013, Issue 67, p. 5-15, from http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=4&sid=6fb6f724-a455-42b4-ae91-71fd0dd499a7%40sessionmgr107&hid=122 (Retrieved February 6, 2016).

Dolving, S., The Efficacy of Trading Based on Moving Average Indicators: An Extension, **Journal of Wealth Management**, 2014, Vol. 17 Issue 1, p. 52-57, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=1ea1cc9d-2537-49fc-8d74-fdd908f2838d%40sessionmgr4003&vid=0&hid=4208 (Retrieved February 2, 2016).

Giryn, C., Kozubski, Fibonacci Numbers as a Tool for Technical Analysis in the Forex Market - The Attempt of Appliication, **Studies & Proceedings Polish Association for Knowledge Management**, 2012, Issue 61, p. 54-66, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=b454dac2-7465-4459-86ab-bcf0de0e562b%40sessionmgr4005&vid=0&hid=4208 (Retrieved January 17, 2016).

Greenblatt, J., Trading Stocks with Fibonacci and Lucas, **Futures (Cedar Falls, Iowa)**, 2007, Vol. 36 Issue 6, p. 32-35, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=0a4a51d6-9d41-4745-a29d-61a2f86bc303%40sessionmgr4001&vid=0&hid=4208 (Retrieved January 17, 2016).

Kabasinskas, A., Macys, U., Calibration of Bollinger Bands Parameters for Trading Strategy Development in the Baltic Stock Market, **Engineering Economics**, 2010 Vol. 21 Issue 3, p244-254, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=5&sid=107f20cc-3164-49a6-b7ae-09b7cd8fe9b1%40sessionmgr198&hid=119 (Retrieved February 5, 2016).

Kofoed., K., Fanning Profits With W.D. Gann, **Futures (Cedar Falls, Iowa)**, 2012, Vol. 41 Issue 12, p. 20-31, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=a8f9b5de-1224-4bef-9409-6483564fd6b6%40sessionmgr4003&vid=0&hid=4208 (Retrieved January 24, 2016).

Miccolis, J., Goodman, M., Dynamic Asset Allocation: Using Momentum to Enhance Portfolio Risk Management, **Journal of Financial Planning**, 2012, Vol. 25 Issue 2, p. 35-42, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=7ca8ea83-3732-45cf-a298-0c74e9a0a0db%40sessionmgr4001&hid=4105 (Retrieved February 5, 2016).

Naseer, M., Tariq, Y., The Efficient Market Hypothesis: A Critical Review of the Literature, **IUP Journal of Financial Risk Management**, 2015, Vol. 12 Issue 4, http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=5&sid=d84c14ee-df72-45ae-9154-9496b7c36b29%40sessionmgr105&hid=120 (Retrieved April 25, 2016).

Radukic, S., Radovic, M., Long Term Trend Analysis in the Capital Market – The Case of Serbia, **Journal of Central Banking Theory and Practice**, 2014, 3, p. 5-18, from http://www.cbcg.me/repec/cbk/journl/vol3no3-1.pdf (Retrieved February 6, 2016).

Raschke, L., It's All the Yiming, **Futures (Cedar Falls, Iowa)**, 1999, Vol. 28 Issue 6, p40-43, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=11&sid=7d90a192-d511-491d-9975-9a71c0306cb9%40sessionmgr4002&hid=4208 (Retrieved January 24, 2016).

Shah, K., The Dow Theory, **Aweshkar Research Journal**, 2012 Vol. 13 Issue 1, p. 77-82, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=9aaabc8e-d7b8-49b9-a75e-093ec38341dc%40sessionmgr4002&vid=0&hid=4208 (Retrieved January 24, 2016).

Siminica, M., Circiumaru, D., The Use of Charts for the Technical Analysis of the Share Quoted on the Stock Exchange, **Annals of the University of Oradea, Economic Science Series**, 2008, Vol. 17 Issue 3, p. 528-533, from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=8&sid=1632291f-975a-4998-9ab0-61b77ddffc29%40sessionmgr198&hid=121 (Retrieved February 4, 2016).

Subramanian, V., Balakrishnan, K., Efficacy of Refined MACD Indicators: Evidence from Indian Stock Markets, **IUP Journal of Applied Finance**, 2014, Vol. 20 Issue 1, p76-91, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=3&sid=9491a753-189c-47aa-8cc5-455ce7bdc8f4%40sessionmgr4003&hid=4110 (Retrieved February 5, 2016).

Suciu, T., Elements of Stock Market Analysis, **Bulletin of the Transylvania University of Brasov. Series V: Economic Sciences**, 2013, Vol. 6 Issue 2, p. 153-160, from http://ezproxy.ticaret.edu.tr:2095/eds/pdfviewer/pdfviewer?vid=2&sid=d84c14ee-df72-45ae-9154-9496b7c36b29%40sessionmgr105&hid=120 (Retrieved April 14, 2016).

Suresh, A.S., A Study on Fundamental and Technical Analysis, **International Journal of Marketing, Financial Services & Management Research**, 2013, Vol 2, No. 5, p. 44-59, from http://indianresearchjournals.com/pdf/IJMFSMR/2013/May/6.pdf (Retrieved February 10, 2016).

Vukovic, D., Grubusic, Z,. Jovanovic, A., The Use of Moving Averages in Technical Analysis of Securities, **Megatrend Review**, 2012, Vol. 9 Issue 1, p301-316, from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?sid=84763ba9-eb41-4f1a-a6e4-256e8597dc93%40sessionmgr4003&vid=0&hid=4208 (Retrieved February 2, 2016).