

T.C.

**TURKISH- GERMAN UNIVERSTY
INSTITUTE OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS**

**AN APPLICATION OF TECHNICAL ANALYSIS TO
ISTANBUL STOCK EXCHANGE FOR THE PERIOD
BETWEEN 2001-2020**

MASTER'S THESIS

Hasan DİLER

ADVISOR

Asst. Prof. Dr. Levent YILMAZ

ISTANBUL, August 2021

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**TEKNİK ANALİZİN 2001-2020 YILLARI ARASINDA
BORSA İSTANBUL ENDEKSİNE UYGULAMASI**

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İSTANBUL, August 21

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ÖZET

Piyasa ve hisse fiyatlarını analiz etme yöntemleri vardır ve hisse senedi fiyatlarını tahminlemek mümkündür. Teknik analiz geçmiş fiyat hareketlerini kullanarak fiyat tahminlemesi yapan tahminleme yöntemlerinden biridir. Bu çalışma sınırlı finansal bilgiye sahip kişilere teknik analizle BİST-100 endeksinin fiyat hareketlerini tahminlemeyi göstermeyi amaçlamaktadır. Çalışma alım ve satım zamanlamalarını anlayabilmek için grafikler ve hesaplamaları içermektedir. Bu çalışmada “BİST-100 endeksinde osilatörleri kullanmak kârlı mı?” sorusunun yanıtı bulunabilecektir. Bu soruya yanıt bulabilmek için teknik analiz teorileri incelenecek ve grafiklerle trend analizi, tersine dönme ve devam formasyonları açıklanacaktır. Formasyon ve teorileri anlattıktan sonra Momentum, Stochastic, MACD ve RSI osilatörlerinin performansları test edilecek ve sonuçları gösterilecektir.

Anahtar Kelimeler: Teknik Analiz, Hisse, Bist-100

ABSTRACT

There are methods to analyze markets and stock prices and it is possible to forecast future stock prices. Technical analysis is a way to forecast market prices with using past prices such as stock prices. This study aims to show the investors who have limited financial knowledge that to forecast price movements of stocks of ISE-100, top 100 stocks of Istanbul Stock Exchange Index, with technical analysis. The study contains graphical patterns and mathematical calculations to understand the timing to buy or sell a stock. In this study, the question “Is technical oscillators profitable in ISE-100?” will be answered. In order to answer this question, the theories related to the technical analysis are examined. Trend analysis, reversal and continuation patterns and oscillators will be explained with many charts of shares of ISE-100. After the examining the patterns and theories related to technical analysis, the performance of four oscillators which are Momentum, Stochastic, MACD and RSI will be tested, and the results are revealed in this study.

Keywords: Technical Analysis, Stock, ISE-100

LIST OF SYMBOLS

- C** : Close Price
- H** : The Highest Price at the Given Period
- L** : The Lowest Price at the Given Period
- n** : Number
- t** : Time
- %D** : 3-period Moving Average of 14-day Stochastic
- %K** : 14-day Stochastic

LIST OF ABBREVIATION

BIST-100	: Istanbul Stock Exchange Index
ISE-100	: Istanbul Stock Exchange Index
MACD	: Moving Average Convergence Divergence
MKK	: Central Securities Depository of Turkey
MOM	: The Momentum Oscillator
NASDAQ	: National Association of Securities Dealers Automated Quotations
RSI	: The Relative Strength Index

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CHAPTER 1. INTRODUCTION AND PURPOSE

Number of investors of Istanbul stock exchange is increasing year by year. MKK, Central Securities Depository of Turkey, published the statistics of the number of investors on Istanbul Stock Exchange. There are 2.002.873 investors on 15.01.2021 in Istanbul Stock Exchange whereas this number was 786.128 less in the beginning of 2020. So, the increase in the number of stock investors in Istanbul Stock Exchange is increased 65% from 31.12.2019 to 15.01.2021 and 1.993.451 of this number is individual investors.

Some of the new investors on Istanbul Stock Exchange may know the fundamental financial knowledge whereas some of them may not. The fact that to have the fundamental financial knowledge is important while investing in a financial tool and people who do not have the fundamental financial knowledge may lose money on their investments.

There are methods to analyze markets and stock prices and it is also possible to forecast future stock prices. Technical analysis is a way to forecast market prices with using past prices such as stock prices. This study aims to show the investors who have limited financial knowledge that to forecast price movements of stocks of ISE-100 with technical analysis. The study contains graphical patterns and mathematical calculations to understand the timing to buy or sell a stock of ISE-100.

In the second chapter, the theories related to the technical analysis are examined. Dow Theory, chart construction, trend analysis, channel lines, reversal and continuation patterns, volume, and long-term charts, which are in the literature, are shown in this chapter. All the graphics used in this chapter are generated by using data from Shanghai Fusion Information Technology Co. (Investing.com).

In the third chapter, Momentum, Stochastic, MACD and RSI oscillators are examined with using the studies in the literature. All the graphics used in this chapter are generated by using data from TradingView. After examining the oscillators, all the oscillators are tested on ISE-100 index, and the results are revealed in this chapter.

CHAPTER 2. LITERATURE REVIEW

Technical analysts believe that the expected price of stocks could be forecasted by historical values because the historical price movements repeat the trends in a forecastable way. Technical analysts are interested in forecasting the short-term price movements for determine the best timing for buying or selling. Therefore, they think that the fundamental analysis is the best method to choose buy or sell decision of stocks whereas the technical analysis is the best method for timing for buying selling of stocks. A technical analyst tries to forecast the future price of a stock by using the historical data (Gassen & Mitra, 1981).

The performance of buy and hold method is better than moving average methods based on the studies which covers 90-year period of Dow Jones Index (Brock et al., 2018).

Technical analysis contains many studies such as market analysis, visual analysis, graphical analysis that help to forecast future movements of stock prices with (Murphy, 1998).

The study which was prepared by Korean future contracts includes trend studies. The study determined increasing and decreasing trends if the price is increases or decreases in 15 minutes otherwise it is called trendless. Authors use increasing trend as buy signal and decreasing trend as sell signal and trendless as sustaining the position. The study shows 31.2% yearly return. (Lee et al., 2003)

A study conducted with Standards and Poors 500 Futures and Options Index Daily prices to corelate buy and sell signals. The author determined 2580 buy-sell signals with using indicators such as moving averages and RSI and analyzed the results after the market closes at that day. The finding of the study is that the returns was better in 1960 than the years after 2000 but with using 30-minute values, it is still profitable on that day. The author says, nowadays it is more profitability to trade on shorter terms therefore traders should shorter the period they trade (Schulmeister, 2009).

MACD, RSI and moving averages are methods which the literature suggests when trading on markets with technical analysis on foreign Exchange or stock markets. There are other methods to help traders for trading in both short-term and long-term (Edwards et al., 2019).

There is a study which conducted on financial literacy with students of faculty of economics who study in 10 universities around Gaziantep which are Adıyaman University, Dicle University, Gaziantep University, Hasan Kalyoncu University, Zirve University, Mustafa Kemal University, Kahramanmaraş Sütçü İmam University, Kilis 7 Aralık University, Osmaniye Korkut Ata University and Harran University. 1856 students participated in the survey and the financial literacy level was 49.9% which is low. The students were successful when they manage their own budgets, but their financial knowledge is not sufficient on saving and investing. The most successful department is international trade department with a level of 56.3% and the less successful department is politic sciences department with a level of 35.7%. The study also shows that the male students are better than female students by financial literacy. The study also shows that the financial literacy level of low-income students are better than high income students (Kılıç, 2019).

There is a study which conducted on financial literacy with 467 students who study at Kırıkkale University. The study shows that the half of the attendees have no idea on financial literacy. 44.1% of them use internet when decide on an investment and 9.4% of them say that they are affected by the comments on internet. 65.1% of them find themselves insufficient in financial knowledge. Base on the findings of the study, the level of financial literacy of students are increasing by year (Demirkıran, 2019).

There is a study which conducted on financial literacy with 720 students who study at Cumhuriyet University. Most of attendees called themselves as financial literate. The financial literacy is 43.2% which is low. The financial knowledge of male students is better than female students based on the survey. The students which have better grades perform worse than other students (Kaya, 2019).

CHAPTER 3. TECHNICAL ANALYSIS

Technical analysis is a method for forecasting of market action, primarily using charts to forecast future price trends. Technicians, people who use technical analysis to decide on transactions, claim that price actions reflect shifts in demand and supply. If demand exceeds supply, prices of underlying will rise and if supply exceeds demand, prices of underlying will fall. Falling prices means bearish and rising prices means bullish. Technicians say that price of an underlying moves in trends which are uptrend, downtrend and sideways trend. Most of the body of technical analysis and the study of market action must do with the study of human psychology. For instance, chart patterns reflect certain pictures that appear on price charts and it shows the bullish or bearish psychology of a market. Human psychology does not tend to change, and these studies based on this idea (Murphy, 2002).

There are some differences and similarities between technical and fundamental forecasting. The fundamental approach examines all the relevant factors affecting the price of a market to determine the intrinsic value of that market. Intrinsic value is the actual worth of an underlying. If intrinsic value is under current market price, then the price of the market is over than expected and should be sold. If market price is below the intrinsic value, then the price of the market is below than expected and should be bought. Technical analysis concentrates on the study of market action. Both methods aim to predict the direction of prices. Traders classify themselves as fundamentalists or technicians. Fundamentalists have a knowledge of analysis on the basic charts and the Technicians also have awareness of the Fundamentals, but they are often in conflict with each other. It is known that some of the most concrete bear or bull markets in history begins with no perceived change in the Fundamentals and they only became known in the new trend is shown up (Bodie et al., 2018).

Timing is crucial because of the high leverage factor in the futures markets. Traders who tends to hold stock long term sometimes find themselves in a wrong way they can decide to hold onto the stock and hope for a comeback. Futures traders don't have that luxury. A buy and hold strategy does not apply to the futures arena. Both the technical and the fundamental approach can be used in the first phase which is the forecasting process, but the real matter is timing. Timing is important in individual stock selection and in the buying and selling of stock market. The direction of commodity prices can be the indicator of inflation in an economy. There are clues about economies' strength and weaknesses. Rising commodity prices is generally a clue of high inflation and decreasing commodity prices shows that inflation will fall (Bodie et al., 2018).



Figure. Example of an Uptrend

Resource: <https://www.investing.com>



Figure 1. Example of a Downtrend

Resource: <https://www.investing.com>

2.1. DOW THEORY

In 1882 Charles Dow and Edward Jones founded Dow Jones. Dow wrote his ideas which include his theories about stock market and these theories were published in Wall Street Journal. He created an index and this index had grown to 30 stocks which reflect the industry. His idea was that the markets reflect every possible knowable factor that affects overall demand and supply, so the prices. Dow considered that an uptrend has a pattern of rising peaks and troughs. In opposite situation, lower peaks and troughs define a downtrend. Dow says that a trend has three parts which are primary, secondary, and minor. The primary trend represents the tide and the secondary trend represents the waves that make up the tide and the minor trend behaves like ripples on the waves. According to Dow, primary trend lasts more than a year, secondary trend lasts three weeks to three months and the minor trend lasts less than three weeks. Dow recognized volume as a secondary factor confirming price signals. In a major uptrend, volume would increase as prices move higher and diminish as prices fall (Frost et al., 2018).

A trend tends to continue in motion until some external force causes it to change direction. There are some tools to spot reversal signals, including the support and resistance levels. Loss of momentum can be shown even earlier with some warning signals. There is a difficulty for trend-follower to recognize an actual reversal signal.

2.2. CHART CONSTRUCTION

There are some charts using in stock markets which are daily bar chart, line charts and candlestick and these are shown below. In a daily bar chart, each vertical bar represents one day's price actions. Bars are green when the close price is higher than open price, and bars are red when close price is lower than open price (Burke, 2002).

In a candle stick chart, the color of the candlestick is determined by the relationship between the open and the close prices. Green candlesticks are positive and red candlesticks are negative.



Figure 2. A Daily Bar Chart of Garanti Bankası

Resource: <https://www.investing.com>

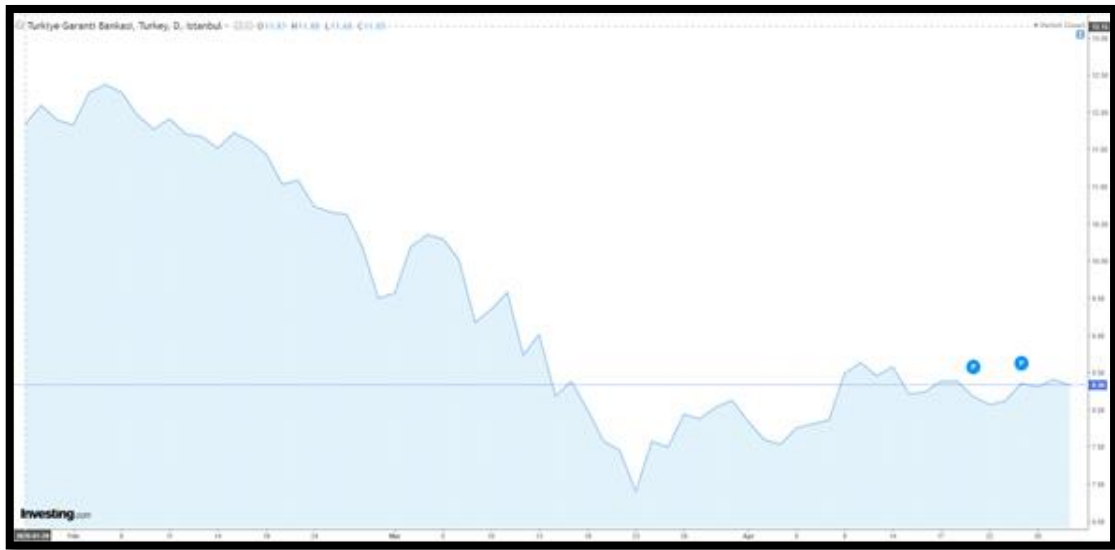


Figure 3. A Daily Line Chart of Garanti Bankası

Resource: <https://www.investing.com>



Figure 4. A Daily Candlestick Chart of Garanti Bankası

Resource: <https://www.investing.com>

In a line chart and volume bar chart, volume represents the total amount of trading activity in that market for the day. It is the total number of contracts traded during the day of the number of stocks that change hands on a given day in the stock market. A higher volume bar means the volume was heavier for that day. A smaller bar represents lighter

volume. The color of a volume bar is determined by the relationship between the open and the close prices. Bars are green when the close price is higher than open price, and bars are red when close price is lower than open price.



Figure 5. A Line Chart and Volume Bars of Garanti Bankası

Resource: <https://www.investing.com>

2.3. CONCEPTS OF TREND

The direction of the market is the trend and it is fundamental to the technical approach for market analysis. Chartists use price patterns, moving averages, support and resistance levels and trendlines to measure the trend of the market. Trading in the direction of the trend is important. Markets do not tend moving in a straight line, on the contrary, it moves with zigzags and these zigzags are the series of waves and have peaks and troughs (Pring, 2002).

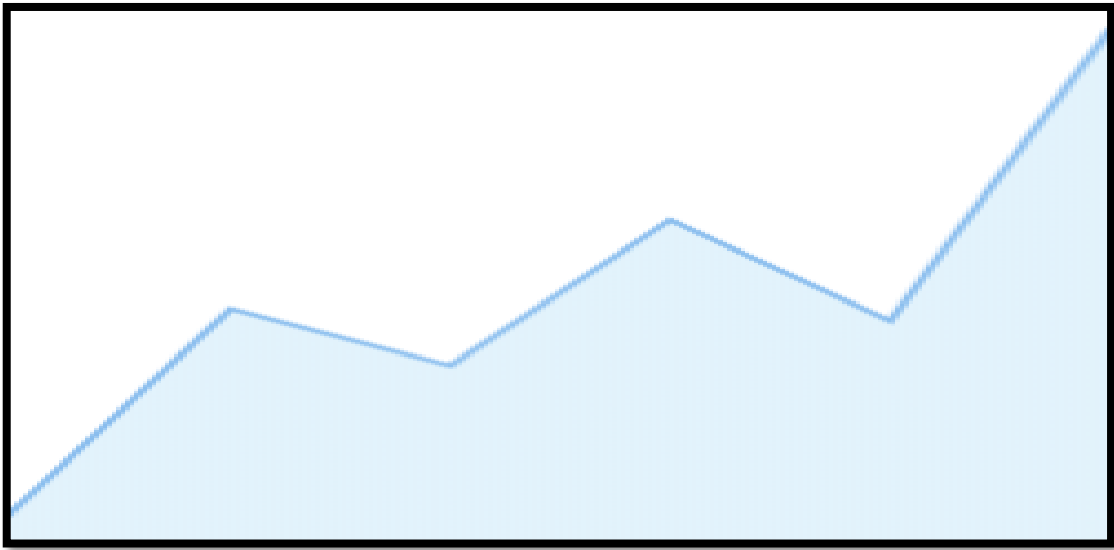


Figure 6. An Uptrend with Ascending Peaks

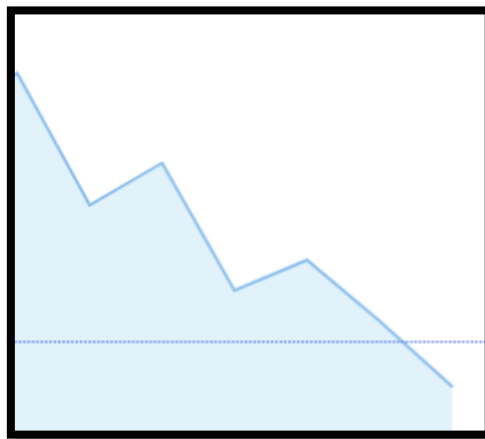


Figure 7. A Downtrend with Descending Peaks

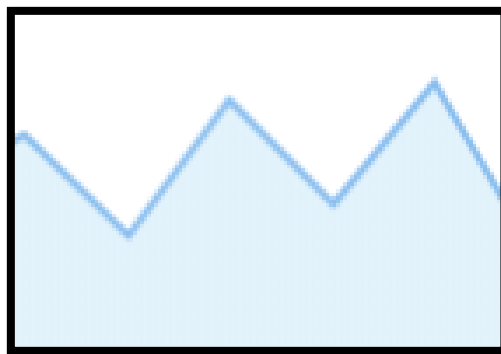


Figure 8. A sideways trend with horizontal peaks



Figure 9. A Downtrend Which is Turning into an Uptrend

Resource: <https://www.investing.com>

A trader confronts three decisions when market moves up, down or stay at the same level. Buying strategy is preferable while an uptrend, selling strategy is preferable while a down trend and it is better to hold while sideways. Trend has three categories, which are major, intermediate and near-term which are also called as waves. Major lasts over six months, secondary, which is called intermediate, lasts three weeks up to three months and the near-term trend is usually defined less than three weeks (Pring, 2002).

In the following tables the major trend lasts eleven months. After six months a short correction occurred during October. An intermediate correction occurred with three short term trends. A line chart which shows the support and resistance points in uptrend, the second support level is usually the same level at the level of the first resistance.



Figure 10. A Line Chart of Akbank with Major, Intermediate, and Short-Term Trends

Resource: <https://www.investing.com>

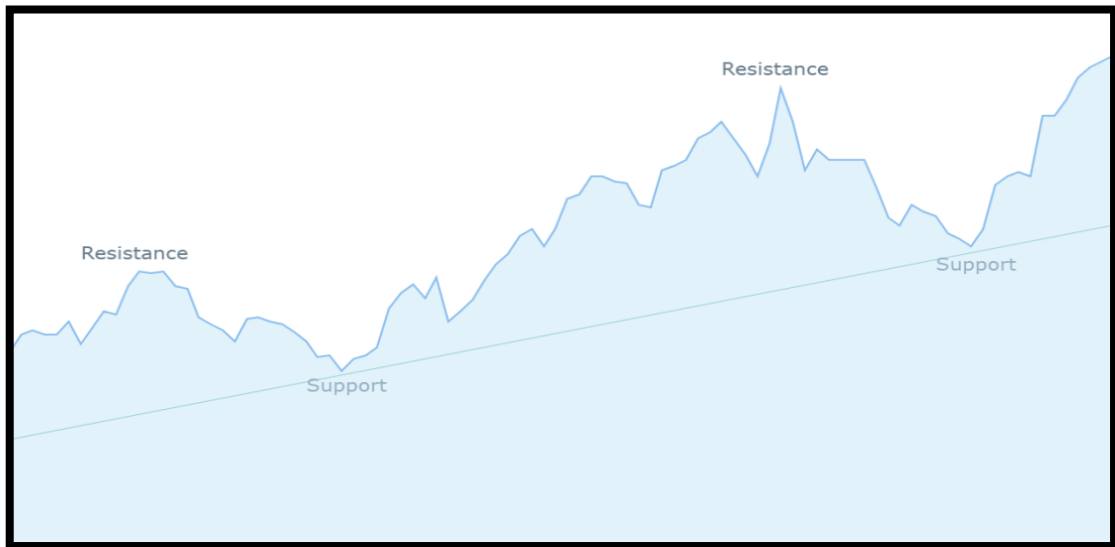


Figure 11. A Line Chart Which Shows the Support and Resistance Points in Uptrend

Resource: <https://www.investing.com>

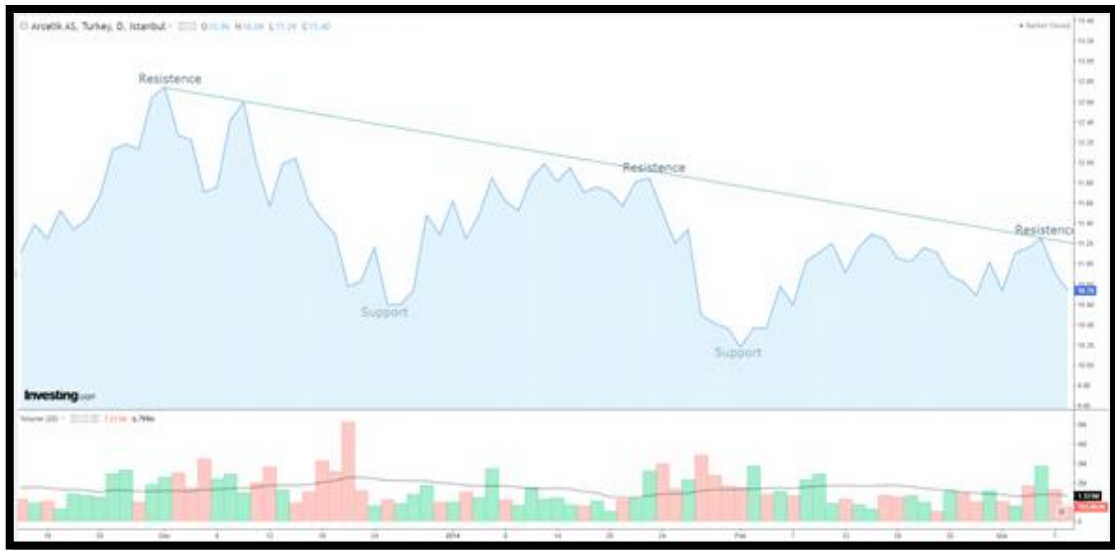


Figure 12. A Line Chart of Arçelik Which Shows the Support and Resistance Levels in Downtrend with Descending Peaks

Resource: <https://www.investing.com>

In downtrends each time, previous support point is tested, and in the uptrend, the previous resistance point is tested as well. In a trend, even if the support levels define as a previous lowest and resistance levels define as previous peak, this do not always occur in this way. Uptrends can reverse to a downtrend. This trend reversal could be revealed with looking the support and resistance points. After a point support and resistance levels reverse their roles and they become the opposite. So, support levels become new resistance or resistance levels become new support. There is a psychologic behavior behind this situation. This reversal pattern can occur both in long term and short term (Murphy, 2002).

In the following uptrend line chart of Turkish Airlines, the green dots are supports and yellow dots are resistance and on the red dot which is supposed to be the support level, is broken and support becomes resistance.



Figure 13. An Uptrend Line Chart of Turkish Airlines

Resource: <https://www.investing.com>

In the following graphic, the green dots are supports and yellow dots are resistance and on the red dot which is supposed to be the resistance, is broken and resistance becomes the support.



Figure 14. A Downtrend Line Chart of Garanti Bankası

Resource: <https://www.investing.com>

In the following graphic, the green dots are supports and yellow dots are resistance and on the red dot, which is supposed to be the resistance point, is broken and becomes the support.

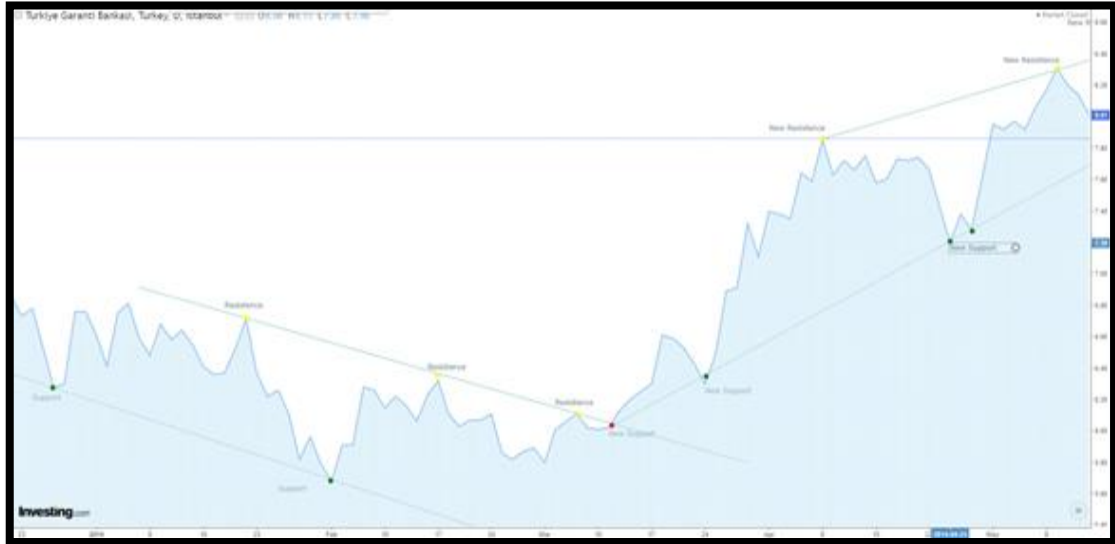


Figure 15. A Line Chart of Garanti Bankası with a Downtrend Which is Turning Into an Uptrend

Resource: <https://www.investing.com>

The round numbers are important when considering supports and resistance levels, such as 10, 20, 25, 50, 75, 100 and multiples of 100. These numbers are psychological numbers for traders, and they are neutral resistances and supports.

In the following uptrend line chart, the green dots are supports and yellow dots are resistance and on the red dot which is supposed to be the support level, is broken and support becomes the resistance.

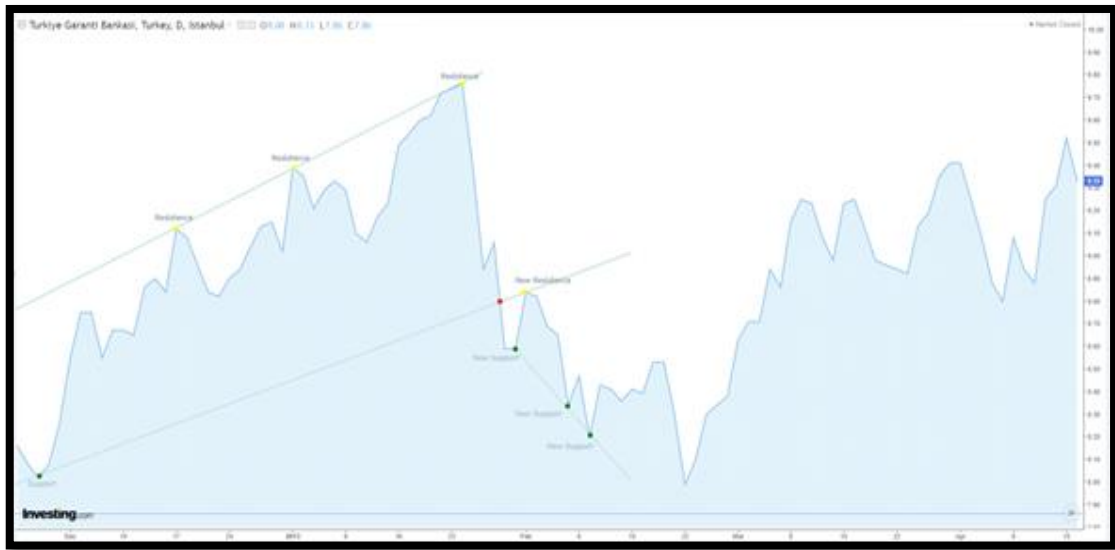


Figure 16. An Uptrend Line Chart of Garanti Bankası with an Uptrend Which is Turning into a Downtrend

Resource: <https://www.investing.com>

After taking into consideration of support and resistance, the trendline is another factor to consider about. An uptrend linear line is drawn on the support points and a down trend linear line is drawn on the resistance points as shown below.

The following graphic is an example of an uptrend linear line. The line is on the support points which are represented with green dots. For drawing an uptrend line, we need at least two support points.



Figure 17. An Uptrend Line Chart of Arçelik

Resource: <https://www.investing.com>

The following line chart of Arçelik is an example of a downtrend linear line. The line is on the resistance points which are represented with yellow dots. For drawing a downtrend line, we need at least two resistance points.



Figure 18. A Downtrend Line Chart of Arçelik

Resource: <https://www.investing.com>

The trendline helps to determine the limits of the corrective phases and tells us when that trend is changing. In an uptrend, the line is drawn on the support points and these support points are the lowest points on the trend. They often touch the line or come very close to the trendline. These lowest points are buying areas for traders (Burke, 2002).

With trendline it is possible to decide on buying or selling unless there is a violation of the trendline. The signal of the violation of the trendlines is liquidation of all positions in the direction of the previous trend. After the price lowers than the trend, this trend line ends.

The following graphic is a line chart of Turkish Airlines. The uptrend line is on the green dots which represents the support points on the trend. On the red dot, the trendline is broken and the trend has an end on this point. This breaking of the trendline is signaling a downside trend reversal.



Figure 19. Broken Uptrend Line Chart of Turkish Airlines

Resource: <https://www.investing.com>

The following graphic is a line chart of Turkish Airlines. The downtrend line is on the yellow dots which represents the resistance points on the trend. On the red dot, the trendline is broken and the trend has an end on this point. This breaking of the trendline is signaling an upside trend reversal.



Figure 20. A Downtrend Line Chart of Turkish Airlines

Resource: <https://www.investing.com>

Support and resistance levels became the opposite after violation and this principle holds true of trendlines. For example, in an uptrend, after the uptrend line is broken, the support level becomes the new resistance level and after the downtrend line is broken, the resistance level becomes the new support level as well. This is a way to forecast in which direction the prices will move in the future (Burke, 2002).

The following graphic is a line chart of Turkish Airlines. The downtrend line is on the yellow dots which represents the resistance levels of trendline. The trend line is broken on the first red dot and the price moves up. Then, the price moves down again and in it will be on the downtrend line again.



Figure 21. Ending of a Downtrend Line Chart of Turkish Airlines

Resource: <https://www.investing.com>

The following graphic is a line chart of Arçelik. The Uptrend line is on the green dots which represents the support levels of trendline. The trend line is broken on the red dot and the price moves down. Then, the price moves up again until the previous support level and this level becomes the resistance in the new trend line.



Figure 22. Ending of an Uptrend Line Chart of Arçelik

Resource: <https://www.investing.com>

Sometimes, after the violation of an uptrend line, prices will decline as a point and this point becomes the support level of new uptrend line. And after some point this new trendline is violated again and the prices moves down until a point and this new point also becomes the new support level of the new uptrend. And this is called fan principle.

The following graphic is a line chart of TÜPRAŞ. The first trend starts with the first green dot and is broken on the first red dot. The price level falls until the second green dots on the second uptrend line. The second uptrend line is broken on the second red dot and the price falls again until the second green dot on the third uptrend line. And this trend line becomes the new trend line.



Figure 23. Broken Uptrend Lines of TÜPRAŞ

Resource: <https://www.investing.com>

A line chart of Akbank. The first trend starts with the first yellow dot and is broken on the first red dot. The price level rises until the second yellow dot on the second downtrend line. The second downtrend line is broken on the second red dot and the price rises again until the second yellow dot on the third downtrend line. And this trend line becomes the new trend line.

The following graphic is a line chart of Akbank. The first trend starts with the first yellow dot and is broken on the first red dot. The price level rises until the second yellow dot on the second downtrend line. The second downtrend line is broken on the second red

dot and the price rises again until the second yellow dot on the third downtrend line. And this trend line becomes the new trend line.

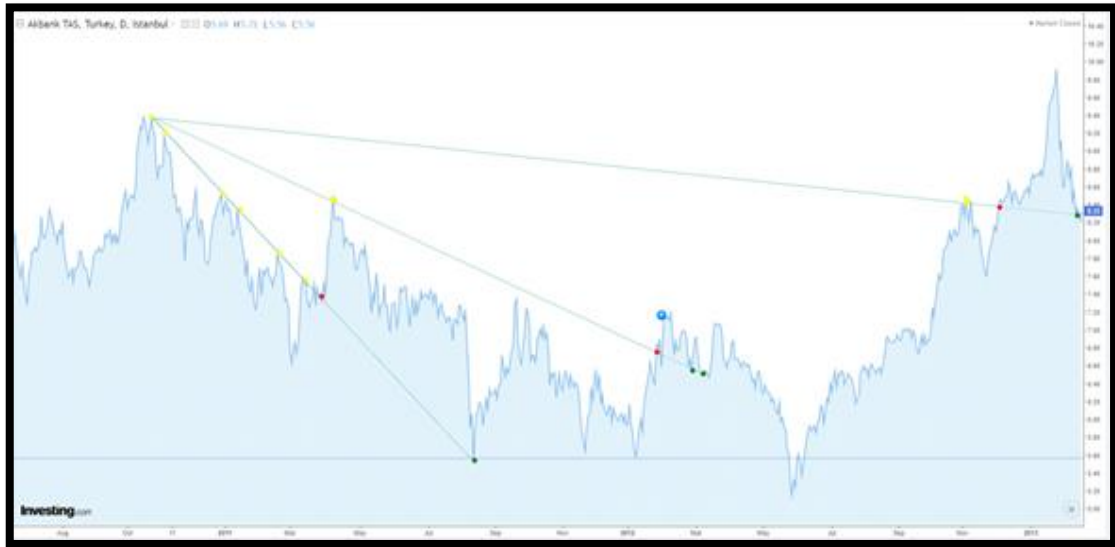


Figure 24. Broken Downtrend Lines of Akbank

Resource: <https://www.investing.com>

Trendlines are adjusted to fit an accelerating or a slowing trend sometimes. In some cases, the slow rising or falling trend line change after a point and it accelerates. Then, a new trend line occurs. In some cases, the main trend line lasts but for some time there is another accelerating trend occurs on the main trend line (Burke, 2002).

The following graphic is a line chart of TAV Havalimanları Holding. The major trendline can be seen in the figure and there are another trend lines on the chart which are accelerating more than the main trend line does. Different trendlines move with the different degrees of trend on the major uptrend line.



Figure 25. A Major Uptrend Line of TAV Havalimanları Holding

Resource: <https://www.investing.com>

2.4. THE CHANNEL LINE

There are a trendline technique which is called channel line. Sometimes prices move between two lines which are mostly parallel. If the channel line is on an uptrend, it's possible to draw the channel line with drawing a parallel line above the uptrend line which is on the resistance levels. And if the channel line is on a downtrend, it's possible to draw the channel line with drawing a parallel line below the downtrend line which is on the support levels (Murphy, 2002).

The following graphic is a line chart of Garanti Bankası. There is a line above the uptrend line and it's on the resistance levels which shows us the channel line. During the channel line, prices fluctuates between these two lines.



Figure 26. An Example of Channel Line

Resource: <https://www.investing.com>



Figure 27. A Channel Line Example of Garanti Bankası

Resource: <https://www.investing.com>

The following graphic is a line chart of Turkish Airlines. On the left side of the graph we can see a downward channel line and it end in some point and the new channel line occurs. It also depends on the trendlines. With the reversal, the downtrend line becomes and uptrend line. It should be considered that trends don't always rise and fall but sometimes stay the same level which we call it sideways trend.



Figure 28. Channel Line Examples of Turkish Airlines

Resource: <https://www.investing.com>

2.5. REVERSAL PATTERNS

Concepts of trend, such as resistance, support and trendlines are basics for technical analysis. However, there are advanced chart patterns. Trends could move into three direction which are uptrend, downtrend and sideways trend and the reversals of trends could be forecasted as well. There are five major reversal patterns, which are head and shoulders, triple bottoms and tops, double bottoms and tops spike tops and bottoms and the rounding pattern. In addition, the volume has an important role and it will be the deciding factor (Murphy, 2002).

The head and shoulders pattern is the best known and most reliable pattern of all reversal patterns. A trend can lose momentum and then the trend could be reversed. And the shape of this reversal shown below. Sometimes we can see head and shoulders as a continuation pattern.

The following graphic is a line chart of Tesla. In the graph we can see that the uptrend has changed to the down trend and this reversal occurs with the head and shoulders pattern. After drawing a neckline which is the line between two red dots, we can see that the height of the shoulders is almost at the same level. The head is higher than the shoulders. The volume on the green dots is lower than the volume on the red dots. the head is the reversal point. In this graph, it is the sell point which the head and shoulder

pattern completes on the second red dot. The volume of the second shoulder is ought to be lower than the volume of the first shoulder.

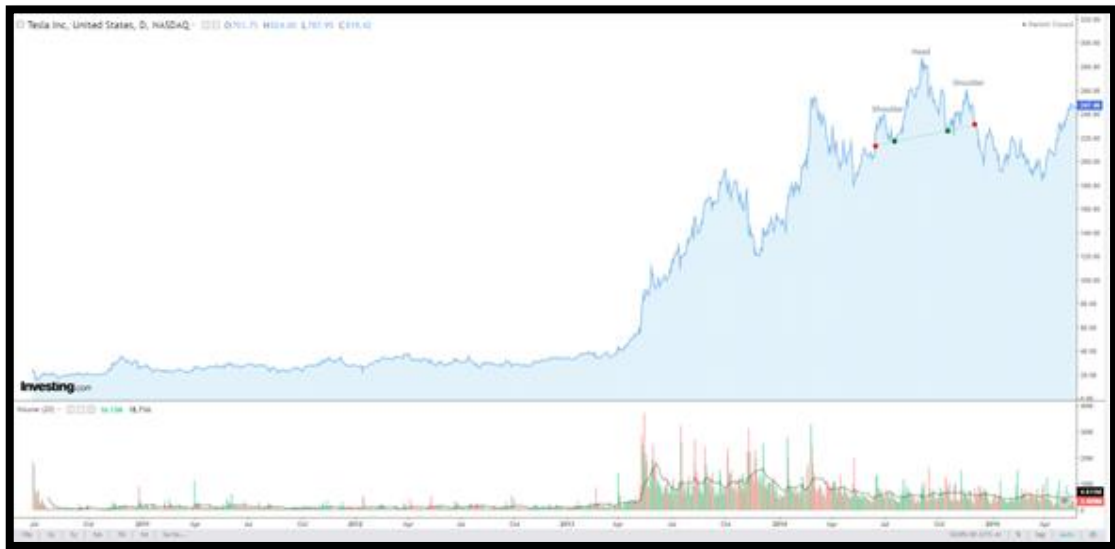


Figure 29. A Line Chart of Tesla with a Head and Shoulders Pattern

Resource: <https://www.investing.com>

The following graphic is a line chart of TAV Havalimanlari Holding. In the graph we can see that the downtrend has changed to the uptrend and this reversal occurs with the head and shoulders pattern. After drawing a neckline which is the line between two red dots, we can see that the height of the shoulders is almost at the same level. The head is higher than the shoulders. The volume on the yellow dots is higher than the volume on the red dots. the head is the reversal point. In this graph, it is the buy point which the head and shoulder pattern completes on the second red dot. The volume of the second shoulder is ought to be higher than the volume of the first shoulder.



Figure 30. A Line Chart of TAV Havalimanlari Holding with a Head and shoulders pattern

Resource: <https://www.investing.com>

One of the other reversal patterns is triple tops and bottoms and it's rarer than head and shoulders pattern. The significant indicator of this pattern is the level of three bottoms which should be nearly at the same level.

The following graphic is a line chart of Microsoft Corporation. We can see in this graph that there is a reversal pattern which is triple bottom. It looks like a head and shoulders pattern but here all levels are nearly at the same level. It mostly includes a symmetry.



Figure 31. A Line Chart of Microsoft Corporation with a Triple Bottom Pattern

Resource: <https://www.investing.com>

One of the other reversal patterns is double tops and bottoms and it's also rarer than head and shoulders pattern. The significant indicator of this pattern is the level of two bottoms which should be nearly at the same level.

The following graphic is a line chart of Arçelik. We can see in this graph that there is a reversal pattern which is double bottom. Both of the bottom levels are nearly at the same level. It mostly includes a symmetry. The volume is increasing to the second bottom point which is green colored.



Figure 32. A Line Chart of Arçelik with a Double Bottom Pattern

Resource: <https://www.investing.com>

The following graphic is a line chart of Turkish Airlines. Example of a double top pattern. Both top levels are almost at the same level. Sometimes the second top level could be a little bit lower than the first one. This double top pattern signals an important decrease on the share price.

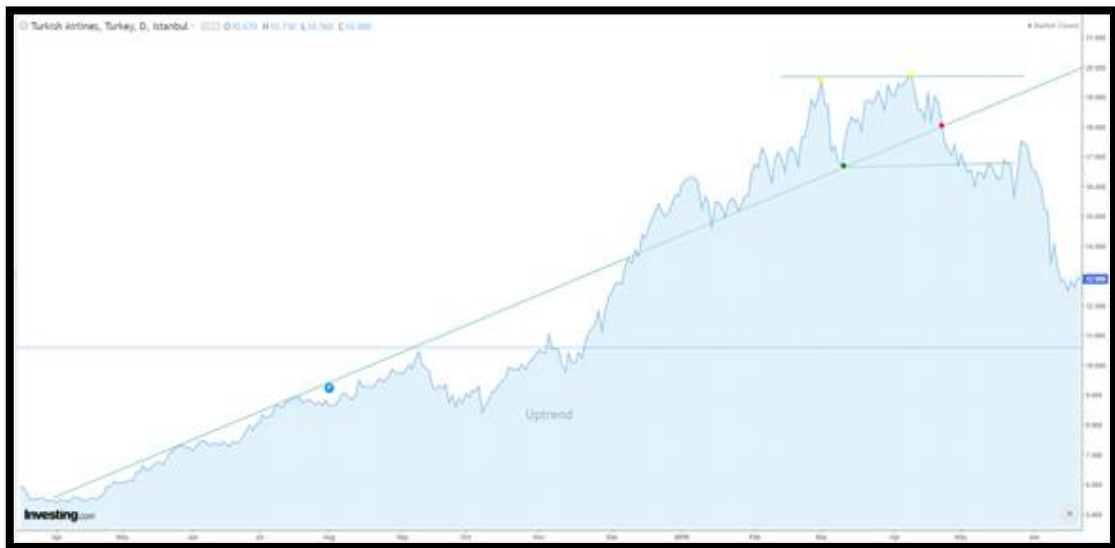


Figure 33. A Line Chart of Turkish Airlines with a Double Top Pattern

Resource: <https://www.investing.com>

Another pattern is saucers and spikes. Reversal patterns may be the shape of saucers or rounding bottoms. And V-Reversal is also an important reversal pattern. The major indicator is the heavy volume. After an increase with a big slope the price decreases with a big slope. Then the downtrend starts (Murphy, 2002).

The following graphic is a line chart of Turkish Airlines. In this chart a saucer bottom is shown. The reversal occurs very slow and gradual, but the turn is major. After a slow reversal, the slope of the uptrend line is big.

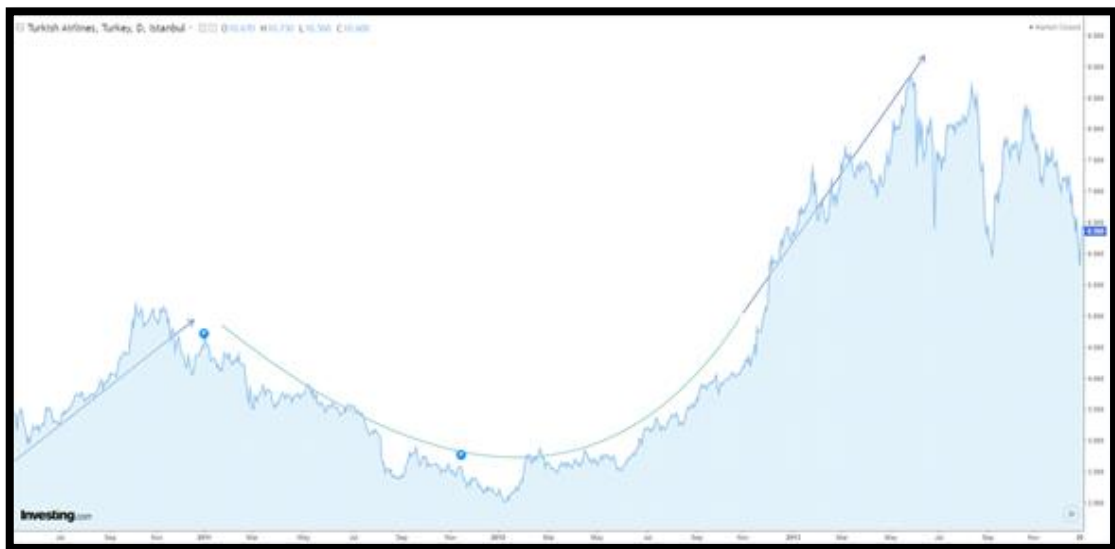


Figure 34. A Line Chart of Turkish Airlines Saucer Bottom Pattern

Resource: <https://www.investing.com>

2.6. CONTINUATION PATTERNS

The continuation patterns usually indicate uptrend or downtrends after a sideways trend. The direction doesn't change in these patterns. One difference between reversal and continuation pattern is the duration. Reversal patterns could take a long time whereas the continuation pattern can take shorter time. One of the continuation patterns is triangles. There are three type of triangles which are symmetrical, ascending and descending. These triangles have different forecasting implications (Murphy, 2002).

The following graphic is a line chart of Oyak Yatırım Ortaklığı. It's an example of a bullish symmetrical triangle. Starting of the uptrend line is the base which is on the vertical line of the first yellow dot. One of the measurement ways is considering the base. The parallel line show to potential of the increase.

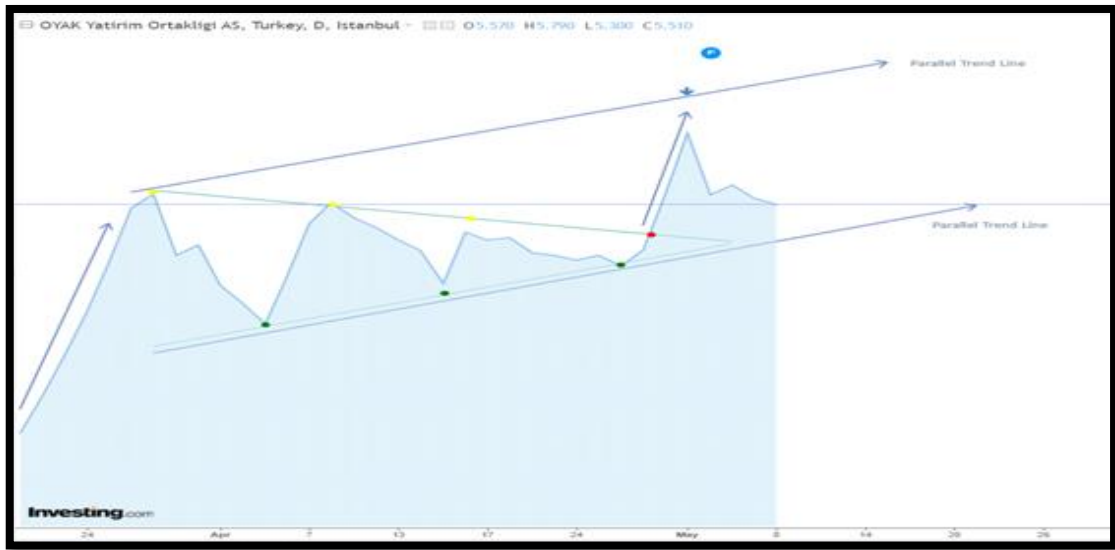


Figure 35. A Line Chart of Oyak Yatırım Ortaklığı with a Bullish Symmetrical Triangle

Resource: <https://www.investing.com>

The following graphic is a line chart of Akbank. It's an example of ascending triangle. Once the upper line is broken, the resistance level becomes support level. This is generally a bullish pattern.

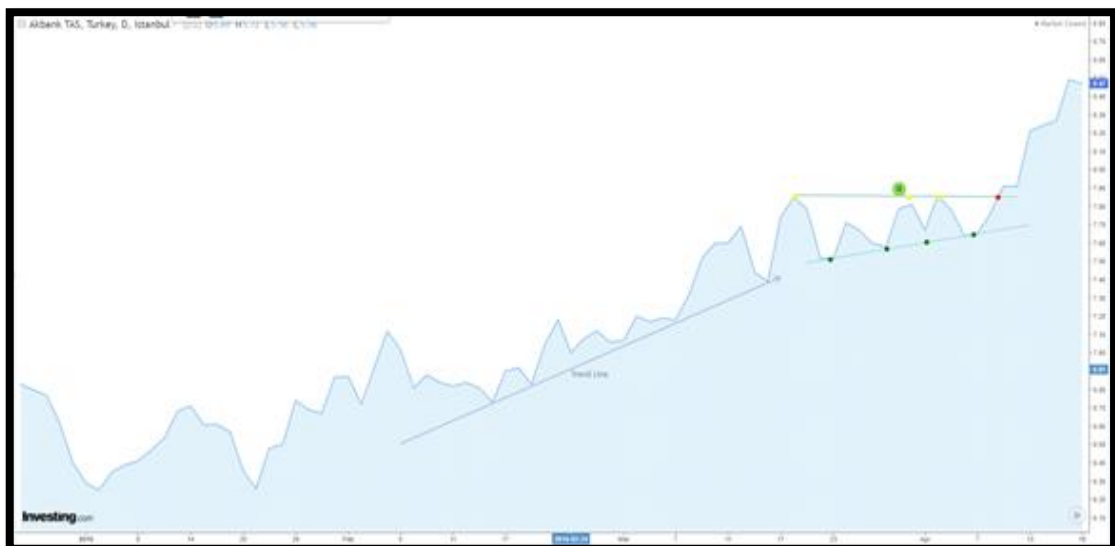


Figure 36. A Line Chart of Akbank with an Ascending Triangle Pattern

Resource: <https://www.investing.com>

The following graphic is a line chart of Arçelik. It's an example of a descending triangle. This is usually a bearish pattern.



Figure 37. A Line Chart of Arçelik with a Descending Triangle Pattern

Resource: <https://www.investing.com>

The following graphics are line charts of Arçelik which are examples of ascending and descending triangle. In the ascending triangle, once the upper line is broken, the resistance level becomes support level. This is generally a bullish pattern.



Figure 38. A Line Chart of Arçelik with an Ascending Triangle Pattern

Resource: <https://www.investing.com>



Figure 39. A Line Chart of Akbank with a Descending Triangle Pattern

Resource: <https://www.investing.com>

The following graphic is a line chart of Türkiye Vakıflar Bankası. It's an example of a bullish symmetrical triangle. The completion of the triangle takes three month and then the prices increases with a big slope.



Figure 40. A Line Chart of Türkiye Vakıflar Bankası with a Bullish Symmetrical Triangle

Resource: <https://www.investing.com>

The following graphic is a line chart of Akbank. It's an example of a bullish rectangle in an uptrend. This pattern is also called trading range and shows prices trading between two parallel lines. This area is called the congestion area.

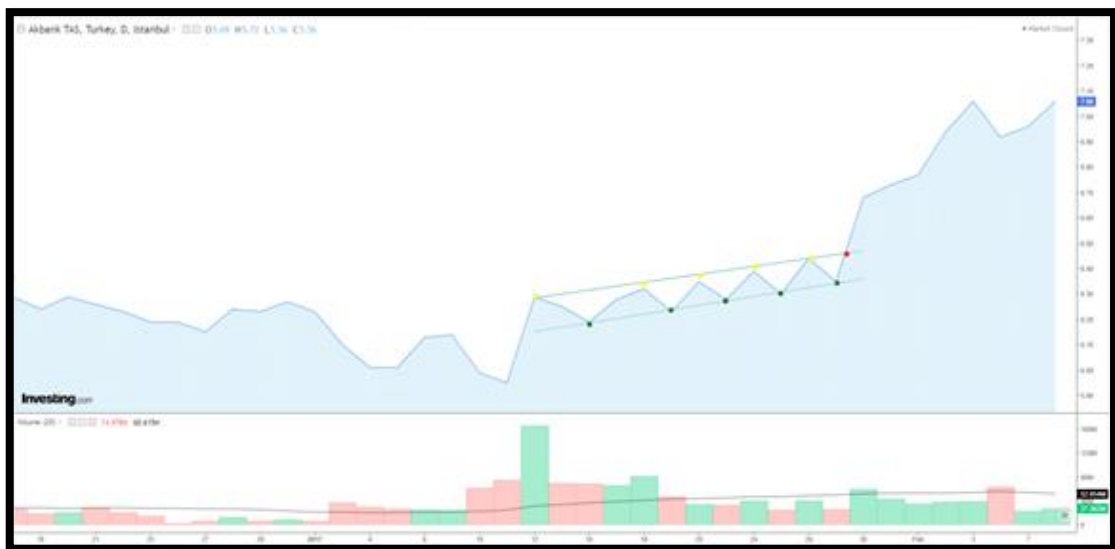


Figure 41. A Line Chart of Akbank with a Bullish Rectangle

Resource: <https://www.investing.com>

2.7. VOLUME

One of the important factors to analyze financial markets is volume which is the number of entities traded during the period. Daily volumes are mostly shown in the graphs as a vertical bar chart (Scott et al., 2018).

The following graphic is a line chart of Arçelik. When the prices change significantly, volumes increase which is the mean of confirming the price rise as a bullish trend.



Figure 42. A Line Chart of Arçelik Which Includes Volume Bars

Resource: <https://www.investing.com>

If volume is increasing, the current price trend should continue in the present direction but if the volume is declining, the action can be viewed as a sign of ending of the trend. Volume should be heavier as the price moves higher in an uptrend. After decreasing volume in a downtrend, the uptrend starts after the lowest volume. To sum up, increasing volume indicates that the price trend will continue but declining volume indicates that the price trend may change. Changes in buying and selling pressure could be detected in volume before price changes.

2.8. LONG TERM CHARTS

Many of the graphs above are short term charts which represents daily charts. However, to forecast the prices, it's important to analyze longer period charts for example

weekly or monthly charts. The best way is using short and long-term charts together. Price patterns can appear on the long-range charts such as weekly or monthly charts. For example, double tops and bottoms pattern, head and shoulders reversals or triangles. When analyzing, we should begin with long term range and then we gradually work with near term. By starting with the big picture, starting with 20 years to today, a trade could have a proper perspective to analyze (Murphy, 2002).



Figure 43. A Long-Term Line Chart of Arçelik

Resource: <https://www.investing.com>

CHAPTER 4. OSCILLATORS

If the market prices are non-trending, prices mostly fluctuate in a channel which is horizontal. In such situations it is hard to forecast whether the prices increase or decrease. There are some technical oscillators which help a technical analyst to forecast. These tools let technical analysts make profit from the zigzags in channels without trends. Market extremes, which mostly calls oversold and overbought conditions can be shown by oscillators and these tools warn technical analysts to be aware of oversold and overbought conditions. Using oscillators to forecast is not useful because sometimes oscillators are very useful and sometimes, they can be misleading (Murphy, 2002).

Most oscillators have the same aim which shows oversold and overbought levels, and on this respect, they look very much alike. Determining the bottom and top level of an uptrend sideways or downtrend channel is very important for a technical analyst and these oscillators are key in the analyses. Mostly, oscillators have an upper band which corresponds to 1 and a lower band which corresponds to 0 and mathematically, these levels cannot be exceeded.

We can use most of the oscillators the most useful in some common situations. When the oscillator is near the upper or the lower band, the buy or sell opportunity is occurred. Extreme points are important signals. And when the level is crossing of midpoint, it is also an opportunity for a trend analyst to buy or sell. For a trend analyst, it is the buy point when the oscillator is on the lower level which corresponds to 0 and it is the sell point when the oscillator is on the upper level which corresponds to 1. Falling from upper bands to lower bands until the lowest value is also the selling areas and increasing from lower bands to upper bands is buying areas (Frost et al., 2018).

3.1. MOVING AVERAGE

The moving average is a technique which has many usages in technical analysis. It is possible to be used both in graphs or in computer systems to catch buy or sell signal. It is an average of given period of data. This data could be the price, oscillators, or

indicators. Mostly using version of moving average is prepared with 10-day closing prices which is the summation of close prices of last 10 days and dividing it by 10. Buy or sell signals (Murphy, 2002).

The following graphic is a daily bar chart of ISE-100 is shown in the graph. Below line chart is the 10-day moving average of close price of ISE-100. When the moving average starts decreasing, the downtrend begins and when the moving average starts increasing, the uptrend begins. So, red arrows represent sell points and green arrows represent buy points.



Figure 44. Daily Bar Chart of ISE-100 with 10-Day Moving Average Line

Resource: <https://tr.tradingview.com>

Because the moving average is used with historical data, it is not a signal which shows the reversal in trend before happened. On the contrary, it follows the market and gives the signal after trend reversal happened. That's why, its more sensitive to track market action with using 10-days moving average than 200-day.

The following graphic is a weekly bar chart of ISE-100, 10-day and 200-day moving averages of close price of ISE-100 are shown in the graph. The 10-day moving average follows the price in a shorter period, that's why it gives the trend reversals more than 200-day moving average. So, red arrows represent sell points and green arrows represent buy points.



Figure 45. Weekly Bar Chart of ISE-100 with 10-Day and 200-Day Moving Average Lines

Resource: <https://tr.tradingview.com>

The following graphic is a daily bar chart of ISE-100 and 200-week moving averages of close price of ISE-100 are shown in the graph. The point when the price breaks the 200-week moving average is a buy signal in an uptrend. Green arrows represent buy points.



Figure 46. Daily Bar Chart of ISE-100 and 200-Week Moving Average Line

Resource: <https://tr.tradingview.com>

The following graphic is a daily line chart of ISE-100 and 40-day moving averages of close price of ISE-100 are shown in the graph. The point when the price breaks the 40-day moving average is a signal to buy or sell. So, red arrows represent sell points and green arrows represent buy points.



Figure 47. Daily Line Chart of ISE-100 and 40-Day Moving Average Line

Resource: <https://tr.tradingview.com>

Using only one average to trade is useful but it also gives more buy and sell signals. When considering buy or sell commissions, decreasing false signals could be helpful. Using two different period moving averages helps in this condition. We can trade when they cross each other. Because the delay, buying or selling signals could occur later than one average method.

The following graphic is a daily line chart of ISE-100, 10-day moving average and 40-day moving average of close price of ISE-100 are shown in the graph. The point when the 10-day moving average breaks the 40-day moving average is a signal to buy or sell. So, red arrows represent sell points and green arrows represent buy points. The blue line is the close price, the orange line is 10 day moving average and the red line is 40 day moving average.



Figure 48. Daily Line Chart of ISE-100 with 10-Day and 40-Day Moving Average Lines

Resource: <https://tr.tradingview.com>

3.1.1. Bollinger Bands

John Bollinger developed this technique with using moving average and two bands. He used 20 day moving average, one upper band which is the 20-day moving average plus two standard deviation and one lower band which is the 20-day moving average minus two standard deviation. The underlying is overbought when the price closes and touches the upper band and is over sold when the price closes and touches the lower band. In an uptrend, prices move between upper band and moving average line. In a down trend, prices move between lower band and moving average line. In no trend situation and reversals, it moves between upper and lower bands (Bollinger, 2002).



Figure 49. Daily Bar Chart of ISE-100 with 20-Day Bollinger Bands

Resource: <https://tr.tradingview.com>

The following graphic is a weekly bar chart of ISE-100 with 20-day Bollinger bands. When the price crosses the lower band, it is a buy signal and when the prices cross upper band, it is a sell signal. So, red arrows represent sell points and green arrows represent buy points.



Figure 50. Weekly Bar Chart of ISE-100 with 20-Day Bollinger Bands

Resource: <https://tr.tradingview.com>

Using three averages is another method to generate buy or sell signals. The most common version of this method is used with 4, 9 and 18 days of moving average. When the 4-day moving average is above 9-day moving average and 9-day moving average is above 18-day average, it is an uptrend. When the 4-day moving average is below 9-day moving average and 9-day moving average is below 18-day average, it is a downtrend. This method gives better signals in big reversals and in short reversals, it may give false signals.

The following graphic is a daily line chart of ISE-100, 4-day moving average, 9-day moving average and 18-day moving average of close price of ISE-100 are shown in the graph. The point when the 4-day moving average is above the 9-day moving average and 9-day moving average is above 18-day moving average, is a signal to buy. The point when the 4-day moving average is below the 9-day moving average and 9-day moving average is below 18-day moving average, is a signal to sell. So, red arrows represent sell points and green arrows represent buy points. The blue line is the close price, the green line is 4 day moving average, the orange line is 9-day moving average and the red line is 18-day moving average.



Figure 51. Daily Line Chart of ISE-100 with 4-Day, 9-Day and 18-Day Moving Average Lines

Resource: <https://tr.tradingview.com>

3.1.2. MACD: Moving average convergence divergence

There are many techniques which uses more than one moving average line and Gerald Appel developed one of them which is moving average convergence/divergence oscillator (MACD). This technique uses two lines which are MACD and the signal line. MACD is the difference between 12-day exponential moving average and 26-day exponential moving average with close prices. Signal is the 9-day moving average of MACD. MACD moves around 0 line as an oscillator and when the MACD is too far above from zero line, the condition is overbought and when it is too far below from zero line, the condition is oversold (Murphy, 2002).

The most effective usage of MACD is on trendless periods when price goes sideways in daily or weekly charts. MACD moves faster than the signal line. Therefore, when MACD crosses above the signal line, it is a possible buy signal and when MACD crosses below the signal line, it is a possible sell signal. Using overbought-oversold conditions with crossing MACD and signal line together, determining buy and sell signals more reliable. When the MACD is far below zero line and crosses above the signal line, it is a reliable buy signal and when the MACD is far above zero line and crosses below the signal line, it is a reliable sell signal (Scott et al., 2018).

The following graphic is a weekly bar chart of ISE-100 with MACD oscillator. The blue line in the lower graph is MACD, the red line in the lower graph is the signal line and they move around a zero line. When the MACD is above the signal line and divergences, bars stand above the zero and its heights gets taller. When the MACD is above the signal line and convergences, bars stand above the zero and its heights gets shorter. When the MACD is below the signal line and divergences, bars stand below the zero and its heights gets taller. When the MACD is below the signal line and convergences, bars stand below the zero and its heights gets shorter. When the MACD is below zero line and starts converging the signal line, it is a buy signal and when the MACD is above zero line and starts converging the signal line, it is a sell signal. So, red arrows represent sell points and green arrows represent buy points.



Figure 52. Weekly Bar Chart of ISE-100 with MACD Oscillator, Method 1

Resource: <https://tr.tradingview.com>

The following graphic is a weekly bar chart of ISE-100 with MACD oscillator. The blue line in the lower graph is MACD, the red line in the lower graph is the signal line and they move around a zero line. When the MACD is above the signal line and divergences, bars stand above the zero and its heights gets taller. When the MACD is above the signal line and convergences, bars stand above the zero and its heights gets shorter. When the MACD is below the signal line and divergences, bars stand below the zero and its heights gets taller. When the MACD is below the signal line and convergences, bars stand below the zero and its heights gets shorter. When the MACD is below zero line and starts converging the signal line, it is a buy signal and when the MACD is above zero line and starts converging the signal line, it is a sell signal. So, red arrows represent sell points and green arrows represent buy points.



Figure 53. Weekly Bar Chart of ISE-100 with MACD Oscillator, Method 2

Resource: <https://tr.tradingview.com>

The following graphic is a weekly bar chart of ISE-100 with MACD oscillator. The blue line in the lower graph is MACD, the red line in the lower graph is the signal line and they move around a zero line. When the MACD is above the signal line and divergences, bars stand above the zero and its heights gets taller. When the MACD is above the signal line and convergences, bars stand above the zero and its heights gets shorter. When the MACD is below the signal line and divergences, bars stand below the zero and its heights gets taller. When the MACD is below the signal line and convergences, bars stand below the zero and its heights gets shorter.

When t-1 level of the MACD is below t-1 level of signal line, t-1 level of signal line is below zero line, MACD is increasing and MACD line and signal line are converging, it is a buy signal and when t-1 level of the MACD is above t-1 level of signal line, t-1 level of signal line is above zero line, MACD is decreasing and MACD line and signal line are converging, it is a sell signal. So, red arrows represent sell points and green arrows represent buy points.



Figure 54. Weekly Bar Chart of ISE-100 with MACD Oscillator, Method 3

Resource: <https://tr.tradingview.com>

To show if using MACD with this method on ISE-100, Istanbul Stock Exchange Index, works or not, following table is prepared. This table contains beginning of the period, ending of the period, beginning price, ending price, change in percentage, days between buy and sell signals and return fields. The beginning and the ending of buying, holding, and selling period. Beginning and ending prices are close prices of the index at the given date. Change in percentage is calculated with the growth rate formula.

$$\text{Growth rate} = (\text{Ending price} / \text{Beginning price})$$

Number of workdays between buy and sell signals is the holding duration after buy signals. The return column represents the compound growth rate of all buy and sell periods. The table is prepared with the 20-year historical data which starts from 2001 and ends with 2020

There are 76 buy and sell signals in 20 years and 50 buy signals are successful which corresponds 66% and 1 Lira becomes 6.05 Lira in 20 years. There are 5019 workdays in 20 years and with this trade model, money is used in 2195 workdays. The highest profit in a period is 40% in 43 workdays. Close price at January 02, 2001 is 94.67 and close price at December 30, 2020 is 1479.91. So, the average daily increase in close

price of ISE-100 index is 0.055% in 20 years and using this trade model gives 0.082% average daily increase.

For the detailed information, a table is prepared and revealed in appendix section as “Appendix 1. Buy and Sell Levels of MACD Method”. This table contains date, daily close prices, 12 day moving average of close price, 26 day moving average of close price, MACD, signal, histogram (difference between MACD and signal), buy signals, sell signals, first buy and first sell signal, price changes between buy and sell signals, days between buy and sell signals, buy signal with successful result, buy signal with unsuccessful result, sell signal with successful result, sell signal with unsuccessful result and returns of 20-year-period which starts from the beginning of 2001 and ends on the 30.12.2020. Buy and sell signals are calculated as in the table. When t-1 level of the MACD is below t-1 level of signal, t-1 level of signal is below zero, MACD is increasing and MACD and signal are converging, it is a buy signal and when t-1 level of the MACD is above t-1 level of signal, t-1 level of signal is above zero, MACD is decreasing and MACD and signal are converging, it is a sell signal. So, red “SELL” below “Sell Signals” field represent sell points and green “BUY” below “Buy Signals” field represent buy points. In this method, many buy or sell signals can be consecutive. Therefore, only the first buy and sell signals are considered as signals. “FIRST BUY and FIRST SELL signal” field includes the first buy signal and first sell signal. “Price changes between buy and sell signals” field includes the price changes between first buy and first sell period. There are two types of percentage in the table. The first one is BUY-SELL change percentage, and the second is SELL-BUY change percentage. The BUY-SELL period starts with a first buy signal and ends with a first sell signal. The percentage next to first sell signal represents the price change between this period. The SELL-BUY period starts with a first sell signal and ends with a first buy signal. The percentage next to first buy signal represents the price change between this period.

“Days between buy and sell signals” field includes the number of workdays between two signals.

“Buy signal with successful result” includes green “1” values when a BUY-SELL period ends with an increase in close price.

“Buy signal with unsuccessful result” includes red “1” values when a BUY-SELL period ends with a decrease in close price.

“Sell signal with successful result” includes green “1” values when a SELL-BUY period ends with a decrease in close price.

“Sell signal with unsuccessful result” includes red “1” values when a SELL-BUY period ends with an increase in close price.

Table 1. Returns of MACD Method

Beginning of The Period	Ending of The Period	Beginning Price	Ending Price	Change in Percentage	Number of workdays between buy and sell signals	Return
Aug19-2020	Oct26-2020	1.124,71	1.144,45	1,8%	48	6,05
Mar26-2020	Apr28-2020	915,28	1.007,07	10,0%	22	5,95
Oct28-2019	Nov25-2019	998,38	1.053,82	5,6%	19	5,41
Sep02-2019	Sep23-2019	983,43	1.000,21	1,7%	15	5,12
Apr10-2019	Jun25-2019	970,15	954,21	-1,6%	49	5,04
Dec28-2018	Feb05-2019	904,35	1.024,48	13,3%	26	5,12
Nov07-2018	Dec05-2018	954,93	939,70	-1,6%	20	4,52
Sep06-2018	Oct02-2018	927,63	981,61	5,8%	18	4,59
Jul27-2018	Aug15-2018	955,85	902,63	-5,6%	13	4,34
Apr04-2018	Jul17-2018	1.139,76	916,30	-19,6%	71	4,60
Feb23-2018	Mar14-2018	1.175,21	1.175,93	0,1%	13	5,72
Dec05-2017	Jan05-2018	1.062,60	1.166,38	9,8%	22	5,71
Oct05-2017	Nov10-2017	1.043,34	1.089,49	4,4%	26	5,20
Apr12-2017	May11-2017	909,52	951,14	4,6%	20	4,98
Nov22-2016	Dec30-2016	758,12	781,39	3,1%	28	4,77
Sep19-2016	Sep30-2016	776,71	764,88	-1,5%	9	4,62
Aug05-2016	Aug24-2016	760,66	761,16	0,1%	13	4,70
May23-2016	Jul20-2016	767,66	749,03	-2,4%	39	4,69
Dec10-2015	Feb11-2016	723,54	709,42	-2,0%	44	4,81
Aug11-2015	Oct22-2015	797,20	802,56	0,7%	50	4,90
Jun17-2015	Jul07-2015	807,13	815,72	1,1%	14	4,87
Feb20-2015	Apr10-2015	854,89	826,46	-3,3%	35	4,82
Dec31-2014	Jan22-2015	857,21	909,03	6,0%	15	4,99
Oct13-2014	Nov07-2014	751,16	779,58	3,8%	18	4,70
Aug25-2014	Sep11-2014	792,62	789,66	-0,4%	13	4,53
Jul07-2014	Aug05-2014	789,51	806,42	2,1%	18	4,55
Nov25-2013	Apr16-2014	765,31	723,99	-5,4%	101	4,45
Aug15-2013	Sep30-2013	739,78	744,87	0,7%	31	4,71
Jun19-2013	Jul31-2013	788,35	733,77	-6,9%	30	4,67
Feb18-2013	Mar20-2013	779,08	821,61	5,5%	22	5,02
Nov30-2012	Dec20-2012	730,59	768,14	5,1%	14	4,76
Oct10-2012	Nov06-2012	684,58	720,40	5,2%	16	4,53
Apr26-2012	Jul06-2012	606,78	627,81	3,5%	50	4,30
Mar15-2012	Apr03-2012	612,79	632,85	3,3%	13	4,16
Nov10-2011	Feb13-2012	555,41	605,57	9,0%	67	4,03
Aug24-2011	Sep26-2011	530,55	568,01	7,1%	20	3,69
Jun01-2011	Jul18-2011	632,25	620,25	-1,9%	33	3,45
Feb08-2011	Mar31-2011	652,54	644,35	-1,3%	37	3,52
Dec08-2010	Jan17-2011	677,05	668,31	-1,3%	28	3,56
Aug27-2010	Oct01-2010	593,46	648,83	9,3%	22	3,61
May26-2010	Jun30-2010	541,03	548,39	1,4%	25	3,30
Feb23-2010	Apr12-2010	514,17	588,22	14,4%	34	3,26
Nov17-2009	Dec29-2009	472,43	517,86	9,6%	28	2,85
Sep25-2009	Oct16-2009	476,25	497,91	4,5%	15	2,60
Mar05-2009	Apr21-2009	230,36	286,79	24,5%	33	2,48
Jan28-2009	Feb17-2009	267,06	239,08	-10,5%	14	2,00
Sep05-2008	Dec31-2008	391,16	268,64	-31,3%	75	2,23
Jun06-2008	Aug08-2008	396,46	409,50	3,3%	45	3,25
Mar25-2008	Apr24-2008	409,92	431,90	5,4%	21	3,14
Feb04-2008	Mar03-2008	457,20	433,44	-5,2%	20	2,98
Dec04-2007	Dec19-2007	540,13	538,47	-0,3%	11	3,15
Aug28-2007	Oct05-2007	477,51	567,93	18,9%	27	3,16
Jun25-2007	Jul26-2007	454,17	525,12	15,6%	23	2,65
May17-2007	Jun06-2007	458,60	458,61	0,0%	14	2,29
Mar16-2007	Apr10-2007	418,20	453,40	8,4%	17	2,29
Jan17-2007	Feb07-2007	392,18	420,99	7,3%	15	2,12
Dec05-2006	Dec25-2006	381,63	387,05	1,4%	14	1,97
Oct10-2006	Nov03-2006	374,49	393,07	5,0%	15	1,94
Jun01-2006	Jul18-2006	383,95	336,18	-12,4%	33	1,85
Mar24-2006	May09-2006	432,74	445,63	3,0%	32	2,12
Nov01-2005	Nov28-2005	327,92	366,21	11,7%	17	2,05
Aug29-2005	Sep20-2005	300,15	337,19	12,3%	15	1,84
Mar07-2005	May24-2005	277,90	241,41	-13,1%	55	1,64
May03-2004	Jun15-2004	176,78	172,30	-2,5%	30	1,88
Feb13-2004	Mar03-2004	190,00	191,72	0,9%	13	1,93
Jun27-2003	Aug25-2003	109,81	117,98	7,4%	41	1,92
May26-2003	Jun11-2003	111,25	105,97	-4,7%	12	1,78
Apr02-2003	Apr28-2003	98,05	113,11	15,4%	17	1,87
Jan07-2003	Feb25-2003	97,53	112,73	15,6%	30	1,62
Sep06-2002	Nov22-2002	96,53	135,01	39,9%	54	1,40
May09-2002	Aug02-2002	119,45	107,82	-9,7%	61	1,00
Feb04-2002	Apr10-2002	130,75	120,31	-8,0%	45	1,11
Oct02-2001	Nov09-2001	78,44	100,81	28,5%	27	1,21
Aug24-2001	Sep11-2001	100,50	92,96	-7,5%	11	0,94
Jun11-2001	Aug14-2001	116,36	89,20	-23,3%	46	1,02
Feb26-2001	May11-2001	88,80	117,79	32,6%	48	1,33

3.2. MOMENTUM

One of the useful oscillators is momentum. It is the velocity measurement of the price changes. Most of the time, 10-day momentum is used for forecasting but in addition to 10-day it is better to use 20, 30, 40, 50, 100-day momentum as well. The formula is constructed with the subtraction a X-day from the closing price (Murphy, 2002).

The formula is:

$$\text{MOM}(n) = (\text{Price today} - \text{price } n \text{ periods ago})$$

If prices increased in 10 days, the 10-day momentum is above the zero and if prices decreased in 10 days, the 10-day momentum is below the zero. The midpoint is 0 but the momentum does not have an upper or lower limit (Scott et al., 2018).

The following graphic is a daily candlestick graph of Istanbul Stock Exchange with 10-day momentum is shown. On the green arrows on the momentum line is the lower level and oversold area on the trendless channel which are the buy points and the red arrows are on the upper level and overbought area which are the sell points.



Figure 55. Daily Candlestick Graph of Istanbul Stock Exchange with 10-Day Momentum

Resource: <https://tr.tradingview.com>

The most used type of momentum is 10-day momentum, but this period can be changed in other situations. For instance, if the trader wants to use a more sensitive graph, 5-day momentum can be a better option than 10-day. Or if the trader wants to use a smoother graph, 40-day or 100-day momentum can be a better option than 10-day (Scott et al., 2018).

The following graphic is a daily candlestick chart of ISE-100 is shown. In the graph the comparison of 10-day and 40-day momentum lines are shown. While 10-day momentum line shows more sensitive, 40-day momentum is more useful to analyze for long term.



Figure 56. Daily Candlestick Chart of ISE-100 with 10-Day and 40-Day Momentum

Resource: <https://tr.tradingview.com>

Using momentum for decision of buying or selling is very useful in channels. If the momentum level is near the lower line and increasing, it shows that the uptrend is started. If the momentum level near the upper line and decreasing, it shows that the downtrend is started. If the momentum crosses of the midpoint which is 0 and increases, it means that the uptrend is accelerating and if the momentum crosses of the midpoint and decreases, that means the downtrend is accelerating and when the momentum is closing to upper level, uptrend should lose momentum (Murphy, 2002).

Drawing trend lines on momentum line gives us a chance to see the reversal before happened. In a downtrend, prices decrease and the trendline can be drawn on the resistance points on the graph. The downtrend drawing can also be drawn on 10-day or 40-day momentum line. If the resistance on downtrend line is broken on momentum graph, it is a signal of the same situation on the price graph.

The following graphic is a daily candlestick chart with 40-day momentum line of Arçelik has been shown in the graph. On the downtrend line of 40-day momentum, the resistance level is broken earlier than the downtrend line of prices. It shows the reversal before it happened. The green arrow is the buy point in this condition.



Figure 57. Daily Candlestick Chart with 40-Day Momentum Line of Arçelik Which Shows a Reversal of a Downtrend

Resource: <https://tr.tradingview.com>

The following graphic is a daily candlestick chart with 40-day momentum line of Arçelik has been shown in the graph. On the uptrend line of 40-day momentum, the support level is broken earlier than the uptrend line of prices. It shows the reversal before it happened. The red arrows are the sell points in this condition.



Figure 58. Daily Candlestick Chart with 40-Day Momentum Line of Arçelik Which Shows a Reversal of an Uptrend

Resource: <https://tr.tradingview.com>

The zero level of momentum line can be used as a buy or sell points by technical analysts. When the downtrend reverses uptrend, on the start point of the uptrend is at the zero level of momentum chart.

The following graphic is a daily bar chart with 40-day momentum line of Arçelik has been shown in the graph. On the downtrend line of 40-day momentum, the resistance level is broken earlier than the downtrend line of prices. The reversal happened on the zero level of momentum line before it happened. The green arrow is the buy point in this condition.



Figure 59. Daily Bar Chart with 40-Day Momentum Line of Arçelik

Resource: <https://tr.tradingview.com>

One difficulty is drawing the upper and lower line of momentum. Since there is no specific upper and lower level, it is not possible to formulate a lower or upper line. Therefore, it is possible to draw a line by visual inspection. The history is important to draw a line.

The following graphic is a daily line chart with 40-day momentum line of ISE-100 index has shown in the graph. On the lower graph, the upper and lower lines are between +70 and -70 which is drawn by visual inspection. Below the lower band is oversold and above the upper band is overbought area. When momentum is in oversold area and breaks the lower band upward, it is a buy signal and when momentum is in overbought area and breaks the upper band downward, it is a sell signal. So, red arrows represent sell points and green arrows represent buy points.



Figure 60. Daily Line Chart with 40-Day Momentum Line of ISE-100 Index with Upper and Lower Bands

Resource: <https://tr.tradingview.com>

Using averages of maximum and minimum levels of momentum helps to draw dynamic upper and lower lines in momentum graph. Average of maximum levels and minimum levels gives the average maximum and minimum levels.

The formula of the average maximum level of 40-day momentum:

= (maximum level of the period between t0 and t -99 + maximum level of the period between t-100 and t -199

+ maximum level of the period between t-200 and t -299 + maximum level of the period between t-300 and t -399

+ maximum level of the period between t-400 and t -499 + maximum level of the period between t-500 and t -599

+ maximum level of the period between t-600 and t -699 + maximum level of the period between t-700 and t -799

+ maximum level of the period between t-800 and t -899 + maximum level of the period between t-900 and t -999

- minimum level of the period between t0 and t -99 - minimum level of the period between t-100 and t -199

- minimum level of the period between t-200 and t -299 - minimum level of the period between t-300 and t -399

- minimum level of the period between t-400 and t -499 - minimum level of the period between t-500 and t -599

- minimum level of the period between t-600 and t -699 - minimum level of the period between t-700 and t -799

- minimum level of the period between t-800 and t -899 - minimum level of the period fr between om t-900 and t -999) / 20

The formula of the average minimum level of 40-day momentum:

= -1 * (maximum level of the period between t0 and t-99 + maximum level of the period between t-100 and t-199

+ maximum level of the period between t-200 and t-299 + maximum level of the period between t-300 and t -399

+ maximum level of the period between t-400 and t-499 + maximum level of the period between t-500 and t-599

+ maximum level of the period between t-600 and t-699 + maximum level of the period between t-700 and t-799

+ maximum level of the period between t-800 and t -899 + maximum level of the period between t-900 and t -999

- minimum level of the period between t0 and t-99 - minimum level of the period between t-100 and t-199

- minimum level of the period between t-200 and t-299 - minimum level of the period between t-300 and t-399

- minimum level of the period between t-400 and t-499 - minimum level of the period between t-500 and t-599

- minimum level of the period between t-600 and t-699 - minimum level of the period between t-700 and t-799

- minimum level of the period between t-800 and t-899 - minimum level of the period between t-900 and t-999) / 20

The upper band is 80% of the average maximum level of 40-day momentum and the lower band is 80% of the average minimum level of 40-day momentum. When the 40-day momentum is below the lower band, it is a buy signal and when the 40-day momentum is above the upper band, it is a sell signal.

To show if using Momentum method on ISE-100, Istanbul Stock Exchange Index, works or not, following table is prepared. This table contains beginning of the period, ending of the period, beginning price, ending price, change in percentage, days between buy and sell signals and return fields. The beginning and the ending of buying, holding, and selling period. Beginning and ending prices are close prices of the index at the given date. Change in percentage is calculated with the growth rate formula.

$$\text{Growth rate} = (\text{Ending price} / \text{Beginning price})$$

Number of workdays between buy and sell signals is the holding duration after buy signals. The return column represents the compound growth rate of all buy and sell periods. The table is prepared with the 20-year historical data which starts from 2001 and ends with 2020

There are 24 buy and sell signals in 20 years and 19 buy signals are successful which corresponds 79% and 1 Lira becomes 10.40 Lira in 20 years. There are 5019 workdays in 20 years and with this trade model, money is used in 1950 workdays. The highest profit in a period is 72% in 41 workdays. Close price at January 02, 2001 is 94.67 and close price at December 30, 2020 is 1479,91. So, the average daily increase in close price of ISE-100 index is 0.055% in 20 years and using this trade model gives 0.120% average daily increase.

For the detailed information, a table is prepared and revealed in appendix section as “Appendix 1. Buy and Sell Levels of Momentum Method”. This table contains date, daily close prices, 40-Day Momentum, Average of extreme momentum levels, buy

signals, sell signals, first buy and first sell signal, price changes between buy and sell signals, days between buy and sell signals, buy signal with successful result, buy signal with unsuccessful result, sell signal with successful result, sell signal with unsuccessful result and returns of 20-year-period which starts from the beginning of 2001 and ends on the 30.12.2020. Buy and sell signals are calculated as below. When 40-day momentum level is below the lower band, it is a buy signal and when 40-day momentum level is below the upper band, it is a sell signal. So, red “SELL” below “Sell Signals” field represent sell points and green “BUY” below “Buy Signals” field represent buy points. In this method, many buy or sell signals can be consecutive. Therefore, only the first buy and sell signals are considered as signals. “FIRST BUY and FIRST SELL signal” field includes the first buy signal and first sell signal. “Price changes between buy and sell signals” field includes the price changes between first buy and first sell period. There are two types of percentage in the table. The first one is BUY-SELL change percentage, and the second is SELL-BUY change percentage. The BUY-SELL period starts with a first buy signal and ends with a first sell signal. The percentage next to first sell signal represents the price change between this period. The SELL-BUY period starts with a first sell signal and ends with a first buy signal. The percentage next to first buy signal represents the price change between this period.

“Days between buy and sell signals” field includes the number of workdays between two signals.

“Buy signal with successful result” includes green “1” values when a BUY-SELL period ends with an increase in close price.

“Buy signal with unsuccessful result” includes red “1” values when a BUY-SELL period ends with a decrease in close price.

“Sell signal with successful result” includes green “1” values when a SELL-BUY period ends with a decrease in close price.

“Sell signal with unsuccessful result” includes red “1” values when a SELL-BUY period ends with an increase in close price.

Table 2. Returns of Momentum Method

Beginning of The Period	Ending of The Period	Beginning Price	Ending Price	Change in Percentage	Number of workdays between buy and sell signals	Return
Mar09-2020	May27-2020	1.035,24	1.049,54	1,4%	52	10,40
May06-2019	Jul19-2019	929,82	1.018,49	9,5%	50	10,26
Apr10-2018	Sep26-2018	1.107,13	991,49	-10,4%	113	9,37
Jun24-2016	Jan24-2017	753,66	842,08	11,7%	144	10,46
Jan04-2016	Mar11-2016	705,18	793,80	12,6%	49	9,36
Jul27-2015	Nov02-2015	773,52	836,94	8,2%	67	8,32
Mar13-2015	May18-2015	766,42	886,52	15,7%	44	7,69
Oct08-2014	Dec01-2014	729,43	861,47	18,1%	37	6,65
Dec25-2013	Apr04-2014	660,97	725,83	9,8%	71	5,63
Jun06-2013	Sep19-2013	758,95	794,66	4,7%	72	5,12
May28-2012	Jul26-2012	548,44	638,41	16,4%	43	4,89
Jun15-2011	Feb01-2012	609,39	592,16	-2,8%	159	4,20
Mar01-2011	May03-2011	587,09	700,72	19,4%	45	4,33
Oct06-2008	Apr29-2009	315,75	307,46	-2,6%	140	3,62
Jan11-2008	Sep08-2008	519,21	405,17	-22,0%	169	3,72
Jan09-2007	Feb01-2007	370,83	423,02	14,1%	17	4,77
May05-2006	Aug21-2006	442,13	371,65	-15,9%	75	4,18
Apr12-2005	Jun24-2005	250,78	270,33	7,8%	52	4,97
May17-2004	Jul26-2004	159,22	186,45	17,1%	49	4,62
Jan29-2003	Oct02-2003	107,26	138,80	29,4%	169	3,94
Mar13-2002	Nov07-2002	105,94	134,72	27,2%	168	3,05
Jul10-2001	Nov19-2001	94,69	122,63	29,5%	91	2,39
Feb21-2001	Apr27-2001	71,81	123,63	72,2%	41	1,85
Jan02-2001	Feb16-2001	94,67	101,69	7,4%	33	1,07

3.3. RSI: RELATIVE STRENGTH INDEX

RSI is the recent price changes' magnitude for evaluating the condition of the price. This oscillator is between 0 and 1 and over 70% is overbought and below 30% is oversold. RSI gives reliable signals for reversals. It is mostly used with 14 periods and is calculated with gains and losses of every closing. Last 14 periods average gains and losses are used in the calculation (Murphy, 2002).

RSI formula = $100 - [100 / (1 + \text{Average of up closes in 14 days} / \text{Average of down closes in 14 days})]$

The following graphic is a daily line chart of ISE-100 is shown in the graph. The green line is 14 period RSI of ISE-100. Over 70% of RSI line is overbought and sell point. Below 30% of RSI line is oversold and buy point.

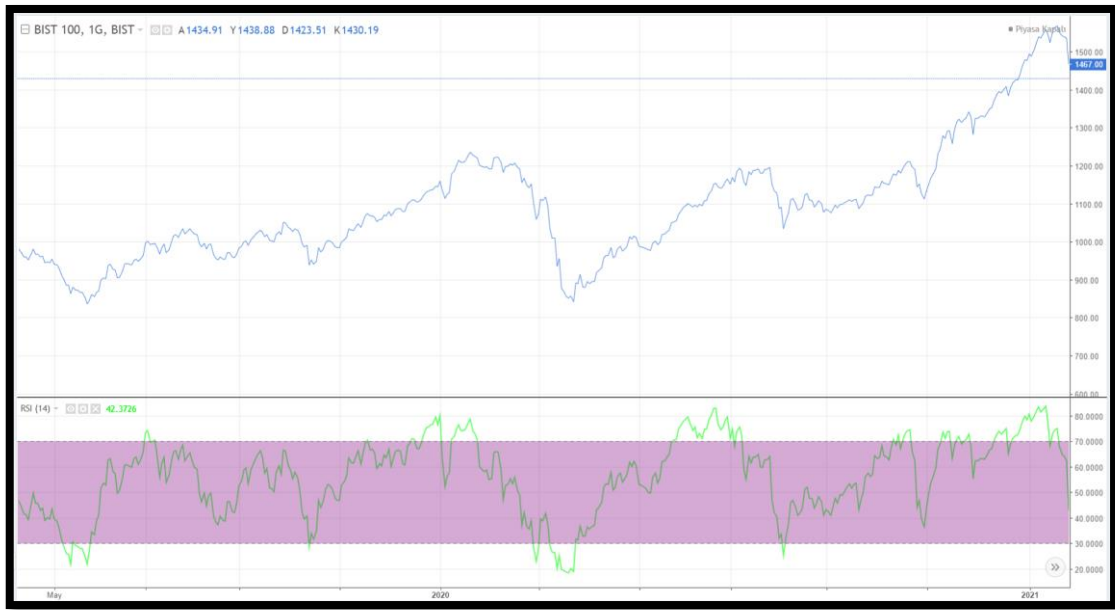


Figure 61. Daily Line Chart of ISE-100 with 14-Period RSI Line

Resource: <https://tr.tradingview.com>

Determining overbought level as more than 80% and oversold level as less than 20% is an effective method. To show if using RSI with this method on ISE-100, Istanbul Stock Exchange Index, works or not, following table is prepared. This table contains beginning of the period, ending of the period, beginning price, ending price, change in percentage, days between buy and sell signals and return fields. The beginning and the ending of buying, holding, and selling period. Beginning and ending prices are close prices of the index at the given date. Change in percentage is calculated with the growth rate formula.

$$\text{Growth rate} = (\text{Ending price} / \text{Beginning price})$$

Number of workdays between buy and sell signals is the holding duration after buy signals. The return column represents the compound growth rate of all buy and sell periods. The table is prepared with the 20-year historical data which starts from 2001 and ends with 2020

There are 6 buy and sell signals in 20 years and 5 buy signals are successful which corresponds 83% and 1 Lira becomes 2.26 Lira in 20 years. There are 5019 workdays in 20 years and with this trade model, money is used in 1106 workdays. The highest profit

in a period is 34% in 598 workdays. Close price at January 02, 2001 is 94.67 and close price at December 30, 2020 is 1479.91. So, the average daily increase in close price of ISE-100 index is 0.055% in 20 years and using this trade model gives 0.074% average daily increase.

For the detailed information, a table is prepared and revealed in appendix section as “Appendix 1. Buy and Sell Levels of RSI Method”. This table contains date, daily close prices, Price Change, RSI, buy signals, sell signals, first buy and first sell signal, price changes between buy and sell signals, days between buy and sell signals, buy signal with successful result, buy signal with unsuccessful result, sell signal with successful result, sell signal with unsuccessful result and returns of 20-year-period which starts from the beginning of 2001 and ends on the 30.12.2020. Buy and sell signals are calculated as below. When RSI breaks up the lower band which is 20 and $RSI_{t0} > RSI_{t1} > RSI_{t2}$, it is a buy signal and when RSI breaks down the upper band which is 80 and $RSI_{t0} > RSI_{t-1} > RSI_{t-2}$, it is a sell signal. So, red “SELL” below “Sell Signals” field represent sell points and green “BUY” below “Buy Signals” field represent buy points. In this method, many buy or sell signals can be consecutive. Therefore, only the first buy and sell signals are considered as signals. “FIRST BUY and FIRST SELL signal” field includes the first buy signal and first sell signal. “Price changes between buy and sell signals” field includes the price changes between first buy and first sell period. There are two types of percentage in the table. The first one is BUY-SELL change percentage, and the second is SELL-BUY change percentage. The BUY-SELL period starts with a first buy signal and ends with a first sell signal. The percentage next to first sell signal represents the price change between this period. The SELL-BUY period starts with a first sell signal and ends with a first buy signal. The percentage next to first buy signal represents the price change between this period.

“Days between buy and sell signals” field includes the number of workdays between two signals.

“Buy signal with successful result” includes green “1” values when a BUY-SELL period ends with an increase in close price.

“Buy signal with unsuccessful result” includes red “1” values when a BUY-SELL period ends with a decrease in close price.

“Sell signal with successful result” includes green “1” values when a SELL-BUY period ends with a decrease in close price.

“Sell signal with unsuccessful result” includes red “1” values when a SELL-BUY period ends with an increase in close price.

Table 3. Returns of RSI Method

Beginning of The Period	Ending of The Period	Beginning Price	Ending Price	Change in Percentage	Number of workdays between buy and sell signals	Return
Mar19-2020	Jun24-2020	851,95	1.144,49	34,3%	64	2,26
May24-2019	Jul08-2019	860,72	986,95	14,7%	28	1,68
Mar17-2015	Jul31-2017	800,31	1.075,31	34,4%	598	1,47
Jul04-2008	Apr13-2009	343,00	284,47	-17,1%	192	1,09
Jan29-2002	Nov11-2002	125,15	127,74	2,1%	199	1,31
Sep25-2001	Oct31-2001	76,45	98,49	28,8%	25	1,29

3.4. STOCHASTIC

Stochastic is an oscillator which is between 0 and 1. These values are the lower and upper bands where the level is getting closer to lower band in downtrend and the level is getting closer to upper band in uptrend. This level represents with %K and with using 3 period moving average of %K line we find %D line (Murphy, 2002).

%K line is calculated with the closing prices of last 14 periods and the formula of %K is:

$$\%K = 100 * [(C - L14) / (H14 - L14)]$$
 where L14 is the lowest price in the last 14 periods, H14 is the highest price in the last 14 periods and C is the nearest closing price.

The formula measures the level of price with in 0 and 1 which can also be shown as 0% and 100%. Below 20% is low reading level and over 80% is high reading level. Because %K is more sensitive than %D, using only %K is sometimes misleading and using %D gives more reliable signals than %K gives. When %D line is over 80%, the underlying is overbought and below 20%, the underlying is oversold.

The most important signal of stochastic oscillator occurs when the %K line crosses %D line. The stochastic oscillator can be used with daily, weekly and monthly charts.

Using shorter period is important to consider buy or sell points on a longer period (Murphy, 2002).

The following graphic is a daily line chart of ISE-100 is shown in the graph. The blue line is %K and the red line is %D. Over 80% of %K line is overbought and sell point. Below 20% of %K line is oversold and buy point.

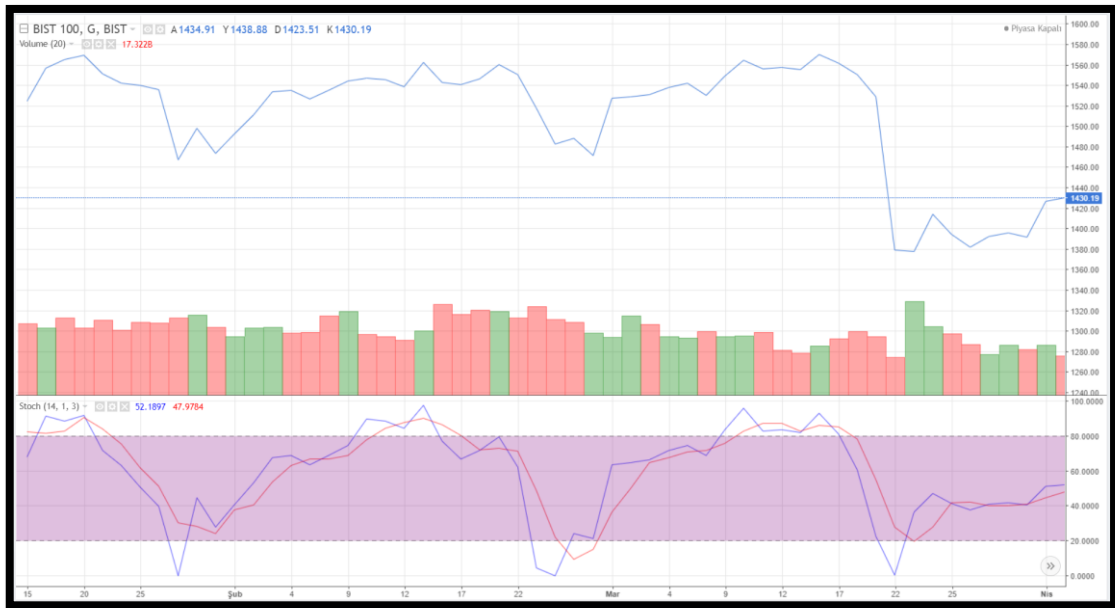


Figure 62. Daily Line Chart of ISE-100 with 14-Period Stochastic Line

Resource: <https://tr.tradingview.com>

The following graphic is a daily line chart of ISE-100 is shown in the graph. The blue line is %K and the red line is %D. Over 80% of %K line is overbought and sell point. Below 20% of %K line is oversold and buy point.

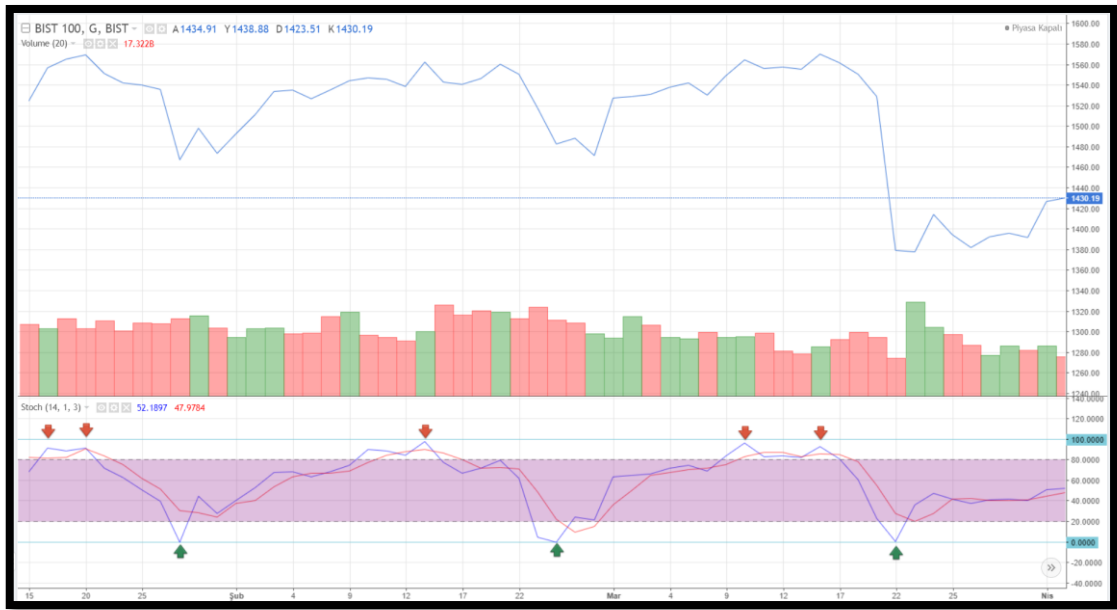


Figure 63. Daily Line Chart of ISE-100 with 14-Period Stochastic Line, Buy and Sell Points

Resource: <https://tr.tradingview.com>

Using 6 and 10 period moving average of %K with %K and %D gives more reliable.

Buy signals:

- When %K, %D and 6 period moving average of %K increases together
- When %K, %D and 6 period moving average of %K is above 10 period moving average of %K. (%K, %D and 6 period moving average of %K should not decrease together)
 - When 10 period moving average of %K is below 20% and %K, %D and 6 period moving average of %K is over 20%. This signal also shows the reversal in trend. (strong buy signal)
 - When 10 period moving average of %K is below 20%, %K, %D and 6 period moving average of %K is over 20% and four of them are increasing. This signal also shows the reversal in trend. (strong buy signal)

Sell signals:

- When %K, %D and 6 period moving average of %K decreases together

- When %K, %D and 6 period moving average of %K is below 10 period moving average of %K. (%K, %D and 6 period moving average of %K should not increase together)
- When 10 period moving average of %K is over 80% and %K, %D and 6 period moving average of %K is below 80%. This signal also shows the reversal in trend. (strong sell signal)
- When 10 period moving average of %K is over 80%, %K, %D and 6 period moving average of %K is below 80% and four of them are decreasing. This signal also shows the reversal in trend. (strong sell signal)

The following graphic is a daily line chart of ISE-100 is shown in the graph. The blue line is %K, the red line is 3 period moving average of %K which is %D, the yellow line is 6 period moving average of %K and green line is 10 period moving average of %K. Red arrows represent sell point and green arrows represent buy point. Buy points are shown with green arrows when %K, %D and 6 period moving average of %K increases together. Sell points are shown with red arrows when %K, %D and 6 period moving average of %K decreases together.



Figure 64. Daily Line Chart of ISE-100 with Stochastic Lines, Method 1

Resource: <https://tr.tradingview.com>

The following graphic is a daily line chart of ISE-100 is shown in the graph. The blue line is %K, the red line is 3 period moving average of %K which is %D, the yellow line is 6 period moving average of %K and green line is 10 period moving average of %K. Red arrows represent sell point and green arrows represent buy point. Buy points are shown with green arrows when 10 period moving average of %K is above 80%. (%K, %D and 6 period moving average of %K should not be below 80% together) and sell points are shown with red arrows when %K, %D and 6 period moving average of %K is below 10 period moving average of %K. (%K, %D and 6 period moving average of %K should not increase together)



Figure 65. Daily Line Chart of ISE- with Stochastic Lines, Method 2

Resource: <https://tr.tradingview.com>

The following graphic is a daily line chart of ISE-100 is shown in the graph. The blue line is %K, the red line is 3 period moving average of %K which is %D, the yellow line is 6 period moving average of %K and green line is 10 period moving average of %K. Red arrows represent sell point and green arrows represent buy point. Buy points are shown with green arrows when 10 period moving average of %K is below 20% and %K, %D and 6 period moving average of %K is over 20% and sell points are shown with red arrows when 10 period moving average of %K is over 80% and %K, %D and 6 period moving average of %K is below 80%

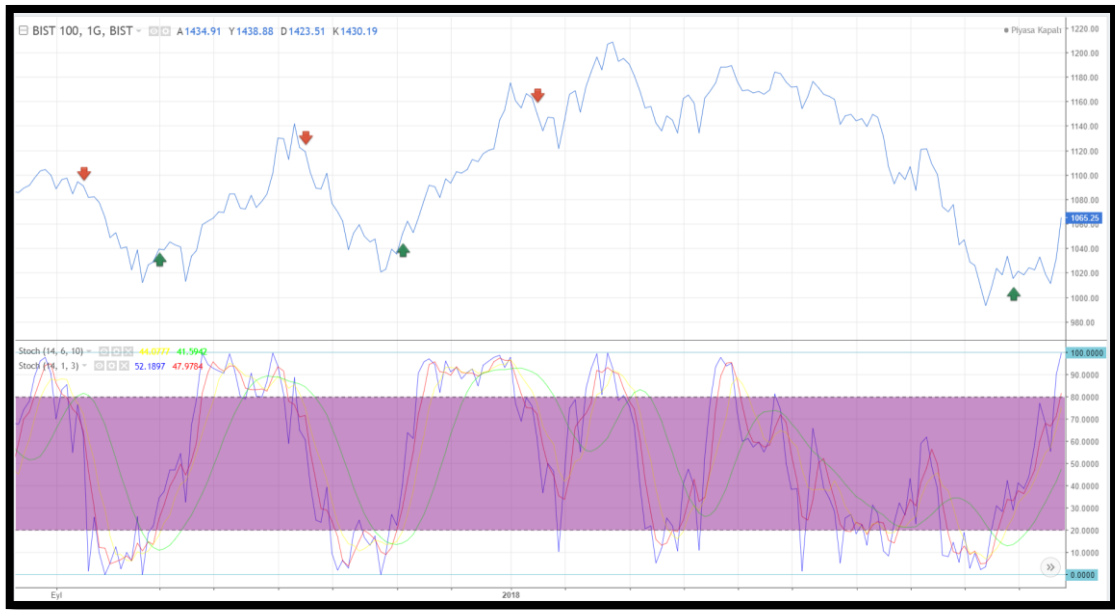


Figure 66. Daily Line Chart of ISE-100 with Stochastic Lines, Method 3

Resource: <https://tr.tradingview.com>

The following graphic is a daily line chart of ISE-100 is shown in the graph. The blue line is %K, the red line is 3 period moving average of %K which is %D, the yellow line is 6 period moving average of %K and green line is 10 period moving average of %K. Red arrows represent sell point and green arrows represent buy point.

Buy points are shown with green arrows when %K, %D and 6 period moving average of %K increases together. When 10 period moving average of %K is below 20%, it is also shown with green arrows. (%K, %D and 6 period moving average of %K should not be below 20% together)

Sell points are shown with red arrows when %K, %D and 6 period moving average of %K decreases together. When 10 period moving average of %K is above 80%, it is also shown with the red arrows. (%K, %D and 6 period moving average of %K should not increase together)

Strong Buy points are shown with triple green arrows when 10 period moving average of %K is below 20% and %K, %D and 6 period moving average of %K is over 20% and strong sell points are shown with triple red arrows when 10 period moving average of %K is over 80% and %K, %D and 6 period moving average of %K is below 80%.



Figure 67. Daily Line Chart of ISE-100 with Stochastic Lines, Method 4

Resource: <https://tr.tradingview.com>

The following graphic is a daily line chart of ISE-100 is shown in the graph. The blue line is %K, the red line is 3 period moving average of %K which is %D, the yellow line is 6 period moving average of %K and green line is 10 period moving average of %K. Red arrows represent sell point and green arrows represent buy points.

Buy points are shown with green arrows when 10 period moving average of %K is below 20%, %K, %D and 6 period moving average of %K is over 20% and four of them are increasing.

Sell points are shown with red arrows 10 period moving average of %K is over 80%, %K, %D and 6 period moving average of %K is below 80% and four of them are decreasing.

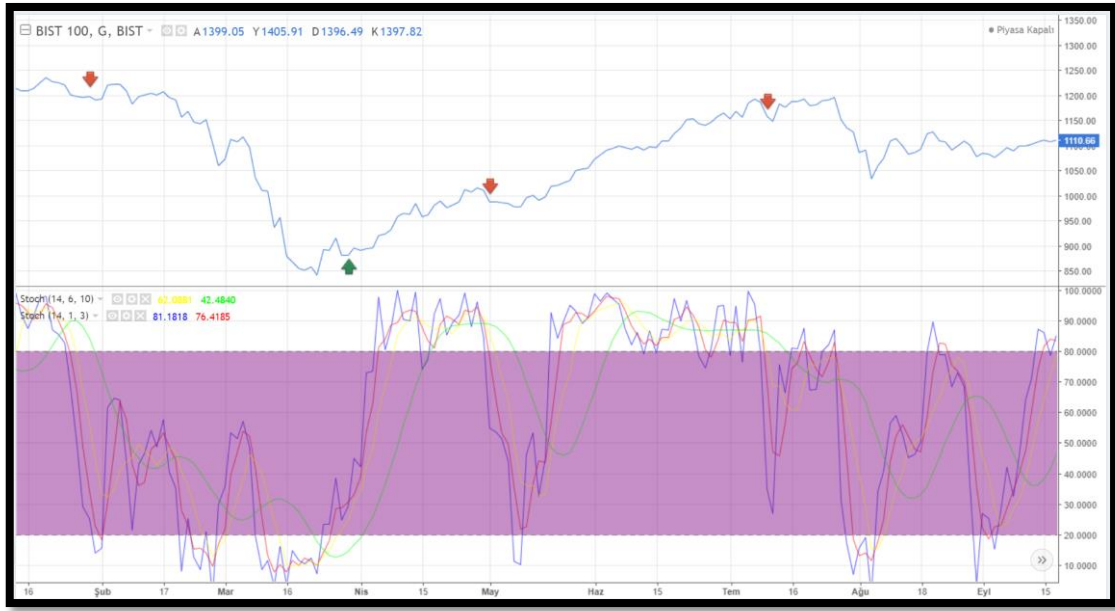


Figure 68. Daily Line Chart of ISE-100 with Stochastic Lines, Method 5

Resource: <https://tr.tradingview.com>

To show if using Stochastic method on ISE-100, Istanbul Stock Exchange Index, works or not, following table is prepared. This table contains beginning of the period, ending of the period, beginning price, ending price, change in percentage, days between buy and sell signals and return fields. The beginning and the ending of buying, holding, and selling period. Beginning and ending prices are close prices of the index at the given date. Change in percentage is calculated with the growth rate formula.

$$\text{Growth rate} = (\text{Ending price} / \text{Beginning price})$$

Number of workdays between buy and sell signals is the holding duration after buy signals. The return column represents the compound growth rate of all buy and sell periods. The table is prepared with the 20-year historical data which starts from 2001 and ends with 2020

There are 18 buy and sell signals in 20 years and 13 buy signals are successful which corresponds 72% and 1 Lira becomes 4.15 Lira in 20 years. There are 5019 workdays in 20 years and with this trade model, money is used in 1541 workdays. The highest profit in a period is 45% in 225 workdays. Close price at January 02, 2001 is 94.67 and close price at December 30, 2020 is 1479.91. So, the average daily increase in

close price of ISE-100 index is 0.055% in 20 years and using this trade model gives 0.92% average daily increase.

For the detailed information, a table is prepared and revealed in appendix section as “Appendix 1. Buy and Sell Levels of Stochastic Method”. This table contains date, daily close prices, Price Change, RSI, buy signals, sell signals, first buy and first sell signal, price changes between buy and sell signals, days between buy and sell signals, buy signal with successful result, buy signal with unsuccessful result, sell signal with successful result, sell signal with unsuccessful result and returns of 20-year-period which starts from the beginning of 2001 and ends on the 30.12.2020. Buy and sell signals are calculated as below.

When RSI breaks up the lower band which is 20 and $RSI_{t0} > RSI_{t1} > RSI_{t2}$, it is a buy signal and when RSI breaks down the upper band which is 80 and $RSI_{t0} > RSI_{t-1} > RSI_{t-2}$, it is a sell signal. So, red “SELL” below “Sell Signals” field represent sell points and green “BUY” below “Buy Signals” field represent buy points.

In this method, many buy or sell signals can be consecutive. Therefore, only the first buy and sell signals are considered as signals. “FIRST BUY and FIRST SELL signal” field includes the first buy signal and first sell signal. “Price changes between buy and sell signals” field includes the price changes between first buy and first sell period. There are two types of percentage in the table. The first one is BUY-SELL change percentage, and the second is SELL-BUY change percentage. The BUY-SELL period starts with a first buy signal and ends with a first sell signal. The percentage next to first sell signal represents the price change between this period. The SELL-BUY period starts with a first sell signal and ends with a first buy signal. The percentage next to first buy signal represents the price change between this period.

“Days between buy and sell signals” field includes the number of workdays between two signals.

“Buy signal with successful result” includes green “1” values when a BUY-SELL period ends with an increase in close price.

“Buy signal with unsuccessful result” includes red “1” values when a BUY-SELL period ends with a decrease in close price.

“Sell signal with successful result” includes green “1” values when a SELL-BUY period ends with a decrease in close price.

“Sell signal with unsuccessful result” includes red “1” values when a SELL-BUY period ends with an increase in close price.

Table 4. Returns of Stochastic Method

Beginning of The Period	Ending of The Period	Beginning Price	Ending Price	Change in Percentage	Number of workdays between buy and sell signals	Return
Mar30-2020	May05-2020	880,59	987,38	12,1%	24	4,15
Oct22-2019	Nov27-2019	978,86	1.058,44	8,1%	25	3,70
Aug29-2019	Sep20-2019	967,18	1.002,37	3,6%	15	3,42
May14-2018	Oct03-2018	1.033,70	971,88	-6,0%	96	3,30
Oct03-2017	Jan09-2018	1.039,08	1.150,23	10,7%	69	3,51
Feb18-2015	Feb09-2016	854,42	714,15	-16,4%	246	3,17
Aug21-2014	Nov06-2014	789,58	775,10	-1,8%	52	3,80
Nov18-2013	Apr22-2014	755,98	731,70	-3,2%	110	3,87
Jun14-2013	Sep26-2013	800,11	756,18	-5,5%	71	4,00
Feb20-2013	Mar20-2013	788,91	821,61	4,1%	20	4,23
Jun01-2012	Jul17-2012	555,68	624,73	12,4%	32	4,06
Oct31-2008	May13-2009	278,33	328,29	17,9%	131	3,61
Jun03-2008	Aug08-2008	404,52	409,50	1,2%	48	3,06
Nov30-2006	Oct19-2007	381,69	554,87	45,4%	225	3,02
Oct31-2005	Dec13-2005	319,64	377,42	18,1%	29	2,08
May24-2004	Jul22-2004	171,67	186,29	8,5%	43	1,76
Sep04-2002	Jun06-2003	94,70	109,73	15,9%	186	1,62
Jul19-2001	Jan11-2002	97,15	136,16	40,2%	119	1,40

3.5. COMBINED METHOD

Using these 4 oscillators together is another method for trading. Analysis of the tables above shows that the sell signals of Momentum and MACD oscillators are more successful than others. Buy signals of Stochastic and RSI is also successful therefore new combined method is used with the buy signals of Stochastic and RSI oscillators and sell signals of Momentum and MACD oscillators. To show if using combined method on ISE-100, Istanbul Stock Exchange Index, works or not, following table is prepared. This table contains beginning of the period, ending of the period, beginning price, ending price, change in percentage, days between buy and sell signals and return fields. The beginning

and the ending of buying, holding, and selling period. Beginning and ending prices are close prices of the index at the given date. Change in percentage is calculated with the growth rate formula.

$$\text{Growth rate} = (\text{Ending price} / \text{Beginning price})$$

Number of workdays between buy and sell signals is the holding duration after buy signals. The return column represents the compound growth rate of all buy and sell periods. The table is prepared with the 20-year historical data which starts from 2001 and ends with 2020

There are 30 buy and sell signals in 20 years and 20 buy signals are successful which corresponds 67% and 1 Lira becomes 4.13 Lira in 20 years. There are 5019 workdays in 20 years and with this trade model, money is used in 785 workdays. The highest profit in a period is 42% in 45 workdays. Close price at January 02, 2001 is 94.67 and close price at December 30, 2020 is 1479.91. So, the average daily increase in close price of ISE-100 index is 0.055% in 20 years and using this trade model gives 0.181% average daily increase.

For the detailed information, a table is prepared and revealed in appendix section as “Appendix 1. Buy and Sell Levels of Combined Method”. This table contains date, daily close prices, Stochastic buy signal, RSI buy signal, Momentum sell signal, MACD sell signal, first buy and first sell signal, price changes between buy and sell signals, days between buy and sell signals, buy signal with successful result, buy signal with unsuccessful result, sell signal with successful result, sell signal with unsuccessful result and returns of 20-year-period which starts from the beginning of 2001 and ends on the 30.12.2020. Buy and sell signals are determined as below.

Stochastic buy and RSI buy signals are used as buys and Momentum sell and MACD sell signals are used as sell signals below. So, red “SELL” below “Sell Signals” field represents sell points and green “BUY” below “Buy Signals” field represents buy points.

In this method, many buy or sell signals can be consecutive. Therefore, only the first buy and sell signals are considered as signals. “FIRST BUY and FIRST SELL signal” field includes the first buy signal and first sell signal. “Price changes between buy and sell signals” field includes the price changes between first buy and first sell period. There are two types of percentage in the table. The first one is BUY-SELL change percentage, and the second is SELL-BUY change percentage. The BUY-SELL period starts with a first buy signal and ends with a first sell signal. The percentage next to first sell signal represents the price change between this period. The SELL-BUY period starts with a first sell signal and ends with a first buy signal. The percentage next to first buy signal represents the price change between this period.

“Days between buy and sell signals” field includes the number of workdays between two signals.

“Buy signal with successful result” includes green “1” values when a BUY-SELL period ends with an increase in close price.

“Buy signal with unsuccessful result” includes red “1” values when a BUY-SELL period ends with a decrease in close price.

“Sell signal with successful result” includes green “1” values when a SELL-BUY period ends with a decrease in close price.

“Sell signal with unsuccessful result” includes red “1” values when a SELL-BUY period ends with an increase in close price.

Table 5. Returns of Combined Method

Beginning of The Period	Ending of The Period	Beginning Price	Ending Price	Change in Percentage	Number of workdays between buy and sell signals	Return
Mar19-2020	Apr28-2020	851,95	1.007,07	18,2%	27	4,13
Oct22-2019	Nov25-2019	978,86	1.053,82	7,7%	23	3,49
Aug29-2019	Sep23-2019	967,18	1.000,21	3,4%	16	3,24
May24-2019	Jun25-2019	860,72	954,21	10,9%	19	3,14
May14-2018	Jul17-2018	1.033,70	916,30	-11,4%	45	2,83
Oct03-2017	Nov10-2017	1.039,08	1.089,49	4,9%	28	3,19
May24-2016	Jul20-2016	794,35	749,03	-5,7%	38	3,04
Dec17-2015	Feb11-2016	737,12	709,42	-3,8%	39	3,23
Feb18-2015	Apr10-2015	854,42	826,46	-3,3%	37	3,35
Oct13-2014	Nov07-2014	751,16	779,58	3,8%	18	3,47
Aug21-2014	Sep11-2014	789,58	789,66	0,0%	15	3,34
Nov18-2013	Nov19-2013	755,98	746,18	-1,3%	1	3,34
Sep04-2013	Sep19-2013	669,66	794,66	18,7%	11	3,38
Jun14-2013	Jul31-2013	800,11	733,77	-8,3%	33	2,85
Feb20-2013	Mar20-2013	788,91	821,61	4,1%	20	3,11
Jun01-2012	Jul06-2012	555,68	627,81	13,0%	25	2,99
Feb26-2009	Apr21-2009	241,69	286,79	18,7%	38	2,64
Jan27-2009	Feb17-2009	257,98	239,08	-7,3%	15	2,23
Oct24-2008	Dec31-2008	241,77	268,64	11,1%	43	2,40
Jun03-2008	Aug08-2008	404,52	409,50	1,2%	48	2,16
Nov30-2006	Dec15-2006	381,69	402,05	5,3%	11	2,14
Oct31-2005	Nov01-2005	319,64	327,92	2,6%	1	2,03
May24-2004	Jun15-2004	171,67	172,30	0,4%	16	1,98
May23-2003	Jun11-2003	110,56	105,97	-4,2%	13	1,97
Jan09-2003	Feb25-2003	102,26	112,73	10,2%	28	2,06
Sep04-2002	Nov07-2002	94,70	134,72	42,3%	45	1,86
Jun18-2002	Aug02-2002	95,75	107,82	12,6%	33	1,31
Jan29-2002	Apr10-2002	125,15	120,31	-3,9%	49	1,16
Sep25-2001	Nov09-2001	76,45	100,81	31,9%	32	1,21
Jul19-2001	Aug14-2001	97,15	89,20	-8,2%	18	0,92

CONCLUSION AND RECOMMENDATIONS

In this study, the question “Is technical oscillators profitable in ISE-100?” is analyzed. In order to answer this question, the theories related to the technical analysis are examined. Trend analysis, reversal and continuation patterns and oscillators are explained with many charts of shares of ISE-100. After the examining the patterns and theories related to technical analysis, the performance of four oscillators which are Momentum, Stochastic, MACD and RSI are tested, and the results are revealed.

In the literature, there are a lot of indicators and oscillators to forecast future price movements of stocks and indices some of which have sufficient performances. In this study four oscillators are tested on ISE-100 which are Momentum, Stochastic, RSI and MACD. Other oscillators and indicators could also be tested in the study, but this would exceed the scope of the study.

Without considering commissions of transactions and dividends, the daily increase in ISE-100 in 20 years is 0.055% whereas the daily increase in the method which uses MACD oscillator is 0.082%, the daily increase in the method which uses Momentum oscillator is 0.119%, the daily increase in the method which uses RSI oscillator is 0.074% , the daily increase in the method which uses Stochastic oscillator is 0.076% and the daily increase in combined method is 0.181%. In this period, daily average overnight interest rate of banks is 0.043%. Base of the daily increases in the methods, the biggest daily increase happened with the combined method and the method which uses Momentum oscillator comes next.

This study is prepared in order for the new investors who have limited financial knowledge to make profit on their investments on stock market. Investors who does not have the sufficient financial knowledge should learn the fundamentals in finance and after using the methods which are examined in the study. It is better to analyze ISE-100 index. Investors should analyze other technical tools in technical analysis after catching buy or sell signals with the methods which are examined in this study. Level of ISE-100 index

is the average of all the shares therefore if an increase in the index is expected, shares will also be expected to increase. Trading on shares in ISE-100 when the oscillators give buy signals in ISE-100 and investing on other financial tools when oscillators give sell signals in ISE-100 is a way to make profit and before trading on any share in ISE-100, it is helpful to read financial statements of companies.

Institutions such as Istanbul Stock Exchange or banks should improve the financial knowledge of investors on stock market by organizing courses etc. Online education and certification programs are also a method for improving investors knowledge. Government may follow the transaction of investors with algorithms and determine attendees for educational programs.

Because of not to exceed the scope of the study, four of the oscillators are tested. Testing other indicators and oscillators on ISE-100, other markets and stocks could be conducted in the future studies. These studies help new investors on markets to make profit on their investments.

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Oct02-2001	78.44	76.31	86.74	-10.43	-9.09	-1.34	BUY		FIRST BUY	-15.6%	14			1		0.94
Sep13-2001	84.66	96.63	95.90	0.73	1.24	-0.50		SELL								0.94
Sep11-2001	92.96	97.95	96.44	1.51	1.16	0.35		SELL	FIRST SELL	-7.5%	11		1			0.94
Aug28-2001	102.39	96.60	97.37	-0.78	-1.21	0.43	BUY									1.02
Aug27-2001	102.94	95.90	97.30	-1.40	-1.02	-0.38	BUY									1.02
Aug24-2001	100.50	95.14	97.06	-1.92	-0.71	-1.21	BUY		FIRST BUY	12.7%	8			1		1.02
Aug15-2001	92.34	96.16	95.23	0.94	1.02	-0.09		SELL								1.02
Aug14-2001	89.20	96.66	95.32	1.34	0.75	0.60		SELL	FIRST SELL	-23.3%	46		1			1.02
Jul26-2001	98.57	93.83	101.77	-7.94	-8.00	0.06	BUY									1.33
Jul25-2001	95.35	93.51	102.14	-8.64	-7.71	-0.92	BUY									1.33
Jul24-2001	101.01	93.94	102.63	-8.69	-7.27	-1.42	BUY									1.33
Jul05-2001	111.76	110.96	113.20	-2.24	-1.93	-0.31	BUY									1.33
Jun29-2001	112.04	111.63	113.21	-1.58	-1.54	-0.03	BUY									1.33
Jun28-2001	110.85	111.70	113.37	-1.67	-1.49	-0.18	BUY									1.33
Jun13-2001	112.84	114.32	117.84	-3.52	-3.72	0.20	BUY									1.33
Jun11-2001	116.36	114.72	118.69	-3.97	-3.10	-0.86	BUY		FIRST BUY	-1.2%	21			1		1.33
May15-2001	115.72	122.02	107.63	14.39	15.72	-1.33		SELL								1.33
May14-2001	118.96	122.68	106.35	16.34	15.54	0.80		SELL								1.33
May11-2001	117.79	121.84	105.02	16.82	15.01	1.81		SELL	FIRST SELL	32.6%	48	1				1.33
Apr12-2001	90.26	81.36	83.92	-2.56	-3.03	0.47	BUY									1.00
Apr11-2001	86.58	80.47	83.83	-3.36	-3.00	-0.37	BUY									1.00
Apr10-2001	83.12	80.20	83.83	-3.64	-2.94	-0.70	BUY									1.00
Apr02-2001	78.56	82.07	84.01	-1.93	-2.09	0.15	BUY									1.00
Mar30-2001	80.23	82.63	84.90	-2.27	-2.11	-0.15	BUY									1.00
Mar01-2001	94.07	88.77	95.64	-6.88	-7.51	0.64	BUY									1.00
Feb28-2001	87.92	88.75	96.21	-7.46	-7.31	-0.16	BUY									1.00
Feb27-2001	86.66	88.98	97.01	-8.03	-7.04	-0.99	BUY									1.00
Feb26-2001	88.80	89.72	97.95	-8.23	-6.72	-1.51	BUY		FIRST BUY	-18.9%	28			1		1.00
Jan26-2001	107.43	109.18	103.10	6.08	6.93	-0.84		SELL								1.00
Jan25-2001	109.80	109.85	102.43	7.42	6.89	0.53		SELL								1.00
Jan17-2001	109.45	104.90	99.17	5.73	3.68	2.05		SELL	FIRST SELL							1.00

Appendix 2. Buy and Sell Levels of Momentum Method

Date	Close Price	40-Day Momentum	Average of extreme momentum levels	Buy Signals	Sell Signals	FIRST BUY and FIRST SELL signal	Price changes between buy and sell signals	Days between buy and sell signals	Buy signal with successful result	Buy signal with unsuccessful result	Sell signal with successful result	Sell signal with unsuccessful result	Return
Dec302020	1.479,91	268,40	157,38		SELL								10,40
Dec292020	1.459,69	249,28	154,14		SELL								10,40
Dec282020	1.439,29	233,92	153,22		SELL								10,40
Dec252020	1.426,03	233,30	152,25		SELL								10,40
Dec242020	1.426,00	245,57	149,23		SELL								10,40
Dec232020	1.417,66	228,37	149,53		SELL								10,40
Dec222020	1.404,97	230,27	150,09		SELL								10,40
Dec212020	1.384,43	206,08	151,06		SELL								10,40
Dec182020	1.408,32	242,62	151,34		SELL								10,40
Dec172020	1.399,36	248,87	151,15		SELL								10,40
Dec162020	1.392,45	240,04	151,59		SELL								10,40
Dec152020	1.395,40	241,69	151,24		SELL								10,40
Dec142020	1.388,55	227,84	149,76		SELL								10,40
Dec112020	1.370,70	225,67	148,44		SELL								10,40
Dec102020	1.353,36	209,85	147,61		SELL								10,40
Dec092020	1.350,32	205,08	147,33		SELL								10,40
Dec082020	1.339,89	216,64	147,51		SELL								10,40
Dec072020	1.329,90	208,73	147,83		SELL								10,40
Dec042020	1.330,87	206,70	147,88		SELL								10,40
Dec032020	1.330,85	211,29	146,91		SELL								10,40
Dec022020	1.325,49	222,84	146,91		SELL								10,40
Dec012020	1.325,29	229,13	145,78		SELL								10,40
Nov302020	1.283,58	196,55	145,53		SELL								10,40
Nov272020	1.328,73	216,77	144,11		SELL								10,40
Nov262020	1.342,49	231,83	145,08		SELL								10,40
Nov252020	1.325,47	218,36	146,56		SELL								10,40
Nov242020	1.320,98	209,74	148,59		SELL								10,40
Nov232020	1.314,25	206,96	149,53		SELL								10,40
Nov202020	1.323,95	221,25	149,62		SELL								10,40
Nov192020	1.313,02	213,96	149,48		SELL								10,40
Nov182020	1.294,72	195,04	149,72		SELL								10,40
Nov172020	1.259,72	170,12	149,98		SELL								10,40
Nov162020	1.292,99	196,18	150,19		SELL								10,40
Nov132020	1.291,29	204,97	150,55		SELL								10,40
Nov122020	1.271,75	195,41	151,75		SELL								10,40
Nov112020	1.279,22	195,31	151,33		SELL								10,40
Nov102020	1.243,00	157,81	151,61		SELL								10,40
Nov092020	1.231,54	152,93	151,01		SELL								10,40
Oct152020	1.180,43	119,84	149,45		SELL								10,40
Oct142020	1.189,29	154,89	149,45		SELL								10,40
Jul292020	1.135,55	137,87	141,22		SELL								10,40
Jul282020	1.152,70	160,77	141,51		SELL								10,40
Jul272020	1.195,67	194,08	141,32		SELL								10,40
Jul242020	1.192,02	195,86	142,12		SELL								10,40
Jul232020	1.190,31	212,39	141,76		SELL								10,40
Jul222020	1.180,80	202,35	140,78		SELL								10,40
Jul212020	1.180,42	196,43	139,46		SELL								10,40
Jul202020	1.192,81	207,10	138,63		SELL								10,40
Jul172020	1.187,86	200,48	138,35		SELL								10,40
Jul162020	1.188,08	199,66	138,64		SELL								10,40
Jul142020	1.177,41	166,31	138,96		SELL								10,40
Jul132020	1.183,99	168,04	139,01		SELL								10,40
Jul102020	1.148,09	141,02	138,04		SELL								10,40
Jul092020	1.157,94	145,27	138,04		SELL								10,40
Jul082020	1.187,13	199,54	136,92		SELL								10,40
Jul072020	1.193,39	211,68	136,66		SELL								10,40
Jul062020	1.184,85	208,66	135,25		SELL								10,40
Jul032020	1.157,48	168,02	136,22		SELL								10,40
Jul022020	1.169,08	187,28	138,36		SELL								10,40
Jul012020	1.153,15	190,66	140,39		SELL								10,40
Jun302020	1.165,25	206,70	141,40		SELL								10,40
Jun292020	1.158,43	172,93	141,98		SELL								10,40
Jun262020	1.146,68	182,69	142,20		SELL								10,40
Jun252020	1.141,39	176,68	142,76		SELL								10,40
Jun242020	1.144,49	186,15	143,94		SELL								10,40
Jun232020	1.153,39	221,14	144,16		SELL								10,40
Jun222020	1.151,90	228,08	144,08		SELL								10,40
Jun192020	1.136,12	215,41	144,93		SELL								10,40
Jun182020	1.124,95	229,42	144,51		SELL								10,40
Jun172020	1.109,40	214,29	144,73		SELL								10,40
Jun162020	1.109,40	218,55	144,13		SELL								10,40
Jun152020	1.095,56	199,12	144,65		SELL								10,40
Jun122020	1.098,35	217,76	144,65		SELL								10,40
Jun112020	1.091,55	210,30	144,65		SELL								10,40
Jun102020	1.097,79	182,51	144,65		SELL								10,40

Feb092018	1.135,90	100,31	104,24	SELL								10,46
Feb082018	1.142,64	102,80	102,70	SELL								10,46
Feb072018	1.155,70	132,28	103,09	SELL								10,46
Feb062018	1.154,57	133,89	103,25	SELL								10,46
Feb052018	1.168,53	120,93	104,99	SELL								10,46
Feb022018	1.181,19	135,80	105,76	SELL								10,46
Feb012018	1.190,44	140,18	106,07	SELL								10,46
Jan312018	1.195,29	135,65	106,07	SELL								10,46
Jan302018	1.193,03	140,35	106,30	SELL								10,46
Jan292018	1.208,45	169,33	106,77	SELL								10,46
Jan262018	1.207,02	144,63	104,77	SELL								10,46
Jan252018	1.186,04	116,27	103,62	SELL								10,46
Jan242018	1.196,48	119,31	103,08	SELL								10,46
Jan232018	1.184,00	82,52	102,93	SELL								10,46
Jan222018	1.172,35	83,75	103,33	SELL								10,46
Jan052018	1.166,38	87,54	107,70	SELL								10,46
Jan022018	1.175,24	103,18	109,16	SELL								10,46
Sep122017	1.091,30	86,90	105,82	SELL								10,46
Sep112017	1.094,58	92,68	106,05	SELL								10,46
Sep072017	1.097,43	101,04	105,75	SELL								10,46
Sep062017	1.096,12	95,40	105,87	SELL								10,46
Sep052017	1.088,73	94,83	105,33	SELL								10,46
Aug312017	1.100,10	107,41	105,99	SELL								10,46
Aug292017	1.104,23	110,91	106,17	SELL								10,46
Aug282017	1.103,40	121,47	106,99	SELL								10,46
Aug252017	1.097,55	110,18	106,97	SELL								10,46
Aug242017	1.091,54	95,18	107,41	SELL								10,46
Aug232017	1.089,53	96,53	107,78	SELL								10,46
Aug222017	1.085,94	91,52	108,35	SELL								10,46
Aug212017	1.086,15	96,72	108,85	SELL								10,46
Aug182017	1.072,02	92,24	108,85	SELL								10,46
Aug172017	1.068,25	92,08	109,12	SELL								10,46
Aug142017	1.095,37	106,69	109,12	SELL								10,46
Aug112017	1.069,63	95,97	109,16	SELL								10,46
Aug102017	1.078,00	102,58	110,80	SELL								10,46
Aug092017	1.087,15	113,67	110,58	SELL								10,46
Aug082017	1.096,39	119,13	110,58	SELL								10,46
Aug072017	1.097,81	122,48	111,28	SELL								10,46
Aug042017	1.085,45	108,32	111,28	SELL								10,46
Aug012017	1.061,47	97,47	111,38	SELL								10,46
Jul312017	1.075,31	123,84	111,38	SELL								10,46
Jul282017	1.077,00	119,75	111,20	SELL								10,46
Jul272017	1.083,92	122,30	112,02	SELL								10,46
Jul262017	1.072,06	116,18	112,06	SELL								10,46
Jul252017	1.070,41	120,45	111,28	SELL								10,46
Jul242017	1.067,11	115,97	111,59	SELL								10,46
Jul212017	1.068,43	106,49	112,05	SELL								10,46
Jul202017	1.067,36	114,13	112,76	SELL								10,46
Jul192017	1.074,18	135,85	112,58	SELL								10,46
Jul182017	1.057,18	117,90	113,09	SELL								10,46
Jul172017	1.062,17	131,79	112,02	SELL								10,46
Jul142017	1.051,76	113,13	111,90	SELL								10,46
Jul132017	1.042,10	98,54	113,31	SELL								10,46

May232013	913,51	87,32	75,59	SELL			4,89
May222013	931,79	98,31	75,11	SELL			4,89
May212013	911,91	80,71	75,11	SELL			4,89
May202013	901,65	66,23	73,59	SELL			4,89
May172013	919,25	100,90	72,70	SELL			4,89
May162013	919,47	97,73	72,70	SELL			4,89
May152013	921,12	110,61	72,24	SELL			4,89
May142013	912,87	106,75	71,87	SELL			4,89
May132013	897,65	98,97	71,81	SELL			4,89
May102013	895,69	102,35	71,81	SELL			4,89
May092013	899,31	117,65	72,71	SELL			4,89
May082013	908,52	133,38	73,05	SELL			4,89
May072013	894,59	127,89	73,18	SELL			4,89
May062013	897,15	138,16	73,70	SELL			4,89
May032013	890,94	118,25	73,61	SELL			4,89
May022013	886,70	97,79	75,20	SELL			4,89
Apr302013	860,46	77,71	74,79	SELL			4,89
Apr292013	851,54	72,46	73,91	SELL			4,89
Apr262013	851,12	70,31	73,79	SELL			4,89
Apr252013	849,43	73,63	72,67	SELL			4,89
Apr242013	847,80	68,37	72,34	SELL			4,89
Apr222013	840,23	59,44	72,44	SELL			4,89
Apr192013	832,85	60,29	72,30	SELL			4,89
Apr172013	843,98	62,49	73,68	SELL			4,89
Feb062013	800,54	80,80	81,72	SELL			4,89
Feb052013	803,10	83,10	81,72	SELL			4,89
Feb042013	807,23	88,56	81,72	SELL			4,89
Feb012013	802,22	92,18	81,72	SELL			4,89
Jan312013	787,83	88,57	81,72	SELL			4,89
Jan302013	789,83	85,22	81,72	SELL			4,89
Jan292013	821,78	115,41	81,72	SELL			4,89
Jan282013	811,66	105,59	81,72	SELL			4,89
Jan252013	847,55	139,64	81,61	SELL			4,89
Jan242013	864,38	148,41	81,61	SELL			4,89
Jan232013	863,41	150,15	81,61	SELL			4,89
Jan222013	856,47	136,32	81,06	SELL			4,89
Jan212013	852,82	139,25	81,06	SELL			4,89
Jan182013	850,05	131,85	80,69	SELL			4,89
Jan172013	848,60	122,10	80,34	SELL			4,89
Jan162013	840,82	124,77	80,01	SELL			4,89
Jan152013	824,06	103,66	79,01	SELL			4,89
Jan142013	819,90	92,53	79,01	SELL			4,89
Jan112013	810,34	96,11	79,01	SELL			4,89
Jan102013	808,37	82,84	78,43	SELL			4,89
Jan092013	811,49	86,20	78,43	SELL			4,89
Jan082013	801,62	84,45	78,41	SELL			4,89
Jan072013	802,24	95,16	78,41	SELL			4,89
Jan042013	795,64	88,02	77,69	SELL			4,89
Jan032013	800,33	88,14	77,87	SELL			4,89
Jan022013	796,42	88,68	76,47	SELL			4,89
Dec312012	782,08	78,52	75,88	SELL			4,89
Dec282012	785,79	78,92	75,40	SELL			4,89
Dec272012	784,54	81,72	75,40	SELL			4,89
Dec262012	779,91	82,21	73,88	SELL			4,89
Dec252012	775,96	79,93	72,99	SELL			4,89
Dec242012	773,14	77,36	72,99	SELL			4,89
Dec212012	766,85	82,27	72,53	SELL			4,89
Dec202012	768,14	87,51	72,16	SELL			4,89
Dec192012	768,10	93,75	72,10	SELL			4,89
Dec182012	772,98	99,14	72,10	SELL			4,89
Dec172012	774,67	105,58	73,00	SELL			4,89
Dec142012	762,93	94,71	73,34	SELL			4,89
Dec132012	769,63	94,65	73,47	SELL			4,89
Dec122012	774,04	106,49	73,18	SELL			4,89
Dec112012	768,15	104,18	73,08	SELL			4,89
Dec102012	767,34	99,63	74,29	SELL			4,89
Dec072012	762,42	95,66	74,02	SELL			4,89
Dec062012	757,86	79,76	73,14	SELL			4,89
Dec052012	760,38	88,31	74,41	SELL			4,89
Dec042012	755,23	76,32	73,86	SELL			4,89
Dec032012	742,99	72,97	73,97	SELL			4,89
Nov082012	726,50	67,08	82,65	SELL			4,89
Nov012012	725,53	76,37	87,13	SELL			4,89
Oct312012	725,29	79,17	88,48	SELL			4,89
Oct302012	717,17	75,56	89,92	SELL			4,89
Sep102012	681,22	72,99	87,23	SELL			4,89
Sep062012	677,15	75,88	87,23	SELL			4,89
Sep052012	675,59	80,80	87,23	SELL			4,89
Aug312012	673,68	79,67	88,31	SELL			4,89

Aug282012	661,39	78,14	88,31	SELL								4,89
Aug272012	659,42	74,74	88,31	SELL								4,89
Aug242012	656,54	72,89	88,31	SELL								4,89
Aug232012	660,79	78,29	88,31	SELL								4,89
Aug222012	661,09	79,08	87,98	SELL								4,89
Aug172012	657,58	82,53	87,90	SELL								4,89
Aug162012	649,16	76,16	87,90	SELL								4,89
Aug152012	646,12	79,16	87,90	SELL								4,89
Aug142012	641,61	79,13	87,31	SELL								4,89
Aug132012	651,49	93,49	87,31	SELL								4,89
Aug102012	651,26	93,82	87,30	SELL								4,89
Aug092012	645,01	89,33	87,30	SELL								4,89
Aug082012	646,99	96,00	86,58	SELL								4,89
Aug072012	649,38	98,13	86,76	SELL								4,89
Aug062012	655,77	101,27	85,36	SELL								4,89
Aug032012	653,04	104,60	84,77	SELL								4,89
Aug022012	637,78	89,68	84,28	SELL								4,89
Aug012012	640,81	91,64	84,28	SELL								4,89
Jul312012	642,60	85,26	82,77	SELL								4,89
Jul302012	650,32	79,53	81,87	SELL								4,89
Jul272012	643,73	78,33	81,87	SELL								4,89
Jul262012	638,41	69,05	81,41	SELL	FIRST SELL	16,4%	43	1				4,89
May282012	548,44	-74,92	92,65	BUY	FIRST BUY	-7,4%	81			1		4,20
Apr032012	632,85	83,66	86,03	SELL								4,20
Apr022012	629,69	81,78	86,03	SELL								4,20
Mar302012	624,23	72,37	86,03	SELL								4,20
Mar282012	618,15	72,07	85,62	SELL								4,20
Mar272012	624,91	81,06	85,62	SELL								4,20
Mar262012	625,61	90,32	85,62	SELL								4,20
Mar232012	614,17	86,20	85,04	SELL								4,20
Mar222012	617,87	102,25	85,04	SELL								4,20
Mar212012	620,65	99,11	85,02	SELL								4,20
Mar202012	621,64	107,54	85,02	SELL								4,20
Mar192012	625,37	117,55	84,16	SELL								4,20
Mar162012	623,36	124,99	83,84	SELL								4,20
Mar152012	612,79	110,96	82,06	SELL								4,20
Mar142012	608,36	96,31	81,47	SELL								4,20
Mar132012	593,89	78,56	80,99	SELL								4,20
Mar092012	592,80	79,39	80,58	SELL								4,20
Mar082012	596,74	84,07	79,69	SELL								4,20
Mar072012	594,80	74,26	79,69	SELL								4,20
Mar062012	591,43	75,90	80,10	SELL								4,20
Mar052012	596,85	71,24	79,74	SELL								4,20
Mar022012	609,02	83,85	79,68	SELL								4,20
Mar012012	607,26	87,77	79,03	SELL								4,20
Feb292012	607,21	91,29	79,45	SELL								4,20
Feb282012	599,78	82,31	79,88	SELL								4,20
Feb272012	588,22	66,95	80,09	SELL								4,20
Feb242012	597,38	89,96	79,79	SELL								4,20
Feb232012	596,67	80,01	79,79	SELL								4,20
Feb222012	608,56	89,70	81,00	SELL								4,20
Feb212012	612,53	99,14	80,73	SELL								4,20
Feb202012	614,49	88,97	79,86	SELL								4,20
Feb172012	611,11	86,67	81,13	SELL								4,20
Feb082012	611,78	73,71	81,86	SELL								4,20
Feb062012	606,75	85,82	80,87	SELL								4,20
Feb032012	601,48	78,64	81,63	SELL								4,20
Feb022012	600,52	89,81	81,63	SELL								4,20
Feb012012	592,16	95,94	82,02	SELL	FIRST SELL	-2,8%	159	1				4,20
Dec232011	519,49	-74,71	87,87	BUY								4,33
Dec222011	515,92	-70,72	87,58	BUY								4,33
Dec142011	513,39	-81,21	84,25	BUY								4,33
Dec132011	525,52	-71,41	84,25	BUY								4,33
Dec122011	524,44	-73,14	84,25	BUY								4,33
Dec012011	538,07	-70,82	84,84	BUY								4,33
Nov242011	496,22	-70,29	84,92	BUY								4,33
Sep232011	563,23	-69,38	83,80	BUY								4,33
Sep152011	571,16	-67,50	84,17	BUY								4,33
Sep142011	561,22	-80,65	83,98	BUY								4,33
Sep122011	556,05	-76,64	84,74	BUY								4,33
Sep092011	559,03	-71,00	85,13	BUY								4,33
Sep052011	540,55	-75,35	88,36	BUY								4,33
Aug292011	539,46	-80,87	88,86	BUY								4,33
Aug262011	537,08	-73,00	89,97	BUY								4,33
Aug252011	529,68	-87,49	89,97	BUY								4,33
Aug242011	530,55	-80,62	90,62	BUY								4,33
Aug232011	524,11	-85,28	91,67	BUY								4,33
Aug222011	532,87	-88,99	93,47	BUY								4,33
Aug192011	530,62	-104,61	93,55	BUY								4,33

Aug182011	519,46	-117,54	93,55	BUY									4,33
Aug172011	542,18	-94,52	93,13	BUY									4,33
Aug162011	540,97	-99,70	92,75	BUY									4,33
Aug152011	534,85	-109,78	91,75	BUY									4,33
Aug122011	521,89	-113,28	91,46	BUY									4,33
Aug112011	520,17	-107,90	90,95	BUY									4,33
Aug102011	503,08	-128,05	90,56	BUY									4,33
Aug092011	529,61	-102,64	89,24	BUY									4,33
Aug082011	522,84	-107,62	88,99	BUY									4,33
Jul142011	627,44	-66,31	81,38	BUY									4,33
Jul122011	626,90	-73,82	81,38	BUY									4,33
Jul112011	629,09	-66,13	81,74	BUY									4,33
Jun222011	612,18	-69,85	81,38	BUY									4,33
Jun202011	610,08	-71,87	81,59	BUY									4,33
Jun162011	611,17	-83,73	82,44	BUY									4,33
Jun152011	609,39	-77,10	82,11	BUY	FIRST BUY	-13,0%	30		1				4,33
May102011	672,60	85,96	80,02	SELL									4,33
May092011	679,56	92,47	79,49	SELL									4,33
May062011	682,41	69,57	78,74	SELL									4,33
May052011	693,75	80,08	78,02	SELL									4,33
May042011	694,38	86,77	79,29	SELL									4,33
May032011	700,72	69,40	78,74	SELL	FIRST SELL	19,4%	45		1				4,33
Mar022011	586,64	-75,55	80,84	BUY									3,62
Mar012011	587,09	-67,31	80,43	BUY	FIRST BUY	90,9%	461				1		3,62
Nov252010	671,49	65,41	79,24	SELL									3,62
Nov242010	672,31	64,84	80,83	SELL									3,62
Nov222010	679,26	69,27	81,03	SELL									3,62
Nov152010	699,98	91,32	81,22	SELL									3,62
Nov122010	695,53	88,67	81,22	SELL									3,62
Nov112010	700,85	101,12	81,22	SELL									3,62
Nov102010	705,61	112,15	81,39	SELL									3,62
Nov092010	715,43	124,85	81,89	SELL									3,62
Nov082010	709,41	126,55	83,05	SELL									3,62
Nov052010	707,79	121,56	83,05	SELL									3,62
Nov042010	709,05	120,15	83,05	SELL									3,62
Nov032010	686,05	98,55	82,63	SELL									3,62
Nov022010	685,22	96,73	82,25	SELL									3,62
Nov012010	690,74	96,31	81,25	SELL									3,62
Oct282010	687,60	92,97	80,96	SELL									3,62
Oct272010	685,89	97,66	80,44	SELL									3,62
Oct262010	707,47	122,67	80,05	SELL									3,62
Oct252010	709,24	125,40	79,76	SELL									3,62
Oct222010	710,07	128,52	79,51	SELL									3,62
Oct212010	704,50	112,80	78,19	SELL									3,62
Oct202010	693,65	94,79	77,94	SELL									3,62
Oct192010	698,39	100,86	78,35	SELL									3,62
Oct182010	704,58	108,55	78,46	SELL									3,62
Oct152010	701,01	102,20	79,00	SELL									3,62
Oct142010	692,26	91,48	78,34	SELL									3,62
Oct132010	701,67	94,74	77,93	SELL									3,62
Oct122010	696,75	98,08	77,64	SELL									3,62
Oct112010	690,00	82,63	76,95	SELL									3,62
Oct082010	672,17	68,13	76,76	SELL									3,62
Oct072010	667,59	64,30	75,26	SELL									3,62
Oct062010	668,80	73,72	75,26	SELL									3,62
Oct052010	662,83	69,83	75,26	SELL									3,62
Sep302010	657,74	75,46	74,82	SELL									3,62
Sep292010	655,51	74,37	73,94	SELL									3,62
Sep282010	655,90	78,61	73,94	SELL									3,62
Sep272010	646,27	69,37	72,83	SELL									3,62
Sep242010	642,41	59,40	73,20	SELL									3,62
Sep232010	641,93	59,14	72,84	SELL									3,62
Sep222010	644,79	69,09	73,04	SELL									3,62
Sep212010	641,25	69,74	73,04	SELL									3,62
Sep202010	642,90	69,44	73,04	SELL									3,62
Sep172010	638,62	70,63	73,12	SELL									3,62
Sep162010	637,33	69,45	73,12	SELL									3,62
Sep152010	633,98	76,83	73,12	SELL									3,62
Sep142010	624,79	68,43	73,12	SELL									3,62
Sep132010	622,60	77,26	72,21	SELL									3,62
Aug022010	606,93	84,36	76,07	SELL									3,62
Jul292010	607,37	66,25	74,58	SELL									3,62
Jul282010	604,04	59,54	74,11	SELL									3,62
May132010	579,30	64,89	78,12	SELL									3,62
May122010	579,76	62,77	78,12	SELL									3,62
May062010	557,64	70,25	76,80	SELL									3,62
May052010	564,41	67,81	76,80	SELL									3,62
Apr292010	587,03	62,53	75,90	SELL									3,62
Apr272010	582,17	64,68	75,90	SELL									3,62

Apr262010	590,43	77,09	75,98	SELL							3,62
Apr222010	583,38	72,74	75,98	SELL							3,62
Apr212010	584,51	70,70	75,98	SELL							3,62
Apr202010	588,86	83,18	75,98	SELL							3,62
Apr192010	581,53	73,27	75,06	SELL							3,62
Apr162010	582,24	82,91	75,31	SELL							3,62
Apr152010	590,55	76,00	75,67	SELL							3,62
Feb042010	534,64	79,51	84,86	SELL							3,62
Feb032010	550,69	92,68	86,45	SELL							3,62
Feb022010	551,48	99,17	86,06	SELL							3,62
Feb012010	555,26	94,11	86,06	SELL							3,62
Jan292010	546,51	82,31	86,25	SELL							3,62
Jan282010	547,70	75,27	86,25	SELL							3,62
Jan212010	553,01	71,66	88,08	SELL							3,62
Jan202010	554,69	76,94	88,08	SELL							3,62
Jan192010	551,60	81,90	87,72	SELL							3,62
Jan182010	545,51	72,53	87,34	SELL							3,62
Jan142010	547,41	84,06	86,85	SELL							3,62
Jan132010	546,27	71,71	86,61	SELL							3,62
Oct262009	512,30	69,27	76,89	SELL							3,62
Oct232009	513,81	68,97	77,00	SELL							3,62
Oct222009	510,17	71,27	76,45	SELL							3,62
Oct212009	512,95	76,16	76,45	SELL							3,62
Oct202009	510,51	63,65	76,76	SELL							3,62
Oct152009	510,18	71,19	76,45	SELL							3,62
Oct142009	510,26	63,29	75,37	SELL							3,62
Oct122009	510,03	83,62	75,55	SELL							3,62
Oct092009	502,18	80,36	76,01	SELL							3,62
Oct082009	498,80	95,03	75,35	SELL							3,62
Oct072009	490,36	90,34	75,64	SELL							3,62
Oct062009	494,66	96,25	75,12	SELL							3,62
Oct052009	479,48	85,53	75,30	SELL							3,62
Oct022009	468,57	79,55	75,31	SELL							3,62
Oct012009	478,04	96,15	76,70	SELL							3,62
Sep302009	479,10	99,02	77,27	SELL							3,62
Sep292009	483,65	101,15	78,44	SELL							3,62
Sep282009	478,16	100,89	80,63	SELL							3,62
Sep252009	476,25	94,69	80,36	SELL							3,62
Sep242009	479,80	100,66	81,46	SELL							3,62
Sep232009	475,49	108,48	81,87	SELL							3,62
Sep182009	471,61	101,56	83,00	SELL							3,62
Sep172009	469,66	101,86	82,70	SELL							3,62
Sep162009	466,81	96,93	82,89	SELL							3,62
Sep152009	459,11	87,55	82,89	SELL							3,62
Sep142009	464,91	92,79	82,89	SELL							3,62
Sep112009	465,83	98,24	82,98	SELL							3,62
Sep102009	449,24	81,26	83,21	SELL							3,62
Sep092009	445,85	75,47	84,66	SELL							3,62
Sep082009	448,46	76,00	86,24	SELL							3,62
Sep072009	452,74	83,25	85,85	SELL							3,62
Sep042009	451,61	83,20	85,85	SELL							3,62
Sep032009	461,46	93,90	86,04	SELL							3,62
Sep022009	457,61	94,33	86,04	SELL							3,62
Sep012009	469,36	111,77	86,04	SELL							3,62
Aug312009	465,51	116,42	86,04	SELL							3,62
Aug282009	475,60	121,53	86,31	SELL							3,62
Aug272009	473,84	115,64	87,22	SELL							3,62
Aug262009	469,60	112,44	87,22	SELL							3,62
Aug252009	480,73	134,78	87,22	SELL							3,62
Aug242009	477,72	132,35	86,20	SELL							3,62
Aug212009	471,70	124,79	85,82	SELL							3,62
Aug202009	465,56	117,39	85,04	SELL							3,62
Aug192009	456,45	109,21	85,33	SELL							3,62
Aug182009	442,33	98,44	85,09	SELL							3,62
Aug172009	442,91	104,84	84,84	SELL							3,62
Aug142009	443,03	106,47	84,55	SELL							3,62
Aug132009	444,84	97,34	83,30	SELL							3,62
Aug122009	438,90	96,21	81,98	SELL							3,62
Aug112009	436,79	87,47	81,87	SELL							3,62
Aug102009	446,86	89,64	82,29	SELL							3,62
Aug072009	447,68	87,66	82,61	SELL							3,62
Aug062009	438,36	88,33	82,73	SELL							3,62
Aug052009	438,99	88,78	82,08	SELL							3,62
Aug042009	446,97	95,28	81,39	SELL							3,62
Aug032009	446,14	97,53	80,79	SELL							3,62
Jul312009	426,41	72,33	80,79	SELL							3,62
Jul302009	421,82	71,68	80,59	SELL							3,62
Jul202009	382,50	60,47	74,71	SELL							3,62
Jul092009	369,88	62,42	73,63	SELL							3,62

Jul082009	371,56	79,67	73,28	SELL								3,62
Jul072009	372,12	76,60	73,28	SELL								3,62
Jul062009	367,59	70,83	73,28	SELL								3,62
Jul032009	367,98	78,41	72,36	SELL								3,62
Jul022009	370,38	83,59	72,61	SELL								3,62
Jul012009	372,46	86,98	73,08	SELL								3,62
Jun302009	369,49	75,03	71,81	SELL								3,62
Jun292009	368,41	73,18	71,67	SELL								3,62
Jun262009	367,56	84,32	71,81	SELL								3,62
Jun252009	363,28	81,67	71,88	SELL								3,62
Jun242009	357,59	73,12	72,74	SELL								3,62
Jun232009	349,09	60,71	72,74	SELL								3,62
Jun222009	354,07	68,61	72,74	SELL								3,62
Jun192009	358,20	81,66	71,98	SELL								3,62
Jun182009	357,16	93,38	72,39	SELL								3,62
Jun172009	345,95	79,44	72,87	SELL								3,62
Jun162009	345,37	79,06	72,40	SELL								3,62
Jun152009	346,91	79,20	72,40	SELL								3,62
Jun122009	348,17	88,73	72,96	SELL								3,62
Jun112009	347,24	89,59	73,33	SELL								3,62
Jun102009	343,89	92,45	74,04	SELL								3,62
Jun092009	338,07	81,10	74,04	SELL								3,62
Jun082009	336,56	82,46	74,20	SELL								3,62
Jun052009	347,50	92,14	75,07	SELL								3,62
Jun042009	342,69	92,67	75,37	SELL								3,62
Jun032009	349,32	100,13	75,48	SELL								3,62
Jun022009	357,22	116,83	74,93	SELL								3,62
Jun012009	360,02	120,33	75,01	SELL								3,62
May292009	350,03	115,06	75,34	SELL								3,62
May282009	350,21	115,68	75,95	SELL								3,62
May272009	351,69	115,49	74,95	SELL								3,62
May262009	348,61	112,46	75,03	SELL								3,62
May252009	354,08	118,69	73,95	SELL								3,62
May222009	350,14	117,31	73,68	SELL								3,62
May212009	347,21	114,06	74,13	SELL								3,62
May202009	351,40	120,85	74,59	SELL								3,62
May182009	336,66	104,46	73,93	SELL								3,62
May152009	334,85	104,49	74,64	SELL								3,62
May142009	330,95	91,54	74,11	SELL								3,62
May132009	328,29	90,77	74,46	SELL								3,62
May122009	330,43	93,43	75,06	SELL								3,62
May112009	322,03	81,76	76,56	SELL								3,62
May082009	328,06	86,37	77,12	SELL								3,62
May072009	328,43	86,91	78,30	SELL								3,62
May062009	337,17	96,85	80,63	SELL								3,62
May052009	330,14	90,23	80,37	SELL								3,62
May042009	321,71	85,92	81,03	SELL								3,62
Apr302009	316,52	72,12	81,44	SELL								3,62
Apr292009	307,46	69,01	82,57	SELL	FIRST SELL	-2,6%	140			1		3,62
Dec182008	263,95	-81,58	72,75	BUY								3,72
Dec172008	267,65	-92,86	72,85	BUY								3,72
Dec162008	263,96	-101,61	72,85	BUY								3,72
Dec152008	255,98	-107,64	73,59	BUY								3,72
Dec122008	249,37	-102,40	75,62	BUY								3,72
Dec052008	240,35	-114,19	75,69	BUY								3,72
Dec042008	246,71	-115,13	76,24	BUY								3,72
Dec032008	239,37	-124,33	77,29	BUY								3,72
Dec022008	244,25	-77,91	78,11	BUY								3,72
Dec012008	243,32	-83,96	78,63	BUY								3,72
Nov282008	257,15	-80,21	79,08	BUY								3,72
Nov272008	253,83	-96,98	79,27	BUY								3,72
Nov262008	244,09	-126,25	79,27	BUY								3,72
Nov252008	244,25	-129,63	79,27	BUY								3,72
Nov242008	241,37	-151,58	79,12	BUY								3,72
Nov212008	219,66	-181,59	79,12	BUY								3,72
Nov202008	212,28	-192,89	78,94	BUY								3,72
Nov192008	219,29	-171,87	78,15	BUY								3,72
Nov182008	234,95	-160,61	78,15	BUY								3,72
Nov172008	240,47	-162,82	78,15	BUY								3,72
Nov142008	254,25	-150,12	78,15	BUY								3,72
Nov132008	251,00	-143,57	78,15	BUY								3,72
Nov122008	253,43	-145,01	78,15	BUY								3,72
Nov112008	258,89	-142,61	78,15	BUY								3,72
Nov102008	267,98	-127,78	78,15	BUY								3,72
Nov072008	266,48	-134,49	78,44	BUY								3,72
Nov062008	273,74	-133,18	77,90	BUY								3,72
Nov052008	278,56	-130,38	76,80	BUY								3,72
Nov042008	293,43	-102,27	76,80	BUY								3,72
Nov032008	279,88	-118,13	76,02	BUY								3,72

Oct312008	278,33	-126,55	76,26	BUY								3,72
Oct302008	267,33	-152,14	76,02	BUY								3,72
Oct282008	248,95	-172,99	75,77	BUY								3,72
Oct272008	243,37	-173,74	75,48	BUY								3,72
Oct242008	241,77	-170,77	74,24	BUY								3,72
Oct232008	250,41	-164,21	72,48	BUY								3,72
Oct222008	256,24	-161,09	72,14	BUY								3,72
Oct212008	267,23	-142,27	72,14	BUY								3,72
Oct202008	267,64	-148,64	72,35	BUY								3,72
Oct172008	258,70	-162,06	71,25	BUY								3,72
Oct162008	276,01	-146,37	70,28	BUY								3,72
Oct152008	294,44	-138,15	69,59	BUY								3,72
Oct142008	305,36	-124,49	68,99	BUY								3,72
Oct132008	289,62	-132,39	68,49	BUY								3,72
Oct102008	284,96	-128,46	68,29	BUY								3,72
Oct092008	308,79	-82,75	66,43	BUY								3,72
Oct082008	307,73	-73,48	65,75	BUY								3,72
Oct072008	315,62	-59,95	65,63	BUY								3,72
Oct062008	315,75	-73,69	65,58	BUY		FIRST BUY	-22,1%	17		1		3,72
Sep102008	392,95	53,75	59,25	SELL								3,72
Sep092008	401,25	65,59	59,26	SELL								3,72
Sep082008	405,17	73,09	59,14	SELL	FIRST SELL		-22,0%	169		1		3,72
Jul252008	375,57	-49,42	59,81	BUY								4,77
Jul162008	363,74	-68,98	62,02	BUY								4,77
Jul152008	352,55	-76,41	64,05	BUY								4,77
Jul142008	358,26	-76,32	64,12	BUY								4,77
Jul112008	350,06	-84,20	64,67	BUY								4,77
Jul102008	355,75	-70,89	65,73	BUY								4,77
Jul092008	356,03	-78,65	66,55	BUY								4,77
Jul082008	348,95	-81,59	67,06	BUY								4,77
Jul072008	350,10	-86,04	67,51	BUY								4,77
Jul042008	343,00	-92,94	67,70	BUY								4,77
Jul032008	339,20	-92,70	67,70	BUY								4,77
Jul022008	335,66	-92,62	67,63	BUY								4,77
Jul012008	332,08	-98,57	67,37	BUY								4,77
Jun302008	350,90	-75,51	67,57	BUY								4,77
Jun272008	358,29	-57,73	67,45	BUY								4,77
Apr032008	401,60	-53,37	55,49	BUY								4,77
Mar312008	390,15	-55,79	55,58	BUY								4,77
Mar282008	395,01	-60,43	55,96	BUY								4,77
Mar272008	406,35	-80,22	56,66	BUY								4,77
Mar262008	406,58	-82,45	56,55	BUY								4,77
Mar252008	409,92	-81,02	56,17	BUY								4,77
Mar242008	411,44	-92,33	56,90	BUY								4,77
Mar212008	397,19	-117,62	56,97	BUY								4,77
Mar202008	398,48	-120,73	56,12	BUY								4,77
Mar192008	409,07	-114,44	55,42	BUY								4,77
Mar182008	407,20	-120,11	55,50	BUY								4,77
Mar172008	394,09	-138,27	55,83	BUY								4,77
Mar142008	425,86	-99,84	55,56	BUY								4,77
Mar132008	424,22	-101,08	54,57	BUY								4,77
Mar122008	442,48	-92,93	54,65	BUY								4,77
Mar112008	433,18	-113,90	54,22	BUY								4,77
Mar102008	415,35	-140,03	54,42	BUY								4,77
Mar072008	415,37	-141,61	54,78	BUY								4,77
Mar062008	425,24	-127,09	55,16	BUY								4,77
Mar052008	434,68	-119,05	55,32	BUY								4,77
Mar042008	429,23	-124,58	56,03	BUY								4,77
Mar032008	433,44	-121,66	55,89	BUY								4,77
Feb292008	447,77	-90,70	56,10	BUY								4,77
Feb282008	458,23	-84,01	56,69	BUY								4,77
Feb272008	462,60	-73,43	56,79	BUY								4,77
Feb262008	455,25	-93,87	56,70	BUY								4,77
Feb252008	448,95	-103,44	57,44	BUY								4,77
Feb222008	455,92	-111,74	59,47	BUY								4,77
Feb212008	464,47	-98,24	59,54	BUY								4,77
Feb202008	458,77	-106,42	60,09	BUY								4,77
Feb192008	462,49	-102,42	61,05	BUY								4,77
Feb182008	457,42	-104,45	61,87	BUY								4,77
Feb152008	443,05	-112,16	62,38	BUY								4,77
Feb142008	454,94	-85,19	62,84	BUY								4,77
Feb132008	447,52	-95,68	63,03	BUY								4,77
Feb122008	435,40	-106,74	63,03	BUY								4,77
Feb112008	413,43	-118,38	62,95	BUY								4,77
Feb082008	419,58	-112,45	62,69	BUY								4,77
Feb072008	418,66	-95,86	62,89	BUY								4,77
Feb062008	433,17	-93,65	62,77	BUY								4,77
Feb052008	443,51	-79,80	62,94	BUY								4,77
Feb042008	457,20	-64,79	63,27	BUY								4,77

Feb012008	444,52	-81,64	63,27	BUY									4,77
Jan312008	426,98	-108,80	63,36	BUY									4,77
Jan302008	443,04	-89,59	63,39	BUY									4,77
Jan292008	445,73	-97,31	63,94	BUY									4,77
Jan282008	437,07	-110,36	64,43	BUY									4,77
Jan252008	454,97	-101,68	64,43	BUY									4,77
Jan242008	450,11	-97,08	64,99	BUY									4,77
Jan232008	425,39	-115,45	64,78	BUY									4,77
Jan222008	445,94	-90,95	63,67	BUY									4,77
Jan212008	455,44	-96,17	63,67	BUY									4,77
Jan182008	486,57	-74,19	62,90	BUY									4,77
Jan172008	489,03	-80,03	63,18	BUY									4,77
Jan162008	490,94	-69,70	63,05	BUY									4,77
Jan152008	503,77	-64,78	62,91	BUY									4,77
Jan142008	514,81	-58,90	62,61	BUY									4,77
Jan112008	519,21	-56,95	61,73	BUY		FIRST BUY	22,7%	239			1		4,77
Nov202007	535,78	50,29	48,52	SELL									4,77
Nov192007	532,63	42,13	48,56	SELL									4,77
Nov162007	543,04	47,03	48,17	SELL									4,77
Nov152007	547,43	53,22	48,17	SELL									4,77
Nov142007	556,65	56,32	47,27	SELL									4,77
Nov132007	547,19	47,82	47,53	SELL									4,77
Nov122007	540,84	38,85	48,00	SELL									4,77
Nov092007	536,89	56,07	47,54	SELL									4,77
Nov082007	551,61	74,10	47,54	SELL									4,77
Nov072007	560,76	81,62	47,20	SELL									4,77
Nov062007	569,06	100,82	47,20	SELL									4,77
Nov052007	560,64	86,75	46,95	SELL									4,77
Nov022007	568,55	99,73	46,84	SELL									4,77
Nov012007	573,71	121,06	46,49	SELL									4,77
Oct312007	576,16	114,67	46,20	SELL									4,77
Oct302007	567,74	101,97	46,27	SELL									4,77
Oct262007	564,47	119,74	45,42	SELL									4,77
Oct252007	557,29	80,15	44,72	SELL									4,77
Oct242007	556,39	57,58	44,81	SELL									4,77
Oct232007	557,52	54,79	45,13	SELL									4,77
Oct222007	539,70	47,84	44,86	SELL									4,77
Oct192007	554,87	55,12	43,87	SELL									4,77
Oct182007	562,68	41,97	43,95	SELL									4,77
Oct172007	579,32	72,24	43,52	SELL									4,77
Oct162007	571,85	67,55	43,72	SELL									4,77
Oct152007	582,32	75,16	44,09	SELL									4,77
Oct112007	580,53	66,59	45,19	SELL									4,77
Oct102007	574,18	61,19	45,48	SELL									4,77
Oct092007	579,11	50,86	46,07	SELL									4,77
Oct082007	562,79	48,20	45,79	SELL									4,77
Oct052007	567,93	52,31	46,13	SELL									4,77
Sep032007	499,37	45,20	54,81	SELL									4,77
Aug312007	501,99	44,94	54,86	SELL									4,77
Aug082007	520,71	49,90	53,43	SELL									4,77
Aug072007	507,08	44,33	53,22	SELL									4,77
Aug022007	513,94	52,00	52,73	SELL									4,77
Aug012007	512,99	50,62	52,37	SELL									4,77
Jul312007	528,25	64,00	51,72	SELL									4,77
Jul302007	514,59	50,90	51,60	SELL									4,77
Jul272007	515,62	53,53	51,55	SELL									4,77
Jul262007	525,12	64,39	51,34	SELL									4,77
Jul252007	548,32	89,72	49,35	SELL									4,77
Jul242007	549,31	93,91	49,18	SELL									4,77
Jul232007	556,25	107,27	48,71	SELL									4,77
Jul202007	529,36	77,94	47,60	SELL									4,77
Jul192007	533,25	85,04	47,63	SELL									4,77
Jul182007	511,12	60,56	47,00	SELL									4,77
Jul172007	516,44	65,41	46,53	SELL									4,77
Jul162007	517,74	70,67	46,40	SELL									4,77
Jul132007	520,87	74,06	46,34	SELL									4,77
Jul122007	520,06	71,88	46,34	SELL									4,77
Jul112007	500,56	49,78	46,28	SELL									4,77
Jul102007	505,58	63,02	46,23	SELL									4,77
Jul092007	512,82	77,53	45,91	SELL									4,77
Jul062007	498,95	49,11	45,00	SELL									4,77
Jun052007	464,52	33,55	41,84	SELL									4,77
May312007	470,81	38,41	41,98	SELL									4,77
May302007	462,75	38,56	40,98	SELL									4,77
May292007	470,03	51,85	41,07	SELL									4,77
May282007	469,28	50,06	40,63	SELL									4,77
May252007	461,94	43,74	40,84	SELL									4,77
May242007	462,37	50,42	41,20	SELL									4,77
May232007	464,25	59,23	42,30	SELL									4,77

Jun222006	342,29	-76,90	45,16	BUY								4,97
Jun212006	337,62	-87,43	45,02	BUY								4,97
Jun202006	346,01	-82,89	45,02	BUY								4,97
Jun192006	348,08	-82,91	45,06	BUY								4,97
Jun162006	340,48	-102,36	44,65	BUY								4,97
Jun152006	336,27	-100,84	44,97	BUY								4,97
Jun142006	329,00	-111,89	44,55	BUY								4,97
Jun132006	323,84	-116,87	44,22	BUY								4,97
Jun122006	343,30	-96,98	43,44	BUY								4,97
Jun092006	348,03	-81,08	42,66	BUY								4,97
Jun082006	353,39	-76,03	42,61	BUY								4,97
Jun072006	367,10	-57,97	42,72	BUY								4,97
Jun062006	374,64	-42,78	42,87	BUY								4,97
Jun052006	379,64	-47,46	41,77	BUY								4,97
Jun022006	392,86	-39,88	41,73	BUY								4,97
Jun012006	383,95	-61,36	41,52	BUY								4,97
May312006	381,32	-61,97	41,21	BUY								4,97
May302006	378,61	-65,38	40,84	BUY								4,97
May292006	389,09	-55,17	41,06	BUY								4,97
May262006	385,93	-60,95	40,69	BUY								4,97
May252006	367,30	-73,21	40,05	BUY								4,97
May242006	361,01	-71,36	39,93	BUY								4,97
May232006	372,35	-56,72	39,88	BUY								4,97
May222006	363,51	-79,95	39,66	BUY								4,97
May152006	402,69	-36,21	37,04	BUY								4,97
May122006	419,71	-40,26	37,07	BUY								4,97
May102006	435,99	-32,92	36,88	BUY								4,97
May052006	442,13	-35,16	36,73	BUY	FIRST BUY	63,6%	217				1	4,97
Mar232006	445,31	26,26	32,82	SELL								4,97
Mar212006	443,99	30,37	32,68	SELL								4,97
Mar202006	444,26	37,61	32,69	SELL								4,97
Mar172006	446,88	48,97	32,75	SELL								4,97
Mar162006	440,51	42,73	33,28	SELL								4,97
Mar152006	432,37	34,00	33,28	SELL								4,97
Mar142006	429,07	36,87	33,42	SELL								4,97
Mar132006	443,46	53,30	33,44	SELL								4,97
Mar102006	425,22	33,83	33,55	SELL								4,97
Mar092006	428,63	39,43	34,15	SELL								4,97
Mar082006	423,40	39,87	34,39	SELL								4,97
Mar072006	438,90	56,80	34,52	SELL								4,97
Mar062006	459,97	82,68	33,95	SELL								4,97
Mar032006	463,66	84,06	33,95	SELL								4,97
Mar022006	468,91	91,74	34,35	SELL								4,97
Mar012006	474,93	98,61	34,18	SELL								4,97
Feb282006	470,16	91,45	34,07	SELL								4,97
Feb272006	477,29	99,87	34,07	SELL								4,97
Feb242006	468,38	86,36	34,11	SELL								4,97
Feb232006	465,54	90,58	34,67	SELL								4,97
Feb222006	462,65	76,77	34,86	SELL								4,97
Feb212006	467,11	82,69	34,74	SELL								4,97
Feb202006	466,89	77,71	34,66	SELL								4,97
Feb172006	462,44	71,13	34,53	SELL								4,97
Feb162006	453,31	67,87	34,66	SELL								4,97
Feb152006	438,04	55,07	34,53	SELL								4,97
Feb142006	435,08	54,19	34,61	SELL								4,97
Feb132006	440,46	65,51	35,07	SELL								4,97
Feb102006	447,73	81,52	35,11	SELL								4,97
Feb092006	441,17	73,57	35,36	SELL								4,97
Feb082006	438,43	69,35	35,38	SELL								4,97
Feb072006	446,53	84,74	35,94	SELL								4,97
Feb062006	448,56	96,02	36,39	SELL								4,97
Feb032006	442,28	85,73	36,75	SELL								4,97
Feb022006	448,41	95,27	37,66	SELL								4,97
Feb012006	452,51	101,24	37,44	SELL								4,97
Jan312006	445,90	97,23	37,24	SELL								4,97
Jan302006	448,91	105,67	37,60	SELL								4,97
Jan272006	453,15	111,43	37,41	SELL								4,97
Jan262006	457,84	116,88	36,88	SELL								4,97
Jan252006	457,46	110,36	36,94	SELL								4,97
Jan242006	444,35	105,87	36,51	SELL								4,97
Jan232006	438,51	101,02	36,19	SELL								4,97
Jan202006	444,66	106,36	36,40	SELL								4,97
Jan192006	436,45	104,93	36,41	SELL								4,97
Jan182006	426,23	98,31	36,50	SELL								4,97
Jan172006	440,77	121,13	36,81	SELL								4,97
Jan162006	436,29	125,90	36,85	SELL								4,97
Jan062006	419,05	106,32	35,52	SELL								4,97
Jan052006	417,22	102,48	35,85	SELL								4,97
Jan042006	413,62	96,92	35,64	SELL								4,97

Jan032006	406,65	88,19	35,70	SELL									4,97
Jan022006	397,91	83,62	35,57	SELL									4,97
Dec302005	397,78	83,74	35,79	SELL									4,97
Dec292005	398,37	90,70	35,43	SELL									4,97
Dec282005	392,20	76,33	34,78	SELL									4,97
Dec272005	390,16	71,65	34,66	SELL									4,97
Dec262005	391,39	76,99	34,61	SELL									4,97
Dec232005	389,20	68,66	34,39	SELL									4,97
Dec222005	383,53	52,35	34,39	SELL									4,97
Dec212005	382,10	41,70	34,22	SELL									4,97
Dec202005	377,29	42,23	33,75	SELL									4,97
Dec192005	379,60	45,46	33,75	SELL									4,97
Dec162005	377,17	42,07	33,78	SELL									4,97
Dec152005	376,32	28,56	33,78	SELL									4,97
Dec132005	377,42	34,41	33,72	SELL									4,97
Dec122005	382,02	48,69	33,68	SELL									4,97
Dec092005	374,96	41,00	33,70	SELL									4,97
Dec082005	385,88	58,43	33,99	SELL									4,97
Dec072005	384,42	51,23	33,95	SELL									4,97
Dec062005	389,18	54,02	33,63	SELL									4,97
Dec052005	391,31	58,81	33,63	SELL									4,97
Dec022005	385,74	51,08	33,80	SELL									4,97
Dec012005	382,97	44,33	33,91	SELL									4,97
Nov302005	380,89	43,70	33,95	SELL									4,97
Nov292005	374,95	42,74	33,95	SELL									4,97
Nov282005	366,21	33,27	33,95	SELL									4,97
Nov252005	367,60	34,89	33,79	SELL									4,97
Nov242005	369,08	42,76	34,06	SELL									4,97
Nov232005	361,79	36,38	33,66	SELL									4,97
Nov212005	356,55	34,52	33,66	SELL									4,97
Nov182005	353,14	38,29	33,68	SELL									4,97
Nov172005	351,27	37,42	33,68	SELL									4,97
Nov162005	348,67	30,35	33,68	SELL									4,97
Nov102005	347,10	38,02	33,68	SELL									4,97
Nov092005	338,48	38,33	32,94	SELL									4,97
Nov082005	337,49	37,29	32,59	SELL									4,97
Nov072005	338,30	40,16	32,45	SELL									4,97
Nov022005	331,52	37,80	32,52	SELL									4,97
Nov012005	327,92	36,00	32,52	SELL									4,97
Oct312005	319,64	30,13	32,52	SELL									4,97
Oct272005	312,73	32,73	32,62	SELL									4,97
Oct262005	314,74	35,68	32,62	SELL									4,97
Oct252005	316,70	34,12	32,62	SELL									4,97
Oct242005	318,46	37,71	32,62	SELL									4,97
Oct212005	314,29	32,53	32,48	SELL									4,97
Oct122005	331,18	33,91	31,50	SELL									4,97
Oct112005	340,40	44,97	32,18	SELL									4,97
Oct102005	335,06	37,29	32,59	SELL									4,97
Oct072005	334,14	37,99	32,74	SELL									4,97
Oct062005	335,10	41,67	32,18	SELL									4,97
Oct052005	347,76	56,11	32,18	SELL									4,97
Oct042005	356,25	68,94	32,66	SELL									4,97
Oct032005	343,01	50,28	32,49	SELL									4,97
Sep302005	333,33	41,45	32,38	SELL									4,97
Sep292005	333,96	44,04	32,38	SELL									4,97
Sep282005	327,45	40,32	32,42	SELL									4,97
Sep272005	333,19	46,44	32,98	SELL									4,97
Sep262005	335,16	51,13	33,17	SELL									4,97
Sep232005	332,50	48,23	33,05	SELL									4,97
Sep222005	334,66	49,65	32,97	SELL									4,97
Sep212005	338,64	58,02	32,84	SELL									4,97
Sep202005	337,19	60,30	32,97	SELL									4,97
Sep192005	332,21	54,13	32,84	SELL									4,97
Sep162005	332,94	54,52	32,92	SELL									4,97
Sep152005	332,71	55,82	33,78	SELL									4,97
Sep142005	326,32	48,51	33,82	SELL									4,97
Sep132005	325,41	51,63	34,07	SELL									4,97
Sep122005	327,11	50,09	34,10	SELL									4,97
Sep092005	322,03	45,86	34,65	SELL									4,97
Sep082005	314,85	45,28	35,11	SELL									4,97
Sep072005	313,85	42,49	35,47	SELL									4,97
Sep062005	318,32	50,21	36,37	SELL									4,97
Sep052005	318,79	52,81	36,16	SELL									4,97
Sep022005	317,02	46,69	35,95	SELL									4,97
Sep012005	319,48	49,26	36,31	SELL									4,97
Aug312005	309,08	41,29	36,12	SELL									4,97
Aug292005	300,15	32,69	35,60	SELL									4,97
Aug262005	300,20	33,11	35,65	SELL									4,97
Aug252005	298,14	32,85	35,23	SELL									4,97

Aug232005	291,82	29,83	35,11	SELL									4,97
Aug222005	289,51	30,21	35,13	SELL									4,97
Aug192005	284,57	28,47	35,22	SELL									4,97
Aug112005	291,12	30,60	36,17	SELL									4,97
Aug102005	296,83	38,84	35,92	SELL									4,97
Aug092005	297,01	44,70	36,06	SELL									4,97
Aug082005	299,25	46,89	35,70	SELL									4,97
Aug052005	299,45	49,67	35,73	SELL									4,97
Aug042005	301,24	56,71	35,62	SELL									4,97
Aug032005	297,27	56,73	35,57	SELL									4,97
Aug022005	295,43	54,23	35,75	SELL									4,97
Aug012005	297,77	56,36	35,75	SELL									4,97
Jul292005	296,15	52,86	35,58	SELL									4,97
Jul282005	293,43	38,78	35,11	SELL									4,97
Jul272005	291,65	39,59	35,10	SELL									4,97
Jul262005	287,31	38,85	35,13	SELL									4,97
Jul252005	292,73	43,52	35,13	SELL									4,97
Jul222005	291,88	38,62	35,20	SELL									4,97
Jul212005	289,92	38,78	35,07	SELL									4,97
Jul202005	287,13	40,50	35,03	SELL									4,97
Jul192005	286,75	39,87	35,23	SELL									4,97
Jul182005	284,03	37,01	35,14	SELL									4,97
Jul152005	284,27	34,76	35,03	SELL									4,97
Jul142005	285,01	34,01	34,71	SELL									4,97
Jul132005	280,62	35,02	34,94	SELL									4,97
Jul122005	276,89	35,51	35,09	SELL									4,97
Jul112005	278,08	35,55	35,20	SELL									4,97
Jul082005	278,42	42,50	35,24	SELL									4,97
Jul072005	276,89	41,69	35,24	SELL									4,97
Jul062005	277,81	37,11	34,99	SELL									4,97
Jul052005	273,78	28,94	34,63	SELL									4,97
Jul042005	277,02	29,04	34,52	SELL									4,97
Jul012005	276,17	28,86	34,13	SELL									4,97
Jun292005	271,36	29,60	33,86	SELL									4,97
Jun272005	265,98	33,12	33,88	SELL									4,97
Jun242005	270,33	31,80	33,92	SELL	FIRST SELL	7,8%	52	1					4,97
May232005	243,29	-26,08	32,00	BUY									4,62
May172005	248,46	-29,00	31,90	BUY									4,62
May162005	249,21	-27,77	31,76	BUY									4,62
May112005	246,63	-28,96	32,39	BUY									4,62
May092005	247,02	-30,66	32,55	BUY									4,62
May062005	249,51	-34,45	33,03	BUY									4,62
May052005	251,00	-29,31	33,03	BUY									4,62
May042005	245,60	-27,95	32,91	BUY									4,62
May032005	241,38	-27,83	32,83	BUY									4,62
Apr292005	235,92	-32,72	32,83	BUY									4,62
Apr282005	235,20	-37,73	32,88	BUY									4,62
Apr272005	240,70	-29,30	32,79	BUY									4,62
Apr262005	244,84	-31,78	33,66	BUY									4,62
Apr252005	247,98	-33,66	33,70	BUY									4,62
Apr222005	247,31	-32,73	33,95	BUY									4,62
Apr212005	244,19	-33,17	33,97	BUY									4,62
Apr202005	241,76	-31,33	34,53	BUY									4,62
Apr192005	241,44	-33,84	34,98	BUY									4,62
Apr182005	232,86	-49,84	35,34	BUY									4,62
Apr152005	238,53	-43,49	35,64	BUY									4,62
Apr142005	245,42	-32,71	35,42	BUY									4,62
Apr122005	250,78	-28,59	35,58	BUY	FIRST BUY	34,5%	178				1		4,62
Mar102005	275,20	29,29	35,04	SELL									4,62
Mar092005	277,46	32,08	35,04	SELL									4,62
Mar082005	276,98	32,67	35,03	SELL									4,62
Mar072005	277,90	32,65	35,06	SELL									4,62
Mar042005	276,63	36,18	35,06	SELL									4,62
Mar032005	275,59	32,18	35,18	SELL									4,62
Mar022005	272,26	28,65	35,05	SELL									4,62
Mar012005	277,68	38,33	35,01	SELL									4,62
Feb282005	283,96	51,06	35,21	SELL									4,62
Feb252005	280,31	46,13	34,69	SELL									4,62
Feb242005	273,55	37,20	34,58	SELL									4,62
Feb232005	269,21	39,77	34,27	SELL									4,62
Feb222005	266,57	39,77	34,34	SELL									4,62
Feb212005	268,64	42,39	34,50	SELL									4,62
Feb182005	272,93	42,17	34,61	SELL									4,62
Feb172005	270,00	39,50	34,65	SELL									4,62
Feb162005	276,62	46,54	34,65	SELL									4,62
Feb152005	281,64	50,14	34,39	SELL									4,62
Feb142005	280,04	54,43	34,03	SELL									4,62
Feb112005	277,36	52,50	33,76	SELL									4,62
Feb102005	273,09	45,10	33,36	SELL									4,62

Feb092005	275,28	42,35	33,36	SELL								4,62
Feb082005	282,70	48,06	33,09	SELL								4,62
Feb072005	282,02	46,86	33,11	SELL								4,62
Feb042005	278,13	43,41	33,11	SELL								4,62
Feb032005	275,55	46,24	33,15	SELL								4,62
Feb022005	279,37	47,60	33,15	SELL								4,62
Feb012005	278,50	47,17	33,15	SELL								4,62
Jan312005	273,30	47,64	33,31	SELL								4,62
Jan282005	270,74	49,69	33,43	SELL								4,62
Jan272005	273,03	51,16	33,12	SELL								4,62
Jan262005	270,56	44,38	32,61	SELL								4,62
Jan252005	268,60	43,16	32,46	SELL								4,62
Jan242005	264,69	38,53	32,24	SELL								4,62
Jan192005	269,18	37,02	32,32	SELL								4,62
Jan182005	268,13	38,07	32,49	SELL								4,62
Jan172005	268,63	34,25	32,85	SELL								4,62
Jan142005	263,63	31,47	32,85	SELL								4,62
Jan132005	264,93	36,35	32,85	SELL								4,62
Jan122005	262,71	33,71	32,85	SELL								4,62
Jan112005	261,10	35,44	32,85	SELL								4,62
Jan102005	256,05	34,62	33,00	SELL								4,62
Jan072005	253,08	34,00	33,02	SELL								4,62
Jan042005	250,42	28,21	32,53	SELL								4,62
Jan032005	254,45	28,94	32,17	SELL								4,62
Dec292004	249,72	26,38	31,79	SELL								4,62
Nov082004	226,16	27,61	33,58	SELL								4,62
Nov052004	232,16	36,44	33,79	SELL								4,62
Nov042004	230,06	34,48	33,81	SELL								4,62
Nov032004	234,38	37,74	33,90	SELL								4,62
Nov022004	232,16	38,52	34,20	SELL								4,62
Nov012004	228,58	35,72	34,25	SELL								4,62
Oct282004	229,00	37,12	34,25	SELL								4,62
Oct272004	225,66	32,98	34,78	SELL								4,62
Oct252004	219,08	30,76	35,21	SELL								4,62
Oct222004	222,44	34,18	35,46	SELL								4,62
Oct212004	222,02	34,27	35,60	SELL								4,62
Oct202004	222,21	33,12	35,60	SELL								4,62
Oct192004	225,51	31,58	35,64	SELL								4,62
Oct182004	223,34	30,86	35,64	SELL								4,62
Oct152004	224,77	32,89	35,64	SELL								4,62
Oct142004	223,19	29,75	35,84	SELL								4,62
Oct132004	226,30	35,81	35,84	SELL								4,62
Oct112004	227,87	30,89	35,84	SELL								4,62
Oct082004	229,51	35,70	35,83	SELL								4,62
Oct072004	224,32	33,21	35,86	SELL								4,62
Oct062004	222,87	32,68	35,86	SELL								4,62
Oct042004	219,88	33,43	35,85	SELL								4,62
Sep302004	219,54	33,25	36,01	SELL								4,62
Sep292004	222,20	34,40	35,27	SELL								4,62
Sep282004	222,94	34,13	35,16	SELL								4,62
Sep272004	220,83	31,38	34,84	SELL								4,62
Sep242004	223,07	31,50	34,92	SELL								4,62
Sep232004	222,77	33,11	35,08	SELL								4,62
Sep222004	214,91	28,56	35,19	SELL								4,62
Sep162004	217,05	36,28	34,61	SELL								4,62
Sep152004	216,16	33,19	34,43	SELL								4,62
Sep142004	217,05	34,67	34,11	SELL								4,62
Sep092004	213,98	31,08	33,85	SELL								4,62
Sep082004	214,68	35,00	33,85	SELL								4,62
Sep072004	211,19	33,83	33,90	SELL								4,62
Sep062004	208,52	31,42	33,90	SELL								4,62
Sep032004	207,75	34,20	33,90	SELL								4,62
Sep022004	205,26	36,37	34,05	SELL								4,62
Sep012004	205,12	36,92	34,17	SELL								4,62
Aug312004	202,18	34,65	33,87	SELL								4,62
Aug272004	198,55	30,70	33,69	SELL								4,62
Aug022004	196,98	29,07	33,03	SELL								4,62
Jul282004	190,19	26,85	32,95	SELL								4,62
Jul262004	186,45	27,23	33,83	SELL	FIRST SELL	17,1%	49	1				4,62
Jun172004	169,01	-31,39	33,28	BUY								3,94
Jun162004	170,99	-31,74	33,46	BUY								3,94
Jun152004	172,30	-31,01	33,46	BUY								3,94
Jun142004	170,80	-34,05	33,55	BUY								3,94
Jun082004	176,04	-32,83	34,39	BUY								3,94
Jun072004	180,20	-28,16	34,46	BUY								3,94
Jun032004	170,44	-33,04	35,07	BUY								3,94
Jun022004	168,68	-33,18	35,21	BUY								3,94
Jun012004	167,67	-34,00	35,21	BUY								3,94
May312004	170,81	-29,43	35,25	BUY								3,94

Nov142002	129,71	35,71	39,23		SELL							3,05
Nov112002	127,74	33,85	39,63		SELL							3,05
Nov082002	132,22	36,75	40,56		SELL							3,05
Nov072002	134,72	40,77	40,71		SELL	FIRST SELL	27,2%	168		1		3,05
Jul042002	90,60	-29,81	35,36	BUY								2,39
Jun272002	90,09	-30,01	36,67	BUY								2,39
Jun262002	86,27	-36,36	36,87	BUY								2,39
Jun252002	90,95	-31,25	37,07	BUY								2,39
Jun242002	89,85	-36,21	37,37	BUY								2,39
Jun212002	92,20	-30,20	37,45	BUY								2,39
Jun202002	91,79	-30,78	37,47	BUY								2,39
Mar202002	107,76	-41,03	33,78	BUY								2,39
Mar192002	106,44	-43,56	33,78	BUY								2,39
Mar182002	106,05	-36,68	33,26	BUY								2,39
Mar152002	107,72	-33,06	33,32	BUY								2,39
Mar142002	106,14	-31,69	33,28	BUY								2,39
Mar132002	105,94	-30,15	33,20	BUY		FIRST BUY	-13,6%	75		1		2,39
Jan242002	130,26	29,45	35,99		SELL							2,39
Jan162002	127,59	31,24	36,13		SELL							2,39
Jan152002	133,48	34,99	36,13		SELL							2,39
Jan142002	136,39	37,19	36,13		SELL							2,39
Jan112002	136,16	37,00	36,05		SELL							2,39
Jan102002	138,19	44,76	35,13		SELL							2,39
Jan092002	140,43	44,65	35,16		SELL							2,39
Jan082002	148,79	52,12	34,47		SELL							2,39
Jan072002	150,00	56,95	34,21		SELL							2,39
Jan032002	142,73	54,50	34,08		SELL							2,39
Jan022002	140,78	52,60	33,92		SELL							2,39
Dec282001	137,83	48,22	33,92		SELL							2,39
Dec272001	136,09	49,78	33,69		SELL							2,39
Dec262001	130,68	44,91	33,54		SELL							2,39
Dec252001	128,76	44,45	33,42		SELL							2,39
Dec242001	126,86	40,59	33,28		SELL							2,39
Dec212001	127,21	46,73	33,28		SELL							2,39
Dec202001	126,79	50,41	32,48		SELL							2,39
Dec192001	127,89	52,90	32,45		SELL							2,39
Dec142001	127,62	51,63	32,23		SELL							2,39
Dec132001	126,56	48,51	32,34		SELL							2,39
Dec122001	127,19	50,49	32,79		SELL							2,39
Dec112001	125,50	47,06	32,42		SELL							2,39
Dec102001	126,45	49,16	32,29		SELL							2,39
Dec072001	126,63	50,37	32,16		SELL							2,39
Dec062001	126,87	52,73	32,33		SELL							2,39
Dec052001	119,31	44,54	31,66		SELL							2,39
Dec042001	113,08	36,63	31,62		SELL							2,39
Dec032001	114,67	39,52	31,58		SELL							2,39
Nov302001	116,34	43,28	31,75		SELL							2,39
Nov292001	109,61	33,09	31,68		SELL							2,39
Nov282001	111,29	32,30	31,68		SELL							2,39
Nov272001	117,22	40,19	31,68		SELL							2,39
Nov262001	120,63	42,96	31,68		SELL							2,39
Nov232001	117,19	37,81	31,44		SELL							2,39
Nov222001	118,56	33,90	31,24		SELL							2,39
Nov192001	122,63	26,35	30,88		SELL	FIRST SELL	29,5%	91		1		2,39
Oct032001	76,70	-24,31	30,32	BUY								1,85
Sep142001	79,38	-32,38	30,48	BUY								1,85
Sep132001	84,66	-26,16	30,59	BUY								1,85
Aug162001	95,38	-26,00	32,40	BUY								1,85
Aug152001	92,34	-27,72	32,36	BUY								1,85
Aug142001	89,20	-28,13	32,26	BUY								1,85
Jul302001	98,33	-28,11	29,69	BUY								1,85
Jul272001	97,65	-28,42	29,69	BUY								1,85
Jul262001	98,57	-28,82	28,89	BUY								1,85
Jul252001	95,35	-28,38	28,86	BUY								1,85
Jul182001	91,06	-30,37	28,71	BUY								1,85
Jul172001	86,89	-35,87	28,61	BUY								1,85
Jul162001	90,80	-36,48	28,60	BUY								1,85
Jul132001	89,41	-32,62	28,31	BUY								1,85
Jul122001	91,23	-34,07	28,36	BUY								1,85
Jul112001	87,30	-41,00	28,36	BUY								1,85
Jul102001	94,69	-25,40	28,32	BUY		FIRST BUY	-23,4%	52		1		1,85
Jun192001	107,94	24,82	27,20		SELL							1,85
Jun182001	110,82	27,22	27,13		SELL							1,85
Jun152001	118,40	36,03	27,11		SELL							1,85
Jun142001	120,17	35,60	26,91		SELL							1,85
Jun132001	112,84	31,66	26,91		SELL							1,85
Jun122001	114,29	36,23	25,79		SELL							1,85
Jun112001	116,36	37,80	25,25		SELL							1,85
Jun082001	121,38	41,15	25,21		SELL							1,85

Appendix 3. Buy and Sell Levels of RSI Method

Date	Close Price	Price Change	RSI	Buy Signals	Sell Signals	FIRST BUY and FIRST SELL	Price changes between buy and sell signals	Days between buy and sell signals	Buy signal with successful result	Buy signal with unsuccessful result	Sell signal with successful result	Sell signal with unsuccessful result	Return
Nov252020	1.325,47	4,49	79,52		SELL								2,26
Oct152020	1.180,43	-8,86	75,30		SELL								2,26
Jun242020	1.144,49	-8,90	74,39		SELL	FIRST SELL	34,3%	64	1				2,26
Mar192020	851,95	-3,82	22,06	BUY		FIRST BUY	-13,7%	176			1		1,68
Jan032020	1.136,84	-22,48	66,94		SELL								1,68
Jul082019	986,95	-9,40	73,18		SELL	FIRST SELL	14,7%	28	1				1,68
May242019	860,72	14,76	27,25	BUY		FIRST BUY	-20,0%	458			1		1,47
Feb052019	1.024,48	1,93	77,22		SELL								1,47
Jan042018	1.154,91	-5,61	76,36		SELL								1,47
Jul312017	1.075,31	-1,69	75,00		SELL	FIRST SELL	34,4%	598	1				1,47
May242016	794,35	26,69	41,97	BUY									1,09
Mar172015	800,31	18,35	28,38	BUY		FIRST BUY	181,3%	1.490				1	1,09
Jan082015	876,90	9,13	77,03		SELL								1,09
Dec022014	849,15	-12,32	76,55		SELL								1,09
Sep082014	822,00	0,07	75,57		SELL								1,09
Jul312014	821,57	-20,61	64,52		SELL								1,09
May202013	901,65	-17,60	70,91		SELL								1,09
Dec192012	768,10	-4,88	75,96		SELL								1,09
Nov022012	714,23	-11,30	71,46		SELL								1,09
Sep112012	681,05	-0,17	77,74		SELL								1,09
Jan102011	678,75	-8,95	70,20		SELL								1,09
Jul232010	593,00	-6,19	77,86		SELL								1,09
Apr132010	580,75	-7,47	69,84		SELL								1,09
Apr062010	584,06	-2,39	76,94		SELL								1,09
Jan112010	539,21	-8,77	72,74		SELL								1,09
Apr132009	284,47	-3,91	76,87		SELL	FIRST SELL	-17,1%	192		1			1,09
Oct242008	241,77	-8,64	22,56	BUY									1,31
Jul042008	343,00	3,80	22,08	BUY		FIRST BUY	168,5%	1.416				1	1,31
Feb052007	427,01	-4,12	78,77		SELL								1,31
Jan182006	426,23	-14,54	78,31		SELL								1,31
Dec072005	384,42	-4,76	77,31		SELL								1,31
Sep202005	337,19	4,98	79,42		SELL								1,31
Sep132004	210,60	0,56	79,90		SELL								1,31
Dec232003	182,42	-1,46	76,43		SELL								1,31
Sep292003	132,56	-5,03	69,63		SELL								1,31
Nov112002	127,74	-4,48	76,56		SELL	FIRST SELL	2,1%	199	1				1,31
Jun182002	95,75	3,44	24,44	BUY									1,29
Jan292002	125,15	-2,50	23,42	BUY		FIRST BUY	27,1%	59				1	1,29
Jan092002	140,43	-8,36	69,31		SELL								1,29
Oct312001	98,49	-0,71	77,55		SELL	FIRST SELL	28,8%	25	1				1,29
Sep252001	76,45	1,30	21,58	BUY		FIRST BUY	-37,4%	99			1		1,00
May072001	122,03	-3,27	75,80		SELL	FIRST SELL							1,00
Oct182000	135,22	-2,42	75,95		SELL								
Nov251999	85,26	-0,29	79,75		SELL								
May121999	54,58	-3,53	66,32		SELL								
Oct271997	31,19	-3,93	61,00		SELL								
Jul171997	20,06	-0,03	76,45		SELL								
Dec111996	9,18	-0,14	67,72		SELL								

Appendix 5. Buy and Sell Levels of Combined Method

Date	Close Price	STOCHASTIC BUY SIGNAL	RSI BUY SIGNAL	MOMENTUM SELL SIGNAL	MACD SELL SIGNAL	FIRST BUY and FIRST SELL signal	Price changes between buy and sell signals	Days between buy and sell signals	Buy signal with successful result	Buy signal with unsuccessful result	Sell signal with successful result	Sell signal with unsuccessful result	Return
Dec302020	1.479,91			SELL									4,13
Dec292020	1.459,69			SELL									4,13
Dec282020	1.439,29			SELL									4,13
Dec252020	1.426,03			SELL									4,13
Dec242020	1.426,00			SELL									4,13
Dec232020	1.417,66			SELL									4,13
Dec222020	1.404,97			SELL									4,13
Dec212020	1.384,43			SELL									4,13
Dec182020	1.408,32			SELL									4,13
Dec172020	1.399,36			SELL									4,13
Dec162020	1.392,45			SELL									4,13
Dec152020	1.395,40			SELL									4,13
Dec142020	1.388,55			SELL									4,13
Dec112020	1.370,70			SELL									4,13
Dec102020	1.353,36			SELL									4,13
Dec092020	1.350,32			SELL									4,13
Dec082020	1.339,89			SELL									4,13
Dec072020	1.329,90			SELL									4,13
Dec042020	1.330,87			SELL									4,13
Dec032020	1.330,85			SELL									4,13
Dec022020	1.325,49			SELL	SELL								4,13
Dec012020	1.325,29			SELL	SELL								4,13
Nov302020	1.283,58			SELL	SELL								4,13
Nov272020	1.328,73			SELL									4,13
Nov262020	1.342,49			SELL									4,13
Nov252020	1.325,47			SELL									4,13
Nov242020	1.320,98			SELL									4,13
Nov232020	1.314,25			SELL									4,13
Nov202020	1.323,95			SELL									4,13
Nov192020	1.313,02			SELL									4,13
Nov182020	1.294,72			SELL									4,13
Nov172020	1.259,72			SELL									4,13
Nov162020	1.292,99			SELL									4,13
Nov132020	1.291,29			SELL									4,13
Nov122020	1.271,75			SELL									4,13
Nov112020	1.279,22			SELL									4,13
Nov102020	1.243,00			SELL									4,13
Nov092020	1.231,54			SELL									4,13
Oct272020	1.152,63				SELL								4,13
Oct262020	1.144,45				SELL								4,13
Oct152020	1.180,43			SELL									4,13
Oct142020	1.189,29			SELL									4,13
Jul292020	1.135,55			SELL									4,13
Jul282020	1.152,70			SELL									4,13
Jul272020	1.195,67			SELL									4,13
Jul242020	1.192,02			SELL									4,13
Jul232020	1.190,31			SELL									4,13
Jul222020	1.180,80			SELL									4,13
Jul212020	1.180,42			SELL									4,13
Jul202020	1.192,81			SELL									4,13
Jul172020	1.187,86			SELL									4,13
Jul162020	1.188,08			SELL									4,13
Jul142020	1.177,41			SELL									4,13
Jul132020	1.183,99			SELL									4,13
Jul102020	1.148,09			SELL									4,13
Jul092020	1.157,94			SELL									4,13
Jul082020	1.187,13			SELL	SELL								4,13
Jul072020	1.193,39			SELL									4,13
Jul062020	1.184,85			SELL									4,13
Jul032020	1.157,48			SELL									4,13
Jul022020	1.169,08			SELL									4,13
Jul012020	1.153,15			SELL									4,13
Jun302020	1.165,25			SELL									4,13
Jun292020	1.158,43			SELL									4,13
Jun262020	1.146,68			SELL									4,13
Jun252020	1.141,39			SELL									4,13
Jun242020	1.144,49			SELL									4,13
Jun232020	1.153,39			SELL									4,13
Jun222020	1.151,90			SELL									4,13
Jun192020	1.136,12			SELL									4,13
Jun182020	1.124,95			SELL	SELL								4,13
Jun172020	1.109,40			SELL	SELL								4,13
Jun162020	1.109,40			SELL	SELL								4,13
Jun152020	1.095,56			SELL	SELL								4,13
Jun122020	1.098,35			SELL									4,13
Jun112020	1.091,55			SELL									4,13
Jun102020	1.097,79			SELL									4,13
Jun092020	1.092,37			SELL									4,13
Jun082020	1.096,37			SELL									4,13
Jun052020	1.100,22			SELL									4,13
Jun042020	1.095,37			SELL									4,13
Jun032020	1.091,11			SELL									4,13
Jun022020	1.080,97			SELL									4,13
Jun012020	1.072,66			SELL									4,13
May292020	1.055,20			SELL									4,13
May272020	1.049,54			SELL									4,13
Apr302020	1.011,10				SELL								4,13

Apr192016	862,51			SELL								3,23
Apr182016	863,44			SELL								3,23
Apr152016	855,73			SELL								3,23
Apr142016	857,85			SELL								3,23
Apr132016	856,97			SELL								3,23
Apr122016	837,20			SELL								3,23
Apr112016	839,88			SELL								3,23
Apr082016	825,02			SELL								3,23
Apr062016	815,11			SELL								3,23
Apr052016	829,64			SELL								3,23
Apr042016	838,73			SELL								3,23
Apr012016	823,59			SELL								3,23
Mar312016	832,68			SELL								3,23
Mar302016	829,18			SELL								3,23
Mar292016	817,34			SELL								3,23
Mar282016	813,45			SELL								3,23
Mar252016	813,56			SELL								3,23
Mar242016	813,58			SELL	SELL							3,23
Mar232016	803,84			SELL	SELL							3,23
Mar222016	817,66			SELL								3,23
Mar212016	834,03			SELL								3,23
Mar182016	829,43			SELL								3,23
Mar172016	813,77			SELL								3,23
Mar152016	790,31			SELL								3,23
Mar142016	801,11			SELL								3,23
Mar112016	793,80			SELL								3,23
Feb162016	709,49				SELL							3,23
Feb152016	710,08				SELL							3,23
Feb122016	709,37				SELL	FIRST SELL						3,23
Feb112016	709,42				SELL	FIRST SELL	-3,8%	39		1		3,23
Dec172015	737,12	BUY				FIRST BUY	-10,8%	172			1	3,35
Nov202015	806,82			SELL								3,35
Nov182015	805,14			SELL	SELL							3,35
Nov122015	821,43			SELL								3,35
Nov052015	829,56			SELL								3,35
Nov042015	836,84			SELL								3,35
Nov032015	829,14			SELL								3,35
Nov022015	836,94			SELL								3,35
Oct232015	801,25				SELL							3,35
Oct222015	802,56				SELL							3,35
Jul092015	822,86				SELL							3,35
Jul082015	803,87				SELL							3,35
Jul072015	815,72				SELL							3,35
May282015	835,70				SELL							3,35
May272015	842,92				SELL							3,35
May212015	865,65			SELL								3,35
May182015	886,52			SELL								3,35
May122015	853,63				SELL							3,35
May112015	847,53				SELL							3,35
May072015	825,70				SELL							3,35
Apr152015	813,58				SELL							3,35
Apr132015	819,38				SELL							3,35
Apr102015	826,46				SELL	FIRST SELL	-3,3%	37		1		3,35
Mar192015	819,22	BUY										3,47
Mar172015	800,31		BUY									3,47
Feb182015	854,42	BUY				FIRST BUY	9,6%	72			1	3,47
Jan282015	903,42			SELL								3,47
Jan272015	911,50			SELL								3,47
Jan262015	914,13			SELL	SELL							3,47
Jan232015	907,36			SELL	SELL							3,47
Jan222015	909,03			SELL	SELL							3,47
Jan212015	903,13			SELL								3,47
Jan202015	892,00			SELL								3,47
Jan192015	880,06			SELL								3,47
Jan162015	874,16			SELL								3,47
Jan152015	877,43			SELL								3,47
Jan142015	875,63			SELL								3,47
Jan132015	883,13			SELL								3,47
Jan122015	878,65			SELL								3,47
Jan082015	876,90			SELL								3,47
Jan062015	869,10			SELL								3,47
Dec292014	841,02			SELL								3,47
Dec262014	849,47			SELL								3,47
Dec252014	848,25			SELL								3,47
Dec242014	848,22			SELL								3,47
Dec232014	844,88			SELL								3,47
Dec222014	851,44			SELL								3,47
Dec192014	835,74			SELL								3,47
Dec182014	832,26			SELL								3,47
Dec172014	808,21			SELL								3,47
Dec152014	828,04			SELL								3,47
Dec122014	832,26			SELL								3,47
Dec112014	847,18			SELL	SELL							3,47
Dec102014	841,26			SELL	SELL							3,47
Dec092014	835,27			SELL	SELL							3,47
Dec082014	848,19			SELL								3,47
Dec052014	852,40			SELL								3,47
Dec042014	862,34			SELL								3,47
Dec012014	861,47			SELL								3,47
Nov112014	784,03				SELL							3,47
Nov102014	777,43				SELL							3,47
Nov072014	779,58				SELL	FIRST SELL	3,8%	18		1		3,47
Oct132014	751,16	BUY				FIRST BUY	-4,9%	20			1	3,34
Sep152014	779,18			SELL								3,34

Sep242010	642,41			SELL								2,64
Sep232010	641,93			SELL								2,64
Sep222010	644,79			SELL								2,64
Sep212010	641,25			SELL								2,64
Sep202010	642,90			SELL								2,64
Sep172010	638,62			SELL								2,64
Sep162010	637,33			SELL								2,64
Sep152010	633,98			SELL								2,64
Sep142010	624,79			SELL								2,64
Sep132010	622,60			SELL								2,64
Aug062010	597,53					SELL						2,64
Aug052010	596,03					SELL						2,64
Aug022010	606,93			SELL								2,64
Jul302010	598,67					SELL						2,64
Jul292010	607,37			SELL								2,64
Jul282010	604,04			SELL								2,64
Jul012010	545,34							SELL				2,64
Jun302010	548,39							SELL				2,64
May132010	579,30			SELL								2,64
May122010	579,76			SELL								2,64
May062010	557,64			SELL								2,64
May052010	564,41			SELL								2,64
Apr292010	587,03			SELL								2,64
Apr272010	582,17			SELL								2,64
Apr262010	590,43			SELL								2,64
Apr222010	583,38			SELL								2,64
Apr212010	584,51			SELL								2,64
Apr202010	588,86			SELL								2,64
Apr192010	581,53			SELL								2,64
Apr162010	582,24			SELL								2,64
Apr152010	590,55			SELL		SELL						2,64
Apr142010	593,30					SELL						2,64
Apr132010	580,75					SELL						2,64
Apr122010	588,22					SELL						2,64
Feb042010	534,64			SELL								2,64
Feb032010	550,69			SELL								2,64
Feb022010	551,48			SELL								2,64
Feb012010	555,26			SELL								2,64
Jan292010	546,51			SELL								2,64
Jan282010	547,70			SELL								2,64
Jan212010	553,01			SELL		SELL						2,64
Jan202010	554,69			SELL		SELL						2,64
Jan192010	551,60			SELL								2,64
Jan182010	545,51			SELL								2,64
Jan142010	547,41			SELL								2,64
Jan132010	546,27			SELL								2,64
Dec302009	516,68							SELL				2,64
Dec292009	517,86							SELL				2,64
Oct262009	512,30			SELL		SELL						2,64
Oct232009	513,81			SELL		SELL						2,64
Oct222009	510,17			SELL								2,64
Oct212009	512,95			SELL								2,64
Oct202009	510,51			SELL								2,64
Oct192009	502,87					SELL						2,64
Oct162009	497,91					SELL						2,64
Oct152009	510,18			SELL								2,64
Oct142009	510,26			SELL								2,64
Oct122009	510,03			SELL								2,64
Oct092009	502,18			SELL								2,64
Oct082009	498,80			SELL								2,64
Oct072009	490,36			SELL								2,64
Oct062009	494,66			SELL								2,64
Oct052009	479,48			SELL								2,64
Oct022009	468,57			SELL								2,64
Oct012009	478,04			SELL								2,64
Sep302009	479,10			SELL								2,64
Sep292009	483,65			SELL								2,64
Sep282009	478,16			SELL								2,64
Sep252009	476,25			SELL								2,64
Sep242009	479,80			SELL								2,64
Sep232009	475,49			SELL								2,64
Sep182009	471,61			SELL								2,64
Sep172009	469,66			SELL								2,64
Sep162009	466,81			SELL								2,64
Sep152009	459,11			SELL								2,64
Sep142009	464,91			SELL								2,64
Sep112009	465,83			SELL								2,64
Sep102009	449,24			SELL								2,64
Sep092009	445,85			SELL								2,64
Sep082009	448,46			SELL								2,64
Sep072009	452,74			SELL								2,64
Sep042009	451,61			SELL								2,64
Sep032009	461,46			SELL								2,64
Sep022009	457,61			SELL								2,64
Sep012009	469,36			SELL								2,64
Aug312009	465,51			SELL								2,64
Aug282009	475,60			SELL								2,64
Aug272009	473,84			SELL								2,64
Aug262009	469,60			SELL								2,64
Aug252009	480,73			SELL								2,64
Aug242009	477,72			SELL								2,64
Aug212009	471,70			SELL								2,64
Aug202009	465,56			SELL								2,64
Aug192009	456,45			SELL								2,64

Dec302005	397,78		SELL							2,03
Dec292005	398,37		SELL							2,03
Dec282005	392,20		SELL							2,03
Dec272005	390,16		SELL							2,03
Dec262005	391,39		SELL							2,03
Dec232005	389,20		SELL							2,03
Dec222005	383,53		SELL							2,03
Dec212005	382,10		SELL							2,03
Dec202005	377,29		SELL							2,03
Dec192005	379,60		SELL							2,03
Dec162005	377,17		SELL							2,03
Dec152005	376,32		SELL							2,03
Dec132005	377,42		SELL							2,03
Dec122005	382,02		SELL							2,03
Dec092005	374,96		SELL	SELL						2,03
Dec082005	385,88		SELL							2,03
Dec072005	384,42		SELL	SELL						2,03
Dec062005	389,18		SELL							2,03
Dec052005	391,31		SELL							2,03
Dec022005	385,74		SELL							2,03
Dec012005	382,97		SELL							2,03
Nov302005	380,89		SELL							2,03
Nov292005	374,95		SELL							2,03
Nov282005	366,21		SELL	SELL						2,03
Nov252005	367,60		SELL							2,03
Nov242005	369,08		SELL							2,03
Nov232005	361,79		SELL							2,03
Nov212005	356,55		SELL							2,03
Nov182005	353,14		SELL							2,03
Nov172005	351,27		SELL							2,03
Nov162005	348,67		SELL							2,03
Nov102005	347,10		SELL							2,03
Nov092005	338,48		SELL							2,03
Nov082005	337,49		SELL							2,03
Nov072005	338,30		SELL							2,03
Nov022005	331,52		SELL							2,03
Nov012005	327,92		SELL	FIRST SELL	2,6%	1	1			2,03
Oct312005	319,64	BUY	SELL	FIRST BUY	85,5%	349			1	1,98
Oct272005	312,73		SELL							1,98
Oct262005	314,74		SELL							1,98
Oct252005	316,70		SELL							1,98
Oct242005	318,46		SELL							1,98
Oct212005	314,29		SELL							1,98
Oct122005	331,18		SELL							1,98
Oct112005	340,40		SELL							1,98
Oct102005	335,06		SELL							1,98
Oct072005	334,14		SELL							1,98
Oct062005	335,10		SELL							1,98
Oct052005	347,76		SELL							1,98
Oct042005	356,25		SELL							1,98
Oct032005	343,01		SELL							1,98
Sep302005	333,33		SELL							1,98
Sep292005	333,96		SELL							1,98
Sep282005	327,45		SELL							1,98
Sep272005	333,19		SELL							1,98
Sep262005	335,16		SELL							1,98
Sep232005	332,50		SELL							1,98
Sep222005	334,66		SELL	SELL						1,98
Sep212005	338,64		SELL	SELL						1,98
Sep202005	337,19		SELL	SELL						1,98
Sep192005	332,21		SELL							1,98
Sep162005	332,94		SELL							1,98
Sep152005	332,71		SELL							1,98
Sep142005	326,32		SELL							1,98
Sep132005	325,41		SELL							1,98
Sep122005	327,11		SELL							1,98
Sep092005	322,03		SELL							1,98
Sep082005	314,85		SELL							1,98
Sep072005	313,85		SELL							1,98
Sep062005	318,32		SELL							1,98
Sep052005	318,79		SELL							1,98
Sep022005	317,02		SELL							1,98
Sep012005	319,48		SELL							1,98
Aug312005	309,08		SELL							1,98
Aug292005	300,15		SELL							1,98
Aug262005	300,20		SELL							1,98
Aug252005	298,14		SELL							1,98
Aug232005	291,92		SELL							1,98
Aug222005	289,51		SELL							1,98
Aug192005	284,57		SELL							1,98
Aug112005	291,12		SELL							1,98
Aug102005	296,83		SELL							1,98
Aug092005	297,01		SELL							1,98
Aug082005	299,25		SELL	SELL						1,98
Aug052005	299,45		SELL	SELL						1,98
Aug042005	301,24		SELL							1,98
Aug032005	297,27		SELL	SELL						1,98
Aug022005	295,43		SELL	SELL						1,98
Aug012005	297,77		SELL							1,98
Jul292005	296,15		SELL							1,98
Jul282005	293,43		SELL							1,98
Jul272005	291,65		SELL							1,98
Jul262005	287,31		SELL							1,98
Jul252005	292,73		SELL							1,98

Sep132001	84,66			SELL								0,92
Sep112001	92,96			SELL								0,92
Aug152001	92,34			SELL								0,92
Aug142001	89,20			SELL	FIRST SELL	-8,2%	18		1			0,92
Jul192001	97,15	BUY			FIRST BUY	-11,2%	125			1		1,00
Jun192001	107,94			SELL								1,00
Jun182001	110,82			SELL								1,00
Jun152001	118,40			SELL								1,00
Jun142001	120,17			SELL								1,00
Jun132001	112,84			SELL								1,00
Jun122001	114,29			SELL								1,00
Jun112001	116,36			SELL								1,00
Jun082001	121,38			SELL								1,00
Jun072001	120,06			SELL								1,00
Jun062001	117,33			SELL								1,00
Jun052001	112,97			SELL								1,00
Jun042001	117,61			SELL								1,00
Jun012001	112,71			SELL								1,00
May312001	108,80			SELL								1,00
May302001	106,87			SELL								1,00
May292001	110,61			SELL								1,00
May282001	112,31			SELL								1,00
May252001	119,68			SELL								1,00
May242001	116,17			SELL								1,00
May232001	120,52			SELL								1,00
May222001	126,44			SELL								1,00
May212001	126,07			SELL								1,00
May182001	127,39			SELL								1,00
May172001	123,73			SELL								1,00
May162001	122,99			SELL								1,00
May152001	115,72			SELL	SELL							1,00
May142001	118,96			SELL	SELL							1,00
May112001	117,79			SELL	SELL							1,00
May102001	121,43			SELL								1,00
May092001	122,76			SELL								1,00
May082001	127,28			SELL								1,00
May072001	122,03			SELL								1,00
May042001	125,30			SELL								1,00
May032001	128,30			SELL								1,00
May012001	120,93			SELL								1,00
Apr302001	123,67			SELL								1,00
Apr272001	123,63			SELL								1,00
Feb162001	101,69			SELL								1,00
Jan262001	107,43			SELL								1,00
Jan252001	109,80			SELL								1,00
Jan172001	109,45			SELL	FIRST SELL							1,00

Appendix 6. Average Overnight Interest Rates

Year	Average Overnight Interest Rate
2001	60,00%
2002	52,89%
2003	39,26%
2004	21,82%
2005	16,24%
2006	16,06%
2007	17,39%
2008	16,70%
2009	10,20%
2010	7,47%
2011	7,08%
2012	8,22%
2013	6,22%
2014	8,57%
2015	9,19%
2016	9,36%
2017	10,24%
2018	15,93%
2019	17,63%
2020	9,33%

Resource: <https://www.tcmb.gov.tr>