“IS IT POSSIBLE TO MAKE PROFIT ONLY WITH TECHNICAL ANALYSIS?-ISE
NATIONAL 100 INDEX ANALYSIS.”
A study on profitability of technical analysis.

AYLİN HAŞAL

AUGUST 2007

"IS IT POSSIBLE TO MAKE PROFIT ONLY WITH TECHNICAL ANALYSIS?-ISE
NATIONAL 100 INDEX ANALYSIS."
A study on profitability of technical analysis.

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
IZMIR UNIVERSITY OF ECONOMICS

BY

AYLİN HAŞAL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN
THE GRADUATE SCHOOL OF SOCIAL SCIENCES

AUGUST 2007

ABSTRACT

"IS IT POSSIBLE TO MAKE PROFIT ONLY WITH TECHNICAL ANALYSIS?-
ISE NATIONAL 100 INDEX ANALYSIS."
A study on profitability of technical analysis.

Aylin Haşal

MA in Financial Economics
Department of Social Sciences

Supervisor: Asst. Prof. Dr. Ayla Oğuş

August 2007, 107 pages

This thesis analyzes the profitability of technical analysis. After studying early empirical papers and surveys on technical analysis, a questionnaire is done to the analysts of Turkish brokerage houses. This personally administrated and mail questionnaires were returned by 66 applicants. This survey is done to understand if technical analysis is a preferred method for stock market, how often it is used, analysts choose which indicators, chart types etc. 59 of 66 analysts answers that they generally use technical analysis to decide a trading strategy. 49 of 59 states that they believe the profitability of technical analysis. Additionally, 43 of 59 technical analysts prefer short term analysis. By the help of these kinds of answers, performance of ISE National 100 index for the first six months of 2007 and for year 2006 is examined separately by using daily, linear charts and indicators and ignoring statistical analysis in order to find if an investor can make profit just by looking technical indicators. After combining all results it can be said that technical analysis is generally enough to make profit in stock markets but not big ones. Moreover, it is the most preferred method, especially for short-term analysis. My aim is to understand if technical analysis is enough by itself. Profits shows it is enough but according to the results if investor includes fundamental factors, news etc. into the decision making process he/she may increase the profit level.

Keywords: technical indicators, charts, forecasting

ÖZET

"SADECE TEKNİK ANALİZ İLE KAR SAĞLAMAK MÜMKÜN MÜ?-IMKB
ULUSAL 100 ENDEKS ANALİZİ"
Teknik analizin karlılığı üzerine bir çalışma.

Aylin Haşal

FİNANS EKONOMİSİ YÜKSEK LİSANS PROGRAMI
Sosyal Bilimler Enstitüsü

Tez Yöneticisi: Yrd. Doç. Dr. Ayla Oğuş

Ağustos 2007, 107 sayfa

Bu çalışma teknik analizin karlılığı ve yararlılığı üzerine yapılmıştır. Önceden
yapılmış çalışmalar ve anketler incelendikten sonra Türkiye'deki borsa aracı
kurumlarında çalışan analistlere bir anket yapılmıştır. Bu elden ve mail ortamında
yapılan anket çalışmasına 66 kişiden yanıt gelmiştir. Bu anket teknik analizin hisse
senedi piyasası için tercih edilen bir yöntem olup olmadığını, hangi sıklıkla
kullanıldığını, analistler tarafından hangi indikatörlerin ve grafik tiplerinin
kullanıldığını ve bunlara benzer konuları anlamak için yapılmıştır. 66 analistten
59'u karar verme sürecinde genellikle teknik analizi tercih ettiklerini belirtmiştir. Bu
59 kişinin 49'u ise teknik analizin karlılığına inandıklarını dile getirmiştir. İlave
olarak, 59'un 43'ü kısa vadeli analizleri tercih etmiştir. Bu tarz cevapların
yardımıyla, istatistiksel geçerlilikler göz ardı edilerek, IMKB Ulusal 100 endeksinin
2007'nin ilk yarısı ve 2006 yıllarını kapsayan günlük, lineer grafiklerinin
kullanıldığı bir analizi yapılmış, sadece teknik göstergelere bakarak kar sağlanıp
sağlanamayacağı bulunmaya çalışılmıştır. Tüm sonuçlar bir araya getirildiğinde,
hisse senedi piyasasında teknik analizin tek başına kar sağlayabildiğini ancak
bunların büyük karlar olmadığını söyleyebiliriz. İlave olarak, teknik analizin,
özellikle kısa vadeli analizlerde, en çok tercih edilen yöntem olduğu ortaya çıkıyor.
Amaç teknik analizin kar yaratmak için tek başına yeterli olup olmadığını anlamaktı.
Çıkan karlar yeterli olduğu gösteriyor ancak, analizlere, yapısal faktörler, temel
analiz, haberler, para giriş çıkışları gibi etkileyiciler ilave edildiğinde yatırımcının
kar rakamını yükseltmesi beklenebilir.

Anahtar Kelimeler: teknik göstergeler, grafikler, tahmin

TABLE OF CONTENTS

LIST OF FIGURES

CHARTS

LIST OF TABLES

CHAPTER I

1-INTRODUCTION

As long as financial markets have existed, people have tried to forecast them, in the hope that good forecasts would bring them great fortunes. The main purpose of technical analysis is to identify the price trends, which are determined by the changing attitudes of investors towards a variety of economic, monetary, political and psychological forces. Technical analysis is one of the most preferred methods to make profit by financial transactions. On the other hand, according to the theory, markets are efficient and it is impossible to beat the market because prices already incorporate and reflect all relevant information. This theory has been met with a lot of opposition, especially from the technical analysts. Their argument against the efficient market theory is that many investors base their expectations on past prices, past earnings, records of accomplishment and other indicators.

In practice, it is very clear that markets are inefficient and using both fundamental and technical analysis methods investors can generally make profit. Most survey studies done until now indicate that technical analysis has been widely used by market participants in futures markets and foreign exchange markets. And, according to the survey results, technical analysis bring profits after transaction costs

especially for short term investments in futures and foreign exchange markets. But there is not any survey study on the profitability of technical analysis for stock market. In order to test "if the technical analysis (indicators) has forecasting power to bring profits", a questionnaire is done to 66 analysts of Turkish brokerage houses. This survey is done to understand if technical analysis is a preferred method for stock market, how often it is used, which indicators, chart types analysts choose etc. By the help of the answers, performance of ISE National 100 index for the first six months of 2007 and for year 2006 is examined separately by using charts and indicators with ignoring statistical analysis in order to find if an investor can make profit just by looking technical indicators. In my opinion, for volatile financial markets like Turkey where foreign investors have more than 70% share in it, it is very difficult to make much profit after transaction costs because of unexpected money inflows- outflows, foreign news etc. However, it is still possible to be positive at the end of the period.

Riskiness of technical trading rule and statistical significance are ignored and no benchmark strategy is used as there are many studies (Taylor, Lukac, Brorsen-1990) that indicate trading rule returns generally do not follow normal distribution and there is no consensus on which benchmark should be used for a specific market. Before starting the analysis, what technical analysis is has to be described.

Technical analysis is a method of evaluating securities by analyzing the statistics generated by market activity, such as past prices and volume. Unlike fundamental analysis, technical analysis does not try to measure intrinsic value of a

security, it tries to forecast price patterns and future activity. In order to do this charts and graphs are used.

Academicians are interested to know if series of speculative prices can be forecasted. On the other hand, in financial practice, it is not the question whether it is possible to forecast, but how the future path of a financial time series can be forecasted. Among practitioners fundamental and technical analysis are techniques developed in financial practice according to which guidelines financial time series should and could be forecasted. Their aim is to give advice on what and when to buy or sell. In contrast, academics focus on the behavior and characteristics of a financial time series itself and try to explore if there is certain dependence in successive price changes that could profitably be exploited by various kinds of trading techniques.(Griffioen 2003)

Pring, a leading technical analyst, provides a specific definition:
"The technical approach to investment is essentially a reflection of the idea that prices move in trends that are determined by the changing attitudes of investors toward a variety of economic, monetary, political, and psychological forces. The art of technical analysis, for it is an art, is to identify a trend reversal at a relatively early stage and ride on that trend until the weight of the evidence shows or proves that the trend has reversed."(Park, Irwin 2004)

The field of technical analysis is based on three assumptions: The market discounts everything, price moves in trends, history tends to repeat itself. Price

(market) discounts everything theorem is similar to the strong and semi-strong forms of market efficiency. Technical analysts believe that the current price fully reflects all information. Because all information is already reflected in the price, it represents the fair value, and should form the basis for analysis. After all, the market price reflects the sum knowledge of all participants, including traders, investors, portfolio managers, buy-side analysts, sell-side analysts, market strategist, technical analysts, fundamental analysts and many others. Technical analysis utilizes the information captured by the price to interpret what the market is saying with the purpose of forming a view on the future. Additionally, most technicians agree that prices trend. However, most technicians also acknowledge that there are periods when prices do not trend. If prices were always random, it would be extremely difficult to make money using technical analysis. Steps of technical analysis can be listed as follows; 1) Broad market analysis through the major indices such as the S&P 500, Dow Industrials, NASDAQ and ISE National 100 and 30 etc. 2) Sector analysis to identify the strongest and weakest groups within the broader market 3) Individual stock analysis to identify the strongest and weakest stocks within select groups.

There are also some psychological explanations of why a large number of people have a strong belief in technical analysis. First of them is "Communal Reinforcement". It is a social construction in which a strong belief is formed when a claim is repeatedly asserted by members of a community, rather than due to the existence of empirical evidence for the validity of the claim. Second is "Selective Thinking". It is the process by which one focuses on favourable evidence in order to justify a belief, ignoring unfavourable evidence. Third one is "Confirmation Bias". It

is a cognitive bias whereby one tends to notice and look for information that confirms one's existing beliefs, while ignoring anything that contradicts those beliefs. It is a type of selective thinking. The last one is "Self-deception". It is the process of misleading ourselves to accept as true or valid what we believe to be false or invalid by ignoring evidence of the contrary position. Technical analysts consider the market to be 80% psychological and 20% logical. Fundamental analysts consider the market to be 20% psychological and 80% logical. Psychological or logical may be open for debate, but there is no questioning the current price of a security. After all, it is available for all to see and nobody doubts its legitimacy. The price set by the market reflects the sum knowledge of all participants. These participants have considered (discounted) everything under the sun and settled on a price to buy or sell. These are the forces of supply and demand at work. By examining price action to determine which force is prevailing, technical analysis focuses directly on the bottom line: What is the price? Where has it been? Where is it going? Even though there are some universal principles and rules that can be applied, it must be remembered that technical analysis is more an art form than a science. As an art form, it is subject to interpretation. However, it is also flexible in its approach and each investor should use only that which suits his or her style. Developing a style takes time, effort and dedication, but the rewards can be significant. (www.technicalanalysis.org.uk)

Dow Theory, a theory based on the collected writings of Dow Jones co-founder and Editor Charles Dow, inspired the use and development of technical analysis from the end of the 19th century. Modern technical analysis considers Dow Theory its cornerstone. Since Charles H. Dow first introduced the Dow Theory in the

late 1800s, technical analysis has been extensively used among market participants such as brokers, dealers, fund managers, speculators, and individual investors in the financial industry.

Charles Dow thought that expectations for the national economy were translated into market orders that caused stocks to rise or fall in prices over the long term together usually in advance of actual economic developments. He believed that fundamental economic variables determine prices in the end. To quantify his theory Charles Dow began to compute averages to measure market movements. This led to the existence of the Dow-Jones Industrial Average (DJIA) in May 1896 and the Dow-Jones Railroad Average (DJRA) in September 1896. Dow Theory depends on six missions;it assumes that all information is discounted in the averages; hence, no other information is needed to make trading decisions. The Dow Theory is based on Charles Dow's philosophy that *the rails should take what the industrials make*. Stated differently, the two averages DJIA and DJRA should confirm each other. He meant that no important bull or bear market signal could take place unless both averages gave the same signal. In other words, both averages had to exceed a previous secondary peak in order for a bull market to begin (Griffioen 2003). If only one average gave the signal, then there was no bull market. Further, market has three types of trend; primary (also called major), secondary (also called intermediate) and tertiary (also called minor) upward and downward price movements. Aim of the theory to detect the primary trend changes in an early stage. Minor trends tend to be much more influenced by random news events than the secondary and primary trends and are said to be therefore more difficult to identify. Volume is also very important, it has to confirm trend. Volume is simply the number of shares or contracts that trade

over a given period of time, usually a day. The higher the volume, the more active the security. Volume bars illustrate how many shares have traded per period and show trends in the same way that prices do. If the primary trend is upward (downward), volume should increase when price rises (declines) and should decrease when price declines (rises).

Chart of a downtrend	Chart of an uptrend

Chart-1	Chart-2

Chart 1 and 2 are examples of downward and upward trends of two securities. The assumption that prices must trend is probably the most important concept in technical analysis. Unfortunately, trends are not always easy to see. Generally, prices tend to move in a series of highs and lows. In technical analysis, the movement of the highs and lows forms a trend. There are three types of trend.

- Up trends

- Downtrends

- Sideways/Horizontal Trends

When each successive peak and trough is higher, it is referred to as an upward trend. If the peaks and troughs are getting lower, it is a downtrend. When there is little movement up or down in the peaks and troughs, it is a sideways or horizontal

trend. A trend of any direction can be classified as a long-term trend, intermediate trend or a short-term trend. In terms of the stock market, a major trend is generally categorized as one lasting longer than a year. An intermediate trend is considered to last between one and three months and a near-term trend is anything less than a month. A long-term trend is composed of several intermediate trends, which often move against the direction of the major trend. If the major trend is upward and there is a downward correction in price movement followed by a continuation of the uptrend, the correction is considered an intermediate trend. The short-term trends are components of both major and intermediate trends.

Trend types according to the time periods

Chart-3

When analyzing trends, it is important that the chart be constructed to best reflect the type of trend being analyzed. To help identify long-term trends, chartists to get a better idea of the long-term trend use weekly charts or daily charts spanning a five-year period. Daily data charts are best used when analyzing both intermediate and short-term trends. It is also important to remember that the longer the trend, the more important it is; for example, a one-month trend is not as significant as a five-year trend. (www.investopedia.com)

CHAPTER II

2-LITERATURE REVIEW

Literature on the profitability of technical analysis is described in two parts. First, main theories in technical analysis concept are examined. After that, surveys, early and modern empirical studies and other literature on the profitability of technical analysis are cited.

2.1-THEORY OF TECHNICAL ANALYSIS

Technical analysis is a very large topic. But, most important theories can be listed like; random walk hypothesis, efficient market hypothesis, noisy rational expectations models, and feedback models. Therefore, in this section they are described only.

2.1.1-Random Walk Hypothesis

It is the theory that stock price changes have the same distribution and are independent of each other, so the past movement or trend of a stock price or market cannot be used to predict its future movement. In short, this is the idea that stocks take a random and unpredictable path. A follower of the random walk theory believes it is impossible to outperform the market without assuming additional risk. Critics of

the theory, however, contend that stocks do maintain price trends over time - in other words, that it is possible to outperform the market by carefully selecting entry and exit points for equity investments.(www.investopedia.com)

Much of the theory on these subjects can be traced to French mathematician Louis Bachelier (1900). He said that "The mathematical expectation of the speculator is zero" and he described this condition as a "fair game". Unfortunately, his insights were so far ahead of the times that they went largely unnoticed for over 50 years. Alexander began defining filters to reveal possible trends in stock prices. A filter strategy buys when price increases by x % from a recent low and sells when price declines by x % from a recent high. Alexander concludes that in speculative markets a price move, once initiated, tends to persist. Thus, he concludes that the basic philosophy underlying technical analysis, that is prices move in trends, holds. The filter rules still show considerable excess profits over the buy-and-hold strategy, but transaction costs wipe out all the profits.(Griffioen 2003)

Fama (1965) tries to show with various tests that price changes are independent and that therefore the past history of stock prices cannot be used to make meaningful predictions concerning its future behavior. Moreover, if it is found that there is some dependence, then Fama argues that this dependence is too small to be profitably exploited because of transaction costs.

2.1.2-Efficient Market Hypothesis

Besides testing the random walk theory with serial correlation tests, runs tests and by applying technical trading rules used in practice, academics were searching for a theory that could explain the random walk behavior of stock prices. EMH is an idea partly developed in the 1960s by Eugene Fama (1965). It states that it is impossible to beat the market because prices already incorporate and reflect all relevant information.

An efficient market is a market where there are large numbers of rational profit maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, competition among the participants leads to a situation where actual prices of securities already reflect the effects of information. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value. There are three forms of the efficient market hypothesis;

- The **"Weak" form** asserts that all past market prices and data are fully reflected in securities prices. In other words, technical analysis is of no use.
- The **"Semistrong" form** asserts that all publicly available information is fully reflected in securities prices. In other words, fundamental analysis is of no use.
- The **"Strong" form** asserts that all information is fully reflected in securities prices. In other words, even insider information is of no use.

This theory is criticized by technical analysts. Their argument against the efficient market theory is that many investors base their expectations on past prices, past earnings, track records and other indicators. Because stock prices are largely based on investor expectation, many believe it only makes sense to believe that past prices influence future prices. Early tests of the EMH focus on technical analysis and it is chartists whose very existence seems most challenged by the EMH. And in fact, the vast majority of studies of technical theories have found the strategies to be completely useless in predicting securities prices. However, researchers have documented some technical anomalies that may offer some hope for technicians, although transactions costs may reduce or eliminate any advantage.

2.1.3-Noisy Rational Expectations Models

Noisy rational expectations equilibrium models were developed on the basis of asymmetric information among market participants. In other words, trading is based on differences in beliefs. Efficient market hypothesis assumes that market participants are rational and have homogeneous beliefs about information. Oppositely, noisy rational expectations equilibrium models assume that the current price does not fully reveal all available information because of noise (unobserved current supply of a risky asset or information quality) in the current equilibrium price. Thus, price shows a pattern of systematic slow adjustment to new information and this implies the existence of profitable trading opportunities (Park, Irwin 2004). Traders demand some quantity of a risky asset based on rational expectations and utility maximization. In either the extremes when all traders choose to be informed or no traders choose to be informed, markets become thin and trading breaks down. This

condition occurs when either there is little noise in the system so there is no need to become informed, or when the cost of information is very low so all traders become informed.

2.1.4-Noise Traders and Feedback Models

In the early 1990s, field of behavioral finance was developed. Behavioral finance is a branch of social science which includes psychology and sociology to the field of finance. In the behavioral finance model, there are two types of investors; arbitrageurs and noise traders. Arbitrageurs are defined as investors who form fully rational expectations about security returns, while noise traders are investors who irrationally trade on noise as if it were information. The behavioralists' approach (feedback models) is based on two assumptions. First, noise traders' demand for risky assets is affected by their irrational beliefs or sentiments that are not fully justified by news or fundamental factors. Second, since arbitrageurs are likely to be risk averse, arbitrage is risky and therefore limited.

In feedback models, noise traders buy when prices rise and sell when prices fall, like trend chasers. For example, when noise traders follow positive feedback strategies (buy when prices rise), this increases aggregate demand for an asset they purchased and thus results in a further price increase. Arbitrageurs having short horizons may think that the asset is mispriced above its fundamental value, and sell it short. However, their arbitrage is limited because it is always possible that the market will perform very well (fundamental risk) and that the asset will be even more overpriced by noise traders in the near future because they can be even more

optimistic. As long as there exists risk created by the unpredictability of noise traders'
opinions, sophisticated investors' arbitrage will be reduced even in the absence of
fundamental risk and thus they do not fully counter the effects of the noise traders.
Arbitrageurs optimally buy the asset that noise traders have purchased and sell it out
much later when its price rises high enough. Therefore, although ultimately
arbitrageurs make prices return to their fundamental levels, in the short run they
amplify the effect of noise traders (De Long et al. 1990).

2.1.5- Other Models

Beja and Goldman (1980) introduced a simple disequilibrium model that
explained the dynamic behavior of prices in the short run. According to their model,
when price movements are forced by supply and demand, a nonstationary economy
must experience at least some transient moments of disequilibrium. Therefore,
observed prices will depend not only on the state of the environment, but also on the
state of the market that includes agents' endowments, preferences, and information
generally changing with time.

Froot, Scharfstein, and Stein (1992) demonstrated that herding behavior of
short-horizon traders could lead to informational inefficiency. Their model showed
that an informed trader who wants to buy or sell in the near future could benefit from
their information only if it is subsequently impounded into the price by the trades of
similarly informed speculators. Thus, short-horizon traders would make profits when
they can coordinate their research efforts on the same information. This kind of

positive informational spillover can be so powerful that herding traders may even analyze information that is not closely related to the asset's long-run value.

Clyde and Osler (1997) provide another theoretical foundation for technical analysis as a method for nonlinear prediction on a high dimension (or chaotic) system. They showed that graphical technical analysis methods might be equivalent to nonlinear forecasting methods. Technical analysis seemed to work better on nonlinear data than on random data and generated more profits than random buying and selling when applied to a known nonlinear system. This led Clyde and Osler to conclude that "Technical methods may generally be crude but useful methods of doing nonlinear analysis".

Introducing a simple agent-based model for market price dynamics, Schmidt (1999, 2000,2002) showed that if technical traders are capable of affecting market liquidity, their concerted actions can move the market price in the direction favorable to their strategy. The logic is simple: if technical traders believe price will fall, they sell, and thus, excess demand decreases. As a result, price decreases, and the chartist component of regular traders forces them to sell. This leads price to decrease further until the fundamentalist priorities of regular traders become overwhelming. The opposite situation occurs if technical traders make a buy decision based on their analysis. Hence, Schmidt concluded that if technical traders are powerful enough in terms of trading volume, they could move price in the direction favorable to their technical trading strategy. (Park, Irwin 2004)

2.1.6-Summary of Theory

In efficient market models, technical trading profits are not feasible because, in efficient markets current prices reflect all available information. The simplest random walk model assumes that successive price changes are independently and identically distributed with zero mean. In contrast, other models, like noisy rational expectations models, feedback models, disequilibrium models, herding models, agent-based models, and chaos theory, postulate that price adjusts to new information due to noise, market frictions, market power, investors' sentiments or herding behavior, or chaos. In these models, therefore, there exist profitable trading opportunities that are not being exploited. For example, noisy rational expectations model assumes that the current price does not fully reveal private information because of noise (unobserved current supply of a risky asset) in the current equilibrium price, so that historical prices (i.e., technical analysis) together with the current price help traders make more precise inferences about past and present signals than does the current price alone. As another example, behavioral finance models say that noise traders, who misperceive noise as if it were information (news or fundamental factors) and irrationally act on their belief or sentiments, bear a large amount of risk relative to rational investors and thus may earn higher expected returns. The behavioral models suggest that technical trading may be profitable in the long run even if technical trading strategies (buy when prices rise and sell when prices fall) are based on noise or "popular models" and not on information. Nevertheless, the efficient markets hypothesis still seems to be a dominant paradigm in the sense that financial economists have not yet reached a consensus on a better model of price formation. Disagreement in theoretical models makes empirical evidence a key

consideration in determining the profitability of technical trading strategies. (Park, Irwin 2004)

2.2-LITERATURE ON THE PROFITABILITY OF TECHNICAL ANALYSIS

The main purpose of technical analysis is to identify the price trends, which are determined by the changing attitudes of investors towards a variety of economic, monetary, political and psychological forces. Most chartists agree that prices trend. However, they also acknowledge that there are periods when prices do not trend. If prices are always random, it would be impossible to make money using technical analysis. The goal of a chartist is to identify these periods of non-random major trends. Some empirical studies done by followers of efficient market hypothesis do not see any utility in technical analysis.

On the other hand, there is strong evidence on the forecasting power of technical analysis (Allen and Taylor 1990 and Neftci 1991). For example, Brock et al (1992) forecast changes in the DJIA over a long sample period. For LeBaron (1999), a financial economist, technical trading rules can be viewed as another set of moment conditions that can be used either in specification testing or in estimation. Technical trading rules therefore assume a dual role as a signal of interesting behavior that may have some practical values, and as a data description that economic theorists should be aware of. Some of the studies are mentioned below.

Conrad and Kaul (1988) found that weekly returns were positively autocorrelated for the portfolio of small stocks. Shiller (1984, 1987), writer of "from

efficient markets theory to behavioral finance", found that irrational investor behaviour resulted in excess bond and stock market volatility. He also suggested that the October 1987 worldwide stock market crash could be due largely to technical analysis. DeBondt, Werner and Thaler (1985, 1987) found that stocks that were extreme losers over a 3-5 year period tend to have strong returns relative to the market during the following years. Oppositely, extreme winners generally get weaker returns in subsequent years. In other words, past losers significantly outperform past winners. Sy (1990) had argued against Sharpe's (1975) conclusion, saying that there was no need for the predictive accuracy to be as high as 70 percent for the gains to be large. In addition, he demonstrated that market timing would be increasingly rewarding when the difference in returns between cash and stocks were narrowed and when market volatility increased. Since aggregate output is serially correlated and, hence, predictable, the theory suggests that stock returns can be predicted based on rational forecasts of output. The empirical results confirm that stock returns are a predictable function of aggregate output and support the accompanying implications of the model. Balvers et al (1990) show empirically that stock returns could be predicted based on national aggregate output. Other studies have shown that some fundamental data like price earnings ratio, dividend yields, business conditions and economic variables can predict to a large degree the returns on stocks. Lo et al (2000) examine the prevalence of various technical patterns in the American share prices during 1962-1996. By comparing the unconditional empirical distribution of daily stock returns to the conditional distribution—conditioned on specific technical indicators such as head-and-shoulders or double-bottoms—it is found that over the 31-year sample period, several technical indicators do provide incremental

information and may have some practical value and the patterns are recurrent. Even though the study does not prove that the patterns are sufficiently predictable to ensure sufficient profit, the authors believe that risks are justified. Despite voluminous literature, the role of technical analysis is still far from clearly understood. (Wong,Manzur,Chew 2002)

2.2.1-Survey Studies

The survey literature indicates that technical analysis has been widely used by market participants in futures markets and foreign exchange markets, and that about 30% to 40% of practitioners appear to believe that technical analysis is an important factor in determining price movement at shorter time horizons up to 6 months.

Survey studies attempt to directly investigate market participants' behavior and experiences, and document their views on how a market works. These features cannot be easily observed in typical data sets. The oldest survey study regarding technical analysis dates back to Stewart (1949). The study was restricted to results in grain futures over a 9-year period and found that 75% of speculators lost money. The result indicated that in general traders were unsuccessful in their grain futures trading, regardless of their scale and knowledge of the commodity traded. Amateur speculators were more likely to be long than short in futures markets. Long positions generally were taken on days of price declines, while short positions were initiated on days of price rises. Thus, trading against the current movement of prices appeared to be dominant. However, a representative successful speculator showed a tendency to buy on reversals in price movement during upward price swings and sell on upswings

that followed declines in prices, suggesting that successful speculators followed market trends.

Smidt (1965) surveyed trading activities of amateur traders in the US commodity futures markets in 1961. He documented that most amateur speculators surveyed preferred to trade commodities about which they had personal knowledge or advice. He attempted to classify their trading strategies and decision-making criteria. In this survey, about 53% of respondents claimed that either they used charts exclusively or moderately in order to identify trends. The chartists, whose jobs hardly had relation to commodity information, tended to trade more commodities in comparison to the other traders (non-chartists). Only 24% of the chartists had been trading for six or more years, while 42% of non-chartists belonged to the same category. There was a slight tendency for chartists to pyramid more frequently than other traders. It is interesting to note that only 10% of the chartists, compared to 29% of the non-chartists, nearly always took long positions.

The Group of Thirty (1985) surveyed the views of market participants on the functioning of the foreign exchange market in 1985. The respondents were composed of 40 large banks and 15 securities houses in 12 countries. The survey results indicated that 97% of bank respondents and 87% of the securities houses believed that the use of technical analysis had a significant impact on the market. The Group of Thirty reported, "Technical trading systems, involving computer models and charts, have become the vogue, so that the market reacts more sharply to short term trends and less attention is given to basic factors."

Brorsen and Irwin (1987) carried out a survey of large public futures funds' advisory groups in 1986. Most of the applicants responded that they relied heavily on computer-guided technical trading systems. Most fund advisors appeared to use technical trading rules by optimizing parameters of their trading systems over historical data. Because of liquidity costs, futures funds held 80% of their positions in the nearby contract, and the average number of commodities they traded had been quite constant through time.

Frankel and Froot (1990) explain the sharp rise in the demand for the dollar over the 1981-85 periods as a shift in the weight of market opinion away from fundamentalists and toward chartists. This shift is modeled as a Bayesian response to the inferior forecasting performance of the economic fundamentalists. The evidence provided was the survey results of *Euromoney* magazine for foreign exchange forecasting firms. According to the magazine, in 1978, nineteen forecasting firms exclusively used fundamental analysis and only three firm's technical analysis. After 1983, however, the distribution had been reversed. In 1983, only one firm reported using fundamental analysis, and eight technical analyses. In 1988, seven firms appeared to rely on fundamental analysis while eighteen firms employed technical analysis. In their analysis, they understood for some time that under conditions of high international capital mobility, currency values would move sharply and unexpectedly in response to new information.

Taylor and Allen's paper (1992) reports the results of a survey conducted on behalf of Bank of England, among chief foreign exchange dealers based in London in

November 1988. The survey asked dealers questions concerning which chartist methods are most used in practice, the role of chartists within their organizations and attempted to elicit views (both quantified and impressionistic) on how market participants view the role of Chartism. The results indicated that 64% of respondents reported using moving averages and/or other trend-following systems and 40% reported using other trading systems such as momentum indicators or oscillators, 60% viewing technical analysis to be at least as important as fundamental analysis and 90% of respondents place some weight on non-fundamental analysis. There is also a skew toward reliance on technical analysis at shorter horizons, which becomes steadily reversed as the length of horizon considered is increased. A very high proportion of dealers say fundamental and technical analyses are complementary.

In Menkhoff's paper (1997) implications of the efficient market hypothesis for the use of technical currency analysis are examined by an evaluation of the response to a postal questionnaire by foreign exchange professionals in Germany. The purposes of this questionnaire study are fourfold. First, it reruns at a different time and place the work of Taylor and Allen (1992), which had documented aspects of technical analysis use by chief foreign exchange dealers in London. Second, it broadens the empirical basis by covering other (non-chief) dealers, and also international fund managers. Third, it introduces a third type of information in addition to fundamental and technical analysis: flow analysis. Fourth, this study extends and organizes the scope of empirical investigation by examining the five propositions related to the efficient market hypothesis. His survey revealed that 87% of the dealers placed a weight of over 10% to technical analysis in their decision-

making. The mean value of the importance of technical analysis appeared to be 35% and other professionals showed similar responses. Respondents believed that technical analysis influenced their decision from intraday to 2-6 months by giving a weight of between 34% and 40%. Other interesting findings were: (1) professionals preferring technical analysis were younger than other participants; (2) there was no relationship between institutional size and the preferred use of technical analysis; and (3) chartists and fundamentalists both indicated no significant differences in their educational level.

Lui and Mole (1998) surveyed the use of technical and fundamental analysis by foreign exchange dealers in Hong Kong in 1995. Similar to previous survey results, technical analysis appeared to be important to dealers at the shorter time horizons up to 6 months. Respondents considered moving averages and/or other trend-following systems the most useful technical analysis. Findings reveal that>85% of respondents rely on both fundamental and technical analyses for predicting future rate movements at different time horizons. At shorter horizons, there exists a skew towards reliance on technical analysis as opposed to fundamental analysis, but the skew becomes steadily reversed as the length of horizon considered is extended. Technical analysis is considered slightly more useful in forecasting trends than fundamental analysis, but significantly more useful in predicting turning points.

Cheung and Wong (2000) reported findings from a survey of practitioners in the interbank foreign exchange markets in Hong Kong, Tokyo, and Singapore. Their survey results indicated that most respondents agree that non-fundamental factors

have impacts on short-run exchange rates. Speculation is believed to increase volatility but also improve market liquidity and efficiency. Despite their claim that intervention exacerbates volatility, more than one-half of the respondents suggest official intervention helps restore equilibrium. In 2005 Wong, Du, and Chong wrote "Do the technical indicators reward chartists? A study on the stock markets of China, Hong Kong and Taiwan." They conclude from the results that, technical analysis can play a useful role in timing of stock market entry and exit.

Cheung, Chinn, and Marsh (2000) surveyed the views of UK-based foreign exchange dealers on technical analysis in 1998. In this survey, fundamental value is seen as a relevant concept by a large proportion of traders at horizons much shorter than mainstream academic theory can explain. On the other hand, speculative forces appear to be an important factor in determining short-term currency movements. Although much has been made of the differences between chartists and fundamentalists, this survey shows very little evidence of systematic differences of opinion between these two groups. However, there is clear evidence of heterogeneity in the foreign exchange market as a whole. There is no consensus among traders on a wide range of important issues relating to fundamental value and the determinants of exchange rate movements. Finally, market 'norms' and behavioural phenomena are very strong in the FX market and appear to be key determinants of the bid–ask spread. In the survey, 33% of the respondents described themselves as technical analysts and the proportion increased by approximately 20% compared to that of five years ago. Moreover, 26% of the dealers responded that technical trading is the most important factor that determines exchange rate movements over the medium run.

Cheung and Chinn (2001) published survey results for US-based foreign exchange traders conducted in 1998. In the survey, about 30% of the traders indicated that technical trading best describes their trading strategy. Five yeas earlier, only 19% of traders had judged technical trading as their trading practice. About 31% of the traders responded that technical trading was the primary factor determining exchange rate movements up to 6 months.

Oberlechner (2001) wrote an article, which presents findings of a questionnaire and an interview survey on the perceived importance of chartist/technical and fundamental analysis among foreign exchange traders and financial journalists in Frankfurt, London, Vienna, and Zurich in 1996. Results confirm that most traders use both forecasting approaches, and that the shorter the forecasting horizon, the more important chartist/technical analysis is. Financial journalists put more emphasis on fundamental analysis than do foreign exchange traders. Results indicate that the importance of chartism may have increased over the last decade. Forecasting styles and the overall importance attached to fundamental versus chartist/technical analysis vary across different trading locations. Foreign exchange traders mention a series of psychological motives and consequences of the use of chartism. For foreign exchange traders, technical analysis seemed to be a more important forecasting tool than fundamental analysis up to a 3- month forecasting horizon, while for financial journalists it seemed to be more important up to 1-month. However, forecasting techniques differed in trading locations on shorter forecasting horizons. From intraday to a 3- month forecasting horizon, traders in smaller trading locations (Vienna and Zurich) placed more weight on technical analysis than did

traders in larger trading locations (London and Frankfurt). Traders generally used a mixture of both technical and fundamental analysis in their trading practices. Only 3% of the traders exclusively used one of the two forecasting techniques. Finally, comparing the survey results for foreign exchange traders in London to the previous results of Taylor and Allen (1992), the importance of technical analysis appeared to increase across all trading horizons relative to 1988 (the year when Taylor and Allen conducted a survey).

It is understood from the survey studies that technical analysis has been widely used by practitioners in futures markets and foreign exchange markets, and regarded as an important factor in determining price movements in the short run. However, number of survey evidence for stock market traders found is very low. Because of this situation, a survey is done with financial analysts of Turkish brokerage houses. The results of the survey will be examined later.

2.2.2-Empirical Studies

Results of early empirical studies on the profitability of technical trading rules, changes market to market. There are studies on stocks, futures and exchange rates. Some important ones are listed below.

Between 1960 and 1987;

For thirty individual stock market, Fama and Blume (1966) found that filter rules could not outperform the simple buy-and-hold strategy after transaction costs. After commissions, only 4 of 30 securities had positive average returns per filter. Van Horne and Parker (1967) studied thirty stocks with moving averages as a technical

trading system and found that no trading rule earned a total closing balance nearly as large as that generated under the buy and hold strategy. Even before transaction costs, gross profits from each moving average rule were less than that from buy and hold. Jensen and Bennington (1970) studied twenty-nine portfolio samples with relative strength index and found that RSI did not outperform buy and hold strategy. James (1968) analyzed stocks from CRSP with moving averages and found that moving average rules could not beat the buy and hold strategy. Dryden (1970) without adjusting transaction costs, by using filters, found there was considerable variation among individual stock returns. Returns only from long transactions were much higher than the buy and hold returns. For seven hog futures Peterson and Leuthold (1982), by using zero mean profit as a benchmark strategy, found that all filter rules produced considerable mean gross profits. That profit levels exceeded any reasonable commission charges in most cases. For July corn and soybean futures contracts, Stevenson and Bear's (1970) results indicated that stop-loss orders and combination rules of filters and stop-loss orders generated substantial net returns and beat the buy-and-hold strategy. Irwin and Uhrig (1984) studied eight commodity futures and found that, trading rule profits were substantial and similar across all four trading systems (channel, moving averages, and momentum oscillators). Bird (1985) studied cash and forward contracts and found over 2/3 of filter rules beat the buy and hold strategy.

In the early studies, very limited evidence of the profitability of technical trading rules was found in stock markets, while technical trading rules often realized sizable net profits in futures markets and foreign exchange markets. Thus, stock

markets appeared to be efficient relative to futures markets or foreign exchange markets during the time periods examined.

Most early studies exhaustively tested one or two popular trading systems, like filter or moving average. This limitation in testing process implies that the successful results in the early studies may be subject to data snooping (or model selection) problems. Jensen and Benington (1970) argued that *"given enough computer time, we are sure that we can find a mechanical trading rule which works on a table of random numbers - provided of course that we are allowed to test the rule on the same table of numbers which we used to discover the rule. We realize of course that the rule would prove useless on any other table of random numbers, and this is exactly the issue with Levy's12 results"*. Indeed, Tomek and Querin (1984) provided evidence for this argument by showing that when technical trading rules may earn positive net returns by chance, although they on average could not generate positive net profits. Moreover, popular trading systems may be ones that have survivorship biases. Although Jensen (1967) suggested replicating the successful results on additional bodies of data and for other time periods to judge the impact of data snooping, none of the early studies except Jensen and Benington (1970) followed this suggestion.

The riskiness of technical trading rules was often ignored. If investors are risk averse, they will always consider the risk-return tradeoffs of trading rules in their investment. Thus, large trading rule returns do not necessarily refute market efficiency since returns may be improved by taking greater risks. For the same

reason, when comparing between trading rule returns and benchmark returns, it is necessary to make explicit allowance for difference of returns due to different degrees of risk.

Most early studies suffer from the lack of statistical tests of technical trading profits. Only four studies (James 1968; Peterson and Leuthold 1982,; Bird 1985; Sweeney 1986) measured statistical significance of returns on technical trading rules using Z- or t-tests under the assumption that trading rule returns are normally distributed. However, applying conventional statistical tests to trading rule returns may be invalid since a sequence of trading rule returns generally does not follow the normal distribution. Talyor (1985) argued that *"the distribution of the return from a filter strategy under the null hypothesis of an efficient market is not known, so that proper significance tests are impossible "*. In fact, Lukac and Brorsen (1990) found that technical trading returns were positively skewed, and thus argued that past applications of t-tests to technical trading returns might be biased. Moreover, in the presence of data snooping, significance levels of conventional hypothesis tests are exaggerated (Lovell 1983; Denton 1985).

Taylor (1986) argued that *"Most published studies contain a dubious optimization. Traders could not guess the best filter size (g) in advance and it is unlikely an optimized filter will be optimal in the future. The correct procedure is, of course, to split the prices. Then choose g using the first part and evaluate this g upon the remaining prices."* If the optimal parameter performs well over in and out-of-

sample data, then the researcher may have more confidence in the results. Only three studies (Irwin and Uhrig 1984; Taylor 1983, 1986) used this procedure.

As it is mentioned in the second paragraph, technical trading profits were often compared to the performance of a benchmark strategy to derive implications for market efficiency. Buy-and- hold returns, geometric mean returns, interest rates for bank deposit, or zero mean profits were benchmarks. However, there was no consensus on which benchmark should be used for a specific market.

Finally, the results of the technical trading studies in the earlier period seem to be difficult to interpret because the performance of trading rules was often reported in terms of an "average". For example, in interpreting their results, Fama and Blume (1966) relied on average returns across all filters for a given stock or across all stocks for a given filter. If they evaluated the performance of the best rules or each individual stock, then their conclusion might have been different. Sweeney (1988) pointed out that *"The averaging presumably reduces the importance of aberrations where a particular filter works for a given stock as a statistical fluke. The averaging can, however, serve to obscure filters that genuinely work for some but not all stocks"* (Park and Irwin 2004)

Between 1988 and 2004;

There are more analytic techniques relative to early studies, with more advanced theories and statistical methods. Modern studies can be divided into six groups according to their testing procedures.

In "Standard" studies parameter optimization, out-of-sample verification, and statistical tests for trading profits are used to test the profitability of technical trading rules. In addition, transaction costs and risk were incorporated into the general trading model. In general, it is found that technical trading profits were available in speculative markets. For example; Lukac, Brorsen, and Irwin did 3 researches on future markets in years 1988-1989-2000. In 1988, out of sample (between 1978 and 84) results indicated that 4 of 12 systems (3 channels, 3 moving averages, 3 oscillators, 2 trailing stops, and a combination) generated significant aggregate portfolio returns and 8 of 12 commodities earned statistically significant net returns from more than one trading system (the dual moving average crossover, close channel, MII price channel, and directional parabolic). In 1989, their paper concluded that the parameter optimization appeared to have little value. In 1990 Lukac and Brorsen examined 30 futures from various exchanges: agriculturals, metals, oils, currencies, interest rates, and S&P 500. Only 3 of 23 trading systems had negative mean monthly portfolio net returns after transaction costs, and 7 of 23 systems generated net returns. Szakmary and Mathur (1997) showed that moving average rules produced statistically and economically significant annual net returns of 3.5%-5.4% in major foreign exchange markets for 1978-1991. Skouras (2001) made an analysis on DJIA between 1962 and 1986 and time-varying estimated rules outperformed various fixed moving average rules employed by Brock. By considering transaction costs mean returns from optimized trading rule is higher than buy and hold strategy. Olson (2004) studied 18 exchange rates between 1971-2000 and declared that the profits of moving average rules in foreign exchange markets have declined over time. Nevertheless, since these studies did not explicitly address

data snooping problems, there is a possibility that the successful results were caused by chance.

Brock, Lakonishok, and LeBaron are main researchers of "Model-based bootstrap" studies. In this testing procedure, model-based bootstrap approaches are used to test trading returns. Different from standard studies, while testing technical trading rules, there is an effort to reduce data snooping problems. Of course, the results of the model-based bootstrap studies differed across markets and sample periods tested. In general, technical trading strategies were profitable in several emerging (stock) markets and foreign exchange markets, while they were unprofitable in developed stock markets. Brock, Lakonishok, and LeBaron (1992) made an analysis on DJIA 1897-1986. This paper tests two of the simplest and most popular trading rules; moving average and trading range break. They found that before transaction costs buy positions across all trading rules cause higher mean returns, which are generally statistically significant. Overall, their results provide strong support for the technical strategies. In their currency future analysis Levich and Thomas (1993) found that after adjustment for transaction costs and risk every filter rule and moving average rule generated positive mean net returns according to buy and hold strategy as a benchmark. Splitting the entire 15-year sample period into three 5-year periods reveals that on average the profitability of some trading rules declined in the 1986-1990 period although profits remained positive (on average) and significant in many cases. Ratner and Leal (1999) examined 10 equity indices in Asia and Latin America between 1982 and 1995 and found that after transaction costs moving average rules generated statistically significant annual net returns of 18.2%-

32.1% in stock markets of Mexico, Taiwan, Thailand, and the Philippines. LeBaron (1999) made an analysis on two foreign currencies between 1979 and 1992 and tried to review simple rules used by traders have some predictive value over the future movement of foreign exchange prices. The results indicated that after removing periods in which the Federal Reserve is active, exchange rate predictability was dramatically reduced. As a critic, Sullivan, Timmermann, and White (1999) pointed popular trading rules may have been profitable over a long historical period by chance. In addition, model-based bootstrap studies often omitted trading rule optimization and out-of-sample verification.

"Genetic programming" studies attempted to avoid data snooping problems by testing ex ante trading rules optimized by genetic programming techniques. In these studies, out-of-sample verification for the optimal trading rules was conducted together with statistical tests, and transaction costs and risk were incorporated into the testing procedure. Genetic programming studies generally indicated that technical trading rules formulated by genetic programming might be successful in foreign exchange markets but not in stock markets. The genetic programming technique may become an alternative approach to test technical trading rules because it provides a sophisticated search procedure. However, it was not applied to technical analysis until the mid-1990s, and moreover, the majority of optimal trading rules identified by a genetic program appeared to have more complex structures than that of typical technical trading rules. Cooper and Gulen (2003) and Timmermann and Granger (2004) suggested that the genetic programming method must not be applied to sample periods before its discovery. In 1997 Neely, Weller and Dittmar (1997) made an

analysis on six exchange rates (mark, yen, pound, franc and 2 cross rates) by using genetic programming techniques to find technical trading rules, and found strong evidence of economically significant out-of-sample excess returns to those rules for each of six exchange rates, over the period 1981-1995. Allen and Karjalainen (1999) used genetic algorithm to learn technical trading rules for the S&P 500 index using daily prices from 1928 to 1995. After transaction costs, the rules did not earn consistent excess returns over a simple buy-and-hold strategy in the out-of-sample test periods. Ready (2002) also documented that over a long time period, genetic trading rules underperformed buy-and- hold strategies for the S&P 500 index or the DJIA index. Neely and Weller (2001) wrote a paper on genetic programming techniques to show that US foreign exchange intervention information improves technical trading rules' profitability for two of four Exchange rates over part of the out-of-sample period. Rules trade contrary to intervention and are unusually profitable on days prior to intervention, indicating that intervention is intended to halt predictable trends. They obtained annual net profits of 1.7%-8.3% for four major currencies over the 1981-1992 periods, although profits decreased to around zero or were negative except for the yen over the 1993-1998 periods. Ready (2002) examined DJIA with 50 genetic programming based trading rules and 4 moving average rules. Moving average rules generated positive excess returns after transaction costs for the period 1963-86, although they yielded negative excess returns for the period 1987-2000. However, because moving average rules performed poorly from 1939-62, they were less likely to be chosen by traders at the beginning of 1963. In fact, every genetic trading rule created over the period 1957-60 outperformed the moving average rules. Similar results were found for the period 1987-2000.

"Reality Check" studies use White's Bootstrap Reality Check methodology to directly quantify the effects of data snooping. White's methodology delivers a data snooping adjusted p-value by testing the performance of the best rule in the context of the full universe of trading rules. Thus, the approach accounts for dependencies across trading rules tested. There are also some difficulties of reality check studies. First, difficulty in constructing the full universe of technical trading rules. Second, if a set of trading rules tested is selected from an even larger universe of rules, a p value calculated by the methodology could be biased toward zero under the assumption that the included rules in the "universe" performed quite well during the sample period. As an analysis on stock market, we have to look Reality Check studies by Sullivan, Timmermann, and White (1999, 2003). There is evidence that technical trading rules might be profitable in the stock market until the mid-1980s but not thereafter. In 1999, they obtained an annual mean return of 17.2% (a breakeven transaction cost of 0.27% per trade) from the best rule for the DJIA index over the 1897-1996 periods, with a data-snooping adjusted p-value of zero. However, in an out-of-sample period (1987-1996), the best rule optimized over the 1897-1986 period yielded an annual mean return of only 2.8%, with a nominal p- value of 0.32. For the foreign exchange market, on the other hand, Qi and Wu (2002) obtained economically and statistically significant technical trading profits over the 1973-1998 periods. They found mean excess returns of 7.2%-12.2% against the buy-and- hold strategy for major currencies except for the Canadian dollar (3.63%) after adjustment for transaction costs and risk.

In "Chart patterns" studies there are visible charts that are used by technical analysts. The results of chart pattern studies varied depending on patterns, markets,

and sample periods tested, and according to the view of analysts. For example, Chang and Osler (1999) showed that the head-and-shoulders rules earned substantial returns for 2 of 6 spot currencies analyzed between 1973 and 1994. Also these returns outperformed buy and holds strategy also after taking account of transaction costs, interest differential, and risk. Caginalp and Laurent (1998) used candle stick reversal patterns and found that for the S&P 500 stocks, this pattern has statistically significant short term predictive power for price movements after transaction costs over the 1992-1996 period. In 2000, Lo, Mamaysky and Wang (2000) proposed a systematic and automatic approach to technical pattern recognition using nonparametric kernel regression, and applied this method to a large number of U.S. stocks from 1962 to 1996 to evaluate the effectiveness of technical analysis. This analysis showed that technical patterns might provide some incremental information for stock investment even if they may not be used to generate excess trading profits.

The nearest neighbor or the feed forward network regressions are using methods in "Nonlinear" studies. These studies investigated either the informational usefulness or the profitability of technical trading rules. Nonlinear studies showed that technical trading rules based on nonlinear models have profitability or predictability in both stock and foreign exchange markets. Gençay (1998) found that simple technical trading rules based on a feed forward network for the DJIA index generated annual net returns of 7%-35% across 6 sub sample periods over the 1963-1988 periods and easily dominated a buy-and-hold strategy. Sosvilla-Rivero, Andrada-Félix, and Fernández-Rodríguez (2002) investigated the profitability of a simple technical trading rule based on Artificial Neural Networks (ANNs). Their

results, based on applying this investment strategy to the General Index of the Madrid Stock Market, suggest that, in absence of trading costs, the technical trading rule is always superior to a buy-and-hold strategy for both ''bear'' market and ''stable'' market episodes. On the other hand, they found that the buy-and-hold strategy generates higher returns than the trading rule based on ANN only for a ''bull'' market subperiod. In 2002 they also showed that a trading rule based on the nearest neighbor regression earned net returns of 35% and 28% for the mark and yen, respectively, during the 1982-1996 period, and substantially outperformed buy and hold strategies. Application of nonlinear approach was not available until recent years to reveal the profitability of technical trading rules like genetic programming studies. Also in this type of study, statistical tests and data snooping problems are ignored.

As a summary of empirical studies, which are made on the profitability of technical analysis, they found results on the positive affects of technical analysis, especially on the futures market. In every market, the number of profitable studies is twice that of unprofitable studies. Also timing of studies is very important. For example, especially in modern studies' results, indicated that technical trading strategies had been able to yield economic profits until the last years of 1900s. Several studies found economic profits in emerging (stock) markets, regardless of sample periods considered. For foreign exchange markets, it seems evident that technical trading strategies have made economic profits over the last few decades, although some studies suggested that technical trading profits have declined or disappeared in recent years. For futures markets, technical trading strategies appeared to be profitable between the mid-1970s and the mid-1980s. No study has yet

comprehensively documented the profitability of technical trading strategies in futures markets after that period.

A technical trading system comprises a set of trading rules that can be used to generate trading signals. In general, a simple trading system has one or two parameters that determine the timing of trading signals. Each rule contained in a trading system is the results of parameterizations. For example, the Dual Moving Average Crossover system with two parameters (a short moving average and a long moving average) may be composed of hundreds of trading rules that can be generated by altering combinatio ns of the two parameters. Among technical trading systems, the most well-known types of systems are moving averages, channels (support and resistance), momentum oscillators, and filters. These systems have been widely used by academics, market participants or both. According to the all survey studies and academic literature there is evidence in support of the usefulness of trading systems works best on currency markets, intermediate on futures markets, and worst on stock markets, chart patterns work better on stock markets than currency markets, nonlinear methods work best overall, and technical analysis doesn't work as well as it used to. As transaction costs decrease, available computing power increases and the number of market participants increases, one would expect markets to become increasingly efficient and thus it is not surprising that the efficiency of technical analysis should diminish.

2.3-THE CRITICS

Technical analysis has been heavily criticized over the decades. One critique is that it trades when a trend is already established. By the time that a trend is signaled, it may already have taken place. Technical analysts are always trading too late (Griffioen 2003). However, technical analysis is still the most preferred method. Much of the criticism of technical analysis has its roots in academic theory - specifically the efficient market hypothesis (EMH). Most of academics believe in at least the weak version of EMH, therefore, from their point of view, if technical analysis works, market efficiency will be called into question.

Chartists assert that their techniques provide excess returns over time. Many academics believe that technical analysis has no predictive power. Some of academicians found evidences of after trading costs are considered, the returns generated by many technical strategies underperform a simple buy and hold strategy (A passive investment strategy in which an investor buys stocks and holds them for a long period, regardless of fluctuations in the market. An investor who employs a buy-and-hold strategy actively selects stocks, but once in a position, is not concerned with short-term price movements and technical indicators). On the other hand, of course there are many other studies found that technical analysis methods can outperform buy and hold strategy. Cheol-Ho Park and Scott H. Irwin (2004) reviewed 93 modern studies on the profitability of technical analysis and considered 59 of them to indicate positive results, and 24 negative results. Despite the positive evidence, it appears that most empirical studies are subject to various problems in their testing procedures, etc., data snooping, ex post selection of trading rules or search technologies, and

difficulties in estimation of risk and transaction costs. According to some academicians, books on technical analysis fail in documenting the validity of their claims. Authors do not hesitate to characterize a pattern as frequent or reliable, without attempting to quantify those assessments. Profits are measured in isolation, without regard for opportunity costs or risk. The lack of a sound statistical analysis arises from the difficulty in programming technical pattern recognition techniques into a computer. Many technical trading rules seem to be somewhat vague statements without accurately mathematically defined patterns. Furthermore, in financial practice technical analysis is criticized because of its highly subjective nature. It is said that there are probably as many methods of combining and interpreting the various techniques as there are chartists themselves. The geometric shapes in historical price charts are often in the eyes of the beholder. Fundamental analysis is compared with technical analysis like astronomy with astrology. It is claimed that technical analysis is voodoo finance and that chart reading shares a pedestal with alchemy. However, even technical analysts warn against investment decisions based upon their charts alone.

On a market level, the prevalence of technical analysis is demonstrated by the fact that most real time financial information services, like Reuters and Telerate, provide detailed, comprehensive and up-to-date technical analysis information. It is obvious that the frequent upgrading of technical analysis services is a response to the demand for technical analysis services and competition among the financial information service providers (Wong, Manzur, Chew 2002).

CHAPTER III

3-METHODOLOGY, OUTLINE OF DATA, AND ANALYSIS

In order to understand if it is possible to make profit only with technical analysis, two graphs of ISE National 100 index are examined. In this section, reasons to choose analyzing stock market, how required data is obtained, used methods in analysis, and results of the chart pattern studies are cited.

3.1-METHODOLOGY

The number of studies that identified profitable technical trading strategies is far greater than the number of studies that found negative results. In this study, my purpose is to find if technical analysis has a forecasting power for future prices and trends of stocks or not. Performance of ISE National 100 index is examined by using charts and indicators with ignoring statistical analysis. Riskiness of technical trading rule and statistical significance are ignored and no benchmark strategy is used. Because, there are many studies say trading rule returns generally do not follow a normal distribution and there is no consensus on which benchmark should be used for a specific market. Moreover, to make short-term analysis and decide hold, buy or sell strategy, a chartist has to be quick and choose most helpful indicators. Therefore, a "chart pattern" study is done in this thesis.

A survey is done to understand if technical analysis is a preferred method for stock market, how often it is used, analysts choose which indicators, chart types etc. Both personally administrated questionnaires and mail questionnaires are used to reach as many analysts as possible. Mail questionnaires gave me a great advantage by covering a wide geographical area and provided the possibility to reach a great number of individuals without waste of time. The survey literature done until now indicates that, technical analysis has been widely used by market participants in future and foreign exchange markets. There is not many surveys on stock market. Because of this, I made a questionnaire and collected data from 66 analysts of Turkish brokerage houses as a primary data source. There are one open ended ten closed ended simple, short questions in this personally administered questionnaire.

By the help of the questionnaire's answers, performance of ISE National 100 index for the first six months of 2007 and for year 2006 is examined separately by using charts and indicators chosen by survey applicants. A chart is simply a graphical representation of a series of prices over a set time frame. There are several things to be aware of when looking at a chart, as these factors can affect the information that is provided. They include the time scale, the price scale and the price point properties used. The most frequently used time scales are intraday, daily, weekly, monthly, quarterly and annually. The shorter the time frame, the more detailed the chart. Charts of this analysis are daily charts. The price scale is on the right-hand side of the chart. It shows a stock's current price and compares it to past data points. A scale can either be constructed in a linear (arithmetic) or logarithmic way. ISE National 100 charts of this analysis are linear.

3.2-QUESTIONNAIRE

Table 1 below is prepared to summarize the questionnaire. First three questions are about age and educational levels. The most important question is the fourth one, because it identifies individuals that generally use technical analysis and only they are going to continue answering the rest of the questions. According to the answers between question 4 and 9, chart pattern study of ISE 100 index is done. Finally, last two questions are asked in order to understand if technicians believe their method's profitability and forecasting power or not. All questions, choices, and answers can be seen in table 1. Before analyzing the questionnaire, I want to give technical information about the choices.

Summary table of the questionnaire

Personal Questions				
1	*What range does your age belong to?*			
	Choice	Explanation	Frequency	Percentage
	a	<25	5	7,58%
	b	25-30	17	25,76%
	c	30-35	28	42,42%
	d	35-40	13	19,70%
	e	>40	3	4,55%
2	*What is your educational level?*			
	Choice	Explanation	Frequency	Percentage
	a	High School	8	12,12%
	b	Collage	2	3,03%
	c	University	52	78,79%
	d	Master Degree	4	6,06%
	e	Phd	0	0,00%
3	*Do you have any of "CMB investment specialist licenses" ?*			
	Choice	Explanation	Frequency	Percentage
	a	Yes, all of them	14	21,21%
	b	Yes, one of them	46	69,70%
	c	No	6	9,09%

Table 1a

	Questions to collect data which will be used in index analysis			
4	*Which one do you generally use in order to decide a trading strategy ?*			
	Choice	**Explanation**	**Frequency**	**Percentage**
	a	Technical Analysis	59	89,39%
	b	Fundamental Analysis	7	10,61%
5	*What are your reasons of using technical analysis more often?*			
	Order	**Explanation**		
	1	Helps short term decision making		
	2	Cheap		
	3	Easy to reach required data		
	4	Not time consuming		
6	*What is your time period in your analysis?*			
	Choice	**Explanation**	**Frequency**	**Percentage**
	a	<1 year	43	72,88%
	b	>1 year	16	27,12%
7	*Which chart type do you generally use?*			
	Choice	**Explanation**	**Frequency**	**Percentage**
	a	Bar	46	77,97%
	b	Line	9	15,25%
	c	Candle Stick	4	6,78%
	d	Point and Figure	0	0,00%
8	*Which one do you generally look in order to make decisions?*			
	Choice	**Explanation**	**Frequency**	**Percentage**
	a	Support and resistance	25	42,37%
	b	Statistical indicators and oscillators	22	37,29%
	c	Patterns(formations)	12	20,34%
9	*Could you choose first 3 indicator you use in your analysis according to their usage frequency?*			
	Choice	**Explanation**	**Frequency**	**Percentage**
	a	Moving averages	15	26%
	b	MACD	13	22%
	c	Relative strength index (RSI)	12	20%
	d	Momentum	7	12%
	e	Trix	5	8%
	f	Stochastic	4	6%
	g	Average directional index	2	4%
	h	Aroon	1	2%

Table 1b

Questions about profitability of technical analysis				
10	*Despite analyzing technical indicators very carefully with all details, how often do you make wrong decisions?*			
	Choice	Explanation	Frequency	Percentage
	a	Never	5	8,47%
	b	Sometimes	32	54,24%
	c	Generally	18	30,51%
	d	Always	4	6,78%
11	*Do you believe the profitability of technical analysis?*			
	Choice	Explanation	Frequency	Percentage
	a	Yes	49	83,05%
	b	No	8	13,56%
	c	I have no idea	2	3,39%

Table 1c

3.2.1-Fundamental & Technical Analysis

In order to make a choice between technical and fundamental analysis in question 4, we have to know the differences. As it is known, technical analysis and fundamental analysis are the two main schools of thought in the financial markets and there are many differences between them. For example, technical analysis looks at the price movement of a security and uses this data to predict its future price movements. Fundamental analysis, on the other hand, looks at economic factors, known as fundamentals. At the most basic level, a technical analyst approaches a security from the charts, while a fundamental analyst starts with the financial statements. By looking at the balance sheet, cash flow statement and income statement, a fundamental analyst tries to determine a company's value. In financial terms, an analyst attempts to measure a company's intrinsic value. In this approach, investment decisions are fairly easy to make. Technical traders, on the other hand, believe there is no reason to analyze a company's fundamentals because these are all accounted for in the stock's price (www.investopedia.com). Technicians believe that all the

45

information they need about a stock can be found in its charts. The big advantage of technical analysis over fundamental analysis is that it can be applied fairly easily and cheaply to all kinds of securities prices. Only some practice is needed in recognizing the patterns, but in principle everyone can apply it. Of course, there exist also some complex technical trading techniques, but technical analysis can be made as easy or as difficult as the user likes. Also, need of more macro economic variables, makes fundamental analysis more costly than technical analysis. For testing technical trading rules only data is needed on prices, volumes and dividends, which can be obtained fairly easily. Another important difference between chart analysis and fundamental economic analysis is that chartists study only the price action of the market itself, whereas fundamentalists attempt to look for the reasons behind that action. However, both the fundamental analyst and the technical analyst make use of historical data, but in a different manner. The technical analyst claims that all information is gradually discounted in the prices, while the fundamental analyst uses all available information including many other economic variables to compute the true value. The pure technical analyst will never issue a price goal. He only trades on the buy and sell signals his strategies generate. In contrast, the fundamental analyst will issue a price goal that is based on the calculated fundamental value. However in practice investors expect also from technical analysts to issue price goals. Neither fundamental nor technical analysis will lead to sure profits (Griffioen 2003). Moreover, fundamental analysis takes a relatively long-term approach to analyzing the market compared to technical analysis. While technical analysis can be used on a timeframe of weeks, days or even minutes, fundamental analysis often looks at data over a number of years. It can take a long time for a company's value to be reflected in the market, so

when a fundamental analyst estimates intrinsic value, a gain is not realized until the stock's market price rises to its "correct" value. This type of investing is called value investing and assumes that the short-term market is wrong, but that the price of a particular stock will correct itself over the long run. This "long run" can represent a timeframe of as long as several years, in some cases. Furthermore, the numbers that a fundamentalist analyzes are only released over long periods. Financial statements are filed quarterly and changes in earnings per share do not emerge on a daily basis like price and volume information. Not only is technical analysis more short term in nature that fundamental analysis, but the goals of a purchase (or sale) of a stock are usually different for each approach. In general, technical analysis is used for a trade, whereas fundamental analysis is used to make an investment. Investors buy assets they believe can increase in value, while traders buy assets they believe they can sell to somebody else at a greater price (www.investopedia.com).

3.2.2-Chart Types

The consensus among technical analysts is that there is no need to look at the fundamentals, because everything that is happening in the world can be seen in the price charts. A true chartist does not even care to know which business or industry a firm is in as long as he can study its stock chart and knows its ticker symbol. There are four main types of charts that are used by investors and traders depending on the information that they are seeking and their individual skill levels. The chart types are the line chart, the bar chart, the candlestick chart and the point and figure chart.
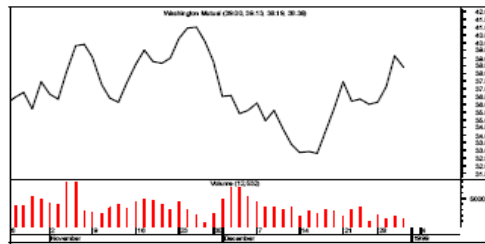
Line chart

Chart-4

The line is formed by connecting the closing prices over the time frame. Line chart, which is shown in chart-4, does not provide visual information of the trading range for the individual points such as the high, low and opening prices.

Bar chart

Chart-5

The vertical line in a bar chart, like chart-5, represents the high and low for the trading period, along with the closing price. The close and open are represented on the vertical line by a horizontal dash. The opening price on a bar chart is illustrated by the dash that is located on the left side of the vertical bar. Conversely, the close is represented by the dash on the right. Generally, if the left dash (open) is lower than the right dash (close) then the bar will be shaded black, representing an up period for the stock, which means it has gained value. A bar that is colored red signals that the stock has gone down in value over that period. When this is the case, the dash on the right (close) is lower than the dash on the left (open). The advantage of using a bar chart over a straight-line graph is that it shows the high, low, open and close prices of the day.

Candlestick chart

Chart-6

Similar to the bar chart, the candlestick also has a thin vertical line showing the period's trading range. The difference comes in the formation of a wide bar on the vertical line, which illustrates the difference between the open and close. In addition, like bar charts, candlesticks also rely heavily on the use of colors to explain what has happened during the trading period. There are two color constructs for days up and one for days that the price falls. When the price of the stock is up and closes above the opening trade, the candlestick will usually be white or clear. If the stock has traded down for the period, then the candlestick will usually be red or black, depending on the site. If the stock's price has closed above the previous day's close but below the day's open, the candlestick will be black or filled with the color that is used to indicate an up day.
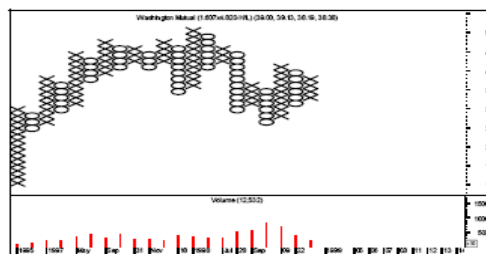
Point and Figure Chart

Chart-7

The point and figure chart is not well known or used by the average investor but it has had a long history of use dating back to the first technical traders. This type of chart reflects price movements and is not as concerned about time and volume in the formulation of the points. The point and figure chart removes the noise, or insignificant price movements, in the stock, which can distort traders' views of the price trends. These types of charts also try to neutralize the skewing effect that time has on chart analysis. This chart plots day-to-day increases and declines in price. In chart-7, "x" are increases, "o" are decreases.

3.2.3-Support and Resistance

A trend line is a simple charting technique that adds a line to a chart to represent the trend in the market or a stock. It is a straight line mathematically determined by any two points along it. In order to draw a trendline, therefore, we require two determining points. Two for top reversal points to fix a down trendline and two for bottom reversal points to fix an up trendline. An upward trendline is drawn at the lows of an upward trend. This line represents the support the stock has every time it moves from a high to a low. The term indicates that support is a level or area on the chart under the market where buying interest is sufficiently strong to overcome selling pressure. As a result, a decline is halted and prices turn back up again. Similarly, a downward trendline is drawn at the highs of the downward trend. This line represents the resistance level that a stock faces every time the price moves from a low to a high. Resistance is the opposite of support and represents a price level or area over the market where selling pressure overcomes buying pressure and a price advance is turned back. Usually a previous peak identifies a resistance level.

3.2.4-Patterns

Changes in sentiments cause certain patterns to occur repeatedly in the price charts, because people react the same in equal circumstances. Many subjective pattern recognition techniques are therefore described in the technical analysis literature, which have fancy names, such as head & shoulders, double top, double bottoms, triangles, rectangles, etc., which should be traded on after their pattern is completed.

Reversal patterns

The preliminary points common to all Reversal patterns are:

- The existence of a prior trend

- The first signal of a reversal is often the breaking of an important trendline.

- The larger the pattern, greater is the subsequent move

- Topping patterns are usually shorter duration and more volatile than bottoms

- Bottoms usually have smaller price ranges and take longer to build

- Volume is more important on the upside

Shoulder-head-shoulder formation

Chart-8

A head and shoulders pattern, which is shown in chart-8, is reversal pattern that signals a security is likely to move against its previous trend.

Another reversal pattern is the double top and bottom. The double top formation is referred to as the "M" and the Double Bottom is the referred to as the "W". Double top can be explained like this; when the pick is created, trade volume is very high in the first top. On the other hand, volume is very low between two tops. After the formation of the second top, prices starts to decrease and the starting point of the first top becomes a resistance. If prices comes to the levels under this they decline one time more than their increase in the first top.

V formations
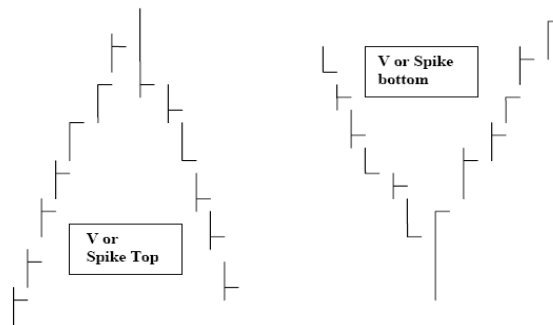
Chart-9

The V-formation or the spikes are difficult to identify because it happens very quickly. The V- pattern unlike all other reversal patterns represents a radical departure from the tendency of markets to gradually change direction. Also in this formation, there must be a symmetric view between ups and downs.

Continuation patterns

The Continuation patterns indicate that the sideways price action on the chart is nothing more than a pause in the prevailing trend and the next move will be in the same direction.

Triangles

It is created by drawing trendlines along a price range that gets narrower over time because of lower tops and higher bottoms. There are three types of triangle formations as are shown in chart-10,11,12. The requirement for the formation of triangles is four reversal points. It takes two points to draw a trendline. In order to draw two converging trendlines, each line must be touched twice.
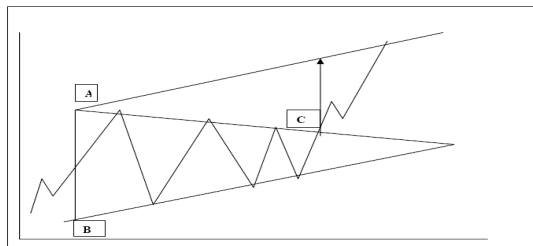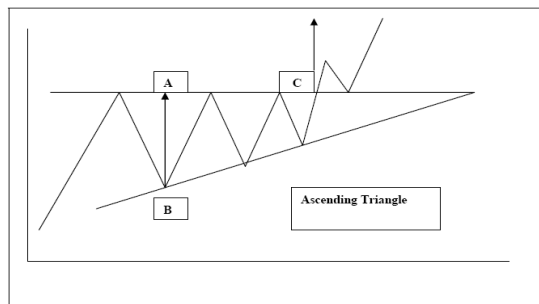
Symmetrical triangle

Chart-10
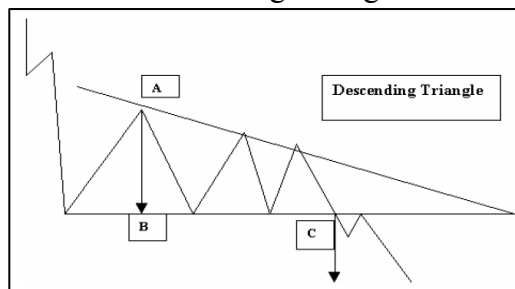
Ascending Triangle

Chart-11

Descending Triangle

Chart-12

Flags & Pennants

Flags and pennants are short-term continuation patterns that are formed when there is a sharp price movement followed by a sideways price movement. The flags and pennants represent brief pauses in the dynamic market move. They are usually treated together because they are very similar in appearance. They represent situations where a steep advance or decline has occurred and the market pauses briefly to "catch its breath". Flags and Pennants are among the most reliable continuation patterns and only rarely produce a trend reversal.

The points to be noted in their formation are:

- They are both preceded by an almost straight-line move on heavy volume.

- Prices then pause for some time on lighter volume.

- The trend resumes on a burst of trading activity.

- Both patterns occur at about the midpoint of the market move.

- The pennant resembles a small horizontal symmetrical triangle.

- The flag represents a small parallelogram that slopes against the prevailing trend.

- Both patterns take less time to form to develop in downtrends.
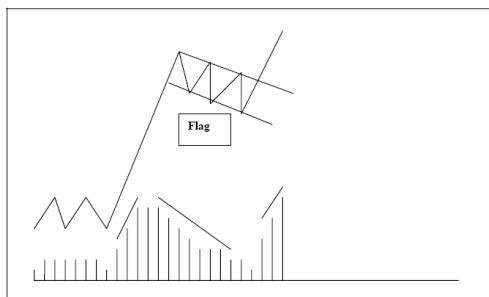
Flag	Pennant

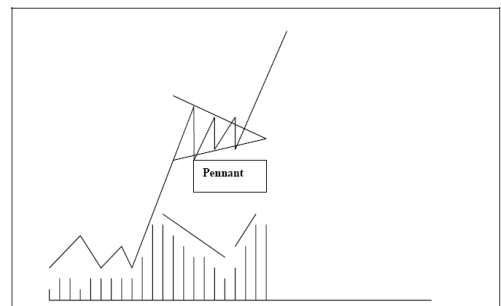| Chart-13	Chart-14

Cup and Handle

A cup-and-handle pattern resembles the shape of a teacup on a chart. It is shown in chart-15. This is a bullish continuation pattern where the upward trend has paused, and traded down, but will continue in an upward direction upon the completion of the pattern. This pattern can range from several months to a year, but its general form remains the same. The cup-and-handle pattern is preceded by an upward move, which stalls and sells off. The sell-off is what forms the initial part of this pattern. After the sell-off, the security will trade flat for an extended period, with no clear trend. The next part of the pattern is the upward move back towards the peak of the preceding upward move. The last part of the pattern, known as the handle, is a relatively smaller downward move before the security moves higher and continues the previous trend (Zaidi, Zaheer).
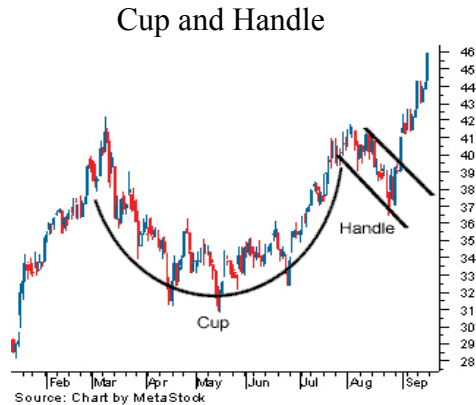

Chart-15

55

3.2.5-Statistical Indicators and Oscillators

Moving averages

Chart-16

You can see two moving averages on a bar chart of a security in chart-16. A moving average is the average price of a security over a set amount of time. The most commonly used moving averages are 20, 30, 50, 100, 200-day moving averages. A moving average is a recursively updated, for example daily, weekly or monthly, average of past prices. Increasing the number of time periods in the calculation is one of the best ways to gauge the strength of the long-term trend and the likelihood that it will reverse. The three most common types of moving averages are simple, linear and exponential. The most widely used moving average is the n-day simple MA given by:

$$M_{t,n} = \frac{1}{n}\sum_{i=t-n+1}^{t} C_i$$
$$= (C_t + C_{t-1} + \cdots + C_{t-n+2} + C_{t-n+1})/n$$

$M_{t,n}$: the simple n-day moving average at period t

Ci: is the closing price for period i.

When the closing price rises above the MA it is a buy signal and when the close falls below the MA it is a sell signal. A clear trend is required to find efficient results from MAs. (Wong, Manzur, Chew 2002)

Linear Weighted Average

Many individuals argue that the usefulness of this type of average is limited because each point in the data series has the same impact on the result regardless of where it occurs in the sequence. It is calculated by taking the sum of all the closing prices over a certain time period and multiplying them by the position of the data point and then dividing by the sum of the number of periods.

Exponential Moving Average

It is the most useful type of moving average because it uses a smoothing factor to place a higher weight on recent data points.

$$EMA_{t,n} = [2(C_t - EMA_{t-1,n})/(n+t)] + EMA_{t-1,n}$$

Moving average convergence divergence (MACD)

This indicator is comprised of two exponential moving averages, which help to measure momentum in the security. It is used to measure short-term momentum compared to longer-term momentum to help signal the current direction of momentum. When the MACD is positive, it signals that the shorter-term moving average is above the longer-term moving average and suggests upward momentum. 26-day and 12-day exponential moving averages are the most common moving average values.   MACD

Chart-17

Momentum

It measures the amount that a security's price has changed over a given time period. It can be used as a trend-following oscillator similar to the MACD and as a leading indicator. Buy when the indicator bottoms and turns up and sell when the indicator peaks and turns down. If the Momentum indicator reaches extremely high or low values, you should assume a continuation of the current trend. This method assumes that market tops are typically identified by a rapid price increase (when everyone expects prices to go higher) and that market bottoms typically end with rapid price declines (when everyone wants to get out).

MOMENTUM = CLOSE(i)/CLOSE(i-N)*100

CLOSE(i): the closing price of the current bar

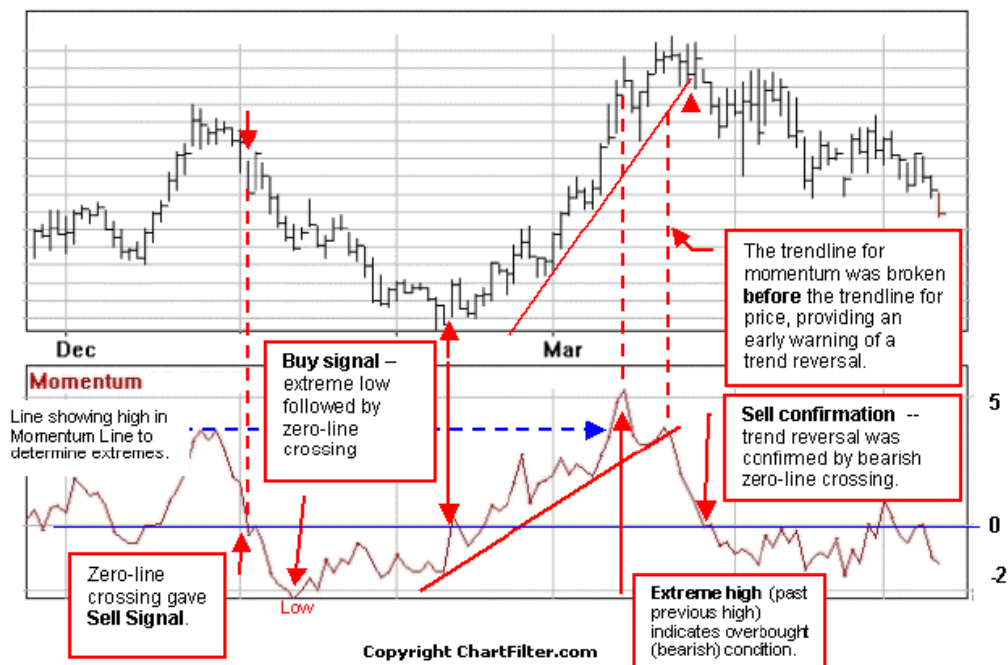CLOSE(i-N): the closing bar price N periods ago

Momentum

Chart-18

58

Relative strength index (RSI)

RSI = 100-(100/(1+RS))

RS: average of n-day up closes/average of n-day down closes

This indicator helps traders to identify whether a security's price has been unreasonably pushed to current levels and whether a reversal may be on the way. 9, 14, 25 days RSI types are most popular. The indicator is plotted in a range between zero and 100. A reading above 70 is used to suggest that a security is overbought, while a reading below 30 is used to suggest that it is oversold.
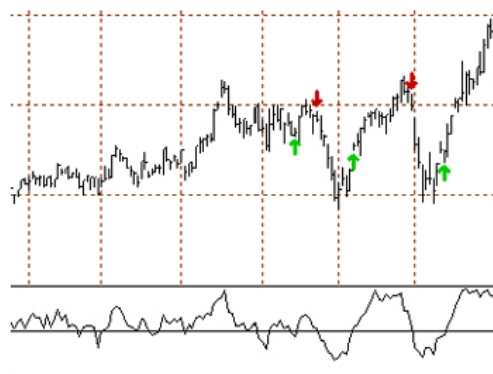
RSI

Chart-19

Stochastic oscillator

If there is an uptrend, the price should be closing near the highs of the trading range, signaling upward momentum in the security. In downtrends, the price should be closing near the lows of the trading range, signaling downward momentum. The stochastic oscillator is plotted in a range of 0 and 100 and signals overbought conditions above 80 and oversold conditions below 20. The stochastic oscillator contains two lines. The first line is the %K, which is essentially the raw measure used

to formulate the idea of momentum behind the oscillator. The second line is the %D, which is simply a moving average of the %K. The %D line is considered to be the more important of the two lines as it is seen to produce better signals. The graph at the bottom of chart-20 shows two lines (K%, D%) of stochastic oscillator.

Stochastic oscillator
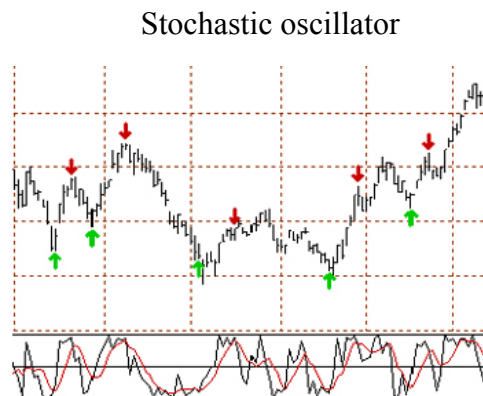
Chart-20

The formula for %K is:

%K = (CLOSE-LOW(%K))/(HIGH(%K)-LOW(%K))*100

CLOSE : today's closing price

LOW(%K): the lowest low in %K periods

HIGH(%K): the highest high in %K periods

The %D moving average is calculated according to the formula:

%D = SMA(%K, N)   N is the smoothing period; SMA is the standard moving average.

Average directional index (ADX)

       This trend indicator that is used to measure the strength of a current trend. It is a combination of two price movement measures: the positive directional indicator (+DI) and the negative directional indicator (-DI). The ADX measures the strength of a trend but not the direction. The +DI measures the strength of the upward trend while the -DI measures the strength of the downward trend. These two measures are also plotted along with the ADX line. Measured on a scale between 0 and 100, readings below 20 signal a weak trend while readings above 40 signal a strong trend. The "point of extremum" is the point when +DI and -DI cross each other. If +DI raises higher than -DI, this point will be the maximum price of the day when they cross. If +DI is lower than -DI, this point will be the minimum price of the day they cross. The point of extremum is used then as the market entry level. Thus, after the signal to buy (+DI is higher than -DI) one must wait till the price has exceeded the point of extremum, and only then buy. However, if the price fails to exceed the level of the point of extremum, one should retain the short position (www.investopedia.com).
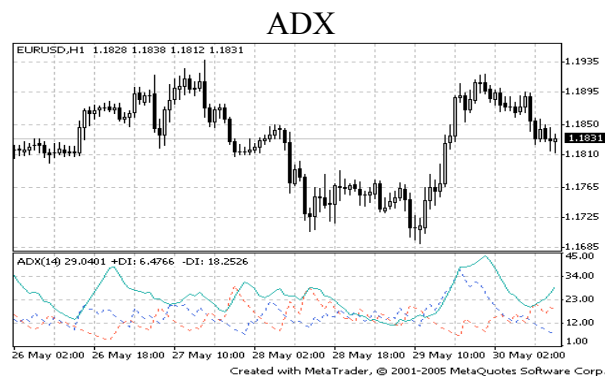
ADX

Chart-21

3.3-ANALYSIS OF THE QUESTIONNAIRE

In this section, answers of the questionnaire are examined with comparing results with early survey studies and theory of technical analysis.

3.3.1-Personal Questions

In 1997, Menkhoff did a postal questionnaire by foreign exchange professionals in Germany on the use of technical currency analysis. He found that professionals preferring technical analysis were younger than other participants; and chartists and fundamentalists both indicated no significant differences in their educational level. Because of this, there is one demographic and two educational level questions in my questionnaire too. The same results with Menkhoff's are found. 59 of 66 analysts answered that they <u>generally</u> use technical analysis to decide a trading strategy. Just 11 of 59 technical analysis users are older than 35 years old. 52 of 66 individual have a university degree. Therefore, it is very difficult to mention a difference in the educational levels. Choosing technical or fundamental analysis does not depend on educational level.

3.3.2-Questions to Collect Data which will be used in Index Analysis

In agreement with the discussions in part 3.2.1, and early survey studies, 59 of 66 analysts answered that they generally use technical analysis rather than fundamental analysis are asked to list their reasons for using technical analysis more often in order of importance. As it is expected, common reasons are as follows,

- Helps short term decision making
- Cheap

- Easy to reach required data

- Not time consuming

In the questionnaire, 43 of 59 technical analysts answered the question of "What is your time period in your analysis? More than 1 year or less then 1 year" by saying that they make short-term analysis. This result is consistent with the theory also. Because fundamental analysis is generally used in the long run.

The other question is; "What chart type do you generally use? Bar, line, candlestick, point and figure". As it is explained in the chart-22, there is nobody using point and figure charts because this technique is very old. Most of them use bar charts. 15% of technical analysts use line charts, 7% of them use candlesticks, 78% of them use bar charts.
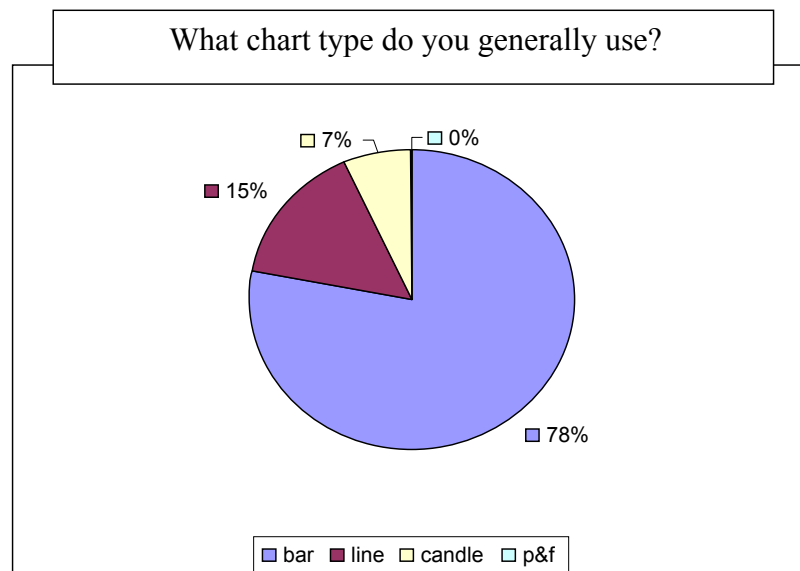

What chart type do you generally use?

Chart-22

"Which one do you generally look in order to make decisions? Support and resistance, statistical indicators and oscillators, patterns (formations)" is the following question of chart type question. Answers of the question show that 25 of analysts look at support and resistance, 22 of them look at indicators and oscillators, and 12 of them look at patterns in other words formations. Early surveys proved that financial analysts who pay attention to technical indicators (for example support and resistance, statistical indicators & oscillators) and charts generally make short-term analysis. Additionally, patterns (in other words formations) are generally used in the long run. Two graphs (chart-23,24) below show the relationship between period of analysis and methods used in the analysis. As it is expected, It is also very clear that, support and resistance has the biggest part in the distribution of less than 1 year analysis. In addition, patterns has the biggest part in the distribution of more than 1 year analysis. 4 of 43 short-term analysts look patterns, 18 of them look indicators and oscillators, and 21 of them look support and resistance. Moreover, 8 of 16 long-term analysts pay attention to patterns, 4 of them to indicators and oscillators, finally 4 of them to support and resistance.
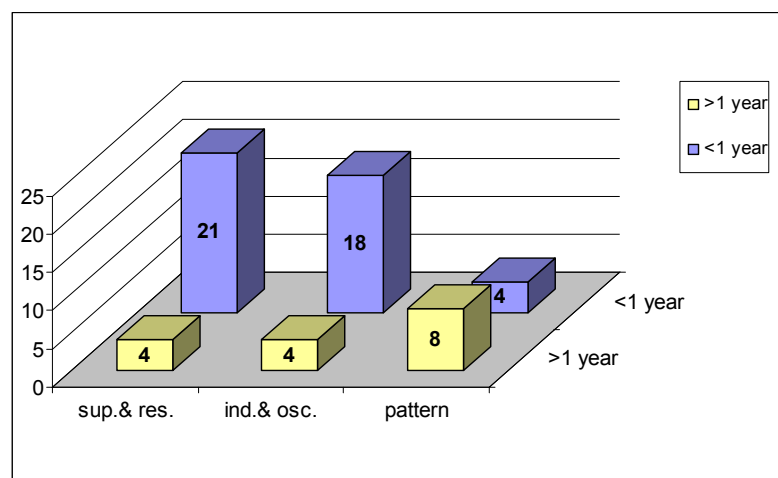
Chart-23
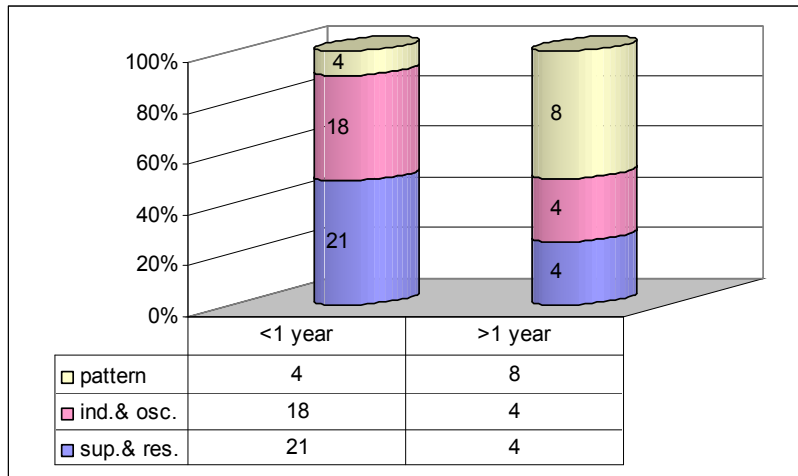
Chart-24

The other question is "Could you choose first 3 indicators you use in your analysis according to their usage frequency?" According to their usage frequency, we can order indicators like those that shown in the chart-25. To make the analysis easy first three indicators are asked from the analysts. Therefore, moving averages, stochastic oscillator, and moving average convergence divergence is used in my analysis. Similar results with Taylor Allen 1992 survey study are found.

Chart-25

3.3.3-Questions about Profitability of Technical Analysis

The other question is to understand despite analyzing technical indicators very carefully with all details, how often they make wrong decisions. As it is shown in chart-26, 54% of total answers are "sometimes", 31% is "generally", %8 is "never", and %7 is "always". The results are consistent with my expectations and early survey st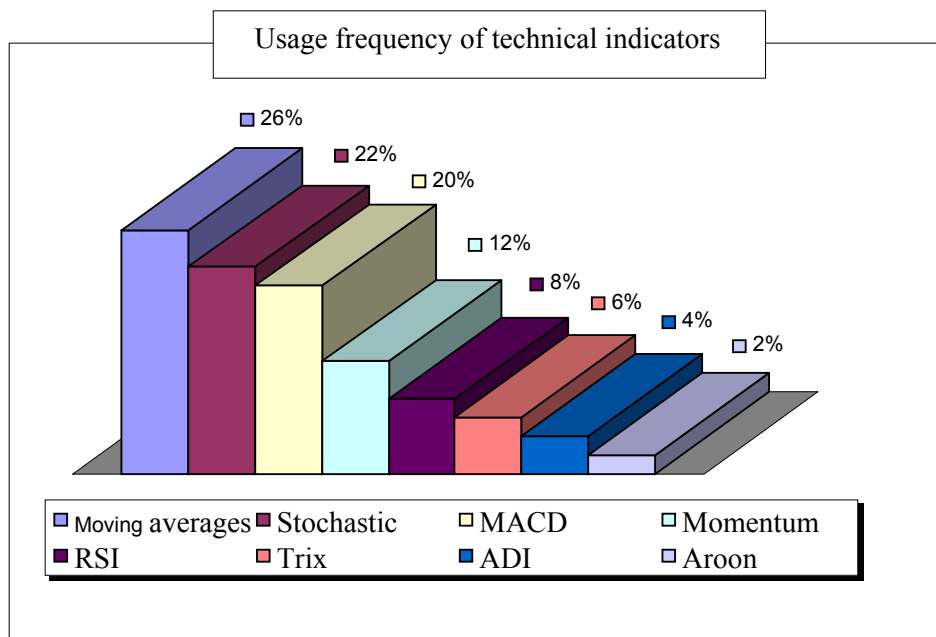udies. Because in the practice it is generally very difficult to choose correct strategy just by looking charts and patterns etc. Especially in volatile markets like Turkey, it is much more difficult. After studying technical indicators, we have to pay attention to fundamentals, money inflow-outflow, foreign investors' distribution, news etc.
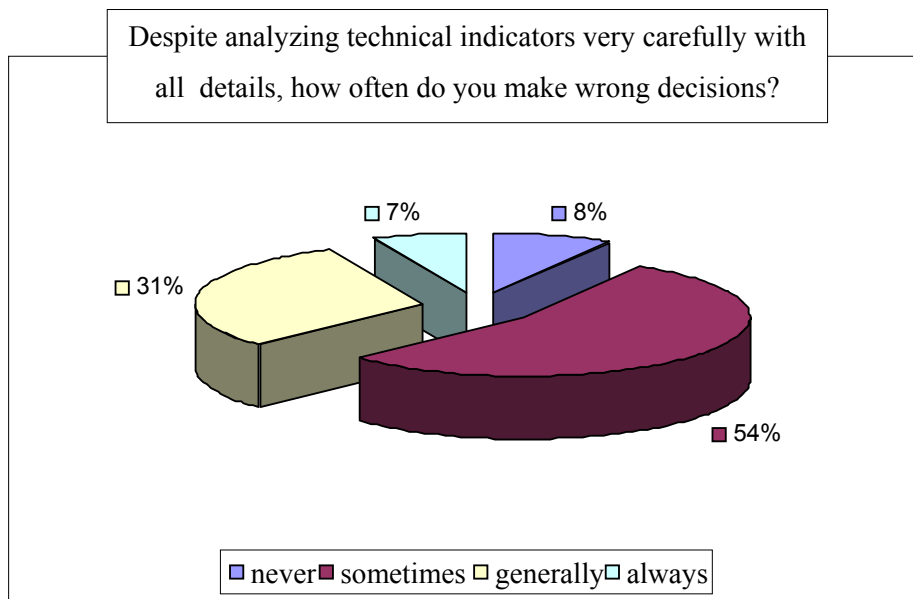

Chart-26

The last question is "Do you believe the profitability of technical analysis?". 49 of 59 answered "yes", 8 of 59 answered "no", and 2 of 59 answered "I have no idea". As it is understood from this results technical analysis is very common and useful especially in short term decision making. In addition, most of the analysts

believe its profitability and forecasting power. Therefore, I am going to show if we can prove this results by studying on ISE 100 index.

3.4-ANALYSIS OF ISE NATIONAL 100 INDEX GRAPHS

In this section, profitability of technical analysis is examined by using survey results. In order to study the whole performance of ISE, ISE National 100 index is used. The Istanbul Stock Exchange (ISE) was established in early 1986. The ISE is the only securities exchange in Turkey established to provide trading in equities, bonds and bills, revenue-sharing certificates, private sector bonds, foreign securities and real estate certificates as well as international securities. The ISE is governed by an Executive Council composed of five members elected by the General Assembly. ISE indices are composed in order to calculate price and return performances of all shares as well as on the basis of relative markets and sectors. Until the end of 1996, the ISE used to compute only the ISE-100, Financials and Industrials price indices. As from 1997, the ISE began to calculate sector and sub-sector indices on the basis of prices and total return.

ISE price indices are computed and published throughout the trading session while the return indices are calculated and published at the close of the session only. The ISE National-100 Index is used as a main indicator of the National Market. ISE National-All Shares Index is composed of all National Market companies except investment trusts. ISE National-30 is composed of National Market companies except investment trusts and will also be used for trading in the Derivatives Market. ISE National-50 is composed of National Market companies except investment trusts. ISE

National-50 Index contains the ISE National-30 Index companies. ISE National-100, which has been calculated since the inception of the ISE, is composed of National Market companies except investment trusts. ISE National-100 Index contains the ISE National-50 and ISE National-30 Index companies. Sector and sub-sector indices are composed of National Market companies excluding investment trusts. ISE Second National Market Index is composed of companies traded in the Second National Market. Regional Markets' name was changed to Second National Market as of March 03, 2003. ISE New Economy Market Index is composed of companies traded in the New Economy Market. ISE Investment Trusts Index is composed of investment trust stocks traded in the National Market (www.imkb.gov.tr).

According to the answers of questionnaire, most of the analysts prefer using technical analysis instead of fundamental analysis because it is easy, not time consuming and give more reliable results in short term analysis. Therefore, all fundamental inputs, money inflow out flow, news are ignored and profitability of technical analysis and its forecasting power are tried to find just by looking charts and technical data. On the other hand, 54% of technical analysts still sometimes make wrong decisions by using charts. However, question of "Do you believe the profitability of technical analysis?" is answered as "yes" by 49 of 59 analysts. Moving averages, MACD, stochastic oscillator, momentum are mostly preferred indicators so in ISE National 100 index analysis, these indicators are used. Moreover, except moving average study, ISE National 100 index values exhibited on bar chart. Because bar charts are mostly preferred chart types (78% of answers) according to the questionnaire results. Early surveys proved that financial analysts who pay attention

to technical indicators (for example support and resistance, statistical indicators & oscillators) and charts generally make short-term analysis. Additionally, patterns (in other words formations) are generally used in long run. Here, my second graph is for the first 6 month of 2007, in other words it is not long term. Therefore, formations are also ignored in the analysis.

In this section, there are two charts of ISE National 100 (chart-27 and 28) to understand if statistical indicators and charts help us to make predictions as it is believed or not. A chart is simply a graphical representation of a series of prices over a set time frame. There are several things to be aware of when looking at a chart, as these factors can affect the information that is provided. They include the time scale, the price scale and the price point properties used. The time scale refers to the range of dates at the bottom of the chart, which can vary from decades to seconds. The most frequently used time scales are intraday, daily, weekly, monthly, quarterly and annually. The shorter the time frame, the more detailed the chart. Charts of this analysis are daily charts. Daily charts are comprised of a series of price movements in which each price point on the chart is a full day's trading condensed into one point. Each point on the graph can be simply the closing price or can entail the open, high, low and close for the stock over the day. The price scale is on the right-hand side of the chart. It shows a stock's current price and compares it to past data points. A scale can either be constructed in a linear (arithmetic) or logarithmic way. ISE National 100 charts of this analysis are linear.

In technical analysis, price gradually moves to new highs or new lows and that trading volume goes with the prevailing trend. Therefore, most popular technical trading rules are trend following techniques such as moving averages and filters. Moving average analysis of daily close prices of index for year 2006 is done in the first graph. A moving average is an indicator that shows the average value of a security's price over a period of time. As the securitys' price changes, its average prices moves up or down. There are five popular types of moving averages; simple, exponential, triangular, variable and weighted. Moving average can be calculated on any data series, including a security's open, high, low, close, volume, or another indicator. A moving average of another moving average is also common. The only significant difference between the various types of moving averages is the weight assigned to the most recent data.

The most popular method of interpreting a moving average is to compare the relationship between a moving average of the security's price itself. A buy signal is generated when the security's price rises above its moving average, and a sell signal is generated when the security's prices falls below its moving average. This type of moving average trading system is not intended to get you in at the exact bottom nor out at the exact top. Rather, it is designed to keep you in line with the security's price trend by buying shortly after the security's price bottoms and selling shortly after in tops. The critical element in a moving average is the number of time periods used in calculating the average. In our analysis 20 and 50 day MAs are used.

Moving average can also be calculated and plotted on indicators. The interpretation of an indicator's moving average is similar to the interpretation of a security's moving average. When the indicator rises above its moving average, it signifies a continued upward movement by the indicator; when the indicator falls below its moving average, it signifies a continued downward movement by the indicator. Indicators that are especially well suited for use with moving average penetration system include the MACD, Price ROC, Momentum, and Stochastics. Some indicators, such as short-term Stochastics, fluctuate so erratically that it is difficult to tell what their trend really is. By erasing the indicator and then plotting a moving average of the indicator, you can see the general trend of the indicator rather than its day-to-day fluctuations. Whipsaws can be reduced, at the expense of slightly later signal, by plotting a short-term moving average of oscillating indicators.

As it is written above, a buy signal is generated when the security's price rises above its moving average, and a sell signal is generated when the security's prices falls below its moving average. When there are more than one MA, if short term MA exceeds long term it is also a buy signal, visa versa. To adapt this into my graph, first of all chart-27 has to be explained. On the vertical line, there are index values. The horizontal line shows days when ISE is open in 2006. Blue line is daily close price of ISE National 100 index. Pink line is 20 day MA. Yellow line is 50 day MA. MAs generally give right signals in this chart. When they say "sell" prices continue to decrease, when they say "buy" prices continue to increase. On the other hand, there are many price fluctuations, which cannot be explained by MAs. For example, after the sell signal in day 63, index value falls as it is expected, but after a short time it

goes to a new high without any change in MA analysis. Also, buy signal in day 89 is very early and misleading. However, you can make profit with selling 44,000 and buying 40,500. Sell signal in day 108 is late but, after this signal index value continued to decrease from 35,000 to 32,000. The most deceptive thing is, MAs do not help you to decide buying stocks, which you sell from 35,000. They give this signal in 38,000 index value. On the other hand, buying from 38,000 and selling according to the signal in day 200 at 40,000 is still profitable.

Without all other indicators, support and resistance analysis, fundamental analysis, money inflow-outflow, news etc., you can get an average profit between 500 and 1000 point just by looking 20 and 50-day linear moving averages. However, if we add transaction costs into account this profit can disappear. In order to make detailed analysis to get more profit from charts, an analyst has to study some other indicators too. However, to show results of analysis on charts easily, MA analysis is separately examined on this graph (chart-27).
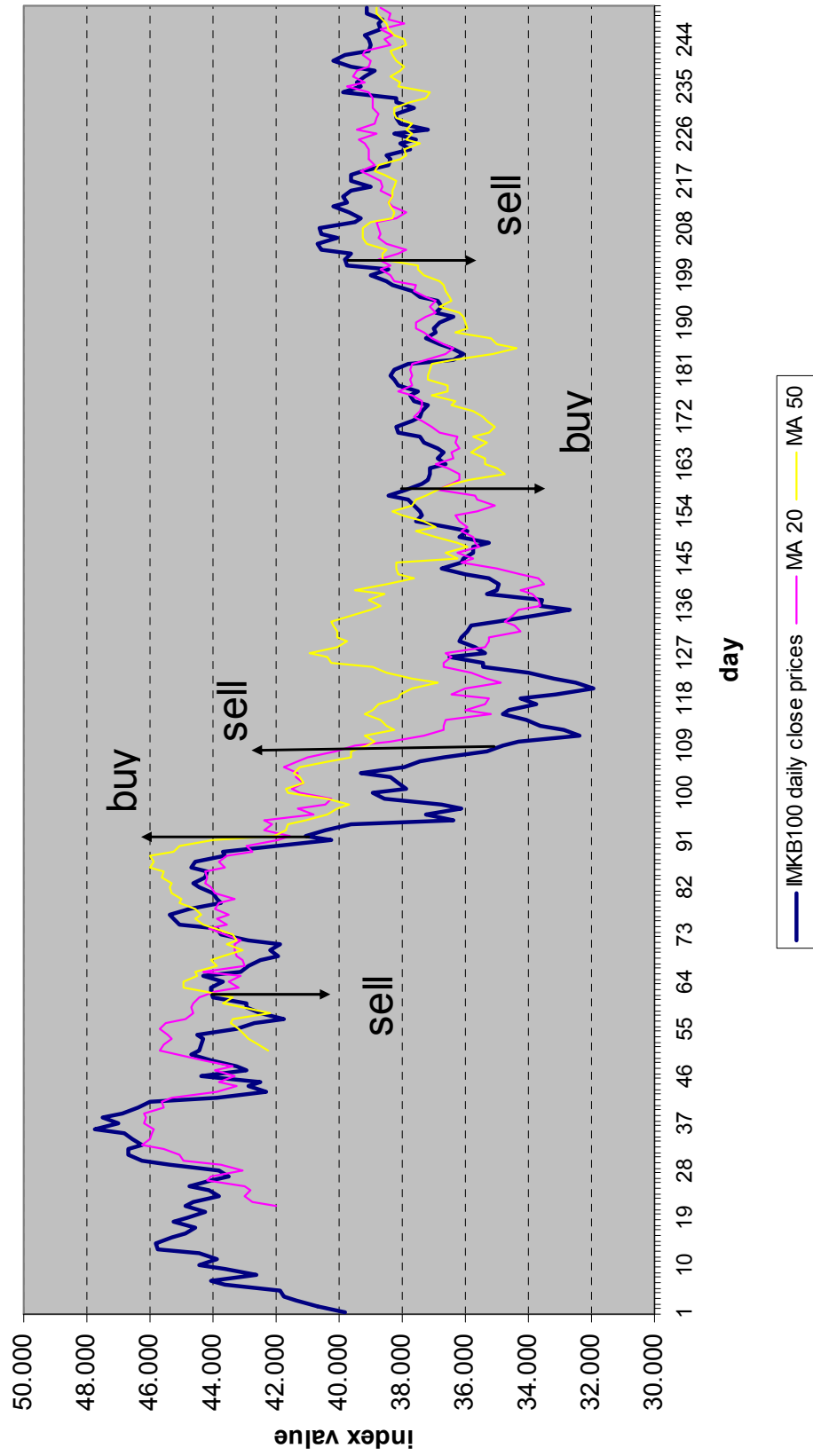
Chart-27

73

Second daily, linear ISE National 100 analysis on page 82 chart-28, is for the first 6 months of year 2007. It is taken from FX 2000 data vendor program with chosen indicators by survey applicants. The values of 2-7, 3-7, 4-7, 5-7, which are located top of the graph, indicate second month of 2007, third month of 2007 etc.

First row is the bar chart of index values. There is also a very strong support line (yellow) of ISE 100 index value in the first raw. As it is mentioned before, support is a price level below the current market price, at which buying interest should be able to overcome selling pressure and thus keep the price from going any lower.

Second row shows volume. Volume is the number of shares or contracts that trade over a given period of time, usually a day. The higher the volume, the more active the security. To determine the movement of the volume (up or down), chartists look at the volume bars that can usually be found at the bottom of any chart. Volume bars illustrate how many shares have traded per period and show trends in the same way that prices do. Volume is an important aspect of technical analysis because it is used to confirm trends and chart patterns. Any price movement up or down with relatively high volume is seen as a stronger, more relevant move than a similar move with weak volume.

Third row shows MACD graph. As it is mentioned before, the MACD (Moving Average Convergence/Divergence) is a trend-following momentum indicator that shows relationship between two moving averages of prices. The MACD

is the difference between a 26-day and 12-day exponential moving average. A 9-day exponential moving average, called the "signal" (or "trigger") line, is plotted on top of the MACD to show buy/sell opportunities. The MACD proves most effective in wide-swinging trading markets. The basic MACD trading rule is to sell when the MACD falls below its signal line. Similarly, a buy signal occurs when the MACD rises above its signal line. It is also popular to buy/sell when the MACD goes above/below zero. The MACD is also useful as an overbought/oversold indicator. When the shorter moving average pulls away dramatically from the longer moving average (i.e., the MACD rises), it is likely that the security price is overextending and will soon return to more realistic levels. MACD overbought and oversold conditions vary from security to security. An indication that an end to the current trend may be near occurs when the MACD diverges from the security. A bearish divergence occurs when the MACD is making new lows while prices fail to reach new lows. A bullish divergence occurs when the MACD is making new highs while prices fail to reach new highs. Both of these divergences are most significant when they occur at relatively overbought/oversold conditions. According to the signals of MACD indicator, I plotted projection lines to the graph and divided it into 9 parts in order to compare these buy and sell signals with other indicators. Shortly, when the red line passes up blue one it means "buy", visa versa.

Fourth row is momentum indicator which measures the amount that a security's price has changed over a given time span. There are two basic ways to use the Momentum indicator. Momentum indicator can be used as a trend following oscillator similar to MACD. Buy when the indicator bottoms and turns up and sell

when the indicator peaks and turns down. If the Momentum indicator reaches extremely high or low values (relative to the historical values), it shows continuation of the current trend. For example, if the Momentum indicator reaches extremely high values and then turns down, prices will probably go still higher. In either case, trade only after prices confirm the signal generated by the indicator (e.g., if indicator peaks and turns down, wait for prices to begin to fall before selling.) Momentum indicator is a leading indicator. This method assumes that market tops are typically identified by a rapid price increase (when everyone expects prices to go higher) and that market bottoms typically end with rapid price declines (when everyone wants to get out). This is often the case, but it is also a broad generalization. As a market peaks, the Momentum indicator will climb sharply and then fall off diverging from the continued upward or sideways movement of the price. Similarly, at a market bottom, Momentum will drop sharply and then begin to climb well ahead of prices. Both of these situations result in divergences between the indicator and prices. Stars on momentum line shows the most clear buy and sell signals of momentum. As it is shown momentum generally give earlier signals than MACD. Shortly, when the red line passes up green line it means "buy", visa versa.

The last row is Stochastic oscillator. The Stochastic oscillator compares where a security's price close relative to its price range over a given time period. The Stochastic oscillator is displayed as two lines. The main line is called K%. The second line, called D%, is a moving average of %K. There are several ways to interpret a stochastic oscillator. Three popular methods include: Buy when the Oscillator (either K% or D%) falls below a specific level and then rises above that

level. Sell when the Oscillator rise above a specific level and then falls below that level. Buy when the K% line rises above the D% line and sell when the K% line falls below the D% line. Look for divergences, for example, where prices are making a series of new highs and the Stochastic Oscillator is failing to surpass its previous highs.

Of course, just looking indicators is not enough. An analyst has to follow trend line and never forget that "trend is their friend". In this analysis, I do not add trend line because indicators chosen from questionnaire results are generally act the same with trend. Actually in a detailed chart analysis, an analyst has to look at Bollinger band and parabolic also. However, to make interpretation easy I took mostly chosen methods from questionnaire results. On the other hand, chosen indicators are the most important ones. Looking to Bollinger band, parabolic, and other second type indicators just helps analyst for being surer about the signals of moving averages, stochastic and MACD. Also sometimes, these second type indicators help to see early signals of a decrease or increase.

In my ISE 100 index chart, prices started to fall at the beginning of period 1 for half of the period and then again went up with creating a V formation. In other words, index value left behind the first levels of falling trend and went higher in period 2. The starting point of decline and uptrend to higher levels of resistance signaled by all of the indicators. However, as it is expected, just stochastic oscillator signaled turning up point at the middle of the period (It touched green support line and turned back). Because it was a very quick movement. An investor who prefers to

get profit from speculation may prefer short-term signals of stochastic, which are not supported with other trend following indicators.

Period 2 started with buy signal (increasing trend), and index value continued to increase with fluctuations. In this period, investor can definitely make profit with buy signal of MACD and Momentum at the beginning, and not selling until the resistance level (yellow line). Of course, index value tried to pass resistance level with fluctuations. These fluctuations just signaled by stochastic oscillator. In these kinds of short-term volatilities, investors generally prefer not to change their strategy. Because there is not any trend-changing signal from main indicators like Momentum, and MACD. But, at the end of period, final turn back of index value from resistance was sell signalled by MACD, and (earlier than MACD) Momentum. According to the procedure, investor should sell at this level and finish the period with profit.

Period 3 starts with wrong signals of MACD and Momentum. But, a chart follower investor have to buy again when indicators give buy signals. As I mentioned before if the Momentum indicator reaches extremely high values and then turns down, you should assume prices will probably go still higher. In either case, trade only after prices confirm the signal generated by the indicator (e.g., if indicator peaks and turns down, wait for prices to begin to fall before selling.) Additionally, stochastic supports this idea with reaching new highs by passing purple resistance level. At the end of period 3, there is a very strong sell signal from all of the indicators because index value turns back to the levels under support line (yellow line), and according to the theory and signals of chart this process may continue to

decrease. So, a technical analyst or an investor have to sell at the end of period 3. It is clear that, making profit is very difficult in this period.

As it is expected period 4 started with a strong fall of prices. Therefore, investor who follows rules of technical analysis until now makes profit with buying at the beginning of period 2 and selling at the end of period 3. In period 4 investor has to find the right time to buy stocks again. To make this decision we have to know from where the prices will turn back. The bottom level of prices just signaled by stochastic but it is very difficult to decide what to do only by looking one indicator. The most strong buy signal is given by momentum (star). Here we can see leading property of momentum. It signaled earlier than MACD. But this buying point is not very lower than level investor sold before. So, after adding transaction costs it is very difficult to make extra profit for this period after selling from the best level at the end of period3.

Investor starts period 5 with a gain and stocks he/she bought at the buy signal of momentum in period 4. This uptrend continued as a rally in this period. Passing up the yellow resistance line is one of the reasons of this continuing increase. This bull market gave investor an opportunity to increase the profit very much. But, the most confusing, deceptive, unexpected, and frightening thing happened at the end of this period. This optimistic continuing up trend was finished without any signal from any indicators! This situation might be because of a bad news but this is caused investors to lost big parts of the profit. So this situation clearly shows only technical analysis of charts is not enough for decision making. This is also consistent with the survey results. As it is mentioned before, question asked in order to understand despite

analyzing technical indicators very carefully with all details, how often they make wrong decisions is answered like, 54% "sometimes", 31% "generally", %8 "never", and %7 "always". This unexpected quick fall of prices caused a gap in index value. A gap in a chart is an empty space between a trading period and the following trading period. This occurs when there is a large difference in prices between two sequential trading periods.

Investor cannot sell before the beginning of period 6 because sell signal of all indicators are given at this time. In addition, there was not any opportunity to sell early because profit realization of bull market was very quick and unexpected. After selling at the beginning of period 6 investor still has profit from the stocks carried until now. But of course he/she lost most of the profit.

Momentum indicator signaled, "Buy" earlier than MACD in period 6. This signal is shown with a star in period 6. If the investor do not wait MACD and buy at that point he/she can buy cheaper stocks. But it is very difficult do decide what to do because this signal is not supported with MACD and stochastic yet. In this kind of situation in order to understand how strong the momentum signal is investor has to look moving averages and other indicators very carefully.

Period 7 starts with a buy signal supported with all indicators. Momentum passes up green line and continues moving in this bull market part of the indicator. Stochastic also passes up its resistance. Investor who wait and buy at the beginning of

this level and sell at the end still makes profit but less than who buy with the buy signal of momentum in period 6.

Period 8 starts with strong sell signal again. All of the indicators become sell here. And again it is possible to get profit with profit realization of period 7. However, stochastic oscillator gives this sell signal near to the end of period 7 with touching purple resistance line and turning back. An investor who speculates and tries to get short-term profits can sell early and increase his/her profit.

Period 9 is one of the most difficult periods to analyze. Actually, following a continuing trend for periods 7-8-9 is difficult and there are some wrong and not totally supported signals. Market's volatility increases and prices start to move around a horizontal trend. In my opinion, an investor can realize the profit at the beginning of period 8 and wait until the trend becomes clear. For example, decreasing of price level at the beginning of period 9 is only signaled with stochastic. All other indicators give wrong "buy" signal! As I mentioned before, this king of volatile and unclear periods increases transaction costs and decreases profits, which is very difficult to make. So an investor can wait until a clear trend occurs. He/she should not forget "trend is our friend".
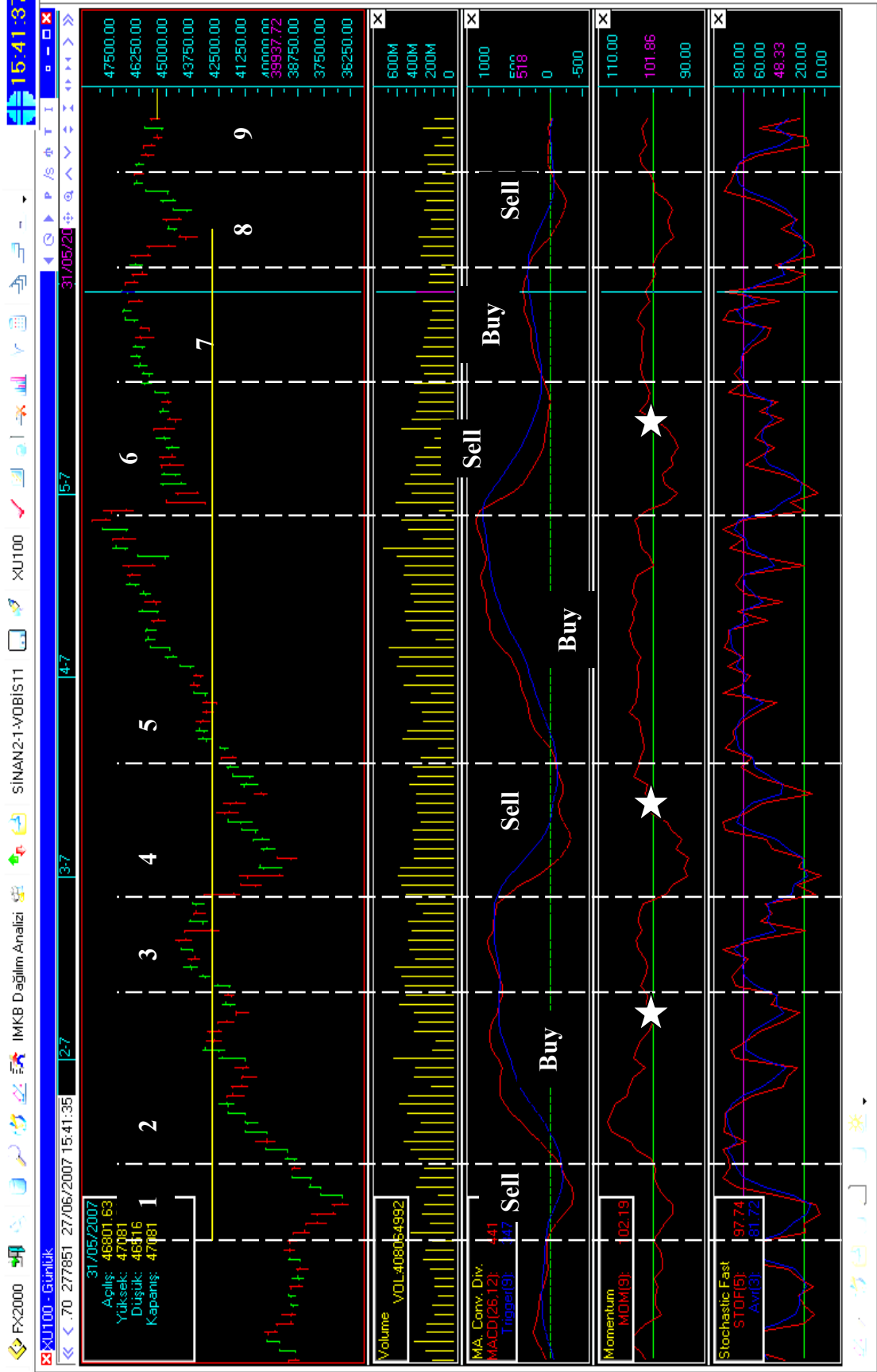
Chart-28

3.5-SUMMARY OF FINDINGS

Similar results with the early surveys like Oberlechner's (2001), Lui and Mole's (1998), Frankel and Froot's (1990), The Group of Thirty's (1985) are found in my questionnaire. However, number of survey evidence for stock market traders is very low. Most of the early surveys were on foreign exchange, commodity or futures. But my survey on the usage of technical analysis in stock market gave very similar results with early ones. For example, 59 of 66 analysts answered that they generally use technical analysis to decide a trading strategy. Additionally, as it is expected, 43 of 59 technical analysts prefer short term analysis. As a chart type bar chart, and as indicators MA, MACD, STOC, MOM are chosen by analysts. By the help of these kinds of findings, two graphs of ISE National 100 index are examined to find if it is possible to make profit just by technical analysis.

According to the results of this analysis, both chart analysis of ISE National 100 index may create net profit at the end just with technical analysis. But, there are also many wrong and unsupported signals. Consistent with the theory, number of these kinds of signals increases in volatile periods. But this study shows us with ignoring all other factors like fundamental analysis, sector analysis, news, money inflow-outflow, it is possible to make profit just with some technical indicators, support and resistance and trend following. In practice, an analyst looks at many more indicators before deciding to do what and when to do it. But, other indicators generally help answer the "when" question for speculators. Indicators used here are generally enough for most of the investors. After combining all results and other studies on profitability of technical analysis, I can say that technical analysis is

generally enough to make profit in stock markets but not big ones. And, it is the most preferred method, especially for short-term analysis. My aim is to understand if technical analysis is enough by itself. Profits show it is enough but according to the results it can be said that if investor includes fundamental factors, news etc. into the decision making process he/she may increase the profit level. The other question in the survey was to understand despite analyzing technical indicators very carefully with all details, how often they make wrong decisions. 54% of total answers are "sometimes", 31% is "generally", %8 is "never", and %7 is "always". The results are consistent with my expectations and early survey studies. Because in practice it is generally very difficult to choose the correct strategy just by looking at charts and patterns etc. Especially in volatile markets like Turkey, it is even more difficult.

The last question in the questionnaire is "Do you believe the profitability of technical analysis?". 49 of 59 answers "yes", 8 of 59 answers "no", and 2 of 59 answers "I have no idea". Therefore, an analyst who uses technical analysis may still have questions about its profitability. In my opinion, it is very normal. As it is shown in the graphs sometimes unexpected money flows, news may destroy all decision making process. So adding fundamental methods to the analysis generally increases profit levels and decreases risks. This idea is also supported by Taylor and Allen's paper (1992). They made a survey on behalf of Bank of England, among chief foreign exchange dealers based in London in November 1988. The survey asked dealers questions concerning which chartist methods are most used in practice, the role of chartists within their organizations and attempted to elicit views (both quantified and impressionistic) on how market participants view the role of Chartism. The results

indicated that 64% of respondents reported using moving averages and/or other trend-following systems and 40% reported using other trading systems such as momentum indicators or oscillators, 60% viewing technical analysis to be at least as important as fundamental analysis and 90% of respondents place some weight on non-fundamental analysis. There is also a skew toward reliance on technical analysis at shorter horizons, which becomes steadily reversed as the length of horizon considered is increased. A very high proportion of dealers say fundamental and technical analyses are complementary.

CHAPTER IV

4-CONCLUSION

This report started with reviewing survey studies, theories and empirical work regarding technical trading strategies. It is understood from the early studies on the profitability of technical analysis that technical analysis has been widely used by market participants especially in futures markets and foreign exchange markets. At least 30% to 40% of practitioners regard technical analysis as an important factor in determining price movement at shorter time horizons up to 6 months. In the theoretical literature, the conventional efficient markets models, rule out the existence of profitable technical trading rules because both models assume that current prices fully reflect all available information. On the other hand, several other models, such as noisy rational expectations models, feedback models, disequilibrium models, herding models, agent-based models, and chaos theory, suggest that technical trading strategies may be profitable because they presume that price adjusts to new information due to noise, market power, traders' irrational behavior, and chaos. In these models, thus, there exist profitable trading opportunities that are not being exploited.

Many studies have examined the profitability of technical trading rules over the years. I divided empirical studies into two groups as "early" studies and "modern" studies depending on the characteristics of testing procedures. In general, the majority of early studies examined one or two technical trading systems, and deducted transaction costs to compute net returns of trading rules. In these studies, however, risk was not adequately handled, statistical tests of trading profits and data snooping problems were often ignored, and out-of-sample tests along with parameter optimization were not conducted, with a few exceptions. The results of early studies varied from market to market. Overall, studies of stock markets found very limited evidence of the profitability of technical trading strategies, while studies of foreign exchange markets and futures markets frequently obtained sizable net profits. In order to test "if the technical analysis (indicators) has forecasting power to bring profits", a questionnaire is done to 66 analysts of Turkish brokerage houses. According to the answers of questionnaire, most of the analysts prefer using technical analysis instead of fundamental analysis because it is easy, not time consuming and give results that are more reliable in short term analysis. Therefore, all fundamental inputs, money inflow out flow, news are ignored and profitability of technical analysis and its forecasting power are tried to find just by looking charts and technical data. On the other hand, 54% of technical analysts still sometimes make wrong decisions by using charts. However, question of "Do you believe the profitability of technical analysis?" is answered as "yes" by 49 of 59 analysts. This survey is done to understand if technical analysis is a preferred method for stock market, how often it is used, analysts choose which indicators, chart types etc. By the help of the answers, performance of ISE National 100 index for the first six months of 2007 and for year

2006 is examined separately by using charts and indicators with ignoring statistical analysis in order to find if an investor can make profit just by looking technical indicators. Without all other indicators, support and resistance analysis, fundamental analysis, money inflow-outflow, news etc., you can get an average profit between 500 and 1000 just by looking 20 and 50-day linear moving averages from the first graph of 2006. However, if we add transaction costs into account this profit can disappear. In order to make detailed analysis to get more profit from charts, an analyst has to study some other indicators too. However, to show results of analysis on charts easily, MA analysis is separately examined on this graph. Second graph is for the first 6 months of 2007. According to the questionnaire answers, analysts choose moving averages as the most helpful indicator with 26%, stochastic oscillator as the second one with 22%, MACD as the third one with 20%, and momentum as the fourth one with 12%. By using these indicators' "buy", "sell" signals, and support and resistance levels of index, second graph is examined. Finally, both chart analysis of ISE National 100 index create net profit at the end just with technical analysis.

But, there are also many wrong and unsupported signals of indicators. Consistent with the theory, number of these kinds of signals increases in volatile periods. But this study shows us with ignoring all other factors like fundamental analysis, sector analysis, news, money inflow-outflow, it is possible to make profit just with some technical indicators, support and resistance and trend following. Of course, just looking indicators is not enough. An analyst has to follow trend line and never forget that "trend is their friend". In this analysis, I do not add trend line because indicators chosen from questionnaire results are generally act the same with

trend. Actually in a detailed chart analysis, an analyst has to look at Bollinger band and parabolic also. However, to make interpretation easy I took mostly chosen methods from questionnaire results. On the other hand, chosen indicators are the most important ones. Looking to Bollinger band, parabolic, and other second type indicators just helps analyst for being surer about the signals of moving averages, stochastic and MACD. Also sometimes, these second type indicators help to see early signals of a decrease or increase. In practice, an analyst looks at many more indicators before deciding what to do and when to do it. But, other indicators generally help answer the "when" question for speculators. Indicators used here are enough for most of the investors. The last question in the questionnaire is "Do you believe the profitability of technical analysis?". 49 of 59 answers "yes", 8 of 59 answers "no", and 2 of 59 answers "I have no idea". Therefore, an analyst who uses technical analysis may still have questions about its profitability. In my opinion, it is very normal. As it is shown in the graphs sometimes unexpected money flows, news may destroy all decision making process. So adding fundamental methods to the analysis generally increases profit levels and decreases risks. For example, some fundamental analysts use technical analysis techniques to figure out the best time to enter into an undervalued security. Oftentimes, this situation occurs when the security is severely oversold. By timing entry into a security, the gains on the investment can be greatly improved. Alternatively, some technical traders might look at fundamentals to add strength to a technical signal. For example, if a sell signal is given through technical patterns and indicators, a technical trader might look to reaffirm his or her decision by looking at some key fundamental data. Oftentimes, having both the fundamentals and technicals on your side can provide the best-case scenario for a trade.

In this analysis process, riskyness of technical trading rule and statistical significance are ignored and no benchmark strategy is used. Because, there are many studies say trading rule returns are generally does not follow normal distribution and there is no consensus on which benchmark should be used for a specific market.

According to the all survey studies and academic literature there is evidence in support of the usefulness of moving averages, momentum, support and resistance and some patterns, technical analysis works best on currency markets, intermediate on futures markets, and worst on stock markets, chart patterns work better on stock markets than currency markets, nonlinear methods work best overall, and technical analysis doesn't work as well as it used to. As transaction costs decrease, available computing power increases and the number of market participants increases, one would expect markets to become increasingly efficient and thus it is not surprising that the efficiency of technical analysis should diminish.

I can conclude from the results that, technical analysis can play a useful role in timing of stock market entry and exit. By applying some technical indicators, traders may enjoy substantial profits, especially when trading costs are getting lower.

4.1-FUTURE RESEARCH

This study analyzes maximum one year time period of Turkish stock market. In order to be surer about the positive results of technical analysis, long term analysis can be done. Because, as it is seen in this study, during decision-making process of "buy" and "sell" unexpected things, which affect financial markets, can happen. In addition, long-term analysis gives opportunity to pay attention to patterns and other indicators.

In spite of positive evidence about profitability and improved procedures for testing technical trading strategies, critics about technical trading profits remains among academics. Most of the skepticism based on data snooping problems and potentially insignificant economic profits after appropriate adjustment for transaction costs and risk. In this context, Timmermann and Granger (2004) provide a detailed guide to the key issues that future studies of the profitability of technical trading systems must address.

1. The set of forecasting models available at any given point in time, including estimation methods.

2. The search technology used to select the best (or a combination of best) forecasting model(s).

3. The available 'real time' information set, including public versus private information and ideally the cost of acquiring such information.

4. An economic model for the risk premium reflecting economic agents' trade-off between current and future payoffs.

5. The size of transaction costs and the available trading technologies and any restrictions on holdings of the asset in question.

The first two issues above focus squarely on the question of data snooping. In many previous studies, technical trading rules that produced significant returns were selected for investigation ex post. These profitable trading rules may have been selected because they were popular or widely used over time. However, there is no guarantee that the trading rules were chosen by actual investors at the beginning of the sample period. Similarly, studies using genetic algorithm or artificial neural networks often apply these relatively new techniques to the sample period before their discovery. Results of these studies are likely to be spurious because the search technologies were hardly available during the sample period. Therefore, the set of trading models including trading rules and other assumptions and the search technologies need to be specified. The third issue is not critical factor in technical trading studies because the information set used typically consists of prices and volume that are easily obtainable in real time, with low costs. It is well known that risk is difficult to estimate because there is no generally accepted measure or model. Also measuring the size of transaction costs is difficult (Park, Irwin 2004).

I totally agree with Timmerman and Granger, and believe that, after finding satisfactory results of studies on these 5 issues, more significant and widely accepted analysis of profitability of technical analysis can be done.

REFERENCES

Allen, H., Taylor, M.P. (1990). Charts, Noise and Fundamentalists in the London Foreign Exchange Market. The Economic Journal 100, 49-59.

Allen, F., and Karjalainen, R. (1999). Using Genetic Algorithms to Find Technical Trading Rules. Journal of Financial Economics, 51,245-271.

Bachelier, L. (1900). Théorie de la Spéculation. Doctoral Dissertation in Mathematics. University of Paris. Translated into English by Cootner, P. H. (ed.) (1964):17-78.

Balvers, R. J., Cosimano T.F., and McDonald, B. (1990). Predicting Stock Returns in an Efficient Market. Journal of Finance, 55, 1109-28.

Beja, A., and Goldman, M.B. (1980). On the Dynamic Behavior of Prices in Disequilibrium. Journal of Finance, 35,235-248.

Bird, P. J. W. N. (1985). The Weak Form Efficiency of the London Metal Exchange. Applied Economics, 17,571-587.

Brock, W., Lakonishock, J and LeBaron, B. (1992). Simple Technical Trading Rules and the Stochastic Properties of Stock Returns. <u>Journal of Finance, 47</u>,1731-1764.

Brorsen, B. W., and Irwin, S. H. (1987). Futures Funds and Price Volatility. <u>The Review of Futures Markets, 6</u>,118-135.

Caginalp, G., and Laurent, H. (1998). The Predictive Power of Price Patterns. <u>Applied Mathematical Finance, 5</u>,181-205.

Chang, P. H. K., and Osler, C.L. (1999). Methodical Madness: Technical Analysis and the Irrationality of Exchange-Rate Forecasts. <u>Economic Journal, 109</u>, 636-661.

Cheung, Y. W., and Wong, C.Y.P. (2000). A Survey of Market Practitioners' Views on Exchange Rate Dynamics<u>. Journal of International Economics, 51</u>, 401-419.

Cheung, Y. W., and Chinn, M. D. (2001). Currency Traders and Exchange Rate Dynamics: A Survey of the US Market. <u>Journal of International Money and Finance, 20</u>, 439-471.

Cheung, Y. W., Chinn, M.D., and Marsh I.W. (2000). How Do UK-Based Foreign Exchange Dealers Think Their Market Operates?. <u>NBER Working Paper</u>, No. 7524

Clyde W. C., and Osler, C.L. (1997). Charting: Chaos Theory in Disguise?. <u>Journal of Futures Markets, 17</u>, 489-514.

Conrad, J. and Kaul, G. (1988). Time-Variation in Expected Returns. Journal of
Business, 61, 409-425

Cooper, M., and Gulen, H. (2003). Is Time-Series Based Predictability Evident in
Real-Time?. Working Paper, Krannert Graduate School of Management, Purdue
University.

DeBondt, Werner, F.M., and Thaler, R.H. (1985). Does the Stock Market overreact.
Journal of Finance, 40, 793-805.

DeBondt, Werner, F.M., and Thaler, R.H. (1987). Further Evidence on Investor
Overreaction and Market Seasonality. Journal of Finance, 42, 557-581

De Long, J.B., Shleifer, A., Summers, L.H., Waldmann, R.J.(1990). Noise trader risk
in financial markets. Journal of Political Economy 98, 703-738.

Denton, F. T. Data Mining as an Industry. (1985). Review of Economics and
Statistics, 67,124- 127.

Dryden, M.(1970). Filter Tests of U.K. Share Prices. Applied Economics, 1,261-275.

Dryden, M.(1970). A Statistical Study of U.K. Share Prices. Scottish Journal of
Political Economy, 17, 369-389.

Fama, E.F.(1965).The behavior of stock market prices.Journal of Business,38,34-105.

Fama, E. F., and Blume, M.E. (1966). Filter Rules and Stock Market Trading. Journal of Business, 39 ,226-241.

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. Journal of Finance.

Frankel, J. A., and Froot, K.A. (1990). Chartist, Fundamentalists, and Trading in the Foreign Exchange Market. American Economic Review, 80, 181-185.

Froot, K. A., Scharfstein, D.S., and Stein, J.C. (1992). Herd on the Street: Informational Inefficiencies in a Market with Short-Term Speculation. Journal of Finance, 47,1461-1484.

Gençay, R.(1998). Optimization of Technical Trading Strategies and the Profitability in Security Markets. Economic Letters, 59,249-254.

Gençay, R.(1999). Linear, Non- linear and Essential Foreign Exchange Rate Prediction with Simple Technical Trading Rules. Journal of International Economics, 47,91-107.

Griffioen G.A.W. (2003). Technical Analysis in Financial Markets. University of

Amsterdam.

Group of Thirty. (1985).The Foreign Exchange Market in the 1980s. New York

Irwin, S. H., and Uhrig, J.W. (1984). Do Technical Analysts Have Holes in Their

Shoes?. Review of Research in Futures Markets, 3, 264-277.

James, F. E. Jr.(1968). Monthly Moving Averages - An Effective Investment

Tool?.Journal of Financial and Quantitative Analysis, 315-326.

Jensen, M. C. (1967). Random Walks: Reality or Myth - Comment. Financial

Analysts Journal, 23,77-85.

Jensen, M. C., and Benington, G. A..(1970) Random Walks and Technical Theories:

Some Additional Evidence. Journal of Finance, 25,469-482.

Lee, C. I., and. Mathur, I. (1996). Trading Rule Profits in European Currency Spot

Cross-Rates. Journal of Banking & Finance, 20,949-962.

Lee, C. I., Mathur, I.(1996). A Comprehensive Look at the Efficiency of Technical

Trading Rules Applied to Cross-Rates. European Journal of Finance, 2,389-411.

LeBaron, B.(1999). Technical Trading Profitability in Foreign Exchange Markets in

the 1990s. Working paper, Brandeis University.

Levich, R. M., and Thomas, L.R. (1993). The Significance of Technical Trading Rule Profits in the Foreign Exchange Market: A Bootstrap Approach. Journal of International Money and Finance, 12,451-474.

Lo, A.W., Mamaysky H. and Wang, J. (2000). Foundations of technical analysis: computational algorithms, statistical inference, and empirical implementation. Journal of Finance, 55, 1705-1764.

Lui, Y. H., and Mole, D. (1998). The Use of Fundamental and Technical Analyses by Foreign Exchange Dealers: Hong Kong Evidence. Journal of International Money and Finance, 17, 535-545.

Lovell, M. C. (1983). Data Mining. Review of Economics and Statistics, 65,1-12.

Lukac, L. P., and Brorsen, B.W. (1989).The Usefulness of Historical Data in Selecting Parameters for Technical Trading Systems. Journal of Futures Markets, 9, 55-65.

Lukac, L. P., and Brorsen, B.W. (1990). A Comprehensive Test of Futures Market Disequilibrium. Financial Review, 25, 593-622.

Lukac, L. P., Brorsen, B.W., and Irwin, S.H. (1988). A Test of Futures Market Disequilibrium Using Twelve Different Technical Trading Systems. Applied Economics, 20, 623-639.

Lukac, L. P., Brorsen, B.W., and Irwin, S.H. (1988). Similarity of Computer Guided Technical Trading Systems. Journal of Futures Markets, 8,1-13.

Menkhoff, L. (1997). Examining the Use of Technical Currency Analysis. International Journal of Finance and Economics, 2, 307-318.

Neely, C. J., and Weller, P.A. (2001). Technical Analysis and Central Bank Intervention. Journal of International Money and Finance, 20,949-970

Neely, C. J., Weller, P.A., and Dittmar, R. (1997). Is Technical Analysis Profitable in the Foreign Exchange Market? A Genetic Programming Approach. Journal of Financial and Quantitative Analysis, 32, 405-426.

Neftci, S.N. (1991), Naive Trading Rules in Financial Markets and Wiener Kolmogorov Prediction Theory: A Study of .Technical Analysis. Journal of Business 64, 549-571.

Oberlechner, T. (2001). Importance of Technical and Fundamental Analysis in the European Foreign Exchange Market. International Journal of Finance and Economics, 6, 81-93.

Olson, D. (2004). Have Trading Rule Profits in the Currency Markets Declined over Time?. Journal of Banking and Finance, 28, 85-105.

Park,C., and Irwin, S.H. October (2004). The Profitability of Technical analysis: A Review. AgMAS Project Research Report

Peterson, P. E., and Leuthold, R.M. (1982). Using Mechanical Trading Systems to Evaluate the Weak form Efficiency of Futures Markets. Southern Journal of Agricultural Economics, 14,147-152.

Pring, M. J. (2002). Technical Analysis Explained. New York, NY: McGraw-Hill

Qi, M., and Wu, Y. (2002). Technical Trading- Rule Profitability, Data Snooping, and Reality Check: Evidence from the Foreign Exchange Market.Working Paper

Ratner, M., and Leal, R. P. C.(1999). Tests of Technical Trading Strategies in the Emerging Equity Markets of Latin America and Asia. Journal of Banking & Finance, 23,1887-1905.

Ready, M. J. (2002). Profits from Technical Trading Rules. Financial Management, 31,43-61.

Schmidt, A. B. (1999). Modeling the Demand-Price Relations in a High-Frequency Foreign Exchange Market. Physica A, 271,507-514.

Schmidt, A.B.(2000).Modeling the Birth of a Liquid Market.<u>Physica A, 283,</u>479-485.

Schmidt, A. B. (2002). Why Technical Trading May Be Successful? A Lesson from the Agent-Based Modeling. <u>Physica A, 303,</u>185-188.

Sharpe, W.F. (1975). Likely Gains From Market Timing. <u>Financial Analysts Journal, March-April,</u> 60-69.

Shiller, R.J. (1984). Stock Prices and Social Dynamics, Brookings Papers on Economic Activity. Brookings Institution, 71-87.

Shiller, R.J., (1987). Investor Behaviour in the October 1987 Stock Market Crash: Survey Evidence. NBER Working Paper, No. 2446. Reprinted in Market Volatility, MIT Press.

Skouras, S.(2001).Financial Returns and Efficiency as Seen by an Artificial Technical Analyst. <u>Journal of Economic Dynamics & Control, 25</u>, 213-244.

Smidt, S.(1965). Amateur Speculators. Ithaca, NY: Graduate School of Business and Public Administration, Cornell University.

Sosvilla- Rivero, S., Andrada-Félix, J., and Fernández-Rodríguez, F. (2002). Further Evidence on Technical Trade Profitability and Foreign Exchange Intervention. <u>Applied Economics Letters, 9,</u>827-832.

Stewart, B. (1949). An Analysis of Speculative Trading in Grain Futures. <u>Technical Bulletin, No. 1001</u>, US Department of Agriculture, Washington, D.C.

Stevenson, R. A., and Bear, R. M. (1970). Commodity Futures: Trends or Random Walks? <u>Journal of Finance, 25</u>, 65-81.

Sullivan, R., Timmermann, A., and White, H. (1999). Data Snooping, Technical Trading Rule Performance, and the Bootstrap. <u>Journal of Finance, 54</u>,1647-1691.

Sullivan, R., Timmermann, A., and White, H. (2001). Dangers of Data-Mining: The Case of Calendar Effects in Stock Returns. <u>Journal of Econometrics, 105</u>, 249-286.

Sullivan, R., Timmermann, A., and White, H. (2003). Forecast Evaluation with Shared Data Sets. <u>International Journal of Forecasting, 19</u>, 217-227.

Sweeny, R. J. (1986). Beating the Foreign Exchange Market. <u>Journal of Finance, 41</u>,163-182.

Sweeny, R. J. (1988). Some New Filter Rule Tests: Methods and Results. <u>Journal of Financial and Quantitative Analysis, 23</u>, 285-300.

Sy W.(1990).Market Timing:Is It a Folly?<u>Journal of Portfolio Management, 16,</u>11-16.

Szakmary, A. C., and Mathur, I. (1997). Central Bank Intervention and Trading Rule Profits in Foreign Exchange Markets. Journal of International Money and Finance, 16, 513-535.

Taylor, S. J.(1983). Trading Rules for Investors in Apparently Inefficient Futures Markets. In Futures Markets - Modeling, Managing and Monitoring Futures Trading, Oxford, UK: Basil Blackwell

Taylor, S. J. (1985). The Behaviour of Futures Prices over Time. Applied Economics, 17, 713-734.

Taylor, S. J. (2000). Stock Index and Price Dynamics in the UK and the US: New Evidence from a Trading Rule and Statistical Analysis. European Journal of Finance, 6, 39-69.

Taylor, S. J. (1986). Modelling Financial Time Series.

Taylor, M. P., and Allen, H. (1992). The Use of Technical Analysis in the Foreign Exchange Market. Journal of International Money and Finance, 11, 304-314.

Timmermann, A., and Granger, C.W.J. (2004). Efficient Market Hypothesis and Forecasting. International Journal of Forecasting, 20, 15-27.

Tomek, W. G., and Querin, S.F. (1984). Random Processes in Prices and Technical Analysis. <u>Journal of Futures Markets, 4</u>, 15-23.

Van Horne, J. C., and Parker, G.G.C (1967). The Random-Walk Theory: An Empirical Test. <u>Financial Analysts Journal, 23</u>, 87-92.

Wong,W., Manzur,M., Chew, B. (2002). How Rewarding is Technical Analysis? Evidence from Singapore Stock Market. NUS Department of Economics

Wong,W., Du,J., Chong, T. November (2005). Do The Technical Indicators Reward Chartists? A Study On The Stock Markets of China, Hong Kong and Taiwan. SCAPE Working Paper Series, Department of Economics

Zaidi, Zaheer. Technical analysis. Winning Techniques of Analyzing Stock Trends and Price Movements.
http://www.investopedia.com/university/technical/

http://en.wikipedia.org/wiki/Technical_analysis

http://www.investorhome.com/emh.htm

http://www.technicalanalysis.org.uk/psychology.html

http://www.ise.org/aboutise.htm

APPENDIX

SURVEY ABOUT TECHNICAL ANALYSIS

My dear colleague,

Please give some few minutes and answer the questions below, which are going to be used by myself in order to analyze the profitability of technical analysis in stock markets.

Thanks…

---

1) What range does your age belong to?

    a- Less than 25

    b- 25-30

    c- 30-35

    d- 35-40

    e- More than 40

2) What is your educational level?

    a- High school

    b- Collage

    c- University

    d- Master degree

    e- Phd

3) Do you have any of "CMB investment specialist licenses" ?

    a- Yes, all of them

    b- Yes, one of them

    c- No

4) Which one do you <u>generally</u> use in order to decide a trading strategy?

    a- Technical analysis

    b- Fundamental analysis

If you choose "a" please answer the questions below,

5) What are your reasons of using technical analysis more often? Please write down according to their importance order.

1- ………………………………………………………………………………

2- ………………………………………………………………………………

3- ………………………………………………………………………………

4- ………………………………………………………………………………

5- ………………………………………………………………………………

6) What is your time period in your analysis?

    a- Short term (< 1 year)

    b- Long term (> 1 year)

7) Which chart type do you <u>generally</u> use?

    a- Bar   c- Candlestick

    b- Line   d- Point and figure

8) Which one do you <u>generally</u> look in order to make decisions?

    a- Support and resistance

    b- Statistical indicators and oscillators

    c- Patterns(formations)

9) Could you choose first 3 indicator you use in your analysis according to their usage frequency?
    a- Moving averages
    b- Moving average convergence divergence (MACD)
    c- Relative strength index (RSI)
    d- Momentum
    e- Trix
    f- Stochastic
    a- Average directional index
    b- Aroon

10) Despite analyzing technical indicators very carefully with all details, how often do you make wrong decisions?
    a- Never
    b- Sometimes
    c- Generally
    d- Always

11) Do you believe the profitability of technical analysis?
    a- Yes
    b- No
    c- I have no idea