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CONTRARIAN INVESTMENT STRATEGIES
AND THE THREE FACTOR MODEL:
AN APPLICATION IN ISTANBUL STOCK EXCHANGE

Tayfun KOCABAŞ

Danışman
Prof. Dr. M. Banu DURUKAN

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Anabilim Dalı : İngilizce İşletme Yönetimi A.B.D.
Programı : İngilizce İşletme Yönetimi Yüksek Lisans Programı
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- Not: Bu bölüm merkezimiz tarafından doldurulacaktır.

Tez Yazarının
Soyadı: KOCABAŞ   Adı: Tayfun

Tezin Türkçe Adı: Karşıtlık Yatırım Stratejileri ve Üç Faktör Modeli: İstanbul Menkul Kıymetler Borsasında Bir Uygulama

Tezin Yabancı Dildeki Adı: Contrarian Investment Strategies and the Three Factor Model: An Application in Istanbul Stock Exchange

Tezin Yapıldığı
Üniversitesi: Dokuz Eylül Üniversitesi   Enstitü: Sosyal Bilimler Enstitüsü   Yıl:2006

Diğer Kuruluşlar:

Tezin Türü:

Yüksek Lisans	:■	Dili: İngilizce
Tezsiz Yüksek Lisans	:☐	Sayfa Sayısı: 99
Doktora	:☐	Referans Sayısı:79

Tez Danışmanının

Ünvanı: Prof. Dr.   Adı: M.Banu   Soyadı: DURUKAN

Türkçe Anahtar Kelimeler: İngilizce Anahtar Kelimeler:
1-Karşıtlık Stratejisi   1-Contrarian Strategy
2-Etkin Piyasa Hipotezi   2-Efficient Market Hypothesis
3-Piyasa Anomalileri   3-Market Anomalies
4-Üç Faktör Modeli   4-Three Factor Model
5-Aşırı Tepki Hipotezi   5-Overreaction Hypothesis

Tarih:
İmza:

Tezimin Erişim Sayfasında Yayınlanmasını İstiyorum   Evet ☐   Hayır ■

FOREWORD

The first words are to the most deserved one, my dear advisor Prof. Dr. M. Banu Durukan who is one of the representatives of my hopes about scientific quality and rigor in Turkey. In any time of the week and day, I have the chance of calling and asking about any subject without hesitation. She is always the one who empowers my abilities and beliefs for the success of this study.

I would like to thank to my family, who are always supporting me throughout this process. This study would not be so joyful without the coffee breaks with my mother, without the comments of my father and without the sweetness of my brother and sister.

I would like to thank also the ones who are not seen on the foreground of this study. I have my first lecture from Associate Prof. Sibel Güven who has revealed my interest in the area of investments. May be and who knows, Associate Prof. Serdar Özkan is the reason for me to keep on the MBA program with his unconditional support and trust in me in any area. I would like to thank to my former manager Esin Fakılı who is the one whom I always trusted and whose support I always felt as an *invisible hand* throughout the long synchronized MBA and work life period. And I would like to thank to Hakkı Yılmaz for everything he has been teaching and telling me about life. It is my honor to meet you.

I would like to thank to my dear friends Volkan Çağlayan and Özcan Atılgan who are the sources of fun and happy hours throughout the MBA program. Thus, the restaurants in Alsancak with unlimited menu are in deep debt just because of this trio.

Lastly, I want to thank to my dear and my most precious; Sibel. You are the one that I do not want to be without anymore. Three long years with only once a month meetings is the hardest of all. Thank you for your patience.

TAYFUN KOCABAŞ

ÖZET

Etkin Piyasa Hipotezi (EPH), piyasaların rasyonel yatırımcılar tarafından yeni gelen bilgiye anında ve tam doğru olarak tepki göstereceği öngörümü üzerine kurulmuştur. Varlıkları fiyatlandırma teorilerinin köşe taşları da EPH varsayımlarına dayanmaktadır.

Diğer taraftan yetmişlerden bu yana EPH varsayımlarının geçerliliğine karşı bulgular sunan çalışmalar bulunmaktadır. Araştırmacılar sürekli olarak piyasa ortalaması üzerinde kar elde edebilmek için EPH ile çelişen anomaliler üzerine kurulu yatırım stratejileri bulma çabasındadırlar. Bu stratejilerden biri de yatırımcıların bilgiye aşırı tepki verip getirilerin gelecekte tersine dönmesi üzerine kurulu ve kısaca kaybeden hisse senetlerinin alınıp kazananların ise elden çıkarılmasını savunan Karşıtlık Stratejisidir. EPH savunucuları ve karşıtları arasındaki bu tartışmanın çözülmesi yatırım literatürü açısından kritik önem taşımaktadır.

Bu çalışmanın amacı İstanbul Menkul Kıymetler Borsası'nda (IMKB) eğer varsa kârlı bir karşıtlık stratejisinin varlığını ortaya çıkarmak ve bu kârlılığın EPH üzerine kurulmuş Fama-French Üç Faktör Modeli (FF-ÜFM) ile açıklanabilirliğini saptamaktır. Bu çalışma yukarıda geçen tartışmanın iki tarafı üzerine de odaklanmıştır. İlk olarak karşıtlık stratejilerinin kârlılığı test edilmiş, takiben FF-ÜFM'nin bu kârlılığı açıklayabilirliği araştırılmıştır.

İstanbul Menkul Kıymetler Borsası (İMKB) verilerinden elde edilen sonuçlar karşıtlık stratejisinin kârlılığını orta vadede destekler niteliktedir. Bununla birlikte karşıtlık stratejisinin kârlılığı 1999 yılından sonraki dönemde daha da açık olarak görülmektedir. Diğer taraftan, FF-ÜFM'nin yüksek eksi düşük (HML) faktörü istatistiksel olarak anlamlı bulunmamasına karşın, model kaybeden ve kazanan hisse senetlerinin getirilerinin hareketlerini ve gelecekteki değerlerinin değişimini başarıyla açıklayabilmektedir.

ABSTRACT

Efficient Market Hypothesis (EMH) was developed on the insight that markets react to new information rapidly and accurately by the actions of rational investors. Milestones of asset pricing theories are based on EMH assumptions.

On the other side, there is also considerable amount of literature against EMH since the seventies. In order to make continuous profits over the market, researchers are looking for investment strategies which are based on the anomalies contradicting with EMH. One of them is the Contrarian Strategy, which simply proposes buying the loser and selling the winner stocks with the expectation of return reversals due to investor overreaction. Resolving the battle between EMH supporters and opponents is critical to investments literature.

In the light of the above discussion, the aim of this study is to reveal a profitable contrarian strategy if it exists in Istanbul Stock Exchange (ISE) and to investigate whether the Fama-French Three Factor Model (FF-TFM) that stands on EMH can explain it. Thus, this study has focused on the two sides of the discussion. In the first part, the profitability of contrarian strategies is tested and subsequently the explanatory power of the FF-TFM of this profitability is investigated.

The results showed that the contrarian strategy is profitable in the intermediate term, and the profitability of contrarian strategy is more obvious after 1999. On the other hand, the FF-TFM has successfully captured the variation in the returns of the loser and winner stocks while the high minus low (HML) factor is found to be insignificant.

CONTRARIAN INVESTMENT STRATEGIES
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CHAPTER 1
EFFICIENT MARKET HYPOTHESIS, ANOMALIES AND
CONTRARIAN STRATEGIES

CHAPTER 2
ASSET PRICING MODELS

CHAPTER 3
DATA SET AND METHODOLOGY

CHAPTER 4
EMPIRICAL RESULTS

ABBREVIATIONS

APT	Arbitrage Pricing Theory
BE/ME	Book to Market Value of Equity
C/P	Cash Flow to Price Ratio
CAPM	Capital Asset Pricing Model
CAR	Cumulative Abnormal Return
E/P	Earnings to Price Ratio
EMH	Efficient Market Hypothesis
EPH	Etkin Piyasa Hipotezi
FF-TFM	Fama-French Three Factor Model
FF-ÜFM	Fama-French Üç Faktör Modeli
HML	High Minus Low Portfolio
HPAR	Holding Period Abnormal Return
HPR	Holding Period Return
ISE	Istanbul Stock Exchange
ISE100	Istanbul Stock Exchange 100 Index
İMKB	İstanbul Menkul Kıymetler Borsası
NYSE	New York Stock Exchange
OTC	Over the Counter
P/E	Price to Earnings Ratio
P/S	Price to Sales Ratio
S&P 500	Standard & Poor 500
SCL	Security Characteristics Line
SMB	Small Minus Big Portfolio
SML	Security Market Line
SUE	Standardized Unexpected Earnings
UK	United Kingdom
US	United States

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INTRODUCTION

The issue of predicting the returns of securities has been in the centre of discussion in the investment literature. This is not surprising since predicting how the prices of securities will behave in the future is the key to wealth. At this point, a strong answer is forwarded to the ones who are in the effort of searching a tool or strategy that helps to predict future returns by the Efficient Market Hypothesis (EMH). EMH clearly states that, in an efficiently working market no one can generate continuous profits over the market mean return. It may be possible to generate higher returns over some period but it is also equally possible to lose in another time with respect to market mean return. This result is based on the assumption that markets react to new information rapidly and accurately by the actions of rational investors. Actually at this point, EMH has been using the traits of perfectly competitive markets from the economics literature. There are so many rational investors that seek even a small profit opportunity in a wide market and as a result all are in the position of price takers. So, EMH states that, due to the competitive structure of the market, investors react rapidly and accurately to new information.

The question is how far a market can be efficient. Since there is not perfect competition in any market, analogous with this view it can be said that there is no fully efficient market. Fama (1970) was the first to classify the markets according to their efficiency as weak-form of efficiency, semistrong-form of efficiency and strong-form of efficiency. Various studies are made to test the efficiency of the markets mostly in the US. Markets seem to react rapidly to some of the news like stock-split announcements (Fama et al., 1969) and take over announcements (Keown and Pinkerton, 1981) whereas react slowly to financial statement announcements (Rendleman et al., 1982). Market efficiency is also tested according to the stock movements and possible trading rules that may generate profits. Actually most of the debate between EMH supporters and opponents are going on in this category. When the serial correlation studies are observed from the literature, the followings are revealed in the markets: short term return reversals (Jegadeesh, 1990), intermediate term return continuation (Jegadeesh and Titman, 1993) and long term return

reversals (De Bondt and Thaler, 1985). Here it should be noted that these patterns are found in well developed markets namely in the US and Japanese markets. For example in New Zealand, Chin et al. (2002) showed that return reversals are observed one year following the portfolio formation date. Thus, the generalization of the above patterns of well developed markets requires further investigation for each country's market. Actually this necessity constitutes one of the contributions of this study.

Analysis of historical data in terms of serial correlation has revealed two main trading strategies. The first one is the *momentum strategy* which simply states that winner stocks will continue to win and the losers will continue to lose. According to the literature, continuation of returns hence profitability of momentum strategy is valid in the intermediate term. Some studies also showed that in the ultra-short term, namely overnight periods, continuation of returns is observable (Huang et al., 2001). However, as Haugen (2001; 605) stated, more studies are required to support the profitability of ultra-short term momentum strategies. The other and the more commonly studied strategy in the literature is the *contrarian strategy* which is based on buying stocks that have been losing and selling stocks that have been winning in a determined time period. The profit of the strategy is built upon the expectation of return reversals in the future. This strategy is first proposed by De Bondt and Thaler (1985) based on the findings on long term return reversals of winner and loser stocks.

Both of the trading strategies contradict with the main assumption of EMH which states that investors are rational decision makers. Actually, the roots of these strategies are referred to the psychology of humans by the behavioral finance community. In the contrarian case investors are assumed to be overreacting to new information and in the momentum case they are underreacting. De Bondt and Thaler (1985) supported their findings with Kahneman and Tversky's (1982) study in experimental psychology in which they found that people tend to overreact to unexpected and dramatic events.

On the other hand, EMH supporters are using asset pricing models that are relying on the assumptions of EMH in order to predict the returns of securities. The

first asset pricing model is developed by Sharpe (1964) and named as the Capital Asset Pricing Model (CAPM). The model relates the return of individual securities with the market portfolio return by a coefficient beta. In accordance with the EMH, CAPM proposes a single risky portfolio, market portfolio, to every investor and assumes that all the systematic risk is reflected by this portfolio. The second model is the Arbitrage Pricing Theory (APT). Starting with the standpoint that there should not be any arbitrage opportunity in an efficient market, APT reaches the same results with CAPM in its one factor form. Although APT necessitates less constraining assumptions than CAPM, what the factors in multifactor APT will be is an open question.

The question if it is possible to represent all the systematic risk by a single market factor is in the centre of discussion. Bodie et al. (2002; 309) states that return of a regulated utility firm and an airline company reacts differently to macroeconomic risk factors like gross domestic product and interest rates. This situation necessitates the search for new asset pricing models.

Fama and French (1992) showed that the relation between beta in CAPM and average stock returns disappeared during the 1963-1990 period. With this shortcoming of CAPM they have started the search for a new model. Fama and French (1992) have analyzed four security characteristics; size, book-to-market value of equity ratio (BE/ME), leverage ratios and earning-price ratios. They have concluded that the combination of size and BE/ME factors were enough to capture the variation in stock returns. One year later, Fama and French (1993) included the market factor to their model and proposed the Fama-French Three Factor Model (FF-TFM) as a new asset pricing model.

FF-TFM was tested against the anomalies by Fama and French (1996). The model was successful in explaining the anomalies of long term reversal of De Bondt and Thaler (1985) and value strategies of Lakonishok et al. (1994). The only shortcoming of the model was its inability to capture the momentum pattern in the intermediate term (Jegadeesh and Titman, 1993).

This study started with the intuition of finding contrarian strategy evidence in ISE and testing the results with the FF-TFM which is an asset pricing model that stands on EMH. The focus actually is not to test the efficiency of ISE rather to investigate whether or not EMH assumptions can be applied in the explanation of contrarian strategy returns. Thus, the aim of this study is to find out whether or not a contrarian strategy is profitable in the intermediate term in Istanbul Stock Exchange (ISE) and to test the explanatory power of the FF-TFM of returns of contrarian strategies. This study makes the following contributions to the investment literature:

1. It provides comprehensive and also organized literature survey in the very broad areas of investment; market efficiency, market anomalies, asset pricing models, contrarian strategies and the FF-TFM.

2. It analyses the profitability of intermediate term contrarian strategies for two time periods in ISE, 1988-2005 full period and 1998-2005 subperiod separately.

3. It is the first study that applies the FF-TFM in the explanation of winner and loser stocks of contrarian investment strategies in ISE.

4. It provides detailed explanations of methodologies applied and can be a guideline for the future researchers in both constituting the FF-TFM basis and the extensive set of winner and loser portfolios.

5. It also contributes to the investment literature of emerging markets by analyzing ISE stocks.

CHAPTER 1
EFFICIENT MARKET HYPOTHESIS, ANOMALIES
AND CONTRARIAN STRATEGIES

In this section of the study, literature review of efficient market hypothesis (EMH) and so-called anomalies that contradict with EMH are presented. First, studies on EMH are discussed then in the following section, anomalies literature is reviewed. In the last part of this section, contrarian investment strategies and the overreaction hypothesis which are also market anomalies are discussed in detail.

1.1 Efficient Market Hypothesis (EMH)

The use of computers in the researches facilitated the systematic analysis of the time series of data in any field. With the power of this tool, Roberts (1959) was one of the first who analyzed the stock prices in order to find a relevant pattern related to the prospects of the firm. The result of this study showed that the prices of stocks seem to move randomly. Roberts (1959) stated that the changes in stock prices and the market index level behave very much as if they had been generated by chance.

The Efficient Market Hypothesis simply states that the stock prices reflect all the available information to the public and at the same time prices move randomly. This definition is for the informationally efficient markets where information is rapidly spread and reflected to prices. Actually Roberts (1959) proved in a way that the randomness of the price movements is a result of market efficiency. If there would be any rule in the movement of the prices, hence any trading rule to the investors, it had been soon exploited by the ones who discovered it and again equilibrium would be reached.

Civelek and Durukan (2003; 376) and Haugen (2001; 580) list the following characteristics that an efficient market should hold.

1. Security prices should respond rapidly and accurately to new information.

2. Changes in expected return of securities should be only due to the time varying interest rates and the risk premium. Due to the other factors, prices only move randomly and in an unpredictable manner.

3. Any trading strategy, which is expected to produce continuous superior results compared with the market, is prone to fail.

4. None of the investment groups can produce continuous superior results when compared to the others, namely gains of knowledgeable investors and of those who are not, can not be different.

5. There should be low transaction costs.

6. Fairly continuous and wide trading should be realized.

The degree of efficiency of a financial market and its implications are discussed in three forms.

1.1.1 The Three Forms of Market Efficiency

The commonly accepted three forms of market efficiency were first introduced by Fama (1970). These are weak-form market efficiency, semistrong-form market efficiency and lastly strong-form market efficiency. The forms of market efficiency, supporting literature and their implications are discussed in the following sections.

1.1.1.1 Weak-From Market Efficiency

The weak-form market efficiency states that the stock prices fully reflect all historical security and market information, including prices, rates of return, traded volume and other market information like block trades in the market. Since this form of efficiency assumes that current stock prices already reflect all past returns data, there should not be any relationship between historical rate of returns and the future rates of returns. So, the distributions of stock returns between the consecutive time periods should look like as shown Figure 1. The second characteristic of the EMH stated above is related to this issue.
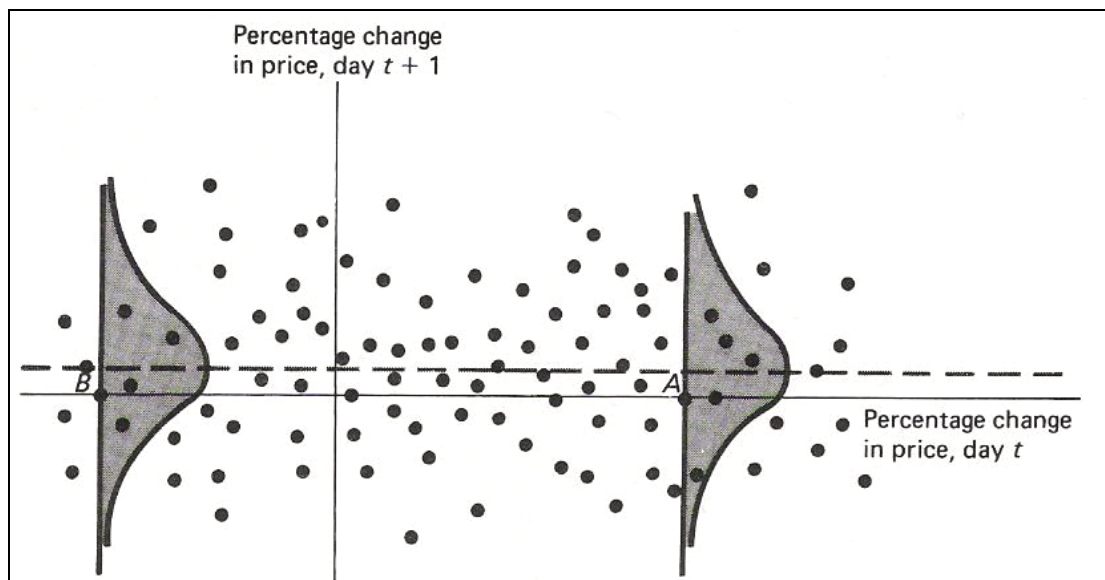
Source: Haugen (2001; 602)

Figure 1 Zero Serial Correlation

Thus trading technique based on historical prices which is called as *technical analysis* is not useful in generating profits according to the weak-form market efficiency. Any trading rule based on the historical prices does not generate continuous profit, just the normal profit for the risk taken. The third characteristic of the EMH is related to this issue.

One of the early studies that tests weak-form efficiency was made by Fama (1965). Fama (1965) analyzed the serial correlations among stock returns for short time horizons ranging from 1 day to 16 days. The results indicated that the correlation values are statistically insignificant over time. The range of correlation coefficients was from 0,1 to -0,1.

Hagerman and Richmond (1973) have tested the independence of stock prices over time with *runs test* rather than correlation tests. The results showed that for the stocks on the OTC market, there is no dependency overtime.

As a trading rule, filter rules are used to test the weak-form market efficiency. Filter rule is simply the buy or sell decision criteria according to a specified percentage change in the price. Fama (1966) tested the filter rules on stocks in Dow-Jones Industrial Average between January 1956 and April 1958. The results showed that, although small filters (0,5%) yield above average returns, the profits disappear since small filters suffer from transaction costs due to excessive buy and sell decisions made. The big filters also do not show any abnormal returns. These results are in accordance with weak-form market efficiency.

Yilmaz (2002) has tested the existence of weak-form market efficiency in 21 emerging markets including ISE for the 1988-2000 period. The results showed that ISE stock return series would tend to approach random walk behavior towards the end of the test period.

There are also studies that contradict with the weak-form of market efficiency. For example, De Bondt and Thaler (1985) presented negative correlation between long-term returns prior to the analysis and returns up to 5 year test period of best performing and the worst performing stocks. Jegadeesh and Titman (1993) showed positive correlation of returns in the intermediate term varying from 3 to 12 months. Jegadeesh (1990) also showed negative correlation of returns in the short term varying from 3 to 1 month. In the very short term period, Conrad and Kaul (1988) analyzed the weekly returns and presented a positive correlation in the prices

of consecutive weeks. These anomalies are discussed in detail in section 1.3 since they form the basis for contrarian strategies.

1.1.1.2 Semistrong-From Market Efficiency

Semistrong-form market efficiency encompasses the weak-form market efficiency and states that the security prices adjust rapidly to the new publicly available information. Hence, the prices fully reflect this information. In Figure 2a, it is better seen that with the semistrong-form of market efficiency the jump in stock returns is a vertical line due to arrival of new information.
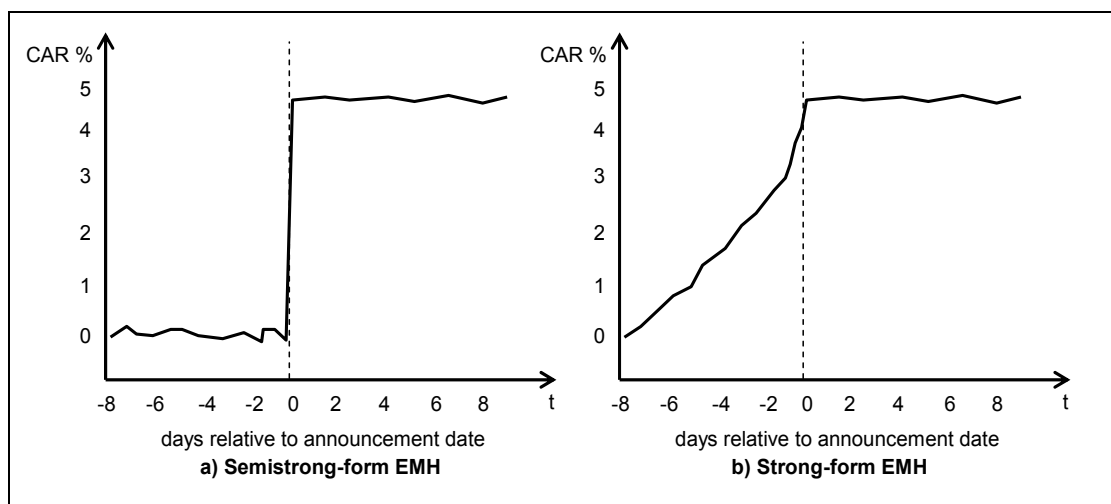
Source: Haugen (2001; 592-593)

Figure 2 Reactions of Markets to New Information

Reilly (1994; 198) states that as an implication of semistrong-form market efficiency, investors who base their decisions on important new information, can not derive abnormal profits from trading. It is because security prices already reflect such kind of information. Thus, the technique of *fundamental analysis* which employs publicly available data like the financial statements in order to identify mispriced stocks is not profitable according to semistrong-form market efficiency.

Fama et al. (1969) have made one of the first studies that analyses the effect of new information on the stock returns where the new information is the stock split

announcement. They have found nearly the same pattern as in Figure 2b. Hence the results for the period (1929-1959) showed the signs of even the strong-form of market efficiency in New York Stock Exchange (NYSE). Keown and Pinkerton (1981) analyses the take over announcement effect on the returns and they have found evidence supporting semistrong-form market efficiency.

Pearce and Roley (1985) examined the effect of macroeconomic event announcements on the markets. They have found those announcements about money supply, inflation, interest rates and the real economic activities either have no effect or just have an effect on the announcement day.

Aydogan and Muradoglu (1998) have tested the ISE semistrong-form market efficiency by investigating the effect of firm announcements, implementation of rights offerings and stock dividends announcement to the stock prices. Their results showed that as the ISE matures in time, neither the board meetings nor the implementation of stock dividends and right offerings cause significant price reactions. This study has found evidence of semistrong-form market efficiency for ISE.

1.1.1.3 Strong-Form Market Efficiency

The strong-form market efficiency states that the current prices of the stocks already reflect all publicly and privately available information. Since all the information even the insiders have is assumed to be available to the public, in the strong-form of market efficiency the cumulative abnormal returns of a stock start escalating prior to the announcement date of an economic event as in Figure 2b. Thus, in the strong-form of market efficiency even the insiders can not make superior profits due to private information like future acquisitions or dividend announcements.

Reilly (1994; 198) states that one of the implications of the strong-form market efficiency is that no group of investors should be able to consistently derive

above average profits. Most of the studies focused on the performance of the mutual funds, since they are managed by the professionals.

According to the study of Jensen (1968) mutual funds performance is not superior to the market index. Actually market index beats the average returns of these mutual funds by 1% by year in the period between 1955 and 1964. Reilly (1994; 226) states that Klemkosky (1977) has also found that the performance of the mutual funds is inconsistent and does not beat the market. The findings of Chang and Lewellen (1984) are similar with the previous studies. Table 1 presents the performance of the mutual funds.

According to the figures in Table 1 it is clear that in all time periods the market return measured by the S&P 500 index return has higher returns than that of mutual funds except the one year period.

So the returns of the mutual funds are in accordance with the strong-form market efficiency. They are not generating superior profits with respect to other investor groups.

Table 1 Performance of Mutual Funds and Other Investment Accounts in the US

Annualized Rates of Return During Alternative Periods Ending December 31, 1992						
	1 year	2 years	4 years	6 years	8 years	10 years
US Equity Broad Universe Medians						
Equity Accounts	9,0	20,6	15,8	13,7	16,3	15,7
Equity Pooled Accounts	7,7	19,5	15,8	13,6	15,9	15,3
Equity-oriented Separate Accounts	9,7	21,0	15,9	13,9	16,6	16,5
Special Equity Pooled Accounts	15,7	32,4	18,5	15,9	16,3	15,8
Mutual Fund Universe Medians						
Balanced Mutual Funds	7,9	15,7	12,2	11,2	13,4	13,5
Equity Mutual Funds	9,3	21,9	14,7	12,7	15,1	14,0
US Equity Style Universe Medians						
Earnings Growth Accounts	7,5	28,0	22,7	17,0	19,1	16,5
Small Capitalization Accounts	15,4	32,8	18,2	15,8	16,9	16,2
Price Driven Accounts	13,5	20,7	13,6	12,9	15,7	15,9
Market-oriented Accounts	8,9	19,8	16,3	14,5	17,0	16,5
S&P 500 Index	7,7	18,6	15,6	14,0	16,6	16,0
No. of Universes that beats S&P500	**9**	**9**	**7**	**4**	**4**	**4**

Source: Reilly (1994; 227)

However in a more recent study Carhart (1997) showed that mutual fund performance outperformed the market in the period of 1962-1993. He constituted deciles of mutual funds ranging from the best (decile 1) to worst (decile 10) and his results indicated that relative performance of mutual funds is persistent over time. In a way the ones in decile 1 manage to preserve their position in time.

To conclude the EMH discussion Bodie et al. (2002; 374) states that there are enough anomalies to justify the search for under priced securities, however the markets are competitive enough that only differential information or insight is profitable. They have concluded in this manner that the markets are efficient. Hence, it is not easy to conclude whether or not the markets are efficient by looking at the huge body of literature that supports efficient markets and the one that contradicts with the efficiency of markets. In the following section anomalies in the markets are analyzed.

1.2 Anomalies in the Markets

Levy (2002; 476) states that a market anomaly is any event, pattern or methodology which can be exploited to produce abnormal returns. Although anomalies are presented as the evidences of market inefficiency, the question of whether they are real anomalies or just called as anomalies due to the lack of a powerful model to explain them is open-ended. Levy (2002; 476) mentions that if some of the so-called anomalies are real, they should disappear by the actions of profit seeking investors.

There are various anomalies in the investment literature. However, Table 2 presents a summary of the anomalies by classifying them as seasonal anomalies, event anomalies, firm anomalies and accounting anomalies. In this section, market anomalies are discussed according to this classification.

Table 2 Classification of Market Anomalies

Anomaly	Description/implication
Firm anomalies	
Size	Returns on small firms tend to be higher, even on a risk-adjusted basis
Closed-end mutual funds	Returns on closed-end funds that trade at a discount tend to be higher
Neglect	Firms that are not followed by many analysts tend to yield higher returns
Institutional holdings	Firms that are owned by few institutions tend to have higher returns
Seasonal anomalies	
January	Security prices tend to be up in January, especially the first few days (as well as the last days of December)
Weekend	Securities tend to be up on Fridays and down on Mondays
Time of day	Securities tend to be up in the first 45 minutes and the last 15 minutes of the day
End of month	Last trading day of the month tends to be up
Seasonal	Firms with highly seasonal sales tend to be up during high sales periods
Holidays	Returns tend to be positive on the last trading day before a holiday
Event anomalies	
Analysts' recommendations	The more analysts recommending purchase of a stock, the more likely it will go down
Insider trading	The more insiders buying a stock, the more likely it is to go up
Listings	Security prices rise after it is announced that a firm will be listed on an exchange
Value Line rating changes	Security prices continue to rise after Value Line places a security in its #1 category
Accounting anomalies	
P/E ratio	Stocks with low P/E ratios tend to have higher returns
Earnings surprises	Stocks with larger-than-anticipated earnings announcements tend to continue to rise even after the announcement
Price/sales ratio	If the price-to-sales ratio is low, then the stock tends to outperform
Price/book ratio	If the price-to-book value is low, then the stock tends to outperform
Dividend yield	If the dividend yield is high, then the stock tends to outperform
Earnings momentum	Stocks of firms whose growth rate of earnings is rising tend to outperform

Source: Levy (2002; 477)

1.2.1   Firm Anomalies

Firm anomalies are the ones that result from the firm characteristics like size or book to market value of equity of the stocks.

1.2.1.1   The Size Anomaly

The *size anomaly* is first documented by Banz (1981). Fama and French (1992) states that Banz's (1981) study showed that average annual returns of small firms (whose market value of equity is small) is considerably higher than the returns of big firms. This may seem in accordance with the EMH since small firms are riskier and require higher returns. However when the returns are adjusted for risk, there is still a premium for the small sized firms with respect to the big firms. Jones (1985; 485) states that Reinganum (1981) also found risk-adjusted abnormal returns for small firms. In his another article Reinganum (1981a) stated that the abnormal returns of small firms is due to the inadequacy of Capital Asset Pricing Model (CAPM) in describing real-world capital markets.

Reilly (1994; 213) states that Brown et al. (1983a) examined the performance of small firms over different time intervals and concluded that the small firm effect is not stable over time. For example in the period of 1967-1975 they have found that returns of small and large firms are positively correlated and large firms outperformed the small ones. This pattern is also observed in 1984-1987 and 1989-1990 periods. Reilly (1994; 213) commented that analyzing the size effect on long time periods may hide the varying patterns in the subperiods.

1.2.1.2   The Book to Market Value of Equity Anomaly

Reilly (1994; 214) states that one of the first studies about the effect of book-to-market value of equity on stock returns is made by Rosenberg et al. (1985). They proposed to use the ratio of book to market value of equity (BE/ME) as a predictor of stock returns. Results showed a significant positive relationship between this ratio and future stock returns. They concluded that this pattern provides evidence against

the EMH. Another study is made by Lakonishok et al. (1994). They presented that stocks that have high ratio of book to market value of equity (named as *value stocks*) has higher returns than the low book to market value ones (growth stocks).

Gonenc and Karan (2003) have tested the value and growth strategies in the ISE between 1993 and 1998 over 60 months data. Contrary to the study of Lakonishok et al. (1994), they have showed that growth stocks have superior performance on the value stocks. They have commented that the structure of the market and the fundamental of stocks traded in the ISE differ from other developed markets.

Although Fama and French (1992) are proponents of market efficiency, their results have also supported the effect of BE/ME ratio in predicting stock return. Stocks that have high BE/ME ratios exhibit higher returns with respect to stocks that have low BE/ME ratios. This relation is clearly seen from Table 3.

Table 3 Average Monthly Returns of Portfolios Formed on Size and BE/ME

	Book-to-Market Portfolios										
	All	Low	2	3	4	5	6	7	8	9	High
All	1.23	0.64	0.98	1.06	1.17	1.24	1.26	1.39	1.40	1.50	1.63
Small-ME	1.47	0.70	1.14	1.20	1.43	1.56	1.51	1.70	1.71	1.82	1.92
ME-2	1.22	0.43	1.05	0.96	1.19	1.33	1.19	1.58	1.28	1.43	1.79
ME-3	1.22	0.56	0.88	1.23	0.95	1.36	1.30	1.30	1.40	1.54	1.60
ME-4	1.19	0.39	0.72	1.06	1.36	1.13	1.21	1.34	1.59	1.51	1.47
ME-5	1.24	0.88	0.65	1.08	1.47	1.13	1.43	1.44	1.26	1.52	1.49
ME-6	1.15	0.70	0.98	1.14	1.23	0.94	1.27	1.19	1.19	1.24	1.50
ME-7	1.07	0.95	1.00	0.99	0.83	0.99	1.13	0.99	1.16	1.10	1.47
ME-8	1.08	0.66	1.13	0.91	0.95	0.99	1.01	1.15	1.05	1.29	1.55
ME-9	0.95	0.44	0.89	0.92	1.00	1.05	0.93	0.82	1.11	1.04	1.22
Large-ME	0.89	0.93	0.88	0.84	0.71	0.79	0.83	0.81	0.96	0.97	1.18

Source: Fama and French (1992)

However, although BE/ME seems to be an anomaly, Fama and French (1992) used the findings of this study to develop their new asset pricing model: Three Factor Model. Their effort is actually to search better models to explain the stock returns.

Francis (1991; 575) states that the underlying reason of this anomaly may be the depreciation deductions of the accountants when an asset is appreciating and the use of depreciation techniques that accelerates the writeoffs considerably may also contribute to BE/ME anomaly.

Size and the BE/ME anomalies are in conflict with the semistrong-form of market efficiency since both characteristics are announced and available to the public.

1.2.1.3 The Neglected Firm Anomaly

Bodie et al. (2002; 361) stated that Arbel and Strebel (1985) interpreted the small firm effect in another way. Since small firms are probably neglected by the investors, there is less information about these firms and in turn this increases the risk attributed to them. When the stocks are classified into highly researched, moderately researched and neglected groups, January effect is found most in the neglected group. So this phenomenon is called as *neglected firm anomaly*.

1.2.1.4 The Liquidity Anomaly

Amihud and Mendelson (1991) showed that stocks that are small and neglected are also less-liquid in terms of trading. So investors demand higher returns for these stocks whose trading costs are also higher. Their analysis showed that less liquid stocks exhibits abnormally high risk adjusted rates of return. Thus, this effect is named as *liquidity anomaly*. Neglected firm and liquidity anomalies also contradict with the semistrong-form of market efficiency.

1.2.2 Seasonal Anomalies

A seasonal anomaly is an anomaly that depends solely on time. Here, two of the seasonal anomalies namely, January effect and the day of the week affect is discussed.

1.2.2.1 January Effect (Anomaly)

Haugen (2001; 606) stated that Keim (1983) showed that the size effect occurs only in January and small firms exhibit higher returns especially on the first two weeks. According to the study results, more than a quarter of the annual difference between the returns of small and big firms takes place in the first week of January. Since January effect is remarkable only in small firms, the anomaly is named as the *small firm in January anomaly*. Haugen and Jorion (1996) present the size effect in January regarding to five year periods in the US stocks. Figure 3 explicitly presents the anomaly.
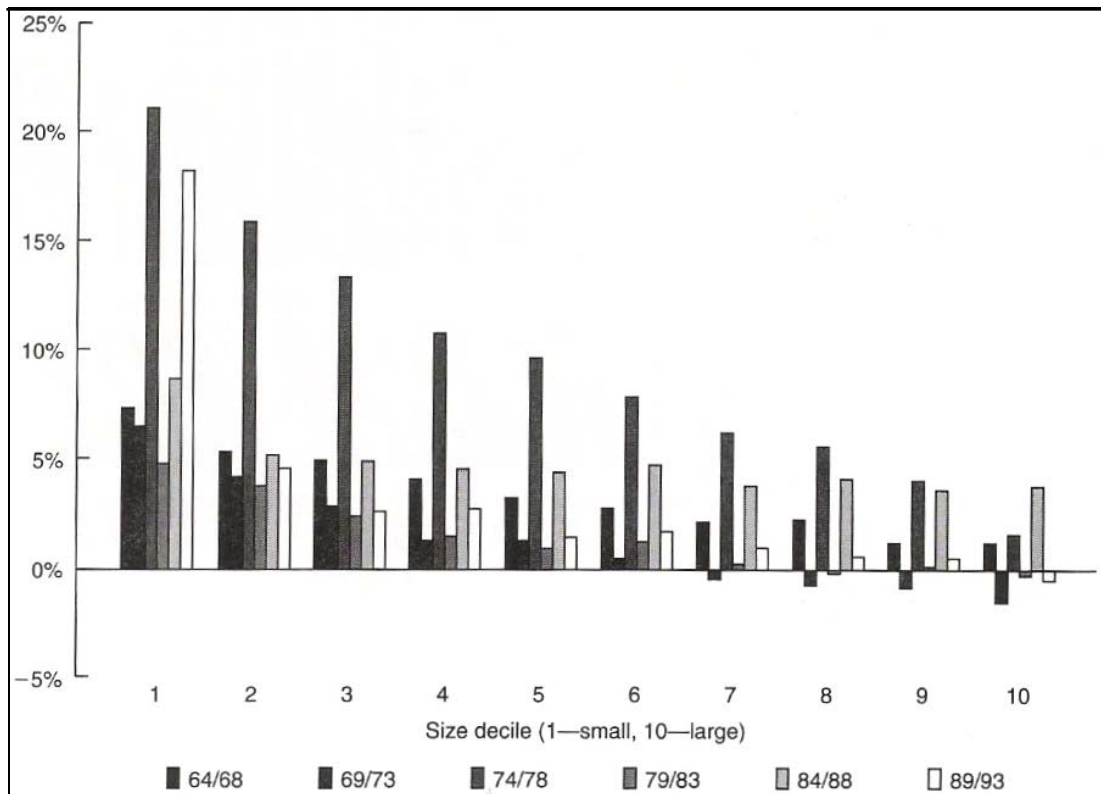
Source: Haugen and Jorion (1996)

Figure 3 January Effect by Size Deciles: Excess Returns by 5 Years Subperiods

Boudreaux (1995) analyzed average monthly index returns in 7 countries (Denmark, France, Germany, Spain, Norway, Malaysia, Switzerland) and showed that the *January effect* is valid also in other countries. The January effect is also clear in the pioneering study of De Bondt and Thaler (1985). Loser portfolios which are

mainly composed of small and distressed firms make distinct jumps in cumulative abnormal returns in Januaries as exhibited in Figure 4.
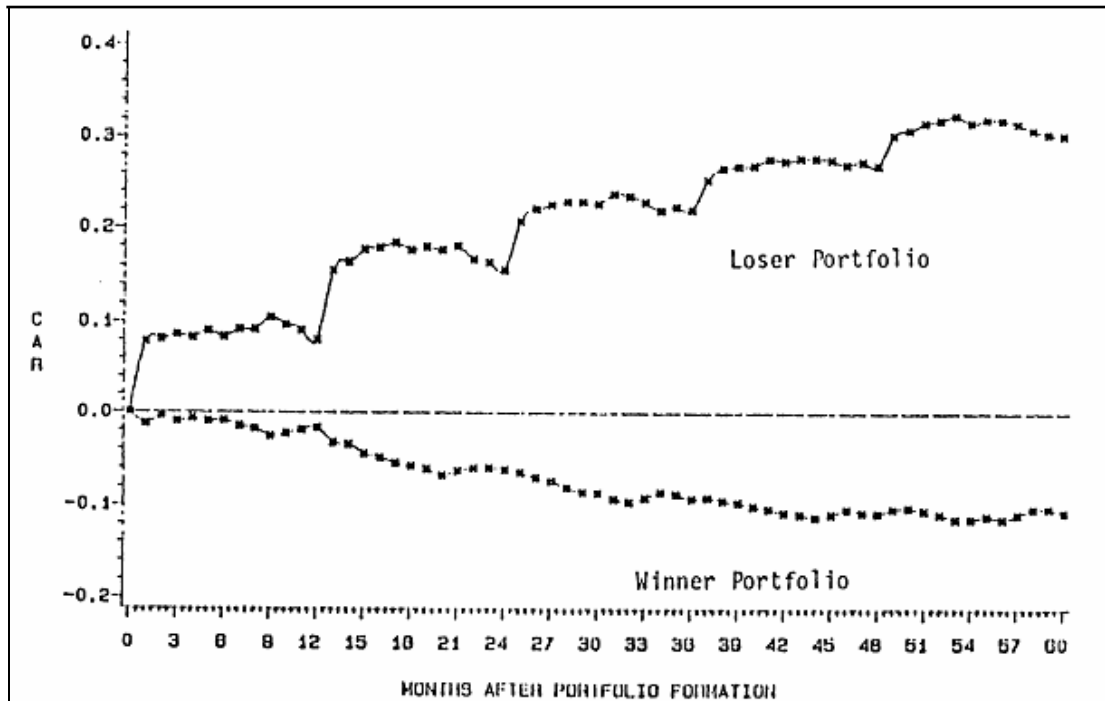
Source: De Bondt and Thaler (1985)

Figure 4 Cumulative Average Residuals of Winner and Loser Portfolios

In the literature, one of the main reasons of January effect is stated as the tax selling purpose. Investors tend to engage in tax selling toward the end of the year in order to show loss on declining stocks, thus take advantage of these losses for paying low taxes. Reilly (1994; 208) states that one of the studies that is made to test this tax selling hypothesis is held by Brown et al. (1983b). In order to examine the January effect, they have observed the Australian exchanges data. This is because the end of year for tax payments is June 30 rather than December 31 in these markets. The study showed that the highest returns are observed in July and January. So, the result of the study is an evidence for the tax selling hypothesis since July is one of the months with highest returns. However, the high returns for January still exist.

Another study that focuses on the reasons of higher returns in January is done by Berges et al. (1984) in Canada for the period of 1951-1980. It is important to state that the capital gain taxes were not introduced until 1973 in Canada. Their results

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also showed high January returns in Canada hence the January anomaly but not tax selling hypothesis.

Reilly (1994; 209) comments on the January effect that although this anomaly is known by the investors and well documented by the literature, it is considerably persistent over time and the reasons of this anomaly are not clear.

1.2.2.2 Day of the Week Effect

The hypothesis that there are differences in expected returns of stocks based on the trading day of the week is called as the *Day of the Week Effect*. Gibbons and Hess (1981) showed evidence of this effect in the US markets. Figure 5 shows the annualized mean percentage change in S&P 500 index with respect to the days of the week in Gibbons and Hess (1981) study.
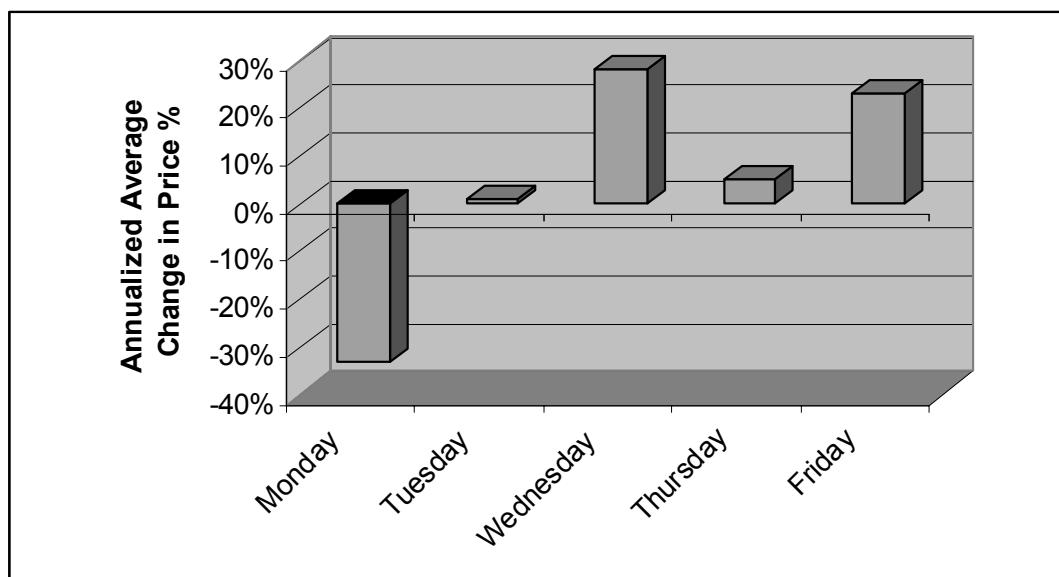
Source: Haugen (2001; 605)

Figure 5 Day of the Week Effect Presented by Gibbons and Hess (1981)

Regarding to the day of the week effect, Haugen (2001; 606) states that although statistically significant differences exist in different days of the week, the commission payments make the transactions as economically insignificant. However, this anomaly can be used as a strategy that is independent of commissions. In the

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case that if anyone decides to buy stocks, buying on Tuesday morning would be profitable due to the Monday decline in prices.

In a recent study, Wang et al. (1997) showed that low Monday returns occur primarily in the last two weeks (fourth and fifth weeks) of the month between 1962 and 1993. And interestingly the mean Monday return of the first three weeks is about zero.

January and the day of the week anomalies are against the weak-form market efficiency assumptions.

1.2.3 Event Anomalies

Events anomalies are the anomalies observed on the prices which occur after the announcement of an event related to the stock. Here, earnings announcement anomaly and exchange listing anomalies are discussed.

1.2.3.1 Earnings Announcement Anomaly[1]

When the effect of quarterly earnings announcement to the prices of stocks is analyzed in the investment literature, it is seen that the response of the market is not so rapid. Haugen (2001; 596) stated that although markets quickly react to the earnings announcement of the firms, Rendleman et al. (1982) showed the full reaction takes place in a period of 90 days after the event. In the study of Rendleman et al. (1982) the firms are ranked according to a measure called standardized unexpected earnings (SUE). SUE is simply calculated as follows (Jones, 1985; 481).

SUE = (Unexpected Earnings) / (Standard Error of Estimate)

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[1] This anomaly can be classified in the Accounting Anomalies as well.

The changes in the cumulative average excess returns of securities that are ranked according to their SUE values are presented in Figure 6. Stocks in decile 10 have the highest SUE values. The pattern in Figure 6 indicates that although substantial adjustment to the earnings announcements occurs before and in the day of the event, a considerable adjustment also occurs in the following days and months. This pattern contradicts with the semistrong-form market efficiency since it assumes that the reaction to the new information in the markets should be rapid and accurate.
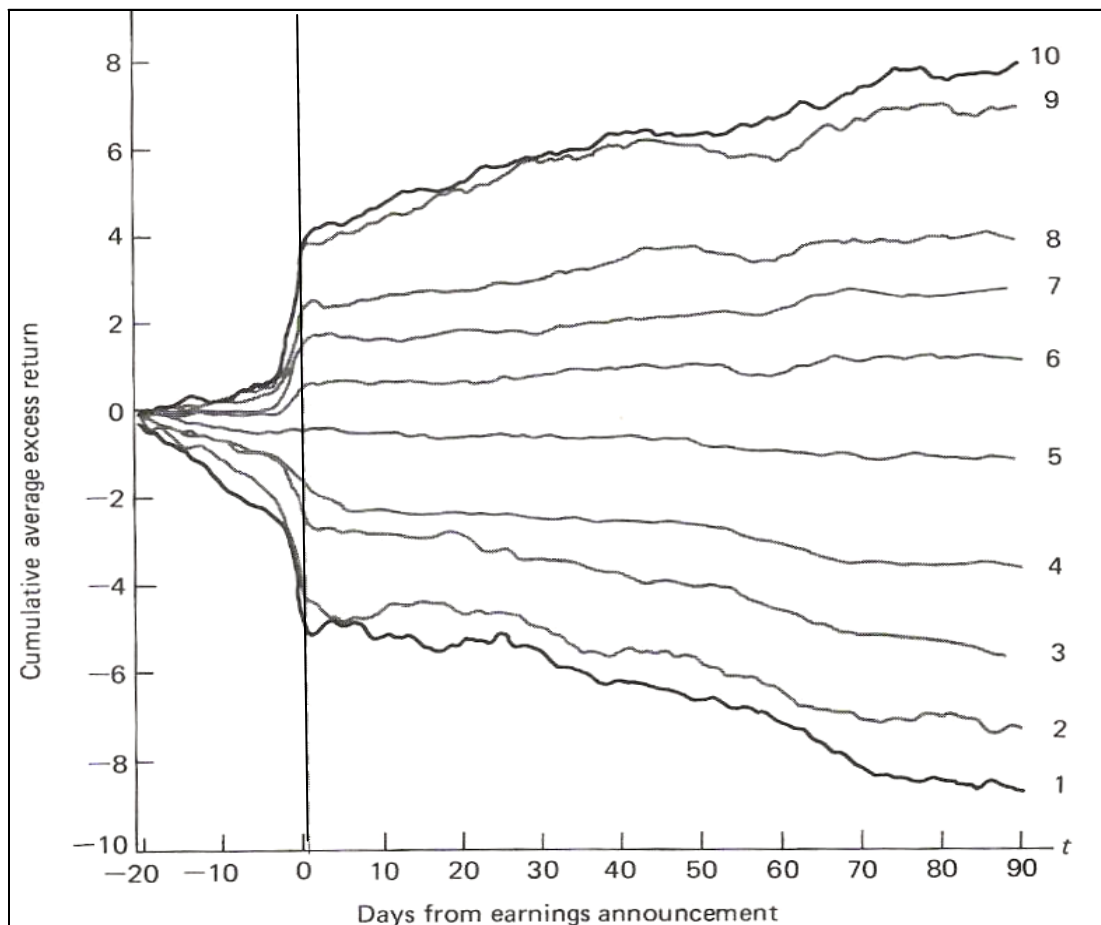
Source: Haugen (2001; 597)

Figure 6 Effect of Earnings Announcement on Returns

1.2.3.2 Exchange Listing Anomaly

One of the significant economic events for a firm is to be listed on a national exchange. The anomaly can be described as security price rising subsequent to the announcement of being listed to a national exchange.

McConnell and Sanger (1986) analyzed the OTC stocks that listed on the NYSE and found that profit opportunities exist immediately after the announcement that a firm is applying for listings. However, Van Horne (1970) showed that listing on a national exchange does not cause a permanent change of firm value in the long term.

The implication of short term profit opportunities from publicly available information contradicts with the semistrong-form of market efficiency.

1.2.4   Accounting Anomalies

These anomalies are changes in the stock prices that occur after the release of accounting information.

1.2.4.1   Price-Earnings (P/E) Ratio Anomaly

Basu (1977) has tested EMH by examining the relationship between P/E ratios of stocks and the return on stocks. The results showed that the stocks that have low P/E ratios have superior returns with respect to the stocks that have high P/E ratios.

Reilly (1994; 211) states that Peavy and Goodman (1983) have also examined the effect P/E ratios on stock returns with adjustments for firm size, industry effects and infrequent trading. The results of the study showed that risk adjusted returns of stocks that have low P/E ratio are higher than the stocks that have high P/E ratio in three industries (electronics, paper, and food).

1.2.4.2   Price-Sales (P/S) Ratio Anomaly

Senchack and Martin (1987) showed that stocks that have low P/S ratios have higher return than the stocks that have high P/S ratios. In their study they even concluded that P/S ratio is a superior indicator of stock return than the P/E ratios.

Both P/E and P/S anomalies are against semistrong-form of market efficiency since they are publicly available ratios.

Anomalies in terms of return reversals and continuation of returns are the roots of contrarian and relative strength strategies (momentum strategies). These will be discussed in the following section.

1.3   Contrarian Investment Strategies

Contrarian investment strategy is based on buying stocks that have been losing and selling stocks that have been winning in a determined time period. Chan (1988) states that contrarian strategy is formulated on the promise that the stock market overreacts to news, so winner stocks tend to be overvalued and loser stocks undervalued. If an investor is aware of this inefficiency, it is possible to make profit when the stock prices revert to the normal values.

This strategy is directly in contradiction with EMH even its weakest form, because this strategy is based on the assumption that one can trace the historical data and can make predictions about the stock returns just relying on this information. Moreover, the assumption of the rationality of investors is violated if the roots of the contrarian strategy are explained by the overreaction or underreaction of the investors to the new information. Chan (1988) states that the reasoning of this explanation is built on the study of Kahneman and Tversky's (1982) study in experimental psychology in which they found that people tend to overreact to unexpected and dramatic events.

The first study that supports the findings related with the overreaction hypothesis is done by De Bondt and Thaler (1985). They find that when stocks are ranked on long term past performance (three to five years prior to ranking) past winners have shown return reversal and tend to be losers in the future and vice versa. The relationship of winner and loser portfolio returns can be seen in Figure 4.

Lehmann (1990) showed that winners and losers based on a one week period experience considerable return reversals in the following week and this reversal makes contrarian strategy profitable even when the bid-ask spread and transaction costs are taken into consideration. Jegadeesh and Titman (1995) supported the findings of Lehmann (1990) and showed that stock prices overreact to the firm specific information but react with a delay to common factors. However, they stated that the main reason of the contrarian profits is due to the overreaction of the investors. Jegadeesh (1990) also showed that winner stocks of last one to three months perform poorly in the future. Lo and MacKinlay (1990) also report short term reversal on returns however attributes half of the success of contrarian strategy to the positive cross correlation between securities not only to overreaction. So it can be argued that in the short term ranging from one week to three months period, the contrarian strategy is valid based on the findings of the above studies while most of them explain this phenomenon with overreaction of markets.

Although contrarian strategy seems to be valid in the long term and in the short term, in the intermediate term that ranges from three to twelve months continuation of the returns is found in the literature. Jegadeesh and Titman (1993) tested the relative strength strategy which is the opposite of contrarian strategy in the intermediate term and showed that well performing stocks in the past continue to do well in the future and the losers continue to lose over 3 to 12 months holding period. They showed that the best return obtained in the relative strength strategy is buying winners and selling losers based on 12 months past data and holding them for 3 months. This movement is named as the *momentum effect* in the literature. Chan et al. (1996) supported the momentum effect in six months to one year period and stated that momentum is not due to size or BE/ME effect rather it is the result of underreaction to new information.

Lakonishok et al. (1994) showed that firms with high ratios of earnings to price (E/P), cash flow to price (C/P) and book to market value of equity (BE/ME) tend to have poor past earnings growth and vice versa. They comment that since the market overreacts to past growth and thus high C/P, BE/ME and E/P stocks (value

stocks) show high future returns and low C/P, BE/ME and E/P stocks (glamour) show poor future returns.

There are other studies that support the contrarian investment strategy and hence the overreaction hypothesis in European markets. Brouwer et al. (1997) have found evidence that supports Lakonishok et al.'s (1994) work in four European countries; France, Germany, the Netherlands and the UK. They have explained the success of value stocks over glamour stocks by overreaction. Mun et al. (1999) also supported contrarian strategy in France and Germany between 1991 and 1996. Antoniou et al. (2001) analyzed the contrarian strategies in Athens Stock Exchange and showed that the contrarian strategy is profitable and it is due to the overreaction to firm specific events rather than the systematic risk factors.

Other than Europe and the US, contrarian strategies are tested and supported in Asian markets as well. Lai et al. (2003) stated that one to two years contrarian strategy is profitable in the Malaysian market between 1987 and 1999. Kang et al. (2002) states that China is one of the few countries whose stock markets are negatively correlated with the US stock market. Due to its huge economy, the movements of the stocks are important to the investors. Kang et al. (2002) analyzed *A type shares* which are only accessible to local investors and showed that contrarian profits are available in the short term (1 to 12 weeks) and momentum strategies are significant in the 3 to 6 months period. Huang et al. (2001) analyzed the Taiwan stock exchange over the period 1990-1996 and reported price momentum in the ultra-short overnight period and following this, a reversal movement that is consistent with the overreaction hypothesis. Chiao and Hueng (2005) analyzed Tokyo Stock Exchange between 1975 and 1999, and showed that contrarian strategies are profitable and it can not be explained by size and BE/ME factors.

Durukan (2004) analyzed Istanbul Stock Exchange and presented that long term contrarian strategy is profitable between 1988 and 2003. Although winner stocks do not lose in the future but have returns around zero, contrarian strategy produces profitable results. This asymmetry of overreaction to winners and losers is supported by the literature.

Karan et al. (2003) have tested the overreaction hypothesis in the Istanbul Stock Exchange (ISE) by using daily price limits between 01.01.1990 and 30.06.1999. The results showed evidence of overreaction to the price limits in the period of 1994-1999. They have formed a trading strategy based on investing in stocks that hit daily price limits. The results of this strategy is 2,4% average excess returns in two days following the limit hit.

There is also evidence of overreaction and hence profitable contrarian strategies in Australia and New Zealand. Chin et al. (2002) demonstrated that in the New Zealand markets contrarian strategies produced profitable results; however the profits are realized with one year lag after the portfolio formation date. Namely, value stocks outperform the glamour stocks beginning from the second year of the test period. They related this situation to the imperfectly competitive structure of the New Zealand markets. Lee et al. (2003) documented evidence about the profitable short term contrarian strategies in the Australian markets between 1994 and 2001. However, they have also stated that if the transaction costs are included in the analysis, all profits would vanish in the practical sense.

Teobald and Yallup (2004) have studied the speed of price adjustments in case of underreaction and overreaction. They have reported that the speed of price adjustments for high capitalized firms is higher than the small capitalized firms and hence as Durukan (2004) concluded big firms are leading small firms in the price movements. Another finding about overreaction is the asymmetry of return reversals. Nam et al. (2001) showed that in the 1926-1997 period, the reversal speed of negative returns to the positives are higher than the reversal of positive to negative returns. They have attributed the asymmetry to the mispricing behavior of overreacting investors.

One of the main discussions in overreaction studies is the methodology used in calculating the returns in portfolio formation and test periods. Conrad and Kaul (1993) argued that when *Holding Period Abnormal Returns* (HPAR) is applied in De Bondt and Thaler (1985) study instead of *Cumulative Abnormal Returns* (CAR), high profits due to overreaction can not be observed. Before going further about this

discussion, it is better to explain the CAR and HPAR methodologies. In selecting and testing a portfolio, CAR methodology sums the monthly excess returns of securities over the market portfolio return. For example to calculate 3 months abnormal return for a stock, three monthly abnormal returns are added. The following is the general formula for CAR.

$$CAR_i = \sum_{t=1}^{n} AR_{it} \quad \text{and} \quad AR_{it} = R_{it} - R_{mt}$$

where R_{it} is the return on security i, R_{mt} is the equally weighted market return in period t and n is the number of periods concerned.

However, HPR methodology calculates this three months return by reinvesting the ending value in each month with that month's return value. Hence it resembles to calculation of the period interest rates with monthly changing discount rates. So at the end of the n holding periods, the monthly returns are compounded n times by each month's rate of return. The following is the general formula for HPR.

$$HPR(k) = \prod_{i=1}^{k} (1 + R_i) - 1$$

where, $HPR(k)$ is the holding period return of k months, R_i is the rate of return in month i.

To keep the analogy with CAR methodology, when the HPR of the market portfolio is subtracted from HPR of a security, holding period abnormal return of that security (HPAR) is obtained. The reasoning of Conrad and Kaul (1993) against using CAR in long term calculations depends on the upward biases due to cumulating monthly returns. Although Loughran and Ritter (1996) criticize Conrad and Kaul's (1993) results in the aspect of survivorship bias, they confirm that due to the methodology differences, CAR and HPAR may point to different firms in the same period as winners or losers. They gave the example of Armour & Co. returns in 1929-1931 period in the US. Due to an extreme return for one month (500%), CAR

resulted in 222% for the three year period whereas HPAR methodology resulted in -92% for the same period. CAR lists the company as the winner whereas HPAR does not.

However Fama (1998) criticizes the use of HPAR and CAR by looking at the bad model problem and give support for CAR, which is the least problematic one in that case. Fama (1998) argues that all models for expected returns are incomplete descriptions of systematic patterns and there is always a gap between the real case and the proposed model in tests. This *bad model* gap increases most rapidly in using HPAR in the long terms when compared to the CAR methodology.

Investment literature is full of supporting evidence for the profitability of contrarian strategies. Actually, the discussion expands on the reasons of the contrarian strategy not on the existence of return reversals. According to EMH supporters, the prices are actually moving randomly and one can find the evidence of underreaction as much as overreaction. In this context, Fama (1998) sates that with the methodological adjustments made; the apparent anomalies are just methodological illusions. The other side of the explanations emphasizes the psychology of human beings and supports that investors do not behave rationally every time and can overreact to unusual events. Antoniou et al. (2001) have made a clear summary about the reasoning behind the contrarian strategy in the literature. With some adjustments made, it is presented in Table 4.

Table 4 Reasoning Behind Overreaction

Reason	Year of Study	Authors
Overreaction to firm specific information	1985, 1987; 1988	DeBondt and Thaler; Lehmann
Seasonality effects	1992	Chopra, Lakonishok and Ritter
Size effects	1981	Banz
Lead lag explanations	1990	Lo and MacKinlay
Changes in risk	1989	Ball and Kothari
Efficient market randomness	1998	Fama

CHAPTER 2
ASSET PRICING MODELS

In this chapter, asset pricing models that are built on the EMH assumptions are presented in a historical sequence of their emergence. The aim of this chapter is to present the theoretical standings of the asset pricing models. Starting from the capital asset pricing model, single index model, arbitrage pricing theory and the Fama-French Three Factor Model (FF-TFM) will be discussed. For the first three pricing models, the underlying assumptions and how the models reach to their ending equations or results are tried to be explained. The discussions of these models presented here are based on Haugen (2001), Bodie et al. (2002) and Civelek and Durukan (2003). The purpose of this section is to facilitate the understanding of emergence of the FF-TFM and its basis.

In the last part of this chapter, the emergence of the FF-TFM is presented according to its historical development. The studies that evoke factors having the greatest effect on a return of security are presented and the applications of the model in various markets are discussed.

2.1 Capital Asset Pricing Model (CAPM)

The CAPM was first developed in the mid-sixties by Sharpe (1964). According to this base version of CAPM, the assumptions listed below should hold.

1. The investors are price-takers and can not affect the price level of securities by their own wealth.

2. All investors concern about the same holding period of assets.

3. Investments are restricted to the *publicly traded financial assets* like stocks, bonds, treasury bills and notes.

4. The investors can borrow or lend at the risk-free rate (Rate of return on government bills and notes is assumed as risk-free rate).

5. In trading securities there are no transaction costs and tax payments.

6. All investors are rational decision makers in the evaluation of risk and return. The distribution of returns is normal.

7. Since all the investors have the same set of information about securities, they reach to a unique optimal risky portfolio of assets. This assumption is known as *homogeneous expectations* of investors.

CAPM states that when the assumptions described above hold for investors and markets, the ending result for the investors is a unique optimal risky portfolio which is called as the *Market Portfolio*. It is the portfolio of all traded assets where the weight of each asset is the market value of asset divided by the sum of market values of all assets. Thus according to CAPM, a passive strategy is the efficient strategy and can be followed by holding portfolios of assets that mimic the market portfolio like index funds. Only the risk aversion of investors makes the difference in allocating their funds to the risk-free securities and the optimal risky portfolio. As Bodie et al. (2002; 267) stated, CAPM is built on the insight that the appropriate risk premium on an asset will be determined by its contribution to the risk of the market portfolio. The contribution of stock *i* to the variance of the market portfolio can be stated as;

$$\text{Stock } i\text{'s contribution to variance } = w_i \cdot Cov\ (R_i, R_M)$$

where w_i is the weight of stock *i* in the market portfolio and $Cov\ (R_i, R_M)$ is the covariance of returns of stock *i* with the market portfolio. When the assumptions of CAPM hold, the equilibrium of marginal price of risk of any security should be equal to the marginal price of risk of the market portfolio. Thus the following equation will hold for all securities;

$$\frac{E(R_i) - R_f}{Cov(R_i, R_M)} = \frac{E(R_M) - R_f}{\sigma_M^2}$$

where $E(R_i)$ and $E(R_M)$ are the expected returns of security i and the market portfolio respectively, R_f is the risk-free rate and σ_M^2 is the variance of the market portfolio. By rearranging the above equation, the general statement of CAPM is obtained;

$$E(R_i) = R_f + \beta_i \left(E(R_M) - R_f \right) \qquad \text{where} \qquad \beta_i = \frac{Cov(R_i, R_M)}{\sigma_M^2}$$

This general equation of CAPM states that expected return of securities can be predicted by obtaining the beta coefficient and expected return of the market portfolio. Beta can be found by analyzing the historical excess returns of securities and a general index which is assumed to mimic the market portfolio. Fitting the regression line named as Security Characteristic Line (SCL) on these returns, the slope gives the beta of the security. If the expected return-beta relationship is presented on a graph whose horizontal axis represents beta and the vertical axis represents the expected return, the line that passes from the risk-free rate of return and the expected market return is called the Security Market Line. The SML of CAPM is used in determining the undervalued and overvalued securities.

Several studies in the literature evaluate the underlying assumptions of CAPM. Regarding to assumption 5, Brennan (1973) examined the effect of different tax rates applied to investors. He found that the expected return and beta relationship is still true with modifications. Haugen (2001; 206) states that Chen, Kim and Kon (1975) have also derived CAPM under transaction costs. Bodie et al. (2002; 271) stated that Mayers (1972) analyzed the impact of non-traded assets like earning power related to human capital in assumption 3 and again the expected return beta relation is found to be valid with adjustments. On the other hand Black (1972) modified the CAPM by relaxing the risk-free rate restrictions in assumption 4, and found that the expected return over risk-free rate of return of a security is a linear function of its beta. Regarding to assumption 2, Fama (1970) analyzed the

multi-period holding of securities and found that single-period setting of CAPM is still valid.

2.2 Single Index Model

Single Index Model was first suggested by Sharpe (1963). In the previous section, it is shown that CAPM uses the *Market Portfolio* and the *expected returns*. First of all, it is not feasible to obtain the market portfolio and test it. Secondly, investors have the realized returns rather than the expected ones, for example in order to determine the beta of a security whose only historical values are available. For these reasons, the market portfolio is replaced with a comprehensive market index and the Single Index Model is obtained;

$$R_i - R_f = \alpha_i + \beta_i (R_X - R_f) + \varepsilon_i$$

where R_i, R_f, and R_X are the historical returns of security i, risk-free rate and market index, respectively. Bodie et al. (2002; 332) states that the additional assumptions of the Single Index Model over CAPM are;

1. Market index is perfectly correlated with the theoretical market portfolio.

2. Distribution of stock returns is stationary over time.

The above equation is the regression equation of the Single Index Model. With the use of historical data of security and market index returns, α_i and β_i coefficients can be determined and then the model can be used as a tool to find the expected return of securities. The alphas of the regression are expected to distribute around zero. Jensen (1968) showed that in the 1945-1964 period, alphas of the US mutual funds distribute around zero.

Single Index Model is assumed as the application of CAPM into realized data, and suffers from the fact that the returns of securities can not be explained by a

single factor. Bodie et al. (2002; 309) states that the regression fittings of securities returns and the market index return generally result in considerably low R^2 values and this is typical. This is the weak side of assuming all the systematic risk can be reflected by a single factor, namely the market index. Different firms in different industries are affected from the macroeconomic events unequally. Thus, in the literature a lot of multifactor models are applied and tested. For example Chen, Roll, Ross (1986) proposed a five factor model where the factors are percent change in industrial production, percent change in expected inflation, percent change in unanticipated inflation, excess return of company bonds over government bonds and excess return of government bonds over Treasury bills. However Bodie et al. (2002; 308) stated that for today there is no compelling evidence to determine a best set of variables that represent systematic risk. In the following sections, the three factor model of Fama and French (1993) as a multifactor model, is explained in detail regarding to the explanatory effect of variables in stocks returns.

2.3   Arbitrage Pricing Theory (APT)

The Arbitrage Pricing Theory was first developed by Stephen Ross in 1976. The model states that the uncertainty in return of security i can be due to two factors, systematic risk and the non-systematic risk. Hence, the return of well diversified portfolios can also be written in the same manner as;

$$R_p = E(R_p) + \beta_p F + e_p$$

where R_p is the return of a well diversified portfolio, F is the deviation of systematic factor from its expected value and β_p is the sensitivity of the portfolio to the systematic risk factor and e_p is the non-systematic risk factor.

It can be proved that as n, number of securities in a well diversified portfolio gets larger the variance of e_p reaches zero and since the expected value of e_p is also zero the e_p factor drops for well diversified portfolios. Thus, the following equation is valid for well diversified portfolios;

$$R_p = E(R_p) + \beta_p F$$

APT states that in order to rule out the arbitrage opportunity between any well diversified portfolios, risk premiums of portfolios should be proportional to portfolio betas. Otherwise, the arbitrage opportunity exists and one can make profit without any risk. So the below equation should hold for all well diversified portfolios;

$$\frac{E(R_A) - R_f}{\beta_A} = \frac{E(R_B) - R_f}{\beta_B}$$

where A and B are two well diversified portfolios. This relation can be seen better in Figure 7.
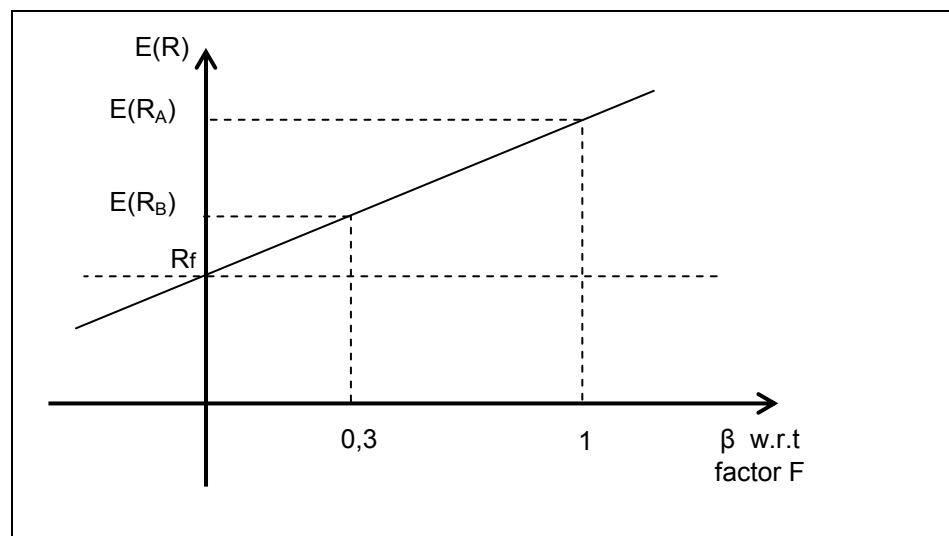
Figure 7 Risk Premiums and Beta Relationship

If a well diversified portfolio C does not lie on the line that passes from the risk-free return rate, arbitrage occurs and the above equation does not hold. When the factor F is taken as the market index, the line is identical to the SML of CAPM. Actually there is no necessity for the APT to have the market portfolio; rather any well diversified portfolio like the market index on the SML is an adequate benchmark portfolio. This result of APT supports the Single index model as well. In

addition, it can be proved that for any two securities in a well diversified portfolio, their risk premiums are proportional to their betas.

Bodie et al. (2002; 331) states that the APT highlights the crucial distinction between systematic risk, which requires a reward in the form of risk premium, and non-systematic risk which does not. In the original multi-factor APT there are more than one systematic risk factor but these are not predetermined. The general form of APT is given below;

$$R_i = E(R_i) + \beta_{i1} F_1 + \beta_{i2} F_2 + ... + \beta_{in} F_n + e_i$$

where $F_1, ..., F_n$ are the deviations of systematic risk factors from their expected values.

Civelek and Durukan (2003; 450) and Bodie et al. (2002; 332) list the differences of APT and CAPM as follows.

1. APT does not make normal distribution of returns assumption of securities like CAPM.

2. APT assumes a multi-factor model to reflect systematic risk where CAPM assumes that the market portfolio reflects the systematic risk solely.

3. APT employs a well diversified portfolio whereas CAPM employs the market portfolio in reaching expected return-beta relationship.

4. APT does not specify the risk factors.

2.4   The Fama-French Three Factor Model

The asset pricing models of CAPM and APT stands on the fact that the market portfolio is mean-variance efficient and the risk premiums of each asset in a well diversified portfolio is proportional to their market betas respectively. Both of these models result in the same model for the return of securities, where security returns are positively related to their market betas in linear form. These models also load on only the market risk premium factor in explaining returns. Thus all the systematic risk is assumed to be explained by the market factor.

However, due to these strong assumptions, literature of investment focused on the validity of these assumptions and considerable amount of studies is done on whether there are other factors to be considered apart from beta.

In the literature, Fama and Macbeth (1973) analyzed pre-1969 period in the US and found a positive relation with the beta and average stock returns. Fama and French (1992) states that Black et al. (1972) also found the same result. However, Fama and French (1992) showed that the relation between beta and average stock returns disappeared during the recent period namely, for the 1963-1990 period in the second study.

Fama and French (1992) stated that Banz's (1981) study showed market value of equity (ME) of companies used with beta increases the explanatory power of models. The average returns of stocks that have low ME are higher when compared to the low ME stocks. In addition to the size effect, Bhandari (1988) analyzed the leverage factor in explaining stock returns. Including size and beta factor in the tests, he showed that leverage helps to explain stock returns. Fama and French (1992) tested the leverage effect with two leverage ratios; assets to book value of equity (they called book leverage, A/BE) and assets to market value of equity (they called market leverage, A/ME). Similar to Bhandari (1988) they found that high market leverage is associated with higher average returns and high book leverage is associated with lower average returns. Another fundamental variable that is evaluated in explaining the stock returns is the book value of equity to market value

of equity ratio (BE/ME). Fama and French (1992) states that Stattman (1980) searched the relation between the returns and the BE/ME ratio of stocks and revealed a positive relation. Analyzing the Japanese stocks Chan, Hamao and Lakonishok (1991) also showed the strong explanatory power of book value of equity to market value of equity ratio in average stock returns. The other fundamental variable worked on is the earnings over price (E/P) ratio of stocks. Fama and French (1992) stated that the study of Basu (1983) showed how E/P ratio also helps to explain the average returns of the US stocks.

Using the fundamental variables in explaining the stock returns can be seen as different ways of scaling stock prices. Actually, returns are calculated on prices and the fundamental variables are also calculated on prices of stocks. Thus, as Fama and French (1992) stated since E/P, ME, leverage ratios and BE/ME are all scaled versions of price, some of these variables are possibly redundant in explaining the returns.

As a result of their first study on the way to the three factor model, Fama and French (1992) provided the following evidence by analyzing the 1963-1990 period in the US.

1. There is no reliable relation between beta and average returns of stocks.

2. If E/P, leverage ratios (A/ME, A/BE), BE/ME and size factors are used alone, they have explanatory power in explaining stock returns.

3. BE/ME factor captures the effects of leverage ratios (A/ME, A/BE) in explaining average stock returns.

4. Size and BE/ME factors together captures the effect of E/P factor in explaining average stock returns.

Fama and French (1993) included bonds to their analysis reasoning that if markets are integrated, a single model should also explain bond returns. They have analyzed five factors that are supposed to be predictive in returns of stocks and bonds. These factors are market factor, size factor, BE/ME factor, TERM factor and DEF factor where TERM measures the unexpected changes in interest rate and DEF measures the default risk of corporate bonds related to economic condition. They have found that market factor, size factor, BE/ME factor have little role in explaining government and corporate bonds except low grade corporate bonds. However stock and bond markets are linked through TERM and DEF factors. Since bond returns are not the focus of this study, how Fama and French explain factors that affect stock returns are emphasized.

They applied time series regressions and stated that size and BE/ME factors can explain the differences in average returns across stocks. However, these factors can not explain the difference between the average returns on stocks and one-month treasury bills. Thus, they have included the risk premium of market factor to test whether or not this discrepancy can be overcome and found that all their test portfolios produce slopes on the market factor that are close to 1. They have commented that the market factor is the link between the average returns on stocks and bills.

Resulting from the study of Fama and French (1993), the three factor model that is proposed for the explanation of stock returns is given below.

$$E(R_i) - R_f = \beta_i \left(E(R_M) - R_f \right) + s_i E(SMB) + h_i E(HML)$$

where $E(R_i)$ - R_f is the excess expected return on a portfolio (stock) and depends on the expected excess return on market portfolio ($E(R_M)$ - R_f), the difference between the expected return on a portfolio of small stocks and the expected return on a portfolio of big stocks ($E(SMB)$) and the difference between the expected return on a portfolio of high BE/ME stocks and the expected return on a portfolio of low BE/ME stocks ($E(HML)$).

Fama and French (1997) used both CAPM and their three factor model to determine the cost of equity for industries and showed that cost of equity differs more than 2% per year between the two models.

Fama and French (1995) tried to determine the economic basis of their model that it stands on. In their study, they have analyzed whether the behavior of stock prices, in relation to size and BE/ME, is consistent with the behavior of the earnings of companies. They have showed that BE/ME ratio of stocks are related to the relative distress of the companies, and stocks that have high BE/ME values are less profitable than stocks that have low BE/ME for four years before and at least five years after the ranking date. Fama and French (1995) showed that growth stocks have low BE/ME and this is typical of firms with high average returns on capital whereas stocks relatively distressed have high BE/ME.

In the same study Fama and French states that the size factor is also related to profitability. By controlling the BE/ME factor, they have showed that small stocks tend to have lower earnings than big stocks. However the size effect is related to earnings after the 1980's for the US where 1981 and 1982 recession turned into a prolonged earnings depression for small stocks.

Fama and French (1996) tested their model in explanation of asset pricing anomalies and showed that except for the continuation of short-term returns that Jegadeesh and Titman (1993) documented, the model captures anomalies including the long term reversal of returns that De Bondt and Thaler (1985) found. They have put the factor returns, risk-free rates and the stock returns to the following regression equation.

$$R_i - R_f = \alpha_i + \beta_i \left(R_M - R_f \right) + s_i SMB + h_i HML + \varepsilon_i$$

The regression results showed that weak firms (or relatively distressed firms) have positive slopes on HML factor and strong firms have negative slopes. Regarding to SMB, big firms load less on this factor with respect to small firms. These results of the regression analysis are consistent with the economical basis.

Since SMB and HML portfolios have positive returns, as a result, weak and small firms load positively on these factors whereas big and strong firms load negatively on HML and less on SMB. The higher returns of small and distressed are consistent with the efficient market assumptions one of which states that investors are rational in evaluating the mean-variance relation and hence higher risk requires higher returns.

The first criticism for the FF-TFM came from Daniel and Titman (1997). They cast doubt on using the factors of HML and SMB which are proxies for BE/ME and size characteristic of stocks, and proposed instead to use the characteristics themselves. So they have tested the original FF-TFM and as well the characteristic model and reported that they statistically reject the three factor model but not the characteristic model. Daniel et al. (2001) also replicated their study for Japan and reached to the same results. Similar to Daniel et al. (2001), Chiao and Hueng (2005) applied the FF-TFM by adding a new factor that is proposed to catch reversal of returns in the contrarian strategy aspect. They have showed that by adding a new variable both the characteristic and original models' explanatory powers increase for return reversals.

Assoe and Sy (2003) applied a revised version of the FF-TFM in explaining contrarian strategy existence in Canada. They allow variation of risk through the months of the year and introduced two additional variables to the original model and showed that shot term return reversals can be captured. Mun et al. (2000) applied the non-parametric regression version of the FF-TFM in the US and Canada stock exchanges and showed the contrarian and momentum strategies by the help of the model. Gregory et al. (2001) tested the FF-TFM in the UK on the basis of one way and two way classification methodology where in the first case stocks are classified by past returns and in the latter one according to the past and expected returns. They have reported that return differences between value and growth stocks according to the one way classification can be explained by the FF-TFM whereas according to the two way classification there are still unexplained return differences between the two groups.

Aksu and Onder (2003) have explored the relationship of size and book-to-market ratio with non-financial stock returns in the Istanbul Stock Exchange between 1993 and 1997. They have applied both the one factor CAPM and the Fama-French Three Factor Model in the test of individual stock returns. The results showed that the FF-TFM has explained the variation in the individual stock returns successfully. The regression fit has considerably high R^2 value of 0,95. However, the resulting HML factor coefficient (h=0,06) is slightly positive and is not statistically significant (t=0,89). Their regression tables showed that two factors; market premium factor and the size factor seem to be capturing the HML effect. They have commented that the insignificance of HML factor is probably due to its correlation (0,26) with the SMB factor.

CHAPTER 3
DATA SET AND METHODOLOGY

In this section of the study, the data set used and the methodology followed in the analysis are explained step by step respectively. The aim of this study is to find out whether or not a contrarian strategy is profitable in the intermediate term in Istanbul Stock Exchange (ISE) and to test the explanatory power of the FF-TFM of returns of contrarian strategies. Since the study is built upon two main analysis points, namely the analysis of the contrarian strategies and the analysis of the explanatory power of the FF-TFM of the returns, the steps are explained according to these two parts, respectively.

3.1 Data Set Used

First, the data set used in the contrarian strategy analysis is presented and subsequently the data set of the FF-TFM analysis is explained in detail in this section.

3.1.1 Data Set for the Contrarian Strategy Analysis

In the analysis of this section, monthly return data of all the securities traded in ISE are obtained from the web site of ISE. For each company there is a separate Excel file that contains monthly returns as well as compounded returns since the month of issue. The return data of the securities go back as far as January 1986 and all of the computed returns end in September 2005. So the available data set is between January 1986 and September 2005. The file for Atakule GMYO Company is provided in Table 5 as an example.

Table 5 Monthly Return Data of Atakule GMYO

| ATAKULE GMYO | AGYO | | | | | |

TARİH / DATE	BORSA FİYATI / PRICE		GETİRİ (ABD$ BAZLI) RETURN (US$ BASED)		GETİRİ (TL BAZLI) RETURN (TL BASED)	
			BİLEŞİK / COMPOUND	AYLIK (%) / MONTHLY (%)	BİLEŞİK / COMPOUND	AYLIK (%) / MONTHLY (%)
30/09/05	1,15		1,93	25,48	1,95	25,00
31/08/05	0,92		1,54	(6,02)	1,56	(4,17)
29/07/05	0,96		1,64	10,12	1,63	9,09
30/06/05	0,88		1,49	9,03	1,49	7,32
31/05/05	0,82		1,37	23,20	1,39	20,59
29/04/05	0,68		1,11	(18,64)	1,15	(16,34)
31/03/05	0,84		1,36	(14,22)	1,38	(9,68)
28/02/05	0,93		1,59	5,12	1,53	1,09
31/01/05	0,92		1,51	21,55	1,51	19,48
29/12/04	770		1,24	14,34	1,27	8,45
30/11/04	710		1,09	(4,94)	1,17	(7,79)
28/10/04	770		1,14	0,54	1,27	(1,28)
30/09/04	780		1,14	18,56	1,28	18,18
31/08/04	660		0,96	10,80	1,08	13,79
30/07/04	580		0,87	1,25	0,95	0,00
30/06/04	580		0,85	2,52	0,95	1,75
31/05/04	570		0,83	(12,67)	0,94	(8,06)
30/04/04	620		0,95	(23,58)	1,02	(17,33)
31/03/04	750		1,25	42,71	1,23	41,51
27/02/04	530		0,88	(0,69)	0,87	(1,85)
30/01/04	540		0,88	2,31	0,89	(1,82)
31/12/03	550		0,86	47,30	0,90	41,03
28/11/03	390		0,58	(7,83)	0,64	(9,30)
31/10/03	430		0,63	3,21	0,71	10,26
30/09/03	390		0,61	0,61	0,64	0,00
29/08/03	390		0,61	12,95	0,64	11,43
31/07/03	350		0,54	(8,17)	0,58	(7,89)
30/06/03	380		0,59	(10,87)	0,62	(11,63)
30/05/03	430		0,66	7,10	0,71	(2,98)
30/04/03	500		0,62	46,58	0,73	35,14
31/03/03	370		0,42	(11,35)	0,54	(5,13)
28/02/03	390		0,47	18,10	0,57	14,71
31/01/03	340		0,40	0,26	0,50	0,00
31/12/02	340		0,40	(33,68)	0,50	(29,17)
29/11/02	480		0,60	52,87	0,70	41,18
31/10/02	340		0,40	5,48	0,50	6,25
30/09/02	320		0,38	(15,04)	0,47	(13,51)
29/08/02	370		0,44	7,02	0,54	2,78
31/07/02	360		0,41	(16,35)	0,52	(10,00)
28/06/02	400		0,49	(22,01)	0,58	(14,89)
31/05/02	470		0,63	(14,22)	0,68	(7,39)
30/04/02	850		0,74	15,37	0,74	14,86
29/03/02	740		0,64	(7,63)	0,64	(10,84)
28/02/02	830		0,69	(30,83)	0,72	(27,83)
HAF/İİF	1.150		1,00	0,00	1,00	0,00

Source: http://www.imkb.gov.tr/sirket/fiyat_getiri.htm

Regarding to the stock codes of the securities, there are 304 different securities listed on the web site and the name of the companies issuing the securities as well as the codes are presented in Table 6.

Table 6 Stocks that Form the Return Data Set

ABANA	ABANA ELEKTROMEKANİK	BISAS	BISAŞ TEKSTİL	EGSER	EGE SERAMİK
ACIBD	ACIBADEM SAĞLIK	BJKAS	BEŞİKTAŞ FUTBOL YAT.	EGYO	EGS GMYO
ADANA	ADANA ÇİMENTO	BOLUC	BOLU ÇİMENTO	EMKEL	EMEK ELEKTRİK
ADBGR	ADANA ÇİMENTO B	BOSSA	BOSSA	EMNIS	EMİNİŞ AMBALAJ
ADEL	ADEL KALEMCİLİK	BOYNR	BOYNER MAĞAZACILIK	ENKAI	ENKA İNŞAAT
ADNAC	ADANA ÇİMENTO C	BRISA	BRİSA	EPLAS	EGEPLAST
AEFES	ANADOLU EFES	BRMEN	BİRLİK MENSUCAT	ERBOS	ERBOSAN
AFMAS	AFM FİLM	BROVA	BOROVA YAPI	EREGL	EREĞLİ DEMİR CELİK
AFYON	AFYON ÇİMENTO	BRSAN	BORUSAN MANNESMANN	ERSU	ERSU GIDA
AGYO	ATAKULE GMYO	BRYAT	BORUSAN YAT. PAZ.	ESCOM	ESCORT COMPUTER
AKALT	AKAL TEKSTİL	BSOKE	BATISÖKE ÇİMENTO	ESEMS	ESEM SPOR GİYİM
AKBNK	AKBANK	BSPRO	BSH EV ALETLERİ	EVNYO	EVG YAT.ORT
AKCNS	AKÇANSA	BTCIM	BATI ÇİMENTO	EVREN	EGELİ YAT. ORT.
AKENR	AK ENERJİ	BUCIM	BURSA ÇİMENTO	FACFA	FACTOTURK FAKTORİNG
AKGRT	AKSİGORTA	BUMYO	BUMERANG YAT.ORT.	FENER	FENERBAHÇE SPORTİF
AKIPD	AKSU İPLİK	BURCE	BURÇELİK	FENIS	FENİŞ ALÜMİNYUM
AKMGY	AKMERKEZ GMYO	BURVA	BURÇELİK VANA	FFKRL	FİNANS FİN. KİR.
AKSA	AKSA	BYSAN	BOYASAN TEKSTİL	FINBN	FİNANSBANK
AKSUE	AKSU ENERJİ	CBSBO	ÇBS BOYA	FMIZP	F-M İZMİT PİSTON
AKYO	AK YAT.ORT.	CELHA	ÇELİK HALAT	FNSYO	FİNANS YAT. ORT.
ALARK	ALARKO HOLDİNG	CEMTS	ÇEMTAŞ	FRIGO	FRİGO PAK GIDA
ALCAR	ALARKO CARRIER	CEYLN	CEYLAN GİYİM	FROTO	FORD OTOSAN
ALCTL	ALCATEL TELETAŞ	CIMSA	ÇİMSA	FVORI	FAVORİ DİNLENME YER.
ALGYO	ALARKO GMYO	CLEBI	ÇELEBİ	GARAN	GARANTİ BANKASI
ALKA	ALKİM KAĞIT	CMBTN	ÇİMBETON	GARFA	GARANTİ FAKTORİNG
ALKIM	ALKİM KİMYA	CMENT	ÇİMENTAŞ	GDKYO	GEDİK YAT.ORT.
ALNTF	ALTERNATİFBANK	CMLOJ	CAMİŞ LOJİSTİK HİZ.	GEDIZ	GEDİZ İPLİK
ALTIN	ALTINYILDIZ	CYTAS	CEYTAŞ MADENCİLİK	GENTS	GENTAŞ
ALYAG	ALTINYAĞ	DARDL	DARDANEL	GEREL	GERSAN ELEKTRİK
ANACM	ANADOLU CAM	DENCM	DENİZLİ CAM	GIMA	GİMA
ANELT	ANEL TELEKOM	DENIZ	DENİZBANK	GLYHO	GLOBAL YAT. HOLDİNG
ANHYT	ANADOLU HAYAT EMEK.	DENTA	DENTAŞ AMBALAJ	GOLDS	GOLDAS KUYUMCULUK
ANSGR	ANADOLU SİGORTA	DERIM	DERİMOD	GOODY	GOOD-YEAR
ARAT	ARAT TEKSTİL	DESA	DESA DERİ	GRGYO	GARANTİ GMYO
ARCLK	ARÇELİK	DEVA	DEVA HOLDİNG	GRNYO	GARANTİ YAT. ORT.
ARENA	ARENA BİLGİSAYAR	DGZTE	DOĞAN GAZETECİLİK	GSDHO	GSD HOLDİNG
ARFYO	ALTERNATİF YAT.ORT.	DISBA	DIŞBANK	GSRAY	GALATASARAY SPORTİF
ARSAN	ARSAN TEKSTİL	DITAS	DİTAŞ DOĞAN	GUBRF	GÜBRE FABRİK.
ASELS	ASELSAN	DMSAS	DEMİSAŞ DÖKÜM	GUSGR	GÜNEŞ SİGORTA
ASLAN	LAFARGE ASLAN ÇİMENTO	DNZYO	DENİZ YAT.ORT.	HEKTS	HEKTAŞ
ASUZU	ANADOLU ISUZU	DOAS	DOĞUŞ OTOMOTİV	HURGZ	HÜRRİYET GZT.
ATAYO	ATA YAT.ORT.	DOBUR	DOĞAN BURDA	HZNDR	HAZNEDAR REFRAKTER
ATEKS	AKIN TEKSTİL	DOGUB	DOĞUSAN	IBTYO	İNFOTREND YAT. ORT.
ATLAS	ATLAS YAT. ORT.	DOHOL	DOĞAN HOLDİNG	IDAS	İDAŞ
ATSYO	ATLANTİS YAT. ORT.	DOKTS	DÖKTAŞ	IHEVA	İHLAS EV ALETLERİ
AVIVA	AVİVA SİGORTA	DUROF	DURAN DOĞAN BASIM	IHGYO	İHLAS GMYO
AVRSY	AVRASYA YAT.ORT.	DYHOL	DOĞAN YAYIN HOL.	IHLAS	İHLAS HOLDİNG
AYCES	ALTINYUNUS ÇEŞME	DYOBY	DYO BOYA	INDES	İNDEKS BİLGİSAYAR
AYEN	AYEN ENERJİ	ECBYO	ECZACIBAŞI YAT. ORT.	INFYO	İNFO YAT. ORT.
AYGAZ	AYGAZ	ECILC	ECZACIBAŞI İLAÇ	INTEM	İNTEMA
BAGFS	BAGFAŞ	ECYAP	ECZACIBAŞI YAPI	IPMAT	İPEK MATBAACILIK
BAKAB	BAK AMBALAJ	ECZYT	ECZACIBAŞI YATIRIM	ISAMB	IŞIKLAR AMBALAJ
BANVT	BANVİT	EDIP	EDİP İPLİK	ISCTR	İŞ BANKASI (C)
BEKO	BEKO ELEKTRONİK	EFES	EFES HOLDİNG	ISFIN	İŞ FİN.KİR.
BERDN	BERDAN TEKSTİL	EGEEN	EGE ENDÜSTRİ	ISGSY	İŞ GİRİŞİM
BFREN	BOSCH FREN SİSTEMLERİ	EGGUB	EGE GÜBRE	ISGYO	İŞ GMYO
BIMAS	BİM MAĞAZALAR	EGPRO	EGE PROFİL	ISYAT	İŞ YAT. ORT.

Table 6 Stocks that Form the Return Data Set (Continued)

CODE	COMPANY	CODE	COMPANY	CODE	COMPANY
IZMDC	İZMİR DEMİR ÇELİK	PETUN	PINAR ET VE UN	VAKFN	VAKIF FİN. KİR.
IZOCM	İZOCAM	PIMAS	PİMAŞ	VAKKO	VAKKO TEKSTİL
KAPLM	KAPLAMİN	PINSU	PINAR SU	VANET	VANET
KARSN	KARSAN OTOMOTİV	PKART	PLASTİKKART	VARYO	VARLIK YAT.ORT.
KARTN	KARTONSAN	PKENT	PETROKENT TURİZM	VESTL	VESTEL
KAVPA	KAV DAN.PAZ.TİC.	PNSUT	PINAR SÜT	VKFRS	VAKIF GİRİŞİM
KCHOL	KOÇ HOLDİNG	PRKAB	TÜRK PRYSMİAN KABLO	VKFYT	VAKIF YAT. ORT.
KENT	KENT GIDA	PRKTE	PARK ELEK.MADENCİLİK	VKGYO	VAKIF GMYO
KERVT	KEREVİTAŞ GIDA	PRTAS	ÇBS PRİNTAŞ	VKING	VİKİNG KAĞIT
KIPA	TESCO KİPA	PTOFS	PETROL OFİSİ	YATAS	YATAŞ
KLBMO	KELEBEK MOBİLYA	RAYSG	RAY SİGORTA	YAZIC	YAZICILAR HOLDING
KLMSN	KLİMASAN KLİMA	SAHOL	SABANCI HOLDİNG	YKBNK	YAPI VE KREDİ BANK.
KNFRT	KONFRUT GIDA	SANKO	SANKO PAZARLAMA	YKFIN	YAPI KREDİ FİN.KİR.
KONYA	KONYA ÇİMENTO	SARKY	SARKUYSAN	YKGYO	YAPI KREDİ KORAY GMYO
KORDS	KORDSA SABANCI DUPONT	SASA	ADVANSA SASA	YKRYO	YAPI KREDİ YAT.O.
KOTKS	KONİTEKS	SEKFK	ŞEKER FİN. KİR.	YKSGR	YAPI KREDİ SİGORTA
KOZAD	KOZA DAVETİYE	SELGD	SELÇUK GIDA	YTFYO	YATIRIM FİN. YAT.ORT.
KRDMA	KARDEMİR A	SERVE	SERVE KIRTASİYE	YUNSA	YÜNSA
KRDMB	KARDEMİR B	SISE	ŞİŞE CAM	ZOREN	ZORLU ENERJİ
KRDMD	KARDEMİR D	SKBNK	ŞEKERBANK		
KRSTL	KRİSTAL KOLA	SKPLC	ŞEKER PİLİÇ		
KRTEK	KARSU TEKSTİL	SKTAS	SÖKTAŞ		
KUTPO	KÜTAHYA PORSELEN	SNPAM	SÖNMEZ PAMUKLU		
LINK	LİNK BİLGİSAYAR	SODA	SODA SANAYİİ		
LIOYS	LİO YAĞ	SONME	SÖNMEZ FİLAMENT		
LOGO	LOGO YAZILIM	TACYO	TAÇ YAT. ORT.		
LUKSK	LÜKS KADİFE	TATKS	TAT KONSERVE		
MAALT	MARMARİS ALTINYUNUS	TBORG	T.TUBORG		
MAKTK	MAKİNA TAKIM	TCELL	TURKCELL		
MEGES	MEGES BOYA	TEBNK	T.EKONOMİ BANK.		
MEMSA	MENSA MENSUCAT	TEKFK	TEKSTİL FİN. KİR.		
MERKO	MERKO GIDA	TEKST	TEKSTİLBANK		
METUR	METEMTUR OTELCİLİK	TEKTU	TEK-ART TURİZM		
MIGRS	MİGROS	THYAO	TÜRK HAVA YOLLARI		
MIPAZ	MİLPA	TIRE	TİRE KUTSAN		
MMART	MARMARİS MARTI	TKBNK	T. KALKINMA BANK.		
MNDRS	MENDERES TEKSTİL	TNSAS	TANSAŞ		
MRDIN	MARDİN ÇİMENTO	TOASO	TOFAŞ OTO. FAB.		
MRSHL	MARSHALL	TOPFN	TOPRAK FİN. KİR.		
MTEKS	METEMTEKS	TRCAS	TURCAS PETROL		
MUTLU	MUTLU AKÜ	TRKCM	TRAKYA CAM		
MYZYO	M. YILMAZ YAT.ORT.	TRNSK	TRANSTÜRK HOLD.		
MZHLD	MAZHAR ZORLU HOLDİNG	TSKB	T.S.K.B.		
NETAS	NETAŞ TELEKOM.	TSKYO	TSKB YAT. ORT.		
NTHOL	NET HOLDİNG	TSPOR	TRABZONSPOR SPORTİF		
NTTUR	NET TURİZM	TTRAK	TÜRK TRAKTÖR		
NUGYO	NUROL GMYO	TUDDF	T.DEMİR DÖKÜM		
NUHCM	NUH ÇİMENTO	TUKAS	TUKAŞ		
OKANT	OKAN TEKSTİL	TUMTK	TÜMTEKS		
OLMKS	OLMUKSA	TUPRS	TÜPRAŞ		
OTKAR	OTOKAR	UCAK	USAŞ		
OYSAC	OYSA ÇİMENTO	UKIM	UKİ KONFEKSİYON		
OZFIN	ÖZ FİNANS FACT.	ULKER	ÜLKER GIDA		
PARSN	PARSAN	UNTAR	ÜNAL TARIM ÜRÜN.		
PENGD	PENGUEN GIDA	UNYEC	ÜNYE ÇİMENTO		
PERYO	PERA YAT. ORT.	USAK	UŞAK SERAMİK		
PETKM	PETKİM	UZEL	UZEL MAKİNA		

It is important to note the characteristics of the data set used. First, the names of the securities that changed due to reasons such as mergers in the study period are listed with the updated ones. For example security name of CARSI changed in 03/01/2005 and was replaced with BOYNR, so the return data file is given as BOYNR but it contains the whole history of CARSI also. Second, the data for the stocks de-listed because of acquisitions are not available so these stocks are not included in the data set. For example Anadolu Gıda (AGIDA) was acquired by Ülker Gıda in 23/02/2004 and the monthly return data for AGIDA is not announced by ISE. Third, companies with stocks de-listed from the ISE markets permanently are not available and so, not included in the study data. An example is Toprakbank (TPBNK). The implications of these characteristics of the data set will be discussed at the end of the study.

The monthly return data for each security was calculated by ISE analysts according to the following formula:

$$R_i = \frac{P_i \times (CS_i + PS_i + 1) - PS_i \times PSP_i + D_i - P_{i-1}}{P_{i-1}} \qquad \forall i = 01/88,...,09/05$$

(Available at http://www.imkb.gov.tr/sirket/fiyat_getiri_aciklama.htm)

where; R_i is the monthly return, P_i is the closing price of the month, CS_i is the number of common stocks outstanding, PS_i is the number of preferred stocks, PSP_i is the price of preferred stocks, D_i is the dividend given in the month and P_{i-1} is the closing price of the previous month.

In the study, the monthly return values that are computed according to the domestic currency (TL and YTL) are used.

Another data type used in the study is the monthly returns of the ISE100 index. Monthly return values of ISE100 index is calculated according to the following formula:

$$R_{ISE100i} = \frac{CL_i - CL_{i-1}}{CL_{i-1}} \qquad \forall i = 01/88,...,09/05$$

where; $R_{ISE100i}$ is the monthly return of ISE100 index, CL_i is the closing level of the index for the current month and CL_{i-1} is the closing level of the index in the previous month. The index data is also obtained from ISE.

The available data for the ISE100 begins from the January of 1988. So in the analysis, data set between January 1988 and September 2005 is used. Arranging the 304 separate return files and index data files, a general purpose database is constructed for the following steps of the analysis.

3.1.2 Data Set for the Fama-French Three Factor Model Analysis

In the analysis of the FF-TFM, the required data types are; monthly return of the securities, monthly returns of risk free assets, monthly return of ISE100 index, market value of equity and the book value of equity of the companies.

The monthly return of the securities and monthly ISE100 index returns are explained in the previous part so these data sets are directly used in this analysis as well. The risk free assets are chosen as treasury bills and notes. In the study, the monthly return rates of the risk free asset are obtained from the monthly bulletins of ISE. An example of the related page in the August of 2005 bulletin is given in Table 7.

Table 7 A Sample Monthly Bulletin Page of Treasury Bills and Notes

<table>
<tr><td colspan="5" align="center">**TREASURY NOTES AND BILL MARKET**</td></tr>
<tr><td colspan="5" align="center">**MONTHLY RETURN SUMMARY (AUGUST 2005)**</td></tr>
<tr><td colspan="5" align="center">**WITH YEARLY SIMPLE INTEREST (%)**</td></tr>
<tr><td>**DAYS REMAINING**</td><td>**MIN**</td><td>**MAX**</td><td>**WEIGHTED AVERAGE**</td><td>**VOLUME (YTL)**</td></tr>
<tr><td>1-30</td><td>12,00</td><td>18,00</td><td>12,79</td><td>427.430.868,37</td></tr>
<tr><td>31-60</td><td>12,40</td><td>13,80</td><td>13,04</td><td>592.549.164,74</td></tr>
<tr><td>61-90</td><td>13,00</td><td>15,00</td><td>13,41</td><td>614.055.846,68</td></tr>
<tr><td>91-180</td><td>13,05</td><td>16,50</td><td>14,24</td><td>1.940.659.472,51</td></tr>
<tr><td>181-270</td><td>14,70</td><td>16,70</td><td>15,46</td><td>2.751.568.623,68</td></tr>
<tr><td>271-365</td><td>15,61</td><td>16,98</td><td>16,15</td><td>655.829.303,18</td></tr>
<tr><td>366 and over</td><td>15,50</td><td>17,41</td><td>16,96</td><td>22.920.045.455,59</td></tr>
<tr><td>**TOTAL**</td><td></td><td></td><td></td><td>**29.902.138.734,75**</td></tr>
</table>

Source: ISE August 2005 Bulletin

In order to calculate the monthly risk free return rate, treasury notes and bills that have less than or equal to thirty days to the maturity are used. The maximum yearly simple return rates are divided by 12 to obtain the monthly nominal return rates. The only exception occurred in December 2000. Since there are no treasury bills and notes that have thirty or less days to maturity, the ones between thirty one and sixty days to maturity are used in the analysis. Arranging the separate monthly bulletin files, a database of the risk free asset returns was constructed and it is presented in Table 8.

Table 8 Monthly Risk-free Rates of Returns Between 04/2000 and 09/2005

Date	Days to Maturity	Max (%)	Monthly Rf	Date	Days to Maturity	Max (%)	Monthly Rf	Date	Days to Maturity	Max (%)	Monthly Rf
30.04.00	1-30	38,0	3,17%	28.02.02	1-30	64,7	5,39%	31.12.03	1-30	23,9	1,99%
31.05.00	1-30	43,0	3,58%	31.03.02	1-30	50,0	4,17%	31.01.04	1-30	23,5	1,96%
30.06.00	1-30	37,0	3,08%	30.04.02	1-30	48,0	4,00%	28.02.04	1-30	22,5	1,88%
31.07.00	1-30	32,0	2,67%	31.05.02	1-30	68,7	5,73%	31.03.04	1-30	20,5	1,71%
31.08.00	1-30	30,5	2,54%	30.06.02	1-30	46,1	3,84%	30.04.04	1-30	20,0	1,67%
30.09.00	1-30	42,0	3,50%	31.07.02	1-30	43,0	3,58%	31.05.04	1-30	21,7	1,81%
31.10.00	1-30	37,0	3,08%	31.08.02	1-30	60,0	5,00%	30.06.04	1-30	20,3	1,69%
30.11.00	1-30	43,0	3,58%	30.09.02	1-30	45,0	3,75%	31.07.04	1-30	21,0	1,75%
31.12.00	31-60	**121,0**	**10,08%**	31.10.02	1-30	49,0	4,08%	31.08.04	1-30	20,0	1,67%
31.01.01	1-30	50,0	4,17%	30.11.02	1-30	72,7	6,06%	30.09.04	1-30	19,0	1,58%
28.02.01	1-30	**999,0**	**83,25%**	31.12.02	1-30	43,0	3,58%	31.10.04	1-30	19,0	1,58%
31.03.01	1-30	125,0	10,42%	31.01.03	1-30	45,1	3,76%	30.11.04	1-30	19,0	1,58%
30.04.01	1-30	90,0	7,50%	28.02.03	1-30	40,0	3,33%	31.12.04	1-30	20,0	1,67%
31.05.01	1-30	101,0	8,42%	31.03.03	1-30	45,0	3,75%	31.01.05	1-30	20,0	1,67%
30.06.01	1-30	63,0	5,25%	30.04.03	1-30	39,0	3,25%	28.02.05	1-30	16,7	1,39%
31.07.01	1-30	67,0	5,58%	31.05.03	1-30	35,0	2,92%	31.03.05	1-30	16,0	1,33%
31.08.01	1-30	70,0	5,83%	30.06.03	1-30	40,4	3,36%	30.04.05	1-30	17,0	1,42%
30.09.01	1-30	59,5	4,96%	31.07.03	1-30	33,0	2,75%	31.05.05	1-30	14,5	1,21%
31.10.01	1-30	73,0	6,08%	31.08.03	1-30	30,0	2,50%	30.06.05	1-30	15,0	1,25%
30.11.01	1-30	72,0	6,00%	30.09.03	1-30	30,0	2,50%	31.07.05	1-30	14,5	1,21%
31.12.01	1-30	53,1	4,43%	31.10.03	1-30	26,0	2,17%	31.08.05	1-30	18,0	1,50%
31.01.02	1-30	54,0	4,50%	30.11.03	1-30	23,0	1,92%	30.09.05	1-30	15,3	1,28%

Source: ISE Monthly Bulletins

The other data sets needed are market value of equity (ME) of the companies and their book value of equity (BE). These data are also obtained from the monthly bulletins of ISE. In the *Valuation Ratios* pages of the reports, market equity and book equity values of all the firms listed in ISE are presented on the industry base. Again arranging the separate monthly files, a database of BE, ME, BE/ME for all firms was constructed. To give an example, a snapshot of this considerably big database is presented in Table 9 for March 2000.

Table 9 Snapshot of BE, ME and BE/ME Database for March 2000

Code	ME 000ytl	BE 000ytl	BE/ME Ratio	Code	ME 000ytl	BE 000ytl	BE/ME Ratio	Code	ME 000ytl	BE 000ytl	BE/ME Ratio
ABANA	11786	1762	0,15	BOYNR	108900	1912	0,02	GOLDS	65000	7424	0,11
ADANA	96481	21300	0,22	CBSBO	4420	356	0,08	GOODY	146985	15886	0,11
ADBGR	50741	19969	0,39	CELHA	15705	4250	0,27	GRNYO	1213	1266	1,04
ADEL	12500	4151	0,33	CEMTS	20966	7622	0,36	GSDHO	202100	10588	0,05
ADNAC	26473	39937	1,51	CEYLN	5411	1683	0,31	GUBRF	39372	8129	0,21
AFYON	23700	1452	0,06	CIMSA	269568	43150	0,16	GUSGR	58000	19790	0,34
AKALT	40700	17149	0,42	CLEBI	66875	4791	0,07	HEKTS	24357	7102	0,29
AKBNK	2750000	758277	0,28	CMBTN	8260	3759	0,46	YKSGR	101120	27921	0,28
AKCNS	456619	74769	0,16	CMENT	96250	25475	0,26	HURGZ	484702	66983	0,14
GARFA	16749	9270	0,55	AVIVA	16500	5011	0,30	HZNDR	5188	1777	0,34
AKGRT	405000	66273	0,16	CYTAS	7320	7313	1,00	IDAS	10875	3291	0,30
AKIPD	24457	12729	0,52	DARDL	21820	5985	0,27	IHEVA	15593	3234	0,21
AKSA	288012	59814	0,21	DENCM	17400	2891	0,17	IHGYO	11570	6427	0,56
AKSUE	52200	3154	0,06	DERIM	6000	1783	0,30	IHLAS	246651	71164	0,29
AKYO	3800	4016	1,06	DEVA	22000	8114	0,37	INTEM	12879	5991	0,47
ALARK	455600	37145	0,08	DISBA	177500	116377	0,66	ISAMB	35511	2697	0,08
ALCAR	95850	21795	0,23	DITAS	10828	2273	0,21	ISCTR	7123910	833284	0,12
ALCTL	285000	21010	0,07	DNZYO	1148	1051	0,92	ISFIN	41225	12652	0,31
ALGYO	42500	30608	0,72	DMSAS	11000	5617	0,51	ISGYO	210000	84013	0,40
ALKIM	70520	9924	0,14	DOBUR	73125	5749	0,08	ISYAT	29400	23168	0,79
ALNTF	63325	53107	0,84	DOGUB	13328	204	0,02	IZMDC	89640	59638	0,67
ALTIN	51357	11899	0,23	DOHOL	1429810	139806	0,10	IZOCM	27300	8499	0,31
ANACM	71079	30463	0,43	DOKTS	49200	14541	0,30	KAPLM	5355	2347	0,44
ANHYT	265000	43244	0,16	DYHOL	1084781	88548	0,08	KARSN	196800	10323	0,05
ANSGR	120000	34047	0,28	ECBYO	1275	934	0,73	KARTN	83025	25076	0,30
ARAT	9375	2033	0,22	ECILC	255830	44474	0,17	KAVPA	66924	13725	0,21
ARCLK	1333200	204038	0,15	ECYAP	47000	21413	0,46	KCHOL	4166643	161983	0,04
ARFYO	2057	2217	1,08	ECZYT	121440	25729	0,21	KENT	76032	11870	0,16
ARSAN	37800	21589	0,57	EDIP	11934	8445	0,71	KERVT	22464	14599	0,65
ASELS	303831	36256	0,12	EFES	139230	20140	0,14	KIPA	68138	8111	0,12
ASLAN	260240	10400	0,04	EGEEN	21700	3751	0,17	KLBMO	7280	2329	0,32
ASUZU	139765	10505	0,08	EGGUB	11048	3334	0,30	KLMSN	30625	5395	0,18
ATAYO	2550	2514	0,99	EGPRO	7560	1952	0,26	KNFRT	5880	4292	0,73
ATEKS	27825	12591	0,45	EGSER	23868	8502	0,36	KONYA	42643	13028	0,31
ATLAS	2145	6412	2,99	EGYO	110000	35197	0,32	KORDS	325129	47584	0,15
ATSYO	1170	2042	1,75	EMKEL	17002	2088	0,12	KOTKS	2574	55	0,02
AVRSY	1809	1950	1,08	EMNIS	10173	3424	0,34	KRDMA	30008	13991	0,47
AYCES	11232	3061	0,27	EPLAS	6900	1263	0,18	KRDMB	12718	6956	0,55
AYGAZ	590000	49802	0,08	ERBOS	24650	4726	0,19	KRDMD	48099	7494	0,16
BAGFS	57000	14884	0,26	EREGL	1197504	295704	0,25	KRSTL	44400	5880	0,13
BAKAB	16500	4148	0,25	ERSU	12480	2090	0,17	KRTEK	18720	8455	0,45
BANVT	139500	16132	0,12	ESEMS	13800	6378	0,46	KUTPO	13133	6575	0,50
BEKO	153700	25946	0,17	EVREN	2280	6995	3,07	LIOYS	20157	2043	0,10
BERDN	16380	18947	1,16	FENIS	15679	3297	0,21	LUKSK	2730	943	0,35
BFREN	36567	6913	0,19	FFKRL	25500	35065	1,38	MAALT	10403	2816	0,27
BOLUC	118802	26653	0,22	FINBN	268813	145967	0,54	MAKTK	26700	11115	0,42
BOSSA	81900	38158	0,47	FMIZP	17587	2140	0,12	MEMSA	20613	4900	0,24
BRISA	271628	64445	0,24	FNSYO	6300	6626	1,05	MERKO	32603	15331	0,47
BRMEN	9501	4067	0,43	FRIGO	5160	2072	0,40	MIGRS	994500	73433	0,07
BROVA	25560	1743	0,07	FROTO	862654	73611	0,09	DGZTE	83734	22014	0,26
BRSAN	71100	12782	0,18	GARAN	1950000	586554	0,30	MIPAZ	72991	16778	0,23
BRYAT	84000	10573	0,13	GDKYO	900	844	0,94	MMART	14200	8023	0,56
BSPRO	415659	31608	0,08	GEDIZ	27600	6393	0,23	MRDIN	67700	16117	0,24
BTCIM	132300	22434	0,17	GENTS	16174	7299	0,45	MRSHL	95251	17897	0,19
BUCIM	176360	14966	0,08	GIMA	232500	13718	0,06	MTEKS	9800	1731	0,18
BUMYO	1125	1379	1,23	PERYO	1998	5261	2,63	MUTLU	20790	5505	0,26
BURCE	3143	779	0,25	GLYHO	49875	12563	0,25	MYZYO	488	818	1,68

Code	ME 000ytl	BE 000ytl	BE/ME Ratio	Code	ME 000ytl	BE 000ytl	BE/ME Ratio	Code	ME 000ytl	BE 000ytl	BE/ME Ratio
MZHLD	9600	2997	0,31	SASA	306425	56168	0,18	TUDDF	75000	13327	0,18
NETAS	480000	35766	0,07	SELGD	6480	1666	0,26	TUKAS	16677	4205	0,25
OYSAC	34125	5773	0,17	SERVE	2670	1179	0,44	TUPRS	2653696	453584	0,17
NTHOL	72471	31132	0,43	SISE	703100	82899	0,12	UCAK	74000	10728	0,14
NTTUR	47658	20113	0,42	SKBNK	58500	47613	0,81	UKIM	15147	6258	0,41
NUGYO	19500	10742	0,55	SKPLC	20625	3665	0,18	UNTAR	12000	3120	0,26
NUHCM	354671	37731	0,11	SKTAS	9120	6983	0,77	UNYEC	126544	25969	0,21
OKANT	2790	7070	2,53	SNPAM	44225	14639	0,33	USAK	5023	1589	0,32
OLMKS	44468	8302	0,19	SONME	25440	6602	0,26	UZEL	146740	19083	0,13
GRGYO	9375	5401	0,58	TACYO	5686	5445	0,96	VAKFN	11670	7252	0,62
OTKAR	134326	10728	0,08	TATKS	78750	15840	0,20	VAKKO	24250	8326	0,34
OZFIN	3296	4067	1,23	TBORG	46711	10625	0,23	VANET	16500	3444	0,21
PARSN	12096	5913	0,49	TEBNK	183750	47105	0,26	VARYO	925	1189	1,29
PENGD	22880	6640	0,29	TEKST	66000	52116	0,79	VESTL	790000	72696	0,09
PETKM	2427750	335440	0,14	CMLOJ	1540	451	0,29	VKFYT	2425	2510	1,04
PIMAS	31752	4224	0,13	THYAO	1987500	66338	0,03	VKGYO	14178	8021	0,57
PINSU	11110	3080	0,28	TIRE	45085	10103	0,22	VKING	12762	3629	0,28
PKENT	4977	3226	0,65	TKBNK	983526	79567	0,08	DYOBY	26366	8589	0,33
PNSUT	71043	14899	0,21	TNSAS	382500	3215	0,01	YATAS	26123	9666	0,37
PRKAB	102060	17129	0,17	TOASO	539784	59241	0,11	YAZIC	273000	18963	0,07
PRTAS	9120	2896	0,32	TOPFN	9213	7795	0,85	YKBNK	3779722	612682	0,16
PTOFS	1700000	117224	0,07	FACFA	9083	6080	0,67	YKFIN	61051	12379	0,20
TEKFK	7830	4977	0,64	TRCAS	179591	19628	0,11	YKGYO	54000	26332	0,49
RAYSG	17941	5891	0,33	TRKCM	435705	78780	0,18	YKRYO	4107	5617	1,37
SAHOL	4756250	317132	0,07	TRNSK	16077	9103	0,57	YTFYO	675	587	0,87
SARKY	75000	23448	0,31	TSKB	58800	34923	0,59	YUNSA	28350	11080	0,39

Source: ISE March 2000 Bulletin

The available bulletins start from April 1999. However, since the factor portfolios of HML and SMB is formed at the end of March and to keep the convenience, the data set in this part of the study covers the period between March 2000 and September 2005.

3.2 Methodology

3.2.1 Methodology for the Contrarian Strategy Analysis

In the literature, contrarian strategy analyses are built upon forming the winner and loser portfolios on a determined *portfolio formation period* and testing the returns of these portfolios on a determined *portfolio test period*.

In this part of the study, so-called *J-K portfolios* are formed following Jegadeesh and Titman (1993), where *J* is the number of months considered in

determining the loser and winner portfolios prior to the portfolio formation date and J is the number of test period months after the formation date. In the analysis J is taken as fixed twelve months and K is from one to twelve months. As previously discussed, two return calculation methodologies exist in selecting the portfolios, namely CAR and HPAR. Based on the discussions in Conrad and Kaul (1993), HPAR methodology is applied in selecting and analyzing the returns of the portfolios. Holding period returns are calculated as shown in the following equation:

$$HPR(k) = \prod_{i=1}^{k}(1 + R_i) - 1$$

where, $HPR(k)$ is the holding period return of k months, R_i is the rate of return in month i.

Using the raw returns database, twelve month HPRs of securities and ISE100 index between December 1988 and September 2004 are obtained. Thus, a new HPR database of stocks and ISE100 index is constructed. Following Conrad and Kaul (1993), the holding period abnormal returns (HPAR) of the securities are found for the same period. HPAR of a security i can be stated as:

$$HPAR_i(k) = HPR_i(k) - HPR_{ISE100}(k)$$

where, $HPAR_i(k)$ is the holding period abnormal return of security i for k months and $HPR_{ISE100}(k)$ is the holding period return of ISE100 index for k months. In order to present a snapshot of this huge $HPAR_i(k)$ database, $HPAR_i(12)$ values of stocks between December 1988 and January 1990 are placed in Appendix 1. In order to increase the statistical significance and the amount of return data of the portfolios, overlapping periods are used following Jegadeesh and Titman (1993) and Ritter and Loughran (1996). Starting from the end of December 1988, a total of 64 winner and 64 loser portfolios are formed by skipping three months between consecutive portfolios up to the end of September 2004. Using the $HPAR_i(k)$ values, the stocks that are in the top 10 percent and the ones in the bottom 10 percent are selected in the beginning of January, April, July and October for each year between 1989 and 2004.

Like Durukan (2004), top ten percent stocks formed the winner portfolio and the bottom ten percent stocks formed the loser portfolio.

Once determining the winner and loser portfolios, portfolios are tested for the following twelve months. Following Conrad and Kaul (1993), equally weighted portfolios are constructed and the portfolio holding period returns are found using the following methodology:

$$AHPAR_p(k) = \frac{1}{n}\sum_{i=1}^{n} HPR_{pi}(k) - HPR_{ISE100}(k) \qquad i = 1,...,n \qquad p = L,W$$

where p is the winner or loser portfolio, n is the number of securities in the portfolio and $AHPAR_p(k)$ is the average holding period abnormal return of portfolio p for k months. Repeating this procedure for each of 64 winner and loser portfolio, $k=1,...,12$ months average holding period returns are obtained. In addition, in order to see the monthly returns of the portfolios for the following 12 months separately, the following formula is used:

$$AR_p(k) = \frac{1}{n}\sum_{i=1}^{n} R_{pi}(k) - R_{ISE100}(k) \qquad i = 1,...,n \qquad p = L,W$$

where $AR_p(k)$ is the average return of portfolio p in month k, $R_{pi}(k)$ is the return of security i in portfolio p for month k and $R_{ISE100}(k)$ is the return of ISE100 index in month k.

3.2.2 Methodology for the Fama-French Three Factor Model Analysis

In the analysis of the FF-TFM, the methodology of Fama and French (1993) is followed. Writing the regression equation of the model once more;

$$R_i - R_f = \alpha_i + \beta_i(R_M - R_f) + s_i SMB + h_i HML + \varepsilon_i$$

the first step is to determine the *SMB* and *HML* portfolios. *SMB* and *HML* portfolios are constructed as follows:

1. As of March of each year *t* (for the 2000-2005 period) all ISE stocks are allocated to two groups (small and big, S and B) based on whether their March market equity (ME) is below or above the median ME of all stocks.

2. ISE stocks are allocated in an independent sort to three book-to-market equity (BE/ME) groups (low, medium or high, L, M, H) based on the breakpoints for the bottom 30 percent, middle 40 percent and top 30 percent of the values of BE/ME for ISE stocks.

3. Intersecting two size and three book-to-market equity portfolios there happens to be six portfolios: S/L, S/M, S/H, B/L, B/M, and B/H. Value weighted monthly returns of these six portfolios are calculated from April of each year t to the March of year *t + 1*. Stocks in these six portfolios can be seen in the Appendix 2.

4. *SMB* is the difference between the average value weighted returns of three small sized portfolios (S/L, S/M, S/H) and the average value weighted returns of three big sized portfolios (B/L, B/M, B/H) in each twelve months following the portfolio formation date.

5. *HML* is the difference between the average of the value weighted returns on the two high book-to-market equity portfolios (S/H, B/H) and the average of the value weighted returns on the two low book-to-market equity portfolios (S/L, B/L) in each twelve months following the portfolio formation date.

Summary statistics of six size-BE/ME portfolios between April 2000 and September 2005 are presented in Table 10. Similar to Fama and French (1996) results, small stocks tend to have higher returns than the big ones and high BE/ME

stocks have higher returns than the low ones. Figure 8 shows the graphical representation of this relationship. Monthly excess returns of *SMB* and *HML* factor portfolios are provided for each year in Appendix 3.

Table 10 Summary Statistics: Monthly Average Excess Returns and Deviations

		Means				Std. Deviations	
Size		BE/ME		Size		BE/ME	
	Low	Medium	High		Low	Medium	High
Small	-0,017	0,002	0,010	Small	0,124	0,133	0,141
Big	-0,011	-0,004	0,003	Big	0,143	0,152	0,155
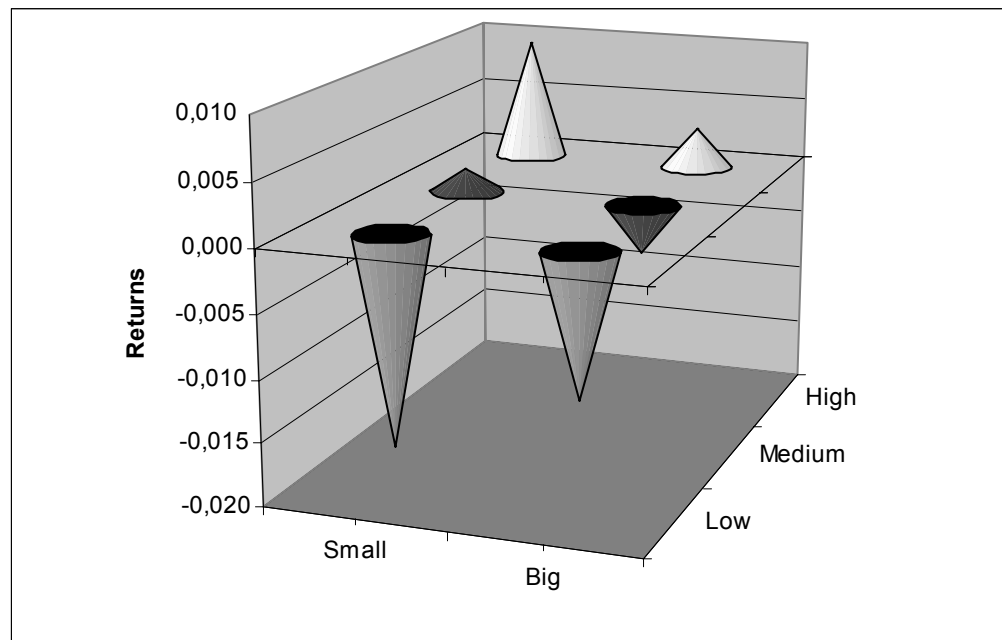
Figure 8 Monthly Average Returns of Six size-BE/ME Portfolios

Since the aim of the study is to investigate if the FF-TFM can explain the winner and loser portfolio returns the data sets of both parts of the study are matched. To make it more clear, both databases, monthly returns database and the database of BE, ME, BE/ME are compared. Although, the company codes that are changed and the companies that are de-listed due to acquisition and liquidation have been revised by the ISE analysts in the return data files, the valuation ratios in the bulletins are not revised in this manner. Namely, if a company code is changed, in the bulletins prior to the change date old code is used and the new one is used after the change date,

whereas only the returns in the name of new code are available. For example, CARSI changed to BOYNR in 03/01/2005, there is only one return file in the name of BOYNR which contains both CARSI and BOYNR data, whereas the company's book equity and market equity values are presented in the valuation ratios pages of the bulletins under two different names CARSI and BOYNR. So in order to synchronize the different data formats the following revisions are made:

1. The information of the de-listed stocks (due to acquisition and liquidation) and the ones whose codes are changed are obtained from ISE beginning from year 2000 to present. This data is presented in Appendix 4.

2. In the BE, ME, BE/ME database old stock names are replaced with the new ones beginning from year 2000.

3. De-listed stocks either due to acquisition or liquidation are removed from the BE, ME, BE/ME database, since the return data of these stocks are not available.

4. According to the notes on the March bulletins of each year, stocks whose data are not available (either ME or BE) or the ones whose calculations are not made by ISE for any reason, are excluded.

After completing the above four steps 10 stocks remained as not matching with the return data set. These stocks are also removed from the BE, ME, BE/ME database. The names of these 10 stocks are ALFA, EGFIN, EGHOL, EGIYM, GOLTS, ISATR, ISBTR, MEDYA, SABAH, SAPAZ.

Following Fama and French (1993), negative BE firms are excluded when calculating the breakpoints for BE/ME or when forming the six size-BE/ME portfolios. The reason to use March bulletins is to avoid *look-ahead bias*. Keim (1990) states that look-ahead bias occurs when the researcher uses data not yet available to the investors. The firms listed in ISE have to announce their financial

statements in the 90 days following their fiscal year end (31 December). So, at the end of March all the required data for this analysis is available to the investors and due to this reason March bulletins are used. ME data in the bulletins are the market values of the companies at the end of March and BE values are from the last available financial statements namely the ending fiscal year values. Keim (1990) used the E/P data in the same manner, earnings values come from the previous fiscal year's ending financial statements and the price is the end of March price of the current year. Chan et al. (1991) analyzed fundamental variables of stocks and their return relationship in Japan. The fiscal year ends in Japan at the end of March and so they used the end of June data in their analysis. However Fama and French (1993) used March data for the ME's of the stocks in determining SMB portfolios whereas when forming the HML portfolio they used BE and ME values at the end of December of year *t-1*. As a representative of the market portfolio ISE100 index is used.

In order to increase the amount of data used in the regression analysis, overlapping one month skipping winner and loser portfolios are constructed between March 2000 and August 2005.

Thus having SMB, HML, R_f, R_{ISE100}, R_i data, it is possible to form the regression analysis. Fama and French (1996) applied the regression to the one month return of the winner and loser portfolios in the test period. In this study, the remaining 11 monthly returns of the portfolios are also fitted on a regression line. The regression data is presented in Appendix 5. Due to the economic crisis in February of 2001, the extreme return rates of the treasury bills for February are excluded from the regression analysis in order not to interrupt the pattern with an outlier.

CHAPTER 4
EMPIRICAL RESULTS

The empirical results of the study are also discussed under two main headings, contrarian strategy findings and the explanatory power of the FF-TFM on the winner and loser portfolio returns. The purpose of this section is to present the results of the analyses made and evaluate the findings in the aspect of the aim of this study.

4.1   Findings Related to Contrarian Strategy in ISE

As previously discussed in the methodology section, ISE stocks are analyzed both in the entire period between January 1988 and September 2005 (1988-2005) and in a more recent period between May 1998 and September 2005 (1998-2005). In 1988-2005 time period, the portfolios are overlapping on each other with skipping three months. Regarding to the portfolio formation periods, 12 months holding period abnormal returns of portfolios and the number of firms in each loser, winner and contrarian strategy portfolio are presented in Appendix 6. The average holding period abnormal returns (HPAR) of the winner, loser and the contrarian strategy portfolios (buying losers and selling winners) in the twelve months following the portfolio formation date are given in Table 11. In the table, n shows the number of portfolios that have K month HPAR data. Since the rate of return data of securities in the last three months of 2005 is not available, n is 64 for K=10, 11 and 12 months holding periods of portfolios.

Table 11 1-12 Month Average HPARs of Winner, Loser and Contrarian Strategy Portfolios with 3-Month Skipping Between January 1988 and September 2005

		K=1 months	K=2 months	K=3 months	K=4 months	K=5 months	K=6 months
j=12 months	Looser (L)	0,046	0,080	0,114	0,154	0,171	0,229
	t(L)	(1,616)	(2,411)	(2,854)	(2,986)	(3,199)	(3,375)
j=12 months	Winner (W)	0,033	0,035	0,047	0,100	0,096	0,101
	t(W)	(1,357)	(1,145)	(1,283)	(1,804)	(1,492)	(1,495)
j=12 months	L-W	0,013	0,045	0,067	0,054	0,075	0,128
	t(L-W)	(0,663)	(1,555)	(1,964)	(1,090)	(1,372)	(2,106)
		n=65	n=65	n=65	n=65	n=65	n=65
		K=7 months	K=8 months	K=9 months	K=10 months	K=11 months	K=12 months
j=12 months	Looser (L)	0,262	0,278	0,419	0,469	0,506	0,643
	t(L)	(3,611)	(3,566)	(3,379)	(3,764)	(3,833)	(4,147)
j=12 months	Winner (W)	0,170	0,167	0,181	0,350	0,328	0,325
	t(W)	(1,919)	(1,793)	(1,790)	(2,295)	(2,090)	(1,929)
j=12 months	L-W	0,093	0,111	0,238	0,120	0,178	0,319
	t(L-W)	(1,207)	(1,369)	(1,997)	(0,815)	(1,151)	(1,765)
		n=65	n=65	n=65	n=64	n=64	n=64

As it is seen from Table 11, loser portfolios have higher HPAR than the winner portfolios for each of the twelve holding periods starting from one-month to twelve-months. Loser portfolios reverse their returns and tend to win starting from the first month. The winner portfolios however do not reverse their returns as in the case of long term analysis of De Bondt and Thaler (1985) and continue to win. In any case contrarian strategy of buying the losers and selling the winners beats the market and has positive returns over the following twelve months. In a previous study on ISE, Durukan (2004) had found the same positive returns for the winner portfolios in the long run.

The results of this analysis in ISE differ from Jegadeesh and Titman (1993) findings in the US exchanges for the intermediate term namely by looking at one year period prior to portfolio formation. They stated that loser portfolios continue to

lose and winner portfolios continue to win, namely momentum effect is observed up to one year time. It can be speculated that this difference is due to the specific economic and political situation of Turkey, where investors hesitate to make long term plans and may be the middle term for the US investors coincides with the long term of Turkish investors. The average HPARs of the portfolios can be seen better in Figure 9.
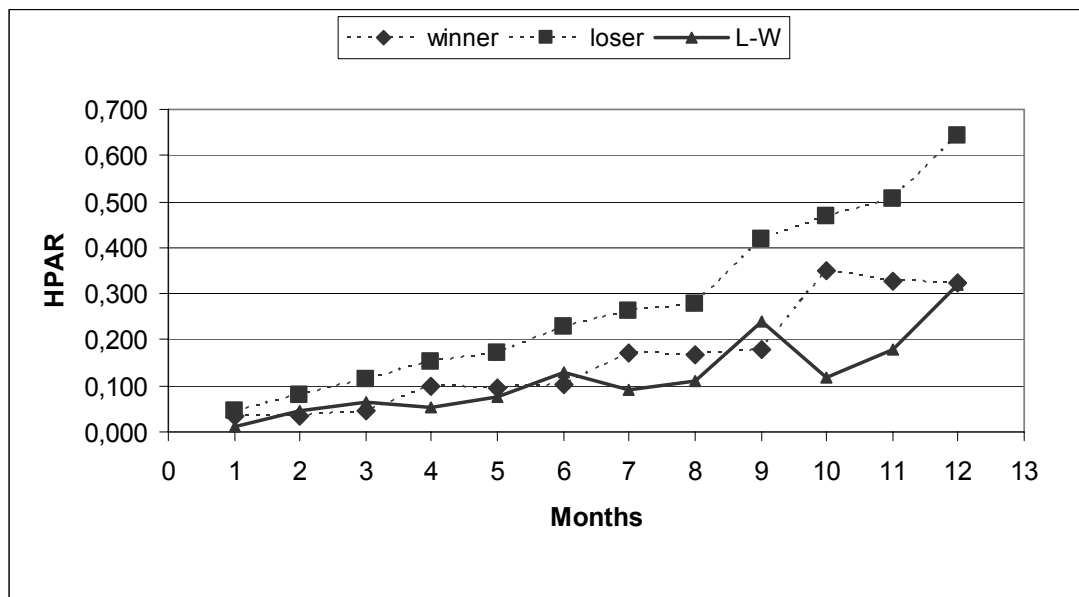
Figure 9 Average HPARs of Loser, Winner and Contrarian Strategy Portfolios (01/88-09/05)

In addition to the holding period return analysis, single monthly returns of the portfolios are also analyzed in order to capture the return trend in the test period. In Table 12 abnormal returns of the portfolios in each of 12 months following the formation date are presented. According to these figures, it is seen that loser portfolio returns are higher than the winner portfolio returns for the first three months and thereafter for months 4, 7 and 10, winner portfolio returns are slightly higher. However looking at the whole 12 month test period, loser portfolio returns beat the winner returns with an average value of 0,032 per month to 0,012 per month, respectively. The close returns of the winner and loser portfolios in months 4, 7 and 10, makes the returns of the contrarian strategy portfolio close to zero and this situation is reflected in the *t* values of the mean returns. Since winner returns are just

slightly over the losers in three months, HPAR values are not affected as seen in Figure 9.

Table 12 Monthly Average Returns of Winner, Loser and Contrarian Strategy Portfolios with 3-Month Skipping Between January 1988 and September 2005

		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
j=12 months	Loser (L)	0,046	0,029	0,034	0,033	0,019	0,049
	t(L)	(1,616)	(1,935)	(1,473)	(1,227)	(1,368)	(2,068)
j=12 months	Winner (W)	0,033	-0,009	0,009	0,035	-0,005	0,006
	t(W)	(1,357)	(0,721)	(0,854)	(1,380)	(0,438)	(0,542)
j=12 months	L-W	0,013	0,038	0,024	-0,002	0,023	0,042
	t(L-W)	(0,663)	(2,597)	(1,009)	(0,131)	(1,801)	(1,634)
		n=65	n=65	n=65	n=65	n=65	n=65
		Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
j=12 months	Loser (L)	0,034	0,013	0,038	0,035	0,015	0,038
	t(L)	(1,282)	(0,980)	(1,658)	(1,246)	(1,072)	(1,563)
j=12 months	Winner (W)	0,035	0,007	-0,005	0,042	-0,003	0,001
	t(W)	(1,548)	(0,596)	(0,515)	(1,623)	(0,301)	(0,178)
j=12 months	L-W	-0,001	0,007	0,044	-0,007	0,018	0,036
	t(L-W)	(0,085)	(0,493)	(1,886)	(0,403)	(1,186)	(1,584)

Figure 10 shows the graphical representation of single monthly abnormal returns of loser portfolios and winner portfolios. In order not to disturb the visibility of the graph, the monthly return of the contrarian strategy portfolio is not shown in Figure 10.
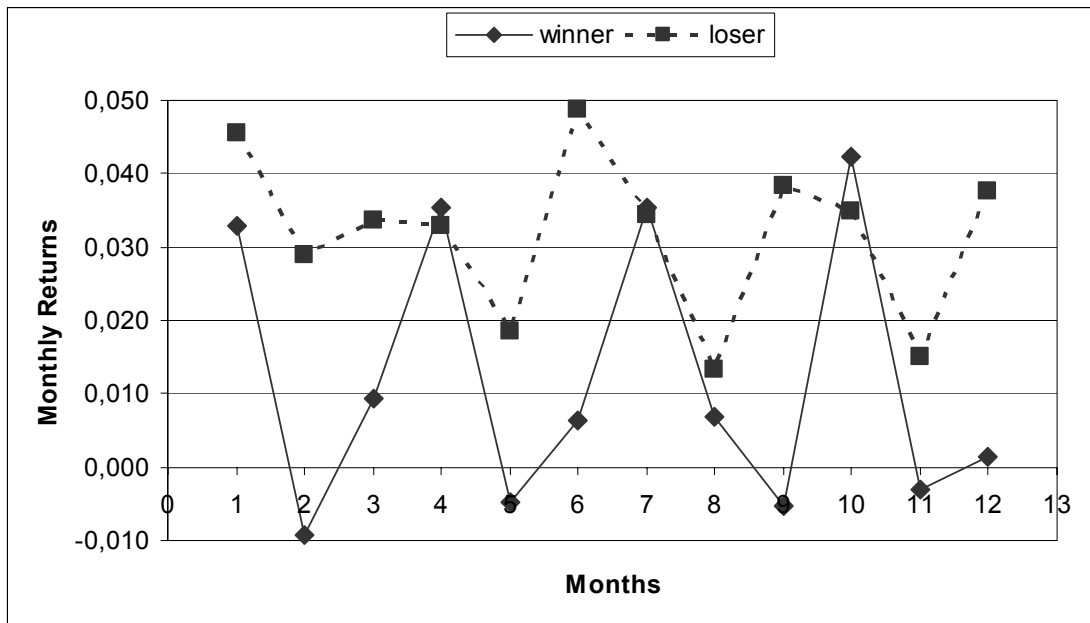
Figure 10 Single Monthly Returns of Loser, Winner Portfolios (01/88-09/05)

One of the purposes of this study is to investigate whether or not the Three Factor Model of Fama and French (1993) can explain the contrarian strategy returns. In addition to the CAPM's market premium factor, the model has a size and book-to-market value of equity factors. So in order to test these factors soundly in a statistical manner, beginning from the May of 1998 to September of 2005 the skipping period between portfolios is decreased to one month and a total of 66 winner and 66 loser portfolios are constructed. The aim of this analysis is to increase the number of firms in six size-BE/ME portfolios and as well as in the winner, loser and strategy portfolios. It can be seen from Appendix 6 that in year 1988 there are only 4 firms in loser and winner portfolios. Regarding to this recent period, portfolio formation periods, 12 months HPAR of portfolios and the number of firms in each loser, winner and contrarian strategy portfolio are presented in Appendix 7.

Similar to 1988-2005 period analysis, for the 1998-2005 period the average holding period abnormal returns (HPAR) of the winner, loser and the contrarian strategy portfolios in the twelve months following the portfolio formation date are given in Table 13. In the table, *n* shows the number of portfolios that have K month HPAR data.

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Table 13 1-12 Monthly Average HPARs of Winner, Loser and Contrarian Strategy Portfolios with 1-Month Skipping Between May 1998 and September 2005

		K=1 months	K=2 months	K=3 months	K=4 months	K=5 months	K=6 months
j=12 months	Looser (L)	0,013	0,029	0,042	0,059	0,084	0,107
	t(L)	(1,355)	(1,525)	(1,731)	(2,069)	(2,344)	(2,505)
j=12 months	Winner (W)	0,007	0,020	0,016	0,007	-0,013	-0,028
	t(W)	(0,603)	(1,073)	(0,700)	(0,249)	(0,489)	(0,946)
j=12 months	L-W	0,006	0,009	0,025	0,053	0,097	0,135
	t(L-W)	(0,501)	(0,389)	(0,845)	(1,502)	(2,343)	(2,780)
		n=77	n=76	n=75	n=74	n=73	n=72
		K=7 months	K=8 months	K=9 months	K=10 months	K=11 months	K=12 months
j=12 months	Looser (L)	0,142	0,185	0,251	0,323	0,384	0,445
	t(L)	(2,776)	(2,900)	(2,907)	(2,914)	(3,026)	(2,991)
j=12 months	Winner (W)	-0,037	-0,043	-0,042	-0,048	-0,043	-0,041
	t(W)	(1,155)	(1,257)	(1,184)	(1,242)	(1,061)	(0,947)
j=12 months	L-W	0,179	0,228	0,293	0,371	0,427	0,485
	t(L-W)	(3,070)	(3,166)	(3,124)	(3,129)	(3,123)	(3,003)
		n=71	n=70	n=69	n=68	n=67	n=66

The figures in Table 13 clearly support the contrarian strategy, selling winners and buying losers. The average HPARs of the losers continue to grow up in the twelve month test period whereas the average HPARs of the winner portfolios show slightly positive returns in the first four months and then they exhibit negative returns in the following eight months.

Beginning from the first month of the test period, the returns of contrarian strategy portfolio are steadily increasing. These results are very close to the findings in the literature of contrarian strategies, like De Bondt and Thaler (1985)'s findings. Thus in the period of 1998-2005 in ISE, it can be said that, the stocks that lose in the recent 12 months tend to win in the following year and the winners of recent 12 month tend to lose in the coming year. This result supports the overreaction hypothesis in ISE. However the effect of overreaction is not symmetric because

average positive return of losers is greater than the absolute value of winner average negative returns. 12 month average HPAR of losers is 0,445 and 12 month average HPAR of winners is -0,041. This asymmetry was also reported by Durukan (2004) in the long term analysis for ISE for the 1988-2003 time period. Figure 11 shows this relationship more explicitly.
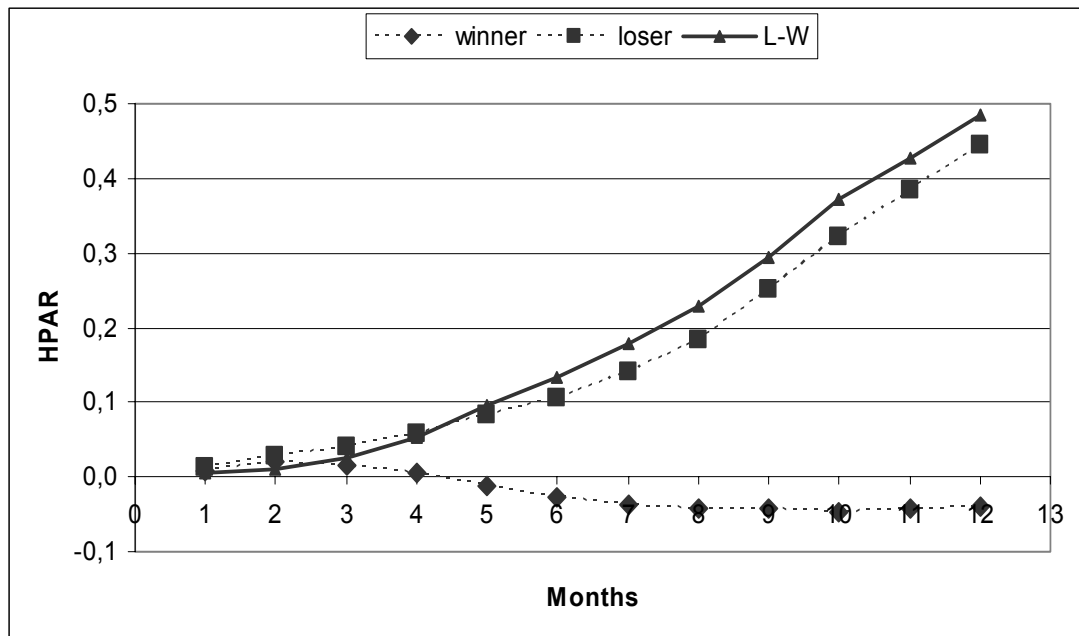
Figure 11 Average HPARs of Loser, Winner and Contrarian Strategy Portfolios (05/98-09/05)

The single monthly returns of winner and loser portfolios are also supporting the contrarian strategy. Monthly returns of the winner loser and the contrarian strategy portfolios are presented in Table 14. In the table, *n* shows the number of portfolios that have returns in month K of the test period.

Table 14 Monthly Average Returns of Winner, Loser and Contrarian Strategy Portfolios with 1-Month Skipping Between May 1998 and September 2005

		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
j=12 months	Looser (L)	0,013	0,011	0,010	0,015	0,016	0,013
	t(L)	(1,355)	(1,041)	(0,970)	(1,474)	(1,588)	(1,239)
j=12 months	Winner (W)	0,007	0,007	-0,004	0,000	-0,003	-0,003
	t(W)	(0,603)	(0,596)	(0,358)	(0,003)	(0,313)	(1,000)
j=12 months	L-W	0,006	0,004	0,014	0,015	0,020	0,017
	t(L-W)	(0,501)	(0,349)	(1,149)	(1,378)	(2,082)	(1,620)
		n=77	n=76	n=75	n=74	n=73	n=72
		Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
j=12 months	Looser (L)	0,014	0,012	0,016	0,013	0,017	0,015
	t(L)	(1,173)	(0,936)	(1,306)	(1,250)	(1,606)	(1,311)
j=12 months	Winner (W)	-0,001	-0,004	0,000	-0,005	-0,006	-0,002
	t(W)	(0,088)	(0,466)	(0,031)	(0,590)	(0,713)	(0,294)
j=12 months	L-W	0,015	0,016	0,016	0,018	0,023	0,018
	t(L-W)	(1,459)	(1,563)	(1,668)	(1,937)	(2,449)	(1,688)
		n=71	n=70	n=69	n=68	n=67	n=66

The results show that average abnormal return of the winner portfolio is positive only for the first two months and negative or near to zero for the remaining 10 months. Loser portfolios have positive average abnormal returns in all months and are showing an increasing trend. This trend can be seen better from the graphical representation of the monthly returns in Figure 12.
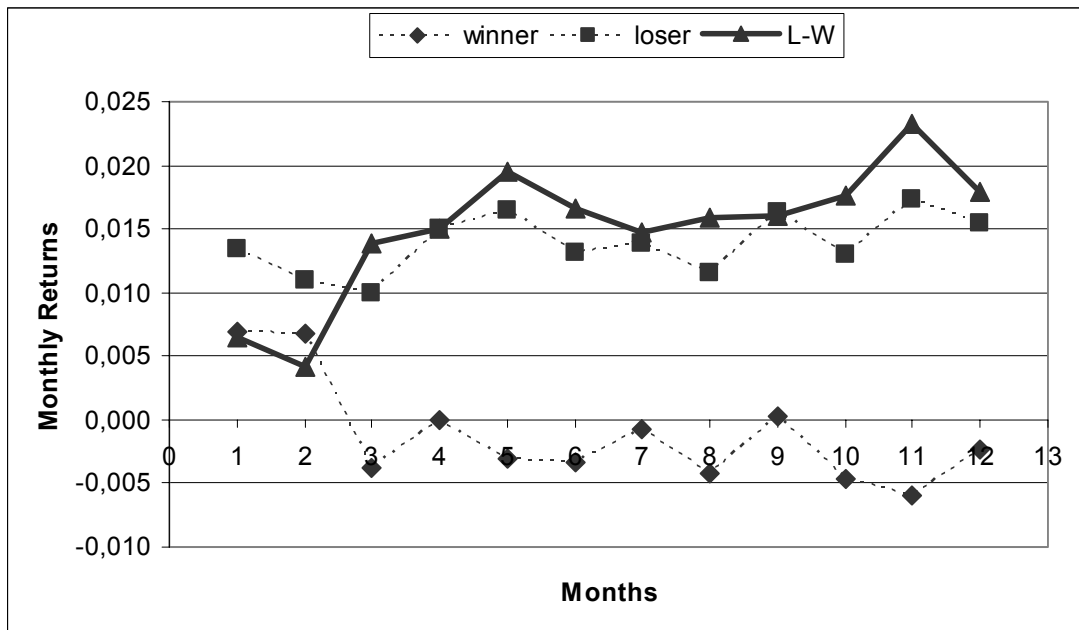
Figure 12 Single Monthly Returns of Loser, Winner and Contrarian Strategy Portfolios (05/98-09/05)

The *t* values of the contrarian strategy portfolio monthly returns are statistically significant beginning from the third month. Again the asymmetry between winner and loser returns is present in the single monthly returns.

When the contrarian strategy findings of the analysis for 1988-2005 period and for 1998-2005 period are compared, it can be concluded that, the overreaction effect is more clear in the latter one. This situation can be due to many factors. One of the reasons is the increasing number of stocks traded in ISE on average in the 1998-2005 period. It can be seen from Appendix 6 and 7 that, the number of stocks was just 4 in winner and loser portfolios at the formation periods in 1988 and it increased to 22 for the winner and the loser portfolios in April of 1999. This situation might lead to higher statistical significance in the calculations for the recent period.

Another factor might be the ISE itself. Trading began in 1986 in ISE, just 20 years ago, so the data of the beginning years may not reflect all the features of a well established, over a hundred year-old exchanges like NYSE. The number of investors and the traded volume was very small and the rationale of buying and selling stocks

is newly being formed. It can be argued that the learning process in ISE by the Turkish investors can be the reason of the difference between the two time periods.

4.2 Findings Related to Fama-French Three Factor Model Analysis

Fama and French (1996) tested the explanatory power of their three factor model on the contrarian strategies on the long term period and also on the short term period. The model was successful in explaining the long term (up to five years) return reversal of winner and loser portfolios as De Bondt and Thaler (1985) reported, whereas it failed to explain the momentum effect that Jegadeesh and Titman (1993) revealed in the intermediate term. The purpose of testing the FF-TFM on the winner and loser portfolio returns in this study is to find out whether or not overreaction anomaly can be explained by a model based on the efficient market assumptions.

The monthly excess returns of winner and loser portfolios are put into the regression analysis with the corresponding monthly excess returns of the market index over the risk-free rate of return, SMB portfolio returns and HML portfolio returns. The regression analysis is applied to each of 12 month's returns following the portfolio formation date. So a total of 24 regression equations are tested. The results are provided in Table 15 and in Table 16 for loser and winner portfolios, respectively. The regression equation used to test the Fama-French Three Factor Model is presented below.

$$R_i - R_f = \alpha_i + \beta_i \left(R_M - R_f \right) + s_i SMB + h_i HML + \varepsilon_i$$

where α_i is the intercept; β_i, s_i and h_i are the factor coefficients.

Table 15 Regression Statistics for the Loser Portfolio Excess Returns

		Regression statistics for 12 months										
		1	2	3	4	5	6	7	8	9	10	11	12
α		0,013	0,011	0,010	0,008	0,010	0,008	0,007	0,003	0,008	0,005	0,007	0,002
	t(α)	1,732	1,646	1,486	1,202	1,388	1,118	0,767	0,415	0,877	0,580	0,828	0,195
β		1,165	1,099	1,094	1,081	1,022	1,074	1,086	1,109	1,122	1,020	1,008	0,974
	t(β)	21,441	21,956	21,596	22,511	18,981	19,442	16,497	20,959	16,797	15,798	15,671	15,417
s		1,136	1,072	0,960	1,023	0,943	1,014	1,033	1,326	1,312	1,096	1,139	1,258
	t(s)	8,537	8,713	7,584	8,461	6,949	7,046	6,010	9,295	7,659	6,005	6,295	7,077
h		-0,098	-0,143	-0,160	0,076	0,080	-0,083	0,057	0,144	0,121	0,373	0,422	0,531
	t(h)	0,663	1,069	1,183	0,592	0,556	0,555	0,322	0,964	0,698	2,235	2,538	3,247
Adj. R²		**0,886**	**0,891**	**0,891**	**0,902**	**0,870**	**0,874**	**0,837**	**0,894**	**0,843**	**0,840**	**0,841**	**0,837**
	F	2E-29	2E-29	6E-29	7E-30	7E-26	9E-26	3E-22	6E-27	6E-22	2E-21	5E-21	1E-20
p-(α)		0,088	0,105	0,143	0,234	0,170	0,268	0,447	0,680	0,384	0,565	0,411	0,846
p-(β)		4E-30	2E-30	1E-29	2E-30	3E-26	1E-26	6E-23	1E-27	7E-23	2E-21	4E-21	8E-21
p-(s)		5E-12	3E-12	3E-10	1E-11	4E-09	3E-09	2E-07	9E-13	4E-10	2E-07	7E-08	4E-09
p-(h)		0,510	0,289	0,242	0,556	0,580	0,581	0,749	0,339	0,488	0,030	0,014	0,002

By looking at Table 15, the first thing to infer from the loser regression analysis is the practically zero F significance levels. This means that all the factor coefficients of the regression equation can not be equal to zero. Secondly, the adjusted R^2 values of the regression fit are considerably high which is ranging from 0,837 to 0,902. This shows that 80-90% of the variation in the loser portfolio returns can be explained by the three factors; market premium, SMB portfolio returns and HML portfolio returns.

Stating the above facts, it is important to analyze statistical significance of the factor coefficients in the regression equations. By looking at the p-values of the coefficients it is seen that market premium factor and the SMB portfolio return factor are highly significant at the 1% level. For all the twelve regression analysis, p-values of these factors are practically zero. But the same thing can not be said for the HML portfolio return factor. Except for months 10, 11 and 12, the coefficient of HML is statistically insignificant. In addition, it can be said that the intercept value of the regressions are statistically equal to zero. As Fama and French (1996) stated this result is sound in the aspect that if the model describes expected returns, the regression intercepts should be close to zero.

Before coming to the concluding inferences about the explanatory power of the FF-TFM in loser portfolio returns, the signs of coefficients of the factors should also be analyzed. Fama and French (1996) comments on the factor loadings of loser portfolios and states that stocks with low past returns tend to have positive SMB and HML slopes because they are smaller and relatively distressed. According to Table 15 the SMB coefficient is positive for all 12 months. The HML is also positive for 8 months but only in three of them it is significant.

Considering the results discussed above, it can be argued that the positive returns of the loser portfolios can be explained with two factors namely market premium factor and the size factor. The positive coefficients of the loser regression equation fit on these two factors, predict positive returns for the future. This is what the contrarian strategy actually argues.

Table 16 Regression Statistics for the Winner Portfolio Excess Returns

	Regression statistics for 12 months											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
α	0,001	0,004	-0,006	0,003	-0,001	0,001	0,003	0,000	0,001	-0,008	-0,003	0,001
t(α)	0,137	0,380	0,617	0,317	0,124	0,141	0,447	0,013	0,122	1,162	0,495	0,212
β	0,838	0,929	0,891	0,917	0,903	0,950	0,987	0,963	0,993	0,963	1,006	1,024
t(β)	10,971	12,592	13,122	14,205	15,893	16,809	20,597	19,980	17,962	18,695	19,213	19,541
s	0,987	1,146	0,947	1,022	0,933	0,997	0,950	0,969	1,067	1,038	1,085	1,050
t(s)	5,273	6,321	5,586	6,291	6,513	6,766	7,591	7,458	7,533	7,133	7,359	7,121
h	0,316	0,312	0,183	0,105	0,213	0,118	0,119	0,140	0,040	0,206	0,079	-0,082
t(h)	1,517	1,587	1,010	0,608	1,404	0,775	0,920	1,031	0,277	1,550	0,585	0,606
Adj. R^2	**0,688**	**0,742**	**0,757**	**0,783**	**0,827**	**0,841**	**0,891**	**0,887**	**0,860**	**0,877**	**0,882**	**0,884**
F	5E-16	3E-18	9E-19	7E-20	2E-22	6E-23	5E-27	4E-26	3E-23	3E-24	3E-24	2E-24
p-(α)	0,891	0,705	0,539	0,752	0,902	0,888	0,656	0,990	0,903	0,251	0,623	0,833
p-(β)	5E-16	2E-18	4E-19	2E-20	1E-22	2E-23	2E-27	1E-26	3E-24	1E-24	5E-25	2E-25
p-(s)	2E-06	4E-08	6E-07	4E-08	2E-08	8E-09	4E-10	7E-10	6E-10	3E-09	1E-09	4E-09
p-(h)	0,134	0,118	0,317	0,545	0,166	0,442	0,362	0,307	0,783	0,127	0,561	0,547

When the figures of Table 16 are analyzed, it is seen that the F values of the regression fits on the excess returns of winner portfolios are very low. The average adjusted R^2 value on twelve months is also high and equal to 0,826. The p-values of the coefficients reveal the fact that SMB and market premium factor coefficients are

statistically meaningful but again the HML coefficient is insignificant. In all of the twelve regressions, the intercept values can be accepted as zero statistically.

In interpreting the coefficients of the factors, attention must be paid to the regression results of Fama and French (1996). They have also found that the winner portfolios have positive coefficients for the market premium factor and the SMB factor (also a meaningful negative return for the HML factor). But the loading on SMB is lower for the winner regression fit with respect to the loser fit. In this study, the average SMB coefficient for the loser portfolios is 1,109 and for the winner regression the average SMB coefficient is 1,016. Average coefficient of the market premium factor is 1,071 and 0,947 for the loser and the winner respectively. These values show that regression results predict higher returns for the losers with respect to the winners in the succeeding periods.

As a result of the above discussion for the winner regression analysis, it can be argued that the returns of the winners can be predicted by the two factors; the market premium factor and the size factor. The average values of coefficients of these two factors predict higher returns for the losers with respect to the winners. As Fama and French (1996) stated the reversal of the returns falls neatly within the predictions of the FF-TFM, actually for this study it is a two factor model comprised of size and market premium factors.

To conclude the empirical results part of the study, it can be stated that supporting evidence about return reversal of the winner and loser stocks that are formed in a twelve month period exists in ISE. However, the reversal of returns of winner and loser portfolios is more significant in the recent 1998-2005 period with respect to the whole 1988-2005 period. Application of the three factor model of Fama and French showed that the HML factor is not significant in predicting returns in Turkey. Actually this result is consistent with the prior study of Aksu and Onder (2003). They have also found that the HML factor is not statistically significant when the regression is applied on the individual stock returns. They have commented that the insignificance of the HML factor is possibly due to the correlation (0,26) with SMB. However, in this study the correlation between SMB and HML is -0,14 and

close to Fama and French (1996)'s findings (-0,08). The other two factors (size and market premium) however did a good job in predicting the return reversal of loser and winner stocks. It can be speculated that the insignificance of the HML factor is due to the change in the accounting regulations in the recent period like shifting to the inflationary accounting. The effect of these changes should be analyzed further in the studies on ISE.

CONCLUSION

In this study one of the most appealing issues of the investment literature, the predictability and the patterns of the stock returns are analyzed in detail. The issue has formed its own community in two distinct disciplines, the ones that support the EMH assumptions and the others that defend the effect of human psychology in investment decision. In this study, both sides are emphasized objectively as much as possible. There is no obvious winner of this discussion throughout the world; there is a clear consensus about the necessity of further research in all markets and in every aspect. Keeping with the scientific identity of this consensus, it is believed that this study has put one more brick to the growing body of investments literature.

Whether or not there is a pattern or explanation of stock returns in the markets is very critical for the investment community. If there are such methodologies or significant patterns about the stock movements that everyone agrees on, a theory of asset pricing, either built on the psychology of humans or on the EMH, will substantially contribute to the understanding of the scientific knowledge.

At the beginning of the study, a comprehensive literature on both the EMH and its pricing models, and market anomalies and their resulting strategies is provided. Special attention is devoted for being organized in this survey, since it is believed that anyone who reads the study and understands the comprehensiveness of the research purpose will realize its necessity.

EMH side of the literature actually formed the start of the investment studies in the financial markets. Beginning from derivation of the optimal portfolio formation methodologies in the fifties, theories based on EMH assumptions guided the investment studies. The first asset pricing theory, CAPM was developed by Sharpe (1964). The theory simply reaches to the result that the systematic risk of any stock can be explained by its relation with the market portfolio. The second asset pricing theory, APT is presented by Stephen Ross in 1976. Starting from the view point of no arbitrage opportunity can be observed in an efficient market, APT

reaches to more or less the same results of CAPM in its one factor form. However the assumptions and path of the theory development differs for both. Due to its simplicity and ease of use CAPM is currently the more preferred asset pricing tool (Civelek and Durukan, 2003; 451). The last emerging asset pricing model is the Three Factor Model developed by Fama and French (1993). Fama and French (1992, 1993, 1996 and 1997) have started from the weak explanatory power of beta in CAPM and developed their theory based on the previous findings on the stock characteristics affecting the returns. The FF-TFM uses the market factor, the size factor and the BE/ME factor to predict the stock returns. Fama and French (1996) support their three factor model against the market anomalies proposed as a threat to EMH.

The other side of the literature is built on the market anomalies that contradict with the EMH. There are various categories of anomalies but the focus of this study is about the serial correlation or returns either with the historical data or stock characteristics. As a summary, studies revealed short term return reversals (Jegadeesh, 1990), intermediate term return continuation (Jegadeesh and Titman, 1993) and long term return reversal (De Bondt and Thaler, 1985) in well developed markets. The resulting contribution of these patterns is to propose trading strategies, namely a momentum strategy of buying winner and selling loser stocks and a contrarian strategy of buying the loser and selling the winner stocks. Opponents of EMH have referred the basis of these strategies to the overreaction or underreaction of investors as based on human psychology.

Thus, the aim of this study was to find out whether or not a contrarian strategy is profitable in the intermediate term and to test the FF-TFM in explaining the returns of contrarian strategies in ISE. The focus actually was not to test the efficiency of ISE rather to see whether or not EMH assumptions can be as well applied in the explanation of contrarian strategy returns. The test of efficiency of ISE is left to the other researches.

Since the study is focusing on two issues, it is better to follow a parallel path in concluding the findings.

Contrarian investment strategy is analyzed in two time frames. Firstly the whole 1988-2005 period is investigated by using three-month-skipping overlapping portfolios of winners and losers. A total of 128 portfolios are chosen according to their 12 months return data and tested in the following 12 months. Results have showed that loser stocks exhibit a clear return reversal after the portfolio formation date. The holding period return values of losers in the test period is increasing significantly. When the returns of losers for the single months are observed, it is found that on average 3,2% monthly returns are realized. These results have showed that buying the loser stocks of one year generates significant returns over the market in the following year. When the returns of winner stocks are observed, there is not a significant return reversal from positive to negative. The single monthly returns of winner stocks are both positive and negative resulting with an average of 1,2% monthly returns. Thus, a return reversal of winners as presented by De Bondt and Thaler (1985) in the long term is not observed in the intermediate term in ISE. However, these findings are in accordance with the previous research of Durukan (2004) that examines the ISE in the long run. The average cumulative abnormal return of the winner portfolios is also found to be positive in that study. So the overreaction of the investors for winners and losers found to be asymmetric. This overreaction asymmetry between the winner and loser is shown by Nam et al. (2001). In spite of the asymmetry, the contrarian strategy is found to be profitable in 1988-2005 period. Contrarian strategy in this period has resulted in 31,9% average annual returns and presented the evidence of significant profits for the investors.

The same analysis is applied to the 1998-2005 period by increasing the density of overlapping portfolios with one-month-skipping. The results have showed that overreaction is clearer in this period. There is a significant loser return reversal with an average annual return of 44,5%. In addition, winner return reversal is statistically significant beginning from the 4th month of the test period. The average annual return of the winners in the test period is found to be -4,1%. Although the asymmetry is going on, the evidence of the return reversal of winner stocks is found in 1998-2005 period. Thus, the contrarian strategy has resulted in 48,5% average annual return.

These comparative findings between different time periods reveal new areas of research in ISE regarding to the causes of these differences. Many reasons can be estimated like the effect of increasing number of stocks in the market, increasing trading volume, more sound structure of ISE and the experienced investors with respect to the past. But all of them should be studied to comment on.

The FF-TFM application in order to test the explanatory power of the model against the contrarian strategy is made for 2000-2005 period. A total of 132 winner and loser portfolios and 36 size-BE/ME portfolios are constructed in order to generate enough data for the regression analysis. For each of the 12 months in the test period for winner and loser portfolios regression analysis is applied. The analysis showed that the FF-TFM has a significant and a well fit to the return data with high adjusted R^2 values that range between 0,68 and 0,90. In each 24 regressions, market factor and the size factor are found to be statistically significant whereas the BE/ME factor is appeared as insignificant in 21 regression equations. This result is also seen in the previous research done in ISE by Aksu and Onder (2003). The concluding results are on the explanatory power of the FF-TFM in return reversal of the winner and loser stocks of the contrarian strategy. The coefficients of the factors in the regression analysis have showed that the model predicts higher future returns for the losers and lower returns for the winners. This is in accordance with the return reversal of contrarian strategy.

To summarize, this study has showed that contrarian strategy is profitable in both 1988-2005 and 1998-2005 periods whereas in the latter period it is more obvious. The application of the FF-TFM on winner and loser portfolios showed that BE/ME factor is not significant, however the remaining two factors, the size and the market factors have successfully captured the return pattern of winner and loser portfolios as well as the return reversal. With these findings it is not easy to conclude about the validity of overreaction and EMH, but the results give clear insight about the stock patterns and the FF-TFM application.

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One of the limitations of this study may be due to the survivorship bias which means that using the data of only the surviving firms. The data obtained from the website of the ISE includes the surviving firms. However, it should be noted that even if the stocks that do not survive are included in the analysis, the statistical tests and requirements of the applied methodologies will probably necessitate the elimination of these distressed firms. For example monthly bulletins of ISE presents that many of the non-surviving firms shows loss of continuity in data or uncalculated stock characteristics like BE/ME. Thus, it is not expected that a deviation from the results presented up to here will be experienced due to survivorship bias.

One of the hidden and actually very beneficial outcomes of this study underlies in the analysis of daily stock returns of ISE for 1988-2005 period. Before starting to use the monthly return data in this study, tremendous effort is devoted to arrange the daily return data for various purposes. The data are obtained from ISE in separate 428 files of stocks and indexes. Although a neat database of returns are obtained eventually, the loss of continuity of data, unknown emerging codes of securities, hidden stock splits (for which the only way to determine is to find and read the related company news to check whether it is actually a split or a 50% daily loss) make the study impossible over the long evaluation periods. The quality of monthly return data is not comparable with the daily ones.

Finally, with this study, ISE stocks are analyzed for the contrarian strategies in the intermediate term. Durukan (2004) has also analyzed the overreaction (contrarian strategy) in the long term in ISE. Further studies are required for the short term investigation of contrarian strategies. In the aspect of the FF-TFM application in ISE stocks, the period prior to year 2000 is waiting for investigation.

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APPENDICES

APPENDIX 1 HPAR(12) of Stocks Between December 1988 and January 1990

	88/12	89/01	89/02	89/03	89/04	89/05	89/06	89/07	89/08	89/09	89/10	89/11	89/12	90/01
ABANA														
ACIBD														
ADANA														
ADBGR														
ADEL														
ADNAC														
AEFES														
AFMAS														
AFYON														
AGYO														
AKALT														
AKBNK														
AKCNS														
AKENR														
AKGRT														
AKIPD														
AKMGY														
AKSA														
AKSUE														
AKYO														
ALARK														
ALCAR														
ALCTL	2,778	5,688	3,642	4,570	4,564	5,064	4,781	5,933	1,594	-1,346	-2,696	-2,467	-5,037	-8,802
ALGYO														
ALKA														
ALKIM														
ALNTF														
ALTIN														
ALYAG														
ANACM	-0,037	0,056	0,269	0,431	0,560	0,858	0,750	0,933	1,329	1,739	1,749	2,946	3,493	2,528
ANELT														
ANHYT														
ANSGR														
ARAT														
ARCLK	0,226	0,061	0,141	0,204	0,194	0,414	-0,177	0,849	0,864	0,744	0,876	1,036	2,554	1,060
ARENA														
ARFYO														
ARSAN														
ASELS														
ASLAN														
ASUZU														
ATAYO														
ATEKS														
ATLAS														
ATSYO														
AVIVA														
AVRSY														
AYCES	0,383	0,205	-0,028	-0,085	-0,315	-0,411	-0,915	-0,641	-1,264	-2,441	-3,284	-2,881	-3,802	-5,940
AYEN														
AYGAZ														
BAGFS	0,081	-0,111	-0,107	-0,093	-0,054	-0,104	-0,295	-0,305	-0,415	-0,518	-1,451	-0,795	-0,587	-1,597
BAKAB														
BANVT														
BEKO														
BERDN														
BFREN														
BIMAS														
BISAS														
BJKAS														
BOLUC	0,282	0,128	0,117	0,160	0,220	-0,069	-0,320	0,006	0,108	0,362	2,101	2,162	2,197	3,507
BOSSA														

APPENDIX 1 HPAR(12) of Stocks Between December 1988 and January 1990 (CONTINUED)

	88/12	89/01	89/02	89/03	89/04	89/05	89/06	89/07	89/08	89/09	89/10	89/11	89/12	90/01
BOYNR														
BRISA	-0,072	-0,116	-0,202	-0,032	0,016	-0,138	-0,118	-0,269	-0,344	-0,968	-1,456	-1,204	-1,259	-0,442
BRMEN														
BROVA														
BRSAN														
BRYAT														
BSOKE														
BSPRO														
BTCIM														
BUCIM														
BUMYO														
BURCE														
BURVA														
BYSAN														
CBSBO														
CELHA	0,245	0,271	0,380	0,369	0,381	0,434	0,463	0,684	0,720	0,558	0,490	0,336	-0,725	-0,197
CEMTS														
CEYLN														
CIMSA	0,007	-0,126	-0,195	-0,294	-0,344	-0,355	-0,592	-0,525	-0,758	-1,361	-1,175	-1,056	-0,026	-1,172
CLEBI														
CMBTN														
CMENT														
CMLOJ														
CYTAS														
DARDL														
DENCM	0,106	0,165	0,063	-0,038	-0,132	-0,416	-0,817	-0,543	-0,966	-1,907	-2,166	-1,765	-3,831	-3,689
DENIZ														
DENTA														
DERIM														
DESA														
DEVA	0,324	0,259	0,069	0,135	-0,040	-0,217	-0,543	-0,526	0,278	-0,075	1,066	1,021	4,917	15,692
DGZTE														
DISBA														
DITAS														
DMSAS														
DNZYO														
DOAS														
DOBUR														
DOGUB														
DOHOL														
DOKTS	-0,060	-0,141	-0,214	-0,269	-0,407	-0,533	-0,453	-0,186	-0,590	-1,144	-1,950	-1,235	-1,331	-3,812
DUROF														
DYHOL														
DYOBY	0,344	0,377	0,495	0,199	0,265	0,873	0,214	0,603	1,039	1,123	4,225	3,684	2,926	7,644
ECBYO														
ECILC														
ECYAP														
ECZYT	0,103	0,196	0,400	0,419	0,466	1,029	0,824	0,417	1,344	3,279	3,105	3,406	7,080	6,573
EDIP														
EFES														
EGEEN														
EGGUB	-0,128	-0,086	-0,038	-0,139	-0,099	-0,399	-0,080	-0,962	-0,659	-0,949	-0,839	-0,405	-2,300	-1,833
EGPRO														
EGSER														
EGYO														
EMKEL														
EMNIS														
ENKAI														
EPLAS														
ERBOS														
EREGL	0,863	0,845	1,342	1,291	2,037	3,511	6,369	5,403	7,663	13,751	18,421	8,528	16,340	17,372

APPENDIX 1 HPAR(12) of Stocks Between December 1988 and January 1990 (CONTINUED)

	88/12	89/01	89/02	89/03	89/04	89/05	89/06	89/07	89/08	89/09	89/10	89/11	89/12	90/01
ERSU														
ESCOM														
ESEMS														
EVNYO														
EVREN														
FACFA														
FENER														
FENIS														
FFKRL														
FINBN														
FMIZP														
FNSYO														
FRIGO														
FROTO	0,235	0,207	0,150	0,185	0,187	0,171	0,348	0,360	0,184	-0,303	-0,117	-0,044	0,624	-0,550
FVORI														
GARAN														
GARFA														
GDKYO														
GEDIZ														
GENTS														
GEREL														
GIMA														
GLYHO														
GOLDS														
GOODY	0,041	-0,159	-0,275	-0,331	-0,434	-0,444	-0,849	-0,644	-1,005	-0,566	-1,910	-1,621	-3,002	-3,041
GRGYO														
GRNYO														
GSDHO														
GSRAY														
GUBRF	-0,357	-0,209	-0,284	-0,335	-0,241	-0,020	-0,725	-0,326	-0,867	-2,046	-2,064	-1,842	-3,784	-5,971
GUSGR														
HEKTS	0,228	0,301	0,328	0,365	0,455	0,802	0,712	0,822	1,634	1,478	1,326	0,066	0,796	0,454
HURGZ														
HZNDR														
IBTYO														
IDAS														
IHEVA														
IHGYO														
IHLAS														
INDES														
INFYO														
INTEM														
IPMAT														
ISAMB														
ISCTR	0,053	0,337	0,193	0,315	0,257	0,038	-0,477	-0,218	-0,810	-1,656	-1,819	-0,465	-2,206	-3,248
ISFIN														
ISGSY														
ISGYO														
ISYAT														
IZMDC	-0,126	0,088	0,200	0,199	-0,113	-0,006	-0,370	-0,539	-1,089	-1,846	-1,984	-1,950	-2,493	-4,589
IZOCM	-0,070	-0,078	0,004	0,117	0,575	0,489	0,991	1,093	1,726	1,313	0,511	-0,489	-0,050	-0,389
KAPLM														
KARSN														
KARTN	-0,057	0,086	0,032	0,107	0,101	0,115	0,762	0,489	0,650	-0,026	0,543	0,785	0,387	0,600
KAVPA	0,168	0,157	0,126	0,147	0,364	0,103	0,032	0,220	0,291	0,387	0,158	-0,509	-0,274	-1,836
KCHOL	-0,094	-0,066	-0,098	-0,073	-0,013	0,267	0,371	0,417	0,678	1,376	1,347	2,345	3,570	6,058
KENT														
KERVT														
KIPA														
KLBMO														
KLMSN														

APPENDIX 1 HPAR(12) of Stocks Between December 1988 and January 1990 (CONTINUED)

	88/12	89/01	89/02	89/03	89/04	89/05	89/06	89/07	89/08	89/09	89/10	89/11	89/12	90/01
KNFRT														
KONYA														
KORDS	-0,038	-0,071	-0,130	0,044	0,083	0,242	0,275	0,379	0,377	-0,187	0,182	0,765	0,031	-0,762
KOTKS														
KOZAD														
KRDMA														
KRDMB														
KRDMD														
KRSTL														
KRTEK														
KUTPO														
LINK														
LIOYS														
LOGO														
LUKSK														
MAALT	-0,086	0,030	0,027	-0,026	-0,290	-0,272	-0,526	-0,423	-0,632	-1,741	-1,793	-1,020	-2,102	-3,370
MAKTK	-0,214	0,057	0,109	-0,133	-0,185	-0,290	-0,146	-0,113	-0,414	0,977	1,059	1,822	2,732	7,243
MEGES														
MEMSA														
MERKO														
METUR														
MIGRS														
MIPAZ														
MMART														
MNDRS														
MRDIN	0,200	0,374	0,142	0,084	-0,146	-0,325	-0,840	-0,312	-0,935	-2,130	-3,007	-2,171	-4,233	-7,583
MRSHL														
MTEKS														
MUTLU														
MYZYO														
MZHLD														
NETAS														
NTHOL														
NTTUR														
NUGYO														
NUHCM														
OKANT														
OLMKS	-0,281	-0,232	-0,374	-0,407	-0,403	-0,454	-0,612	-0,590	-0,787	-1,177	-2,065	-1,243	-0,228	-2,274
OTKAR														
OYSAC														
OZFIN														
PARSN														
PENGD														
PERYO														
PETKM														
PETUN														
PIMAS	-0,071	0,196	0,085	0,248	0,495	0,896	0,080	0,027	1,043	0,708	0,129	-0,768	-2,497	-6,871
PINSU	-0,035	0,140	0,239	0,133	0,113	0,163	0,372	0,613	-0,321	-1,798	-1,409	-0,805	-3,088	-4,304
PKART														
PKENT														
PNSUT	0,187	0,505	0,529	0,429	0,397	0,401	0,166	0,236	0,956	1,087	1,293	1,398	1,056	0,705
PRKAB	-0,209	-0,145	-0,249	-0,364	-0,449	-0,467	-0,509	-0,253	-0,818	-0,006	-0,384	0,153	-0,323	0,359
PRKTE														
PRTAS														
PTOFS														
RAYSG														
SAHOL														
SANKO														
SARKY	0,063	0,099	0,316	0,253	0,297	0,113	0,632	0,835	1,591	1,719	3,371	4,143	6,733	5,729
SASA														
SEKFK														

	88/12	89/01	89/02	89/03	89/04	89/05	89/06	89/07	89/08	89/09	89/10	89/11	89/12	90/01
SELGD														
SERVE														
SISE	0,027	0,148	0,362	0,920	1,258	1,864	2,595	2,064	2,066	3,230	3,743	4,012	4,167	14,940
SKBNK														
SKPLC														
SKTAS														
SNPAM														
SODA														
SONME														
TACYO														
TATKS														
TBORG														
TCELL														
TEBNK														
TEKFK														
TEKST														
TEKTU														
THYAO														
TIRE														
TKBNK														
TNSAS														
TOASO														
TOPFN														
TRCAS														
TRKCM														
TRNSK														
TSKB														
TSKYO														
TSPOR														
TTRAK														
TUDDF	-0,006	-0,014	0,030	0,000	-0,055	-0,170	-0,189	-0,302	-0,606	-1,195	-1,505	-1,150	-1,930	-1,915
TUKAS														
TUMTK														
TUPRS														
UCAK														
UKIM														
ULKER														
UNTAR														
UNYEC														
USAK														
UZEL														
VAKFN														
VAKKO														
VANET														
VARYO														
VESTL														
VKFRS														
VKFYT														
VKGYO														
VKING														
YATAS														
YAZIC														
YKBNK	0,168	0,365	0,381	0,735	0,543	0,370	-0,106	0,778	0,299	0,611	0,395	0,916	0,321	9,487
YKFIN														
YKGYO														
YKRYO														
YKSGR														
YTFYO														
YUNSA														
ZOREN														

APPENDIX 2 Stocks in Six Size-BE/ME Portfolios for Each Year

03.2000						03.2001					
B/H	B/M	B/L	S/H	S/M	S/L	B/H	B/M	B/L	S/H	S/M	S/L
ALGYO	ADANA	AKCNS	ADNAC	ADEL	ABANA	ALGYO	ACIBD	AEFES	ADNAC	ALTIN	ABANA
ALNTF	ADBGR	AKGRT	GARFA	ARAT	AFYON	ALNTF	ADANA	AKENR	AKALT	ARENA	ADEL
ANACM	AKALT	AKSUE	AKIPD	AYCES	BROVA	ANACM	ADBGR	AKGRT	GARFA	AYCES	AFYON
ARSAN	AKBNK	ALARK	AKYO	BAKAB	CBSBO	ARSAN	AKBNK	AKSUE	AKIPD	BAKAB	ARAT
BOSSA	AKSA	ALCTL	ARFYO	BURCE	DENCM	BOSSA	AKCNS	ALARK	AKYO	BRMEN	AVRSY
DISBA	ALCAR	ALKIM	ATAYO	CELHA	DOGUB	DENTA	AKSA	ALCTL	ALKA	CEMTS	BROVA
ECYAP	ALTIN	ANHYT	ATEKS	CEMTS	EGEEN	DISBA	ALCAR	ANHYT	ALYAG	CEYLN	BURCE
FINBN	ANSGR	ARCLK	ATLAS	CEYLN	EMKEL	EREGL	ALKIM	ARCLK	ARFYO	CMBTN	DENCM
IZMDC	BAGFS	ASELS	ATSYO	AVIVA	ERSU	FINBN	ANSGR	ASLAN	ATAYO	AVIVA	DOGUB
MERKO	BFREN	ASLAN	AVRSY	DARDL	FMIZP	ISYAT	ASELS	AYEN	ATLAS	DERIM	DUROF
NTHOL	BOLUC	ASUZU	BERDN	DERIM	KOTKS	IZMDC	ASUZU	AYGAZ	ATSYO	DEVA	EGPRO
NTTUR	BRISA	AYGAZ	BRMEN	DEVA	LIOYS	MIPAZ	ATEKS	BANVT	BERDN	DITAS	EMKEL
SKBNK	BRSAN	BANVT	BUMYO	DITAS		NTHOL	BAGFS	BFREN	BSOKE	ECBYO	KERVT
TEKST	CMENT	BEKO	CMBTN	EGGUB		NTTUR	BEKO	BRISA	BUMYO	EGEEN	KLBMO
TSKB	DOKTS	BRYAT	CYTAS	EGPRO		SKBNK	BOLUC	BRYAT	CELHA	EGGUB	KOTKS
YKGYO	ECILC	BSPRO	DNZYO	EGSER		TEKST	BRSAN	BSPRO	DNZYO	EMNIS	LOGO
	ECZYT	BTCIM	DMSAS	EMNIS		TSKB	BTCIM	BUCIM	DMSAS	EPLAS	MAALT
	EGYO	BUCIM	ECBYO	EPLAS		YKGYO	CIMSA	BOYNR	EDIP	ERBOS	MEGES
	EREGL	BOYNR	EDIP	ERBOS			DOHOL	CLEBI	EGYO	FENIS	OYSAC
	GARAN	CIMSA	ESEMS	FENIS			DOKTS	CMENT	ESEMS	FMIZP	PIMAS
	GLYHO	CLEBI	EVREN	FRIGO			ECILC	CYTAS	EVREN	GDKYO	PRTAS
	GUBRF	DOBUR	FFKRL	GEDIZ			ECYAP	DOBUR	FFKRL	GEDIZ	VKING
	GUSGR	DOHOL	FNSYO	HEKTS			ECZYT	DYHOL	FNSYO	GENTS	
	YKSGR	DYHOL	GDKYO	HZNDR			EGSER	EFES	FRIGO	GLYHO	
	IHLAS	EFES	GENTS	IDAS			ESCOM	ERSU	FVORI	GUBRF	
	ISFIN	FROTO	PERYO	IHEVA			GARAN	FROTO	PERYO	HEKTS	
	ISGYO	GIMA	GRNYO	IZOCM			GSDHO	GIMA	GRNYO	HZNDR	
	KARTN	GOLDS	IHGYO	KLBMO			GUSGR	GOLDS	KNFRT	IDAS	
	KAVPA	GOODY	INTEM	KLMSN			HURGZ	GOODY	KRDMB	INTEM	
	KONYA	GSDHO	ISYAT	LUKSK			ISFIN	ISCTR	KRDMD	IPMAT	
	DGZTE	HURGZ	KAPLM	MAALT			ISGYO	KARSN	KRTEK	ISAMB	
	MIPAZ	ISAMB	KERVT	MAKTK			IZOCM	KARTN	KUTPO	KAPLM	
	MRDIN	ISCTR	KNFRT	MEMSA			KAVPA	KCHOL	LIOYS	KLMSN	
	MRSHL	KARSN	KRDMA	MTEKS			KIPA	KENT	MAKTK	KRDMA	
	OLMKS	KCHOL	KRDMB	MUTLU			KONYA	KORDS	MEMSA	LINK	
	PNSUT	KENT	KRTEK	MZHLD			DGZTE	MIGRS	MERKO	LUKSK	
	SARKY	KIPA	KUTPO	PENGD			MNDRS	MRSHL	MYZYO	MMART	
	SASA	KORDS	MMART	PINSU			MRDIN	MUTLU	MZHLD	MTEKS	
	SNPAM	KRDMD	MYZYO	PRTAS			OLMKS	NETAS	OKANT	NUGYO	
	TATKS	KRSTL	NUGYO	RAYSG			PNSUT	NUHCM	GRGYO	PARSN	
	TBORG	MIGRS	OKANT	SELGD			PRKAB	OTKAR	OZFIN	SERVE	
	TEBNK	NETAS	GRGYO	SKPLC			SARKY	PENGD	PETUN	SKPLC	
	TIRE	OYSAC	OZFIN	SONME			SASA	PETKM	PINSU	TEKTU	
	TRKCM	NUHCM	PARSN	CMLOJ			SNPAM	PRKTE	PKENT	TUKAS	
	TUDDF	OTKAR	PKENT	TUKAS			SODA	PTOFS	TEKFK	UKIM	
	UNYEC	PETKM	TEKFK	UKIM			SONME	SAHOL	RAYSG	UNTAR	
	YKFIN	PRKAB	SERVE	UNTAR			TATKS	SANKO	SELGD	VAKKO	
		PTOFS	SKTAS	USAK			TBORG	SISE	SKTAS	VANET	
		SAHOL	TACYO	VAKKO			TEBNK	TCELL	TACYO	VKFRS	
		SISE	TOPFN	VANET			TIRE	THYAO	TOPFN	YUNSA	
		THYAO	FACFA	VKING			TUDDF	TKBNK	FACFA		
		TKBNK	TRNSK	DYOBY			UNYEC	TOASO	TRNSK		
		TNSAS	VAKFN	YATAS			UZEL	TRCAS	USAK		
		TOASO	VARYO	YUNSA			VESTL	TRKCM	VAKFN		
		TRCAS	VKFYT				YKBNK	TUPRS	VARYO		
		TUPRS	VKGYO				YKFIN	UCAK	VKFYT		
		UCAK	YKRYO				YKSGR	YAZIC	VKGYO		
		UZEL	YTFYO				ZOREN		DYOBY		
		VESTL							YATAS		
		YAZIC							YKRYO		
		YKBNK							YTFYO		

APPENDIX 2 Stocks in Six Size-BE/ME Portfolios for Each Year (CONTINUED)

03.2002						03.2003					
B/H	B/M	B/L	S/H	S/M	S/L	B/H	B/M	B/L	S/H	S/M	S/L
AGYO	ADANA	AEFES	ADNAC	ABANA	AFYON	AKALT	ADBGR	ADANA	ACIBD	ABANA	AFYON
AKALT	ADBGR	AKBNK	AKIPD	ACIBD	AKSUE	ALGYO	AKBNK	AEFES	ADNAC	ADEL	AKSUE
ALGYO	AKGRT	AKCNS	AKYO	ADEL	ARENA	ANHYT	AKENR	AKCNS	AGYO	ARENA	ARAT
ALNTF	AKSA	AKENR	ALKA	GARFA	AVRSY	ANSGR	AKGRT	ALARK	AKIPD	AYCES	AVRSY
ANACM	ALCAR	ALARK	ARFYO	ALTIN	AYCES	BSOKE	AKSA	ALCTL	AKYO	BRMEN	BROVA
ANSGR	ALKIM	ALCTL	ATAYO	ALYAG	BAKAB	DISBA	ALCAR	ALKIM	ARFYO	BRYAT	BURCE
BSOKE	ANHYT	ARCLK	ATLAS	BRMEN	BROVA	EREGL	ALKA	ALNTF	ATAYO	CELHA	CMLOJ
DISBA	ARSAN	ASELS	ATSYO	CELHA	BURCE	FINBN	ALTIN	ARCLK	ATLAS	CEMTS	DOGUB
EREGL	ASUZU	ASLAN	BISAS	CMBTN	CEYLN	GOLDS	ANACM	ASELS	ATSYO	CEYLN	DUROF
FINBN	BAGFS	ATEKS	BUMYO	DENCM	CMLOJ	GSDHO	ARSAN	ASLAN	BISAS	CMBTN	EGEEN
ISGYO	BOLUC	AYEN	CEMTS	DERIM	DEVA	ISGYO	ASUZU	AYGAZ	BUMYO	CYTAS	EGPRO
ISYAT	BOSSA	AYGAZ	DENTA	DMSAS	DUROF	IZMDC	ATEKS	BAKAB	DMSAS	DENCM	ERSU
IZMDC	BRISA	BANVT	DITAS	ECBYO	EGSER	MNDRS	AYEN	BANVT	EDIP	DENTA	ESCOM
MIPAZ	BRSAN	BEKO	DNZYO	EDIP	ERSU	SKBNK	BAGFS	BEKO	EGYO	DERIM	FMIZP
NTHOL	BRYAT	BFREN	EVREN	EGEEN	PERYO	TEBNK	BJKAS	BFREN	EVREN	DEVA	IDAS
OLMKS	CIMSA	BJKAS	FFKRL	EGGUB	IDAS	TEKST	BOLUC	BSPRO	FFKRL	DITAS	LINK
SKBNK	DOBUR	BSPRO	FNSYO	EMNIS	IHEVA	TSKB	BOSSA	BUCIM	FNSYO	DNZYO	LUKSK
SNPAM	DOHOL	BTCIM	FVORI	ERBOS	KLBMO	YKBNK	BRISA	BOYNR	FVORI	ECBYO	NTTUR
TEKST	DOKTS	BUCIM	GDKYO	ESCOM	KRSTL		BRSAN	CLEBI	GEDIZ	EGGUB	PARSN
TSKB	ECILC	CLEBI	GEDIZ	FENIS	LUKSK		BTCIM	CMENT	GRGYO	EMNIS	PIMAS
YKGYO	ECYAP	CMENT	GRGYO	FMIZP	OYSAC		CIMSA	AVIVA	GRGYO	ERBOS	SKPLC
	ECZYT	AVIVA	GRNYO	FRIGO	VKING		DOBUR	DYHOL	GRNYO	FENIS	
	GARAN	CYTAS	IHGYO	GENTS	DYOBY		DOHOL	EFES	HEKTS	FRIGO	
	GOLDS	DYHOL	INTEM	GUBRF			DOKTS	ENKAI	IHGYO	GARFA	
	GSDHO	EFES	ISFIN	HEKTS			ECILC	FROTO	INTEM	GDKYO	
	GUSGR	FROTO	KNFRT	HZNDR			ECYAP	GOODY	ISFIN	GENTS	
	IHLAS	GLYHO	KONYA	IPMAT			ECZYT	GSRAY	ISYAT	GLYHO	
	IZOCM	GOODY	KRTEK	KAPLM			GARAN	HURGZ	IZOCM	GUBRF	
	KARTN	GSRAY	KUTPO	KAVPA			GUSGR	IHEVA	KNFRT	HZNDR	
	KIPA	HURGZ	MAKTK	KLMSN			IHLAS	KCHOL	LIOYS	IPMAT	
	MNDRS	ISCTR	MEMSA	LINK			ISCTR	KENT	MAKTK	KAPLM	
	MRDIN	KARSN	MERKO	LIOYS			KARSN	KIPA	MEMSA	KAVPA	
	MRSHL	KCHOL	MMART	LOGO			KARTN	KOZAD	MERKO	KLMSN	
	NTTUR	KENT	MYZYO	MAALT			KONYA	METUR	MIPAZ	KRSTL	
	NUHCM	KORDS	MZHLD	MTEKS			KORDS	MIGRS	MMART	KRTEK	
	PETKM	MIGRS	NUGYO	MUTLU			KUTPO	MRDIN	MUTLU	LOGO	
	PNSUT	DGZTE	OKANT	PARSN			DGZTE	NETAS	MZHLD	MAALT	
	PRKAB	NETAS	OZFIN	PINSU			MRSHL	OYSAC	NTHOL	MTEKS	
	SANKO	OTKAR	PETUN	SERVE			OLMKS	NUHCM	NUGYO	MYZYO	
	SARKY	PENGD	PKENT	SKTAS			PRKAB	OTKAR	OKANT	SELGD	
	SASA	PRKTE	TEKFK	TEKTU			PRKTE	PENGD	OZFIN	SERVE	
	SISE	PTOFS	RAYSG	TIRE			SARKY	PETKM	PETUN	TUKAS	
	SODA	SAHOL	SELGD	TUKAS			SASA	PTOFS	PINSU	UKIM	
	SONME	SKPLC	TSKYO	UKIM			SISE	SAHOL	PKENT	UNTAR	
	TATKS	TBORG	TACYO	UNTAR			SNPAM	SANKO	PNSUT	VANET	
	TEBNK	THYAO	TOPFN	VAKFN			SODA	TBORG	RAYSG	VARYO	
	TKBNK	TOASO	FACFA	VAKKO			SONME	TCELL	SKTAS	VKFRS	
	TRKCM	TUPRS	TRNSK	VKFRS			TATKS	THYAO	TSKYO	VKGYO	
	TUDDF	UCAK	USAK	VKFYT			TIRE	TNSAS	TACYO	YATAS	
	UNYEC	UZEL	VANET				TKBNK	TOASO	TEKFK	YTFYO	
	VESTL	YAZIC	VARYO				TUDDF	TRKCM	TEKTU		
	YKBNK	YKSGR	VKGYO				UNYEC	TUPRS	TOPFN		
	YKFIN	ZOREN	YATAS				VAKKO	UCAK	FACFA		
			YKRYO				VESTL	UZEL	TRNSK		
			YTFYO				YKSGR	YAZIC	USAK		
							YUNSA	YKFIN	VAKFN		
							ZOREN	ZOREN	VKFYT		
									VKING		
									YKGYO		
									YKRYO		

APPENDIX 2 Stocks in Six Size-BE/ME Portfolios for Each Year (CONTINUED)

03.2004						03.2005					
B/H	B/M	B/L	S/H	S/M	S/L	B/H	B/M	B/L	S/H	S/M	S/L
AKENR	ACIBD	AEFES	ABANA	ARENA	AFYON	AKENR	ADBGR	ACIBD	ABANA	AKSUE	AFMAS
AKSA	ADANA	AKGRT	ADEL	ARFYO	AKSUE	AKSA	AKCNS	ADANA	ADEL	ARFYO	ALYAG
ALGYO	ADBGR	ALARK	ADNAC	ATAYO	ALYAG	ALCAR	ALKIM	AEFES	ADNAC	ATAYO	ARAT
ALTIN	AKBNK	ALCTL	AGYO	ATLAS	ARAT	ALGYO	ANACM	AFYON	AGYO	ATLAS	ARENA
ATEKS	AKCNS	ANACM	AKALT	ATSYO	BROVA	ATEKS	ANSGR	AKBNK	AKALT	ATSYO	BROVA
BOSSA	ALCAR	ARCLK	AKIPD	AVRSY	BUMYO	BOSSA	ASUZU	AKGRT	AKIPD	AVRSY	CEYLN
BRSAN	ALKA	ASLAN	AKYO	BRMEN	BURCE	BSOKE	AYGAZ	ALARK	AKYO	BRMEN	CMLOJ
DISBA	ALKIM	ASUZU	AYCES	BRMEN	BYSAN	BTCIM	BAGFS	ALCTL	ALTIN	BUMYO	DERIM
ECYAP	ALNTF	BEKO	BISAS	CEYLN	DERIM	DOKTS	BANVT	ALNTF	ARSAN	BURCE	DITAS
EREGL	ANHYT	BFREN	BJKAS	CMLOJ	DNZYO	ECYAP	BEKO	ANHYT	AYCES	BURVA	DNZYO
FFKRL	ANSGR	BRYAT	BSOKE	DENCM	DOGUB	ECZYT	BOLUC	ARCLK	BAKAB	BYSAN	DOBUR
GOLDS	ARSAN	BSPRO	CELHA	DENTA	DUROF	EREGL	BRISA	ASELS	BISAS	CELHA	DOGUB
GSDHO	ASELS	CIMSA	CMBTN	DITAS	EPLAS	FFKRL	BRSAN	ASLAN	DENCM	CMBTN	DUROF
ISGYO	AYEN	CMENT	DEVA	DOBUR	ERBOS	GOLDS	BRYAT	AVIVA	DENTA	DESA	EMKEL
ISYAT	AYGAZ	AVIVA	DMSAS	ECBYO	ERSU	GOODY	CEMTS	AYEN	DMSAS	DYOBY	ESEMS
IZMDC	BAGFS	CYTAS	EDIP	EGEEN	FMIZP	GSDHO	CIMSA	BFREN	ECBYO	EGSER	FRIGO
IZOCM	BANVT	DOHOL	EGYO	EGGUB	GDKYO	ISGYO	CMENT	BJKAS	EDIP	ERBOS	GARFA
KONYA	BOLUC	DYHOL	EMNIS	EGPRO	GEREL	ISYAT	DENIZ	BOYNR	EGEEN	ERSU	GRNYO
KRDMD	BRISA	DYOBY	FNSYO	ESCOM	GRNYO	KORDS	DEVA	BSPRO	EGGUB	ESCOM	HZNDR
MNDRS	BTCIM	EFES	FVORI	EVREN	INFYO	OLMKS	DISBA	BUCIM	EGYO	EVREN	IHEVA
NTHOL	BUCIM	ENKAI	GEDIZ	FENIS	KOTKS	PETKM	DOAS	CLEBI	EMNIS	FACFA	KOTKS
OLMKS	CEMTS	FENER	GRGYO	FRIGO	KOZAD	PNSUT	DOHOL	CYTAS	FNSYO	FENIS	KOZAD
PNSUT	CLEBI	FROTO	IDAS	GARFA	LINK	SARKY	ECILC	DGZTE	FVORI	GDKYO	KRDMB
PRKAB	DOKTS	GLYHO	IHGYO	GENTS	MIPAZ	SASA	GLYHO	DYHOL	GENTS	GEDIZ	LINK
SASA	ECILC	GSRAY	INTEM	PERYO	MYZYO	SISE	GUSGR	EFES	GRGYO	GEREL	MIPAZ
SKBNK	ECZYT	HURGZ	IPMAT	HEKTS	NTTUR	SODA	INDES	EGPRO	HEKTS	GUBRF	MYZYO
TEBNK	EGSER	IHEVA	KAPLM	HZNDR	PARSN	YKFIN	ISFIN	ENKAI	IDAS	INFYO	PENGD
TEKST	FINBN	KARSN	KNFRT	KAVPA	PENGD	YKGYO	ISGSY	FENER	IHGYO	INTEM	PIMAS
TSKB	GARAN	KCHOL	KRTEK	KLMSN	PIMAS	IZMDC	FINBN	ISAMB	IPMAT		PKART
YKBNK	GOODY	KENT	LIOYS	KOZAD	PRTAS	IZOCM	FMIZP	KRTEK	KAPLM		UNTAR
	GUBRF	KIPA	MAALT	KRDMA	SKPLC	KARSN	FROTO	LIOYS	KAVPA		
	GUSGR	MIGRS	MAKTK	KRDMB	TSKYO	KCHOL	GARAN	MAALT	KLMSN		
	IHLAS	DGZTE	MEMSA	KRSTL	VAKFN	KONYA	GIMA	MAKTK	KNFRT		
	ISCTR	NETAS	MERKO	LOGO	YTFYO	KRDMD	GSRAY	MEMSA	KRSTL		
	ISFIN	NUHCM	MMART	LUKSK		MMART	HURGZ	MERKO	KUTPO		
	KARTN	PRKTE	MTEKS	METUR		MRSHL	IHLAS	MNDRS	LOGO		
	KORDS	SAHOL	OKANT	MUTLU		NETAS	ISCTR	MTEKS	LUKSK		
	KUTPO	SANKO	PETUN	MZHLD		OTKAR	KARTN	MUTLU	METUR		
	MRDIN	SISE	PINSU	NUGYO		PRKAB	KENT	NTTUR	NUGYO		
	MRSHL	TCELL	PKENT	OZFIN		PTOFS	KIPA	OZFIN	OKANT		
	OTKAR	THYAO	RAYSG	SELGD		SAHOL	KRDMA	PARSN	PKENT		
	OYSAC	TNSAS	SKTAS	SERVE		SANKO	MIGRS	PERYO	RAYSG		
	PETKM	TOASO	TEKFK	TACYO		SKBNK	MRDIN	PETUN	SEKFK		
	PTOFS	TRCAS	TEKTU	TUKAS		SNPAM	NTHOL	PINSU	SERVE		
	SARKY	TRKCM	TOPFN	UKIM		TBORG	NUHCM	PRTAS	SKPLC		
	SNPAM	UCAK	FACFA	UNTAR		TEBNK	OYSAC	SELGD	SONME		
	SODA	ULKER	TRNSK	USAK		TEKST	PRKTE	SKTAS	TACYO		
	SONME	YAZIC	VANET	VAKKO		THYAO	TATKS	TEKFK	TEKTU		
	TATKS	ZOREN	VKFRS	VARYO		TIRE	TCELL	TRNSK	TOPFN		
	TBORG		VKFYT	VKING		TOASO	TKBNK	VAKKO	TSKYO		
	TIRE		VKGYO	YATAS		TRCAS	TNSAS	VANET	TUKAS		
	TKBNK		YUNSA	YKGYO		TRKCM	TTRAK	VKFRS	UKIM		
	TUDDF			YKRYO		TSKB	TUDDF	VKGYO	USAK		
	TUPRS					TUPRS	UCAK	YATAS	VAKFN		
	UNYEC					UNYEC	ULKER	YKRYO	VARYO		
	UZEL					UZEL	YKSGR	YKRYO	VKING		
	VESTL					VESTL		YUNSA	YTFYO		
	YKFIN					YAZIC					
	YKSGR					YKBNK					
						ZOREN					

APPENDIX 3 Monthly Excess Returns of 6 Size-BE/ME Portfolios between April 2000 and September 2005

Date	B/H	B/M	B/L	S/H	S/M	S/L	Date	B/H	B/M	B/L	S/H	S/M	S/L
04/00	0,157	0,209	0,131	0,303	0,184	0,190	02/03	0,001	0,025	0,011	0,028	0,013	0,027
05/00	-0,190	-0,206	-0,194	-0,103	-0,054	-0,108	03/03	-0,181	-0,204	-0,223	-0,137	-0,154	-0,139
06/00	-0,172	-0,125	-0,135	-0,075	-0,062	-0,082	04/03	0,182	0,281	0,146	0,309	0,278	0,290
07/00	-0,053	-0,071	-0,059	-0,007	-0,004	-0,067	05/03	-0,024	-0,039	-0,039	-0,010	-0,041	-0,062
08/00	-0,028	-0,060	-0,075	0,081	0,065	0,012	06/03	-0,088	-0,054	-0,092	-0,107	-0,068	-0,081
09/00	-0,167	-0,181	-0,184	-0,139	-0,136	-0,078	07/03	-0,080	-0,098	-0,057	-0,093	-0,088	-0,072
10/00	0,101	0,138	0,240	0,048	0,029	0,035	08/03	0,015	0,020	0,080	0,087	-0,027	-0,044
11/00	-0,403	-0,378	-0,384	-0,410	-0,445	-0,368	09/03	0,114	0,082	0,038	0,018	0,008	-0,005
12/00	-0,074	-0,051	-0,003	-0,185	-0,189	-0,196	10/03	0,222	0,150	0,164	0,145	0,093	0,027
01/01	0,078	0,081	0,096	0,058	0,111	0,040	11/03	-0,102	-0,079	-0,085	-0,062	-0,039	-0,035
03/01	-0,050	-0,088	-0,151	-0,022	0,063	-0,032	12/03	0,450	0,198	0,214	0,232	0,191	0,108
04/01	0,411	0,407	0,405	0,465	0,305	0,219	01/04	-0,077	-0,085	-0,081	-0,019	-0,034	-0,054
05/01	-0,166	-0,168	-0,209	-0,110	-0,099	-0,056	02/04	0,058	0,039	0,046	0,069	0,063	0,043
06/01	0,099	0,006	-0,043	0,051	0,051	0,075	03/04	0,184	0,084	0,049	0,182	0,151	0,096
07/01	-0,200	-0,179	-0,175	-0,137	-0,151	-0,198	04/04	-0,130	-0,098	-0,082	-0,021	-0,054	-0,080
08/01	-0,002	-0,065	-0,059	-0,063	-0,062	-0,080	05/04	-0,046	-0,075	-0,078	-0,059	-0,051	-0,105
09/01	-0,281	-0,294	-0,290	-0,275	-0,329	-0,344	06/04	0,034	0,043	0,000	-0,052	0,005	-0,059
10/01	0,229	0,277	0,299	0,327	0,299	0,364	07/04	0,089	0,057	0,038	0,040	0,180	0,015
11/01	0,159	0,194	0,109	0,114	0,144	0,086	08/04	0,020	0,034	0,002	0,008	0,023	0,004
12/01	0,073	0,159	0,143	0,183	0,135	0,042	09/04	0,088	0,063	0,127	0,075	0,084	0,135
01/02	0,038	-0,064	-0,111	0,044	-0,008	-0,033	10/04	-0,039	0,054	0,090	0,037	0,088	0,072
02/02	-0,241	-0,220	-0,220	-0,154	-0,204	-0,224	11/04	0,040	-0,007	-0,107	-0,022	-0,012	-0,060
03/02	-0,068	0,081	-0,025	-0,045	0,008	-0,042	12/04	0,090	0,101	0,051	0,006	-0,019	-0,005
04/02	0,015	-0,066	-0,051	-0,021	0,021	-0,022	01/05	0,157	0,095	0,074	0,052	0,061	0,099
05/02	-0,151	-0,114	-0,109	-0,024	-0,060	-0,111	02/05	0,038	0,034	-0,018	0,032	0,017	0,035
06/02	-0,085	-0,228	-0,003	-0,071	-0,046	-0,033	03/05	-0,085	-0,119	-0,106	-0,055	-0,102	-0,069
07/02	0,022	0,027	0,064	0,022	0,037	0,011	04/05	-0,134	-0,121	-0,073	-0,131	-0,149	-0,139
08/02	-0,043	-0,124	-0,125	-0,035	-0,086	-0,043	05/05	0,086	0,105	0,072	0,081	0,093	0,061
09/02	-0,146	-0,116	-0,124	-0,096	-0,075	-0,034	06/05	0,081	0,066	0,072	0,014	0,033	0,037
10/02	0,108	0,161	0,138	0,050	0,063	0,045	07/05	0,120	0,086	0,061	0,112	0,107	0,080
11/02	0,275	0,315	0,213	0,227	0,176	0,145	08/05	0,014	0,024	0,031	0,034	0,010	-0,043
12/02	-0,276	-0,279	-0,245	-0,182	-0,208	-0,241	09/05	0,096	0,042	0,057	0,026	0,007	-0,066
01/03	0,0469	0,0647	0,0107	0,0081	-0,02	0,0226							

	B/H	B/M	B/L	S/H	S/M	S/L
μ	0,003	-0,004	-0,011	0,010	0,002	-0,017
σ	0,155	0,152	0,143	0,141	0,133	0,124

APPENDIX 4 ISE Announcement of Acquired, Liquidated and Code Changed Stocks

COMPANIES WITH STOCKS DE-LISTED FROM THE ISE MARKETS PERMANENTLY (AS FROM YEAR 2000)		
CODE	**STOCK**	**DE-LISTING DATE**
GORBN	GORBON IŞIL	22.12.2004
IKTFN	İKTİSAT FİNANSAL KİRALAMA	13.05.2004
FACF	FACTO FİNANS	13.05.2004
METAS	METAŞ	08.10.2003
CUKEL	ÇUKUROVA ELEKTRİK	18.06.2003
KEPEZ	KEPEZ ELEKTRİK	18.06.2003
SEZGD	SEZGİNLER GIDA	18.11.2002
AKTAS	AKTAŞ ELEKTRİK	16.08.2002
EGDIS	EGS DIŞ TİCARET	16.08.2002
GUMUS	GÜMÜŞSUYU HALI	16.08.2002
KOYTS	KÖYTAŞ TEKSTİL	16.08.2002
SOKSA	SÖKSA	16.08.2002
MDRNU	MUDURNU TAVUKÇULUK	07.05.2002
TPBNK	TOPRAKBANK	31.01.2002
EMEK	EMEK SİGORTA	30.01.2002
APEKS	APEKS DIŞ TİCARET	15.01.2002
INMDY	INTERMEDYA	15.01.2002
IHFIN	İHLAS FİNANS	07.11.2001
DEMIR	DEMİRBANK	20.09.2001
SVGSH	SEVGİ SAĞLIK HİZM.	09.07.2001
ESBNK	ESBANK	03.04.2001
YABNK	YAŞARBANK	03.04.2001
EMSAN	EMSAN BEŞYILDIZ	18.10.2000
EMPAS	EMSAN PAS.ÇELİK	18.10.2000

COMPANIES WITH STOCKS DE-LISTED FROM THE ISE MARKETS PERMANENTLY BECAUSE OF ACQUISITIONS (AS FROM YEAR 2000)			
CODE	**STOCK**	**EXPLANATION**	**DE-LISTING DATE**
AGIDA	ANADOLU GIDA	Anadolu Gıda was acquired by Ülker Gıda.	23.02.2004
MARET	MARET	Maret and Pastavilla were acquired by Tat Konserve.	
PASTA	PASTAVİLLA		11.08.2003
ENKA	ENKA HOLDİNG	Enka Holding was acquired by Enka İnşaat.	22.07.2002
BYRBY	BAYRAKLI BOYA	Bayraklı Boya was acquired by Dyo Boya (Yasaş).	10.06.2002
SYBNK	SINAİ YATIRIM BANKASI	Sınai Yatırım Bankası was acquired by TSKB.	26.04.2002
TOFAS	TOFAŞ OTO TİCARET	Tofaş Oto. Ticaret was acquired by Tofaş Oto. Fabrika.	11.06.2001
PNET	PINAR ENTEGRE ET	Pınar Un was acquired by Pınar Entegre Et and the shares of resulting company started to be traded with the new title "Pınar Et ve Un".	11.08.2000
PNUN	PINAR UN		
ANBRA	ANADOLU BİRACILIK	Anadolu Biracılık, Ege Biracılık and Güney Biracılık were acquired by Erciyas Biracılık and the shares of resulting company started to be traded with the new title "Anadolu	24.07.2000
EGBRA	EGE BİRACILIK		
ERCYS	ERCİYAS BİRACILIK		
GUNEY	GÜNEY BİRACILIK		

APPENDIX 4 ISE Announcement of Acquired, Liquidated and Code Changed Stocks (CONTINUED)

STOCK CODE CHANGES (AS FROM YEAR 2000)		
CODE BEFORE CHANGE	*CODE AFTER CHANGE*	*DATE*
DISBA	FORTS	02.01.2006
EVREN	EGCYO	02.01.2006
DUROF	DURDO	02.01.2006
BSPRO	BSHEV	02.01.2006
CARSI	BOYNR	03.01.2005
COMUN	AVIVA	03.01.2005
GLBYO	PERYO	03.01.2005
GLMDE	GLYHO	03.01.2005
MILYT	DGZTE	03.01.2005
TPFAC	FACFA	03.01.2005
NIGDE	OYSAC	02.01.2004
ISGEN	ISFIN	02.01.2004
SYBYO	TSKYO	02.01.2004
AKFIN	GARFA	02.01.2003
DMRYO	DNZYO	02.01.2003
RANTL	TEKFK	02.01.2003
YASAS	DYOBY	02.01.2003
OSGYO	GRGYO	02.01.2002
TEZSN	CMLOJ	02.01.2002
HLKSG	YKSGR	02.01.2001
SODAS	SODA	02.01.2001
ALRSA	ALCAR	04.01.2000
GLOBL	GLBYO	04.01.2000
ISTMP	FMIZP	04.01.2000
KAVOR	KAVPA	04.01.2000
KRDMR	KRDMD	04.01.2000
OTOSN	FROTO	04.01.2000
PEGPR	BSPRO	04.01.2000
SMENS	PRKAB	04.01.2000

Source: http://www.imkb.gov.tr/endeksler/endeks_sirketler.htm

APPENDIX 5 Regression Data for the Analysis of the FF-TFM

L:Loser , W:Winner Portfolios						1st Month		2nd Month		3rd Month		4th Month		5th Month	
						L	*W*	*L*	*W*	*L*	*W*	*L*	*W*	*L*	*W*
Date	Rf	ISE100	ISE100-Rf	SBM	HML	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf
04/00	0,032	0,206	0,175	0,060	0,070	0,224	0,109								
05/00	0,036	-0,156	-0,192	0,109	0,005	-0,085	-0,113	-0,095	-0,105						
06/00	0,031	-0,107	-0,138	0,071	-0,015	-0,052	0,056	-0,020	0,001	-0,037	-0,125				
07/00	0,027	-0,041	-0,068	0,035	0,033	-0,008	-0,018	-0,019	-0,031	-0,011	-0,025	0,015	-0,057		
08/00	0,025	-0,053	-0,079	0,107	0,058	-0,050	0,120	-0,016	0,094	-0,028	0,030	0,008	-0,004	0,023	-0,045
09/00	0,035	-0,136	-0,171	0,060	-0,022	-0,097	-0,039	-0,113	-0,016	-0,137	-0,045	-0,109	-0,028	-0,089	-0,063
10/00	0,031	0,193	0,162	-0,122	-0,063	0,105	-0,007	0,033	-0,018	0,076	-0,018	0,088	0,019	0,106	0,062
11/00	0,036	-0,354	-0,390	-0,019	-0,031	-0,381	-0,458	-0,371	-0,455	-0,345	-0,456	-0,389	-0,452	-0,359	-0,432
12/00	0,101	0,079	-0,022	-0,147	-0,030	-0,147	-0,140	-0,053	-0,139	-0,061	-0,110	-0,093	-0,121	-0,087	-0,098
01/01	0,042	0,132	0,091	-0,015	0,000	0,112	-0,012	0,134	0,046	0,063	0,061	0,091	0,051	0,039	0,069
03/01	0,104	-0,087	-0,192	0,099	0,056	-0,009	-0,039	-0,020	0,025	-0,086	0,056	-0,033	0,036	-0,072	0,022
04/01	0,075	0,542	0,467	-0,078	0,126	0,486	0,304	0,401	0,328	0,422	0,260	0,392	0,256	0,296	0,343
05/01	0,084	-0,120	-0,204	0,092	-0,006	-0,061	-0,059	-0,099	-0,105	-0,029	-0,138	-0,045	-0,057	-0,040	0,001
06/01	0,053	0,030	-0,023	0,038	0,059	0,022	0,188	0,020	0,125	0,013	0,076	0,088	0,064	0,084	0,144
07/01	0,056	-0,115	-0,171	0,023	0,018	-0,116	-0,159	-0,152	-0,159	-0,155	-0,147	-0,159	-0,158	-0,177	-0,177
08/01	0,058	-0,004	-0,062	-0,026	0,037	-0,146	-0,001	-0,082	-0,040	-0,101	-0,059	-0,110	-0,053	-0,124	-0,082
09/01	0,050	-0,228	-0,278	-0,028	0,039	-0,362	-0,199	-0,339	-0,232	-0,298	-0,243	-0,308	-0,260	-0,304	-0,239
10/01	0,061	0,291	0,231	0,062	-0,054	0,434	0,127	0,435	0,229	0,464	0,282	0,388	0,288	0,353	0,268
11/01	0,060	0,181	0,121	-0,039	0,039	0,357	0,026	0,259	0,060	0,212	0,063	0,235	0,062	0,186	0,065
12/01	0,044	0,185	0,140	-0,005	0,035	0,201	0,099	0,139	0,065	0,164	0,067	0,194	0,079	0,260	0,069
01/02	0,045	-0,038	-0,083	0,047	0,113	0,018	-0,066	-0,001	-0,066	0,013	-0,072	0,016	-0,064	-0,001	-0,072
02/02	0,054	-0,166	-0,220	0,033	0,024	-0,220	-0,157	-0,210	-0,153	-0,219	-0,160	-0,218	-0,149	-0,209	-0,170
03/02	0,042	0,056	0,015	-0,022	-0,023	0,016	-0,025	0,074	-0,032	0,026	-0,034	0,013	-0,050	0,049	-0,052
04/02	0,040	-0,020	-0,060	0,027	0,034	0,020	0,045	0,020	0,050	0,012	-0,017	0,010	0,010	-0,030	-0,029
05/02	0,057	-0,090	-0,147	0,060	0,022	-0,083	-0,085	-0,073	-0,046	-0,101	-0,052	-0,086	-0,047	-0,069	-0,069
06/02	0,038	-0,099	-0,138	0,055	-0,060	-0,134	-0,025	-0,117	-0,062	-0,116	-0,071	-0,110	-0,095	-0,086	-0,070
07/02	0,036	0,091	0,055	-0,014	-0,015	0,088	-0,015	0,012	-0,011	0,030	0,044	-0,015	-0,013	0,058	-0,005
08/02	0,050	-0,067	-0,117	0,043	0,045	-0,100	-0,047	-0,094	-0,074	-0,078	-0,080	-0,026	-0,018	0,044	-0,018
09/02	0,037	-0,074	-0,111	0,060	-0,042	-0,088	-0,109	-0,084	-0,073	-0,101	-0,080	-0,096	-0,062	-0,107	-0,078
10/02	0,041	0,159	0,119	-0,083	-0,013	0,108	0,040	0,100	0,050	0,104	0,004	0,079	0,057	0,064	0,055
11/02	0,061	0,297	0,237	-0,085	0,072	0,213	0,043	0,256	0,032	0,306	0,057	0,305	0,075	0,326	0,113
12/02	0,036	-0,220	-0,256	0,056	0,014	-0,189	-0,219	-0,204	-0,182	-0,253	-0,191	-0,261	-0,187	-0,263	-0,193

APPENDIX 5 Regression Data for the Analysis of the FF-TFM (CONTINUED)

Date	6th Month L Ri-Rf	6th Month W Ri-Rf	7th Month L Ri-Rf	7th Month W Ri-Rf	8th Month L Ri-Rf	8th Month W Ri-Rf	9th Month L Ri-Rf	9th Month W Ri-Rf	10th Month L Ri-Rf	10th Month W Ri-Rf	11th Month L Ri-Rf	11th Month W Ri-Rf	12th Month L Ri-Rf	12th Month W Ri-Rf
04/00														
05/00														
06/00														
07/00														
08/00														
09/00	-0,117	-0,061												
10/00	0,086	0,084	0,073	0,103										
11/00	-0,396	-0,422	-0,393	-0,419	-0,425	-0,402								
12/00	-0,090	-0,101	-0,156	-0,093	-0,207	-0,115	-0,201	-0,101						
01/01	0,057	0,076	0,054	0,076	0,064	-0,006	0,068	0,049	0,061	0,019				
03/01	-0,096	0,034	-0,070	-0,006	-0,037	0,014	-0,047	0,007	0,001	0,000	-0,012	-0,016	0,046	-0,043
04/01	0,302	0,378	0,399	0,396	0,361	0,369	0,329	0,356	0,361	0,392	0,367	0,348	0,351	0,351
05/01	-0,025	-0,043	0,069	-0,128	0,036	-0,127	0,061	-0,148	0,038	-0,141	0,057	-0,175	0,078	-0,146
06/01	0,020	0,082	0,037	0,083	0,081	0,043	0,079	0,086	0,078	0,045	0,102	0,076	0,121	0,046
07/01	-0,150	-0,225	-0,167	-0,178	-0,158	-0,211	-0,129	-0,224	-0,151	-0,194	-0,137	-0,204	-0,139	-0,220
08/01	-0,139	-0,071	-0,144	-0,075	-0,077	-0,099	0,031	-0,096	0,063	-0,095	0,020	-0,101	-0,026	-0,114
09/01	-0,340	-0,257	-0,377	-0,289	-0,362	-0,293	-0,319	-0,315	-0,230	-0,309	-0,179	-0,346	-0,223	-0,333
10/01	0,385	0,307	0,372	0,270	0,441	0,244	0,505	0,319	0,306	0,290	0,267	0,308	0,184	0,355
11/01	0,226	0,085	0,252	0,038	0,292	0,072	0,252	0,101	0,212	0,121	0,266	0,141	0,173	0,167
12/01	0,235	0,085	0,216	0,108	0,191	0,127	0,185	0,091	0,186	0,076	0,198	0,095	0,184	0,105
01/02	-0,002	-0,104	-0,013	-0,042	0,023	-0,007	0,018	0,010	0,011	0,029	-0,007	0,012	0,063	0,042
02/02	-0,199	-0,177	-0,201	-0,191	-0,196	-0,190	-0,210	-0,186	-0,204	-0,174	-0,209	-0,199	-0,210	-0,192
03/02	0,062	-0,037	0,006	-0,041	-0,002	-0,039	-0,008	-0,032	-0,012	-0,048	-0,005	-0,035	0,034	-0,035
04/02	-0,008	-0,015	-0,021	-0,006	-0,027	-0,007	-0,019	-0,015	-0,016	-0,019	-0,016	-0,020	-0,009	-0,041
05/02	0,021	-0,067	-0,045	-0,065	-0,094	-0,067	-0,040	-0,066	-0,037	-0,065	-0,064	-0,072	-0,017	-0,063
06/02	-0,116	-0,067	-0,065	-0,077	-0,101	-0,044	-0,129	-0,021	-0,094	-0,046	-0,090	-0,052	-0,074	-0,073
07/02	0,071	0,010	0,060	0,034	0,028	0,038	0,079	0,008	0,154	-0,007	0,105	0,019	0,050	0,038
08/02	-0,030	-0,006	-0,050	-0,045	-0,056	-0,020	-0,079	-0,054	-0,099	-0,035	-0,086	-0,053	-0,121	-0,044
09/02	-0,079	-0,063	-0,085	-0,071	-0,110	-0,103	-0,109	-0,111	-0,085	-0,114	-0,111	-0,110	-0,122	-0,107
10/02	0,056	0,040	0,092	0,039	0,071	0,041	0,020	0,048	0,026	0,088	-0,010	0,069	0,008	0,054
11/02	0,326	0,076	0,216	0,100	0,178	0,092	0,256	0,059	0,300	0,071	0,292	0,047	0,230	0,105
12/02	-0,290	-0,196	-0,294	-0,215	-0,268	-0,182	-0,273	-0,209	-0,289	-0,203	-0,247	-0,198	-0,279	-0,198

APPENDIX 5 Regression Data for the Analysis of the FF-TFM (CONTINUED)

						1st Month		2nd Month		3rd Month		4th Month		5th Month	
						L	*W*	*L*	*W*	*L*	*W*	*L*	*W*	*L*	*W*
Date	Rf	ISE100	ISE100-Rf	SBM	HML	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf	Ri-Rf
01/03	0,038	0,064	0,026	-0,037	0,011	-0,010	-0,044	-0,030	0,015	-0,034	-0,010	-0,023	-0,018	-0,031	-0,023
02/03	0,033	0,049	0,016	0,010	-0,005	0,055	-0,017	0,023	0,015	0,028	-0,020	0,027	-0,016	0,052	-0,007
03/03	0,038	-0,181	-0,219	0,059	0,022	-0,207	-0,188	-0,186	-0,191	-0,194	-0,184	-0,198	-0,192	-0,159	-0,177
04/03	0,033	0,215	0,182	0,089	0,028	0,385	0,187	0,367	0,178	0,346	0,159	0,352	0,244	0,335	0,216
05/03	0,029	-0,011	-0,040	-0,004	0,034	-0,062	-0,038	-0,047	-0,077	-0,036	-0,032	-0,042	-0,024	-0,030	-0,052
06/03	0,034	-0,044	-0,077	-0,008	-0,011	-0,120	-0,041	-0,129	-0,082	-0,130	-0,065	-0,136	-0,063	-0,136	-0,068
07/03	0,028	-0,029	-0,056	-0,006	-0,022	-0,096	-0,072	-0,096	-0,084	-0,110	-0,096	-0,092	-0,077	-0,093	-0,067
08/03	0,025	0,098	0,073	-0,033	0,033	-0,027	-0,067	-0,040	-0,069	-0,031	-0,080	-0,020	-0,027	-0,019	-0,053
09/03	0,025	0,124	0,099	-0,072	0,050	0,011	-0,018	0,016	-0,048	0,033	-0,037	0,053	-0,024	0,047	-0,010
10/03	0,022	0,207	0,185	-0,090	0,088	0,064	0,153	0,041	0,130	0,068	0,076	0,070	0,110	0,093	0,092
11/03	0,019	-0,072	-0,091	0,043	-0,022	-0,055	-0,039	-0,060	-0,031	-0,055	-0,032	-0,063	-0,057	-0,033	-0,055
12/03	0,020	0,274	0,254	-0,111	0,180	0,170	0,198	0,168	0,227	0,140	0,260	0,180	0,210	0,230	0,216
01/04	0,020	-0,073	-0,093	0,045	0,019	-0,080	0,040	-0,064	-0,046	-0,068	-0,051	-0,078	-0,037	-0,043	-0,020
02/04	0,019	0,094	0,076	0,011	0,019	0,038	0,238	0,022	0,206	0,033	0,070	0,060	0,065	0,040	0,047
03/04	0,017	0,069	0,052	0,037	0,111	0,095	0,227	0,082	0,246	0,079	0,125	0,074	0,171	0,106	0,272
04/04	0,017	-0,107	-0,124	0,052	0,006	-0,026	-0,104	-0,045	-0,088	-0,070	-0,098	-0,051	-0,077	-0,052	-0,073
05/04	0,018	-0,052	-0,070	-0,005	0,039	-0,078	-0,105	-0,071	-0,096	-0,057	-0,112	-0,066	-0,120	-0,082	-0,096
06/04	0,017	0,052	0,035	-0,061	0,020	-0,043	-0,080	-0,052	-0,064	-0,030	-0,065	-0,031	-0,069	-0,054	-0,074
07/04	0,018	0,079	0,061	0,017	0,038	0,052	0,190	0,085	0,182	0,056	0,069	0,065	0,075	0,080	0,073
08/04	0,017	0,043	0,027	-0,007	0,011	0,012	0,051	0,024	0,058	0,025	0,057	0,035	0,066	0,024	0,056
09/04	0,016	0,086	0,070	0,005	-0,049	0,076	0,281	0,083	0,308	0,083	0,304	0,063	0,318	0,051	0,194
10/04	0,016	0,043	0,027	0,031	-0,082	0,047	-0,025	0,087	-0,036	0,081	-0,059	0,050	-0,052	0,035	-0,043
11/04	0,016	-0,018	-0,034	-0,007	0,093	-0,062	-0,079	-0,051	-0,094	-0,021	-0,074	-0,019	-0,083	-0,013	-0,089
12/04	0,017	0,111	0,094	-0,087	0,025	0,010	-0,026	0,011	-0,030	-0,016	-0,007	-0,013	0,011	-0,013	0,023
01/05	0,017	0,094	0,078	-0,038	0,018	0,034	0,056	0,024	0,025	0,053	0,075	0,029	0,054	0,052	0,059
02/05	0,014	0,039	0,025	0,010	0,026	-0,002	0,007	0,013	0,003	-0,017	-0,002	-0,005	-0,016	0,003	0,017
03/05	0,013	-0,100	-0,113	0,028	0,017	-0,106	-0,087	-0,108	-0,077	-0,107	-0,106	-0,112	-0,105	-0,103	-0,112
04/05	0,014	-0,077	-0,091	-0,030	-0,027	-0,160	-0,109	-0,153	-0,143	-0,123	-0,156	-0,137	-0,147	-0,139	-0,150
05/05	0,012	0,070	0,058	-0,010	0,017	0,073	0,057	0,056	0,064	0,012	0,072	0,049	0,065	0,039	0,066
06/05	0,013	0,068	0,056	-0,045	-0,007	-0,008	0,079	0,000	0,043	0,002	0,061	-0,014	0,084	0,032	0,083
07/05	0,012	0,099	0,087	0,011	0,045	0,064	0,279	0,053	0,321	0,049	0,280	0,049	0,255	0,044	0,109
08/05	0,015	0,044	0,029	-0,023	0,030	0,005	0,042	0,001	0,031	0,009	0,064	0,047	0,040	0,057	0,023
09/05	0,013	0,078	0,066	-0,076	0,065	-0,015	0,015	-0,038	0,072	-0,031	0,044	-0,012	0,077	-0,026	0,017

APPENDIX 6 Sizes and 12 Months HPARs of 3 Month Skipping Winner, Loser and Contrarian Portfolios Formed Between January 1988 and September 2004

Portfolio Formation Period	# of Firms in Portfolio	Loser HPAR (L)	t(L)	Winner HPAR (W)	t(W)	HPAR L-W	t(L-W)
01.1988-12.1988	4	-0,401	9,216	2,607	10,861	-3,007	11,053
04.1988-03.1989	4	-0,922	4,957	0,842	3,129	-1,764	4,058
07.1988-06.1989	4	3,363	10,268	-0,649	9,364	4,012	11,666
10.1988-09.1989	4	3,341	6,535	6,650	8,920	-3,310	6,567
01.1989-12.1989	4	1,931	8,506	2,694	5,955	-0,763	2,484
04.1989-03.1990	4	0,487	4,218	3,929	10,219	-3,442	9,561
07.1989-06.1990	4	0,303	4,004	1,225	11,691	-0,922	12,209
10.1989-09.1990	5	0,297	7,194	0,059	2,889	0,237	5,970
01.1990-12.1990	5	0,072	2,051	0,607	14,501	-0,535	9,131
04.1990-03.1991	6	-0,151	9,367	-0,146	8,740	-0,005	0,269
07.1990-06.1991	6	-0,481	12,869	-0,219	8,431	-0,262	7,932
10.1990-09.1991	7	-0,285	7,701	0,508	10,110	-0,793	9,881
01.1991-12.1991	8	0,078	2,470	0,130	10,133	-0,052	1,361
04.1991-03.1992	8	-0,099	3,501	0,179	10,179	-0,278	6,560
07.1991-06.1992	9	1,417	12,848	-0,340	9,586	1,756	12,238
10.1991-09.1992	10	0,995	8,942	-0,841	9,356	1,836	9,268
01.1992-12.1992	10	3,570	10,935	-0,265	4,350	3,835	10,569
04.1992-03.1993	10	0,568	1,597	-0,461	8,595	1,028	2,559
07.1992-06.1993	10	0,335	3,055	-0,727	11,224	1,062	9,809
10.1992-09.1993	11	1,844	12,027	0,864	8,762	0,980	13,945
01.1993-12.1993	11	1,229	11,390	0,025	0,609	1,204	15,863
04.1993-03.1994	11	1,803	12,361	1,151	9,873	0,652	9,540
07.1993-06.1994	11	2,806	10,575	0,295	9,499	2,512	9,334
10.1993-09.1994	12	0,649	5,975	-0,125	6,000	0,774	6,181
01.1994-12.1994	12	0,463	5,144	0,068	2,979	0,395	4,510
04.1994-03.1995	13	0,242	10,978	-0,215	7,955	0,457	10,977
07.1994-06.1995	13	0,382	7,173	-0,439	9,769	0,821	8,916
10.1994-09.1995	13	0,238	6,741	0,091	4,687	0,147	5,312
01.1995-12.1995	14	0,688	11,095	-0,066	2,987	0,755	9,802
04.1995-03.1996	15	2,001	7,147	2,040	8,080	-0,039	1,042
07.1995-06.1996	16	1,877	5,932	2,312	7,463	-0,435	6,339
10.1995-09.1996	17	2,836	9,525	2,949	9,617	-0,113	1,635
01.1996-12.1996	17	2,217	26,047	2,997	17,240	-0,780	7,709

APPENDIX 6 Sizes and 12 Months HPARs of 3 Month Skipping Winner, Loser and Contrarian Portfolios Formed between January 1988 and September 2004 (CONTINUED)

Portfolio Formation Period	# of Firms in Portfolio	Loser HPAR (L)	t(L)	Winner HPAR (W)	t(W)	HPAR L-W	t(L-W)
04.1996-03.1997	17	-0,362	6,253	-0,490	8,108	0,128	6,150
07.1996-06.1997	18	0,162	4,669	-0,262	5,573	0,424	11,160
10.1996-09.1997	18	0,043	0,950	-0,126	5,696	0,170	4,615
01.1997-12.1997	19	0,355	6,094	0,017	0,520	0,338	7,966
04.1997-03.1998	20	-0,287	4,178	0,172	6,935	-0,459	7,920
07.1997-06.1998	20	-0,339	5,613	-0,162	5,830	-0,177	4,691
10.1997-09.1998	21	-1,111	9,359	-1,464	11,215	0,353	12,194
01.1998-12.1998	21	-1,441	14,841	-2,308	13,389	0,866	9,342
04.1998-03.1999	22	0,582	6,604	-1,084	8,637	1,666	9,398
07.1998-06.1999	23	3,437	10,744	-0,570	5,848	4,007	10,736
10.1998-09.1999	23	4,861	9,994	-0,070	1,628	4,931	10,450
01.1999-12.1999	23	0,109	2,181	0,175	11,136	-0,065	1,549
04.1999-03.2000	24	0,032	0,615	-0,043	1,792	0,075	2,364
07.1999-06.2000	24	0,401	11,968	0,010	0,268	0,391	8,684
10.1999-09.2000	24	0,387	6,599	-0,142	6,143	0,529	10,455
01.2000-12.2000	24	0,154	5,236	-0,224	10,496	0,378	13,451
04.2000-03.2001	26	0,388	9,092	0,135	4,350	0,253	6,163
07.2000-06.2001	27	0,476	10,427	0,156	7,978	0,320	6,491
10.2000-09.2001	28	0,756	13,483	0,193	3,594	0,563	11,761
01.2001-12.2001	28	0,221	10,226	0,182	6,799	0,039	2,532
04.2001-03.2002	28	0,209	10,967	0,212	9,416	-0,003	0,213
07.2001-06.2002	28	0,283	5,512	-0,052	2,984	0,335	5,734
10.2001-09.2002	28	-0,140	6,475	-0,464	17,044	0,324	13,737
01.2002-12.2002	28	-0,231	5,793	-0,638	10,200	0,407	13,102
04.2002-03.2003	28	-0,013	0,262	-0,702	8,398	0,689	13,386
07.2002-06.2003	28	-0,344	9,575	-0,232	5,191	-0,112	3,461
10.2002-09.2003	28	-0,227	11,531	1,135	10,701	-1,362	12,112
01.2003-12.2003	28	-0,190	10,146	0,451	10,505	-0,641	12,387
04.2003-03.2004	28	-0,147	4,620	-0,158	6,797	0,011	0,548
07.2003-06.2004	29	-0,302	9,208	-0,093	2,015	-0,209	7,435
10.2003-09.2004	29	-0,238	7,901	-0,505	14,491	0,267	8,183
AHPAR		**0,643**	**4,147**	**0,325**	**1,929**	**0,319**	**1,765**

APPENDIX 7 Sizes and 12 Months HPARs of 1 Month Skipping Winner, Loser and Contrarian Portfolios Formed between May 1998 and September 2004

Portfolio Formation Period	# of Firms in Portfolio	Looser HPAR (L)	t(L)	Winner HPAR (W)	t(W)	L-W HPAR	t(L-W)
05.1998-04.1999	22	0,933	8,571	-0,925	8,952	1,858	9,789
06.1998-05.1999	23	1,404	9,101	-0,691	7,142	2,095	9,618
07.1998-06.1999	23	3,437	10,744	-0,570	5,848	4,007	10,736
08.1998-07.1999	23	3,939	9,915	-0,401	6,276	4,341	9,958
09.1998-08.1999	23	6,317	10,817	-0,378	6,713	6,695	11,038
10.1998-09.1999	23	4,861	9,994	-0,070	1,628	4,931	10,450
11.1998-10.1999	23	2,591	6,994	0,052	1,312	2,539	7,449
12.1998-11.1999	23	1,420	4,555	0,327	6,352	1,093	3,991
01.1999-12.1999	23	0,109	2,181	0,175	11,136	-0,065	1,549
02.1999-01.2000	23	-0,025	0,752	0,121	3,250	-0,146	11,454
03.1999-02.2000	23	-0,040	1,092	-0,074	2,283	0,034	3,086
04.1999-03.2000	24	0,032	0,615	-0,043	1,792	0,075	2,364
05.1999-04.2000	24	0,001	0,030	0,087	2,140	-0,086	5,217
06.1999-05.2000	24	0,124	4,371	0,145	2,343	-0,021	0,489
07.1999-06.2000	24	0,401	11,968	0,010	0,268	0,391	8,684
08.1999-07.2000	24	0,278	7,427	-0,087	2,025	0,365	6,730
09.1999-08.2000	24	0,412	7,960	-0,257	7,539	0,669	9,803
10.1999-09.2000	24	0,387	6,599	-0,142	6,143	0,529	10,455
11.1999-10.2000	24	0,579	7,806	-0,210	13,376	0,790	10,134
12.1999-11.2000	24	0,525	6,126	-0,114	4,488	0,639	9,231
01.2000-12.2000	24	0,154	5,236	-0,224	10,496	0,378	13,451
02.2000-01.2001	25	0,407	9,337	0,233	6,835	0,174	6,966
03.2000-02.2001	26	0,606	10,338	0,275	15,367	0,332	6,436
04.2000-03.2001	26	0,388	9,092	0,135	4,350	0,253	6,163
05.2000-04.2001	26	0,444	11,422	0,438	17,393	0,005	0,181
06.2000-05.2001	26	0,404	10,531	0,404	21,902	0,000	0,019
07.2000-06.2001	27	0,476	10,427	0,156	7,978	0,320	6,491
08.2000-07.2001	27	0,414	7,330	0,149	5,206	0,264	3,958
09.2000-08.2001	27	0,397	8,195	0,232	7,048	0,165	3,953
10.2000-09.2001	28	0,756	13,483	0,193	3,594	0,563	11,761
11.2000-10.2001	28	0,426	10,440	0,183	3,961	0,243	10,096
12.2000-11.2001	28	0,301	8,078	0,046	1,701	0,255	14,491
01.2001-12.2001	28	0,221	10,226	0,182	6,799	0,039	2,532

APPENDIX 7 Sizes and 12 Months HPARs of 1 Month Skipping Winner, Loser and Contrarian Portfolios Formed between May 1998 and September 2004 (CONTINUED)

Portfolio Formation Period	# of Firms in Portfolio	Looser HPAR (L)	t(L)	Winner HPAR (W)	t(W)	L-W HPAR	t(L-W)
02.2001-01.2002	28	0,246	9,258	0,068	3,435	0,179	8,193
03.2001-02.2002	28	0,188	9,186	0,099	2,999	0,089	3,493
04.2001-03.2002	28	0,209	10,967	0,212	9,416	-0,003	0,213
05.2001-04.2002	28	0,338	13,945	0,185	11,787	0,152	6,292
06.2001-05.2002	28	0,075	5,375	0,038	2,146	0,037	1,964
07.2001-06.2002	28	0,283	5,512	-0,052	2,984	0,335	5,734
08.2001-07.2002	28	-0,033	2,321	-0,123	4,525	0,090	2,820
09.2001-08.2002	28	0,055	3,693	-0,294	11,949	0,349	11,054
10.2001-09.2002	28	-0,140	6,475	-0,464	17,044	0,324	13,737
11.2001-10.2002	28	-0,344	8,302	-0,288	11,802	-0,056	2,067
12.2001-11.2002	28	-0,129	4,237	-0,150	6,494	0,021	1,908
01.2002-12.2002	28	-0,231	5,793	-0,638	10,200	0,407	13,102
02.2002-01.2003	28	-0,160	3,409	-0,429	7,913	0,269	11,957
03.2002-02.2003	28	-0,125	2,723	-0,358	7,105	0,234	10,584
04.2002-03.2003	28	-0,013	0,262	-0,702	8,398	0,689	13,386
05.2002-04.2003	28	-0,231	6,375	-0,257	4,599	0,026	1,177
06.2002-05.2003	28	-0,155	5,103	-0,248	4,474	0,093	2,226
07.2002-06.2003	28	-0,344	9,575	-0,232	5,191	-0,112	3,461
08.2002-07.2003	28	-0,395	14,677	0,055	1,149	-0,450	9,537
09.2002-08.2003	28	-0,243	10,048	0,329	5,878	-0,572	10,749
10.2002-09.2003	28	-0,227	11,531	1,135	10,701	-1,362	12,112
11.2002-10.2003	28	0,162	7,649	0,893	9,949	-0,731	9,370
12.2002-11.2003	28	-0,053	3,367	0,372	5,105	-0,424	5,398
01.2003-12.2003	28	-0,190	10,146	0,451	10,505	-0,641	12,387
02.2003-01.2004	28	-0,262	9,728	0,031	0,945	-0,293	11,118
03.2003-02.2004	28	-0,159	4,878	-0,109	3,385	-0,050	1,946
04.2003-03.2004	28	-0,147	4,620	-0,158	6,797	0,011	0,548
05.2003-04.2004	29	-0,378	9,381	-0,223	9,575	-0,155	6,072
06.2003-05.2004	29	-0,390	9,614	-0,218	5,005	-0,172	6,626
07.2003-06.2004	29	-0,302	9,208	-0,093	2,015	-0,209	7,435
08.2003-07.2004	29	-0,351	9,012	-0,147	3,950	-0,204	7,051
09.2003-08.2004	29	-0,034	1,156	-0,215	6,171	0,181	6,097
10.2003-09.2004	29	-0,238	7,901	-0,505	14,491	0,267	8,183
AHPAR		**0,445**	**2,991**	**-0,041**	**0,947**	**0,485**	**3,003**