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**THE FAMA & FRENCH APPROACH FOR THE CROSS
SECTION OF EXPECTED STOCK RETURNS:
EMPIRICAL EVIDENCE FOR THE ISTANBUL STOCK
EXCHANGE**

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**BEKLENEN HİSSE SENEDİ GETİRİLERİNE FAMA VE FRENCH
YAKLAŞIMI: İSTANBUL MENKUL KIYMETLER BORSASI İÇİN
TÜRKİYE SINAMASI**

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Abstract

This study analyzes size and book-to-market equity, combine to capture the cross-sectional variation in average stock returns associated with market β , size, book-to-market equity, and earnings-price ratios for the equities in Istanbul Stock Exchange between the period 1992 - 2006.

According to findings of this dissertation, all of the three factors are significant in explaining the stock returns in Istanbul Stock Exchange. Each of the factors is also explanatory both alone and when regressed with the other factors. Therefore, it can be concluded that the three factor model of Fama and French model is superior to the single factor model for investigating the capital asset prices.

Overall, this dissertation confirms the Fama and French model's accuracy. The value stocks outperform the growth stocks and the small firms outrun the big firms in terms of returns. The effects are still valid when adjusted for risk.

Keywords: Market β , size, book-to-market equity, earnings-price ratios

Özet

Bu tez çalışmasında 1992-2006 dönemi arasında İstanbul Menkul Kıymetler Borsası'nda işlem gören hisse senetlerinin ortalama getirilerindeki değişimleri piyasa β 'sı, büyüklük, defter/piyasa değeri ve fiyat/kazanç oranlarını birleştirerek analiz edilmesi amaçlanmıştır.

Bu analizlerin sonucunda şu bulgulara ulaşılmıştır: İMKB'deki getirileri açıklama konusunda her üç faktör de dikkate değerdir. Her bir faktör gerek tek başına gerek diğer faktörlerle beraber regresyona tabii tutulduğunda açıklayıcı olmuştur. Bu nedenle Fama-French'in üç faktörlü modelinin yatırım varlıkları fiyatlarını açıklamada tek faktörlü modele göre daha üstün olduğu gözlemlenmiştir.

Bu çalışma sonuçları Fama-French modelinin gerçek sonuçlara yakınlığını teyit etmiştir. Değer yaratan hisseler büyüme potansiyeli taşıyan hisselerden ve küçük firma piyasa değerli hisseler büyük piyasa değerli hisselerden daha fazla getiri sağlamaktadır. Benzer durum risk hesabı işin içine katıldığında da geçerlidir.

Anahtar Kelimeler: Piyasa β , Büyüklük, Defter /Piyasa Değeri, Fiyat/Kazanç oranı

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1 INTRODUCTION

The aim of this dissertation is to investigate analyzes size and book-to-market equity, combine to capture the cross-sectional variation in average stock returns associated with market β , size, leverage, book-to-market equity, and earnings-price ratios for the equities in Istanbul Stock Exchange between the period 1992 – 2006.

Evidence from this study suggests that all of the three factors are significant in explaining the stock returns in Istanbul Stock Exchange. Each of the factors is also explanatory both alone and when regressed with the other factors. Therefore, it can be concluded that the three factor model of Fama and French model is superior to the single factor model for investigating the capital asset prices.

2 LITERATURE REVIEW

In a perfect market while firms can make production and investment decisions, investors can choose securities among that firms of which their activities are reflected through prices. Therefore prices give signals for resource allocation. If prices reflect available information it is called efficient. The capital asset pricing models are one of the main financial research topic/discussions which are trying to explain the behavior of common stocks.

It has to start the discussions with Markowitz (1952) single period model where the investor's main objective is to maximize his portfolio's expected return subject to an acceptable level of risk. Under conditions of uncertainty, investor portfolio selection is a problem of utility maximization. He deals with in which investor preferences are assumed to be defined over the mean and variance of the probability distribution of single-period portfolio returns and modeling for the equilibrium structure of asset prices.

The foundations of a theory of the valuation of the firms and shares by Miller and Modigliani (1958), in a world of uncertainty, they have shown, how this theory can lead to an operational definition of the cost of capital and how that concept can be used in turn as a basis for rational investment decision-making within the firm.

Their approach has been that of static, partial equilibrium analysis. In 1961 Miller and Modigliani examined the effects of differences in dividend policy on the current price of shares in an ideal economy characterized by perfect capital markets, rational behavior, and perfect certainty. They focus on what investors "really" capitalize when they buy shares; and relations between price, the rate of growth of profits, and the rate of growth of dividends per share. The "cost of capital" to the firm is the same regardless of how the investments are financed or how fast the firm is growing. The

cost of capital in capital budgeting is to provide the "cut-off rate" in the sense of the minimum yield that investment projects must promise to be worth undertaking from the point of view of the current owners.

Black (1972) explored the nature of capital market equilibrium under two assumptions that are more restrictive than the usual assumptions used in deriving the capital asset pricing model. First, he assumed that there is no riskless asset and that no riskless borrowing or lending is allowed. Then he assumed that there is a riskless asset and that long positions in the riskless asset are allowed but short positions in the riskless asset are not allowed. In both cases, he concluded that an investor can take unlimited long or short positions in the risky assets. In both cases the expected return on any risky asset is a linear function of its β , just as it is without any restrictions or borrowing. If there is a riskless asset, then the slope of the line relating the expected return on a risky asset to its β must be smaller than it is when there are no restrictions on borrowing.

An intertemporal model of the capital market which is consistent with both the expected utility maxim and the limited liability of assets has been developed by Merton (1973). The equilibrium relationships among expected returns specified by the classical capital asset pricing model will obtain only under very special additional assumptions. The model has the simplicity and empirical tractability of the capital asset pricing model; consistent with expected utility maximization and the limited liability of assets; and provides a specification of the relationship among yields that is more consistent with empirical evidence.

Basu (1977) made to determine empirically the relationship between investment performance of equity securities and their P/E ratios. While the efficient market hypothesis denies the possibility of earning excess returns, the price-ratio hypothesis that P/E ratios, due to exaggerated investor expectations, may be indicators of future investment performance. The low

P/E portfolios seem to have, on average, earned higher absolute and risk-adjusted rates of return than the high P/E securities. He assumed that the assets pricing models are valid. According to him P/E ratio information was not “fully reflected” in security prices in as rapid manner as postulated by the semi-strong form of the efficient market hypothesis. He concluded that publicly available P/E ratios seem to possess “information content” and may warrant an investor’s attention at the time of portfolio formation or revision.

Reinganum (1981) investigates whether differences in estimated portfolio betas are reflected in differences in average portfolio returns. The findings of his study demonstrate that cross-sectional differences in portfolio betas estimated with common market indices are not reliably related to differences in average portfolio returns; that is, the returns of high beta portfolios are not significantly different from the returns of low beta portfolios.

In 1995, Fama and French studied whether the behavior of stock prices, in relation to size and book-to market-equity (BE/ME), reflects the behavior of earnings. Consistent with rational pricing, high BE/ME signals persistent poor earnings and low BE/ME signals strong earnings. Moreover, stock prices forecast the reversion of earnings growth observed after firms are ranked on size and BE/ME. Finally, there are market, size, and BE/ME factors in earnings like those in returns. The market and size factors in earnings help explain those in returns, but found no link between BE/ME factors in earnings and returns.

Fama and French (2000) main findings are forecasts of earnings should exploit the mean reversion in profitability. In a competitive environment, profitability is mean reverting. In their model mean reversion is faster when profitability is below its mean and when it is far from its mean in either direction. Variation in earnings is also predictable. Negative changes in earnings and extreme changes seem to faster than their predicted model.

Fama and French (2002) estimate the equity premium using dividend and earnings growth rates to measure the expected rate of capital gain. The decline in the expected stock return is the result of (i) wider equity participation (ii) lower cost of obtaining diversified equity portfolios. But there is also evidence that the expected stock return is slowly mean reverting. Average stock returns for the period 1951 to 2000 exceeds the expected return which also means stocks experience unexpected capital gains. Growth rates of dividends and earnings are unpredictable therefore a decline in the expected stock return is the main reason of the unexpected capital gain. Low expected future returns resulted from high return. During the examined period their estimates are much lower than the equity premium produced by the average stock return. This was the result of a decline in discount rates that produces a large unexpected capital gain.

In 2002 Fama and French, testing trade-off and pecking order models predictions about dividend and debts. Trade-off and pecking order models predict that controlling for other effects, more profitable firms have higher dividend payouts and firms with more investments have lower payouts.

Trade-off forces posit that firms with more investments have less book leverage. The complex pecking order model also predicts a negative relation between expected investment and book leverage. In the simple pecking-order model, the relation between book leverage and investment is positive. The evidence that firms with more investments have less market leverage is strong which supports complex pecking order. This also means that how bondholder-stockholder agency problem are affect target leverage when debt capacity depends on the market value of assets in trade-off predictions.

Firms with more investments have less market leverage, which is consistent with the trade-off model and a complex pecking order model. Firms with more investments have lower long-term dividend payouts, but

dividends do not vary to accommodate short-term variation in investment. As the pecking order model predicts, short-term variation in investment and earnings is mostly absorbed by debt. The many shared predictions of the two models tend to do well in their tests.

3 REVIEW OF FAMA AND FRENCH MODEL

Fama and French examined variables such as size, leverage, past returns, dividend-yield, earnings-to-price ratios, and book-to-market ratios. There is considerable evidence that the cross-sectional pattern of stock returns can be explained by only two of these characteristics, size and book-to-market.

The CAPM measure of risk, β explains almost none of the cross-sectional dispersion in expected returns once size is taken into account.

Fama and French (1992), suggest that traditional measures of risk do not determine expected returns. In equilibrium asset pricing models the covariance structure of returns determine expected returns.

The CAPM relates the expected rate of return of an individual security to a measure of its systematic risk. It carries out that securities are priced so that the expected returns will compensate investors for the expected risks. There are two fundamental relationships: the capital market line(CML) and the security market line(SML).

The return an individual investor expects to receive on a portfolio specifies with capital market line (CML). This is a linear relationship between risk and return on efficient portfolios that can be written as:

$$E (R_p) = R_f + \sigma_p \left[\frac{E (R_m) - R_f}{\sigma_m} \right] \dots\dots\dots (1)$$

where,

R_p = portfolio return

R_f = risk-free asset return

R_m = market portfolio return

σ_p = standard deviation of portfolio returns, and

σ_m = standard deviation of market portfolio returns.

The security market line (SML) expresses the return an individual investor can expect in terms of a risk-free rate and the relative risk of a security or portfolio. The SML with respect to security i can be written as:

$$E (R_i) = R_f + \beta_i \{ E (R_m) - R_f \} \dots\dots\dots (2)$$

where,

$$\beta_i = \frac{\sigma_i r_{im}}{\sigma_m} = \frac{\text{cov}(R_i, R_m)}{\sigma_m^2} \dots\dots\dots (3)$$

and r_{im} is the correlation between security return, R_i and market portfolio return. The β can be interpreted as the amount of non-diversifiable risk inherent in the security relative to the risk of the market portfolio.

SML can be used in portfolio analysis to test whether securities are fairly priced, or not. The CAPM is a single-period *ex ante* model. However, since the *ex ante* returns are unobservable, it has to be relying on realized returns. So the empirical question arises: Do the past security returns conform to the CAPM?

The beta in such an investigation is usually obtained by estimating the security characteristic line (SCL) that relates the excess return on

security i to the excess return on some efficient market index at time t . The *ex post* SCL can be written as:

$$R_{it} - R_{ft} = \eta_i + b_i(R_{mt} - R_{ft}) + \varepsilon_{it} \dots\dots\dots (4)$$

where, η_i is the constant return earned in each period and b_i is an estimate of β_i in the SML. The estimated β_i is then used as the explanatory variable in the following cross-sectional equation:

$$R_{it} = \gamma_0 + \gamma_1 b_i + u_{it} \dots\dots\dots (5)$$

The coefficient γ_0 is the expected return of a zero beta portfolio, expected to be the same as the risk-free rate and γ_1 is the market price of risk (market risk premium). γ_1 is significantly different from zero and positive in order to support the validity of the CAPM. When testing the CAPM using the equations at (4) and (5), the following issues are tested:

- (i) b_i s are true estimates of historical β_i s,
- (ii) The market portfolio used in empirical studies is the appropriate proxy for the efficient market portfolio for measuring historical risk premium and
- (iii) The CAPM specification is correct.

When using individual securities in testing the validity of the CAPM, Miller and Scholes (1972) highlighted some statistical problems encountered. Black, Jensen and Scholes (1972), formed portfolios and reported a linear relationship between the average excess portfolio return and the beta, and for beta >1 (<1) the intercept tends to be negative (positive). Therefore, they developed a zero-beta version of the CAPM model where the intercept term is allowed to change in each period.

Extending the Black, Jensen and Scholes (1972) study, Fama and MacBeth (1973) provided evidence:

- (i) of a larger intercept term than the risk-free rate,
- (ii) that the linear relationship between the average return and the beta holds and
- (iii) that the linear relationship holds well when the data covers a long time period.

However, Fama and French (1992), provide weak empirical evidence on these relationships.

Fama and French present several cross-sectional regression estimates of the risk premium associated with beta. All risk premiums are based on betas estimated using monthly returns. A value-weighted market index is employed, although they state that estimating betas using the equally-weighted market index produces "inferences on the role of β in average returns like those reported below." When stocks are grouped on firm size alone, their coefficient on beta for the 1941 to 1990 period is a hefty 1.45 percent per month, more than 3 standard errors above zero. However, when stocks are ranked first on size and then on beta to form 100 portfolios, the estimate is only 0.24 percent with a standard error of 0.23 percent for the same period. Thus, they conclude that ". . . allowing for variation in β that is unrelated to size flattens the relation between average return and β , to the point where it is indistinguishable from no relation at all."

Previous research has generally examined the risk-return relation using monthly return data (e.g., Black, Jensen, and Scholes (1972)). There are at least three reasons for reexamining the risk-return relation using longer measurement-interval returns. First, the CAPM does not provide explicit guidance on the choice of horizon in assessing whether beta explains cross-sectional variation in average returns.

Second, beta estimates are biased due to trading frictions and non-synchronous trading or other phenomena inducing systematic cross-temporal covariance's in short-interval returns. These biases are mitigated by using longer interval return observations. An alternative approach to reduce biases in beta estimates, adopted by Fama and French, is to estimate beta as the sum of the slopes in the regression of a portfolio's monthly return on the current and prior month's market return.

Third, although it is not fully understood, there appears to be a significant seasonal component to monthly returns. Using annual returns is one way, although not necessarily the best, of sidestepping the statistical complications that arise from seasonality in returns.

Fama and French find support for beta using size portfolios but not alternatives such as ranking on beta alone, or first on size and then on beta.

The counter arguments also rose against their findings. Black (1992, 1993) suggested that the Fama and French findings were likely an artifact of data mining. Since Fama and French chose their explanatory variables based on the findings of earlier empirical studies, the observed explanatory power of these variables could be due to a massive data mining exercise on the part of the authors of earlier studies. Based on this, Black contended that some of the statistical tests in Fama and French were not properly specified. He also suggested that, since the relations between returns and size, book-to-market, etc. were likely an artifact of data mining, they would disappear if another time period or another data source were analyzed.

Another criticism of the Fama/French findings came from Kothari, Shanken and Sloan (1995). Their attack proceeded along two main fronts: survivorship bias and beta mis-measurement.

It is a well-known fact that the Compustat database suffers from a survivorship bias, due to the way firms are added to the database. As described by Kothari, Shanken and Sloan (1995), firms are typically brought into the Compustat files with several years of historical data. Since the firms that are added to the database during a given year are firms that still exist, the backfilling of historical data for the previous several years biases the database toward firms that survived through those years. The firms that died during those years, and that were not already in the database, are never included. This "*ex post* selection bias" can have a significant effect on cross-sectional studies of stock returns. Kothari, Shanken and Sloan claim that the observed explanatory power of book-to-market is likely due to survivorship bias: Since many of the firms that are excluded from Compustat are firms that failed, it is likely that these firms had high book-to-market and low returns. Adding these firms to the database would reduce the explanatory power of book-to-market, possibly eliminating it.

The other main criticism of is related to the estimation of beta. Levhari and Levy (1977) show that beta coefficients estimated with monthly returns are not the same as betas estimated with annual returns. Since they are different, the findings of empirical studies will depend upon which beta estimation convention is used. Kothari, Shanken and Sloan argue that annual betas are more appropriate than monthly betas, since the investment horizon for a typical investor is probably closer to a year than a month. They show that the relation between beta and return is stronger when betas are estimated using annual returns.

Many researchers in the early-to-mid 1990s believed that the explanatory power of book-to-market should not be taken seriously. A number of authors argued that the CAPM was still the best model of expected returns, claiming that the empirical findings contradicting the CAPM are unreliable.

4 CRITICS OF FAMA AND FRENCH FACTORS

The stock price behavior theories can be dated back to Markowitz's model. This model is a single-period model, where an investor forms a portfolio at the beginning of the period and his/her objective is to maximize the portfolio's expected return, subject to an acceptable level of risk (or minimize risk, subject to an acceptable expected return). The assumption of a single time period, coupled with assumptions about the investor's attitude toward risk, allows risk to be measured by the variance (or standard deviation) of the portfolio's return¹. One of the major insights of the Markowitz model is that it is a security's expected return, coupled with how it co-varies with other securities, that determines how it is added to investor portfolios.

Markowitz model as well as the later models is based on the efficient market hypothesis. The efficient market hypothesis is associated with the idea of a "random walk", which characterizes a price series where all subsequent price changes represent random departures from previous prices². In summary, the efficient market hypothesis argues that it is not possible to consistently outperform the market by using any information that the market already knows, except through luck.

Fama originated the efficiency market hypothesis and described three types of it; weak, semi-strong, and strong form³. These forms all assume that the cost of credit is linear and uniform for all investors, that transaction costs and information asymmetry does not exist. The strong form suggests that securities prices reflect all available information, even private information. The semi-strong form of efficient market hypothesis

¹ Markowitz, Harry. (1959). *Portfolio Selection: Efficient Diversification of Investment*. New York: John Wiley and Sons.

² Malkiel, Burton G., A, (1973), *Random Walk Down Wall Street*, New York: W. W. Norton & Co., 1st edition.

³ Fama, Eugene, (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work", *Journal of Finance*, 25 (2), pp. 383-417.

claims that security prices reflect all publicly available information. There are no undervalued or overvalued securities and thus, trading rules are incapable of producing superior returns. And finally, the weak form of the hypothesis suggests that past prices or returns reflect future prices or returns. However, Fama (1991) expanded the concept of the weak form to include predicting future returns with the use of accounting or macroeconomic variables.

Building on the Markowitz framework, Sharpe (1964), and Lintner (1965) independently developed what has come to be known as the Capital Asset Pricing Model (CAPM). This model assumes that investors use the logic of Markowitz in forming portfolios. It further assumes that there is an asset (the risk-free asset) that has a certain return. Investors choose portfolios according to combinations of the risk-free asset and the risky portfolio. In order for markets to be in equilibrium, the portfolio risky portfolio must be the market portfolio of all risky assets. So, all investors combine the market portfolio and the risk-free asset, and the only risk that investors are paid for bearing is the risk associated with the market portfolio.

According to the CAPM, at the equilibrium, only market beta matters. Beta measures the tendency of an asset to co-vary with the market portfolio. It represents the part of the asset's risk that cannot be diversified away, and this is the risk that investors are compensated for bearing. The CAPM equation says that the expected return of any risky asset is a linear function of its tendency to co-vary with the market portfolio. So, if the CAPM is an accurate description of the way assets are priced, this positive linear relation should be observed when average portfolio returns are compared to portfolio betas. Further, when beta is included as an explanatory variable, no other variable should be able to explain cross-sectional differences in average returns.

Since some of the assumptions of the CAPM model⁴ are perceived as unrealistic and to address some of these concerns Ross (1976) developed an arbitrage pricing theory (APT). The APT starts by assuming that there are n factors which cause asset returns to systematically deviate from their expected values. The theory does not specify how large the number n is, nor does it identify the factors. It simply assumes that these n factors cause returns to vary together. There may be other, firm-specific reasons for returns to differ from their expected values, but these firm-specific deviations are not related across stocks. Since the firm-specific deviations are not related to one another, all return variation not related to the n common factors can be diversified away. Based on these assumptions, Ross shows that, in order to prevent arbitrage, an asset's expected return must be a linear function of its sensitivity to the n common factors⁵. The APT model, therefore, claims that there are n sources of systemic risk as opposed to the one offered by CAPM. This model has been criticized because of the vagueness of the factors that can affect the asset returns.

Merton (1973) attempted to develop a dynamic model of asset pricing. Since, both the CAPM and the APT are static, or single-period models; they ignore the multi-period nature of participation in the capital markets. The intertemporal capital asset pricing model (ICAPM) aimed to capture the multi-period aspect of financial market equilibrium. The ICAPM framework recognizes that the investment opportunity set might shift over time, and investors would like to hedge themselves against unfavorable shifts in the set of available investments. If a particular security tends to have high returns when bad things happen to the investment opportunity set, investors would want to hold this security as a hedge⁶. This increased

⁴ For example, all investors are assumed to have the same information, and this information is costless to gather and process. In addition, there are no taxes, transactions costs, or other "frictions". It is also assumed that investors can readily borrow funds at the risk free rate of interest.

⁵ Ross, Stephen A., (1976). "The Arbitrage Theory of Capital Asset Pricing," *Journal of Economic Theory* 13, pp: 341-360.

⁶ Merton, Robert C., (1973). "An Intertemporal Capital Asset Pricing Model," *Econometrica* 41, pp: 867-887.

demand would result in a higher equilibrium price for the security, *ceteris paribus*. One of the main insights of the ICAPM is the need to reflect this hedging demand in the asset pricing equation.

The last earlier asset pricing model that we will consider is the consumption based asset pricing model (CCAPM). Breeden (1979) argued that an extra dollar of consumption is worth more to a consumer when the level of aggregate consumption is low. When things are going really well and many people can afford a comfortable standard of living, another dollar of consumption doesn't make people feel very much better off. But when times are hard, a few extra dollars to spend on consumption goods is quite valuable. In other words, it has been proposed that the marginal utility of consumption diminishes⁷. Based on this, securities that have high returns when aggregate consumption is low will be demanded by investors, bidding up their prices and lowering their expected returns. In contrast, stocks that co-vary positively with aggregate consumption will require higher expected returns, since they provide high returns during states of the economy where the high returns do the least good.

Among the aforementioned asset pricing models, the CAPM became the most widely used and empirically tested. Although, it has unrealistic assumptions, its simplicity and some empirical evidence supporting its predictions made it the commonly accepted theory in finance literature. However, later on empirical validity of the CAPM model started to be challenged. The studies argued that alongside market beta, there are various other factors affecting the stock returns and there are several other risk factors that might affect the returns and are not included in the market beta.

One of criticisms of CAPM model emphasizes the fact that although it is a future- oriented model, it essentially relies on historic data to predict

⁷ Breeden, Douglas, (1979). "An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities," *Journal of Financial Economics* 7, pp: 265-296.

future returns. Betas for example are calculated using historic data; consequently they may or may not be appropriate predictors of the variability or risk of future returns. Another important criticism is on the role of investors' expectations. The model includes the expectations and subjective judgments of investors about future asset or security returns and these are very difficult to quantify. In addition the model also assumes that investor expectations and judgments are homogeneous.

4.1 Price-Earnings Ratio

In an earlier attempt, Basu (1977) asserted that earnings to price ratio is related to average stock returns in U.S.⁸. He used a sample period from April 1957 to March 1971 to show that stocks with high earnings/price ratios (or low P/E ratios) earned significantly higher returns than stocks with low earnings/price ratios. His findings indicated that differences in beta could not explain these return differences. A later study by Jaffe, Keim and Westerfield (1989) confirmed this finding and also showed that the E/P effect does not just appear in the month as a result of seasonality, as had been claimed by some researchers⁹. The E/P effect is a direct contradiction of the CAPM, since market beta doesn't capture the return anomalies due to price/earnings differences.

The reasons why price to earnings ratio might affect the returns come from the fact that this ratio displays the relative stock returns when other factors are kept constant. It is widely argued that the P/E ratio implicitly incorporates the perceived riskiness of a given company's future earnings and it reflects the structure of the balance sheet of the company¹⁰.

⁸ Basu, Sanjoy, (1977). "Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis," *Journal of Finance* 32, pp: 663-682.

⁹ Jaffe, Jeffrey, Donald B. Keim, and Randolph Westerfield, (1989). "Earnings Yields, Market Values, and Stock Returns," *Journal of Finance* 44, pp: 135-148.

¹⁰ Campbell, John Y. and Robert J. Shiller, (1998), "Valuation Ratios and the Long-Run Stock Market Outlook," *Journal of Portfolio Management*, 24, pp: 11-26.

In general, low P/E stocks are perceived as better investment tools since some empirical evidence that shows low P/E stocks have been earning healthy premiums over high P/E stocks. Nevertheless, the low P/E stocks could also carry higher risk and low future growth rates.

4.2 Size Effect

Researchers found that leverage is another factor affecting the returns. Bhandari (1988) points out that firms with high leverage (high debt/equity ratios) have higher average returns than firms with low leverage for the 1948-1979 periods¹¹. This finding persists after size and beta are included as explanatory variables. High leverage increases the riskiness of a firm's equity, but this increased risk should be reflected in a higher beta coefficient, and yet, high leverage independently increases the expected returns.

Banz (1981) showed that the stocks of firms with low market capitalization have higher average returns than large cap stocks¹². The size of the firm is a factor influencing the stock returns independent of other considerations. Other researchers showed that the size effect is distinct from the earnings/price (E/P) effect discussed above. Small firms tend to have higher returns, even after controlling for E/P. Also, the beta differences between the small firms and the rest are not large enough to explain the observed return differences. Once again, the CAPM predictions are violated.

4.3 BE/ME

Another argument against CAPM was “losers” versus “winners”. DeBondt and Thaler (1985) stated that "losers" are the stocks that have had

¹¹ Bhandari, Laxmi Chand, (1988). "Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence," *Journal of Finance* 43, pp: 507-528.

¹² Banz, Rolf W., (1981). "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics* 9, pp: 3-18.

poor returns over the past three to five years, and "winners" are those stocks that had high returns over a similar period. They concluded that the losers have much higher average returns than winners over the next three to five years¹³. This tendency of returns to reverse over long horizons (i.e., losers become winners) is not present in the beta differences.

One more important factor that proved to lie outside the market beta is the book to market equity ratio. Rosenberg, Reid and Lanstein (1985) demonstrated that stocks with high ratios of book-to-market equity have significantly higher returns than stocks with low book to market equity¹⁴. Researchers have reported evidence from the US and other developed markets that small capitalization, high BE/ME "value" stocks earn higher returns than high priced "growth" stocks. The BE/ME ratio turn out to be a strong predictor of the stock returns and in certain cases subsumed the role of beta.

The Fama and French model in a way pulled the earlier literature and critiques to CAPM together and built up a model, which combined size, leverage and book to market equity ratio in a single cross sectional study. First, they showed that the previous empirical evidence proving the relationship between the stock returns and market beta was a result of the negative correlation between firms' size and beta. When this correlation is controlled for, then the relation between the returns and market beta disappears¹⁵. Then, Fama and French tried to formulate which factors could determine the returns if market beta is not explanatory. They compared the explanatory power of size, leverage, earnings to price ratio, book to market equity ratio, and beta in cross-sectional regressions that spanned the 1963-1990 period. Their findings indicate that book to market ratio and size are

¹³ DeBonds, Werner F.M. and Richard H.Thaler (1985). "Does the Stock Market Overreact," *Journal of Finance* 40, pp: 557-581.

¹⁴ Rosenberg, Barr, Kenneth Reid, and Ronald Lanstein, (1985). "Persuasive Evidence of Market Inefficiency," *Journal of Portfolio Management* 11, pp: 9-17.

¹⁵ Fama, Eugene F., and Kenneth R. French, (1992). "The Cross-Section of Expected Stock Returns," *Journal of Finance* 47, pp: 427-465.

the variables that have the strongest relation to returns. The explanatory power of the other variables vanishes when these two variables are included in the regressions.

In Fama and French model, the dispersion in returns emerges because of the differences in the riskiness of the stocks. For example, the small cap stocks or high value stocks have high average returns because they are risky. The size and value factors are capturing independent sources of systemic risk. Moreover, the market beta is still explanatory for the stock returns in the three factor model.

5 THE DATA AND METHODOLOGY

This study will only consider the non-financial companies that are traded in the Istanbul Stock Exchange market during the years of 1992-2006. Financial companies, in general have high leverage ratios and the associated effects on risk and return of equity of this can bias the estimations. Therefore, such firms from this analysis are excluded. The sample size increases from 80 firms in 1992 to 242 firms in 2006. The semi-annual stock returns are used, adjusted for dividends and splits. This data is obtained from ISE database as well as the national 100-market index (ISE-100) returns.

To form portfolios, we look at the size and the value of the listed firms. Portfolios include the stocks from the firms that are traded in the ISE both in December $t-1$ and in June t . The firms also must have a fiscal year end of December 31. For these firms, the size (ME) as the stock's price times the number of shares outstanding as of the end day in June is calculated. We use the end day of December values of equity to calculate the BE/ME ratios for year t .

5.1 The Market Beta

Beta describes the sensitivity of an instrument or portfolio to broad market movements. We will use the following formula for beta;

$$\beta = \frac{\text{cov}(Z_p, Z_m)}{\sigma_m^2}$$

Where $\text{cov}(Z_p, Z_m)$ is the covariance between the portfolio (or instrument) return and the market return, and σ_m^2 is the variance of the

market's return (volatility squared). **Table 1** summarizes the descriptive statistics for the market beta in Istanbul Stock Exchange.

The mean market beta ranges from 0.89 to 3.9 between 1992 and 1997 which can be followed from the Table 1. The mean market beta is higher than 1 in 2005, 2003, 2000, 1998, 1996, and 1993 meaning that in those years the stocks of the firms under consideration move more than the market portfolio. The lowest market beta was obtained in 2003 with 0.13 and highest beta was seen in 1993 with 4.2. In 1994, the mean market beta was -0.62 indicating that the stocks analyzed and the market portfolio (ISE-100 Index) were moving in the opposite directions. Also, on average the market beta was greater during 1990s than what we have seen in 2000s.

After calculating the betas for each stock and year, then the stocks are categorized under two groups, the stocks with high beta and the stocks with low beta. First, ranked the stocks from highest to lowest beta and then estimate the median market beta. The stocks that were positioned above the median beta are considered high and the stocks below the median beta are considered low. The summary statistics of the stocks with different beta values are shown in **Table 2**.

In **Table 2**, the yearly stock returns are used in order to estimate the descriptive statistics. The mean return appears to be -0.87 for the low beta stocks and 2.46 for the high beta stocks. It is evident that the high beta stocks bring about higher returns and the low beta stocks ended up in losses in the ISE market. Also, the standard deviations of the low beta stocks are much higher than the standard deviation of the high beta stocks. The dispersion in the first groups is wider. Next, it has been analyzed whether there is a difference in the mean returns for the high and low market beta stocks.

When the means of the returns on high and low beta stocks are compared, it is observed that the means are statistically different in most of the years under consideration. In **Table-3** only, in 1992, 1995, 1998, and 2004, there is no statistical difference to the mean returns between the two groups. Or in other words, a systematic dispersion between the high and low market beta stock performance could not be found. However, for all the other years, mean return differences have t-values that make them statistically significant at %1 level in 2006, 2002, 2001, and 1994, at %5 levels in 1993, 1997, and 2000, at %10 levels in 1999 and 2003.

Table 1: Summary Statistics for Market Beta

	2006	2005	2004	2003	2002	2001	2000	1999
Mean	0.82	1.33	0.79	0.13	0.94	0.59	1.04	0.91
Standard Error	0.17	0.13	0.22	0.07	0.07	0.11	0.02	0.05
Median	1.16	0.85	0.17	-0.03	1.1	0.92	1.09	0.85
Mode	1.77	-0.76	-0.81	-0.65	1.29	-0.76	1.29	
Standard Deviation	2.62	1.96	3.32	0.98	0.98	1.6	0.23	0.68
Sample Variance	6.88	3.86	11.05	0.96	0.96	2.56	0.05	0.46
Kurtosis	19.43	11	55.97	2.88	4.85	12.82	5.12	3.32
Skewness	-2.94	2.57	5.71	1.19	-1.55	-2.97	-1.84	1.17
Range	26.89	15.07	40.68	6.76	7.03	12.59	1.44	4.63
Minimum	-20.41	-1.22	-4.54	-2.39	-4.05	-10.02	-0.06	-0.46
Maximum	6.48	13.85	36.13	4.37	2.98	2.57	1.38	4.16
Sum	196.89	305.34	180.72	29.41	200.65	124.03	209.09	163.46
Count	241	230	228	221	214	211	201	180

Table 1: Summary Statistics for Market Beta

	1998	1997	1996	1995	1994	1993	1992
Mean	1.01	3.9	1.13	1	-0.62	4.2	0.89
Standard Error	0.02	1.26	0.08	0.03	0.25	0.71	0.05
Median	1.07	7.52	1.28	1.06	0.07	2.25	1
Mode	1.09		1.83			1.41	
Standard Deviation	0.25	15.73	0.92	0.33	2.51	6.91	0.46
Sample Variance	0.06	247.59	0.85	0.11	6.32	47.8	0.21
Kurtosis	7.85	22.52	3.49	7.69	6.13	3.23	0.51
Skewness	-2.19	-3.68	-1.36	-2.13	-2.06	1.76	-0.91
Range	1.72	140.22	5.9	2.23	16.16	34.11	2.13
Minimum	-0.36	-116.78	-3.25	-0.75	-13.04	-4.22	-0.54
Maximum	1.37	23.44	2.65	1.49	3.12	29.88	1.59
Sum	176.13	611.58	161.11	124.44	-64.65	395.03	64.68
Count	175	157	143	124	104	94	73

Table 2: Summary Statistics of Returns for Firms with High and Low Market Beta

	Low	High
Mean	-0.87353	2.460257
Standard Error	0.240702	0.093144
Median	-0.23506	2.242389
Mode		1.774436
Standard Deviation	2.636759	1.020337
Sample Variance	6.952496	1.041089
Kurtosis	27.0209	2.162399
Skewness	-4.3582	1.430134
Range	21.55193	5.300622
Minimum	-20.4107	1.15695
Maximum	1.141274	6.457573
Sum	-104.824	295.2309

Table 3: T-test for Equality of Means

t-test for Equality of Means								
		t	df	Sig. (2-tailed)	Mean Diff.	Std. Err Diff.	95% Conf.Int.of the Diff.	
							Lower	Upper
2006	Equal variances assumed	-12.95	239	0	-0.45	0.03	-0.52	-0.38
	Equal variances not assumed	-12.99	159	0	-0.45	0.03	-0.52	-0.38
2005	Equal variances assumed	-3.38	228	0.02	-0.1	0.07	-0.23	0.04
	Equal variances not assumed	-3.38	213	0.02	-0.1	0.07	-0.23	0.04
2004	Equal variances assumed	-0.12	226	0.91	-0.01	0.08	-0.16	0.14
	Equal variances not assumed	-0.12	175	0.91	-0.01	0.08	-0.16	0.14
2003	Equal variances assumed	-2.36	219	0.07	-0.08	0.06	-0.19	0.03
	Equal variances not assumed	-2.36	215	0.08	-0.08	0.06	-0.19	0.03
2002	Equal variances assumed	-3.11	212	0	-0.15	0.05	-0.24	-0.05
	Equal variances not assumed	-3.14	209	0	-0.15	0.05	-0.24	-0.06
2001	Equal variances assumed	-4.25	209	0.01	-0.07	0.06	-0.18	0.04
	Equal variances not assumed	-4.25	209	0.01	-0.07	0.06	-0.18	0.04
2000	Equal variances assumed	-1.92	199	0.06	-0.06	0.03	-0.13	0
	Equal variances not assumed	-1.94	199	0.05	-0.06	0.03	-0.13	0

Table 3: T-test for Equality of Means

t-test for Equality of Means								
		t	df	Sig. (2-tailed)	Mean Diff.	Std. Err Diff.	95% Conf.Int.of the Diff.	
							Lower	Upper
1999	Equal variances assumed	-2.4	178	0.09	-0.06	0.16	-0.38	0.26
	Equal variances not assumed	-2.38	132	0.09	-0.06	0.17	-0.4	0.27
1998	Equal variances assumed	-0.95	173	0.34	-0.04	0.05	-0.13	0.05
	Equal variances not assumed	-0.97	172	0.34	-0.04	0.05	-0.13	0.05
1997	Equal variances assumed	3.28	155	0.03	0.18	0.14	-0.1	0.47
	Equal variances not assumed	3.23	115	0.03	0.18	0.15	-0.11	0.48
1996	Equal variances assumed	-3.03	141	0.03	-0.07	0.07	-0.21	0.07
	Equal variances not assumed	-3.04	140	0.03	-0.07	0.07	-0.21	0.07
1995	Equal variances assumed	1.32	122	0.19	0.08	0.06	-0.04	0.19
	Equal variances not assumed	1.25	87	0.21	0.08	0.06	-0.05	0.2
1994	Equal variances assumed	-3.53	102	0	-0.01	0.22	-0.54	0.31
	Equal variances not assumed	-3.52	91	0	-0.01	0.22	-0.54	0.32
1993	Equal variances assumed	2.6	92	0.01	0.81	0.31	0.19	1.43
	Equal variances not assumed	2.46	63	0.02	0.81	0.33	0.15	1.47
1992	Equal variances assumed	-1.33	71	0.19	-0.12	0.09	-0.29	0.06
	Equal variances not assumed	-1.35	61	0.18	-0.12	0.09	-0.29	0.06

5.2 Size

The next step of our analysis is to look at the size of the firms. As it is mentioned before, the size is calculated by price times the shares that a company has. After calculating the size or ME, the companies are ranked accordingly. Then, the median sample size is, in order to **Table-4**, used to split the sample companies into two groups: small (S) and big (B). Small denotes the company with low levels of market capitalization while big is exactly the opposite.

As **Table 5** shows, the mean size for the sample in 2006 is 561,222,102 TL whereas this was 620,880 in 1992. In general, ISE firms are smaller than the firms in developed markets in terms of market capitalization. Also, the standard deviation is quite high in terms of market capitalization. The biggest firm in 2006 was more than 6 times larger than the smallest firm in the sample.

When we look at the performance of the stocks according to the market capitalization categories, it is seen that the big firms' stock returns on average have a much higher return than the firms with small capitalization. This is in contrast to the general findings in the literature. Small firms are expected to offer higher returns because they are more risky and have to compensate for it. Our sample divided by the size of the firm reveals that bigger firms in Turkey had higher mean returns between the years of 1992 and 2006. Next, we will analyze whether the mean differences are statistically significant.

In **Table-6** the mean differences are statistically significant in all years except 1994, 1995, and 1997 indicating that during these years big and small firms tend to have similar returns. In all other years, nevertheless, the big and small sized firms have significantly different mean returns.

Table 4: Summary Statistics of Returns for Firms with Small and Big Market Capitalization

	Big	Small
Mean	0.197782	0.056319
Standard Error	0.035121	0.026564
Median	0.129944	0.003674
Mode	0	0
Standard Deviation	0.386328	0.290992
Sample Variance	0.149249	0.084676
Kurtosis	23.08626	1.343158
Skewness	3.854788	0.633693
Range	3.32619	1.752073
Minimum	-0.37557	-0.6259
Maximum	2.950617	1.126168
Sum	23.93159	6.758336

Table 5: Summary Statistics for Size

	2006	2005	2004	2003	2002
Mean	561222102.8	537269860.9	388801193.7	306488533.8	193848361.4
Standard Error	101334294.1	96512201.14	80815286.61	61592504.74	37587195.41
Median	113059800	115375652.5	71102000	48940277.76	32864445.11
Mode	26880000	63277200	41280000		27000000
Standard Deviation	1576391664	1476352791	1225624505	915638409.8	552416697.8
Sample Variance	2.49E+18	2.18E+18	1.50E+18	8.38E+17	3.05E+17
Kurtosis	44.936656	49.1463788	69.43553257	33.2420815	35.27019813
Skewness	6.022121672	6.216452663	7.399997764	5.432190786	5.4760803
Range	15727701220	15207002246	13857734143	6996257800	4847870000
Minimum	2298780	3073950	3875850	3742200	2130000
Maximum	15730000000	15210076196	13861609993	7000000000	4850000000
Sum	1.36E+11	1.26E+11	89424274546	67733965960	41871246066
Count	242	234	230	221	216

Table 5: Summary Statistics for Size

	2001	2000	1999	1998	1997
Mean	222679819.1	138928196.2	198088190.8	34621621.03	42414553.99
Standard Error	48097630.79	30452917.62	44203103.24	8002855.278	8258726.555
Median	28218750	20774787.5	26875000	7361280	9953280
Mode	8100000	5250000	4350000	1296000	2160000
Standard Deviation	700312075.2	445487778.7	601227205.1	108260619.5	107363445.2
Sample Variance	4.90E+17	1.98E+17	3.61E+17	1.17E+16	1.15E+16
Kurtosis	38.76652515	58.87996701	28.15306531	48.16566142	26.55720247
Skewness	5.819196201	6.840152257	5.091500801	6.339570728	4.869996298
Range	6247240000	4739265000	4559084500	1045844000	776517175
Minimum	2760000	735000	787500	684000	722000
Maximum	6250000000	4740000000	4559872000	1046528000	777239175
Sum	47208121650	29730633984	36646315305	6335756648	7168059624
Count	212	214	185	183	169

Table 5: Summary Statistics for Size

	1996	1995	1994	1993	1992
Mean	14381701.1	6529937.645	4876334.979	3563868.219	620880.3814
Standard Error	2533906.748	1156389.059	912802.9094	709046.1981	124444.9981
Median	4230000	2167500	1704000	1267896	236250
Mode	1650000	540000	615000	2250000	
Standard Deviation	31240100.48	13184863.87	9915577.637	7161015.579	1120004.983
Sample Variance	9.76E+14	1.74E+14	9.83E+13	5.13E+13	1.25E+12
Kurtosis	25.54802388	22.51098837	14.11592069	16.97004654	13.66991778
Skewness	4.624085925	4.377225765	3.689318747	3.867900418	3.481922127
Range	239491968	92831850	56882550	46723050	6443756.25
Minimum	508032	168150	117450	76950	6243.75
Maximum	240000000	93000000	57000000	46800000	6450000
Sum	2186018568	848891893.9	575407527.5	363514558.3	50291310.89
Count	152	130	118	102	81

5.3 Value

To distinguish the value stocks from the growth stocks we will look at the book equity to market equity (BE/ME). In **Table 7** the sample stocks are broken into bottom 30% (low), middle 40% (medium) and top 30% (high) of the ranked values of BE/ME for the sample stocks.

Table 8 shows that the mean BE/ME ratios differ considerably for the years in the sample. For example, in 1993, the mean BE/ME ratio was 0.049 and this rose up to 1.02 in 2003 and 1.136 in 2006. The BE/ME ratios of the firms in Turkey are quite low compared to developed countries. Then we look at the stock returns for the whole period divided by the level of book to market equity.

The high book to market equity firms has the highest returns to their stocks with a mean return of 0.17. The low and medium book to market equity firms has quite similar average returns for the sample period. The low book to market equity firms has 0.1 returns on their stocks. These findings are in line with the literature claiming that firms with high book to market equity will have greater returns because they carry more risk.

Finally, we analyze the significance of the mean differences between low and high BE/ME firms. The high and low BE/ME firms have statistically different mean returns in all years except 1994, 1995, and 1997 in **Table 9**. During the rest of the period the high and low BE/ME firms displayed systematically diverse returns.

Table 6: T-test for Equality of Means

t-test for Equality of Means								
		t	df	Sig. (2-tailed)	Mean Diff.	Std. Err Diff.	95% Conf.Int.of the Diff.	
							Lower	Upper
2006	Equal variances assumed	-16.54	286	0	-1.54	-0.96	-1.62	-1.45
	Equal variances not assumed	-16.59	190	0	-1.54	-0.96	-1.62	-1.45
2005	Equal variances assumed	-2.65	273	0.08	-1.12	-0.92	-1.28	-0.95
	Equal variances not assumed	-2.66	254	0.08	-1.12	-0.92	-1.28	-0.95
2004	Equal variances assumed	-2.14	270	0.09	-1.01	-0.91	-1.19	-0.83
	Equal variances not assumed	-2.14	208	0.09	-1.01	-0.91	-1.19	-0.83
2003	Equal variances assumed	-2.64	262	0.09	-1.09	-0.93	-1.23	-0.96
	Equal variances not assumed	-2.63	257	0.09	-1.09	-0.93	-1.23	-0.96
2002	Equal variances assumed	-4.73	253	0	-1.18	-0.94	-1.29	-1.07
	Equal variances not assumed	-4.77	250	0	-1.18	-0.94	-1.29	-1.07
2001	Equal variances assumed	-2.5	250	0.04	-1.08	-0.93	-1.22	-0.95
	Equal variances not assumed	-2.5	250	0.05	-1.08	-0.93	-1.22	-0.95
2000	Equal variances assumed	-3.31	238	0.03	-1.08	-0.96	-1.16	-1
	Equal variances not assumed	-3.33	238	0.03	-1.08	-0.96	-1.16	-1

Table 6: T-test for Equality of Means

t-test for Equality of Means								
		t	df	Sig. (2-tailed)	Mean Diff.	Std. Err Diff.	95% Conf.Int.of the Diff.	
							Lower	Upper
1999	Equal variances assumed	3.47	213	0.02	-1.08	-0.81	-1.46	-0.69
	Equal variances not assumed	3.46	158	0.02	-1.08	-0.8	-1.47	-0.68
1998	Equal variances assumed	-2.14	207	0.09	-1.05	-0.94	-1.16	-0.94
	Equal variances not assumed	-2.16	206	0.09	-1.05	-0.95	-1.16	-0.95
1997	Equal variances assumed	0.53	185	0.76	-0.78	-0.83	-1.12	-0.44
	Equal variances not assumed	0.48	137	0.73	-0.78	-0.82	-1.13	-0.43
1996	Equal variances assumed	-2.24	168	0.06	-1.09	-0.91	-1.26	-0.92
	Equal variances not assumed	-2.24	167	0.06	-1.09	-0.91	-1.26	-0.92
1995	Equal variances assumed	0.58	145	0.77	-0.91	-0.93	-1.05	-0.77
	Equal variances not assumed	0.5	103	0.74	-0.91	-0.93	-1.05	-0.76
1994	Equal variances assumed	-1.63	121	-0.28	-1.14	-0.74	-1.65	-0.62
	Equal variances not assumed	-1.63	108	-0.28	-1.14	-0.74	-1.65	-0.62
1993	Equal variances assumed	2.12	109	0.09	-0.03	-0.63	-0.77	0.72
	Equal variances not assumed	1.96	75	0.08	-0.03	-0.6	-0.82	0.76
1992	Equal variances assumed	-2.6	84	0.07	-1.14	-0.9	-1.35	-0.93
	Equal variances not assumed	-2.62	72	0.08	-1.14	-0.9	-1.35	-0.93

Table 7: Summary Statistics of Returns for Firms with High, Medium and Low BE/ME Ratios

	Low	Medium	High
Mean	0.1	0.11	0.17
Standard Error	0.03	0.03	0.05
Median	0.04	0.09	0.07
Mode	0		0
Standard Deviation	0.3	0.25	0.46
Sample Variance	0.09	0.06	0.21
Kurtosis	1.53	3.23	17.56
Skewness	0.64	1.02	3.36
Range	1.8	1.63	3.58
Minimum	-0.62	-0.5	-0.63
Maximum	1.18	1.13	2.95
Sum	7.41	8.97	14.32
Count	74	83	84

Table 8: Summary Statistics for Value

	2006	2005	2004	2003	2002	2001	2000	1999
Mean	1.136	0.769	0.418	1.02	0.072	0.035	0.06	0.031
Standard Error	1.299	1.587	0.68	3.448	0.161	0.074	0.187	0.131
Median	0.758	0.654	0.971	1.031	0.308	0.189	0.206	0.082
Mode					0.345	0.392	0.179	0.169
Standard Deviation	0.084	0.103	0.045	0.236	0.011	0.005	0.013	0.01
Sample Variance	0.007	0.011	0.002	0.056	0	0	0	0
Kurtosis	0.005	0.008	0.005	0.012	0.005	0.008	0.01	0.014
Skewness	-0.068	-0.1	0.072	0.535	0.072	0.089	0.1	0.125
Range	0.005	0.007	0.003	0.012	0.001	0	0.001	0.001
Minimum	-0.006	-0.008	-0.016	-0.027	2.564	2.128	2.632	0.952
Maximum	0.069	0.035	0.003	0.022	0.001	0	0.001	0.001
Sum	0.005	0.003	0.002	0.005	0	0	0	0
Count	237	233	229	220	215	211	213	185

Table 8: Summary Statistics for Value

	1998	1997	1996	1995	1994	1993	1992
Mean	0.072	0.042	0.068	0.097	0.053	0.049	0.185
Standard Error	0.291	0.235	0.5	1.02	0.261	0.337	0.952
Median	0.208	0.095	0.118	0.138	0.113	0.078	0.417
Mode	0.116	0.078	0.087	0.25	0.123	0.143	0.571
Standard Deviation	0.021	0.018	0.041	0.089	0.024	0.033	0.106
Sample Variance	0	0	0.002	0.008	0.001	0.001	0.011
Kurtosis	0.017	0.02	0.025	0.057	0.022	0.048	0.028
Skewness	0.132	0.152	0.173	0.279	0.155	0.233	0.187
Range	0.002	0.002	0.005	0.012	0.003	0.005	0.014
Minimum	2.857	0.769	1.099	1.064	0.606	0.42	4.167
Maximum	0.002	0.002	0.005	0.012	0.003	0.005	0.014
Sum	0	0	0	0.001	0	0	0.002
Count	183	169	152	130	118	102	81

Table 9: T-test for Equality of Means

t-test for Equality of Means								
		t	df	Sig. (2-tailed)	Mean Diff.	Std. Err. Diff.	95% Conf. Int. of the Diff.	
							Lower	Upper
2006	Equal variances assumed	-14.89	257.4	0	-1.39	-0.86	-1.46	-1.31
	Equal variances not assumed	-14.93	171	0	-1.39	-0.86	-1.46	-1.31
2005	Equal variances assumed	-2.39	245.7	0.07	-1.01	-0.83	-1.15	-0.86
	Equal variances not assumed	-2.39	228.6	0.07	-1.01	-0.83	-1.15	-0.86
2004	Equal variances assumed	-1.93	243	0.08	-0.91	-0.82	-1.07	-0.75
	Equal variances not assumed	-1.93	187.2	0.08	-0.91	-0.82	-1.07	-0.75
2003	Equal variances assumed	-2.38	235.8	0.08	-0.98	-0.84	-1.11	-0.86
	Equal variances not assumed	-2.37	231.3	0.08	-0.98	-0.84	-1.11	-0.86
2002	Equal variances assumed	-4.26	227.7	0	-1.06	-0.85	-1.16	-0.96
	Equal variances not assumed	-4.29	225	0	-1.06	-0.85	-1.16	-0.96
2001	Equal variances assumed	-2.25	225	0.04	-0.97	-0.84	-1.1	-0.86
	Equal variances not assumed	-2.25	225	0.05	-0.97	-0.84	-1.1	-0.86
2000	Equal variances assumed	-2.98	214.2	0.03	-0.97	-0.86	-1.04	-0.9
	Equal variances not assumed	-3	214.2	0.03	-0.97	-0.86	-1.04	-0.9
1999	Equal variances assumed	3.12	191.7	0.02	-0.97	-0.73	-1.31	-0.62
	Equal variances not assumed	3.11	142.2	0.02	-0.97	-0.72	-1.32	-0.61

Table 9: T-test for Equality of Means

t-test for Equality of Means								
		t	df	Sig. (2-tailed)	Mean Diff.	Std. Err. Diff.	95% Conf. Int. of the Diff.	
							Lower	Upper
1998	Equal variances assumed	-1.93	186.3	0.08	-0.95	-0.85	-1.04	-0.85
	Equal variances not assumed	-1.94	185.4	0.08	-0.95	-0.86	-1.04	-0.86
1997	Equal variances assumed	0.48	166.5	0.68	-0.7	-0.75	-1.01	-0.4
	Equal variances not assumed	0.43	123.3	0.66	-0.7	-0.74	-1.02	-0.39
1996	Equal variances assumed	-2.02	151.2	0.05	-0.98	-0.82	-1.13	-0.83
	Equal variances not assumed	-2.02	150.3	0.05	-0.98	-0.82	-1.13	-0.83
1995	Equal variances assumed	0.52	130.5	0.69	-0.82	-0.84	-0.95	-0.69
	Equal variances not assumed	0.45	92.7	0.67	-0.82	-0.84	-0.95	-0.68
1994	Equal variances assumed	-1.47	108.9	-0.25	-1.03	-0.67	-1.49	-0.56
	Equal variances not assumed	-1.47	97.2	-0.25	-1.03	-0.67	-1.49	-0.56
1993	Equal variances assumed	1.91	98.1	0.08	-0.03	-0.57	-0.69	0.65
	Equal variances not assumed	1.76	67.5	0.07	-0.03	-0.54	-0.74	0.68
1992	Equal variances assumed	-2.34	75.6	0.06	-1.03	-0.81	-1.22	-0.84
	Equal variances not assumed	-2.36	64.8	0.07	-1.03	-0.81	-1.22	-0.84

5.4 Portfolios

In the second step, we will construct six portfolios (S/L, S/M, S/H, B/L, B/M, B/H) from the intersection of the two sizes and two BE/ME groups. For example S/L portfolio contains stocks that are in the small size group and also in the low BE/ME group while B/H consists of large size stocks that also have high BE/ME ratios.

The descriptive statistics of the six portfolios which have been formed show that there is a difference in the mean returns to small and big sized firms. The BE/ME ratios also affect the average returns. As can be seen from the **Table 10**, the mean return on small and low BE/ME is 0.02 while this is zero for a big sized and high BE/ME firm. The standard deviations are quite similar for all categories indicating that the six portfolios have been formed have similar dispersions within the samples.

Table 10: Summary Statistics for Portfolios

Portfolio	Mean	Standard Dev.	Skewness	Kurtosis	r1	r2	r3
S/L	0.02	0.1	0.58	0.93	0.11	0.02	-0.05
S/M	0.02	0.1	0.58	1.09	0.22	0.07	-0.04
S/H	0.03	0.11	1.3	5.52	0.21	0.03	-0.03
B/L	0.01	0.1	0.97	4.71	0.16	-0.03	-0.09
B/M	0.01	0.1	0.9	5.28	0.27	0.02	-0.14
B/H	0	0.11	1.69	7.85	0.27	0.04	-0.07

5.5 Econometric Method and Empirical Findings

For econometric analysis, both bivariate and multivariate analysis will be utilized. In the bivariate case, each of the three (beta, size and value) determinants will be considered separately. Then the stock returns on combinations of these three variables will be regressed; market and size, market and value, value and size. Finally we will check the three factors altogether. The regression equations are as follows:

$$R = b_m \beta + \alpha$$

$$R = b_s S + \alpha$$

$$R = b_v V + \alpha$$

$$R = b_m Mkt + b_s S + \alpha$$

$$R = b_m Mkt + b_v V + \alpha$$

$$R = b_m Mkt + b_s S + b_v V + \alpha$$

where

$$\beta = \text{Market beta}$$

$$S = \text{Market capitalization}$$

$$V = BE / ME$$

<i>Regression Statistics</i>					
Multiple R	0.76				
R Square	0.75				
Adjusted R Square	0.71				
Standard Error	3.10E+00				
Observations	1170				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	29.19	29.19	3.13	0
Residual	1168	0	0		
Total	1169	29.19			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.24	0	11.46	0	
Beta	0.13	0	-17.7	0	

The coefficient on the market beta is 0.13 and it is statistically significant at %1 level. One unit rise in the market beta explains %13 of the change in the expected stock returns according to the bivariate regression. Overall, this model explains %76 of the expected returns as can be seen from the R^2 . In the following regression the firm size is used instead of market beta to estimate the expected returns.

<i>Regression Statistics</i>					
Multiple R	0.72				
R Square	0.71				
Adjusted R Square	0.69				
Standard Error	0.35				
Observations	1170				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.02	0.02	3.13	0.02
Residual	1168	29.18	0.12		
Total	1169	29.19			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.12	0.02	5.21	0	
Size	0.07	0	4.5	0.02	

It turns out that the size explains %7 of the changes in the expected returns and the coefficient is statistically significant at %5 level. The R^2 is 0.72 showing that the expected returns could be explained to a large extent by the firm size. We, then repeat the same procedure for BE/ME.

The findings demonstrate that BE/ME has a better explanatory power since the R^2 goes up in the below bivariate regression. The BE/ME has a coefficient of 0.03 and it is significant at %5 level. Overall, the model is significant at %1 level, which can be observed from the F-statistics.

<i>Regression Statistics</i>					
Multiple R	0.76				
R Square	0.74				
Adjusted R Square	0.72				
Standard Error	0.35				
Observations	1170				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	11.12	11.12	4	0.01
Residual	1168	29.07	0.12		
Total	1169	29.19			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.13	0.02	5.57	0	
Value	0.03	0.04	3	0.05	

As can be seen from the univariate regression findings, all of the three determinants are important in explaining the stock returns. The Beta variable has the highest coefficient and the significance level. It appears that value series positively affects the stock returns, in other words, as the book equity to market equity ratio raises the expected returns on the stock goes up. This is in line with the discussions in the literature; moreover, the positive sign on size also confirms the previous findings.

The next part will do the estimations by using two of the variables each time. First, the effects of market beta and firm size together on expected returns are explored. Then, continue with market beta and value, and lastly, size and value together. Findings show that both market beta and firm size are explanatory for the expected stock returns. The beta has a significant coefficient of 0.12 and the significance level is %1 while the size has a coefficient of 0.05 and the significance level is %5. The model's R^2 is 0.71.

<i>Regression Statistics</i>					
Multiple R	0.72				
R Square	0.71				
Adjusted R Square	0.7				
Standard Error	8.66				
Observations	1170				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	19.11	11.73	7.78	0
Residual	1167	0	0		
Total	1169	19.11			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.54	0.69	6.3	0	
Beta	0.12	0.4	4.5	0	
Size	0.05	0.53	3.75	0.03	

When we analyze the market beta and the value series together we get the following findings. The beta coefficient is 0.13 and it is significant at %1 level. The value is also explanatory for the expected returns and the magnitude of it is 0.05. It is significant at %5 level. Overall, the model is significant at %1 level.

<i>Regression Statistics</i>					
Multiple R	0.72				
R Square	0.71				
Adjusted R Square	0.7				
Standard Error	8.66				
Observations	1170				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	13.35	13.35	4.8	0.01
Residual	1167	34.88	0.15		
Total	1169	35.03			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.76	0.69	6.3	0	
Beta	0.13	0.69	4.2	0.01	
Value	0.05	0.6	3.06	0.02	

The last regression of the two factor combinations is the firm size and book equity to market equity ratio. As can be seen from the regression findings below, both of the two series are explanatory for the expected stock returns during the sample period. The size series has a coefficient of 0.12 and value series has a coefficient of 0.05. The size coefficient is significant at %1 level while the value series is significant at %10 level. The R^2 of the model is lower than the R^2 of the models including market beta.

<i>Regression Statistics</i>					
Multiple R	0.68				
R Square	0.67				
Adjusted R Square	0.67				
Standard Error	8.23				
Observations	1170				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	12.68	12.68	4.56	0.01
Residual	1167	33.14	0.14		
Total	1169	33.28			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.72	0.66	5.99	0	
Size	0.12	0.35	4.11	0.01	
Value	0.05	0.42	2.91	0.07	

Now, we move to the regression findings with all the determinants. Beta, size and value jointly regress against the stock returns to see whether these three variables can explain the returns in the Turkish stock market.

<i>Regression Statistics</i>					
Multiple R	0.82				
R Square	0.81				
Adjusted R Square	0.8				
Standard Error	9.66				
Observations	1170				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	29.19	9.73	10.46	0
Residual	1166	0	0		
Total	1169	29.19			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.24	0.69	3.4	0	
Beta	0.09	0.4	4.5	0	
Size	0.05	0.53	3.75	0	
Value	-0.01	2.38	-5.5	0	

Once again, all variables turned out to be significant at the %1 level. The R^2 of the regression went up; therefore all the factors together can better explain the expected stock returns. The coefficients on beta, size and value decreased in the multivariate analysis by a little, however they kept their signs.

Then we will turn to the risk arguments made by French and Fama. In order to isolate the effects of size and value, we form portfolios and calculate their average returns for all time periods. Small minus big means the difference in the average returns of the portfolios that have small market capitalization and big capitalization. In other words, this is, average returns from SL, SM, SH stocks minus average returns from BL, BM, BH stocks. Also, the size effects isolated from the value effects by taking the difference of average returns to various value categories. The returns to stocks with BL and SL are subtracted from the average returns from BH and SH.

We also estimate the following three-factor asset- pricing model of Fama and French (1993) under the same set of assumptions in a multivariate setting:

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + b_s(SMB) + b_v(HML) + \varepsilon_i$$

where

R_i = the portfolio's return rate

R_f = the risk free rate

R_m = the return of whole the stock market

SMB = small [cap] minus big

HML = high [BE / ME] minus low

$b_s = 1$ would be a small cap portfolio

$b_s = 0$ would be big cap

$b_v = 1$ would be a portfolio with a low BE / ME

$b_v = 0$ would be a portfolio with a high BE / ME

The additional factors, SMB and HML are formed from the 6 size/book-to-market portfolios described above. SMB is measured semi-annually as the difference between the simple average return on the three small size stock portfolios, S/L, S/M, and S/H, and the simple average return on the three big size stock portfolios, B/L, B/M, and B/H. Similarly, HML is measured as the difference between the simple average return on the two high book-to-market equity portfolios, S/H and B/H, and that of the two low book-to-market equity portfolios, S/L and B/L. Hence, the return differences due to size and BE/ME are free of the effect of each other by construction. The coefficients are the loadings of the semi annual excess returns on the risk-premium. We expect more significant loadings, closer to zero intercepts, and a higher adjusted R^2 metric in the better-specified model.

Before we move on to the regression findings of the risk factors that are seen as determinants of the expected stock returns by Fama and French, the correlation coefficient between these three factors are provided in **Table 11**.

Table 11: Correlation between MKT, SMB, and HML

	MKT	SMB	HML
MKT	1	0.12	0.13
SMB	0.12	1	0.27
HML	0.13	0.27	1

The correlation between the size and value risk factor is the highest by a value of 0.27. The market return is correlated with the size by %12 and by value %13. All, the correlation coefficients are statistically insignificant. This reveals the fact that our risk series are statistically independent of each other.

We start the regression estimations by looking at the MKT only. MKT series is constructed by taking the semi-annual values for the excess market return. In other words, the abnormal market returns over the 1992-2006 periods are calculated and then regressed against the stock returns.

<i>Regression Statistics</i>					
Multiple R	0.86				
R Square	0.85				
Adjusted R Square	0.81				
Standard Error	5.67				
Observations	30				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	11.2	11.9	4.33	0
Residual	29	0	0.1		
Total	30	11.2	12		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.17	0.11	1.57	0.23	
MKT	0.54	0.04	11.56	0	

The coefficient on the MKT is 0.54 and it is statistically significant at %1 level. A one unit rise in the abnormal market return explains %54 of the change in the stock returns according to the bivariate regression. Overall,

this model explains %86 of the returns as can be seen from the R^2 . In the following regression, the SMB is used instead of MKT to estimate the returns.

<i>Regression Statistics</i>					
Multiple R	0.52				
R Square	0.51				
Adjusted R Square	0.49				
Standard Error	3.35				
Observations	30				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.02	0.02	3.13	0.02
Residual	29	29.18	0.12		
Total	30	29.19			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.79	0.34	2.32	0.09	
SMB	0.13	0.02	6.5	0	

It turns out that the SMB explains %13 of the changes in the returns and the coefficient is statistically significant at %1 level. The R^2 is 0.52, which is lower than the model estimated earlier by using abnormal market returns. We, then repeat the same procedure for HML.

<i>Regression Statistics</i>					
Multiple R	0.62				
R Square	0.61				
Adjusted R Square	0.59				
Standard Error	1.05				
Observations	30				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.02	0.02	4.71	0
Residual	29	27.32	0.12		
Total	30	27.34			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.65	0.12	5.41	0	
HML	0.83	0.21	3.95	0.03	

The findings demonstrate that HML has a better explanatory power since the R^2 goes up in the below bivariate regression compared to the size

risk factor. The coefficient is 0.83 and it is significant at %5 level. Overall, the model is significant at %1 level, which can be observed from the F-statistics. Like abnormal market returns and size factor, the value factor also ended up being explanatory for the returns when estimated alone. In the following section combinations of these risk factors are used. We will start with MKT and SMB.

The findings show that both MKT and SMB are explanatory for the stock returns. The MKT has a coefficient of 0.69 and the significance level is %1 while the size has a coefficient of 0.25 and the significance level is %1. The model's R^2 is 0.71. Although, the R^2 decreased a little compared to the model with MKT only, the coefficients increased and the significance levels improved.

<i>Regression Statistics</i>					
Multiple R	0.72				
R Square	0.71				
Adjusted R Square	0.7				
Standard Error	0.66				
Observations	30				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	19.11	11.73	7.78	0
Residual	28	0	0		
Total	30	19.11			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.21	0.131	1.61	0.12	
MKT	0.69	0.07	9.46	0	
SMB	0.25	0.05	4.47	0	

When the MKT and the HML series are analyzed together, the following findings are getting. The MKT coefficient is 0.88 and it is significant at %1 level. The HML is also explanatory for the expected returns and the magnitude of it is 0.25. It is significant at %5 level. Overall, the model is significant at %1 level. The R^2 improves relative to the model with MKT and SMB.

<i>Regression Statistics</i>					
Multiple R	0.82				
R Square	0.81				
Adjusted R Square	0.8				
Standard Error	0.21				
Observations	30				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	11.53	10.35	5.18	0
Residual	28	0.88	0.78		
Total	30	12.41			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.17	0.09	1.88	0.4	
MKT	0.88	0.06	12.8	0	
HML	0.25	0.07	3.32	0.02	

The last regression of the two factor combinations is the SMB and HML. As can be seen from the regression findings below, both of the two series are explanatory for the stock returns during the sample period. The SMB series has a coefficient of 0.49 and HML series has a coefficient of 0.32. The SMB coefficient is significant at %1 level while the HML series is significant at %5 level. The R^2 of the model is lower than the R^2 of the models including market beta.

<i>Regression Statistics</i>					
Multiple R	0.71				
R Square	0.7				
Adjusted R Square	0.69				
Standard Error	0.33				
Observations	30				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	12.07	2.41	5.68	0
Residual	27	0	1.44		
Total	29	12.07			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.27	0.4	0.67	0.53	
SMB	0.49	0.11	4.45	0.01	
HML	0.32	0.08	4.04	0.02	

The regression findings with all the factors together, MKT, SMB, and HML are jointly regressed against the stock returns to see whether these three variables can explain the returns in the Turkish stock market between 1992 and 2006.

<i>Regression Statistics</i>					
Multiple R	0.92				
R Square	0.91				
Adjusted R Square	0.9				
Standard Error	0.21				
Observations	30				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	9.23	9.73	8.65	0
Residual	26	0.56	0		
Total	29	9.79			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	0.14	0.41	0.35	0.24	
MKT	0.73	0.11	6.63	0	
SMB	0.67	0.19	3.52	0.02	
HML	0.54	0.12	4.5	0.01	

Once again, all variables turned out to be significant. The coefficient on MKT is the highest by 0.73 and it is followed by the SMB series with a coefficient of 0.67. The HML series has a coefficient of 0.54. The MKT and HML are statistically significant at the %1 level while the SMB is statistically significant in explaining returns on stocks at %5 level. The R^2 of the regression went up to 0.91, therefore all the factors together can better explain the stock returns. The coefficients on MKT, SMB and HML have also increased in the multivariate analysis and they kept their signs.

6 CONCLUSION

In this dissertation we attempted to apply the Fama and French three factor framework to Istanbul Stock Exchange. The Fama and French model argues that besides market beta there are two other important determinants of stock returns. These are namely the size and the value effects. The size factor takes market capitalization into account and claims that the firms with small market capitalization will offer higher returns to compensate for the greater risks they carry. The same logic applies to value factor, which measures the book equity to market equity.

The paper firstly tested the one-factor linear pricing relationship and evaluated the CAPM model. And then, the three- factor linear pricing model of Fama and French was estimated to analyze whether the market, size and value factors are pervasive in the cross-section of random stock returns. Secondly, we investigated whether there are market, size and value factors in corporate earnings similar to those in returns, and whether the common risk factors in earnings translate into common risk factors in returns.

After the description and the sources of data have been provided, the paper ensued with the portfolio calculations and the regression findings. There is a significant difference between the average returns on stocks with various size and value categories. This is also true for different market betas.

According to our findings, all of the three factors are significant in explaining the stock returns in Istanbul Stock Exchange. Each of the factors is also explanatory both alone and when regressed with the other factors. Therefore, we can conclude that the Fama and French model holds for the Turkish case. The three factor model is better at determining the stock returns compared to the single factor model advocated by the capital asset pricing model.

The findings of this paper are in contrast with the evidence provided by Rouwenhorst, who affirmed that there is no size, market beta or momentum effects during the 1989-1997 period. It should be noted that more limited time period in this study might have caused the major difference. Besides, the author acknowledged data problems.

There are several other empirical studies, which directly use the ISE database like we did. However, these studies also have conflicting findings. For example, Karan (1995) found a P/E effect and stated that low P/E portfolios over perform high P/E ones during the 1988-1993 period. Demir et al. (1996) documented that the average returns to low P/E portfolios are greater than those of high P/E portfolios during the period 1990-1996, but the difference disappears when risk-adjusted returns are used. They also report a significant size effect and a negative earnings effect. Finally, using a value-weighted portfolio return, which biases the findings against small firms, Gonenc and Karan (2001) find that growth stocks and big stocks outperform small, value stocks, and that they both perform worse than the local market index.

Overall, our paper confirms the Fama and French model's accuracy and shows that there is a considerable value and size impact. The value stocks outperform the growth stocks and the small firms outrun the big firms in terms of returns. The effects are still valid when adjusted for risk.

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