Business and Economics Research Journal
Volume 4 Number 2 2013
pp. 11-22
ISSN: 1309-2448
www.berjournal.com

Fama and French Three-Factor Model: Evidence from Istanbul Stock Exchange

Veysel Eraslan[a]

Abstract: *This study tests the validity of the Fama and French three-factor asset pricing model on the Istanbul Stock Exchange (ISE). Monthly excess stock returns over the period from 2003 to 2010 are used in the analysis. Realized returns show that portfolios containing large firms have higher average excess returns than portfolios containing smaller sized firms. Generally, portfolios containing low book-to-market ratio firms perform better than those containing high book-to-market ratio firms. Nine portfolios are constructed according to size and book-to-market ratio of firms in order to explain the variations on excess portfolio returns by using market risk factor, size risk factor and book-to-market ratio risk factors. Size factor has no effect on portfolios having big-size firms but can explain the excess return variations on portfolios having small and medium-sized firms. Book-to-market ratio factor has an effect on portfolios with high book-to-market ratio firms. Fama and French three-factor model has power on explaining variations on excess portfolio returns but this power is not strong throughout the test period on the ISE.*

Keywords: Asset pricing, book-to-market ratio, Fama and French three factor model, risk, excess return.

JEL Classification: G, G1, G12

1. Introduction

After the construction of Modern Portfolio Theory by Markowitz (1952), different models have been developed in order to relate excess portfolio returns to excess market portfolio returns. A popular model used to explain this relationship is the Capital Asset Pricing Model (CAPM) which was developed by Sharpe (1964) and Lintner (1965). The idea of this model is based on only one risk factor which is the excess market portfolio return. In this model, covariance of portfolio return with the market portfolio return plays an important role in explaining variations on the excess portfolio return. However, an empirical study by Fama and French (1992) shows that covariance of portfolio return and market return does not explain changes on portfolio excess returns. They find that covariance has little or no power in terms of explaining cross-sectional variations in equity returns.

The Fama and French three-factor asset pricing model was developed as a response to poor performance of the CAPM in explaining realized returns. Fama and French (1993) argue that anomalies relating to the CAPM are captured by the three-factor model. They base their model on the fact that average excess portfolio returns are sensible to three factors namely: (i): excess market portfolio return; (ii): the difference between the excess return on a portfolio of small stocks and the excess return on a portfolio of big stocks (SMB, small minus

[a]PhD., Res. Assist., Istanbul University, Faculty of Economics, Department of Economics (English), Istanbul, Turkiye, eraslanv@gmail.com

big); and (iii) the difference between the excess return on a portfolio of high-book-to-market stocks and the excess return on a portfolio of low-book-to-market stocks (HML, high minus low). They formulate their model as:

$$E(R_i) - R_f = b_i[E(R_M - R_f)] + s_i E(SMB) + h_i E(HML) \quad (1)$$

where

$E(R_i)$: Expected rate of portfolio return.

R_f: Risk-free rate of return.

$E(R_M\text{-}R_f)$: Expected rate of excess market portfolio return.

E (SMB): Expected value of the difference between the excess return on a portfolio of small stocks and the excess return on a portfolio of big stocks.

E (HML): Expected value of the difference between the excess return on a portfolio of high-book-to-market stocks and the excess return on a portfolio of low-book-to-market stocks

The model fits two additional risk factors to the CAPM in order to explain the return variations better and cure the anomalies of the CAPM. Fama and French (1996, p.56) point out that the model captures many of the variations in the cross-section of average stock returns, and it absorbs most of the anomalies that have plagued the CAPM. In the same study they argue that the empirical success of their model suggests that it is an equilibrium pricing model, a three-factor version of Merton's (1973) intertemporal CAPM or Ross's arbitrage pricing theory.

This paper empirically tests the Fama and French three-factor model on Istanbul Stock Exchange (ISE). The aim of this study is to test the validity of the model with Turkish equity market data. It is important that investors identify the factors affecting portfolio returns. This study aims to test whether these factors are good indicators for constructing portfolios. This makes evaluation of risk of a specific portfolio more accurate and easier. The paper is also aimed at extending the prior studies on the ISE with a more complete and numerically larger dataset than other studies. This study uses a larger index (ISE-all index). Most of the previous studies were based on a smaller size index (ISE-100) or sectoral indices. One of the goals of the study is to show that the CAPM is not the only reliable model on explaining portfolio returns variations and the Fama-French model can also contribute to portfolio construction and risk identification. In Section Two of this study, previous studies concerning the Fama and French three-factor model are summarized. In Section Three, data and methodology are presented. Section Four summarizes statistical and empirical results. A summary and concluding remarks are provided in Section Five.

2. Literature review

Study of Fama and French (1993) presents a different perspective to asset pricing models. They aim to explain excess portfolio returns with three risk factors. These factors are excess market portfolio return, the difference between the excess return on a portfolio of small stocks and excess return on a portfolio of big stocks, and the difference between the

excess return on a portfolio of high-book-to-market stocks and the excess return on a portfolio of low-book-to-market stocks. They find that portfolios constructed to mimic risk factors related to market, size and book-to-market-equity (BE/ME) have important effects on stock returns. They claim that the model is successful in capturing the cross-section of average returns on U.S. stocks.

Fama et. al (1993) explain the differences between the returns on the New York Stock Exchange (NYSE) and National Association of Security Dealers (NASD). Stocks on the NYSE have higher average returns than the stocks of similar size on the NASD during the test period. They use Fama and French three-factor model to explain the difference. Their analysis demonstrates that reason for this variation is the difference between the risk of the stocks, which is captured by Fama and French three-risk factor model. Fama et al. (1993, p.37) argue that stocks with high sensitivity tend to be firms with persistently poor earnings, which lead to low stock price and high book-to-market equity ratios. Stocks with low sensitivity to the book-to-market risk factor tend to have persistently high earnings which lead to low BE/ME. They conclude that book-to-market ratio is the most important risk factor that explains the difference in returns between NYSE stocks and NASD stocks.

Fama and French (1995,) test whether variations on stock prices, in relation to size and BE/ME reflect the variations on earnings. Fama and French (1995, p.131) show that consistent with rational pricing, high BE/ME signals persistent poor earnings and low BE/ME signals strong earnings. They test their model on NYSE, AMEX and NASDAQ stock markets. They find that market and size factor in earnings explain the factors in returns but they did not find any relation between BE/ME factors in earnings and returns.

Another study belongs to Fama and French (1996) includes U.S. data. They argue that anomalies of the CAPM widely disappear by using a three-factor model. By using the equation (1), they can explain the strong patterns in returns observed when portfolios are formed according to earnings/price, cash flow/price and sales growth.

Daniel and Titman (1996) test the Fama and French model on NYSE, AMEX and NASDAQ for the period 1963-1993. Their findings do not support Fama and French model. They conclude that there is no relation between expected return and Fama- French risk factors.

Aleati et.al (2000) tested the model for stocks listed on Italian Stock Exchange during the period 1981-1993. They find that only the market index and variables related to interest rate changes are priced in the stock returns. They conclude that size and price-to book ratio are dependent on the estimation period.

Davis, Fama and French (2000) test the model by extending Daniel and Titman's (1997) study from 1929 through 1997. They find a contradicting result with Daniel and Titman. Their study supports the validity of Fama and French model.

Connor and Sehgal (2001) empirically examine the Fama and French model for India. Their results support the model. They accept that there are many questions unanswered in their study. One of the questions is if the size and value factors pervasive in explaining the risk of a wider range of portfolio.

Faff (2001) tests the model in Australian stock market by using shelf index. Results support the Fama and French model. He finds that the estimated premia for the market and for the book-to-market factor are positive. He emphasizes that this perverse result relates to the size risk premium which is negative in the sample.

Aksu and Onder (2003) compared the Capital Asset Pricing Model and Fama-French Three Factor Model on Istanbul Stock Exchange. This study contains only non-financial firms traded in the ISE during the 1993-1997 period. Monthly stock returns including dividends are used in the analysis. They find that Fama and French model has explanatory power on explaining stock return variations. Additionally, they find that Fama and French Model is more efficient than CAPM in explaining stok returns.

Gaunt (2004) tests validity of both the Fama and French model and the CAPM in Australian Stock Exchange. He finds that Fama and French three-factor model provides a better explanation of Australian stock returns than the CAPM.

Another test of the three factor model in Australian market belongs to Faff (2004). He uses the Generalized Method of Moments approach. Results of the study support the three factor model based on asset pricing tests but when the estimated risk premia is considered, evidence for validity of the Fama and French model is less powerful.

Doganay (2006) tests the Fama and French model on Istanbul Stock Exchange. Test period includes the months from July 1995 through June 2005. This study supportS that excess market portfolio return, size and market-to-book ratio are effective on the variations of excess portfolio returns.

Gökgöz (2008) uses the ISE sectors indexes to test the model during the years 2001-2006. In this study, validity of the Fama and French three-factor model is tested for each industry, services, real estate, financel and technology sector indexes. It is concluded that Fama and French model has a powerful support in the scope of this study. It is also emphasized that since the model is applicable on ISE, it can be used by investors.

Al-Mwalla and Karasneh (2011) test the model in Amman stock market over the period June 1999 to June 2010. They also test the CAPM with the same data and compare the results of these two models. They indicate that Fama and French model has more explanatory power than the CAPM during the test period.

Güzeldere and Sarıoglu (2012) test the validity of the model on ISE-100 index throughout the years from 1999 to 2011. Monthly returns are analyzed by using panel data analysis method. Findings of the study support the validity of the Fama and French three-factor model during the study period. It is concluded that this model is a good and powerful alternative to the CAPM.

Hamid et.al (2012) test the efficacy of the model by using portfolio returns for returns in financial sector. They use the stocks listed on Karachi Stock Exchange in Pakistan. Fama and French model is applied to six portfolios in this study. Monthly data belong to 20 banks are taken for five-year period starting from January 2006 to December 2010. Results of the study show that the model is applicable to the financial sector of Pakistan’s economy.

3. Data and methodology

The principal aim of this study is to test the validity of the Fama and French three-factor model on the ISE. This research adopts a methodology similar to that developed by Fama and French (1996). The ISE is the only stock exchange in Turkey. As of February 2012 the ISE has had a total capitalization of over 400 billion TRY and monthly volume of about 90 billion TRY.[1] In total, there are 365 stocks trading on ISE. The current study has a monthly-based test period from January 2003 to December 2010. Throughout this 96-month analysis period, firms included in this study should have been listed for at least 36 months prior to the portfolio formation date. This requirement aims to ensure that all companies have more than two years' accounting data available. This time restriction contributes to the reliability of the data. Gaunt (2004) uses a similar strategy (18-month restriction) in his study. Thus, 274 stocks listed in ISE-all index are analyzed in the study. The Fama and French three-factor model regression equation is stated as:

$$R_{it} - R_{ft} = \alpha_{it} + b_{it}\left(R_{Mt} - R_{ft}\right) + s_{it}(SMB) + h_{it}(HML) + \varepsilon_{it} \qquad (2)$$

where R_i is the total return of portfolio i, R_f is the risk free asset return and R_M is the total market portfolio return. The left-hand side of equation (2) is the excess portfolio return in month t, (R_{Mt}-R_{ft}) is the excess market portfolio return in month t. In this study, ISE-all index is used as a proxy for the market portfolio. Monthly returns of three or six-month Turkish Treasury bill rates are used as a proxy for the risk free rate.[2] The second risk factor, calculated as small minus big (SMB), is the difference in returns on a portfolio of small stocks and on a portfolio of big stocks. The words small and big stand for size of the market equity (ME) which is the multiplication of the share price and the number of shares outstanding. The third risk factor, high minus low (HML), represents the difference in returns on a portfolio of high book-to-market value (BE/ME) stocks and on a portfolio of low BE/ME stocks. Ruppert (2010, p.456) defines book value as the net worth of the firm according to the its accounting balance sheet.

Risk factors SMB and HML are similar to those in the Fama and French (1996) portfolio formation procedure. From 2003 through to 2010 ISE-all stocks (remaining 274 stocks) are allocated to two groups which are small or big (S or B), based on whether their market equity (ME) is below or above the median ME for ISE stocks. ISE stocks are placed in an independent sort to three book-to-market equity (BE/ME) groups (low, medium or high; L, M, or 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. The final six portfolios are the intersection of the two ME and the three BE/ME groups (S/L, S/M, S/H, B/L, B/M and B/H). For example, the S/H portfolio includes the stocks in the small-size group that are also in the high-BE/ME group. Excess return on these portfolios in each month is calculated by averaging the total excess returns of the individual stocks in these portfolios. Individual stock excess-return is the difference between individual stock-return in that month and risk free rate in that month. Individual stock return in any month is calculated by ISE as:

$$G_i = \frac{F_i * (BDL + BDZ + 1) - R * BDL + T - F_{i-1}}{F_{i-1}} \qquad (3)$$

where G_i is the return of individual asset for month i, F_i is the closing price of the stock on the last trading day of month i, BDL is the number of rights issues received during the month, BDZ is the number of bonus issues received during the month, R is the price for exercising rights (i.e. subscription price), T is the amount of net dividends received during the month for a stock with a nominal value of TRY, F_{i-1} is the closing price of a stock on the last trading day of the month i-1.[3]

For each month SMB is the difference between the average of the returns on the three small-stock portfolios (S/L, S/M and S/H) and the average of the returns on the three big stock portfolios (B/L, B/M and B/H).

$$SMB = [(S/L+S/M+S/H) – (B/L+B/M+B/H)]/3 \quad (4)$$

HML is the difference between the average of the returns on the two high-BE/ME portfolios (S/H and B/H) and the average of the returns on the two low-BE/ME portfolios (S/L and B/L).

$$HML = [(S/H+B/H) – (S/L+B/L)]/2 \quad (5)$$

After the construction of SMB and HML portfolios for the right hand side of equation (2), nine portfolios are constructed with a similar procedure in order to calculate excess portfolio returns for each month. All 274 stocks used in the analysis are sorted by size and distributed into three groups (S, M, B) such that first one (S) contains 91 stocks, the second (M) contains 92 stocks and the last (B) contains 91 stocks. Moreover, stocks are independently allocated to another three groups (L, M, H) based on the book-to-market equity (BE/ME) such that first one (L) contains 91 stocks, the second (M) contains 92 stocks and the last (H) contains 91 stocks. Nine portfolios (S/L, S/M, S/H, M/L, M/M, M/H, B/L, B/M, B/H) are constructed as the intersection of the three size groups and three BE/ME groups. For example, B/L portfolio is constructed by the stocks in the biggest third of firms and the lowest third of BE/ME ratio.

4. Empirical Results

Portfolio return values and their statistical relationships are presented with regression results here.

4.1. Summary Statistics

Table 1 below shows mean and standard deviations of six portfolio-returns, SMB portfolio return and HML portfolio return.

Table 1: Summary statistics for six portfolios, excess market portfolio return, SMB and HML

Portfolio	Mean	St. Dev.
S/L	1.3409	10.1612
S/M	1.1934	9.4480
S/H	1.1401	10.0680
B/L	1.4655	10.2702
B/M	1.3942	8.8152
B/H	2.1655	9.0585
R_M-R_f	0.9421	9.2169
SMB	-0.4502	3.5650
HML	0.4991	8.0214

As for the three risk factors, excess-market return (RM-Rf) and HML are more volatile than SMB. While the former two have positive mean returns, the latter has a negative mean return. Higher BE/ME ratios yield poor earnings as mentioned by Fama and French (1995), except in the case of the B/H portfolio.

Table 2 shows the correlation between three risk factor portfolios. Excess market portfolio return is negatively related to both SMB and HML portfolio returns. This correlation is not strong. Although SMB and HML portfolios are positively correlated, this correlation is weak.

Table 2: Correlation between three risk factor portfolios

	R_M-R_f	SMB	HML
R_M-R_f	1	-0.16259	-0.3637
SMB	-0.16259	1	0.0979
HML	-0.3637	0.0979	1

Table 3 below reports the number of stocks in each of the nine portfolios.

Table 3: Number of stocks in each nine portfolios

	Book-to-Market Equity (BE/ME)		
Size	**Low (L)**	**Medium (M)**	**High (H)**
Small (S)	39	27	25
Medium (M)	31	33	28
Big (B)	21	32	38

Table 4 shows the average monthly rate of return for constructed nine-portfolios and the standard deviation for dependent variables.

Table 4: Average monthly rate of excess returns for constructed nine portfolios and the standard deviations for dependent variables

	Book-to-Market Equity (BE/ME)					
Size	**Mean Excess Returns**			**Standard Deviations**		
	Low (L)	**Medium (M)**	**High (H)**	**Low (L)**	**Medium (M)**	**High (H)**
Small (S)	1.2448	1.0536	1.2991	10.1768	9.8978	9.8562
Medium(M)	1.6110	1.3714	1.9939	10.4445	8.8444	10.4761
Big (B)	1.2609	1.5710	1.9327	10.3226	9.3001	8.3369

It can be inferred from Table 4 that there is to be a positive relation between average return and the size of the portfolios. In other words, big size portfolios (B/L, B/M, B/H) outperform small size portfolios (S/L, S/M, S/H). High BE/ME stocks (S/H, M/H, B/H) outperform low BE/ME stocks (S/L, M/L, B/L). This is a conflicting result to six-portfolio mean results in Table 1. Medium size portfolios (M/L, M/M, M/H) outperform small size portfolios (S/L, S/M, S/H). On the other hand, two of medium BE/ME portfolios (S/M and M/M) perform worse than low BE/ME portfolios (S/L and M/L). However, the B/M portfolio outperforms the B/L portfolio. Thus it can be concluded that there is a persistent size effect on the ISE. Value effect also exists but it is not as persistent as the size effect.

4.2. Estimation Results

Equation (2) is used for estimating the effects of the three risk factors on excess portfolio returns. Estimation results are summarized in Table 5.

Table 5: Regression results of Fama and French three-factor model.

	Book-to-Market Equity (BE/ME)					
	intercept			p-value		
SIZE	Low (L)	Medium (M)	High (H)	Low (L)	Medium (M)	High (H)
Small (S)	0.986*	0.756	0.674	0.025	0.120	0.056
Medium(M)	0.888	0.685	0.960	0.076	0.117	0.124
Big (B)	0.330	0.667**	1.011*	0.278	0.005	0.017
	Book-to-Market Equity (BE/ME)					
	slope (b)			p-value		
	Low (L)	Medium (M)	High (H)	Low (L)	Medium (M)	High (H)
Small (S)	0.924***	0.903***	1.026***	0.000	0.000	0.000
Medium(M)	1.003***	0.884***	0.866***	0.000	0.000	0.000
Big (B)	1.059***	0.984***		0.000	0.000	0.000
	Book-to-Market Equity (BE/ME)					
	slope (s)			p-value		
	Low (L)	Medium (M)	High (H)	Low (L)	Medium (M)	High (H)
Small (S)	1.206***	1.211***	1.242***	0.000	0.000	0.000
Medium(M)	0.421***	0.422***	0.299	0.003	0.000	0.088
Big (B)	0.080	0.056	0.026	0.348	0.395	0.809
	Book-to-Market Equity (BE/ME)					
	slope (h)			p-value		
	Low (L)	Medium (M)	High (H)	Low (L)	Medium (M)	High (H)
Small (S)	-0.140*	-0.017	0.434***	0.016	0.788	0.000
Medium(M)	-0.066	0.085	0.415***	0.316	0.138	0.000
Big (B)	-0.062	0.003	0.234***	0.121	0.920	0.000

*****: 0.1% significance, **: 1% significance, *: 5% significance.**

Table 6, below, shows the adjusted-R square values of each of the nine portfolio regressions.

Table 6:Adjusted-R square values of each nine portfolio regressions

	Book-to-Market Equity (BE/ME)		
Size	Low (L)	Medium (M)	High (H)
Small (S)	0.8301	0.7801	0.8894
Medium (M)	0.7902	0.7769	0.6763
Big (B)	0.9203	0.9412	0.8018

R-squared values reflect that three risk factors together can explain the considerable part of the variation on excess portfolio monthly returns for each portfolio.

Table 7 shows the F-statistics values for each of the nine portfolios.

Table 7: F-values for each portfolio

F-Statistics			
	Low (L)	**Medium (M)**	**High (H)**
Small (S)	155.7	113.4	255.5
Medium (M)	120.3	111.3	67.15
Big (B)	366.5	508.1	129.1

The p-values associated with these F-statistics are very low which indicates that the model fits to the data using Ordinary Least Squares method.

The null hypothesis for the intercept term is that it is zero. If the intercept term is significantly indifferent from zero, than the three factor model is correct. Fama et.al (1993) mention that if the expected excess portfolio return is different from zero, it must be compensation for risk. The model is based on the fact that risk premium is captured by RM-Rf, SMB and HML. Thus the intercept should be close to zero. Residuals are normally distributed for each portfolio. Table 5 shows that for the significance level of 0.1% all portfolio intercept terms are zero, meaning that the Fama and French three-factor model performs well in terms of explaining excess portfolio returns. At the significance level of 1%, the three factor model performs well in terms of explaining excess portfolio returns except the portfolio B/M. At the significance level of 5% the three factor-model performs well on explaining excess portfolio returns except the portfolios S/L, B/M and B/H. The Fama and French three-factor model has explanatory power on six portfolios out of nine at the significance level of 5%.

Fama and French found that at the existence of SMB and HML risk factors in the model, slope (b) of market risk factor, R_M-R_f, is close to 1. Fama et al. (1993, p.40) point out that similar slopes imply that sensitivity to the market factor does not explain much of the variation in average returns across stocks. The job is left to the size and book-to-market factors. Table 5 gives that market factor slope (b) is close to 1 for all portfolios and these slopes are also close to each other. This means that in addition to market risk factor the other two risk factors are essential for explaining the differences in excess portfolio returns. Closeness of slope values also implies that market risk premium increases average returns on all portfolios by approximately the same amount.

As was the case in the previous studies of Fama and French the SMB slope (s) is higher for small stock portfolios than the others. They conclude that SMB captures the size effect in portfolio returns. Table 1 indicates that the mean SMB return is -0.4502. Table 5 shows that all nine portfolios have a positive size slope (s) coefficient and this value is higher when the size is lower. However, big size portfolios and M/H portfolio have insignificant slopes, This means that the size effect is not measured on big size portfolios and on the portfolio M/H. It can be concluded, therefore, that medium size portfolios (M/L and M/M) lose less than small size portfolios operating on ISE or small size portfolios win less than medium size portfolios (M/L and M/M). This also means that positive exposure to size risk reduces the average excess return while negative exposure to size risk increases the average excess return concerning medium and small size portfolios.[4] This result is consistent with the values set out in Table 4. The result shows that medium size portfolios outperform small size portfolios. This is a similar conclusion to that shown in Table 5. In short, the size factor SMB plays a vital role in explaining portfolio returns for medium and small size portfolios but it has no effect on large-scale portfolio returns.

HML is the risk factor capturing the book-to-market effect of stocks on average excess portfolio returns. Table 1 shows that the mean HML return is 0.4991. Table 5 shows that, at the significance level of 1%, HML has statistically strong explanatory power only on high BE/ME stock portfolios because low and medium BE/ME stock portfolios have statistically insignificant slope coefficients (h) at 1% significance level. Three portfolios out of nine have statistically significant slope coefficients (h) at 1% significance level. In other words, there is no BE/ME effect for the portfolios S/L, S/M, M/L, M/M, B/L and B/M at this significance level. The effect is significant also for the portfolio S/L at 5% significance level. For the portfolios S/H, M/H and B/H, BE/ME risk factor has positive slope (h) coefficients while it is negative for the portfolio S/L. Since HML has a positive value for high BE/ME portfolios it is expected that (S/H) > (M/H) > (B/H) on average excess portfolio returns, putting everything else constant. It is clear from Table 4 that this is not a consistent expectation with the realised average excess portfolio returns on the ISE during the study period. Realized average returns are (M/H) > (B/H) > (S/H). This inconsistency has not a powerful explanation on the basis of book-to-market values. In short, book-to-market value is effective for high BE/ME stock portfolios, but this effect is ambiguous meaning that BE/ME ratio effects average excess portfolio returns in an un-systematic and un-explained manner.

5. Conclusion

The aim of this study was to explain the excess portfolio return variations by the Fama and French three-factor model. For this purpose market risk factor, RM-Rf, size risk factor (SMB) and BE/ME risk factor (HML) were used as the explanatory variables. Estimation results show that the Fama and French three-factor model has a limited potential to explain variations on the return of portfolios which are constructed by using stocks operating on ISE during the years from January 2003 to December 2010. The empirical part of the study is based on monthly excess return on each stock. Nine portfolios were constructed in order to test the model. Statistical results show that big size and medium size portfolios overwhelm small size portfolios on realized excess returns. Moreover, high BE/ME stock portfolios have higher excess returns than low BE/ME stock portfolios. Market risk factor is found to be effective on each excess portfolio returns. Intercept is found to be about zero for all portfolios meaning that other two risk factors are also necessary to explain excess portfolio return variations. Size risk factor (SMB) was found to be effective on excess portfolio returns of small and medium size (M/L and M/M) stock portfolios while it was found to be ineffective on big size stock portfolio excess returns and on the portfolio M/H. Sign and the magnitude of SMB slope (s) coefficient support the statistical result that medium size portfolios have higher earnings than small ones. In other words, variations on small and medium size stock portfolio returns can be explained by the size risk factor SMB. Although SMB is not efficient for big size stock portfolios, it supports the size effect on medium and small size stock portfolios. The third risk factor HML is found to have no effect on low and medium BE/ME ratio portfolios at 1% significance level. HML is effective on high BM/ME ratio portfolio returns but this effect is ambiguous and cannot be explained in a systematic way. As a result, Fama and French three-factor model have some power on explaining variations in the portfolio returns but this power is not strong and wide. Market risk factor has a wider and stronger effect on portfolio returns than the other two risk factors.

This study finds less powerful results for the validity of the model than the others which have been carried out on ISE. The reason for this is that different time periods are used in each study. Moreover, in each study different indices and different numbers of portfolios

are used for the analysis. Economic crisis is also an important factor affecting the results of the studies. All crises affected macroeconomic variables and stock prices from different perspectives. Despite all these factors, it can be seen that the results of this study are consistent with those of other studies undertaken in Turkey and abroad. Stocks on ISE can be divided into subsectors in order to capture the individual effects of the three risk factors more precisely on the sector base. Additionally, the validity of the CAPM on ISE can be tested against the Fama and French model. This comparison can lead to more efficiently constructed portfolios. Although the model does not have strong power on the ISE, it is still one of the most important asset pricing models in finance.

End Notes

1. Source: http://www.spk.gov.tr/apps/aylikbulten/index.aspx?submenuheader=0

2. Visit Turkish Central Bank webpage for Treasury bill rates: http://evds.tcmb.gov.tr/yeni/cbt-uk.html

3. Source: http://www.ise.org/Data/fiyat_getiri_aciklama.aspx?sfopl=true

4. See Fama et.al (1993) p.41 for more detailed explanation.

References

Aksu, M., Onder, T. (2003). The size and the book-to-market effects and their role as risk proxies in the Istanbul Stock Exchange. Available at SSRN: http://ssrn.com/ abstract=250919. (Access date: 27 August 2012)

Al-Mwalla, M., & Karasneh, M. (2011). Fama and French three factor model: Evidence from emerging market. European Journal of Economics, Finance and Administrative Sciences, 41, 132-140.

Aleati, A., Gottardo, P., Murgia, M. (2000). The pricing of Italian equity returns. Economic Notes, 29 (2), 153-177.

Capital Market Boards of Turkey. http://www.spk.gov.tr/apps/aylikbulten (Access date: 19 February 2012).

Central Bank of the Republic of Turkey Statistical Data. http://evds.tcmb.gov.tr (Access date: 16 February 2012).

Connor, G., & Sehgal, S. (2001). Test of the Fama and French model in India. Financial Markets Group Discussion paper, No.379.

Daniel, K., & Titman, S. (1996). Evidence on the characteristics of cross sectional variation in stock returns. http://www.nber.org/papers/w5604.pdf?new_window=1 (Access date: 3 March 2012).

Davis, J., Fama, E.,& French, K. (2000). Characteristics, covariances and average returns: 1927-97. Journal of Finance, 55(1), 389-406.

Doganay, M. (2006). A test of the Fama-French three factor asset pricing model in the Istanbul Stock Exchange. İktisat İsletme ve Finans, 21, 61-71.

Faff, R. (2001). An examination of the Fama and French three-factor model using commercially available factors. Australian Journal of Management, 26(1), 1-17.

Faff, R. (2004). A simple test of Fama and French model using daily data: Australian evidence. Applied Financial Economics, 14(2), 83-92.

Fama, E., & French, K. (1992). The cross-section of expected stock returns. Journal of Finance, 47(2), 427-465.

Fama, E., & French, K. (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33(1), 3-56.

Fama, E., French, K., Booth, D., & Sinquefield, R. (1993). Differences in the risks and returns of NYSE and NASD stocks. Financial Analysts Journal, 49(1), 37-41.

Fama, E., & French, K. (1995). Size and book-to-market factors in earnings and returns. Journal of Finance, 50(1), 131-155.

Fama, E., & French, K. (1996). Multifactor explanations of asset pricing anomalies. Journal of Finance, 51(1), 55-84.

Gaunt, C. (2004). Size and book to market effects and the Fama French three factor asset pricing model: Evidence from Australian Stock Market. Accounting and Finance, 44(1), 27-44.

Gökgöz, F. (2008). The viability of three-factor asset pricing model for the Istanbul Stock Exchange. Ankara Üniversitesi SBF Dergisi, 63(2), 43-64.

Guzeldere, H. & Sarıoglu S.E. (2012). Varlık fiyatlamada Fama-French üç faktor model'in geçerliliği: İMKB üzerine bir araştırma. Business and Economics Research Journal, 3(2), 1-19.

Hamid, Z., Hanif, C., Malook, S., Wasimullah (2012). Fama and French three factor model: Empirical evidence from financial market of Pakistan. African Journal of Business Management, 6(8), 2945-2950.

Istanbul Stock Exchange. http://www.ise.org/Data/StocksData.aspx (Access date: 11 February 2012).

Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. Review of Economics and Statistics, 47(1), 12-37.

Markowitz, H. (1952). Portfolio selection. The Journal of Finance, 7(1), 77-91.

Ruppert, D. (2011). Statistics and data analysis for financial engineering. New York: Springer.

Sharpe, W. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. Journal of Finance, 19(3), 425-442.