

Testing Fama and French's Three-Factor Asset Pricing Model: Evidence from Borsa İstanbul

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Abstract

The aim of this study is to investigate the validity of the Three Factor Asset Pricing Model, which has been intensively tested in finance literature, in Borsa İstanbul in the period of 2006-2014 on sector base. In this context, the yearly data of the companies listed on the BIST Industrials, BIST Services and BIST Financials indexes was tested with panel data analysis method that combines horizontal profile observations of companies. Furthermore, as a result of the analysis, whether the risk factors in explaining the returns on stocks vary on sectoral base was also determined. The findings of panel data analysis stipulated that company size, market value/book value ratio, and market portfolio risk premiums explained the equity risk premium as a whole for the industrial sector. In financial and services sectors, solely market portfolio risk premium was significant in explaining equity returns.

Keywords: Three-Factor Model, Fama and French, Panel Data Analysis, Borsa İstanbul.

JEL Classification Codes: C19, D53, G14.

Fama ve French'in Üç Faktörlü Varlık Fiyatlandırma Modeli'nin Geçerliliği: Borsa İstanbul Örneği

Öz

Bu çalışmanın amacı, literatürde geniş bir uygulama alanı bulan Üç Faktörlü Varlık Fiyatlandırma Modeli'nin, 2006-2014 döneminde Borsa İstanbul'da geçerliliğini sektörel bazda incelemektir. Bu bağlamda, söz konusu dönem itibarıyla BIST Sınai, BIST Hizmetler ve BIST Mali endekslerinde listelenen şirketlere ait yıllık veriler, hem zaman hem de yatay kesit boyutunu birlikte dikkate alan panel veri analizi ile test edilmiş ve pazar portföyü riski, piyasa değeri/defter değeri oranı ve firma büyüklüğü ile hisse senetlerinin normalüstü getirileri arasındaki ilişki ortaya konmaya çalışılmıştır. Bununla birlikte, hisse senedi getirilerini açıklamada sektörel anlamda risk faktörleri arasında farklılık olup olmadığı da yapılan analiz neticesinde tespit edilmiştir. Analiz bulgularına göre, sınai sektöründe, firma büyüklüğü, piyasa değeri/defter değeri oranı ve pazar portföyü risk priminin, hisse senedinin risk primini bir bütün olarak açıkladığı tespit edilmiştir. Mali sektör ve hizmetler sektöründe ise, yalnızca pazar portföyü risk primi, hisse senedi getirilerini açıklamada anlamlı bulunmuştur.

Anahtar Kelimeler: Üç Faktörlü Model, Fama ve French, Panel Veri Analizi, Borsa İstanbul.

JEL Sınıflandırma Kodları: C19, D53, G14.

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1. Introduction

The relationship between the return that the investors would gain as a result of their investments in financial assets and the risk level that they would take by investing in the same assets is quite significant for the investors. Thus, measurement of the relationship between the expected return and the risk became one of the major topics of research in financial literature.

Modern Portfolio Theory, proposed by Markowitz in the 1960s, was developed by Sharpe (1964), Lintner (1965), and Black (1972), and Capital Asset Pricing Model (CAPM) that suggests a positive relationship between the expected return and the systematic risk of a security was manifested. CAPM was empirically tested in several studies in the literature, and criticized for it failed to explain the variance in equity returns in the face of developing market conditions. In studies conducted in subsequent years, to eliminate the shortcomings of CAPM, which only takes one single risk factor into consideration, multi factor asset pricing models were developed.

Fama & French examined the change of average equity returns in time in a study they conducted in 1992 and they stated that, in addition to the return of market portfolio, the size of the examined portfolio and market value/ book value ratio could be effective on equity returns. Then, the researchers conducted another study in 1993 and added the two new risk factors to CAPM and developed the alternative 3-Factor Asset Pricing Model.

CAPM, which is often used in asset pricing, explains the expected return of a security based on the expected return in the market and the beta of the security (a measure of the risk of the security). However, several studies tested the power of capital asset pricing model in explaining securities returns and determined that variables other than the beta had explanatory power as well (Canbaş & Arıoğlu, 2008, 80).

Before Fama and French proposed the three-factor model, in an article they published in 1992, they included company size, MV/BV ratio, earnings/price ratio and leverage ratio variables in the model. Their analysis resulted in an inverse proportion between the beta value and company size. Furthermore, as long as beta value did not include company market size, could not correlate with average returns. In addition, during the period of analysis (1940 – 1990), when beta is the only variable, it was found that there was a very weak relationship between the beta value and security returns, and even there was no correlation. Thus, it could be argued that the above mentioned study negated the model, which assumed that there was a positive relationship between beta and average return, and beta could alone explain security returns via cross-section analysis. Based on the results of the above study, security returns are affected by company size negatively and positively by MV/BV ratio. In addition, the study determined that as magnitude

increases, security returns decrease and as MV/BV rate increases, the returns increase as well. In other words, “value” portfolios with high MV/BV ratios result in higher returns when compared to “growth” portfolios with lower MV/BV ratios (Coşkun & Önal, 2014, 236). Following that study, company size and MV/BV ratio factors were included in CAPM, resulting in the three-factor model (Koy, 2013, 104).

The objective of this study was the investigation of the validity of Three Factor Model by Fama & French, which enjoyed a widespread field of application lately, in Borsa Istanbul in 2006-2014 period, and examination of the relationship between market portfolio risk, MV/BV ratio and company size (market value) and above normal returns of equities based on industries and including the BIST Industrial, BIST Financial and BIST Services indices. The significance of the research is the test of the validity of Three Factor Model in Borsa Istanbul, a developing market, using current figures by panel data analysis and taking the effects of the Global Crisis into consideration.

The study is divided into four sections. The first section briefly discusses Capital Assets Pricing Model and Three Factor Asset Pricing Model developed as an alternative to CAPM. A substantial number of studies that scrutinized the validity of Fama and French’s Three Factor Model in developed and developing markets are mentioned in the second section. Methodology, hypotheses and the model of the study are explained in the third section, and finally the findings are discussed.

2. Literature Review

Fama & French proposed the Three Factor Model in the study they conducted in 1993 for the first time and examined the factors that explain the return on equities (Fama & French, 1993). They determined three different risk factors in the study, namely market risk factor, corporation size risk factor expressed with equity capital market value, and equity capital book value / market value ratio risk factor. They have established that the related risk factors could statistically explain the variability in equity returns as a result of the study. Another finding of the study was that equities with high BV/MV ratio have better returns than those with a lower ratio and small business equities have better returns when compared to large firms. Researchers determined that this was due to higher risk factor of the related equities. In another study by Fama & French conducted in 1995, the relationships between market risk factor, corporate size risk factor and book value / market value ratio risk factor, and variance in return per equity was examined (Fama & French, 1995). It was determined that the mentioned risk factors could statistically explain the variance in returns per equity. The researchers, in a study they conducted in 1993, investigated the relationship between the equities trading in NYSE, AMEX, and NASDAQ between 1963 and 1992 and Three Factor Model, however they included price/earnings ratio, cash flow/price ratio and sales growth ratio in the model they used in their study this time around. They were not able to

establish a significant relationship between the new factors they included and equity returns and reported that Three Factor Model was successful in this study as well. Another finding of this study was that when portfolios are created based on short-term returns, predictive quality of the Three Factor Model diminishes. In another study, researchers conducted in 1998, they scrutinized 13 developed and 16 developing nation data for 1975-1995 and analyzed the effects of several factors on equity returns. They have named equities with high BV/MV ratios as value equities, and equities with low BV/MV ratios as growth equities and have concluded that value equities yield higher returns in global markets.

Ajili (2002) tested the validity of Fama & French's Three Factor Model for 1976-2001 in French equity market and determined that the model was powerful in explaining the equity returns in this market. Similar results have also been obtained in studies conducted by Pena, Forner & Lopez-Espinoza (2010) with 164 non-financial Spanish market company data for 1991-2004 period, conducted by Taneja (2010) with data from 187 corporations for the 2004-2009 period for the Indian market and conducted by Olbrys (2010) in Poland equity market for the 2002-2009 period. Similarly, Trimech et al. (2009) investigated the validity of Three Factor Model using 1985-2006 data for French equity market and found that the explanatory power of the model increased in medium and long term portfolios. On the other hand, Hu (2003) researched the relationship between above normal returns of equities trading in NYSE, AMEX, and NASDAQ in 1953-2001 and the Three Factor Model and reported that the model was more powerful in explaining the variance in equity returns in the short term than CAPM. In addition, the study determined that explanatory powers of both methods decreased in the long term.

Allen & Cleary (1998) investigated the validity of Three Factor Model in Malaysian equity market for the 1977-1992 period. The analysis they conducted demonstrated an inverse relationship between beta coefficient and expected return and they mentioned a powerful size effect with the exception of a few periods. Furthermore, they reported that the returns of equities with high BV/MV ratio were higher than the returns of equities with low BV/MV ratio. Concurrently, Drew & Veeraraghavan (2002) researched whether Three Factor Model was valid in Malaysian markets for the 1992-1999 period, and arrived at parallel results to Allen & Cleary (1998). Similarly, O'Brien, Brailsford & Gaunt (2004) examined the validity of Three Factor Model in Australia equity market for 1991-2000 and compared the explanatory power of the model to CAPM. The study demonstrated that portfolios with high BV/MV ratio earned greater returns than the portfolios with low BV/MV ratio. Furthermore, the existence of small firm effect in Australian market was indicated. Authors stated that Three Factor Model was more explanatory than CAPM. On the other hand, in a study by Malin & Veeraraghavan (2004) that investigated the validity of Three Factor Model in France, Germany, and the United Kingdom equity markets for, little firm effect

was determined for France and Germany; and large firm effect for the United Kingdom. In addition, for all three markets, contrary to Fama & French's 1996 findings, they found that corporations with a low BV/MV ratio yielded better returns. Also, Drew, Naughton, & Veeraraghavan (2003) investigated the validity of Three Factor Model in Shanghai Stock Exchange and in contrary to the findings of the study conducted by Fama & French in 1996, concluded that small sized growth companies provided more returns when compared to large-scale and value firms.

Charitou & Constantinidis (2004) researched the validity of Three Factor Model in Tokyo Stock Exchange for 1992-2001 period and they have concluded that it was more powerful in explaining the variance in equity returns when compared to CAPM. Results of the study indicated that for small firms, market value risk factor had more explanatory power than book value / market value ratio risk factor; and for large firms, the opposite was true. In addition, it was stipulated that the most powerful explanatory variable was the market risk factor. Similarly, Connor & Saghal (2001) researched the validity of Three Factor Model in Indian market and concluded that there was a statistically significant relationship between equity returns and market risk factor, and equity capital book value / market value ratio risk factor. In addition, they determined that the most powerful explanatory variable was the market risk factor.

Studies in developing countries in this regard have revealed mixed results. In a study by Cleassens, Dasgupta & Glen (1998), conducted with data from 19 emerging markets for the 1986-1993 period, examined the relationships between company size, price/earnings ratio, market value/book value ratio and dividend yields. Study results showed that there was a statistically significant finding for market value book value ratio only in 6 national markets. The relationship between company size and equity returns was significant statistically in 11 national markets, and contrary to the findings of studies conducted in developed nation markets, the relationship was positive. In another study, Chui & Wei (1998) studied the data listed in Hong Kong, Korea, Malaysia, Taiwan, and Thailand markets between 1977 and 1993, and investigated the relationship between market beta, BV/MV ratio and company size, and equity returns. The results of that study demonstrated a weak relationship between mean equity return and market beta in all markets investigated. Authors reported that BV/MV ratio explained the variance in equity returns only in Hong Kong, Korea and Malaysia markets, and the effect of company size existed in all markets except Taiwan. Also, Djajadikerta & Nartea (2005) examined the effects of firm size and BV/MV ratio and the validity of Three Factor Model in New Zealand market for 1994-2002. Study results indicated a statistically significant and powerful relationship between company size and equity returns in the said market, and a weak relationship between BV/MV ratio and equity returns. In addition, the study stipulated that Fama & French's Three Factor Model was more efficient in

explaining equity returns in New Zealand equity market when compared to CAPM, however, it was inefficient in explaining the majority of the variance in returns.

In addition to those mentioned, there are few studies in the literature that different research methods were applied. For instance Lam, Li & So (2009), which utilized the 1981-2001 data for Hong Kong equity market and was conducted with the addition of momentum factor to Three Factor Model, it was determined that the four factor model designed had a high explanatory power in explaining the variance in equity returns in the said market. In another study conducted in Chinese Stock Exchange, Cao, Leggio, & Schniedejans (2005) scrutinized the performance of Three Factor Model and artificial neural networks in predicting equity returns, and determined that artificial neural networks achieved better results.

International literature review demonstrates that there were many studies conducted on the subject matter. However, it could be argued that there was only limited number of studies on Three Factor Model conducted in Turkey.

The first study on the validity of Fama & French's Three Factor Model in Turkish market was conducted by Aksu & Önder (2003) on stock data for IMKB in 1993-2001. Stocks of financial companies were excluded from this research. Study results showed that Three Factor Model was valid in explaining the variance in equity returns for the related period. Furthermore, the authors investigated firm value and market value/book value ratio anomalies in their study, and determined that both anomalies existed in IMKB.

The study by Doğanay (2006) that covered the 120-month period between July 1995 and June 2005, examined all equities except investment trusts and the ones with a negative equity capital trading in IMKB. The author determined that market risk, company size and MV/BV ratio were the common risk factors that affected equity returns and investors that carry these risks had better returns. Gökgöz (2008) investigated whether Three Factor Model was valid for IMKB during 2001-2006 using time series and section regression analysis on 5 different indices (IMKB-Industrial, Services, Real Estate, Securities, and Technology indices), and concluded that the model was valid for all indices included.

Canbař & Ariođlu (2008) examined whether Three Factor Model was valid in explaining the variance in equity returns for the equities, including financial companies, trading in IMKB during the July 1993 – June 2004 period, and concluded that the model was considerably valid for the above mentioned period. In addition, the authors determined that the most powerful explanatory variable was the market risk factor, and the risk factor based on MV/BV ratio was more effective than the risk factor based on the company size. Atakan & Gökbulut (2010) studied the validity of Three Factor Model with the data for 82 industrial corporations trading in IMKB for 1993-2007 using panel analysis, and concluded that in addition to company size, MV/BV ratio and market risk factors played an important role in explaining IMKB equity returns. Study findings indicated that all three risk factors moved in the same direction with equity returns and, in contrast to Canbař & Ariođlu (2008)'s study, stressed that the most significant risk factor that explained equity returns was the market value. Güzeldere & Sariođlu (2012) tested the validity of Three Factor Model by panel data analysis using monthly data for non-financial corporations trading in IMKB-100 Index between 1999 and 2011. Findings of the study showed that company size, market value/book value ratio and market portfolio risk premium explained the equity risk premium as a whole. In other words, it was determined that Three Factor Model was valid for IMKB for the period of interest. Furthermore, the above-mentioned explanatory variables were moving in the same direction with the equity returns and, similarly to Canbař & Ariođlu (2008)'s study, the variable that explained the equity return the best was the market portfolio risk premium.

On the other hand, Karan & Gönenç (2003), in a study they conducted with data for stocks trading in IMKB between 1993 and 1998, investigated the validity of Three Factor Model and concluded that the risk factor related to the market value/book value ratio was not efficient in explaining the variance in equity returns.

3. Methodology

3.1. Purpose and Context

The objective of the study was to scrutinize the validity of Fama & French's Three Factor Model (1993; 1996), which has been applied in various fields during the recent years, in Istanbul Stock Exchange between 2006 and 2014, and to analyze the relationship between market portfolio risk, MV/BV ratio and company size (market value), and the above normal equity returns on the basis of different industries. In addition, the differences between the risk factors, if any, in explaining equity returns based on different industries were also indicated. For this purpose, initially, companies that were traded continuously in BIST Industrial, BIST Financial and BIST Services indices by 2006 for the period of interest were identified. The reason why the study covered the period of 2006-2014 was the fact that financial statements of the corporations traded in the capital

market were required to be prepared according to International Financial Reporting Standards as of January 1st, 2005 by the decree of Capital Markets Board Series: XI, No: 25. Furthermore, beta coefficients for equities were calculated based on historical data, and this was also effective in the selection of the period of analysis.

Data for 91 industrial sector, 29 financial sector, and 13 services sector firms continuously traded in Istanbul Stock Exchange between the years of 2006 and 2014 was used for the analysis. Corporate data were procured from corporate yearly financial statements and other sources; and 365-day treasury bill data were obtained from Turkish Central Bank web site. Information on corporate share certificates and financial statements for the 2006-2007 period were obtained from BIST web site (www.borsaistanbul.com), and the financial statements for the 2008-2014 period were obtained from the web site of Public Disclosure Platform (www.kap.gov.tr). To determine the validity of Three Factor Model for Istanbul Stock Exchange in the 2006-2014 period, panel data analysis method, which makes it possible to analyze section and time series together, was utilized. Analysis was conducted using Stata 12.0 software.

3.2. Study Hypothesis and Model

Three Factor Model equation that was developed by Fama & French (1993; 1996) was formulated as displayed in Equation 1. The risk premiums based on equity risk premium, company size, MV/BV ratio, and market portfolio were analyzed using panel data analysis separately for each sector was formulated as displayed in Equation 2. The significance of the coefficients of the equation would mean that Three Factor Model was valid for Istanbul Stock Exchange for the above mentioned industries.

$$E(R_i) - R_f = \beta_{im} [E(R_m) - R_f] + \beta_{is} E(MV) + \beta_{ih} E(MV/BV)$$

$$ERP_{i,t} = R_{i,t} - R_{f,t} = \alpha_0 + \alpha_1 MV_{i,t} + \alpha_2 (MV/BV)_{i,t} + \beta_{i,t} (R_m - R_f) + \alpha_3 (Dummy2008)_{it} + \alpha_4 (Dummy2009)_{it} + \varepsilon_{it} \quad (2)$$

In the equation (2);

i= Firm,

t= Time,

β = The indicator of the risk of the stock,

ε = Error term

$ERP_{i,t} = R_{i,t} - R_{f,t}$ = Equity risk premium,

MV = Total market value of company stocks,

MV/BV = Market Value / Book Value ratio,

$R_m - R_f$ = Market risk premium.

Furthermore, Dummy2008 and Dummy2009 variables were added to the model to observe the effects of the Global Financial Crisis experienced in the period of interest.

The hypothesis formed based on the Model 1 could be expressed as follows:

H_0 : There is no relationship between above-normal equity returns and market portfolio risk premium, equity company size and MV/BV ratios.

H_1 : There is a relationship between above-normal equity returns and market portfolio risk premium, equity company size and MV/BV ratios.

3.3. Empirical Findings

The results of Breusch-Pagan Lagrange Multiplier Test conducted to determine whether pooled least squares model or fixed effects model was suitable for the prediction of the model utilized in the study are presented in table 1 separately for each sector.

Table 1: Breusch-Pagan Lagrange Multiplier Test

Sector	chi2(1)	Prob>chi2
Industry	0.00	1.0000
Financial	0.00	1.0000
Services	0.00	1.0000

Examination of the results displayed in table 1 indicated that Breusch-Pagan Lagrange Multiplier Test was not able to reject the H_0 hypothesis, which stated that the pooled model should be utilized for each sector. Thus, for the prediction of the model constructed for the sectors, pooled least squared method would be used.

For the panel data analysis to provide accurate results, model should be examined for autocorrelation and heteroscedasticity. The existence of autocorrelation in the model was tested with Wooldridge test for each sector separately. The results are displayed in table 2.

Table 2: Wooldridge Test

Sector	Prob>chi2
Industry	0.0000
Financial	0.3247
Services	0.1116

Results depicted in the table 2 showed that the H_0 hypothesis, which expressed that Wooldridge test was not autocorrelation in the first degree for the industry sector, was rejected. Thus, while there was a first degree autocorrelation in the model constructed for the industry sector, there were no autocorrelation in financial and services sectors in the models designed.

Whether there was heteroscedasticity problem in the model, separately for each sector, was tested using White test. H_0 hypothesis for this test reflected a constant variance. Results are displayed in table 3. It was identified that, while there was a heteroscedasticity problem in the model designed for industry sector, there was no heteroscedasticity in the model designed for financial and services sectors.

Table 3: White Test

Sector	chi2(1)	Prob>chi2
Industry	33.46	0.0099
Financial	19.41	0.3056
Services	19.56	0.2972

To resolve autocorrelation and heteroscedasticity problems in the model constructed for the industry sector, model was corrected with clustered standard errors and predicted again using pooled least squares model. Prediction results for financial and services sectors were obtained by pooled least squares model. Results are given in table 4.

The explanatory power of the regression predicted using pooled least squares model corrected for clustered standard errors method for the industry sector was approximately 33%; explanatory power of the regression predicted using pooled least squares model for the financial sector was approximately 51%; and for the services sector, it was approximately 43%. Validity of the regression equation, for each sector, was extremely high (Prob > F = 0,0000).

Table 4: Panel Data Analysis

Sector: Industry				
Model 1: ERP	Coefficient	std.dev.	t-statistics	p-value
MV	0.0481554	0.0186164	2.75	0.005
MV/BV	-0.0397488	0.0168256	-2.91	0.008
MR	0.5665795	0.0861779	8.51	0.000
D8	-0.3847153	0.0686369	-3.88	0.000
D9	0.5322653	0.1077868	4.11	0.000
Adjusted R ²	0.3379			
F Statistic	164.67			
Prob.(F Statistic)	0.0000			
Sector: Financial				
Model 1: ERP	Coefficient	std.dev.	t-statistics	p-value
MV	0.0425291	0.0039484	2.81	0.141
MV/BV	-0.0360703	0.0040211	-2.85	0.198
MR	0.7631437	0.0076067	12.87	0.000
D8	-0.0205284	0.0118304	-3.97	0.874
D9	0.2774123	0.0085271	-1.80	0.027
Adjusted R ²	0.5193			
F Statistic	53.15			
Prob.(F Statistic)	0.0000			
Sector: Services				
Model 1: ERP	Coefficient	std.dev.	t-statistics	p-value
MV	0.055096	0.0048976	1.12	0.133
MV/BV	-0.025845	0.0010182	-2.54	0.482
MR	0.1001327	0.02095	4.78	0.000
D8	-0.0692357	0.0183929	-3.76	0.126
D9	0.0109695	0.0136362	0.80	0.120
Adjusted R ²	0.4311			
F Statistic	16.82			
Prob.(F Statistic)	0.0000			

4. Summary and Conclusions

With the acceptance of the Modern Portfolio Theory proposed by Markowitz in the 1960's, the measurement of the relationship between expected return and the risk became one of the significant research topics of finance literature. This model was developed in time by different scholars and multi-factor asset pricing models were proposed. One of these models was the Three Factor Asset Pricing Model, which was a contribution of Fama & French to the finance literature in 1993.

Three Factor Model was proposed as an alternative to the Capital Assets Pricing Model (CAPM), which suggests a positive relationship between the expected return and the systematic risk of an equity, and the validity of the model was tested by several researchers in developed and emerging markets. In several empirical studies, Three Factor Model was successful in explaining equity returns and it was determined that the model had a better explanatory power when compared to CAPM.

The objective of this study was to determine the validity of the Three Factor Model in Istanbul Stock Exchange in the 2006-2014 period. In the study, the relationship between market portfolio risk, MV/BV ratio and company size, and above normal equity returns was scrutinized using panel data analysis method with respect to BIST Industrial, BIST Financial, and BIST Services indices.

The findings of panel data analysis stipulated that company size, MV/BV ratio, and market portfolio risk premiums explained the equity risk premium as a whole for the industrial sector. In financial and services sectors, solely market portfolio risk premium was significant in explaining equity returns. Furthermore, it was determined that the most significant factor in explaining equity returns in the industrial sector was the market portfolio risk premium. The effect of market portfolio risk premium on equities was observed higher in the financial sector. The reasons behind the differences could possibly be related to level of profitability, risk and growth factors of sectors. Another finding of the study showed that the relationship between market portfolio risk premium and equity returns was positive for all three sectors.

Industry-specific findings demonstrated that large-scale firm equity returns were higher when compared with others. However, for only industrial sector, there is a statistically significant relationship between company size and equity returns. Studies conducted in developed nations showed that, in many markets, there was a negative relationship between company size and average equity returns; in other words, equity returns of portfolios including small firms were higher. In studies conducted in developing nations, examination of the relationship between company size and equity returns yielded mixed results. When considered in terms of industrial sector, the results of this study on company size were parallel to other studies conducted on Istanbul Stock Exchange previously. In other words, it is possible to mention a large firm effect in Istanbul Stock Exchange for the period of interest.

The findings also demonstrated that the relationship between MV/BV ratio and equity returns was negative for all three sectors, but the relationship was statistically significant for only industrial sector. In other words, when considered in terms of industrial sector, equities with a lower MV/BV ratio yielded better returns when compared to equities with higher MV/BV ratio. This finding contradicts with the results of several studies conducted in developed markets.

Also in studies conducted in developing nations, there are mixed results on the relationship between MV/BV ratio and equity returns.

The study is conducted to test the validity of the three-factor model in Istanbul Stock Exchange, which is a developing market, using current data and by taking the effect of the global crisis into account. Thus, two dummy variables were added to the model to observe the effects of the global financial crisis. Therefore, in addition to the findings explained above, study results demonstrated that there was a significant relationship between the dummy variable and security returns only in manufacturing industry for both years and in financial industry for 2009. Manufacturing industry findings demonstrated that the related relationship was in negative direction for 2008. In 2009, however, the relationship was positive for both industries. This could be explained with the fact that the funds created by expansionist monetary policies of developed countries had been directed into developing country markets.

Since it is still an emerging market, and the number of corporations trading in Istanbul Stock Exchange increase continuously, further detailed studies could be conducted on the subject using statistical and econometric analyses. In further studies, momentum factor could be added to the three-factor model by Fama and French to create a four-factor model, furthermore, profitability and investment factors could also be included to create a five-factor model and their validity could be scrutinized in Istanbul Stock Exchange for additional contribution to the finance literature. Thus, it could be investigated whether the above mentioned models could be used as an alternative to the three-factor model by individual and corporate investors.

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