Makale Türü: Araştırma Makalesi/Research Article

EVALUATING THE IMPACT OF SPECIFIC VARIABLES IN THE BORSA ISTANBUL 30 INDEX

Diler Türkoğlu[1]
Fatih Konak[2]

Öz

Yatırımcılar ve portföy yöneticilerin odak noktasında, risk ve getiri arasındaki ilişkinin tahmin edilebilmesi ve sermaye varlıklarının fiyatlandırılması süreci için, özellikle, riskli varlıkların beklenen getirilerinin ve etkili faktörlerin belirlenmesi büyük önem taşımaktadır. Bu bağlamda çalışmada bir sermaye varlıkları fiyatlama modeli olan ve Fama ve French tarafından geliştirilen Beş Faktörlü Modelinin Borsa İstanbul 30 Endeksi'nde faaliyet gösteren firmaların risksiz faiz oranı üzerindeki olası etkisinin 2012-2021 yılları arasındaki çeyreklik veriler alınarak test edilmesi amaçlanmaktadır. Bu kapsamda piyasa riski, büyüklük, değer, karlılık ve yatırım faktörlerinin risksiz faiz oranını aşan getirilerine olan etkileri, literatürde sıkça kullanılan, Panel Veri Analizi yöntemiyle incelenmiştir. Elde edilen bulguları temel olarak incelediğimizde büyüklük, değer, karlılık ve piyasa riski değişkenlerinin bağımlı değişken üzerinde pozitif ve anlamlı etkisinin olduğu; ancak yatırım faktörünün bağımlı değişken üzerinde kabul edilebilir bir etkisinin olmadığı tespit edilmiştir. Gerçekleştirilen analiz veri seti ve temel varsayımlar çerçevesinde Fama ve French Beş Faktörlü Model kriterlerinin BİST 30 Endeksi'nde yer alan firmaların risksiz faiz oranını aşan getirisi üzerindeki etkisi olduğu iddia edilmektedir.

Anahtar Kelimeler: Varlık Fiyatlama Modeli, Fama-French Beş Faktör Modeli, BIST 30 Endeksi

Abstract

Estimating the link between risk and return, determining the expected returns of riskier assets, and identifying the key components of the capital asset pricing process are all essential for investors and portfolio managers. In the context of quarterly data spanning from 2012 to 2021, this research aims to investigate the potential influence of the Fama and French-developed Five-Factor Model, a variant of the capital asset pricing model, on the risk-free interest rate of companies listed in the Borsa Istanbul 30 Index. Employing the widely-known Panel Data Analysis approach, the study assesses the impact on returns above the risk-free interest rate, taking into account market risk, size, value, profitability, and investment characteristics. After an initial examination of the results, it is apparent that the dependent variable is positively and significantly affected by the variables of size, value, profitability, and market risk. Conversely, the investment component has an undesirable impact on the dependent variable. The assertion is made that the French Five-Factor Model influences returns beyond the risk-free interest rate for companies in the BIST 30 Index, provided that the dataset and fundamental analysis assumptions are met.

Keywords: Asset Pricing Model, Fama-French Five Factor Model, BIST 30 Inde

[1] Dr, diler.turkoglu@samsun.edu.tr, ORCID: 0000-0001-5247-1590
[2] Prof. Dr., Hitit University, fatihkonak@hitit.edu.tr, ORCID: 0000-0002-6917-5082

1. Introduction

Taking into consideration each scenario they encounter, investors seek to both grow and safeguard their income in various ways. They often turn to financial markets to put this into practice. However, social and economic events impact financial markets, creating an unpredictable structure. One of the main challenges for investors is making decisions amidst uncertainty (Konak & Bağcı, 2016, p. 57). Consequently, for investors and financial managers, forecasting stock returns in securities markets and calculating return risk is crucial. Since the Capital Asset Pricing Model is continually being refined to determine the direction and magnitude of the link between risk and return, research on evaluating the systematic risk of the portfolio has attracted significant attention in the literature.

Modern financial economics centers on asset pricing models. These models estimate the link between an asset's risk and its expected return, which is crucial for two reasons. First, this link provides a benchmark rate of return for evaluating potential investments. Second, it allows for the confident calculation of expected returns on assets not yet traded on the market (Bodie, Kane, and Marcus, 1989, p. 228). In essence, the Capital Asset Pricing Model (CAPM) posits that systematic risk, determined by calculating the covariance of an asset's return with that of a market portfolio comprising all currently traded securities, correlates with the asset's expected return above the risk-free rate (Hamid, Hanif, Saif ul Malook, and Wasimullah, 2012). Thus, CAPM aids scholars and investors in quantifying systematic risk and understanding the relationship between risk and stock return. Developed through the studies of Tobin, Sharpe, and Lintner, and proposed by Markowitz in 1960, the CAPM is an equilibrium model that examines the relationship between risk and return of a security in detail, determining if a return commensurate with the risk is likely for the security to be invested in. The traditional portfolio management approach widely diversifies securities, often ignoring the relationship between them in an attempt to minimize portfolio risk (Karan, 2013, pp. 199; Bağcı and Konak, 2016, pp. 31). To strengthen the model and enhance the explanatory power of CAPM, various improvements have been suggested. According to Banz (1981), CAPM is a univariate capital pricing model that fundamentally links market risk with a security's expected return. Highlighting CAPM's limitations, Basu (1983), citing Banz (1981), observed that firm size has been influencing stock returns for many years. Fama and French (1993) discovered that returns above the risk-free interest rate relate to company size and the portfolios of companies with high and low firm value, or PD/DD ratios. They expanded on Sharpe's (1964) capital asset pricing model, proposing a three-factor asset pricing model that includes size, value, and the excess market return contribution. Subsequent research suggested that other elements, in addition to the three-factor model, might be beneficial, indicating that the evolution of CAPM is ongoing. Carhart (1997), for instance, added the momentum factor to explain the short-term persistence in equity mutual fund returns, addressing common variables in returns and investment costs. His findings consistently produced reliable outcomes based on size, value, and momentum factors, affirming market efficiency. Similarly, using the Fama and French (1993) Three-Factor Model, Chan and Faff (2005) explored the role of liquidity in asset pricing and developed a four-factor model. Thus, capital asset pricing models are continuously evolving through empirical research. Considering the literature, Fama and French (2015) suggested that, along with size and value factors, investment and profitability factors might be instrumental in understanding changes in return above the risk-free interest rate. Their research demonstrated that this model surpasses the three-factor model in terms of results.

In addition to the fundamental criteria and methodology for portfolio construction in factor models by Fama and French, this study is primarily motivated to provide information on the individual effects of variables whose impacts have been disclosed in finance literature. The dataset is considered as an index portfolio comprising all firms listed in the BIST 30 Index. Consequently, the aim of this study is to investigate, utilizing panel data analysis, the relationship between variables in the French and Fama Five-Factor Model and the returns of companies operating in the BIST 30 Index that exceed the risk-free interest rate. The return above the risk-free interest rate will serve as the dependent variable in the research, while the market risk premium, business size, firm value, investment, and profitability will function as independent factors. It is crucial to reiterate that the BIST 30, perceived as a single investment basket, is the sole variable on which the impacts of the five significant components are evaluated in this research.

The study provides an overview of the literature on capital asset pricing models and portfolio design, details the dataset employed in the analysis, and outlines the methodology. Subsequently, the study presents its findings and their interpretation. The research concludes with a discussion of the congruence of the findings with the existing literature and proposes recommendations for further research.

2. Literature Review

Several notable studies in the national and international literature have explored the capital asset pricing models developed by Fama and French (1993; 2015):

Petkove (2006) aimed to determine the impact of shocks on the time variations in the investment opportunities of the HML and SMB components in the French and Fama Three-Factor Model. The research results revealed a significant relationship between HML and SMB and innovations in the state variables that predict their variation. Atakan and Gökbulut (2010) examined the applicability of Fama and French's Three-Factor Model on the Istanbul Stock Exchange (ISE). They used annual data from ISE companies from 1993 to 2007, applying the Panel Data Analysis method. The results demonstrated a statistically significant relationship between the market value/book value ratio, stock risk premium, and company size.

Fama and French (2015) expanded on their Three-Factor Model by introducing the RMW and CMA variables alongside SMB and HML values to test a five-factor model on publicly listed companies in the USA. The SMB variable yielded substantial negative outcomes, while the HML variable showed significant positive results. Koy (2013) assessed the reliability of the French Three-Factor Model and the Fama Model in the Istanbul Stock Exchange from 2002 to 2011. The conclusions indicated that while the returns of stocks on the risk-free interest rate couldn't be entirely explained, the model produced meaningful results when applied to portfolios that included small-market-cap firms. In a study conducted between 2005 and 2014, Kaya and Güngör (2017) evaluated the Fama and French Three-Factor Model in Borsa Istanbul using the Panel Data Analysis technique. The research revealed a strong negative relationship between size and stock returns and a significant positive relationship between DD/PD and stock returns.

A positive and statistically significant correlation was observed between stock returns and the market portfolio. In their study covering the years 2006-2018, Arı and Eren Sarıoğlu (2021) examined the returns surpassing the risk-free interest rate of equities from continuously operating firms in Borsa Istanbul, utilizing the Fama and French Five-Factor Model. They discovered a significant positive relationship between the CMA factor and stock returns, as indicated by the findings of the Panel Data Analysis. However, no meaningful correlation was found regarding the RMW component. Aras et al. (2018) evaluated the performance of the Fama-French Multifactor models in Borsa Istanbul. Their analysis involved monthly value-weighted percentage returns from 18 intersecting portfolios between January 2005 and June 2017, which were higher than the risk-free rate of return. The study's results suggest that the Fama-French Three-Factor Model (FF3F) outperforms CAPM, the FF3F model is superior to the three-factor models, and the Fama-French Five-Factor Model (FF5F) surpasses both the FF3F and the four-factor models.

Çömlekçi and Sondemir (2019) tested the Fama and French Three-Factor Model in the Participation 30 Index between 2011-2017, analyzing 25 continuously traded stocks using a regression method. They concluded that the Fama and French Three-Factor Model was not valid in the constrained years. Racicot and Rentz (2016) investigated the addition of the liquidity factor to the Fama and French Five-Factor Model, employing an enhanced generalized method of moments (GMM) methodology. Their findings provided evidence supporting the SMB, HML, RMW, CMA, and LIQ variables. Loughran (2021), on the other hand, evaluated the Fama and French Five-Factor Model on the New York Stock Exchange (NYSE) to determine the performance of equity return portfolios. The analysis indicated that factors such as profitability, size, and value are not highly effective in explaining returns for companies with capitalizations larger than those typically found on the NYSE.

Zeren, Yilmaz, and Belke's (2018) research aimed to evaluate the French Five-Factor Model and the Fama model for companies listed in the BIST Sustainability Index. Analyses conducted using data collected between 1995 and 2017 revealed insufficient evidence supporting the validity of the FF5F Model for the given indicator. However, in his master's thesis, Karaömer (2017) examined the Fama-French Five-Factor Model and the Fama model in Borsa Istanbul, using monthly data from 2005 to 2016. The French Five-Factor Model and the Fama model outperformed other asset pricing methods when assessing the 14 intersecting portfolios using the regression model. Similarly, in his PhD thesis, Kartal (2019) examined the reliability of the French Five-Factor Model and the Fama model in the Participation 30 Index. The model was found to be valid in the Participation 30 Index. Coşkun and Torun (2021) conducted a study in Borsa Istanbul to evaluate the validity of the Fama and French Three-Factor Model as well as the Fama and French Five-Factor Model. Multiple time series regression analysis was used to assess the monthly data of the companies consistently quoted in the BIST100 Index between 2009 and 2018. The evaluation's findings demonstrated the validity of both models in Borsa Istanbul.

3. Data Set and Methodology

The model was designed to investigate the relationship between the returns of firms over the risk-free interest rate and the variables outlined in the Fama and French Five-Factor Model. For this purpose, quarterly data were utilized from 19 firms listed in the BIST 30 Index. This data was sourced from the DataStream Database Programme, covering the period from 2012 to 2021. In this model, the return above the risk-free interest rate is treated as the dependent variable. This study assesses the impacts of several independent factors, including the market risk premium, firm size, firm value, investment, and profitability. Table 1 presents detailed information about the companies included in the analysis as well as an overview of the BIST 30 Index.

Table 1: BIST Codes and Sectors of the Companies Included in the Analysis

BIST CODE	SECTOR
ARCLK	Metal Goods
ASELS	Technology
BIMAS	Wholesale and Retail Trade
EREGL	Main Metal Industry
GUBRF	Chemicals Pharmaceuticals Petroleum
HEKTS	Chemicals Pharmaceuticals Petroleum
KRMD	Basic Metal Industry
KOZAL	Mining and Quarrying
KOZA	Mining and Quarrying
FROTO	Metal Goods Machinery Electrical Equipment and Transport Vehicles
PGSUS	Transport, Storage and Communication
PETKM	Chemicals Pharmaceuticals Petroleum
SASA	Chemicals Pharmaceuticals Petroleum
TOASO	Metal Goods Machinery Electrical Equipment and Transport Vehicles
TCEL	Transport, Storage and Communication
TUPRS	Chemicals Pharmaceuticals Petroleum
THYAO	Transport, Storage and Communication
TTKOM	Transport, Storage and Communication
VESTL	Metal Goods Machinery Electrical Equipment and Transport Vehicles

Excluding the companies in the financial sector, Table 1 identifies 19 continuous firms within the listed companies of the BIST 30 Index. As noted by Fama and French (1992), financial sector companies, characterized by high leverage ratios, are excluded from the sample. Table 2 presents explanatory data for the variables used in the analysis involving these 19 companies.

Table 2: Dependent and Independent Variables

Variables	Abbreviations
Return in excess of the risk-free interest rate	Ri-Rf
Market risk premium	Rm-Rf
Firm Size ln(Market Capitalisation)	SMB
Firm Value (PD/DD)	HML
Investment (Total Assets)	CMA
Profitability (EBIT/Total Assets)	RMW

Table 2 explains the variables used in the analysis. The dependent variable, Ri-Rf, represents the return exceeding the risk-free interest rate. This risk-free rate is determined using Government Domestic Debt Securities, aligning with the approaches of Fama and French (2015) and Aras et al. (2018). The rationale, as Sayılgan (2019, p. 230) notes, is that the nominal interest rate of government securities, especially in inflationary contexts, excludes non-repayment risk, liquidity risk, maturity risk, and reinvestment risk. For the independent variables: Rm-Rf, the market risk premium, is computed using data from the BIST 100 Index as the market portfolio. SMB, signifying company size, employs the natural logarithm of market capitalization to capture return volatility. HML, representing firm value, is calculated using the market value to book value ratio. CMA, the investment component, is included by considering total assets. RMW, the profitability variable, is determined by the ratio of EBIT to Total Assets.

The study employs Panel Data Analysis Method due to its ability to account for both temporal and spatial dimensions in the data, presenting consistent cross-sectional units over time. This method is preferred as it reduces bias that could arise from aggregating large datasets (individuals, firms, etc.) into broad categories and enables the examination of complex behavioral models (Porter and Gandhi, pp. 592–593). Furthermore, Panel Data facilitates the efficient analysis of dynamic adjustments and can obviate the necessity for extensive time series data. This is achieved by leveraging the dynamic responses of different units and utilizing the available information (Kennedy, 2006, p. 331). Grounded in this theoretical context, we have constructed a model to explore the potential impacts of various factors – market risk premium, firm size, firm value, investment, and profitability – on the returns exceeding the risk-free interest rate for companies listed in the BIST 30 Index. The model is structured as follows:

$$R_{i,t} - R_{f,t} = a_i + \beta_i\left(R_{m,t} - R_{f,t}\right) + s_i(SMB_t) + h_i(HML_t) + r_i(RMW_t) + c_i(CMA_t) + \varepsilon_{i,t} \quad (1)$$

The hypotheses of the model are as follows:

H_0: Profitability, market risk premium, size, value, and investment factors do not affect the stock's return over the risk-free interest rate.

H_1: Profitability, market risk premium, size, value, profitability, and investment factors affect the stock's return over the risk-free interest rate.

4. Analysis and Findings

Descriptive statistics data of variables ((Ri-Rf), CMA, HML, Rm-Rf, RMW, and SMB) used as performance measurement criteria in the study are analyzed and presented in Table 3.

Table 3. Descriptive statistics

	RI_RF	CMA	HML	RM_RF	RMW	SMB
Average	-0.47677	229541	2.319323	-0.5263	0.105767	8.838742
Median	-0.40278	12317652	1.72	-0.4515	0.099834	9.119172
Max.	2.39015	3.53E+08	15.26	2.031002	0.500579	11.59127
Min.	-4.48932	126906	0.19	-3.849	-0.05074	4.905497
Std. Dev.	1.191899	36892760	1.921414	1.16768	0.077431	1.322972
Skewness	-0.58529	5.41468	2.473193	-0.5675	0.789024	-0.69422
Kurtosis	4.185359	42.96797	11.96027	4.045997	4.538941	2.828357
Jarque-Bera	76.89923	47511.86	2902.534	66.01019	134.6231	54.23098
Prob.	0.000	0.000	0.000	0.000	0.000	0.000
Obs.	665	665	665	665	665	665

The mean and standard deviation are crucial characteristics of a distribution. The mean represents the center of the distribution, while the standard deviation indicates the spread. Additionally, skewness reflects the symmetry of the distribution, while kurtosis relates to the thickness or size of its tails. For a random variable with a normal distribution, the accepted kurtosis value is 3; a distribution exceeding this is termed thick-tailed (Stock & Watson, 2011, p.27). In Table 3, descriptive statistics for 665 observations, assessing normal distribution and statistical significance levels, are presented through the Jarque-Bera test. Upon analysis, it becomes apparent that the variable representing returns exceeding the risk-free interest rate has a negative average. This suggests that interest returns are often greater than firm returns when the return surpassing the risk-free interest rate has a negative average (Arı & Eren Sarıoğlu, 2021, p. 123). Correlation analysis is an additional technique for exploring the relationship between variables. The coefficient, indicating the strength and direction of the link between variables, is the most basic definition of correlation (Güriş, Çağlayan, and Güriş, 2011, p. 149).

Table 4: Correlation Matrix of the Variables

	RI_RF	CMA	HML	RM_RF	RMW	SMB
RI_RF	1					
CMA	0.022244	1				
HML	0.091292	-0.18933	1			
RM_RF	0.00746	0.016884	0.054883	1		
RMW	0.010059	-0.18963	0.107408	-0.002369	1	
SMB	0.041463	0.416335	0.366224	0.022799	0.000913	1

When examining the correlation matrix in Table 4, it was observed that none of the correlation values between the independent variables exceeded the critical threshold of 0.80, as suggested by Gujarati and Porter (2009, p. 338). Consequently, we can infer that the variables in the model are not subject to multicollinearity problems. Given the limited temporal scope of the dataset, conducting a stationarity analysis was deemed unsuitable (Yerdelen Tatoğlu, 2018, p. 267). Therefore, Table 5 presents the results of the Hausman Test, the Fixed Effects Model, and the Pooled Least Squares Tests, conducted subsequent to the correlation matrix analysis. These tests are instrumental in determining the most suitable model for the data, ensuring the reliability and validity of the regression analysis.

Table 5: Results of Pooled OLS Test, Hausman Test and Fixed Effects Model

Pooled OLS Test Results			
Variables	**Coeff.**	**T-Stat**	**P-Value**
CMA	0.000000000412	1.446749	0.1484
HML	0.024348	4.621391	0.000***
RM_RF	0.999819	135.2922	0.000***
RMW	0.122874	1.079839	0.2806
SMB	-0.00049	-0.05957	0.9525
C	-0.02514	-0.38116	0.7032
Hausman Test Results			
Chi-Sq. Stat.			57.280979
P-Value			0.000***
Fixed Effects Model Results			
Variables	Coeff.	T-Stat	P-Value
CMA	0.00000000018	0.525053	0.5995
HML	0.031507	3.909153	0.0001***
RM_RF	0.997326	139.2107	0.000***
RMW	0.311586	1.898562	0.0581*
SMB	0.054374	3.488919	0.0005***
C	-0.542638	-4.49551	0

***,**,* demonstrate significance levels of 1%, 5% and 10%, respectively.

After examining the results from the Pooled OLS Test presented in Table 5, we find that at the 1% significance level, the independent variables HML (High Minus Low, representing firm value) and Rm-Rf (market risk premium) have a significant and positive impact on the dependent variable Ri-Rf (return over risk-free interest rate). However, the analysis indicates that the other factors, while positively impacting the dependent variable, do not do so to a statistically significant degree.

A notable limitation of the Pooled OLS (Ordinary Least Squares) Test is its simplicity in estimation, which comes at the cost of an assumption that both the averages of the variables and their interrelationships remain constant over time and across all units when all observations are pooled together (Karagöz, 2016, p. 279). This assumption may not always hold true, particularly in diverse or dynamic data sets. Therefore, panel data analysis becomes a more suitable approach as it allows for individual assessment of companies across both time and data dimensions. In the panel data estimation procedure, the first step involves testing the null hypothesis, which posits that all cross-section coefficients are equal. If this hypothesis is accepted, the data are pooled. However, if the null hypothesis is rejected, the Hausman test is employed to determine if the random effect estimator is unbiased. Depending on the outcome of the Hausman test, the analysis proceeds with either the random effect estimate (if the null hypothesis is accepted) or the fixed effect estimator (if it is rejected) (Kennedy, 2006, p. 335). This approach ensures a more nuanced understanding of the data by accounting for individual differences across units and over time.

H_0: Random effects are present (P- value >0.005).

H_1: Random effects are not present (P- value < 0.005).

The continuation of Table 5 presents the results of the Hausman Test for the dependent variable Ri-Rf (return over the risk-free interest rate). Analysis of these results reveals that the P-value is below 0.005, indicating significance. Consequently, the null hypothesis (H0) is rejected, supporting the applicability of the Fixed Effects Model for this analysis.

With the application of the Fixed Effects Model, we observe significant findings:

- HML Variable (Firm Value): This variable demonstrates a positive and statistically significant effect on Ri-Rf at the 1% level. A 1% change in HML corresponds to an increase of 0.03 percent in Ri-Rf. This finding aligns with Fama and French's (2015) research, suggesting that companies with higher Price to Dividend/Dilution (PD/DD) ratios, indicative of HML, may have higher profitability potential and, consequently, better stock returns.
- Market Risk Premium (Rm-Rf): This variable significantly influences Ri-Rf at the 1% level, indicating that a 1% change in the market risk premium could result in a 0.99 increase in Ri-Rf. This relationship highlights the sensitivity of the return over the risk-free rate to changes in market risk premium.
- Profitability Variable (RMW): Interestingly, the Fixed Effects Model reveals the RMW variable to be significant at the 10% level on Ri-Rf, despite its insignificance in the Pooled OLS Test. This indicates that a 10% change in profitability could lead to a 0.31-unit increase in Ri-Rf, underlining the importance of profitability in influencing returns.
- Company Size (SMB): Initially insignificant in the Pooled OLS Test, the SMB variable becomes significant at the 1% level in the Fixed Effects Model. This suggests that for every 1% change in company size, there could be a 0.05 increase in Ri-Rf. This shift in

significance underlines the varying impacts of company size on returns when considering individual company characteristics over time.

- Investment Aspect (CMA): While the investment component (CMA) is observed to have a positive effect on Ri-Rf, this impact does not show statistical significance in this model. This result implies that, while investment may influence returns, its effect is not robustly significant in the context of the BIST 30 Index companies under study.

In summary, the Fixed Effects Model provides a more detailed and nuanced view of the relationships between these variables and the return over the risk-free interest rate for firms in the BIST 30 Index. The significant findings for HML, Rm-Rf, RMW, and SMB offer valuable insights into the factors influencing stock returns in this context.

5. Conclusion

Fama and French (2015) introduced a groundbreaking perspective to the literature by incorporating investment and profitability elements into their five-factor model, suggesting these factors wield the most influence on stock returns. This study investigates the impact of variables within the Fama and French Five-Factor Model on the returns exceeding the risk-free interest rate for 19 firms listed in the BIST 30 Index between 2012 and 2021, utilizing the BIST 30 Index as a portfolio. The findings indicate positive and statistically significant outcomes for all factors except investment.

Specifically: Firm Value (HML); The positive influence of firm value on the return exceeding the risk-free interest rate (ri-rf) aligns with previous works (Atakan and Gökbulut, 2010; Fama and French, 2015; Kaya and Güngör, 2017). However, it contrasts with the findings of Koy (2013), Zeren et al. (2018), and Arı and Eren Sarıoğlu (2021). Profitability (RMW); The positive and statistically significant impact of profitability on ri-rf supports the expected positive correlation between profitability and company return. This result is consistent with Zeren et al. (2018) but conflicts with the findings of Arı and Eren Sarıoğlu (2021). Size (SMB); Despite yielding statistically significant outcomes, the positive impact of the size variable on ri-rf contradicts the negative association reported by Fama and French (2015). This result is not in line with the expectations based on the negative relationship between size and returns above the risk-free interest rate. Market Risk Premium (Rm-Rf); The statistically significant positive impact of market risk premium on ri-rf aligns with the findings of Arı and Eren Sarıoğlu (2021) and Atakan and Gökbulut (2010).

The statistical significance of four out of the five independent variables in relation to the dependent variable suggests that the French Five-Factor Model and Fama and French Five-Factor Model criteria may indeed influence returns higher than the risk-free interest rate for companies. However, these findings conflict with some prior research (Zeren et al., 2018; Arı and Eren Sarıoğlu, 2021) while being consistent with others (Aras et al., 2018). Future research could enhance the model by exploring different indices and introducing additional variables (such as momentum, reverse momentum, liquidity, and volatility) to broaden the understanding of how these factors impact returns above the risk-free interest rate in both national and global indices.

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