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The Nexus Between Corporate Investment Decisions and Firm Profitability: Moderating Role of Fund Flows and Investment Opportunities*

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ABSTRACT

The study aims to investigate the moderating role of fund flows and investment opportunities in the relationship between investment decisions and firm profitability with a panel data analysis for 107 real sector firms traded in Borsa Istanbul for the period 2000-2020. Return on assets and return on equity variables are selected for firm profitability, while growth rate of fixed assets, growth rate of total assets and growth rate of capital expenditures to total assets are selected for investment decisions. As a result of the analysis, it has found that investment decisions have a significant impact on firm profitability. The study also finds that the interaction of fund flows and investment decisions and the interaction of investment opportunities and investment decisions have significant effects on firm profitability and that the inclusion of these interaction variables in the model increases the impact of investment decisions on firm profitability.

Keywords: *Investment Decisions, Profitability, Fund Flow, Investment Opportunity, BIST*

Jel Classification*: C33, G30, G31*

Yatırım Kararları ile Firma Karlılığı Arasındaki İlişki: Fon Akışları ve Yatırım Fırsatlarının Moderatör Rolü

ÖZET

Çalışmada yatırım kararları ile firma karlılığı ilişkisinde fon akışları ve yatırım fırsatlarının moderator rolünün 2000-2020 döneminde Borsa İstanbul'da işlem gören 107 reel sektör firması için panel veri analizi ile araştırılması amaçlanmıştır. Firma karlılığı için aktif karlılık ve özsermaye karlılığı, yatırım kararları için sabit varlıkların büyüme oranı, toplam varlıkların büyüme oranı ve sermaye harcamalarının toplam varlıklara büyüme oranları değişkenleri seçilmiştir. Gerçekleştirilen analizler sonucunda yatırım kararlarının firma karlılığını önemli derecede etkilediği tespit edilmiştir. Ayrıca çalışmada fon akışları ve yatırım kararlarının etkileşimi ve yatırım fırsatları ve yatırım kararlarının etkileşiminin firma karlılığı üzerinde anlamlı etkilerinin olduğu ve bu etkileşim değişkenleri modele dahi edildikten sonra yatırım kararlarının firma karlılığı üzerindeki etkisini artırdığı bulgulanmıştır.

Anahtar Kelimeler: *Yatırım Kararları, Kârlılık, Fon Akışı, Yatırım Fırsatı, BİST*

JEL Sınıflandırması: *C33, G30, G31*

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1. INTRODUCTION

The concept of investment is associated with various activities and the ultimate goal in all these activities is to use the funds for a period of time to increase the wealth of investors. Funds to be invested are classified as real and financial investments. Real investment includes fixed types of tangible assets, while financial investment includes paper and electronic contracts such as stocks and bonds (Islam et al. 2022: 2). Through investment decisions, firms accomplish their corporate objectives, which is why these decisions are so important for firm value. In order to increase wealth, firms will choose short- or long-term investments that provide the highest return with manageable risk. The right investment decision will produce optimal performance for increasing the growth of firm assets (Nurlela et al. 2019: 448; Nugroho 2021: 16). Historically, the concept of investment decisions dates back to the work of Modigliani and Miller (1958), who separately introduced the principle of investment segregation, the irrelevance theorem of capital structure and the irrelevance theorem of dividends, which form the basis of modern corporate finance theory. Modigliani and Miller (1958) argue that investment policy alone determines shareholder wealth in frictionless markets and that leverage and payout decisions have no effect on firm value given a value-maximizing investment program. Specifically, when a firm considers different leverage and payout decisions, it divides the cash flows from investment into different parts whose individual values in frictionless markets must inevitably equal the value generated by the underlying investment policy. Nevertheless, the irrelevance theory is not valid too if the complete market assumption is not valid (DeAngelo and DeAngelo, 2006: 294; Islam et al. 2022:1-2).

Based on unrealistic assumptions, the MM theorem explains that market imperfections are important for capital structure to matter. Firms therefore move towards a given debt-to-equity ratio, trading the advantages of debt for disadvantages. Pecking order theory (Myers and Majluf, 1984) refutes this idea of the existence of financial goals and argues that firms follow certain financial hierarchy. The pecking order theory explains that managers first prioritize retained earnings to finance their activities and choose to issue debt if they need more funds, and finally issue equity when there is no point in issuing more debt (Jahanzeb et al. 2013: 11-12). In such cases, firms' investments are influenced by cash flows, and firms' investment decisions largely depend on the availability of cash flows (Islam et al. 2022: 2). The pecking order theory, which suggests that firms' second-ranked source of funding is external financing besides internal funds, explains that a firm's investment opportunities are related to its investment decisions. Investment opportunities are a component of company value, which is the result of choices made to invest in the future. This means that company value can influence the investment decision in the next period. High enterprise value indicates that the stock price at that time is also high, which reflects the breadth of the company's investment opportunities. The higher the stock price, the easier it will be for companies to attract investors to buy the company's stock. Thus, capital additions will have an impact on increasing the institutional capital available for investment by companies (Prasetya and Yulianto, 2019: 18-19). In this context, the study aims to reveal the relationship between investment decisions, the interaction between investment decisions and fund flows, the interaction between investment decisions and investment opportunities, and firm performance in 107 real sector firms traded in Borsa Istanbul for the period 2000-2020. When the literature is examined, while there are studies that address the issue with different variables, the author

could not find a study investigating the moderating role of fund flows and growth opportunities for firms traded in Borsa Istanbul. Therefore, the number of studies on the subject is limited. With this scope, it can be said that the study will contribute to the literature and offer originality. The policy implications of the study findings are important for firm managers, shareholders and other firm stakeholders.

2. LITERATURE REVIEW AND RELATED HYPOTHESES

Investment decisions are very significant for firms. Investment decisions can positively affect shareholders' wealth and firm profitability (Hatem, 2016: 112). For this reason, analyzing the factors affecting these decisions and their impact on firm profitability has been one of the most frequently analyzed topics in the literature. When examined the effects of investment decisions on firm profitability and performance, Gordon and Iyengar (1997) found a positive relationship between return on investment and capital expenditures. In another study, Da Silva et al. (2013) examined the relationship between investment decisions and profitability for non-financial companies listed on the Brazilian Stock Exchange for the period 2001-2011 and found a negative relationship between past investments and profitability and a positive relationship between current investments and profitability. In a different study, Hatem (2016) found that profitability positively affects investment decisions in their study for a sample of four countries in the period 2003-2010. Similarly, Akron et al. (2020) found that profitability positively affects investment decisions for a sample of hospitality companies in the USA for the period 2001-2018. From a different perspective, Islam et al. (2022) examined the moderating role of cash flows in the relationship between investment decisions and firm performance for a sample of 68 non-financial firms operating in Pakistan for the period 2013-2017. As a result of the study, it was found that investment decisions significantly affect the performance of firms and cash flows have a negative moderating role on this relationship. On the contrary, Suleman (2021) found that investment decisions do not affect firm value for real estate and construction firms traded on the Indonesian stock exchange in the period 2014-2017. Similarly, Bon and Hartoko (2022) found that investment decisions do not affect firm value as a result of their research for manufacturing companies traded on the Indonesian Stock Exchange for the period 2015-2019. Putri and Budyastuti (2021) also found that investment decisions do not affect firm value for firms listed on the Indonesia Stock Exchange. Based on the above discussion, the following hypothesis is formulated.

H1: *There is a positive relationship between investment decisions and firm profitability.*

When the studies investigating the factors affecting investment decisions are analyzed, Galeotti et al. (1994) stated that small firms are more sensitive to cash flows in investment decisions, similarly Kaplan and Zingales (1997) and Fazzari et al. (2000) stated that cash flows affect firms' investment decisions. In another study, Nguyen and Dong (2013) show that cash flow, fixed capital intensity, business risk, leverage and firm size are key factors in investment activities. Prasetya and Yulianto (2019) found that cash flows affect investment decisions but not growth opportunities for firms listed on the Indonesia Stock Exchange in the period 2012-2016. In another study, Aksar et al. (2022) found that corporate governance improves investment efficiency in their study on the Asian Economy for the period 2006-

2019. Based on the above discussion, the following hypotheses are formulated with the idea that fund flows and growth opportunities may affect investment decisions.

H2: *Fund flows have a moderating role in the relationship between investment decisions and firm profitability.*

H3: *Investment opportunities have a moderating role in the relationship between investment decisions and firm profitability.*

The following sections present the methodology, findings, discussion, conclusions and policy implications.

3. DATA SOURCES AND EMPIRICAL ECONOMETRIC MODEL

The study aims to examine the moderating role of fund flows and investment opportunities in the relationship between investment decisions and firm profitability. The secondary data used in this study were obtained from the Finnet database. The research period was determined as the 2000-2020 period for which data is available. The scope of the research consists of 107[1] real sector firms operating in Borsa Istanbul. The variables selected for firm profitability are return on assets and return on equity, while the variables selected for investment decisions are growth rate of fixed assets, growth rate of total assets and growth rate of capital expenditures to total assets. Fund flows and investment opportunities are selected as moderator variables (see Table 1).

Table 1: Variables Description

Variables	Measurement	Acronym	Literature
Dependent Variables (Firm Profitability)			
Return on Assets	Net Profit/Total Assets	ROA	Prasetya and Yulianto (2019), Islam et al. (2022)
Return on Equity	Net Profit/Total Equity	ROE	Putri and Budyastuti (2021)
Independent Variables (Investment Decisions)			
Growth Rate of Total Assets	$(\text{Total Assets}_t - \text{Total Assets}_{t-1}) / \text{Total Assets}_t$	GTA	Prasetya and Yulianto (2019), Islam et al. (2022)
Growth Rate of Fixed Assets	$(\text{Fixed Assets}_t - \text{Fixed Assets}_{t-1}) / \text{Fixed Assets}_t$	GFA	Islam et al. (2022)
Ratio of capital expenditures to total assets	Capital Expenditures/Total Assets	CETA	Islam et al. (2022)
Moderating Variables			
Fund Flow	(Net Income + Depreciation) / Fixed Assets	FF	Islam et al. (2022)
Investment Opportunity	Book Value /Market Value	BM	Prasetya and Yulianto (2019)

[1] It is shown in Appendix 1.

The explained variables in the study are ROA (Return on Assets) and ROE (Return on Equity), while the explanatory variables are GTA (Growth Rate of Total Assets), GFA (Growth Rate of Fixed Assets), CETA (Ratio of Capital Expenditures to Total Assets), FF (Fund Flow) and BM (Investment Opportunity). Specifically, regression models (1 and 2) are constructed to examine the relationship between investment decisions and firm profitability.

$$ROA_{it} = \alpha_0 + \alpha_1 GTA_{it} + \alpha_2 GFA_{it} + \alpha_3 CETA_{it} + \alpha_4 FF_{it} + \alpha_5 BM_{it} + \mu_{it} \quad (1)$$

$$ROE_{it} = \alpha_0 + \alpha_1 GTA_{it} + \alpha_2 GFA_{it} + \alpha_3 CETA_{it} + \alpha_4 FF_{it} + \alpha_5 BM_{it} + \mu_{it} \quad (2)$$

This study also investigates the moderating role of fund flows and investment opportunities in the relationship between investment decisions and firm profitability. The following regression models are constructed to examine these relationships (3-6).

$$ROA_{it} = \alpha_0 + \alpha_1 GTA_{it} + \alpha_2 GFA_{it} + \alpha_3 CETA_{it} + \alpha_4 FF_{it} + \alpha_5 BM_{it} + \alpha_6 FF \times GTA_{it} + \alpha_7 FF \times GFA_{it} + \alpha_8 FF \times CETA_{it} + \mu_{it} \quad (3)$$

$$ROE_{it} = \alpha_0 + \alpha_1 GTA_{it} + \alpha_2 GFA_{it} + \alpha_3 CETA_{it} + \alpha_4 FF_{it} + \alpha_5 BM_{it} + \alpha_6 FF \times GTA_{it} + \alpha_7 FF \times GFA_{it} + \alpha_8 FF \times CETA_{it} + \mu_{it} \quad (4)$$

$$ROA_{it} = \alpha_0 + \alpha_1 GTA_{it} + \alpha_2 GFA_{it} + \alpha_3 CETA_{it} + \alpha_4 FF_{it} + \alpha_5 BM_{it} + \alpha_6 BM \times GTA_{it} + \alpha_7 BM \times GFA_{it} + \alpha_8 BM \times CETA_{it} + \mu_{it} \quad (5)$$

$$ROE_{it} = \alpha_0 + \alpha_1 GTA_{it} + \alpha_2 GFA_{it} + \alpha_3 CETA_{it} + \alpha_4 FF_{it} + \alpha_5 BM_{it} + \alpha_6 BM \times GTA_{it} + \alpha_7 BM \times GFA_{it} + \alpha_8 BM \times CETA_{it} + \mu_{it} \quad (6)$$

When the literature is analyzed, investment decisions are expected to positively affect firm profitability (see Da Silva et al. (2013), Hatem (2016), Akron et al. (2020)). Islam et al. (2022) emphasize that firms' investments are affected by cash flows and the importance of the availability of cash flows in investment decisions. Cleary (1999) stated that the investment decisions of firms are sensitive to internal funds. Therefore, fund flows are expected to have a moderating role in the relationship between investment decisions and firm profitability. In the study, the book-to-market value ratio is used for investment opportunities. High BM indicates low investment opportunities for firms. Investment opportunities increase corporate capital by providing firms with additional capital to invest (Prasetya and Yulianto, 2019). Therefore, investment opportunities are expected to have a moderating role in the relationship between investment decisions and firm profitability.

4. METHODOLOGICAL FRAMEWORK

In this study, panel data analysis is applied to examine the moderating role of fund flows and investment opportunities in the relationship between investment decisions and firm profitability. In this context, first, multicollinearity and endogeneity are tested. Then, cross-sectional dependence and homogeneity are tested for the variables. Since the N dimension is larger than the T dimension, Pesaran (2004) CD (cross-sectional dependence) test results are taken into account. The mathematical expression of the test is shown in Equation 7.

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{p}_{ij} \right) \sim N(0,1) \quad (7)$$

Taking into account the results of the cross-section dependence test, stationarity has been investigated with the selected unit root tests. Since cross-section dependence has been detected in all variables in the study, the unit root test has been performed with the Pesaran

and Shin CIPS (Cross-sectionally augmented Im-Peseran-Shin) test, which is a second-generation unit root test. Its mathematical expression is shown in Equation 8.

$$CIPS = N^{-1} \sum_{i=1}^{N} \pi_i(N, T) \quad (8)$$

After the stationarity analyses, F test, Breusch-Pagan LM (1980) test and Honda (1985) test are used to examine which of the pooled, fixed effects and random effects models are valid in the model. The models are shown in Equation 9, Equation 10 and Equation 11, respectively.

$$\text{Unconstrained Model: } Y_i = X_i \beta_i + u_i \qquad i = 1,2,3,\dots,N$$

$$\text{Constrained Model: } Y_i = X\beta + u \quad (9)$$

$$LM = (LM_1 + LM_2) \sim X^2 \quad (10)$$

$$HONDA = \sqrt{(LM_1 + LM_2)} \sim N(0,1) \quad (11)$$

Finally, autocorrelation and heteroscedasticity tests are performed and the estimator to be used is determined according to the test results. If these problems are present in the models, consistent and robust results can be obtained by using robust estimators.

5. RESULTS AND DISCUSSION

The mean, median, minimum and maximum, standard deviation, skewness, kurtosis and Jargue-Bera (J-B) descriptive statistics for the variables for the relevant period and sample are shown in Table 2.

Table 2. Descriptive Statistics

Stats.	ROA	ROE	GTA	GFA	CETA	FF	BM
Mean	3.607410	5.552737	17.93783	16.20613	5.736372	0.123123	0.957826
Median	3.804645	7.807338	13.29895	10.19257	3.875898	0.092617	0.760485
Maximum	92.79843	114.6940	161.4886	203.7271	76.15196	10.46248	9.646751
Minimum	-94.47502	-203.9226	-94.10978	-95.54725	-64.89609	-1.645576	-9.219839
Std. Dev.	11.35157	24.65074	23.62656	27.60059	8.187428	0.343377	0.922733
Skewness	-0.526887	-1.665038	1.024314	1.526619	0.692911	19.96563	1.424872
Kurtosis	11.55958	12.77454	5.380579	8.270927	15.64706	540.0365	26.98895
Jarque-Bera	6963.527	9983.336	923.5199	3473.949	15154.96	27151504	54638.68
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	2247	2247	2247	2247	2247	2247	2247

When the descriptive statistics values of the variables are analyzed, it is observed that the highest standard deviation value is in the GFA variable. The mean values are 3.60 for ROA, 5.55 for ROE, 17.93 for GTA, 16.20 for GFA, 0.12 for FF and 0.95 for BM. JB probability values are less than the critical value of 0.05 for all variables. In the relevant period, it can be said that the return on equity of the companies is higher than the return on assets, but the standard deviation is also higher. The growth rate of the total assets of the enterprises and the growth rate of their fixed assets are similar in the relevant period. The

book value/market value variable, which shows investment opportunities in the market, is less than 1, which is accepted as the average limit in the relevant period and sample. Therefore, it is determined that all variables do not exhibit a normal distribution. Therefore, the problem of multicollinearity between independent variables was investigated with the Spearman correlation test, which is used in cases where there is no normal distribution. The test results are shown in Table 3.

Table 3. Spearman Correlation Matrix for Multicollinearity

Correlation	GTA	GFA	CETA	FF	BM
GTA	1.000000				
GFA	0.644925	1.000000			
CETA	0.362369	0.472328	1.000000		
FF	0.193794	0.044042	0.211877	1.000000	
BM	-0.093592	-0.057751	-0.142337	-0.165949	1.000000
P-value	GTA	GFA	CETA	FF	BM
GTA	-----				
GFA	0.0000	-----			
CETA	0.0000	0.0000	-----		
FF	0.0000	0.0368	0.0000	-----	
BM	0.0000	0.0062	0.0000	0.0000	-----

When the correlation relationship between the independent variables is analyzed, it is observed that the highest relationship is between the GFA and GTA variables (0.64). Since there is no high-level relationship (0.75) between the independent variables, it can be said that there is no multicollinearity problem between them. Then, whether there is an endogeneity problem in the models is investigated by the correlation relationship between the error term estimated through OLS and the explanatory variables. The test results are shown in Table 4 and Table 5.

Table 4. Spearman Correlation Matrix for Endogeneity (Model 1)

Correlation	Error Term	GTA	GFA	CETA	FF	BM
Error Term	1.000000					
GTA	0.048650	1.000000				
GFA	0.063452	0.645485	1.000000			
CETA	0.129423	0.363179	0.473996	1.000000		
FF	0.376885	0.197506	0.045497	0.213066	1.000000	
BM	-0.091655	-0.091742	-0.058426	-0.139586	-0.159588	1.00000
P-value	Error Term	GTA	GFA	CETA	FF	BM
Error Term	-----					
GTA	0.0206	-----				
GFA	0.0025	0.0000	-----			
CETA	0.0000	0.0000	0.0000	-----		
FF	0.0000	0.0000	0.0304	0.0000	-----	
BM	0.0000	0.0000	0.0054	0.0000	0.0000	-----

When the correlation test results in Table 3 and Table 4, which investigate the endogeneity problem for Model 1 and Model 2, are analyzed, it is found that there is no high-

level relationship (0.75) between the error term estimated through OLS and the explanatory variables. Therefore, there is no endogeneity problem in the models.

Table 5. Spearman Correlation Matrix for Endogeneity (Model 2)

Correlation	Error Term	GTA	GFA	CETA	FF	BM
Error Term	1.000000					
GTA	0.063076	1.000000				
GFA	0.061391	0.645485	1.000000			
CETA	0.127597	0.363179	0.473996	1.000000		
FF	0.403632	0.197506	0.045497	0.213066	1.000000	
BM	-0.090193	-0.091742	-0.058426	-0.139586	-0.159588	1.00000
P-value	Error Term	GTA	GFA	CETA	FF	BM
Error Term	-----					
GTA	0.0027	-----				
GFA	0.0035	0.0000	-----			
CETA	0.0000	0.0000	0.0000	-----		
FF	0.0000	0.0000	0.0304	0.0000	-----	
BM	0.0000	0.0000	0.0054	0.0000	0.0000	-----

In this study, cross-section dependence is investigated with Breusch-Pagan (1980) LM, Pesaran CD and Scaled LM (2004), Pesaran, Ullah and Yagamata (2008) Bias-Corrected Scaled LM tests. The test results are shown in Table 6.

Tablo 6. Results of Cross-Sectional Dependence Tests

Variables	Breusch-Pagan LM		Pesaran scal. LM		Bias-corrected scal. LM		Pesaran CD	
	Statistic	p-value	Statistic	p-value	Statistic	p-value	Statistic	p-value
ROA	10693.3***	0.000	47.1587***	0.000	44.4837***	0.000	12.1439***	0.000
ROE	10669.4***	0.000	46.9347***	0.000	44.2597***	0.000	13.4548***	0.000
GTA	15630.7***	0.000	93.5201***	0.000	90.8451***	0.000	93.8042***	0.000
GFA	13231.2***	0.000	70.9885***	0.000	68.3135***	0.000	86.5497***	0.000
CETA	20301.9***	0.000	137.380***	0.000	134.705***	0.000	96.6877***	0.000
FF	14420.3***	0.000	82.1539***	0.000	79.4789***	0.000	53.8421***	0.000
BM	26977.5***	0.000	200.063***	0.000	197.388***	0.000	112.963***	0.000

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively

Since the N dimension is larger than the T dimension, Pesaran (2004) CD test results are taken into consideration. When the test results are analyzed, the realized probability value for all variables is less than the critical value of 0.05. The null hypothesis of no cross-section dependence is rejected. In addition, Breusch-Pagan (1980) LM, Pesaran Scaled LM (2004), Pesaran, Ullah and Yagamata (2008) Bias-Corrected Scaled LM test results also support Pesaran (2004) CD test results. Since cross-section dependence problem is detected in all variables, the unit root test is performed with the CIPS test that takes into account cross-section dependence. The test results are shown in Table 7.

Tablo 7. Results of Panel 2nd Generation Unit Root Tests

Variables	Intercept		Intercept and Trend	
	Pesaran CIPS			
	CIPS t-stat.	p-value	CIPS t-stat.	p-value
ROA	-3.32519***	<0.01	-3.65660***	<0.01
ROE	-3.54714***	<0.01	-3.78404***	<0.01
GTA	-4.04203***	<0.01	-4.01731***	<0.01
GFA	-3.97394***	<0.01	-4.10133***	<0.01
CETA	-3.37488***	<0.01	-3.62688***	<0.01
FF	-5.39558***	<0.01	-5.69990***	<0.01
BM	-2.30893***	<0.01	-2.76926***	<0.01

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

When the CIPS unit root test results in Table 7 are analyzed, it is observed that the test probability value is less than the critical value of 0.05 for all variables at constant and constant-trend. The null hypothesis that there is a unit root is rejected. All variables are found to be stationary at I(0) level. The analyses conducted within the scope of dependent variables are presented in the following sections under 2 subheadings.

5.1. Investment Decision and Return on Assets

This section presents the findings of the models investigating the relationship between investment decisions and return on assets and the moderating role of fund flow and investment opportunities in this relationship. In this context, firstly, F test, Breusch-Pagan LM (1980) test and Honda (1985) test are performed to determine which of the pooled, fixed effects and random effects models will be used. The test results are shown in Table 8.

Table 7. Model Selection for Panel Data

	Model 1		**Model 3**		**Model 5**	
Test	Stat.	P-value	Stat.	P-value	Stat.	P-value
F Tests						
Individual effect (F.E)	8.81019	0.000	8.353821	0.000	8.99282	0.000
Time Effect (F.E)	7.74375	0.000	8.553291	0.000	7.97354	0.000
Individual and time Effect (F.E.)	8.81374	0.000	8.651315	0.000	9.03352	0.000
Breuch-Pagan LM Tests						
Individual effect (R.E)	1445.42	0.000	1301.695	0.000	1498.09	0.000
Time Effect (R.E)	149.777	0.000	198.2309	0.000	164.461	0.000
Individual and time Effect (R.E.)	1595.20	0.000	1499.925	0.000	1662.55	0.000
Honda (1985) Test						
Individual effect (R.E)	38.0187	0.000	36.07900	0.000	38.7052	0.000
Time Effect (R.E)	12.2383	0.000	14.07945	0.000	12.8242	0.000
Individual and time Effect (R.E.)	35.5371	0.000	35.46738	0.000	36.4368	0.000

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

According to the F-test statistics for Model 1, Model 2 and Model 3, the appropriate model is the two-sided fixed effects model, and according to the Breuch-Pagan LM (1980) and Honda (1985) tests, the random effects model is more efficient than the pooled model. Since the data consist of a specific period and group (Baltagi, 2005), estimation is performed with the two-sided fixed effects model. The autocorrelation and variance test results for the fixed effects model are shown in Table 9.

Table 9. Heteroscedasticity and Autocorrelation for Fixed Effects

	Model 1		**Model 3**		**Model 5**	
Heteroscedasticity	Stat.	P-value	Stat.	P-value	Stat.	P-value
Breusch-Pagan-Godfrey LM H_0: No Heteroscedasticity	1791.60	0.000	1838.61	0.000	1442.83	0.000
Autocorrelation						
Baltagi and Li (1991) LM-stat H_0: No Autocorrelation	158.610	0.000	159.714	0.000	154.575	0.000

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

When the results of the variance test for all models are analyzed, it is observed that the test probability value is less than the critical value of 0.05. The null hypothesis of no cross-section is rejected. When the autocorrelation test results for all models are analyzed, it is observed that the test probability value is less than the critical value of 0.05. The null hypothesis of no autocorrelation is rejected. Therefore, it is determined that there are problems of variance and autocorrelation for Model 1, Model 3 and Model 5. White (Dioganal) estimation method, which takes these problems into account and solves them, is used in the estimation process. Regression estimates for the models are shown in Table 10.

Tablo 10. OLS White (Dioganal) Estimation Results

Dependent Variables ROA			
Variables	Model 1	Model 3	Model 5
GTA	0.078029(0.0000) ***	0.051582(0.0000) ***	0.096021(0.0000) ***
GFA	-0.017943(0.0116) **	-0.010109(0.2158)	-0.010965(0.2093)
CETA	-0.054869(0.0315) **	-0.043342(0.2239)	-0.168883(0.0005) ***
FF	6.306593(0.0007) ***	7.688018(0.0000) ***	6.342482(0.0009) ***
BM	-0.903537(0.0000) ***	-0.909369(0.0000) ***	-1.110833(0.0000) ***
FFxGTA	-	0.153133(0.0001) ***	-
FFxGFA	-	-0.047656(0.0865) *	-
FFxCETA	-	-0.091545(0.6123)	-
BMxGTA	-	-	-0.018165(0.0737) *
BMxGFA	-	-	-0.005637(0.1614)
BMxCETA	-	-	0.126405(0.0007) ***
C	2.902209(0.0000) ***	2.806160(0.0000) ***	3.087440(0.0000) ***
R-squared	0.436895	0.459868	0.444653
Adjusted R-squared	0.407619	0.430987	0.414958
S.E. of regression	9.122892	9.071075	8.981072
F-statistic	14.92324	15.92267	14.97402
Prob(F-statistic)	0.0000***	0.0000***	0.0000***

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

When the OLS estimation results are analyzed, it is determined that all three models are significant at 1% significance level according to the F statistic probability value. The explanatory power of the independent variables for the dependent variable is 43% in Model 1, 45% in Model 3 and 44% in Model 5. Model 1, which investigates the relationship between investment decisions and return on assets, reveals a statistically significant and positive relationship between GTA and ROA, and a statistically significant and negative relationship between GFA and CETA and ROA. Specifically, the empirical findings indicate that a one-unit increase in the GTA variable will lead to a 0.07 unit increase in ROA, a one unit increase in the GFA variable will lead to a 0.01 unit decrease in ROA, and a one-unit increase in the CETA variable will lead to a 0.05 unit decrease in ROA. In addition, significant relationships

are found between the moderator variables fund flows and investment opportunities and ROA. Specifically, a one unit increase in FF leads to a 6.30 unit increase in ROA and a one unit increase in BM leads to a 0.90 unit decrease in ROA. High BM indicates low investment opportunities for firms. As investment opportunities decrease, return on assets decreases. Therefore, it can be said that there is a linear relationship between fund flows and investment opportunities and return on assets.

Model 2, which analyzes the interaction between fund flows and investment decisions, reveals a statistically significant and positive relationship between FFxGTA and ROA, and a statistically significant and negative relationship between FFxGFA and ROA. On the other hand, no significant relationship was found between FFxCETA and ROA. After the FFxGTA variable is included in the model, the effect of GTA on ROA decreases. Model 3, which analyzes the interaction between investment opportunities and investment decisions, reveals a statistically significant and negative relationship between BMxGTA and ROA, and a statistically significant and positive relationship between BMxCETA and ROA. On the other hand, no significant relationship was found between BMxGFA and ROA. After BMxGTA and BMxCETA variables were included in the model, the effect of GTA and CETA on ROA increased. The findings are similar to Islam et al. (2022).

5.2. Investment Decision and Return on Equity

This section presents the findings of the models investigating the relationship between investment decisions and equity and the moderating role of fund flow and investment opportunities in this relationship. In this context, firstly, it is investigated which of the pooled, fixed effects and random effects models will be used. The test results are shown in Table 11.

Table 11. Model Selection for Panel Data

	Model 2		**Model 4**		**Model 6**	
Test	Stat.	P-value	Stat.	P-value	Stat.	P-value
F Tests						
Individual effect (F.E)	6.28214	0.000	6.02909	0.000	6.26227	0.000
Time Effect (F.E)	6.23675	0.000	7.05429	0.000	6.84745	0.000
Individual and time Effect (F.E.)	6.44832	0.000	6.43264	0.000	6.55830	0.000
Breuch-Pagan LM Tests						
Individual effect (R.E)	824.051	0.000	758.096	0.000	818.574	0.000
Time Effect (R.E)	131.908	0.000	178.838	0.000	165.560	0.000
Individual and time Effect (R.E.)	955.960	0.000	936.935	0.000	984.135	0.000
Honda (1985) Test						
Individual effect (R.E)	28.7062	0.000	27.5335	0.000	28.6107	0.000
Time Effect (R.E)	11.4851	0.000	13.3730	0.000	12.8670	0.000
Individual and time Effect (R.E.)	28.4196	0.000	28.9253	0.000	29.3292	0.000

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

According to the F-test statistics for all models, the appropriate model is the two-sided fixed effects model, and according to the Breuch-Pagan LM (1980) and Honda (1985) tests, the random effects model is more efficient than the pooled model. Since the data consist of a specific period and group (Baltagi, 2005), estimation is performed with the two-sided fixed effects model. The autocorrelation and variance test results for the fixed effects model for Model 2, Model 4 and Model 6 are shown in Table 12.

Table 12. Heteroscedasticity and Autocorrelation for Fixed Effects

	Model 2		**Model 4**		**Model 6**	
Heteroscedasticity	Stat.	P-value	Stat.	P-value	Stat.	P-value
Breusch-Pagan-Godfrey LM H_0: No Heteroscedasticity	1890.56	0.000	1991.45	0.000	1894.93	0.000
Autocorrelation						
Baltagi and Li (1991) LM-stat H_0: No Autocorrelation	74.1238	0.000	73.9766	0.000	73.0407	0.000

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

When the test results for variance and autocorrelation are analyzed for all models, it is observed that the test probability value is less than the critical value of 0.05. The null hypothesis of no cross-section and no autocorrelation is rejected for all models. Therefore, for Model 2, Model 4 and Model 6, estimation is performed with the White (Dioganal) estimation method that takes into account and solves these problems. Regression estimates for the models are shown in Table 13.

Tablo 13. OLS White (Dioganal) Estimation Results

Dependent Variables ROE			
Variables	Model 2	Model 4	Model 6
GTA	0.192095(0.0000) ***	0.114838(0.0000) ***	0.233253(0.0000) ***
GFA	-0.033988(0.0261) **	-0.009641(0.5560)	-0.026689(0.1593)
CETA	-0.121644(0.0053) ***	-0.131890(0.0147) **	-0.231068(0.0005) ***
FF	8.608650(0.0079) ***	8.268265(0.0106) **	8.369234(0.0086) ***
BM	-2.431968(0.0000) ***	-2.370476(0.0000) ***	-2.195687(0.0001) ***
FFxGTA	-	0.438212(0.0000) ***	-
FFxGFA	-	-0.108275(0.0028) *	-
FFxCETA	-	-0.038760(0.8659)	-
BMxGTA	-	-	-0.045257(0.0432) **
BMxGFA	-	-	-0.004334(0.6520)
BMxCETA	-	-	0.130726(0.0153) **
C	4.625048(0.0000) ***	4.792701(0.0000) ***	4.361481(0.0000) ***
R-squared	0.396643	0.431656	0.398498
Adjusted R-squared	0.365274	0.401267	0.366335
S.E. of regression	21.12829	20.88832	21.07478
F-statistic	12.64447	14.20396	12.38999
Prob(F-statistic)	0.0000***	0.0000***	0.0000***

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

When the OLS estimation results are analyzed, it is determined that all three models are significant at 1% significance level according to the F statistic probability value. The explanatory power of the independent variables for the dependent variable is 39% in Model 2, 43% in Model 4 and 39% in Model 6. Model 1, which investigates the relationship between investment decisions and return on equity, reveals a statistically significant and positive relationship between GTA and ROA, and a statistically significant and negative relationship between GFA and CETA and ROE. Specifically, the empirical findings indicate that a one unit increase in the GTA variable will lead to a 0.19 unit increase in ROE, a one unit increase in the GFA variable will lead to a 0.03 unit decrease in ROE, and a one unit increase in the CETA variable will lead to a 0.12 unit decrease in ROE. In addition, significant relationships are found between the moderator variables fund flows and investment opportunities and ROE.

Specifically, a one unit increase in FF leads to an 8.60 unit increase in ROE and a one unit increase in BM leads to a 2.43 unit decrease in ROE. As investment opportunities decrease, return on assets decreases. Therefore, it can be said that there is a linear relationship between fund flows and investment opportunities and return on equity.

Model 2, which analyzes the interaction between fund flows and investment decisions, reveals a statistically significant and positive relationship between FFxGTA and ROE, and a statistically significant and negative relationship between FFxGFA and ROE. On the other hand, there is no significant relationship between FFxCETA and ROE. After the FFxGTA variable is included in the model, the effect of GTA on ROE decreases. Model 3, which analyzes the interaction between investment opportunities and investment decisions, reveals a statistically significant and negative relationship between BMxGTA and ROE, and a statistically significant and positive relationship between BMxCETA and ROE. On the other hand, there is no significant relationship between BMxGFA and ROE. The effect of GTA and CETA on ROE increased after BMxGTA and BMxCETA variables were included in the model. Investment decisions affect both return on assets and return on equity similarly. All the findings of the study are summarized in Table 14.

Table 14. Summary of Results

Dependent Variables	**ROA**	**ROE**
Independent Variables	**Detected Relationship**	**Detected Relationship**
GTA	Positive	Positive
GFA	Negative	Negative
CETA	Negative	Negative
FF	Positive	Positive
BM	Negative	Negative
FFxGTA	Positive	Positive
FFxGFA	Negative	Negative
FFxCETA	No Relationship	No Relationship
BMxGTA	Negative	Negative
BMxGFA	No Relationship	No Relationship
BMxCETA	Positive	Positive

6. CONCLUSIONS AND POLICY IMPLICATIONS

The study aims to investigate the moderating role of fund flows and investment opportunities in the relationship between investment decisions and firm profitability for 107 real sector firms traded in Borsa Istanbul for the period 2000-2020. Return on assets and return on equity variables are selected for firm profitability, while growth rate of fixed assets, growth rate of total assets and growth rate of capital expenditures to total assets are selected for investment decisions. Fund flows and investment opportunities are selected as moderator variables. As a result of the analysis, a positive relationship was found between the growth rate of fixed assets and return on assets and return on equity, a negative relationship between the growth rate of fixed assets and return on assets and return on equity, and a negative relationship between the growth rate of capital expenditures to total assets and return on assets and return on equity. In addition, there is a positive relationship between fund flows and return on assets and return on equity, and a negative relationship between investment

opportunities and return on assets and return on equity. Investment opportunities are measured by the book value to market value ratio. A high ratio indicates low investment opportunities. Therefore, as investment opportunities decrease, firm profitability decreases. In general, it can be said that investment decisions have significant effects on firm profitability. The study also investigates the interaction of fund flows and investment decisions and the interaction of investment opportunities and investment decisions on firm profitability. Significant relationships were found between interaction variables and both return on assets and return on equity. After the inclusion of interaction variables in the model, the impact of investment decisions on firm profitability increased. This supports the pecking order theory. According to the theory, firms' investment decisions largely depend on the availability of cash flows. Moreover, investment decisions of firms are sensitive to funds. In addition, if firms need more funds, they will turn to external financing, thus firms will have higher investment opportunities. According to the findings, it can be said that firms prefer both internal and external borrowing in the relevant period and sample. The findings of the study are important for firm managers, shareholders and other firm stakeholders. Firms should take decisions that will maximize firm profitability and shareholders' wealth in their internal and external financing and investment decisions, taking into account that investment decisions significantly affect firm profitability. For future studies, it may be advisable to examine the subject separately on the basis of sectors, to add the cash flow variable as a moderator variable instead of the fund flow variable, and to use different methods in the calculation of the variables.

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Appendix 1. Firms Included in the Analysis

S. N.	BIST CODE	S. N.	BIST CODE	S. N.	BIST CODE	S. N.	BIST CODE
1	ADEL	**31**	CMBTN	**61**	IHEVA	**91**	SASA
2	AFYON	**32**	CMENT	**62**	IPEKE	**92**	SELGD
3	AKENR	**33**	CIMSA	**63**	IZMDC	**93**	SKTAS
4	AKCNS	**34**	DMSAS	**64**	KAPLM	**94**	SNPAM
5	ATEKS	**35**	DERIM	**65**	KRDMD	**95**	TBORG
6	AKSA	**36**	DEVA	**66**	KARSN	**96**	TATGD
7	AKSUE	**37**	DITAS	**67**	KRTEK	**97**	TOASO
8	ALCAR	**38**	DOBUR	**68**	KARTN	**98**	TUKAS
9	ALKA	**39**	DOGUB	**69**	KENT	**99**	TUPRS
10	ALKIM	**40**	DOKTA	**70**	KERVT	**100**	PRKAB
11	ALMAD	**41**	DURDO	**71**	KLMSN	**101**	ULKER
12	AEFES	**42**	DYOBY	**72**	KNFRT	**102**	USAK
13	ASUZU	**43**	EDIP	**73**	KONYA	**103**	VESTL
14	ARCLK	**44**	EGEEN	**74**	KORDS	**104**	VKING
15	ARSAN	**45**	EGGUB	**75**	KRSTL	**105**	YATAS
16	AYEN	**46**	EGPRO	**76**	KUTPO	**106**	YYAPI
17	AYGAZ	**47**	EGSER	**77**	LUKSK	**107**	YUNSA
18	BAGFS	**48**	EMKEL	**78**	MRSHL		
19	BAKAB	**49**	ENKAI	**79**	MNDRS		
20	BANVT	**50**	EREGL	**80**	MERKO		
21	BSOKE	**51**	ERSU	**81**	MNDTR		
22	BRMEN	**52**	FMIZP	**82**	NUHCM		
23	BRSAN	**53**	FROTO	**83**	OTKAR		
24	BFREN	**54**	FRIGO	**84**	PRKME		
25	BOSSA	**55**	GENTS	**85**	PARSN		
26	BRISA	**56**	GOLTS	**86**	PENGD		
27	BURCE	**57**	GOODY	**87**	PETKM		
28	BUCIM	**58**	GUBRF	**88**	PINSU		
29	CELHA	**59**	HEKTS	**89**	PNSUT		
30	CEMTS	**60**	HURGZ	**90**	SARKY		