



JATSS, 2026; 8(3), 373-394

First Submission:05.05.2026

Revised Submission After Review:30.08.2026

Accepted For Publication:22.09.2026

Available Online Since:25.09.2026

Research Article

**The Impact of Agency Costs on Investment Efficiency: Evidence from
Overinvestment and Underinvestment in Borsa İstanbul**

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Abstract

Introduction: Agency costs can reduce resource allocation efficiency by distorting firms' investment decisions through conflicts of interest among managers, shareholders, and lenders. Therefore, examining the impact of agency costs on investment efficiency is a significant research area in the corporate finance literature. This study aims to analyze the impact of agency costs on firms' investment efficiency.

Method: To determine the direction of investment inefficiency, overinvestment and underinvestment behaviors are examined through separate models. The study uses quarterly data from 24 firms listed on the BIST Industrial Index for the period 2015-2023. Investment efficiency was measured using the absolute value of residuals obtained from the expected investment model, in accordance with the approach of Biddle et al. (2009). Overinvestment and underinvestment were calculated using the positive and negative components of the residuals.

Results or Findings: The study findings reveal that agency costs significantly affect investment efficiency, and this effect differs depending on the direction of investment divergence.

Discussion or Conclusion: The results reveal that agency costs not only increase overall investment inefficiency but can also influence both overinvestment and underinvestment behaviors of firms. These findings demonstrate that effective corporate governance mechanisms are crucial for optimizing investment decisions.

Keywords: financial management, investment efficiency, agency costs.

JEL Codes: G32, L25, O16

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JATSS, 2026; 8(3), 373-394

İlk Başvuru:05.05.2026

Düzeltilmiş Makalenin Alınışı: 30.08.2026

Yayın İçin Kabul Tarihi: 22.09.2026

Online Yayın Tarihi: 25.09.2026

Araştırma Makalesi

Vekalet Maliyetlerinin Yatırım Verimliliğine Etkisi: Borsa İstanbul'da Aşırı ve Yetersiz Yatırım Üzerine Kanıtlar

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Öz

Giriş: Vekalet maliyetleri, yöneticiler, hissedarlar ve borç verenler arasındaki çıkar çatışmaları yoluyla firmaların yatırım kararlarını bozarak kaynak tahsis verimliliğini azaltabilir. Bu nedenle, vekalet maliyetlerinin yatırım verimliliği üzerindeki etkisini incelemek, kurumsal finans literatüründe önemli bir araştırma alanıdır. Bu çalışma, vekalet maliyetlerinin firmaların yatırım verimliliği üzerindeki etkisini analiz etmeyi amaçlamaktadır.

Yöntem: Yatırım verimsizliğinin yönünü belirlemek için, aşırı yatırım ve yetersiz yatırım davranışları ayrı modeller aracılığıyla incelenmiştir. Çalışma, 2015-2023 dönemi için BIST Sanayi Endeksi'nde listelenen 24 firmanın üç aylık verilerini kullanmaktadır. Yatırım verimliliği, Biddle vd. (2009) yaklaşımına uygun olarak, beklenen yatırım modelinden elde edilen artıkların mutlak değeri kullanılarak ölçülmüştür. Aşırı yatırım ve yetersiz yatırım, artıkların pozitif ve negatif bileşenleri kullanılarak hesaplanmıştır.

Sonuçlar ya da Bulgular: Çalışma bulguları, vekalet maliyetlerinin yatırım verimliliğini önemli ölçüde etkilediğini ve bu etkinin yatırım sapmasının yönüne bağlı olarak farklılık gösterdiğini ortaya koymaktadır.

Tartışma ya da Yapılan Çıkarımlar: Sonuçlar, vekalet maliyetlerinin yalnızca genel yatırım verimsizliğini artırmakla kalmayıp, firmaların hem aşırı yatırım hem de yetersiz yatırım davranışlarını da etkileyebileceğini göstermektedir. Bu bulgular, etkili kurumsal yönetim mekanizmalarının yatırım kararlarını optimize etmede kritik bir rol oynadığını ortaya koymaktadır.

Anahtar Kelimeler: finansal yönetim, yatırım verimliliği, vekalet maliyeti

JEL Kodlar: G32, L25, O16

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Introduction

Investment efficiency determines a firm's long-term performance and value creation capacity. Modigliani-Miller (1958), under the assumption of perfect market conditions, argues that a firm's investment decisions are determined solely by investment opportunities. These opportunities are typically measured through indicators such as Tobin's Q (Stein, 2003). Thus, investments with a positive net present value (NPV) are accepted, whereas those with a negative NPV should be rejected. However, various frictions in capital markets can cause firms' investment decisions to deviate from the optimal level. As a result of these deviations, firms may exhibit overinvestment behavior by investing in projects with negative NPV, or they may face underinvestment problems by rejecting projects with positive NPV.

Agency theory argues that information asymmetry occurs between managers (agents) and shareholders (principals) when management and ownership are separated. This results in shareholders, despite being the actual owners of the firm, not having complete information about the risks they are exposed to (Fama & Jensen, 1983b; Ross, 1973). This information asymmetry is further deepened when shareholders find it costly to monitor the daily activities of their agents and therefore avoid oversight (Fama & Jensen, 1983a). The theory rests on three fundamental assumptions: the tendency of individuals to maximize their own self-interest, the existence of conflicts of interest between parties, and information asymmetry. In this context, conflicts of interest and information asymmetry can lead managers to act against shareholder interests and make inefficient investment decisions, such as over- or under-investing (Ullah et al., 2020).

The aim of this paper is to explore the relationship between agency costs and investment efficiency, and to investigate whether these costs contribute to over- or under-investment behavior in firms. To this end, quarterly data from 24 companies listed on the BIST Industrial Index, with continuously accessible data and similar asset sizes, for the period 2015–2023 were used. The study period ended as of 2023: Q4, when the most current and complete annual financial data for the firms became available. This study is expected to offer several different contributions to the literature. Firstly, to the best of our knowledge, no empirical study has directly examined the impact of multi-dimensional agency costs on investment behavior in the context of Türkiye. Secondly, investment behavior is examined simultaneously in three different dimensions: investment efficiency, over-investment, and under-investment. While a significant portion of existing studies consider investment efficiency in a single dimension, this study examines and compares investment deviations in two ways (over-investment and under-investment). Thirdly, this study includes agency costs in the analysis within the framework of different stakeholder relationships, enabling a detailed and multi-dimensional understanding of this phenomenon.

Literature

Research on managerial behavioral traits shows that overconfidence and agency conflicts can reduce investment efficiency. Asadi et al. (2021), using data from firms listed on the Tehran Stock Exchange (2010–2018), report that firm's manager overconfidence is associated with cash holdings positively, while cash holdings are negatively related to investment efficiency. Overall, their findings suggest that agency costs may increase as overconfident managers tend to allocate resources inefficiently, including investment in negative-NPV projects. Similarly, Bhatta (2025), using panel data from India between 2001 and 2015, examined the relationship between insider ownership and investment efficiency and found that increased insider ownership, particularly by increasing the tendency to over-invest,

reduces investment efficiency. This suggests that insiders may prioritize their personal interests over shareholder value maximization. Furthermore, Shin and Kim (2002), in their analysis of manufacturing firm data from 1984-1994, revealed that corporate investment decisions were significantly affected by agency costs and that capital expenditures were allocated inefficiently. In this context, Chen et al. (2016) also examined the effect of free cash flow on overinvestment and found that firms with high free cash flow showed a higher tendency to overinvest. Also Chowdhury et al. (2023) examined the effect of executive power on investment efficiency and found that CEOs with excessive power tend to over-invest, thus reducing investment efficiency. Furthermore, this negative effect was found to be more pronounced in firms with high levels of information asymmetry, agency issues, and competition in the product market. Similarly Majeed et al. (2025) found a generally negative relationship between CEO power and investment efficiency. However, the study also showed that powerful CEOs under financial pressure can increase investment efficiency by making more strategic decisions. Ali et al. (2024) investigate the impact of board characteristics of firms traded on the Pakistan Stock Exchange (PSX) on investment efficiency (IE) and the role of corporate ownership (IO) in this relationship. The findings show that board size increases investment efficiency, while board activity intensity decreases it; independence and gender diversity generally have no significant effect. Furthermore, corporate ownership was found to both increase investment efficiency and play a regulatory role that strengthens the effect of board independence. Yahaya (2026) examined the effect of CEO overconfidence on investment efficiency for firms traded on the Nigerian stock exchange. The findings show that overconfident CEOs deviate more from optimal investment levels, reducing investment efficiency. Furthermore, firm size and profitability were found to increase investment efficiency, while growth opportunities reinforced the negative impact of CEO overconfidence.

Financial reporting quality and information asymmetry are also among the key factors affecting investment efficiency. Chen et al. (2011), using World Bank Business Survey (WBES) data, analyzed firms operating in different sectors between 2002 and 2005 and found that financial statement quality increased investment efficiency. Similarly, McNichols and Stubben (2008), using data from 1978-2002, examined the investment behavior of firms managing earnings and documented that firms manipulating financial reporting significantly overinvested during those periods. More recent studies also support these findings. For example, Li et al. (2024), in their analysis of publicly traded firms in the US between 2010 and 2022, showed that financial reporting quality was positively correlated with investment efficiency, and this relationship was particularly pronounced in firms with older CEOs. Khuong et al. (2025), in their analysis of firms operating in Vietnam, showed that increasing the comparability of financial statements reduces information asymmetry, thereby strengthening the positive impact of corporate governance on investment efficiency. Furthermore, using a sample of U.S. firms, Alhadi et al. (2021) demonstrate that comparable financial information enhances investment efficiency by limiting deviations caused by insufficient or excessive investment. Also Wu et al. (2024) show that financial flexibility enhances investment efficiency by constraining overinvestment and contributes positively to firm performance, while investment efficiency and scale condition this effect. Pan and Yang (2025) found that the quality of information disclosure in the Chinese A-share market improved investment efficiency. According to the results, when transparency quality increases, it improves asymmetric information and investment quality, and reduces financial constraints, thus preventing underinvestment. Assad et al. (2026) found that the quality of financial reporting in US firms increased investment efficiency. Similarly, Khan et al. (2024) showed that this relationship was positive in frontier markets and stronger in countries with high investor protection.

There are also studies in the literature on corporate governance and investment efficiency. Rim and Sul (2020), using a large sample of 30 countries, showed that reforms to board independence increased investment efficiency. It was determined that firms with an excessive investment tendency, in particular, reduced their investment levels following these reforms. Salehi et al. (2022) provide evidence that ownership structure and board autonomy shape the interaction between investment efficiency and firm value, while also showing that investment efficiency enhances firm value. In a study conducted by Girardone et al. (2024) on US S&P 1500 companies, it was shown that the CEO's internal debt position increased investment efficiency and contributed to more optimal investment decisions by reducing both excessive and insufficient investment problems. Med bechir and Jouirou (2024) showed that board size and firm size increased investment efficiency, while shareholder activism, CEO duality, leverage level, and the proportion of female executives decreased investment efficiency in Asia. Godsel et al. (2023), in their study involving 1,375 global companies, revealed that investor relations activities increase investment efficiency. Specifically, more intensive communication with investors, gathering market information, and conveying this feedback to the board of directors contributes to firms making more effective investment decisions. The findings show that investors provide managers with valuable information about investment opportunities and risks, thereby increasing investment efficiency. Huo et al. (2024) investigated the effect of mixed ownership structure on investment efficiency in publicly traded companies in China. Their findings show that mixed ownership enhances investment efficiency, with agency costs acting as a mediator in this relationship. Furthermore, the results reveal that this effect can change under different agency conflicts and external shocks (e.g., the COVID-19 period).

The impact of financial structure and borrowing decisions on investment efficiency is also an important area of research. Han et al. (2024), in their study on listed firms in China, showed that the use of short-term debt increased investment efficiency. Similarly, Abuhommous (2024), in his analysis with data covering the period 1971-2021 in the USA, revealed that short-term debt disciplined management decisions by reducing information asymmetry and increased investment efficiency. In contrast, Kim et al. (2024) found that financial constraints increase investment inefficiency, and this effect is stronger in firms with high free cash flow, bankruptcy risk, and growth potential. Ling and Wu (2022) examine the effect of leverage level on investment efficiency in China. Their findings show that a decrease in the leverage ratio in state-owned enterprises increases investment efficiency. Furthermore, the policy creates a balancing effect by reducing overinvestment in heavily indebted firms while mitigating underinvestment in less indebted firms. Wei (2023) examines the effect of equity concentration on investment inefficiency in a sample of non-financial companies traded on the A-stock market in China. The findings show a significant and positive relationship between ownership concentration and investment inefficiency, meaning that the concentration of shares in certain partners increases investment inefficiency.

Finally, the impact of sustainability, climate risk and social responsibility dimensions on investment efficiency is also gaining increasing importance. Xu et al. (2024) showed that climate risk reduces investment efficiency by causing firms to deviate from their optimal investment levels in a multi-country firm sample. Lian and Weng (2024), in their study on firms operating in the Chinese A-stock market, showed that ESG performance increased investment efficiency by reducing performance volatility. Similarly, Khediri (2021), in his analysis of firms operating in Western European countries, presented evidence that corporate social responsibility positively affects investment efficiency. Lin et al. (2021) examined how business strategy shapes the relationship between Corporate Social Responsibility (CSR) and

overinvestment in the US, revealing that firms with high CSR activities tend to overinvest more. Furthermore, they presented findings suggesting that business strategy plays a significant moderating role in this relationship. Zhang et al. (2025) investigated the impact of Climate Policy Uncertainty index (CPU) on enterprise investment efficiency using data from non-financial firms traded on the Shanghai and Shenzhen stock exchanges. Their findings show that CPU negatively impacts investment efficiency across all sectors. Furthermore, this effect varies according to firm characteristics; it is more pronounced in non-governmental, technology-intensive businesses with relatively low levels of managerial education.

Overall, the literature reveals that investment efficiency has a multidimensional structure and that managerial behaviors, financial reporting quality, corporate governance mechanisms, financial structure, and ESG/CSR performance play a decisive role in this process. These studies show that reducing information asymmetry, properly structuring managerial incentives, and strengthening corporate governance mechanisms are critically important in increasing investment efficiency.

Methodology

This paper examines whether agency costs affect the efficiency of investment allocation in businesses. Quarterly data from the second quarter of 2015 to the fourth quarter of 2023 for firms traded on the BIST industrial index were used. The starting period was chosen as the second quarter of 2015 because the dataset was only available continuously and reliably from that point onwards. Twenty-four firms were included in the analysis, creating a dataset consisting of a total of 840 observations. Agency costs, variables representing investment efficiency, secondary data used to calculate overinvestment and underinvestment, and the dataset for the control variables was compiled from information available in the Finnet database. Table 1 includes the variables and calculation methods used in the study.

Table 1*Variables and Symbols in the Study*

Variable	Calculation method	Symbol
Shareholder–Lender Agency Costs	Sales / Total Assets	A_1
Manager – Lender Agency Costs	Cash Flows from Operating Activities /Total Asset	A_2
Manager – Shareholder Agency Costs	Operating Expenses /Total Asset	A_3
Investment Efficiency	Biddle et al. (2009) model residuals ($\varepsilon_{i,t}$) see equations (1), (2), (3), and (4).	Inv_eff
Overinvestment	Max ($0, \varepsilon_{i,t}$)	Ov_inv
Underinvestment	Min ($0, \varepsilon_{i,t}$)	Un_inv
Leverage	Total Debt/Total Assets	Lev
Size	Log (total Assets)	Size

Note. Created by the author

Managerial shareholder agency costs arise when company managers use company assets for their own needs, and shareholders prevent this by not keeping idle funds in the company. Furthermore, managers may prioritize short-term investments over long-term ones due to concerns about success. This situation leads to a conflict of interests between managers and shareholders. Managerial lender agency costs, in short, arise because stakeholders who provide external resources to the company want to benefit from the company's profits first. Shareholder lender agency costs stem from the priority of profitability between the two parties. In other words, each party demands that profits be presented to them before the company's earnings. This conflict can lead to agency costs in the company. The calculation of agency costs (A_1 , A_2 , and A_3) is primarily based on the study by Ang et al. (2000). Similar calculations have also been used in the studies by Wang (2010), Singh et al. (2003), Fleming et al. (2005), Topaloğlu (2019), and Nur and Korkmaz (2022).

Following similar studies in the literature (Sharaf et al., 2026; Salehi et al., 2022; Abuhommous, 2024; Han et al., 2024), the Biddle et al. (2009) approach was applied in this study when calculating investment efficiency (*inv_eff*), overinvestment (*ov_inv*), and underinvestment (*un_inv*). The approach developed by Biddle et al. (2009) was used to measure investment efficiency. In this context, the investment level of firm *i* in period *t* was estimated through a model in which sales growth was used as the key indicator reflecting the firm's investment opportunities.

$$INV_{i,t} = \alpha + \beta_1 SG_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Where,

The investment level of company *i* in period *t*

$SG_{i,t-1}$ = Sales growth in the previous period (indicator of growth opportunities)

$\varepsilon_{i,t}$ = Investment deviation (residual)

Investment efficiency is estimated using the absolute magnitude of the residuals obtained from the specified model:

$$Inv_eff_{i,t} = |\varepsilon_{i,t}| \quad (2)$$

The company's investments exceeded its expected investment level;

$$Ov_inv_{i,t} = \max(0, \varepsilon_{i,t}) \quad (3)$$

Here;

If $\varepsilon_{i,t} > 0$, there is overinvestment. Otherwise, it is taken as 0.

The company's investments are below the expected investment level:

$$Un_inv_{i,t} = \min(0, \varepsilon_{i,t}) \quad (4)$$

Here,

If $\varepsilon_{i,t} < 0$ there is underinvestment. Otherwise, it is set to 0.

Positive residuals reflect overinvestment behavior, whereas negative residuals reflect underinvestment behavior. The absolute residual values represent the magnitude of investment inefficiency, regardless of whether it is positive or negative (Chen et al., 2011).

The regression models created within the scope of the research design are as follows. The main subject of the research is to examine the effect of agency costs on investment efficiency. Investment efficiency is the dependent variable, and 3 agency costs are independent variables. In the study, the control variables were determined as debt ratio and firm size.

$$Inv_eff_{i,t} = \alpha + \beta_1 A1_{i,t} + \beta_2 A2_{i,t} + \beta_3 A3_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \varepsilon_{i,t} \quad (5)$$

The degree of investment inefficiency is captured by the size of the residuals obtained from the estimated investment model, regardless of their sign. In addition, the nature of inefficiency is identified based on residual deviations, where upward deviations from expected investment levels represent overinvestment, whereas downward deviations reflect underinvestment.

The model overinvestment behavior is as follows:

$$Ov_inv_{i,t} = \alpha + \beta_1 A_{1i,t} + \beta_2 A_{2i,t} + \beta_3 A_{3i,t} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \varepsilon_{i,t} \quad (6)$$

The empirical specification for underinvestment behavior is formulated as follows:

$$Un_inv_{i,t} = \alpha + \beta_1 A_{1i,t} + \beta_2 A_{2i,t} + \beta_3 A_{3i,t} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \varepsilon_{i,t} \quad (7)$$

Findings

The study first presents the results regarding descriptive statistics, based on the analyses conducted.

Table 2

Descriptive Statistics

	Inv_eff	A ₁	Lev	Size	A ₂	A ₃	Un_inv	Ov_inv
Mean	0.048409	0.694544	0.534607	9.295001	0.046862	0.060249	-0.024187	0.024222
Median	0.024953	0.587835	0.538812	9.277268	0.038211	0.048532	-0.010031	0.000000
Maximum	1.971028	3.042536	1.401248	10.99989	0.636626	0.354774	0.000000	1.971028
Minimum	3.62E-05	0.011374	0.000000	8.142624	-0.347947	0.002296	-0.274583	0.000000
Std. Dev.	0.104206	0.464959	0.224507	0.531026	0.112559	0.047843	0.041301	0.101618
Skewness	11.11718	1.287141	-0.121304	0.451380	0.532052	1.572862	-3.46559	12.50718
Kurtosis	177.3814	5.117805	2.579024	3.047729	6.545043	6.606428	17.45797	207.4630
Jarque-Bera	1080326.	388.4580	8.252931	28.56987	478.9169	800.6124	8986.892	14.83311
Probability	0.000000	0.000000	0.016140	0.000001	0.000000	0.000000	0.000000	0.000000
Sum	40.61542	582.7225	448.5357	7798.506	39.31719	50.54854	-2.02932	20.32222
Sum Sq. Dev.	9.099765	181.1646	42.23813	236.3065	10.61700	1.918156	1.429466	8.653381

Note. Created by the author using e-views

When the descriptive statistics results of the variables are examined, the indicators of agency cost show that variable A1 has a mean value of 0.694 and a high variation (standard deviation: 0.464). Positive skewness (1.28) and leptokurtic structure (kurtosis > 3) indicate that this variable has a right-skewed and thick-tailed distribution. Variables A2 and A3 similarly deviate from normal distribution with positive skewness and high kurtosis values. This indicates that agency costs among firms have a heterogeneous structure. When the investment efficiency (Inv_eff) and the components of investment variance, namely overinvestment (Ov_inv) and underinvestment (Un_inv), are examined, it is seen that they have quite high skewness and kurtosis values.

In general, the fact that the p-value of the Jarque-Bera test is less than the critical value of 0.05 for all variables indicates that the variables do not meet the assumption of a normal distribution.

Multicollinearity occurs when there is strong linear dependence among independent variables in a regression model. As the variables included in the study did not follow a normal distribution, the issue of multicollinearity was examined using the Variance Inflation Factor (VIF) method in conjunction with Spearman's correlation analysis, which is more appropriate in such cases.

Table 3*Spearman Correlation Analysis*

	Inv_eff	A ₁	Lev	Size	A ₂	A ₃	Un_inv	Ov_inv
	1.000000							
Inv_eff	-----							

	-0.003593	1.000000						
A ₁	-0.103950	-----						
	0.9172	-----						
	0.063397	-0.083694	1.000000					
Lev	1.837837	-2.429871	-----					
	0.0664	0.0153	-----					
	0.156240	0.188941	0.377360	1.000000				
Size	4.576384	5.566519	1.178899	-----				
	0.0000	0.0000	0.0000	-----				
	0.050458	0.380952	-0.069550	0.188915	1.000000			
A ₂	1.461647	1.192016	-2.01702	5.565722	-----			
	0.1442	0.0000	0.0440	0.0000	-----			
	-0.122765	0.554069	-0.052350	-0.011417	0.258180	1.000000		
A ₃	-3.57878	1.925562	-1.51662	-0.330335	7.731501	-----		
	0.0004	0.0000	0.1297	0.7412	0.0000	-----		
	-0.260056	0.108995	-0.093528	-0.096222	0.035835	0.222509	1.000000	
Un_inv	-7.791742	3.172227	-2.717766	-2.796777	1.037411	6.602944	-----	
	0.0000	0.0016	0.0067	0.0053	0.2998	0.0000	-----	
	0.919772	0.040615	0.026998	0.121111	0.066307	-0.035456	0.139759	1.000000
Ov_inv	67.80384	1.176005	0.781376	3.529845	1.922567	-1.026407	4.083439	-----
	0.0000	0.2399	0.4348	0.0004	0.0549	0.3050	0.0000	-----

Note. Created by the author using e-views

In Table 3, it is seen that the highest correlation relationship is between the investment efficiency variable and the overinvestment variable. Since the investment efficiency and overinvestment variables are used as dependent variables in different models, they do not have a multicollinearity problem.

Table 4*VIF Test Results*

	First Model		Second Model		Third Model	
Variable	Coef. Variance	VIF	Coef. Variance	VIF	Coef. Variance	VIF
A ₁	0.000168	2.588943	0.000213	2.588.943	1.90E-05	2.588943
Lev	0.000416	1.042944	0.000527	1.042944	4.71E-05	1.042944
Size	7.62E-05	1.107902	9.65E-05	1.107902	8.62E-06	1.107902
A ₂	0.001168	1.245778	0.001479	1.245778	0.000132	1.245.778
A ₃	0.017497	2.373141	0.022156	2.373141	0.001980	2.373141
C	0.006410	NA	0.008116	NA	0.000725	NA

Note.Created by the author using e-views

Variances Inflation Factor (VIF) values below 10 indicate that there is no multicollinearity problem (Hair et al., 1998). Upon examining the VIF results obtained in this context, it can be seen that the values for all models remain below this threshold. Consequently, the absence of multicollinearity among the independent variables has been confirmed both theoretically and empirically.

Table 5

Cross-sectional Correlation Test Based on Model and Variable

	Test	Statistic	Prob
Model1	PesaranCD	14.47432	0.0000
Model2	PesaranCD	14.60709	0.0000
Model3	PesaranCD	33.19852	0.0000
A ₁	PesaranCD	75.80196	0.0000
A ₂	PesaranCD	19.67418	0.0000
A ₃	PesaranCD	73.24514	0.0000
Inv_eff	PesaranCD	19.66568	0.0000
Ov_inv	PesaranCD	27.64109	0.0000
Un_inv	PesaranCD	41.00204	0.0000
Lev	PesaranCD	14.87572	0.0000
Size	PesaranCD	93.40279	0.0000

Note. Created by the author using e-views

The Pesaran CD test statistics confirm cross-sectional dependence in both models and across all variables, under the null hypothesis of cross-sectional independence. However, the fact that all probability values obtained ($p=0.0000$) are statistically significant at the 1% significance level indicates that the null hypothesis is rejected, and therefore, there is strong cross-sectional dependence among the units comprising the panel. When examined on a model basis, the CD test statistics are high and significant for all three models. This indicates that the error terms in the model estimates are not independent among firms; in other words, firms are affected jointly by common shocks or macroeconomic factors. Similarly, the results on a variable basis reveal the presence of cross-sectional dependence in all series. In particular, the very high test statistics obtained for firm size and agency cost indicators (A₁ and A₃) show that these variables behave similarly among firms and are sensitive to common dynamics.

Table 6*CIPS Test for Unit Root*

Variable	Test Statistic	p-Value
A ₁	4.81876	0.00000
A ₂	7.64193	0.00000
A ₃	3.38857	0.00070
Inv_eff	1.49810	0.01341
Un_inv	5.79758	0.00000
Ov_inv	8.30810	0.00000
Size	4.44924	0.00001
Lev	4.55033	0.00001

Note. Created by the author using e-views

To examine the stationarity properties of the panel data variables, the Cross-sectionally Augmented IPS (CIPS) unit root test developed by Pesaran (2007) was implemented. The choice of this test was motivated by prior findings confirming cross-sectional dependence in the dataset. Since first-generation unit root tests (LLC, IPS, etc.) do not yield consistent results in the case of cross-sectional dependence, second-generation tests must be used.

Examining the findings, it is seen that the probability values of the CIPS test statistics for all variables are below the 5% significance level. This indicates that the null hypothesis of the test, "there is a unit root in the series (it is not stationary)," is rejected. Therefore, it is concluded that all variables A₁, A₂, A₃, Inv_eff, Un_inv, Ov_inv, Size, and Lev are stationary at the level (I(0)).

The results of the analysis of the models created regarding investment efficiency and agency costs are presented in the table. In this context, firstly, the F-test, Breuch-Pagan LM and Hausman tests were used to investigate which of the fixed effects model, random effects model and pooled model would be used for estimation.

Table 7*Model Selection*

Test	Model ₁		Model ₂		Model ₃	
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
F	14.31976	0.0000	2.931311	0.0000	32.3626	0.000
LM	14.88348	0.0000	5.586529	0.0000	52.7977	0.000
Hausman	329.3517	0.0000	276.8379	0.0000	375.8372	0.000

Note. Created by the author using e-views.

The F-test findings indicate that the pooled OLS assumption is violated, as significant unit-specific effects are detected across all models at the 1% level. Consequently, a panel estimation framework incorporating individual effects is more appropriate. Similarly, the fact that the LM test results are also significant for all models shows that the random effects model is more suitable than the pooled model. The Hausman specification test, which is used to

evaluate the choice between fixed and random effects estimators, yields statistically significant statistics at the 1% level across all model specifications ($p < 0.01$), indicating that the fixed effects approach is more appropriate than the random effects alternative. Therefore, the fixed effects model is selected as the appropriate estimation approach, as the random effects estimator is found to be inconsistent. In line with these findings, the most suitable estimation method for Model 1 (Inv_eff), Model 2 (Over_inv), and Model 3 (Un_inv) was determined to be the fixed effects model. Therefore, in the continuation of the analyses, all models were estimated within the framework of the fixed effects approach.

Table 8

Heteroskedasticity Test Results

Likelihood Ratio	First Model	1842.066	0.0000
Likelihood Ratio	Second Model	1767.393	0.0000
Likelihood Ratio	Third Model	1291.431	0.0000

Note. Created by the author using e-views

According to the Likelihood Ratio test results, the probability values for all models are less than 0.01. This situation indicates that there is a heteroscedasticity problem in the estimated models. Estimation was performed using the Period SUR method developed by Beck and Katz (1995), which takes these problems into account and solves them.

Table 9

Model 1. Agency Costs and Investment Effectiveness

Dependent Variable		inv_eff		
Method		Period SUR		
Period		2015-2023		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
A ₁	0.017059	0.014638	1.165408	0.2442
A ₂	0.080322	0.023892	3.361851	0.0008
A ₃	-0.262370	0.122532	-2.14124	0.0326
Lev	0.011747	0.014973	0.784541	0.4330
Size	0.000714	0.011143	0.064051	0.9489
C	0.034178	0.103361	0.330668	0.7410
R ²	0.331863	F-statistic 13.96082		
Adjusted R ²	0.308092	Prob(F-statistic) 0.00000		

Note. Created by the author using e-views

The Shareholder-Lender Agency Cost (A₁) was found to have no significant effect on investment efficiency. The Manager-Lender Agency Cost (A₂) is positive and highly significant, statistically strong at the 1% level. An increase in agency costs between the manager and the lender reduces investment efficiency. When evaluated, it can be said that the conflict of interest between managers and lenders and borrowing pressure negatively impact the firm's optimal capital allocation. The Manager-Shareholder Agency Cost (A₃) is negative and significant at the 5% level. As the conflict of interest between the manager and the shareholder increases, investment efficiency decreases. On the other hand, the level of debt did not have a

statistically significant effect on investment efficiency. Firm size is also not an explanatory variable in the model.

Table 10

Model 2. Agency Costs and Overinvestment

Dependent Variable		Ov_inv		
Method		Period SUR		
Period		2015-2023		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
A ₁	0.008358	0.009134	0.915045	0.3604
A ₂	0.042941	0.021896	1.961123	0.0502
A ₃	-0.145363	0.075254	-1.931646	0.0537
Lev	-0.007280	0.011639	-0.625513	0.5318
Size	0.021063	0.008966	2.349277	0.0190
C	-0.166703	0.079948	-2.085134	0.0374
R ²	0.095352		F-statistic	3.418422
Adjusted R ²	0.064119		Prob(F-statistic)	0.004596

Note. Created by the author using e-views

The model is generally statistically significant. Shareholder-Lender Agency Cost (A₁) does not explain overinvestment behavior ($p = 0.3604$). Manager-Lender Agency Cost (A₂) shows a positive correlation at the 10% significance level. As agency conflict between manager and lender increases, the tendency to overinvest increases. Manager-Shareholder Agency Cost (A₃) shows a negative correlation, which is considered significant at the 10% level. As manager-shareholder conflict increases, overinvestment behavior decreases. Firm size significantly and positively influences overinvestment behavior. As firm size increases, the tendency to overinvest increases. In large firms, high cash flow, perceived investment opportunities, and management confidence can lead to overinvestment problems. In addition, the level of debt does not affect overinvestment behavior.

Table 11*Model 3. Agency costs and underinvestment*

Dependent Variable		un_inv		
Method		Period SUR		
Period		2015-2023		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
A ₁	0.001492	0.004552	0.327833	0.7431
A ₂	0.023088	0.008526	2.707812	0.0069
A ₃	0.042629	0.035953	1.185685	0.2361
Lev	-0.003694	0.005956	-0.620251	0.5353
Size	0.004102	0.003733	1.098934	0.2721
C	-0.065004	0.034547	-1.881631	0.0602
R ²	0.510228		F-statistic	30.17406
Adjusted R ²	0.493319		Prob(F-statistic)	0.000000

Note. Created by the author using e-views

Overall, the model is statistically quite significant. The independent variables together strongly explain underinvestment behavior. Shareholder-lender agency cost (A₁) does not explain underinvestment behavior. Manager -lender (A₂) is positive and significant at the 1% level. The positive Manager-Lender coefficient, due to the negative residuals calculation of the Biddle et al. (2009) model, leads to the conclusion that agency costs reduce underinvestment. The excessive control mechanisms of lenders discipline the tendency of managers to miss profitable investment opportunities. Shareholder-manager agency cost has no significant effect on underinvestment. Firm size does not affect underinvestment behavior.

Conclusion

This study measures the impact of agency costs on investment efficiency using quarterly data from 2015-2023 for 24 companies with similar asset sizes listed on the BIST industrial index. The study also analyzes the impact of agency costs on firm investment behavior across three dimensions: investment efficiency, overinvestment, and underinvestment. The findings show significant differences between the models in terms of both explanatory power and the effects of the variables. The underinvestment model's high explanatory power (51%) indicates that agency costs play a stronger role in explaining firms' behavior of not investing or missing investment opportunities. In contrast, the overinvestment model's low explanatory power (9%) suggests that this behavior is influenced more by internal managerial preferences, market conditions, or behavioral factors other than agency costs. The moderate explanatory power of the investment efficiency model (33%) indicates that agency costs have a partial but significant effect on the quality of investment decisions. When evaluated in terms of agency relationships, The manager-shareholder agency cost has a significant and negative impact on investment efficiency. In addition, the increase in manager-lender agency costs also reduces investment efficiency. In contrast, no statistically significant effect was found on shareholder-lender agency cost, leverage, and firm size variables. The findings demonstrate that conflicts of interest between managers and shareholders negatively impact investment decisions and are generally consistent with agency theory. The manager-shareholder agency cost has a negative effect, and firm size has a positive and significant effect on overinvestment, revealing that large firms exhibit a higher tendency to overinvest. The findings are generally consistent with agency theory and the free cash flow hypothesis, indicating that managerial behaviors, especially in large firms, can increase the tendency to overinvest. The analysis results show that in all three

models, an increase in manager-lender agency costs increases investment inefficiency and overinvestment tendency. These results may indicate that borrowing pressure and conflicts of interest with lenders push managers towards inefficient capital expenditures. The insignificant agency cost between shareholders and lenders in all models indicates that the impact of indirect agency relationships on investment decisions is limited. When considering control variables, the leverage variable is not significant in any model. The effect of debt level is primarily manifested through agency costs arising from debt relationships. Firm size has a positive and significant effect only on the overinvestment model. This suggests that larger firms exhibit more overinvestment and, when evaluated within the framework of the free cash flow hypothesis, may indicate that increased management influence in large-scale firms can lead to inefficient use of resources.

When compared with other studies in the literature, the findings of this study are generally consistent with those of Asadi et al. (2021), Bhatta (2025), Shin and Kim (2002), Chen et al. (2016), Chowdhury et al. (2023), Majeed et al. (2025), and Wei (2023), which have shown that agency costs can have negative effects on investment decisions. In particular, the reduction of investment efficiency due to manager-shareholder agency costs parallels the findings of Asadi et al. (2021), who found that managers' overconfidence increases cash accumulation, thus reducing investment efficiency. Similarly, Bhatta's (2025) finding that insider ownership increases the tendency to overinvest, thus reducing investment efficiency, and Chen et al.'s (2016) findings that high free cash flows encourage overinvestment also support the tendency to overinvest observed in large firms in this study. Furthermore, Shin and Kim's (2002) findings that capital expenditures are allocated inefficiently due to agency costs are consistent with our results showing that manager-shareholder conflicts reduce investment efficiency.

The results obtained in terms of executive power and behavioral factors are also similar to some studies in the literature. Chowdhury et al. (2023), Majeed et al. (2025), and Yahaya (2026) have shown that CEO power or overconfidence reduces investment efficiency. Although this study does not directly measure CEO power, the fact that the cost of executive-shareholder agency reduces investment efficiency shows that executives can put their own interests before firm value, and this can impair the effectiveness of investment decisions. In this respect, the results of this study support the behavioral corporate finance and agency theory literature.

The results obtained in terms of debt and financial structure show both similarities and differences with some findings in the literature. In this study, the leverage ratio was not found to be significant in any model, but it was determined that the manager-creditor agency cost had a strong and positive effect, especially on underinvestment. This result is consistent with Kim et al.'s (2024) findings that financial constraints increase investment inefficiency and with Ling and Wu's (2022) results showing that high debt negatively affects investment decisions. The strong results obtained, especially in the underinvestment model, coincide with the predictions of Debt Overhang theory. In contrast, Han et al. (2024) and Abuhommous (2024) suggest that the use of short-term debt increases investment efficiency. In this study, however, the debt level did not have a direct significant effect. The reason for this difference may be the differences in financial systems, institutional structures, and the level of development of capital markets between countries.

From the perspective of regulatory bodies and capital markets, some important policies can be developed. Since manager-lender and manager-shareholder agency costs directly affect investment decisions, measures to reduce information asymmetry are necessary. In Turkey, institutions that display companies' investment expenditures, such as public disclosure

platforms, should improve their standards. Increasing transparency and corporate governance will also prevent minority shareholders from suffering losses due to managers' inefficient and excessive investment decisions. The study results differ from some literature assumptions in classical agency theory (Jensen & Meckling, 1976; Myers, 1977) and information asymmetry theory (Myers & Majluf, 1984). The analysis shows that the Manager-Lender agency cost increases inefficiency and overinvestment, indicating that debt pressure can push managers towards riskier and less efficient projects. The negative coefficient of the Manager-Shareholder agency cost in investment inefficiency and overinvestment models reveals that corporate governance mechanisms working in favor of the board of directors and shareholders reduce information asymmetry, preventing managers from inefficiently spending equity. This study also shows that in the Turkish market, which is bank-based and heavily reliant on debt financing, creditor rights and debt contracts have a more decisive theoretical role in shaping investment efficiency compared to equity markets.

This study has some limitations. Firstly, the scope of the analysis is limited to 24 companies included in the BIST industrial index. This may limit the generalizability of the results and may lead to different results for different sectors or larger samples. Secondly, the data period used in the study is limited to quarterly data from 2015 to 2023. Starting the data in 2015 prevents the analysis of longer-term trends. Thirdly, the analysis period was terminated in 2023 because inflation accounting, implemented in Turkey after 2023, creates changes in financial statements. This may result in the exclusion of more recent data from the analysis. Including macroeconomic variables in future studies could increase the explanatory power of the models. Furthermore, calculating the representation cost using different measurement methods could contribute to future research. Another methodological limitation of the study is the risk of endogeneity and bidirectional causality. In this study, the effect of agency costs on investment costs was examined within the framework of static panel data. However, businesses can influence each other simultaneously. In future studies, System GMM or dynamic panel data methods employing lagged instrumental variables can be used to investigate potential endogeneity effects in depth.

References

- Abuhommous, A.A.A. (2024). Does the firm's life cycle matter in the relationship between short-term debt and investment efficiency? *International Journal of Finance & Economics*, 30(2), 1429–1449. <https://doi.org/10.1002/ijfe.2977>
- Alhadi, A., Habib, A., Taylor, G., Hasan, M. & Al-Yahyaee, K. (2021). Financial statement comparability and corporate investment efficiency. *Meditari Accountancy Research*, 29(6), 1283–1313. <https://doi.org/10.1108/MEDAR-12-2019-0629>
- Ali, S., Farooq M., Xiaohong, Z., Hedvicakova, M. & Murtaza, G. (2024). Board characteristics, institutional ownership, and investment efficiency: Evidence from an emerging market. *PLOS One*, 19(2), 1-24. <https://doi.org/10.1371/journal.pone.0291309>
- Ang, J., Cole, R. A. & Lin, J. W. (2000). Agency costs and ownership structure. *The Journal of Finance*, 55 (1), 81-106. <https://doi.org/10.1111/0022-1082.00201>
- Asadi, A., Oladi, M. & Aghel, M.G. (2021). Evaluation of managerial overconfidence, cash holding, and investment efficiency in companies. *Journal of Mathematics*, Article 1954526. <https://doi.org/10.1155/2021/1954526>
- Assad, N., Jaafar, A. & Zervopoulos, P.D. (2026). The interplay of financial reporting quality and investment efficiency: Evidence from the USA, *Journal of Financial Reporting and Accounting*, 24(1), 46–65. <https://doi.org/10.1108/JFRA-04-2023-0199>
- Beck, N. & Katz, J. (1995). What to do (and not to do) with time-series cross-section data. *American Political Science Review*, 89(3), 634-647. <https://doi.org/10.2307/2082979>
- Bhatta, B. (2025). Insider ownership and investment efficiency. *International Journal of Finance & Economics*. 1–17. <https://doi.org/10.1002/ijfe.70084>
- Biddle, G. C., Hilary, G. & Verdi, R.S. (2009). How does financial reporting quality relate to investment efficiency? *Journal of Accounting and Economics*, 48 (2-3), 112–131. <https://doi.org/10.1016/j.jacceco.2009.09.001>
- Chen, X., Y. Sun, and X. Xu. (2016). Free cash flow, over-investment and corporate governance in China. *Pacific-Basin Finance Journal*, 37, 81–103. <https://doi.org/10.1016/j.pacfin.2015.06.003>
- Chen, F., Hope, O.-K., Li, Q., & Wang, X. (2011). Financial reporting quality and investment efficiency of private firms in emerging markets. *The Accounting Review*, 86(4), 1255–1288. <https://doi.org/10.2308/accr-10040>
- Chowdhury, Md.R.U., Xie, F. & Hasan Md. M.M. (2023). Powerful CEOs and investment efficiency. *Global Finance Journal*, 58, 1-24. <https://doi.org/10.1016/j.gfj.2023.100886>
- Fama, E. F., & Jensen, M. C. (1983a). Agency problems and residual claims. *Journal of Law and Economics*, 26(2), 327–349.
- Fama, E. F., & Jensen, M. C. (1983b). Separation of ownership and control. *Journal of Law and Economics*, 26(2), 301–325.
- Fleming, G., Heaney, R., & McCosker, R. (2005). Agency costs and ownership structure in Australia. *Pacific-Basin Finance Journal*, 13(1), 29-52. <https://doi.org/10.1016/j.pacfin.2004.04.001>

- Girardone, C., Li, J. Li, Y. & Zhao, M. (2024). CEO Inside debt and corporate investment efficiency. *International Journal of Finance & Economics*, 30(4), 3345–3367. <https://doi.org/10.1002/ijfe.3066>
- Godsel, D., Jung, B., & Mescall, D. (2023). Investor relations and investment efficiency. *Contemporary Accounting Research*, 40(3), 1966–1998. <https://doi.org/10.1111/1911-3846.12860>
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Prentice Hall.
- Han, M, Huang, W. & Shen, Y. (2024). Debt structure, economic stimulus and firm investment efficiency. *European Financial Management*, 30(1), 284–313. <https://doi.org/10.1111/eufm.12414>
- Huo, X., Zhao, Y. & Dong, Z. (2024). How mixed ownership affects investment efficiency? evidence from state-owned enterprises in China. *PLOS One*, 19(6), Article e0306190 <https://doi.org/10.1371/journal.pone.0306190>
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- Khan, M.A., Irfan, S. & Naveed, S. (2024). Impact of financial reporting quality on investment efficiency and role of investor protection in frontier markets. *Review of Accounting and Finance*, 23(5), 598–620. <https://doi.org/10.1108/RAF-07-2023-0220>
- Khediri, K.B. (2021). CSR and investment efficiency in Western European countries. *Corporate Social Responsibility Environment Management*, 28(6), 1769–1784. <https://doi.org/10.1002/csr.2151>
- Khuong, N.V., Tai, V. T. T. & Anh, L.H.T. (2025). Corporate governance and investment efficiency: What is the role of financial statement comparability? *Business Strategy & Development*, 8(3), Article 70136. <https://doi.org/10.1002/bsd2.70136>
- Kim, T., Lee, B. B. & Paik, D.G. (2024). The relationship between financial constraints and investment efficiency. *Journal of Corporate Accounting & Finance*, 36(1), 61-80. <https://doi.org/10.1002/jcaf.22740>
- Li, Z., Athanasiadis, K. A., Fygkioris, M. I., & Koufopoulos, D. N. (2024). Financial reporting quality, CEO age, and investment efficiency: Evidence from the U.S. market. *New Challenges in Accounting and Finance*, 11, 29–53. <https://doi.org/10.32038/NCAF.2024.11.03>
- Lian, Y. & Weng, X. (2024). ESG performance and investment efficiency. *Finance Research Letters*, 62, Article 105084. <https://doi.org/10.1016/j.frl.2024.105084>
- Lin, Y.-E., Li, Y.-W., Cheng, T. Y., & Lam, K.(2021). Corporate social responsibility and investment efficiency: Does business strategy matter? *International Review of Financial Analysis*, 73,1-19. <https://doi.org/10.1016/j.irfa.2020.101585>
- Ling, X. & Wu, W. (2022). Leverage and investment efficiency: Evidence from China's deleveraging policy. *Finance Research Letters*, 47,1-9. <https://doi.org/10.1016/j.frl.2021.102629>

- Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5(2), 147–175. [https://doi.org/10.1016/0304-405X\(77\)90015-0](https://doi.org/10.1016/0304-405X(77)90015-0)
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187–221. [https://doi.org/10.1016/0304-405X\(84\)90023-0](https://doi.org/10.1016/0304-405X(84)90023-0)
- Majeed, M.A., Ullah, I., Ahsan, T. & Al Gamrh, B. (2025). Investment efficiency under financial constraints: The role of CEO power. *Research in International Business and Finance*, 79, 1-17. <https://doi.org/10.1016/j.ribaf.2025.103059>
- Med bechir, C., & Jouirou, M. (2024). Investment efficiency and corporate governance: Evidence from Asian listed firms. *Journal of Sustainable Finance & Investment*, 14(3), 596–618. <https://doi.org/10.1080/20430795.2021.1974241>
- McNichols, M.F. & Stubben, S.R. (2008). Does earnings management affect firms' investment decisions? *The Accounting Review*, 83(6), 1571-1603. <https://doi.org/10.2308/accr.2008.83.6.1571>
- Modigliani, F., & Miller, M.H. (1958). The cost of capital, corporation finance and the theory of investment, *American Economic Review*, 48(3), 261–297.
- Nur, T. & Korkmaz, T. (2022). Serbest nakit akışları, temsil maliyetleri ve firma performansı arasındaki ilişki: BİST’te işlem gören firmalar üzerine bir araştırma. *Finans Ekonomi ve Sosyal Araştırmalar Dergisi*, 7(1), 103-120. <https://doi.org/10.29106/fesa.1072926>
- Pan, L. & Yang, Y. (2025). Enhancing investment efficiency through improved information disclosure, *Finance Research Letters*, 77, 1-8. <https://doi.org/10.1016/j.frl.2025.107103>
- Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2), 265–312. <https://doi.org/10.1002/jae.951>
- Rim, H. J., & Sul, E. (2020, July 17). *Director independence and corporate investment efficiency: Evidence from board reforms worldwide* SSRN Working Paper <https://doi.org/10.2139/ssrn.3668694>
- Ross, S. A. (1973). The economic theory of agency: The principal's problem. *American Economic Review*, 63(2), 134–139.
- Salehi, M., Zimon, G., Arianpoor, A. & Gholezoo, F. E. (2022). The Impact of investment efficiency on firm value and moderating role of institutional ownership and board independence. *Journal of Risk and Financial Management*, 15(4), Article 170. <https://doi.org/10.3390/jrfm15040170>
- Sharaf, I. H., El-Moslemany, R., Elswah, T., Almutairi, A. & Abdelazim, S.I. (2026). Does earning management matter for the tax avoidance and investment efficiency nexus? Evidence from an emerging market. *Journal of Risk Financial Management*, 19(1), Article 67. <https://doi.org/10.3390/jrfm19010067>
- Shin, H.H. & Kim, Y. H. (2002). Agency costs and efficiency of business capital investment: Evidence from quarterly capital expenditures. *Journal of Corporate Finance*, 8(2), 139–158. [https://doi.org/10.1016/S0929-1199\(01\)00033-5](https://doi.org/10.1016/S0929-1199(01)00033-5)

- Singh, M., & Davidson III, W. N. (2003). Agency costs, ownership structure and corporate governance mechanisms. *Journal of Banking & Finance*, 27(5), 793-816. [https://doi.org/10.1016/S0378-4266\(01\)00260-6](https://doi.org/10.1016/S0378-4266(01)00260-6)
- Stein, J. C. (2003). Agency, information and corporate investment. In G. M. Constantinides, M. Harris, & R. M. Stulz (Eds.), *Handbook of the Economics of Finance* (Vol. 1, pp. 111–165). Elsevier.
- Topaloğlu, E. E. (2019). Temsil maliyetleri ve finansal kısıtlar: Borsa İstanbul Metal Ana Endeksi firmaları üzerine bir uygulama. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi*, 7(5), 15–25. <https://doi.org/10.18506/anemon.459369>
- Ullah, I., Majeed, M.A., Fang, H. & Khan, M.A. (2020). Female CEOs and investment efficiency: Evidence from an emerging economy. *Pacific Accounting Review*, 32(4), 443–474, <https://doi.org/10.1108/PAR-08-2019-0099>
- Wang, Y. (2010). The impacts of free cash flows and agency costs on firm performance. *Journal of Service Science and Management*, 3(4), 408-418. <https://doi.org/10.4236/jssm.2010.34047>
- Wei, Z. (2023). Equity concentration and investment efficiency. *Frontiers in Business, Economics and Management*, 11(2), 163-170. <https://doi.org/10.54097/fbem.v11i2.12580>
- Wu, W., Le, C., Shi, Y. & Alkaraan, F. (2024). The influence of financial flexibility on firm performance: The moderating effects of investment efficiency and investment scale. *Journal of Applied Accounting Research*, 25(5), 1183–1202, <https://doi.org/10.1108/JAAR-07-2023-0192>
- Xu, W., Huang, W. & Li, D. (2024). Climate risk and investment efficiency. *Journal of International Financial Markets, Institutions and Money*, 92, 1-28. <https://doi.org/10.1016/j.intfin.2024.101965>
- Yahaya, O.A. (2026). CEO overconfidence and investment efficiency of Nigerian listed firms. *Journal of Corporate Finance and Governance*, 3(4), 411-445. <https://doi.org/10.10165/jcfig.2026.v3i4.411>
- Zhang, Z., Cheng, S., Wang, C., Song, S., & Feng, Y. (2025). Climate policy uncertainty and corporate investment efficiency: Evidence from China. *Journal of Environmental Planning and Management*, 68(4), 957–977. <https://doi.org/10.1080/09640568.2023.2276062>

Information About the Article/Makale Hakkında Bilgiler

The Ethical Rules for Research and Publication / Araştırma ve Yayın Etiği

The author declared that the ethical rules for research and publication were followed while preparing the article.

Yazar makale hazırlanırken araştırma ve yayın etiğine uyulduğunu beyan etmiştir.

Conflict of Interests/ Çıkar Çatışması

The author has no conflict of interest to declare.

Yazar çıkar çatışması bildirmemiştir.

Grant Support/ Finansal Destek

The author declared that this study has received no financial support.

Yazar bu çalışma için finansal destek almadığını beyan etmiştir.

Author Contributions/ Yazar Katkıları

The draft process of the manuscript/ Taslağın Hazırlanma Süreci S.T., Data Collection/Verilerin Toplanması S.T., Writing the Manuscript/ Makalenin Yazılması S.T., Submit, Revision and Resubmit Process/ Başvuru, Düzeltme ve Yeniden Başvuru Süreci S.T.

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