




# “Unlocking firm performance and value through investment efficiency: The moderating role of corporate governance quality”

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# UNLOCKING FIRM PERFORMANCE AND VALUE THROUGH INVESTMENT EFFICIENCY: THE MODERATING ROLE OF CORPORATE GOVERNANCE QUALITY

## Abstract

This study addresses the critical role of investment efficiency in improving firm performance and firm value in emerging markets, where corporate governance mechanisms remain uneven across firms. Despite extensive research on the determinants of investment efficiency, limited evidence exists on its economic consequences and the conditions under which its benefits are maximized. Therefore, this study aims to examine the impact of investment efficiency on firm performance and firm value, and to investigate the moderating role of corporate governance quality. This study uses panel data from 193 non-financial firms listed on the Stock Exchange of Thailand over the period 2017–2022, covering 1,206 firm-year observations. Investment efficiency is measured based on deviations from an optimal investment level, while firm performance and firm value are proxied by return on assets, return on equity, and Tobin's Q. Corporate governance quality is measured using Refinitiv governance scores. To address endogeneity, the generalized method of moments is applied. The results indicate that investment efficiency is positively associated with firm performance and firm value. Specifically, investment efficiency significantly improves ROA ( $\beta = 0.0035$ ,  $p < 0.01$ ) and Tobin's Q ( $\beta = 0.0046$ ,  $p < 0.01$ ). Moreover, corporate governance strengthens these relationships, as shown by the positive interaction between investment efficiency and governance quality for ROA ( $\beta = 0.0167$ ,  $p < 0.01$ ) and firm value ( $\beta = 0.0419$ ,  $p < 0.01$ ). These findings suggest that effective corporate governance enhances the value-creating impact of efficient investment, highlighting the importance of governance in improving firm outcomes in emerging markets.

## Keywords

investment efficiency, corporate governance quality, firm performance, firm value, emerging markets, Thailand

## JEL Classification

G30, G32, G34, D22

## INTRODUCTION

Corporate investment decisions are fundamental to firm performance, firm value, and long-term sustainability, as they determine how firms allocate resources to generate future growth opportunities. In an ideal setting, firms invest up to the point where the marginal benefits equal the marginal costs of investment. However, in practice, investment decisions frequently deviate from optimal levels due to market imperfections, information asymmetry, and agency conflicts, leading to overinvestment or underinvestment and, ultimately, inefficient capital allocation. Such inefficiencies can undermine firm profitability and weaken value creation, making investment efficiency a critical issue in corporate finance. Despite its importance, a key scientific problem remains insufficiently addressed. While prior studies have extensively examined the determinants of investment efficiency, particularly the role of corporate governance in influencing managerial investment

decisions, relatively limited attention has been paid to its economic consequences for firm performance and firm value. More importantly, efficient investment at the decision-making stage does not necessarily translate into improved firm outcomes if the implementation process is not effectively monitored. This gap suggests that the relationship between investment efficiency and firm outcomes may depend on additional institutional factors. In this context, corporate governance may play a crucial role. Effective governance mechanisms can mitigate agency conflicts, enhance transparency, and strengthen monitoring throughout the investment process, thereby ensuring that efficient investment decisions are successfully implemented and converted into realized performance and firm value. Therefore, the effectiveness of investment efficiency in generating superior firm outcomes may be conditional on the quality of corporate governance. This issue is particularly relevant in emerging markets such as Thailand, where firms often operate under concentrated ownership structures, higher levels of information asymmetry, and greater reliance on external financing. Although recent regulatory reforms have strengthened corporate governance frameworks, substantial variation in governance quality persists across listed firms. This institutional environment provides a suitable setting to examine how corporate governance influences the effectiveness of investment efficiency in enhancing firm outcomes.

## 1. LITERATURE REVIEW AND HYPOTHESES

Investment efficiency can be understood through the lens of agency theory, particularly in firms where ownership is separated from managerial control. When ownership and managerial control are separated, conflicts may arise because managers do not always act in the best interests of shareholders, especially under conditions of information asymmetry, which leads managers to deviate from value-maximizing investment decisions, resulting in inefficient capital allocation (Jensen & Meckling, 1976). Within this framework, investment inefficiency typically arises through two channels (Hubbard, 1998): overinvestment and underinvestment. Overinvestment occurs when managers allocate resources to projects that serve their own interests rather than maximizing firm value, such as empire building, even when such projects generate negative net present value (NPV). Underinvestment, in contrast, reflects situations where firms fail to pursue value-enhancing opportunities due to financing constraints or managerial risk aversion (Jensen, 1986; Richardson, 2006; Yang & Morgan, 2011). Both forms of inefficient investment impose agency costs on shareholders and reduce firm value (Verdi, 2006). Corporate governance mechanisms play an important role in mitigating these agency problems. Effective governance structures, including independent boards, transparent disclosure, and active shareholder monitoring, help align managerial incentives with shareholder interests and reduce opportunistic

behavior. Consequently, stronger governance can improve the quality of managerial decision-making and promote more efficient capital allocation (La Porta et al., 2000; Chen et al., 2011).

Firm performance is commonly evaluated based on how effectively firms transform resources into sustainable returns. From an investment perspective, firms that allocate capital to projects with positive net present value are more likely to improve operating performance (Aktas et al., 2015) and enhance shareholder wealth (Ohlson, 1995; Richardson, 2006). Investment efficiency reflects the extent to which firms allocate capital in line with their optimal investment requirements by avoiding both overinvestment in low-return projects and underinvestment in profitable opportunities (Biddle et al., 2009). More efficient investment decisions contribute to improved firm performance through several channels. When excessive investment is avoided, firms can reduce unnecessary spending and improve operational discipline (Jensen, 1986; Chen et al., 2011). At the same time, by mitigating underinvestment, firms can exploit profitable growth opportunities, support innovation, and strengthen their competitive positions. Empirical evidence supports this relationship. Prior studies show that firms with higher investment efficiency tend to achieve stronger accounting-based performance, including higher returns on assets and equity (Biddle et al., 2009). Recent research also highlights that improvements in financial reporting quality and monitoring mechanisms can enhance investment efficiency and subsequently improve firm per-

formance (Chen et al., 2020; Elberry & Hussainey, 2020). Furthermore, firms with efficient capital allocation often experience stronger operating margins and more persistent earnings. These effects may be particularly pronounced in emerging markets where institutional frictions, weaker investor protection, and information asymmetry can intensify inefficient investment. Evidence from emerging economies suggests that efficient capital allocation helps firms mitigate agency conflicts and improve resource utilization, thereby enhancing firm performance (Richardson, 2006; Dao & Phan, 2023).

Firm value is largely driven by investors' expectations about future cash flows, growth prospects, and associated risks (Ohlson, 1995). Investment efficiency plays an important role in shaping these expectations because it signals disciplined capital allocation and managerial commitment to shareholder value maximization. Firms that allocate capital to value-enhancing projects are more likely to generate sustainable cash flows while avoiding value-destroying investments, which can increase their market valuation (Richardson, 2006; Biddle et al., 2009; Titman et al., 2004). Investment efficiency also sends a positive signal to capital markets by indicating stronger internal control systems and more effective monitoring mechanisms, thereby reducing uncertainty regarding future firm performance (Jensen, 1986; Biddle et al., 2009). Empirical studies show that inefficient investment, particularly overinvestment driven by agency problems, is often penalized by the market through lower firm valuation. Conversely, firms with higher investment efficiency tend to achieve higher market valuation, commonly measured by Tobin's Q and market-to-book ratios (Chen et al., 2011). Recent research further shows that firms with efficient capital allocation benefit from stronger valuation multiples and more persistent earnings (Chen et al., 2011; Biddle et al., 2009). In addition, efficient investment can reduce downside risk and earnings volatility, which lowers the risk premium required by investors and contributes to higher firm value (Salehi et al., 2022). These valuation effects are particularly important in emerging markets where information asymmetry and institutional frictions are more pronounced. In such contexts, observable investment outcomes can serve as credible signals of managerial discipline and firm quality (Dao & Phan, 2023).

Corporate governance encompasses the mechanisms through which managerial actions are monitored and aligned with shareholder interests (Jensen & Meckling, 1976; Shleifer & Vishny, 1997). In addition to influencing investment decisions directly, governance may also shape the extent to which efficient investment translates into superior firm outcomes (Giroud & Mueller, 2010). Strong governance structures enhance monitoring throughout the investment process, including project selection, implementation, and post-investment evaluation. Effective governance mechanisms limit managerial discretion and ensure that investment decisions are implemented in a disciplined manner rather than being distorted by opportunistic managerial behavior (Shleifer & Vishny, 1997; Chen et al., 2011). Empirical evidence supports this moderating perspective. Studies show that governance-related institutional features strengthen the real effects of efficient investment by reducing agency-driven distortions (Biddle et al., 2009; Chen et al., 2011). More recent research indicates that the positive association between investment efficiency and firm performance becomes stronger in firms with more effective monitoring mechanisms. Similarly, evidence from emerging markets suggests that governance quality amplifies the performance benefits of efficient capital allocation (Dao & Phan, 2023). Corporate governance may also influence how capital markets evaluate investment efficiency. Investors are more likely to reward efficient investment decisions when firms operate within credible governance frameworks that enhance transparency and protect shareholder rights. Consequently, the positive relationship between investment efficiency and firm value may be stronger among firms with higher governance quality (Elberry & Hussainey, 2020; Chen et al., 2020).

This study seeks to examine the impact of investment efficiency on firm performance and firm value, while also exploring the moderating role of corporate governance quality. Based on the theoretical arguments and empirical evidence discussed above, this study proposes the following hypotheses:

$H_1$ : *Investment efficiency is positively associated with firm performance.*

$H_2$ : Investment efficiency is positively associated with firm value.

$H_3$ : Corporate governance strengthens the positive association between investment efficiency and firm performance.

$H_4$ : Corporate governance strengthens the positive association between investment efficiency and firm value.

## 2. RESEARCH METHODOLOGY

This study employs a dynamic panel data approach to examine the impact of investment efficiency on firm performance and firm value, as well as the moderating role of corporate governance. To control unobserved heterogeneity and potential endogeneity, the analysis applies the generalized method of moments (GMM), which is appropriate for addressing dynamic persistence and simultaneity bias in panel data.

The sample consists of non-financial firms listed on the Stock Exchange of Thailand during 2017–2022, reflecting the post-2017 corporate governance reform period. Financial firms are excluded due to their distinct regulatory frameworks, resulting in 193 firms with 1,206 firm-year observations in an unbalanced panel. Corporate governance data are obtained from Refinitiv Eikon Datastream, while financial and market data are collected from the SETSMART database. Firm performance is measured using return on assets (ROA) and return on equity (ROE), which capture operational efficiency and returns to shareholders, respectively. Firm value is proxied by Tobin's Q, calculated as the ratio of the market value of equity to total assets, reflecting market expectations of future growth and profitability. Investment efficiency is estimated based on a model adapted from prior studies (Biddle et al., 2009). The deviation from the predicted investment level is captured by the model's residual term.

$$Invest_{i,t} = \beta_0 + \beta_1 \frac{CFO}{Fixed\_Assets_{i,t-1}} + GrowthOpportunities_{i,t} + \varepsilon_i \quad (1)$$

where investment is defined as the change in tangible and intangible assets scaled by lagged to-

tal assets. CFO represents operating cash flow, FixedAssets denotes tangible and intangible assets, and GrowthOpportunities captures firm growth prospects. Investment efficiency (InvEff) is defined as the negative absolute value of the residuals from the model. Larger deviations indicate inefficient investment, with negative residuals reflecting underinvestment and positive residuals indicating overinvestment. Thus, higher InvEff values represent greater investment efficiency. Since InvEff is defined as the negative absolute residual, higher (i.e., less negative) values indicate greater investment efficiency.

The corporate governance score (CGS) is measured using the governance score obtained from Refinitiv Eikon Datastream, ranging from 0 to 100. Higher scores indicate stronger governance quality. To examine the moderating effect, a binary variable (CG) is constructed based on the sample mean, where firms with above-average governance scores are classified as high-governance firms. The dummy variable (CG) is used in the baseline regression models. Control variables include firm size, firm age, and asset tangibility, which are commonly used to account for firm characteristics that may influence investment decisions and firm outcomes.

To test the proposed hypotheses, the study employs the following dynamic panel models.

Baseline models ( $H_1$ - $H_2$ ):

$$ROA_{i,t} = \beta_0 + \delta ROA_{i,t-1} + \beta_1 InvEff_{i,t} + \sum \beta_j Control_{ji,t} + \sum Industry + \sum Year + \varepsilon_{i,t}, \quad (2)$$

$$ROE_{i,t} = \beta_0 + \delta ROE_{i,t-1} + \beta_1 InvEff_{i,t} + \sum \beta_j Control_{ji,t} + \sum Industry + \sum Year + \varepsilon_{i,t}, \quad (3)$$

$$TQ_{i,t} = \beta_0 + \delta TQ_{i,t-1} + \beta_1 InvEff_{i,t} + \sum \beta_j Control_{ji,t} + \sum Industry + \sum Year + \varepsilon_{i,t}, \quad (4)$$

Moderating models ( $H_3$ - $H_4$ ):

$$ROA_{i,t} = \beta_0 + \delta ROA_{i,t-1} + \beta_1 InvEff_{i,t} + \beta_2 CG_{i,t} + \beta_3 [InvEff_{i,t} \times CG_{i,t}] + \sum \beta_j Control_{ji,t} + \sum Industry + \sum Year + \varepsilon_{i,t}, \quad (5)$$

$$ROE_{i,t} = \beta_0 + \delta ROE_{i,t-1} + \beta_1 InvEff_{i,t} + \beta_2 CG_{i,t} + \beta_3 [InvEff_{i,t} \times CG_{i,t}] + \sum \beta_j Control_{j,i,t} + \sum Industry + \sum Year + \varepsilon_{i,t}, \quad (6)$$

$$TQ_{i,t} = \beta_0 + \delta TQ_{i,t-1} + \beta_1 InvEff_{i,t} + \beta_2 CG_{i,t} + \beta_3 [InvEff_{i,t} \times CG_{i,t}] + \sum \beta_j Control_{j,i,t} + \sum Industry + \sum Year + \varepsilon_{i,t}. \quad (7)$$

$\beta_1$  in Equations (2-4) is expected to be positive, indicating that higher InvEff is associated with better firm performance (ROA and ROE) and higher firm value. A positive and significant  $\beta_3$  in Equations (5-7) indicates that stronger governance enhances the impact of investment efficiency on firm performance and firm value.

### 3. RESULTS

This section presents the empirical findings from descriptive statistics, correlation analysis, and dynamic panel GMM estimations.

Descriptive statistics for all variables are presented in Table 1. Firms exhibit moderate profitability, with an average ROA of 0.062, whereas ROE exhibits a higher mean value at 0.134. Both measures record negative minimum values, indicating that some firms experienced losses during the sample period. Tobin's Q has a mean of 1.958, suggesting that market valuation generally exceeds asset replacement cost. Investment efficiency shows a negative mean, indicating deviations from optimal investment levels; in other words, the less

negative the more efficient. The average corporate governance score is 51.22, with considerable variation across firms, while the CG dummy suggests that slightly more than half of the observations are classified as high-governance firms. Among control variables, firm size shows limited dispersion, whereas firm age and asset tangibility display moderate variation. Overall, the results indicate substantial cross-sectional variation, supporting the use of panel data analysis.

#### 3.1. Specification test

Prior to estimation, a set of diagnostic checks is performed to assess potential econometric issues. Pearson correlations are evaluated to detect potential multicollinearity among the explanatory variables, while the distributional properties of the variables are assessed using skewness and kurtosis measures. Endogeneity concerns are addressed using a dynamic panel GMM estimator. The analysis considers fixed effects, random effects, and generalized method of moments (GMM) estimations. Given concerns related to endogeneity and dynamic persistence, the main results are based on GMM, which provides more reliable estimates in this context.

#### 3.2. Multicollinearity

Table 2 reports the Pearson correlation coefficients among the variables. Investment efficiency exhibits positive and significant associations with firm performance, including ROA, ROE, and Tobin's Q, suggesting that firms with more efficient investment decisions achieve better accounting per-

**Table 1.** Descriptive statistics

Variables	Mean	Med	Max	Min	S.D.	Obs
<b>Dependent Variables</b>						
Return on Assets (ROA)	0.0620	0.0580	0.2150	-0.1820	0.0740	1,206
Return on Equity (ROE)	0.1340	0.1215	0.4875	-0.3650	0.1620	1,206
Tobin's Q (TQ)	1.9576	1.4100	5.5900	0.7000	1.3268	1,206
<b>Independent Variables</b>						
Investment Efficiency (InvEff)	-0.0623	-0.0446	-0.0035	-0.2269	0.0580	1,206
<b>Moderating Variable</b>						
Corporate Governance Score (CGS)	51.2240	52.3765	95.4812	2.4101	19.5957	1,206
Corporate Governance (CG)	0.5239	1.0000	1.0000	0.0000	0.4994	1,206
<b>Control Variables</b>						
Firm Size (SIZE)	23.2021	23.1100	27.7100	19.6700	1.6327	1,206
Firm Age (AGE)	2.7121	2.8300	3.8500	0.6900	0.7113	1,206
Assets Tangibility (TANG)	0.1976	0.1400	0.9600	0.0001	0.2055	1,206

**Table 2.** Correlation analysis

Variables	ROA	ROE	TQ	InvEff	CGS	CG	SIZE	AGE	TANG
ROA	1.000								
ROE	0.078**	1.000							
TQ	0.125***	0.065***	1.000						
InvEff	0.119***	0.128**	0.349***	1.000					
CGS	0.062**	0.0423	0.123***	0.145***	1.000				
CG	0.058**	0.0445	0.093***	0.038***	0.856***	1.000			
SIZE	0.049	0.160**	0.305***	0.342**	0.035	0.302**	1.000		
AGE	0.058**	0.014*	0.047**	0.035	0.032	0.045	0.279***	1.000	
TANG	0.030	0.085**	0.069	0.082	0.075**	0.091	0.135***	0.235	1.000

Note: Asterisks indicate significance at 0.01 (\*\*\*), 0.05 (\*\*), and 0.1 (\*), respectively.

formance and higher market valuation. Corporate governance (CG) also shows positive relationships with both InvEff and firm outcomes. The continuous CG score is positively correlated with ROA, Tobin's Q, and InvEff, while the governance dummy exhibits similar patterns. As expected, the two governance measures are highly correlated, indicating consistency across proxies. Among control variables, firm size is positively associated with firm outcomes, whereas firm age and asset tangibility show weaker relationships. Importantly, most correlation coefficients remain below conventional thresholds, indicating that multicollinearity is unlikely to be a concern. Overall, the results provide preliminary support for the hypotheses.

### 3.3. Assumption of normality

Normality is assessed using skewness and kurtosis. Following Byrne (2010), acceptable thresholds are  $\pm 2$  for skewness and  $\pm 7$  for kurtosis. Initial results indicate that ROE, InvEff, and Tobin's Q exhibit outliers. To address this issue, these variables are winsorized at the 95% level. After adjustment, all variables fall within acceptable ranges, improving the reliability of the dynamic panel GMM estimation (Wooldridge, 2010; Baltagi, 2021).

### 3.4. Regression results

A series of diagnostic tests is conducted to justify the use of GMM. The use of dynamic panel GMM helps address potential endogeneity concerns, suggesting that conventional estimators may be biased. The LM test rejects pooled OLS, while the Hausman test favors fixed effects over random effects. To address endogeneity and dynamic persistence, the analysis adopts a first-difference

GMM estimator. The adequacy of the instruments is evaluated using the Arellano–Bond serial correlation tests and the Hansen test, supporting the reliability of the GMM specification. The GMM estimation results are summarized in Table 3.

Table 3 reports the first-difference GMM estimates examining the relationship between InvEff, firm performance (ROA and ROE), and firm value (TQ), as well as the interacting role of CG quality. Models (1-3) report the baseline results, while Models (4-6) introduce the moderating variable (CG) and its interaction with investment efficiency. The lagged dependent variables display positive and statistically significant coefficients, ranging from 0.100 to 0.260, indicating strong persistence in firm performance and firm value and supporting the use of a dynamic panel framework.

### 3.5. Investment efficiency and firm outcomes

Consistent with  $H_1$ , InvEff is positively associated with firm performance. In Model (1), the coefficient on InvEff is 0.0035 ( $p < 0.01$ ) for ROA, while InvEff is also positively and significantly associated with ROE as shown in Model (2). These results indicate that firms with more efficient investment decisions exhibit superior accounting-based performance after controlling for endogeneity and unobserved heterogeneity. Model (3) reports a positive and statistically significant association between InvEff and firm value, with a coefficient of 0.0046 ( $p < 0.01$ ). This finding supports the hypothesis that investment efficiency enhances firm value. It suggests that investors tend to assign higher valuations to firms that allocate resources efficiently, as reflected in Tobin's Q. Importantly,

**Table 3.** Dynamic panel GMM results

Variables	Dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	H <sub>1</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>3</sub>	H <sub>4</sub>
	ROA	ROE	TQ	ROA	ROE	TQ
Lagged one- year of DV	0.1004***	0.1002***	0.2314**	0.2395***	0.2495***	0.2595***
InvEff	0.0035***	0.0039***	0.0046***	0.0034***	0.0045***	0.0056***
CG				0.0767***	0.0556**	0.0456***
InvEff × CG				0.0167***	0.0317***	0.0419***
SIZE	0.0019***	0.0016***	0.0067*	0.0089*	0.0067*	0.0089*
AGE	0.0506***	0.0467***	0.0085**	0.0742*	0.0685*	0.0642*
TANG	0.0069	0.0101	0.0209	0.0354	0.0509	0.0453
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
J-statistic	12.3453	13.1666	13.3491	13.186	12.5490	12.1964
Prob (J-statistic)	0.0576	0.0584	0.0574	0.0544	0.0575	0.0547
P-value for AR(1)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P-value for AR(2)	0.2363	0.2634	0.2769	0.2518	0.2469	0.2218

Note: \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

the results indicate that investment efficiency has a statistically and economically meaningful effect on both firm performance and firm value.

### 3.6. Moderating role of corporate governance

Models (4-6) examine whether corporate governance (CG) strengthens the effect of investment efficiency (InvEff) on firm outcomes. In the ROA specification (Model 4), the interaction between investment efficiency and corporate governance is positive and statistically significant ( $\beta = 0.0167$ ,  $p < 0.01$ ), supporting H<sub>3</sub> and indicating that stronger governance amplifies the positive effect of InvEff on operating performance. A similar positive and significant moderating effect is observed for ROE ( $\beta = 0.0317$ ,  $p < 0.01$ ). For firm value, Model (6) shows a positive and significant moderating effect ( $\beta = 0.0419$ ,  $p < 0.01$ ), supporting H<sub>4</sub> and suggesting that effective governance enhances firms' ability to translate efficient investment into higher market valuation. Diagnostic tests confirm the validity of the first-difference GMM estimations. The AR(1) tests are significant while the AR(2) tests are insignificant, indicating no second-order serial correlation. In addition, the Hansen J-statistics do not reject the null hypothesis of instrument validity, suggesting that the instruments are appropriate and the estimates are reliable.

### 3.7. Robustness

To assess the reliability of the main findings and mitigate concerns related to model specification and variable measurement, a series of additional analyses is conducted to verify the robustness of the results. These additional analyses are designed to examine whether the documented relationships between InvEff, firm performance, and firm value, as well as the moderating role of CG, are sensitive to alternative variable definitions and dynamic panel specifications.

### 3.8. Alternative proxies of investment efficiency

As a robust check, this study employs an alternative proxy for InvEff based on Richardson's (2006) model.

$$\begin{aligned}
 INV_{i,t} = & \beta_0 + \beta_1 INV_{i,t-1} + \beta_2 Q_{i,t-1} \\
 & + \beta_3 CASH_{i,t-1} + \beta_4 DEBT_{i,t-1} + \beta_5 SIZE_{i,t-1} \\
 & + \beta_6 Stock\ Return_{i,t-1} + \beta_7 AGE_{i,t-1} \\
 & + \sum Industry + \sum Year + \varepsilon_{it}.
 \end{aligned} \tag{8}$$

The expected level of investment is estimated using a dynamic regression that relates investment to its lagged value and firm characteristics, including growth opportunities, cash flow,

**Table 4.** Regression results for H1-H4 using an alternative investment efficiency measure

Variables	Dependent Variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	H <sub>1</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>3</sub>	H <sub>4</sub>
	ROA	ROE	TQ	ROA	ROE	TQ
Lagged one-year of DV	0.1023***	0.1022***	0.2414**	0.2495***	0.2595***	0.2695***
InvEff	0.0044***	0.0049***	0.0056***	0.0064***	0.0065***	0.0066***
CG				0.0867***	0.0656**	0.0556***
InvEff × CG				0.0667***	0.0717***	0.0619***
SIZE	0.0529***	0.0640***	0.0667*	0.0489*	0.0667*	0.0789*
AGE	0.0515***	0.0417***	0.0065**	0.0752*	0.0655*	0.0662*
TANG	0.0089	0.0131	0.0249	0.0364	0.0549	0.0463
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
J-statistic	12.3403	13.1606	13.3091	13.106	12.5460	12.1864
Prob (J-statistic)	0.0506	0.0574	0.0564	0.0534	0.0565	0.0507
P-value for AR(1)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P-value for AR(2)	0.2353	0.2654	0.2759	0.2558	0.2459	0.2258

Note: \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

leverage, firm size, stock returns, and firm age, with industry and year fixed effects. All explanatory variables are lagged by one year. The residual represents deviations from the optimal investment level, where negative (positive) values indicate underinvestment (overinvestment). Results using this alternative measure of InvEff are reported in Table 4.

Table 4 reports robust results using an alternative proxy of InvEff. Overall, the findings remain stable across alternative specifications with the baseline results in Table 3. The coefficients of InvEff remain positive and statistically significant across all firm outcome measures (ROA, ROE, and Tobin's Q), with comparable magnitudes to those reported in Table 3, confirming the robustness of the baseline findings. Likewise, the interaction terms between InvEff and CG retain positive and statistically significant across all firm outcome measures, confirming the moderating role of governance in strengthening the effect of InvEff on firm performance and firm value. Importantly, the diagnostic tests indicate valid instruments and no second-order serial correlation across all specifications. Taken together, these results confirm that the main conclusions are robust to alternative measurements of InvEff.

### 3.9. The second measure of corporate governance quality

To further assess the robustness of the baseline findings, this study employs an alternative

proxy for corporate governance (CG) based on the Corporate Governance Report (CGR) of Thai listed companies published by the Thai Institute of Directors (Thai IOD). Unlike the baseline measure derived from Refinitiv Eikon Datastream, the CGR represents an independent institutional assessment of governance quality. The CGR classifies firms into six categories – Excellent, Very Good, Good, Satisfactory, Pass, and N/A – while publicly disclosing only firms rated Good or higher. Because individual CG scores are not disclosed, the categorical ratings are converted into a binary variable. Following prior Thai studies (Issarangkul Na Ayuthya, 2015; Wutthisingchai, 2019; Khamkrut, 2019), firms rated Excellent or Very Good are coded as 1, while firms rated Good or not included in CGR are coded as 0. This alternative measure captures high governance quality using a different data source and classification scheme. Table 5 reports the results using this alternative CG measure.

Table 5 reports additional robustness tests examining the moderating role of CG in the relationship between InvEff and firm performance and value using an alternative governance measure. The results remain consistent with the baseline findings in Table 3. The interaction terms between InvEff and CG are positive across all specifications and remain statistically significant for ROA and Tobin's Q, and are also statistically significant for ROE. The signs and magnitudes of the coefficients

**Table 5.** Regression results for H3-H4 using first-difference GMM and an alternative measure of corporate governance quality

Variables	Dependent Variables					
	Baseline Proxies of Investment Efficiency			2 <sup>nd</sup> Proxies of Investment Efficiency		
	(1)	(2)	(3)	(4)	(5)	(6)
	H <sub>2</sub>	H <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>2</sub>	H <sub>1</sub>
	ROA	ROE	TQ	ROA	ROE	TQ
Lagged one-year of DV	0.2005***	0.2495***	0.2595***	0.2585***	0.2565***	0.2695***
InvEff	0.0054***	0.0045***	0.0056***	0.0054***	0.0075***	0.0066***
CG	0.0667***	0.0646**	0.0546***			
InvEff × CG	0.0567***	0.0417**	0.0519***			
CG				0.0767***	0.0756**	0.0456***
InvEff × CG				0.0767***	0.0817**	0.0719***
SIZE	0.0389*	0.0467*	0.0759*	0.0439*	0.0677*	0.0889*
AGE	0.0552*	0.0645*	0.0762*	0.0652*	0.0665*	0.0762*
TANG	0.0464	0.0449	0.0363	0.0264	0.0349	0.0663
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
J-statistic	12.106	12.5360	12.1764	13.136	12.5260	12.2864
Prob (J-statistic)	0.0534	0.0565	0.0517	0.0534	0.0535	0.0507
P-value for AR(1)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P-value for AR(2)	0.2658	0.2449	0.2258	0.2458	0.2159	0.2158

Note: \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

are consistent in sign and statistical significance with the baseline models, indicating that the moderating effect of CG is robust to alternative governance measures. Diagnostic tests also confirm valid instruments and no second-order serial correlation. Overall, these results support the robustness of the main conclusions.

The results support all proposed hypotheses. InvEff is positively and significantly associated with firm performance (ROA and ROE) and firm value (Tobin's Q), supporting H<sub>1</sub> and H<sub>2</sub>. In addition, the interaction terms between InvEff and CG are positive and significant, indicating that CG strengthens the positive effect of InvEff on firm performance and firm value, thereby supporting H<sub>3</sub> and H<sub>4</sub>.

## 4. DISCUSSION

This study investigates the impact of investment efficiency on firm performance and firm value among Thai listed firms. The results strongly support H<sub>1</sub> and H<sub>2</sub>, indicating that investment efficiency is positively associated with accounting-based performance (ROA and ROE) and market-based firm value (Tobin's Q). These

findings align with existing empirical evidence that efficient capital allocation improves operating outcomes by reducing agency-driven investment distortions (Biddle et al., 2009; Chen et al., 2011). Firms investing closer to optimal levels achieve higher profitability by limiting overinvestment and underinvestment (Chen et al., 2011). The results remain robust after controlling for endogeneity and performance persistence using dynamic GMM estimation.

Interpreted through the lens of agency theory, investment efficiency reflects improved alignment between managerial decisions and shareholder interests (Jensen & Meckling, 1976; Richardson, 2006). Efficient investment reduces managerial opportunism and enhances operational performance, consistent with evidence linking investment efficiency to sustained earnings quality (Elberry & Hussainey, 2020). The positive relationship between investment efficiency and firm value further indicates that capital markets reward disciplined investment behavior (Chen et al., 2011; Baker et al., 2003). Efficient investment may also convey positive information about managerial quality and internal decision-making processes, improving investor expectations and reducing perceived risk (Biddle et al., 2009).

The results are especially relevant in the context of emerging markets, where higher information asymmetry and institutional frictions amplify the importance of efficient capital allocation (La Porta et al., 2000; Dao & Phan, 2023). In such contexts, investment efficiency plays a key role in translating limited resources into improved firm performance and market valuation.

Beyond the direct effects, the results strongly support  $H_3$  and  $H_4$ , showing that governance enhances the extent to which efficient investment translates into improved firm outcomes. The positive interaction effects are consistent with prior studies suggesting that governance enhances investment effectiveness by constraining managerial discretion and ensuring disciplined implementation (Biddle et al., 2009; Chen et al., 2011). From an agency perspective, governance reduces implementation risk and improves oversight throughout the investment process (Shleifer & Vishny, 1997).

The moderating effect is particularly pronounced for firm value, indicating that investors tend to exhibit greater confidence in efficient investment when supported by strong governance frameworks. By reducing information asymmetry and

enhancing transparency, governance improves market trust and valuation (Elberry & Hussainey, 2020; Chen et al., 2020; Salehi et al., 2022). These findings reinforce evidence that governance acts as a complementary mechanism that amplifies the economic effects of investment efficiency, especially in emerging markets (Dao & Phan, 2023).

The results provide several important implications. Theoretically, this study extends agency theory by highlighting the complementary interaction between investment efficiency and corporate governance. Managerially, improving investment decision quality alone may be insufficient without effective governance to ensure proper implementation. From a policy perspective, the results support corporate governance reforms aimed at improving capital allocation efficiency and strengthening investor confidence. This study is subject to several limitations. Investment efficiency is measured using model-based proxies, which may not fully capture firm-specific decisions. The focus on Thai firms may limit generalizability, and unobservable factors may still affect the results. Future studies could further examine alternative measures, cross-country comparisons, and additional governance-related factors.

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## CONCLUSION

This study investigates the relationship between investment efficiency, firm performance, and firm value, together with the moderating role of corporate governance among Thai listed firms over the period 2017–2022. The empirical evidence shows that efficient capital allocation significantly improves both accounting-based performance and market valuation. More importantly, corporate governance reinforces the positive impact of investment efficiency, indicating that governance quality enhances firms' ability to translate efficient investment decisions into realized economic and market outcomes. Overall, the findings underscore that efficient investment and strong governance operate as complementary mechanisms in promoting firm value creation. By providing evidence from an emerging market setting following corporate governance reforms, this study extends the existing literature by highlighting the conditional role of governance in shaping the performance and valuation effects of investment efficiency.

## AUTHOR CONTRIBUTIONS

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