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The Effects of Tax Avoidance, Audit Quality, Board Size, and Managerial Ownership on Investment Efficiency: Profitability as a Moderating Variable

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Abstract
Investment efficiency is a critical determinant of corporate value creation, particularly in capital-intensive industries such as shipping, where strategic capital allocation directly affects long-term competitiveness. However, investment decisions are often influenced by corporate governance mechanisms and financial policies, including tax avoidance, audit quality, board size, managerial ownership, and profitability. This study aims to examine the effects of tax avoidance, audit quality, board size, and managerial ownership on investment efficiency, while investigating the moderating role of profitability. A quantitative research design was employed using secondary panel data collected from 25 shipping companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period, yielding 100 firm-year observations. Data were analyzed using descriptive statistics, classical assumption tests, multiple linear regression, and Moderated Regression Analysis (MRA). The findings reveal that tax avoidance significantly enhances investment efficiency, whereas audit quality, board size, and managerial ownership do not exert significant direct effects. Profitability significantly strengthens the relationships between tax avoidance, managerial ownership, and board size with investment efficiency but does not moderate the relationship between audit quality and investment efficiency. The regression model is statistically significant and explains 30.2% of the variation in investment efficiency. These findings highlight the importance of strategic tax management and profitability in improving investment efficiency while emphasizing the need to strengthen governance effectiveness beyond structural corporate mechanisms.

INTRODUCTION

Investment efficiency is an important element in increasing company value, as stated by Richardson (2006) who explains that investment inefficiency occurs in two forms, namely overinvestment and underinvestment. Both of these forms can be caused by limited funds, asymmetrical information, and conflicts of interest between management and owners. Research by Damha and Kusumawati (2024) adds that inefficient investment practices are often rooted in governance issues, low audit quality, and weak corporate internal control mechanisms. Therefore, studying the factors that affect investment efficiency is essential to ensure optimal use of the company's resources.

Shipping companies in Indonesia are showing efforts to improve investment efficiency through innovation and the right internal strategy (Gena et al., 2020; Prabangkara et al., 2021;

Rachman & Nursyamsi, 2025). PT Salam Pacific Indonesia Lines (SPIL) has digitized its operations, including container tracking, fleet management, and integrated customer service, thereby increasing operational efficiency by 15–20% per year. PT Pelayaran Nasional Ekalya Purnamasari Tbk (ELPI), which diversifies its services, including the offshore segment, managed to increase gross profit by 33% and net profit by 64% YoY in 2024. Meanwhile, PT Pertamina International Shipping (PIS) reduced operating expenses by around 38% through fleet digitization and route management, while increasing EBITDA by more than 21%. This phenomenon shows that strategic investment in technology and service diversification can improve the efficiency of capital allocation, optimize internal funds, and improve the profitability of shipping companies in Indonesia (Kusumawati & Punomo, 2024).

On the other hand, investment efficiency in the shipping sector also faces various obstacles that can reduce the productivity of capital use (Pangalos, 2023; Rehmatulla et al., 2017). Many companies still face high and volatile fuel costs, inefficient shipping routes, and external regulatory pressures that force companies to make defensive investments or less productive capital allocations. This condition causes investment decisions to not be entirely optimal, as the company's funds are used more to cover operational costs or meet regulatory compliance than for the expansion or development of productive assets. This phenomenon confirms that investment efficiency in the shipping industry is greatly influenced by a combination of the company's internal strategy, technological innovation, and external industry conditions.

Although this phenomenon has been widely observed, empirical research on investment efficiency in Indonesian shipping companies is still limited, especially those that examine the relationship between tax avoidance, profitability, and corporate governance simultaneously. Previous research has tended to focus on the manufacturing sector or multisector, so the specific phenomenon of the shipping industry facing high-cost pressures, demand fluctuations, and regulatory risks has rarely been quantitatively analyzed. This gap is an opportunity for this study to examine the factors that affect investment efficiency in Indonesian shipping companies more comprehensively.

Tax avoidance measures are increasingly in the spotlight in financial and tax studies because they are believed to affect the company's investment behaviour, as emphasized by Hasan, Kim, and Teng (2021) who assess that tax avoidance is closely related to the availability of internal funds that companies can use for investment activities. Tax avoidance can theoretically increase a company's cash flow, but on the other hand it can raise governance risks and agency issues as described by Desai and Dharmapala (2006) who found that the practice is often associated with conflicts of interest between management and shareholders. In the context of Indonesian companies, Siregar (2018) also said that tax avoidance has a double impact, namely it can increase investment financing efficiency but also increase the risk of manipulation of financial statements.

Audit quality is one of the governance mechanisms that is considered to be able to suppress opportunistic management practices, as conveyed by Francis and Michas (2021) who stated that high-quality auditors have better ability to detect and report material errors in financial statements. Good audit quality is also believed to increase company transparency so that investment decisions can be made more precisely, as evidenced by Francis (2004) who found that companies with quality auditors are less likely to carry out activities that undermine

investment efficiency. In addition, Herusetya (2019) research shows that companies in Indonesia that are audited by quality auditors have a higher level of investment efficiency.

The size of the board of commissioners also plays an important role in influencing the effectiveness of supervision, as stated by Sari and Putri (2022) who stated that the board of commissioners with a larger number of members has more resources, expertise, and perspectives so that it is able to increase the supervisory capacity of company management. This is strengthened by research by Rahmawati and Haryanto (2023) which emphasizes that the board of commissioner's functions as a company control mechanism to minimize opportunistic management behaviour through the function of supervision and strategic advice. In the Indonesian context, Kusnadi's (2015) research shows that the size of the board of commissioners is positively related to the level of supervision so that it can improve the quality of investment decisions.

Managerial ownership is also often associated with the efficiency of company decisions, as outlined by Sari and Nugroho (2022) who found that the greater the proportion of shareholding by management, the more aligned the interests of management are with shareholders thereby encouraging more efficient company decision-making. This is strengthened by research by Utami and Nugroho (2023) which found that an optimal level of managerial ownership is able to suppress the tendency of overinvestment and underinvestment through the alignment of interests between management and shareholders.

In addition to these main variables, profitability is thought to play a role as a moderation variable because more profitable companies tend to have more stable internal cash flows, as conveyed by Rahmawati and Nugroho (2022) who stated that a high level of profitability strengthens the company's ability to fund investments from internal sources, thus affecting the relationship between governance mechanisms and investment efficiency. High profitability can strengthen the relationship between tax avoidance variables, audit quality, governance mechanisms, and investment efficiency as found by Sudarmadji (2017) who states that profitability can improve the accuracy of investment decisions. Arun's research (2020) also found that profitability strengthens the role of governance in reducing inefficient investment practices.

Thus, this study is important to conduct because the combination of tax avoidance variables, audit quality, board of commissioner's size, managerial ownership, and profitability moderation has not been comprehensively researched, especially in the context of Indonesia and the shipping sector. Previous research, such as Chen et al. (2011), found that tax avoidance rates have a negative effect on investment efficiency because tax avoidance creates asymmetric information that makes it difficult for external parties to supervise. This result is in line with Richardson's (2006) research which states that companies with profit management practices and tax aggressiveness tend to experience overinvestment. From these previous studies, it can be concluded that there are still inconsistencies in the results of the research so that a new research model is needed by including the profitability moderation variable on the relationship between tax avoidance, audit quality, size of the board of commissioners and managerial ownership on investment efficiency in the context of companies on the Indonesia Stock Exchange.

Based on the above background, the research questions formulated are: (1) Does tax avoidance affect investment efficiency? (2) Does audit quality affect investment efficiency?

(3) Does managerial ownership affect investment efficiency? (4) Does the size of the board of commissioners affect investment efficiency? (5) Does profitability moderate the effect of tax avoidance on investment efficiency? (6) Does profitability moderate the effect of audit quality on investment efficiency? (7) Does profitability moderate the influence of managerial ownership on investment efficiency? (8) Does profitability moderate the influence of the size of the board of commissioners on investment efficiency?

Overall, this study aims to: (1) Examine the effect of tax avoidance on investment efficiency; (2) Testing the influence of audit quality on investment efficiency; (3) Examining the influence of managerial ownership on investment efficiency; (4) Examining the influence of the size of the board of commissioners on investment efficiency; (5) Analyzing the role of profitability in moderating the effect of tax avoidance on investment efficiency; (6) Analyzing the role of profitability in moderating the influence of audit quality on investment efficiency; (7) Analyzing the role of profitability in moderating the influence of managerial ownership on investment efficiency; and (8) Analyze the role of profitability in moderating the influence of the size of the board of commissioners on investment efficiency in shipping companies listed on the IDX for the 2021–2024 period.

This research is based on Agency Theory (Jensen & Meckling, 1976) which explains the relationship between principals (shareholders) and agents (management). This theory states that conflicts of interest and information asymmetry between principals and agents can lead to suboptimal investment decision-making, both in the form of overinvestment and underinvestment. Therefore, governance mechanisms such as audit quality, board size and managerial ownership are needed to reduce agency conflicts and improve investment efficiency. Profitability as a moderation variable is positioned based on the argument that companies with high financial performance have better financing flexibility and stronger governance.

Investment efficiency is the company's ability to make optimal investment decisions, namely not to over-invest or under-investment, as stated by Biddle et al. (2009). Investment efficiency reflects the extent to which the funds owned by a company are allocated to projects that provide added value and support the sustainability of the company's performance, as explained by Chen et al. (2011). In this study, investment efficiency was measured using the residual investment approach developed by Biddle et al. (2009). The first stage is to estimate the investment model to obtain the company's normal investment level with the equation:

$$INVi,t+1 = \beta 0 + \beta 1\ SalesGrowthi,t + \varepsilon i,t+1$$

where INVi,t+1 is the investment level of the company i in the period t+1, calculated as (Total Assets t+1 – Total Assets t) / Total Assets t; SalesGrowthi,t is the company's sales growth i in period t, calculated as (Salest – Salest-1) / Salest-1; and εi,t+1 is residual which is a measure of investment inefficiency. The residual absolute value is used as a measure of investment inefficiency; The closer it is to zero, the higher the company's investment efficiency.

Tax avoidance is an effort by company management to minimize the tax burden that must be paid through tax planning that is still within the corridor of applicable tax regulations, as stated by Dyreng et al. (2008). In this study, tax avoidance was measured using the Effective Tax Rate (ETR) as widely used in corporate tax research by Saputri and Hadi (2022), with the formula: ETR = Income Tax Burden / Profit Before Tax. The lower the ETR value, the higher

the tax avoidance rate the company commits. Tax avoidance strategies can affect the availability of a company's cash flow which further impacts the company's investment decisions, as explained by Hanlon and Heitzman (2010).

Audit quality reflects the auditor's ability to detect and report material misstatements in the company's financial statements, as explained by Rahayu and Nugroho (2022). In this study, audit quality was measured using dummy variables based on the affiliation of Public Accounting Firms (KAP), as well as the measurement approach widely used in audit research by Francis (2004). Companies audited by KAP affiliated with the Big Four are assumed to have higher audit quality (value 1) than companies audited by non-Big Four KAP (value 0). Higher audit quality is expected to increase the effectiveness of supervision over management and reduce opportunistic practices, as stated by DeFond and Zhang (2014).

Managerial ownership is the proportion of company shares owned by management, both directors and commissioners who are directly involved in the company's decision-making, as explained by Saputra and Hidayat (2021). The greater the managerial ownership, the greater the management incentive to increase the company's value and avoid inefficient investment decisions, as stated by Fauzi and Rahman (2022). In this study, managerial ownership is formulated as: KM = Number of Shares Owned by Management / Total Shares Outstanding × 100%.

The size of the board of commissioners reflects the number of members of the board of commissioners who are tasked with carrying out the function of supervising the performance of the board of directors, as explained by Putri and Santoso (2022). The board of commissioners has an important role in ensuring that management decisions, including investment decisions, are carried out optimally and in line with the interests of shareholders. In this study, the size of the board of commissioners was measured by calculating the number of members of the board of commissioners listed in the company's annual report, as used by Zahra and Pearce (1989): UDK = Total Number of Members of the Board of Commissioners.

Profitability is the ability of a company to generate profits from the resources it has, as defined by Brigham and Houston (2019). In this study, profitability plays a role as a moderation variable that is suspected to be able to strengthen or weaken the influence of tax avoidance, audit quality, managerial ownership, and the size of the board of commissioners on investment efficiency. Profitability is measured using Return on Assets (ROA): ROA = Net Profit / Total Assets. The use of ROA is considered relevant for the asset-intensive shipping industry because it reflects the efficiency of the company's asset utilization, as explained by Penman (2013). The interaction variables are formed by multiplying the profitability value by each independent variable (ETR×ROA; LONG×; KM×LONG; UDK×ROA).

RESEARCH METHOD

Objects, Subjects, and Data Types

The research object in this study is the investment efficiency in shipping companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period. The subjects of the study are shipping companies that are officially listed as issuers on the IDX and are still active during the observation period. Shipping companies are chosen because of their capital-intensive industry characteristics so that investment decisions are very crucial and have the potential to cause investment efficiency problems, as explained by Biddle et al. (2009). The type of data

used is secondary quantitative data in the form of panel data obtained from the annual financial statements published through the official website of the IDX.

Sampling Techniques

The sampling technique uses the purposive sampling method, with the following criteria: (1) Shipping companies listed on the IDX and not delisted during the 2021–2024 period; (2) The Company publishes the annual financial statements in full and publicly accessible; (3) The company has data related to research variables such as tax information, auditors, managerial ownership structure, and the number of board of commissioners. The sample selection process is presented in Table 1.

Table 1. Research Sample Criteria

Sample Criteria	Number of Companies
Shipping Companies listed on the IDX	31
Companies that publish their financial statement data for the 2021–2024 period consistently	25
The company has complete data related to the variables used	25
Number of research observations (25 × 4 years)	100

Source: Researcher's Processing Results (2026)

Data Analysis Techniques

Data analysis techniques include: (1) Descriptive statistical analysis to describe the characteristics of research data; (2) The classical assumption test includes the normality test using Kolmogorov-Smirnov, the multicollinearity test using the Tolerance and VIF values, the heteroscedasticity test using Scatterplot, and the autocorrelation test using Durbin-Watson; (3) Multiple linear regression to test the direct influence of independent variables; and (4) Moderated Regression Analysis (MRA) to test the role of profitability moderation. Prior to MRA testing, dependent variables were transformed through Z-Scores, absolute values, and natural logarithms to produce LN_ABS_EI variables that met the normality assumptions.

The multiple linear regression model is formulated as follows:

$$EI = \alpha + \beta_1 TA + \beta_2 KA + \beta_3 KM + \beta_4 UDK + \varepsilon$$

While the MRA model is formulated as follows:

$$EI = \alpha + \beta_1 X + \beta_2 Z + \beta_3 (X \times Z) + \varepsilon$$

where EI is the investment efficiency, X is the independent variable, Z is profitability (ROA), X × Z is the interaction variable, and ε is the error term. The existence of the moderation effect is determined based on the significance of the coefficient of the interaction variable (β_3). The T test is used to test for partial influences, the F test to test simultaneous influences, and the determination coefficient (R^2) to measure the explanatory power of the model.

RESULTS AND DISCUSSION

Data Description

This study uses shipping sector companies listed on the IDX as the object of the study. This sector was chosen because it has an important role in distribution and trade activities, especially in archipelagic countries such as Indonesia. The operational activities of shipping

companies are closely related to considerable investment decisions, especially in fleet procurement, ship maintenance, and the development of supporting infrastructure. The number of samples used was 25 companies that met the research criteria with data for the period 2021 to 2024, resulting in 100 observations. The selection of the period aims to capture the dynamics of the company's performance after various changes in economic conditions after the COVID-19 pandemic.

Descriptive Statistical Analysis

Descriptive statistical analysis was carried out to provide an overview of the characteristics of the research data. Descriptive statistics present the minimum, maximum, mean, median, and standard deviation values of each research variable. The results of descriptive statistical analysis are presented in Table 2.

Table 2. Descriptive Statistical Analysis

Variable	N	Minimum	Maximum	Red	Std. Deviation	Median
YES.	100	-6,89	0,00	-0,3450	0,86681	-0,20
ETR	100	-4,34	2,01	0,0064	0,65641	0,035
OR	100	0,00	1,00	0,1700	0,37753	0,00
KM	100	0,00	0,63	0,0596	0,11995	0,00
UDK	100	2,00	6,00	2,8800	0,98760	3,00
LONG	100	-2,29	0,28	0,0055	0,26234	0,03
Valid N (listwise)	100					

Source: Researcher's Processing Results (2026)

Description: ETR = Tax Avoidance; KA = Audit Quality; KM = Managerial Ownership; UDK = Size of the Board of Commissioners; ROA = Profitability; EI = Investment Efficiency

The Investment Efficiency (EI) variable has an average value of -0.3450 with a standard deviation of 0.86681, indicating a fairly high variation between companies. A negative average value indicates that in general the sample companies still experience deviations from the optimal investment level. The minimum EI value of -6.89 is owned by PT Capitol Nusantara Indonesia Tbk (CANI) in 2024, which indicates that the company's investment decisions are far from the optimal investment level. On the other hand, the maximum value of 0.00 is owned by several companies, namely PT Tanah Laut Tbk (INDX) in 2021, 2022, and 2023, PT Pelayaran Nelly Dwi Putri Tbk (NELY) in 2023, and PT Rig Tenders Indonesia Tbk (RIGS) in 2022.

The Tax Avoidance variable proxied using the Effective Tax Rate (ETR) has an average value of 0.0064 or 0.64% with a median of 0.035 or 3.50%. The minimum ETR value of -4.34 occurred in PT Buana Artha Anugerah Tbk (BULL) in 2021, which shows that there are companies that record tax benefits that are greater than pre-tax profits. The maximum ETR value of 2.01 occurred at PT Tanah Laut Tbk (INDX) in 2021. The Audit Quality variable had

an average of 0.17, which means that about 17% of observations used the Big Four KAP. Managerial ownership has an average of 5.96% with a median of 0%, indicating that more than half of the sample companies have no managerial ownership. The maximum KM value of 63% is owned by PT Sidomulyo Selaras Tbk (SDMU) in 2021.

The size of the Board of Commissioners has an average of 2.88 members with a minimum of 2 and a maximum of 6 people. The maximum value is owned by PT Samudera Indonesia Tbk (SMDR) during the 2021–2024 period. Profitability (ROA) has an average of 0.55% with high variation (standard deviation of 26.23%). The minimum ROA value of -2.29 occurred at PT Capitol Nusantara Indonesia Tbk (CANI) in 2023, while the maximum value of 0.28 was owned by PT Samudera Indonesia Tbk (SMDR) in 2022 and PT Pelayaran Nelly Dwi Putri Tbk (NELY) in 2023.

Classical Assumption Test

Before hypothesis testing, the dependent variable is transformed through residual standardization using Z-Score, converted to an absolute value (Abs_EI), then transformed by natural logarithm to produce a LN_ABS_EI variable. This step aims to improve the distribution of data, reduce the level of skewness, and meet the assumption of normality so that the results of regression analysis become more valid and reliable.

Normality Test

The normality test was carried out using the One-Sample Kolmogorov-Smirnov Test. The test results on the MRA model are presented in Table 3.

Table 3. Test Normality with Moderation

Remarks	Value
N	75
Mean (Normal Parameters)	0,0000000
Std. Deviation (Normal Parameters)	0,82779813
Absolute (Most Extreme Differences)	0,084
Positive	0,084
Negative	-0,057
Test Statistic	0,084
Asymp. Sig. (2-tailed)	0,200
Monte Carlo Sig. (2-tailed)	0,210

Source: Researcher's Processing Results (2026)

Asymp value. Sig. (2-tailed) of 0.200 is greater than 0.05, so it can be concluded that the MRA model has met the residual normality assumption. Thus, the research model is feasible to use in subsequent hypothesis testing.

Multicollinearity Test

The multicollinearity test was carried out by looking at the values of Tolerance and Variance Inflation Factor (VIF). The regression model is declared free of multicollinearity

symptoms if the Tolerance value is > 0.10 and VIF is < 10. The test results are presented in Table 4.

Table 4. Multicollinearity Test with Moderation

Variable	Tolerance	VIVID
ETR	0,918	1,090
OR	0,491	2,035
KM	0,392	2,552
UDK	0,904	1,106
ETR_ROA	0,922	1,084
KA_ROA	0,769	1,301
KM_ROA	0,477	2,098
UDK_ROA	0,892	1,121

Source: Researcher's Processing Results (2026)

The entire VIF value is below 10 and the Tolerance value is above 0.10, with the highest VIF value being only 2.552 in the managerial ownership variable. Thus, the MRA model is free from the symptoms of multicollinearity and the entire regression coefficient can be reliably interpreted.

Heteroscedasticity test

Heteroscedasticity testing was performed by looking at the Scatterplot graph between the predictive value of the dependent variable (ZPRED) and its residual (SRESID). The test results are presented in Table 5.

Table 5. Summary of Heteroscedasticity Test Results

Models	Test Results	Conclusion
MRA (with moderation)	The data points are randomly spread, not forming a specific systematic pattern on the ZPRED vs SRESID Scatterplot chart	Heteroscedasticity-free

Source: Researcher's Processing Results (2026)

The data points are randomly spread and do not form a specific systematic pattern even though the addition of interaction variables (MRAs) has been made. Thus, the MRA model is proven to be free from heteroscedasticity problems.

Autocorrelation Test

The autocorrelation test used Durbin-Watson statistics. The model is declared free of autocorrelation if the Durbin-Watson value is between the range dU and (4-dU). The test results are presented in Table 6.

Table 6. Autocorrelation Test with Moderation

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
0,615	0,378	0,302	0,87653	2,314

Source: Researcher's Processing Results (2026)

The Durbin-Watson value of 2.314 is within the acceptable range to state that the MRA model is free of serious autocorrelation symptoms. With the fulfilment of all classical assumptions, the research model is declared valid and feasible for use in hypothesis testing.

Moderated Regression Analysis (MRA) and Hypothesis Testing

Hypothesis testing was carried out using an MRA model with LN_ABS_EI dependent variables. The test results are presented in Table 7.

Table 7. Moderated Regression Analysis (MRA)

Variable	B	Std. Error	Standardized Beta	t	Sig.
(Constant)	-1,390	0,381		-3,653	<0.001
ETR	-1,009	0,337	-0,303	-2,992	0,004
OR	-0,666	0,468	-0,197	-1,425	0,159
KM	1,744	3,267	0,083	0,534	0,595
UDK	-0,044	0,136	-0,033	-0,326	0,745
ETR_ROA	-17,706	8,612	-0,208	-2,056	0,044
KA_ROA	3,110	9,170	0,038	0,339	0,736
KM_ROA	-65,663	29,389	-0,314	-2,234	0,029
UDK_ROA	-0,642	0,178	-0,372	-3,617	<0.001

Source: Researcher's Processing Results (2026)

Description: ETR = Tax Avoidance; KA = Audit Quality; KM = Managerial Ownership; UDK = Size of the Board of Commissioners; ROA = Profitability

Based on the results of data processing, the following moderation regression equations were obtained:

$$\mathbf{LN\_ABS\_EI = -1{,}390 - 1{,}009ETR - 0.666KA + 1{,}744KM - 0.044UDK - 17{,}706(ETR \times LONG) + 3{,}110(LONG\times) - 65{,}663(KM \times LONG) - 0.642(UDK \times LONG) + \varepsilon}$$

4.5 F Test

Table 8. Test F

	Sum of Squares	df	Mean Square	F	Sig.
Regression	30,772	8	3,846	5,006	<0.001
Residual	50,708	66	0,768		
Total	81,480	74			

Source: Researcher's Processing Results (2026)

An F value of 5.006 with a significance of <0.001 (< 0.05) shows that simultaneously the variables ETR, KA, KM, UDK, and their moderation interaction variables have a significant effect on investment efficiency. This research model meets statistical requirements and is feasible for use in partial hypothesis testing.

Coefficient of Determination (R^2)

Table 9. Coefficient of Determination (R^2)

R	R Square	Adjusted R Square
0,615	0,378	0,302

Source: Researcher's Processing Results (2026)

The Adjusted R Square value of 0.302 shows that the variables ETR, KA, KM, UDK, and all moderation interaction variables are able to explain 30.2% of the variation in investment efficiency. Meanwhile, the remaining 69.8% is explained by other factors outside the model such as macroeconomic aspects, internal policies of the company, industrial structure, and other variables of company characteristics.

Discussion of Research Results

H1: The Effect of Tax Avoidance on Investment Efficiency

The results of the analysis showed a coefficient of B of -1.009 with a significance of 0.004, so that H1 was accepted. Tax avoidance has a positive and significant effect on investment efficiency. The lower the ETR (the higher the tax avoidance), the more efficient the company's investment rate. Theoretically, these results support the argument that tax savings are a strategic instrument to increase internal cash flow, so that companies have additional liquidity to fund investment projects that provide positive returns without having to face costly external funding constraints. Management's ability to manage tax burdens ultimately minimizes the risk of investment inefficiencies. This result is in line with the findings of Chen et al. (2010) who stated that companies with more intensive tax avoidance tend to have better investment efficiency due to the additional sources of internal funds that are ready to use, and supported by research by Desai and Dharmapala (2006) which stated that tax avoidance activities carried out correctly can increase the value of the company through cash flow efficiency. Nevertheless, Graham et al. (2014) state that tax avoidance can increase information asymmetry and Hanlon and Heitzman (2010) provide a critical note that long-term investment efficiency may be compromised if tax avoidance triggers legal uncertainty. In Indonesia, tax avoidance within the corridor of reasonable tax planning remains an effective managerial tool for capital efficiency, especially given the limited access to external funding for shipping companies.

H2: The Effect of Audit Quality on Investment Efficiency

A coefficient of B of -0.666 with a significance of 0.159 indicates that H2 is rejected. The quality of the audit does not have a significant effect directly on investment efficiency. This is possible because investment decisions are an internal strategic domain decided by management, while the auditor's main function is more focused on verifying the reliability of financial statements. Although auditors have a role to play in limiting opportunistic behavior, in the context of complex investment project selection, auditors often only give opinions on the fairness of the numbers, not on operational policies. In addition, the uniformity of audit quality among sample companies, where many companies use quality auditors as a governance standard, results in audit quality variables losing their discriminatory power. These results are in line with Ashbaugh-Skaife et al. (2007) and DeFond and Zhang (2014). On the other hand, Francis and Wang (2008) argue that high audit quality provides an incentive for management

to be more cautious in investment decision-making, but this effectiveness depends on the strength of the legal system in the research country.

H3: The Influence of Managerial Ownership on Investment Efficiency

A B coefficient of 1.744 with a significance of 0.595 indicates that H3 is rejected. Managerial ownership has no significant effect on investment efficiency. The relatively low level of managerial ownership (average of only 5.96%) results in the incentives perceived by managers not significant enough to change investment decision-making behavior. Managers may still have personal preferences in project selection that are not in line with maximizing the company's value. In addition, investment efficiency can be affected by other factors such as control of the board of commissioners or the capital market. These results are in line with Morck et al. (1988) who introduced an inverted U-shaped curve in the influence of managerial ownership. In corporate structures in Indonesia that are generally concentrated in a family or group of controlling shareholders, managerial ownership is often only a formality and not a major determining variable in strategic decision-making.

H4: The Effect of the Size of the Board of Commissioners on Investment Efficiency

A coefficient of B of -0.044 with a significance of 0.745 indicates that H4 is rejected. The size of the board of commissioners has no significant effect on investment efficiency. A board that is too large can cause coordination and free-rider problems so that there is no real improvement in efficiency. These findings imply that it is more important to pay attention to aspects of the competencies, special expertise, and independence of the members of the board of commissioners rather than simply focusing on the total number. These results are in line with Yermack (1996) and Eisenberg et al. (1998). In Indonesia, the size of the board is often determined by regulations or traditions of family companies, rather than by the need for supervisory efficiency, so the number of board members does not correlate with the quality of supervision in reviewing investment projects.

H5: The Role of Profitability in Moderating the Influence of Tax Avoidance

The interaction coefficient of ETR_ROA of -17.706 with a significance of 0.044 indicates that H5 is accepted. Profitability significantly moderates (strengthens) the influence of tax avoidance on investment efficiency. Companies with high profitability have better cash buffers, so tax savings can be directly allocated to productive projects without any liquidity barriers. Profitability also increases the legitimacy of tax strategies in the eyes of stakeholders, so tax avoidance practices are perceived as part of an efficient financial management strategy. These findings are in line with Richardson and Lanis (2007). On the other hand, Dyreng et al. (2010) argue that companies with high profitability are often subject to stricter supervision by tax authorities. However, in the Indonesian context, profitability serves as a catalyst that stabilizes managerial behavior and amplifies the positive impact of tax avoidance on investment efficiency.

H6: The Role of Profitability in Moderating the Influence of Audit Quality

A KA_ROA interaction coefficient of 3.110 with a significance of 0.736 indicates that H6 is rejected. Profitability does not moderate the relationship between audit quality and investment efficiency. This shows that the effectiveness of auditor supervision does not depend on the high or low profitability of the company. Auditors work based on fixed professional standards, regardless of the company's financial condition. When all sample companies use relatively uniform quality auditors, the audit quality variable loses its discriminatory power.

These findings are in line with DeFond and Zhang (2014) who stated that auditor supervision is more ex-post than ex-ante. In Indonesia, the decision to use high-quality auditors is often seen as a step to comply with capital market regulations (OJK), so that its influence is no longer dependent on the company's profitability.

H7: The Role of Profitability in Moderating the Influence of Managerial Ownership

The coefficient of KM_ROA interaction of -65.663 with a significance of 0.029 indicates that H7 is accepted. Profitability significantly moderates (strengthens) the influence of managerial ownership on investment efficiency. In conditions of high profitability, managers who also own shares have a greater incentive to maintain the sustainability of the company through efficient investments because the economic value of the shares they own becomes more valuable. The alignment of interests becomes even more pronounced when profitability is strong, as managers will tend to avoid high-risk or inefficient projects. These findings are in line with Kim and Lu (2011). High profitability also provides abundant internal resources, so managers who own shares can avoid dependence on external financing that contributes to investment efficiency through the prevention of underinvestment.

H8: The Role of Profitability in Moderating the Influence of Board of Commissioners Size

The UDK_ROA interaction coefficient of -0.642 with a significance of <0.001 indicates that H8 is accepted. Profitability significantly moderates (strengthens) the influence of the size of the board of commissioners on investment efficiency. The effectiveness of the supervisory board of commissioners is highly dependent on the company's financial performance. In high-profitability companies, the board of commissioners has more space and resources to carry out strategic oversight functions, so the resulting investment decisions tend to be more efficient. Highly profitable companies also tend to have more structured internal processes, including investment approval processes that involve the board of commissioners in more depth. These findings are in line with Adams and Ferreira (2007). Profitability is not only the final goal, but a prerequisite for the creation of effective corporate governance in suppressing investment inefficiency.

CONCLUSIONS

Based on the results of data analysis and hypothesis testing, this study concludes that tax avoidance has a positive and significant effect on the investment efficiency of shipping companies listed on the IDX for the 2021–2024 period, while audit quality (Sig. 0.159), the size of the board of commissioners (Sig. 0.745), and managerial ownership (Sig. 0.595) do not have a significant effect directly on investment efficiency. Profitability has been shown to moderate and strengthen the influence of tax avoidance (ETR_ROA, Sig. 0.044), managerial ownership (KM_ROA, Sig. 0.029), and the size of the board of commissioners (UDK_ROA, Sig. <0.001) on investment efficiency, but it has not been shown to moderate the relationship between audit quality and investment efficiency (KA_ROA, Sig. 0.736). The model was simultaneously shown to be significant (F = 5.006, Sig. <0.001) with an Adjusted R Square of 30.2%. These findings imply that for companies, taxation strategies should be managed as a strategic instrument to maintain investment liquidity and that any tax savings need to be reinvested into projects with long-term growth prospects; For the Board of Commissioners, a paradigm shift from administrative supervision to performance-based strategic supervision is

needed, especially when profitability declines; For investors, profitability should be used as the main filter in assessing the credibility of corporate governance; and for subsequent researchers, it is recommended to use the System Generalized Method of Moments (GMM) model to address the potential for endogeny, add macroeconomic variables as control variables, expand the scope of industrial sectors, and consider complementary qualitative approaches through interviews with senior management to explore the reasons behind investment decisions that cannot be explained by quantitative data alone.

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