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Tax Avoidance and Investment Efficiency: The Role of CFO Certification as Moderating Variable

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ABSTRACT

Investment efficiency reflects the extent to which a company is able to optimally allocate its resources to profitable projects that create added value; however, this efficiency can be disrupted when management engages in tax avoidance practices that create information asymmetry and divert resources from optimal investment decisions. This study aims to examine the effect of tax avoidance on investment efficiency, as well as to test whether the presence of a certified chief financial officer (CFO) is able to weaken that relationship in energy sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period. Unlike prior studies that have largely examined tax avoidance and investment efficiency as a direct relationship, this study incorporates CFO certification as a moderating variable, thereby offering new insight into the role of professional certification as a monitoring mechanism. This study employs a quantitative associative approach with a population of 91 companies. The sample was selected through purposive sampling, resulting in 17 companies with a total of 85 observations over five years of observation. Data were analyzed using panel data regression and Moderated Regression Analysis (MRA) with the assistance of EViews 13 software. The results show that tax avoidance has a significant effect on investment efficiency, while chief financial officer (CFO) certification does not moderate the relationship between tax avoidance and investment efficiency. This indicates that chief financial officer (CFO) certification has not been able to weaken the relationship between tax avoidance and investment efficiency in energy sector companies in Indonesia during the observation period.

Keywords: *Chief Financial Officer Certification; Investment Efficiency; Tax Avoidance.*

INTRODUCTION

Investment efficiency reflects a company's ability to manage and allocate its resources optimally so that the investments made generate benefits in line with the company's expectations (Damha & Kusumawati, 2025). Efficient investment reduces the likelihood of overinvestment and underinvestment, both of which can be detrimental to the company. Overinvestment occurs when a company invests excessively in less profitable projects, resulting in a negative net present value, while underinvestment occurs when a company fails to take advantage of investment opportunities that are actually profitable (Kuswara & Sari, 2022). One indicator commonly used to assess investment efficiency is the Incremental Capital Output Ratio (ICOR), where a lower value indicates greater investment efficiency. In Indonesia, the ICOR value fluctuated from 8,66 in 2021, declining to 6.02 in 2022, and rising again to 6,33 in 2023 (BPS, 2024), before decreasing to 4,00 in 2024 (Maran et al., 2025). Nevertheless, this figure remains higher than that of other ASEAN countries such as Vietnam, Thailand, and Malaysia, which range between 3 and 4, indicating that investment in Indonesia is still relatively inefficient (Yamani, 2022).

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This issue becomes increasingly important when examined in the context of the energy sector, which requires substantial capital to support its operational and business development activities. Data from BPS cited in Ahdiat (2026) show that the mining and quarrying sector, classified as the energy sector by the Indonesia Stock Exchange, experienced negative growth of -0.66% in 2025, in contrast to other sectors that continued to grow positively. The energy sector's contribution to national GDP also declined from 9.15% in 2024 to 8.75% in 2025. Furthermore, the realization of renewable energy investment in 2024 reached only USD 1.8 billion, far below the target of USD 2.6 billion (Institute for Essential Services Reform, 2025). These conditions indicate that investment in the energy sector has not yet generated optimal output, making the issue of investment efficiency in this sector still relevant for further research.

This issue can be explained through agency theory as the grand theory underlying this research. Agency theory describes the relationship between company owners as principals and managers as agents entrusted with the authority to manage the company, including investment decision-making Jensen & Meckling (1976) in Kuswara & Sari (2022); Sukarno et al. (2022). Differences in interests between the two parties may give rise to agency conflicts and information asymmetry, as managers generally have broader access to internal information than company owners. As a result, the investment decisions made by managers do not always reflect the best interests of shareholders (Sukarno et al., 2022). To further explain how funds generated from tax avoidance affect investment decisions, this study also employs free cash flow theory as a derivative of agency theory Jensen (1986) in Kuswara & Sari (2022). This theory explains that surplus company funds (free cash flow) should ideally be used to finance projects that increase firm value; however, in the absence of adequate oversight, such funds may be misused by managers to finance unprofitable investments.

Tax avoidance is one of the factors that may affect investment efficiency (Damha & Kusumawati, 2025), referring to a legal strategy to reduce the tax burden by taking advantage of loopholes in prevailing tax regulations (Widuri et al., 2020). According to free cash flow theory, tax savings have the potential to increase internal cash reserves that can support more optimal investment Jensen & Meckling (1976) in Kuswara & Sari (2022). This phenomenon is also reflected in Indonesia's relatively low tax-to-GDP ratio, recorded at 12% in 2023, lower than Malaysia, Thailand, and the Philippines, and below the Asia-Pacific regional average of 19.5% as well as the average of Organisation for Economic Co-operation and Development (OECD) member countries at 33.9% (OECD, 2025). On the other hand, the additional cash generated from tax avoidance also has the potential to intensify conflicts of interest between managers and company owners, as managers may use such funds for personal interests or invest in less profitable projects, thereby reducing investment efficiency (Sukarno et al., 2022).

Previous research on the effect of tax avoidance on investment efficiency has produced mixed findings. Previous studies on the effect of tax avoidance on investment efficiency show mixed results. Several studies found a negative effect, since funds saved from taxes are often misused by management for personal interests rather than the company's benefit (Firmansyah & Triastie (2020); Widuri et al. (2020); Sukarno et al. (2022); Damha & Kusumawati (2025); El-feky et al. (2024); Ajmal et al. (2025)). This supports agency theory, which explains that the separation of ownership and management creates conflicts of interest, giving management room to act for personal gain rather than optimal investment decisions. Other studies found a positive effect, as tax savings increase the internal funds available for investment (Ngelo et al. (2022); Lu et al. (2023)). This also aligns with agency theory, provided the company has strong enough oversight to ensure these funds serve shareholders' interests. Meanwhile, some studies found no significant effect (Rahayu et al. (2023); Hidayat et al. (2024)), suggesting that conflicts of interest do not always materialize when oversight is already effective in limiting management's misuse of funds. In this case, the lack of significance may indicate that the company's monitoring function is working well.

These conflicting results suggest that the effect of tax avoidance on investment efficiency may be influenced by other factors, one of which is the quality of decision-making by the chief financial officer (CFO). The CFO is responsible for designing tax strategies, managing cash flow, and determining the company's investment allocation (Harymawan et al., 2020). Notably, an overly dominant CFO tends to be conservative, which may push the company toward underinvestment (Chy & Buadi, 2025). CFO certification, such as Chartered Accountant, Certified Management Accountant, Certified Internal Auditor, Chartered Financial Analyst, and Certified Public Accountant, serves as an indicator of professional competence in finance, accounting, and professional ethics (Kuswara & Sari, 2022). From the perspective of agency theory, a certified CFO is expected to function as a monitoring mechanism that reduces conflicts of interest, thereby ensuring that financial decisions better reflect shareholders' interests. Several studies have demonstrated the relationship between CFO competence and the quality of investment decisions: CFO educational background has a positive effect on investment decisions (Gamat et al., 2022); higher education and certification make CFOs more selective and risk-averse (Harymawan et al., 2020); and CFO certification has been shown to weaken the negative effect of tax avoidance on investment efficiency (Kuswara & Sari, 2022). However, other studies have found that individual executive characteristics do not always have a significant effect on investment decisions (Luthfiah et al., 2024), indicating that the moderating role of CFO certification still warrants further investigation.

This issue becomes even more relevant given that the level of professional CFO certification ownership in Indonesia remains relatively low. Descriptive statistics from this study show that only 18.82% of the sampled energy sector companies have certified CFOs, while the remaining 81.18% do not, despite the fact that CFO qualifications have been proven to contribute to improved investment decision quality and firm value (Gamat et al., 2022). Although empirical studies specifically examining CFO certification as a moderating variable remain limited, this study is theoretically grounded in agency theory, which explains that a competent and certified CFO can function as an internal monitoring mechanism that reduces conflicts of interest between management and shareholders, thereby influencing how tax avoidance affects investment efficiency. This theoretical basis is further supported by prior empirical evidence showing that CFO competence and certification are associated with better investment decision quality (Gamat et al. (2022); Harymawan et al. (2020)) and can weaken the negative effect of tax avoidance on investment efficiency (Kuswara & Sari, 2022), which together provide sufficient grounds to justify examining CFO certification as a moderating variable in this study.

Based on this discussion, two research gaps remain to be addressed. First, research examining the effect of tax avoidance on investment efficiency with CFO certification as a moderating variable remains relatively limited, particularly in the energy sector in Indonesia. Second, the findings of previous studies on the moderating role of CFO certification remain inconsistent. Unlike previous studies, which generally only examined the direct relationship between tax avoidance and investment efficiency, this study incorporates CFO certification as a moderating variable in the context of energy sector companies in Indonesia. Based on this phenomenon and these research gaps, this study aims to analyze the effect of tax avoidance on investment efficiency and to examine whether CFO certification strengthens or weakens this effect in energy sector companies listed on the Indonesia Stock Exchange during the 2020-2024 period.

HYPOTHESIS DEVELOPMENT

The Effect of Tax Avoidance on Investment Efficiency

Tax avoidance can be explained through agency theory, which states that the separation between ownership and management creates information asymmetry, giving management more room to decide how company funds are used. This condition opens up the possibility for managers to use tax-saving funds for personal interests rather than for investments that benefit shareholders, thereby reducing investment efficiency, as shown in the studies of Sukarno et al. (2022), Widuri et al. (2020), El-feky et al. (2024), and Ajmal et al. (2025). On the other hand, tax avoidance can also be explained through free cash flow theory, which states that a lower tax burden increases a company's internal cash flow, providing additional funds to finance investments without relying on external financing (Jensen & Meckling (1976), in Sukarno et al. (2022). When these funds are managed properly and directed to profitable projects, tax avoidance can actually improve investment efficiency (Ngelo et al. (2022); Lu et al. (2023)). In other words, agency theory as the grand theory of this study explains the risk of tax avoidance being misused by management, while free cash flow theory supports this by showing that tax avoidance can also improve investment efficiency when the funds are well managed. Based on this explanation, the first hypothesis is formulated as follows:
H1: Tax avoidance is presumed to affect investment efficiency.

The Role of CFO Certification in Moderating the Effect of Tax Avoidance on Investment Efficiency

CFOs with professional certification demonstrate a high level of competence and integrity in the fields of finance, auditing, and taxation (Kuswara & Sari, 2022). Based on agency theory, this competence allows a certified CFO to function as an internal control mechanism that reduces conflicts of interest between owners and managers. A certified CFO is more capable of evaluating investment projects objectively and is bound by stronger professional ethics, making them less likely to allow tax-saving funds to be used for opportunistic purposes. As a result, funds generated from tax avoidance are more likely to be channeled toward productive investments rather than misused for managers' personal interests, as explained by Habib & Hossain (2013) in Kuswara & Sari (2022). This mechanism explains why CFO certification is expected to weaken the negative effect of tax avoidance on investment efficiency, a pattern empirically supported by Kuswara & Sari (2022), whose findings show that CFO certification weakens this negative effect. This is further reinforced by Gamat et al. (2022), who found that CFO educational background has a positive effect on investment decisions, as well as Harymawan et al. (2020), who showed that certified CFOs tend to be more risk-averse, thereby encouraging more efficient use of funds. In other words, agency theory strengthens this argument by explaining that CFO certification serves as a monitoring mechanism that limits managers' discretion over tax-saving funds, reducing the agency conflict that tax avoidance can otherwise create. Based on this explanation, the second hypothesis is formulated as follows:
H2: CFO certification is presumed to weaken the effect of tax avoidance on investment efficiency.

Based on the background description, theoretical review, and previous research, the framework for this study is as follows:

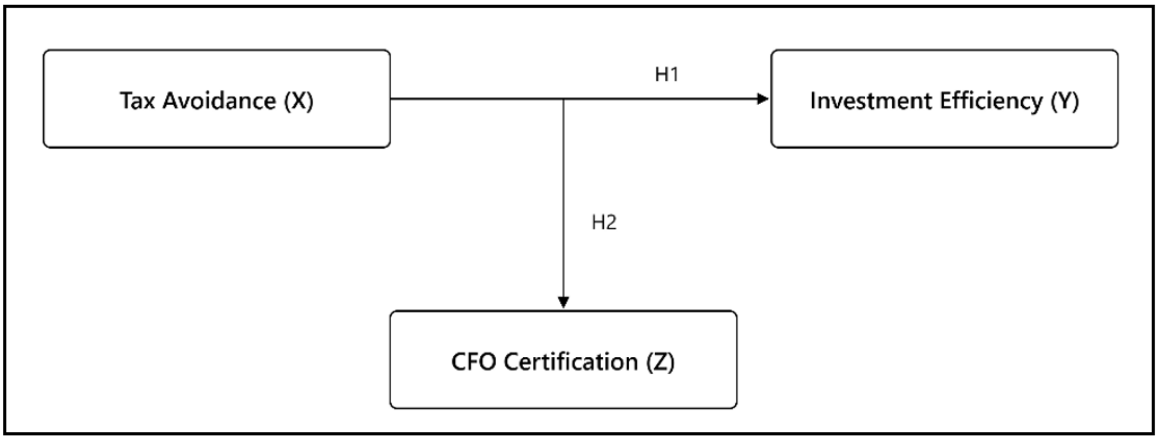

Figure 1. Conceptual Framework

METHODS, DATA, AND ANALYSIS

Three variables make up this research: one independent variable, one dependent variable, and one moderating variable. X (tax avoidance) serves as the independent variable in this research. Y (investment efficiency) is the dependent variable here. Z (CFO certification), meanwhile, serves as the study's moderating variable. Table 1 details the study's operational variables:

Table 1 Research Variable Operations

Variable	Variable Type	Indicator	Scale
Investment Efficiency (Y)	Dependent	INVEST = β0 + β1MTBi,t-1 + β2SGi,t-1 + β3FCFi,t + β4LEVi,t-1 + β5LOGSALEi,t-1 + εi,t Model Huang (2020) in Ngelo et al. (2022)	Ratio
Tax Avoidance (X)	Independent	Cash Effective Tax Rate (CETR) = Cash Paid for Taxes / Pre-Tax Income (Kuswara & Sari, 2022)	Ratio
CFO Certification (Z)	Moderating	Dummy: 1 = certified CFO (CA/CPA/CFA); 0 = uncertified (Kuswara & Sari, 2022)	Nominal

Source: Data processed by the author (2026)

Data collection in this study was carried out using literature review and documentation methods. The literature review was conducted to build the theoretical framework underlying this research, particularly agency theory, tax avoidance, investment efficiency, and CFO certification, as well as to support the formulation of hypotheses. The literature collected consisted of academic journal relevant to tax avoidance and investment efficiency, and prior studies with similar research topics, which were used as references and comparisons for the research gap and hypothesis development.

The documentation method was carried out by collecting secondary data in the form of annual reports and financial statements of energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. These documents were obtained by downloading them directly from the official IDX website (www.idx.co.id) and the official websites of each sampled company. The data collected included financial statement items required to calculate the Cash Effective Tax Rate (CETR), investment efficiency, and CFO certification status, which were then tabulated for further processing.The data were then analyzed using descriptive statistics, classical assumption tests, panel data regression analysis, and

Moderated Regression Analysis (MRA) with the assistance of Eviews 13. The sampling technique used in this study is purposive sampling, in which the sample is selected based on predetermined criteria to ensure that its characteristics are representative of the population under study. Table 2 presents the criteria used in selecting the sample for this research:

Table 2. Research Sample Criteria

No	Criteria	Number of companies	
		Does Not Meet The Criteria	**Meet The Criteria**
	Initial population:		**91**
1	Energy sector companies listed on the IDX during the 2020–2024 research period	(31)	**60**
2	Energy sector companies that generated profits (did not experience losses) during the 2020–2024 research period	(33)	**27**
3	Energy sector companies with positive total equity during the 2020–2024 research period	(1)	**26**
4	Energy sector companies with positive operating cash flow during the 2020–2024 period	(5)	**21**
5	Companies that presented complete data related to all research variables during the 2020–2024 period	(4)	**17**
Research Period (Years)			**5**
Number of Companies Sampled			**17**
Total Research Data over 5 Years (17 × 5)			**85**

Source: Data processed by the author (2026)

RESULTS AND DISCUSION

Results

Descriptive Statistics Test

Table 3. Results of the Descriptive Statistics Test

	Y_EI	X_TA	Z_SC
Mean	0.063612	0.239356	0.188235
Median	0.066514	0.173588	0.000000
Maximum	0.136448	0.908013	1.000000
Minimum	-0.057678	7.1e-05	0.000000
Std. Dev.	0.033076	0.229159	0.393220
Skewness	-0.920257	0.949195	1.595113
Kurtosis	5.319027	2.968069	3.544384
Jarque-Bera	31.04403	12.76736	37.09503
Probability	0.000000	0.001689	0.000000
Sum	5.407002	20.34524	16.00000
Sum Sq. Dev.	0.091895	4.411163	12.98824
Observations	85	85	85

Source: Eviews 13 Output (data processed by the author, 2026)

Based on the results of the descriptive statistics test, this study used 85 observational data points for each variable. The investment efficiency variable (Y) has a mean value of 0,063612, with a maximum value of 0,136448 (PT Petrosea Tbk. or PTRO, 2021) and a minimum value of -0,057678 (PT Baramulti Suksessarana Tbk. or BSSR, 2021), as well as a standard deviation of 0,033076. The tax avoidance variable (X) has a mean value of 0,239356, with a maximum value of 0,908013 (PT AKR Corporindo Tbk. or AKRA, 2024) and a minimum value of 0,000071 (PT Energi Mega Persada Tbk. or ENRG, 2021), as well as a standard deviation of 0,229159. Meanwhile, the CFO certification variable (Z), measured using a dummy variable, has a mean value of 0,188235, indicating that only 18,82% of the sample companies had certified CFOs, while the remaining 81,18% did not; a median value of 0 confirms that the majority of sample companies did not have certified CFOs, with a standard deviation of 0,393220.

Estimation and Selection of Panel Data Regression Models

Table 4. Results of Panel Data Regression Model Selection

No	Test	Model Comparison	Result	Decision
1	Chow Test	CEM vs FEM	Prob. 0,0000 < 0,05	FEM
2	Hausman Test	FEM vs REM	Prob. 0,7323 > 0,05	REM
3	Lagrange Multiplier Test	CEM vs REM	Prob. 0,0000 < 0,05	REM

Source: Eviews 13 Output (data processed by the author, 2026)

Based on the summary table above, the Chow Test shows that FEM is more appropriate than CEM, while the Hausman Test shows that REM is more appropriate than FEM. Since the two tests produced different selected models, the Lagrange Multiplier Test was subsequently conducted and showed that REM is more appropriate than CEM. Therefore, the Random Effect Model (REM) was established as the best model and used in the hypothesis testing of this study.

Classical Assumption Test

Normality Test

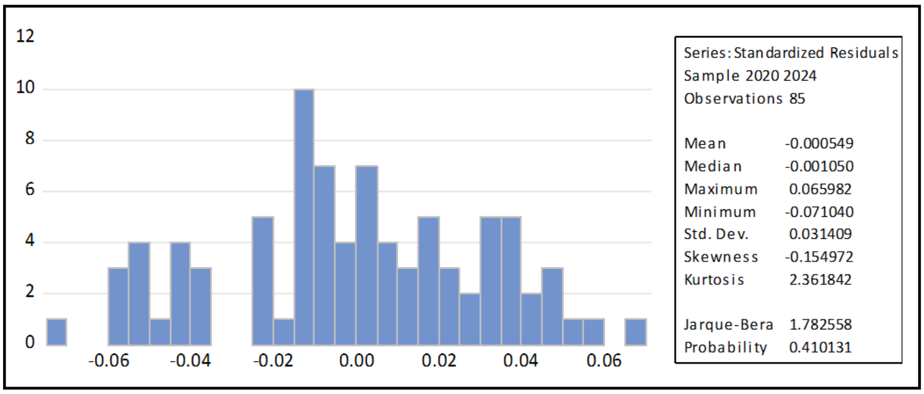

Figure 2. Results of the Normality Test
Source: Eviews 13 Output (data processed by the author, 2026)

The results of the normality test show a Jarque-Bera probability value of 0,410131, while the significance level used is 0,05. Since this probability value is greater than the significance level (0,410131 > 0,05), it can be concluded that the data in this study are normally distributed.

Multicollinearity Test

Table 5. Results of the Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.62E-05	2.137703	NA
X_TA	0.000258	2.298683	1.092550
Z_SC	8.76E-05	1.345895	1.092550

Source: Eviews 13 Output (data processed by the author, 2026)

The multicollinearity test table above shows a Centered VIF value of 1,092550 for the tax avoidance variable (X_TA) and 1.092550 for the CFO certification variable (Z_SC). Both values are below the threshold of 10 (1,092550 < 10), indicating that the regression model in this study does not experience multicollinearity problems among the independent variables.

Heteroscedasticity Test

Table 6. Results of the Heteroscedasticity Test (Breusch-Pagan-Godfrey)

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	2.045070	Prob. F(2,82)	0.1359
Obs*R-squared	4.038347	Prob. Chi-Square(2)	0.1328
Scaled explained SS	7.882831	Prob. Chi-Square(2)	0.0194

Source: Eviews 13 Output (data processed by the author, 2026)

The results of the heteroscedasticity test using the Breusch-Pagan-Godfrey method show an Obs*R-squared probability value of 0,1328, which is above the significance level of 0,05 (0,1328 > 0,05). Therefore, the regression model in this study is free from heteroscedasticity problems.

Autocorrelation Test

Table 7. Results of the Autocorrelation Test

R-squared	0.088221	Mean dependent var	0.031415
Adjusted R-squared	0.065983	S.D. dependent var	0.026818
S.E. of regression	0.025918	Sum squared resid	0.055084
F-statistic	3.967041	Durbin-Watson stat	1.849076
Prob(F-statistic)	0.022671		

Source: Eviews 13 Output (data processed by the author, 2026)

The results of the autocorrelation test show a Durbin-Watson value of 1,849076, which falls within the range of -2 to +2 (-2 < 1,849076 < +2). Therefore, the regression model in this study does not experience autocorrelation problems.

Panel Data Linear Regression Analysis Test

Table 8. Panel Data Linear Regression Analysis Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.052887	0.007096	7.453350	0.0000
X_TA	0.045942	0.016572	2.772359	0.0069
Z_SC	-0.001444	0.011216	-0.128765	0.8979

Source: Eviews 13 Output (data processed by the author, 2026)

The panel data regression equation model in this study is as follows: $Y = \alpha + \beta 1X1 + \beta 2X2 + \varepsilon$. Then, this equation is substituted based on the Table 8. The resulting regression equation is as follows:

$$\mathbf{Y\_EI = 0{,}052887 + 0{,}045942\ X\_TA + (-0{,}001444)\ Z\_SC + \varepsilon}$$

The constant value obtained is 0,052887, which means that if tax avoidance and CFO certification are 0, then the value of investment efficiency is 0,052887. The regression coefficient value for the tax avoidance variable is 0,045942, meaning that if tax avoidance increases by 1 unit, it will increase the value of investment efficiency by 0,045942 units, assuming that other independent variables remain constant. The positive sign indicates a direct relationship between the tax avoidance variable and the investment efficiency variable. The regression coefficient value for the CFO certification variable is -0,001444, meaning that if CFO certification decreases by 1 unit, it will reduce investment efficiency by 0,001444 units, assuming that the values of other independent variables remain constant. The negative sign indicates an inverse relationship between the CFO certification variable and the investment efficiency variable.

Hypothesis Testing

F-Test (Simultaneous Test)

Table 9. Results of the F-Test (Simultaneous Test)

R-squared	0.088221	Mean dependent var	0.031415
Adjusted R-squared	0.065983	S.D. dependent var	0.026818
S.E. of regression	0.025918	Sum squared resid	0.055084
F-statistic	3.967041	Durbin-Watson stat	1.849076
Prob(F-statistic)	0.022671		

Source: Eviews 13 Output (data processed by the author, 2026)

Based on the results of the F-test presented in the table above, the F-table value was obtained using df1 (numerator) = k = 2 and df2 (denominator) = n − k − 1 = 85 − 2 − 1 = 82, resulting in an F-table value of 3,11. The calculated F-value of 3,967041 is greater than the F-table value (3,967041 > 3,11), with a probability value of the calculated F of 0,022671, which is smaller than 0,05 (0,022671 < 0,05). Therefore, H0 is rejected, and it can be concluded that the variables of tax avoidance (X_TA) and CFO certification (Z_SC) simultaneously have a significant effect on investment efficiency (Y_EI).

t-Test (Partial Test)

Table 10. Results of the t-Test (Partial Test)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.052887	0.007096	7.453350	0.0000
X_TA	0.045942	0.016572	2.772359	0.0069
Z_SC	-0.001444	0.011216	-0.128765	0.8979

Source: Eviews 13 Output (data processed by the author, 2026)

From the results of the t-test presented in the table above, the t-table value obtained (α/2; n − k − 1 = 0,05/2; 85 − 2 − 1 = 82) is 1,98932. The results of the t-test can be explained as follows. Tax avoidance (X_TA) has a t-statistic value of 2,772359 with a probability of 0,0069. This t-statistic value is greater than the t-table value (2,772359 > 1,98932), with a probability smaller than 0,05 (0,0069 < 0,05), so it can be concluded that tax avoidance has a significant effect on investment efficiency. CFO certification (Z_SC) has a t-statistic value of -0,128765 with a probability of 0,8979. This t-statistic value is smaller than the t-table value (-0,128765 < 1,98932), with a probability greater than 0,05 (0,8979 > 0,05), so it can be concluded that CFO certification does not have a significant effect on investment efficiency.

Coefficient of Determination (R^2)

Table 11. Coefficient of Determination

R-squared	0.088221	Mean dependent var	0.031415
Adjusted R-squared	0.065983	S.D. dependent var	0.026818
S.E. of regression	0.025918	Sum squared resid	0.055084
F-statistic	3.967041	Durbin-Watson stat	1.849076
Prob(F-statistic)	0.022671		

Source: Eviews 13 Output (data processed by the author, 2026)

Based on the coefficient of determination results shown in the table above, the Adjusted R-squared value obtained is 0,065983. This value indicates that the tax avoidance and CFO certification variables are able to explain 6,59% of the variation in investment efficiency, while the remaining 93,41% is explained by other variables outside this research model.

Moderated Regression Analysis (MRA) Test

Table 12. Results of the Moderated Regression Analysis (MRA) Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.053310	0.007059	7.552177	0.0000
X_TA	0.043765	0.018111	2.416526	0.0179
Z_SC	-0.004480	0.017817	-0.251472	0.8021
X_TA_Z_SC	0.009430	0.040388	0.233485	0.8160

Source: Eviews 13 Output (data processed by the author, 2026)

Based on the table presented above, the regression equation with the moderating variable can be formulated as follows:

$$\boxed{\mathbf{Y\_EI = 0.053310 + 0.043765\ X\_TA + (-0.004480)\ Z\_SC + 0.009430\ X\_TA\_Z\_SC} + \varepsilon}$$

The following is the interpretation of the MRA equation above. The constant value of 0,053310 indicates that if all independent variables are equal to zero, investment efficiency is 0,053310. The tax avoidance coefficient value (X_TA) of 0,043765 indicates that every one-unit increase in CETR will increase investment efficiency by 0,043765, assuming other variables remain constant; the probability value of X_TA is 0,0179, which is smaller than the significance level α = 0,05 (0,0179 < 0,05), so tax avoidance has a significant effect on investment efficiency. The CFO certification coefficient value (Z_SC) of -0,004480 indicates that every one-unit increase in CFO certification will decrease investment efficiency by 0,004480, assuming other variables remain constant; the probability value of Z_SC is 0,8021, which is greater than the significance level α = 0,05 (0,8021 > 0,05), so CFO certification does not have a significant effect on investment efficiency. The interaction coefficient value of tax avoidance and CFO certification (X_TA_Z_SC) of 0,009430 indicates that CFO certification has a positive moderating direction on the relationship between tax avoidance and investment efficiency. However, the probability value of 0,8160 is greater than the significance level α = 0,05 (0,8160 > 0,05), so CFO certification is not able to significantly moderate the relationship between tax avoidance and investment efficiency.

DISCUSSION

The Effect of Tax Avoidance on Investment Efficiency

The results of the first hypothesis test indicate that tax avoidance has a statistically significant effect on investment efficiency, thus H1 is accepted. This finding shows that an increase in the CETR value contributes to an increase in the company's investment efficiency. Given that CETR is inversely related to the level of tax avoidance, this result indicates that the lower the level of tax avoidance conducted by a company, the higher its investment efficiency. This condition shows that companies with a better level of tax compliance tend to be able to manage resources more optimally, resulting in more efficient investment decisions, as they are less prone to both overinvestment and underinvestment. This finding is consistent with agency theory and free cash flow theory, which together explain that funds generated through aggressive tax avoidance tend to increase information asymmetry and conflicts of interest between management and shareholders, opening opportunities for managers to divert internal cash toward less profitable projects rather than value-adding investment. Conversely, companies that are more transparent and compliant with their tax obligations tend to have better governance and closer oversight, which limits managers' discretion over free cash flow and enables them to make investment decisions that are closer to the optimal level. This result is consistent with the findings of Damha & Kusumawati (2025), Kuswara & Sari (2022), Sukarno et al. (2022), Widuri et al. (2020), Firmansyah & Triastie (2020), and El-feky et al. (2024), but differs from Rahayu et al. (2023) and Hidayat et al. (2024), who did not find a significant effect between tax avoidance and investment efficiency; this difference is presumably due to differences in sample characteristics, industry sectors, or the research periods used.

CFO Certification Weakens the Effect of Tax Avoidance on Investment Efficiency

The results of the second hypothesis test indicate that CFO certification is unable to weaken the effect of tax avoidance on investment efficiency, thus H2 is rejected. Although the interaction term points in a positive direction, this effect is not statistically significant. This finding indicates that the presence of a certified CFO has not been able to exert a sufficiently strong influence to alter the relationship between tax avoidance and investment efficiency in energy sector companies, contrary to what agency theory would predict. From the perspective of agency theory, CFO certification is theoretically expected to serve as a monitoring mechanism that reduces agency problems between managers and shareholders, since a certified CFO is assumed to possess greater competence and professional integrity in overseeing the use of corporate resources. However, the results of this study suggest that certification alone is not sufficient to strengthen this monitoring function, as investment decisions are fundamentally shaped by the agency relationship between the CEO, as the primary agent, and shareholders, as the principal, while the CFO, even when certified, typically functions only as a provider of information and recommendations rather than as the final decision-maker.

Given this limited authority, CFO certification does not automatically reduce the information asymmetry or conflicts of interest that lie at the core of agency problems, meaning that the potential for CEOs to exercise discretionary power over investment decisions persists even when the firm has a certified CFO. This condition is presumably also due to the fact that companies' investment efficiency is likely determined more by other factors outside this research model, as well as the relatively small proportion of sample companies with a certified CFO, so that the expected moderating effect has not been significantly observed. Beyond this limited proportion of certified CFOs, several other explanations may account for the non-significant moderating role found in this study. First, holding a professional certification does not necessarily reflect the extent of a CFO's actual authority over investment decisions. Harymawan et al. (2020) note that a CFO's core task is essentially to compile financial data and provide recommendations to the CEO, so that the final investment decision ultimately rests with the CEO rather than with the CFO. Chy & Buadi (2025) similarly find that a CFO's influence on investment decisions depends heavily on how much power the CFO actually holds within the firm, with an overly powerful CFO tending toward excessive conservatism and underinvestment rather than more efficient outcomes.

Second, this study measures CFO certification with a simple dummy variable that only captures whether a certification is held, without distinguishing the level of competence or the type of certification obtained. This differs from Gamat et al. (2022), who used CFO educational background as an alternative proxy and found a significant effect on investment decisions, suggesting that the choice of proxy for CFO competence can meaningfully shape the conclusions drawn. Third, investment efficiency is plausibly driven more by a company's internal financing conditions than by the individual characteristics of its CFO. Ngelo et al. (2022) and Lu et al. (2023) show that the availability of internal funds and financing constraints are important determinants of investment efficiency, while Widuri et al. (2020) explain that high information asymmetry can push firms toward both underinvestment and overinvestment, regardless of the competence of the individual decision-maker.

Taken together, these explanations suggest that the non-significant moderating role of CFO certification found in this study does not merely reflect the small number of certified CFOs sampled, but may also stem from the limited scope of CFO authority, the limitations of a dummy-based competence measure, and the more dominant influence of firms' internal financial conditions. On this basis, CFO certification cannot yet be regarded as a factor capable of weakening the effect of tax avoidance on investment efficiency among energy sector companies. This result is consistent with the findings of Luthfiah et al. (2024), who found that CFO education and certification do not affect corporate investment decisions, but differs from that of Gamat et al. (2022), who found that CFO educational background affects investment decisions and firm value.

CONCLUSION AND SUGGESTION

This study aims to analyze the effect of tax avoidance on investment efficiency and the moderating role of CFO certification in energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The results of the first hypothesis test indicate that tax avoidance has a positive and significant effect on investment efficiency, thus H1 is accepted. Companies with lower levels of tax avoidance tend to have higher investment efficiency, which indicates that tax compliance is aligned with better corporate governance, thereby reducing agency conflicts and encouraging more rational investment decisions. Meanwhile, the results of the second hypothesis test show that CFO certification is unable to moderate the effect of tax avoidance on investment efficiency, thus H2 is rejected. This finding indicates that among the energy sector companies sampled in this study, the presence of a certified CFO has not been proven to be a sufficiently strong factor in influencing the relationship between tax avoidance and investment efficiency.

This study has several limitations that should be noted. The Adjusted R-squared value of 6.59% indicates that there are still many other variables outside the model that affect investment efficiency, such as financial reporting quality, debt maturity, profitability, and corporate governance. In addition, the measurement of CFO certification using only a dummy variable has not fully reflected the CFO's overall competence, and the sample, limited to 17 energy sector companies, means that the results of this study cannot yet be generalized to other sectors. Based on these limitations, future research is recommended to add other variables that may potentially affect investment efficiency in order to improve the model's explanatory power. The measurement of CFO competence could also be expanded by considering other proxies, such as work experience, level of education, or professional background.

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