

The Influence of Debt Maturity and Environmental Social Governance on Investment Efficiency

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Abstract

Purpose – This study aims to demonstrate the influence of Debt Maturity and Environmental Social Governance (ESG) on Investment Efficiency in mining companies listed on the Indonesia Stock Exchange (IDX) for the 2022-2025 period.

Methodology – This study employed a quantitative method with an associative approach. The population in this study was mining companies listed on the IDX. Through purposive sampling, a sample of 23 companies was obtained, with a total of 92 observations. The data analysis method used multiple linear regression analysis, processed using SPSS version 25 software.

Findings – The results of the study indicate that: (1) Debt Maturity has a negative and significant effect on Investment Efficiency, with a calculated t-value of -7.781 and a significance level of $0.000 < 0.05$. (2) Environmental Social Governance (ESG) has an effect on Investment Efficiency, with a calculated t-value of 2.183 and a significance level of $0.032 > 0.05$. Simultaneously (F-test), all variables had a significant effect, with an F-value of 17.790.

Limitations – This study is limited by the sample size, which focused only on the mining sector, and by the fact that several companies did not publish complete ESG reports during the study period.

Future research agenda – Future researchers are advised to expand the research object to other sectors or add other independent variables, such as audit quality or audit committees, which may have a stronger influence on investment efficiency.

Keywords: Debt Maturity, ESG, and Investment Efficiency.

Introduction

The mining sector is one of the sectors that requires the most investment. Therefore, a mining company requires investment efficiency in its operations. Investment efficiency is a key indicator in assessing a company's ability to utilize its assets and capital to generate optimal profits. Therefore, to achieve investment efficiency, companies need to improve themselves and consider several factors before making investment decisions. A comprehensive study of various factors influencing investment efficiency is required, such as debt maturity, environmental and social governance (ESG), leverage, and firm size.

According to data from companies listed on the Indonesia Stock Exchange (IDX), many companies in the mining sector have not yet implemented optimal investment efficiency, especially in the post-pandemic environment. This research is urgent due to the suboptimal investment efficiency of mining companies. Therefore, it is hoped that this research will encourage increased investment efficiency in mining companies. Furthermore, as we are currently facing the post-recovery period from the COVID-19 pandemic, many mining companies are also experiencing a decline in investment efficiency, resulting in many mining companies not achieving optimal profits.

Based on the background outlined above, the problem in this research relates to the suboptimal investment efficiency in the mining sector, with influencing factors being debt

maturity and environmental social governance. The decline in investment efficiency that is the main focus of this study is in 2023, where in this year the investment efficiency of the mining sector decreased drastically until 2024. Therefore, this study was conducted to determine the influence of debt maturity, Environmental Social Governance, leverage, and Firm Size simultaneously on investment efficiency in mining sector companies listed on the IDX for the period 2021-2024.

Literature review

Agency Theory

The theory used in this study is agency theory. Agency theory is the agency relationship between a company and its shareholders, or the company's responsibility to investors. Agency theory explains the contractual relationship between principals (capital owners or shareholders) and agents (managers or company administrators), where the principal authorizes the agent to manage the company in their own interests (Barli, 2018; Kimsen et al., 2019). However, in practice, conflicts of interest often arise due to differing goals between the two parties. Principals focus on increasing company value and efficiency, while agents tend to pursue personal interests such as bonuses or short-term profits.

Based on the aforementioned agency theory, the interrelationship between the dependent variable, namely investment efficiency, occurs when investment decision-making is not managed properly, triggering a conflict of interest between company management (agents) and shareholders (principals). This conflict is initiated by information asymmetry, where management has greater information than the company owners. This condition allows management to make investment decisions that are not fully oriented towards increasing company value, which can lead to investment inefficiencies in the form of overinvestment or underinvestment. According to agency theory proposed by Husnan and Pudjiastuti (2015), conflicts of interest between company owners and management can arise due to information asymmetry in corporate decision-making. Shareholders expect management to allocate funds optimally to maximize company value, while management potentially has personal interests in investment decision-making (Jensen and Meckling, 1976).

Debt Maturity

Within the framework of agency theory, decisions regarding debt maturity are closely related to controlling management behavior. According to Harjito and Martono (2014), a company's debt structure is not only determined by the amount of debt but also by its repayment period. Long-term debt tends to provide management with greater flexibility in managing company funds because payment pressures do not occur in the short term. This situation can increase the potential for agency conflicts due to reduced oversight from creditors. Sutikno (2019) also emphasized that debt maturity policy is part of a financial strategy aimed at maintaining a balance between debt burden and long-term investment needs. Based on the explanation above, it can be concluded that the longer a company's debt maturity, the lower its investment efficiency. This is in line with research conducted by Desi Indriyani (2024), which found that debt maturity negatively impacts investment efficiency. Therefore, the hypothesis proposed in this study is:

H1: Debt maturity negatively impacts investment efficiency

Environmental, Social, and Governance (ESG)

Environmental, Social, and Governance (ESG) in agency theory is viewed as a governance mechanism aimed at controlling management behavior. Effendi (2016) states that the application of good corporate governance principles emphasizes transparency, accountability, and management responsibility to company owners. In the context of modern business development, ESG practices reflect companies' efforts to increase information disclosure and oversight, thereby reducing information asymmetry and suppressing conflicts of interest between agents and principals. Research by Huwaidah and Syafruddin (2025) on ESG disclosure and financial reporting quality found that both variables had a positive and significant effect on investment efficiency. Using purposive sampling and obtaining 108 samples, the study also showed that ESG and other control variables simultaneously had a significant effect on investment efficiency. Meanwhile, research conducted by Sulistyowati and Wahyudi (2024) on non-financial sector companies showed that ESG reporting in aggregate had a significant effect on investment efficiency. However, when analyzed separately for each of the environmental, social, and governance pillars, the effect was insignificant. Based on these two studies, it can be concluded that overall ESG disclosure makes a significant contribution to improving corporate investment efficiency. Although the influence of each pillar individually is not always significant, implementing ESG as a whole has been shown to support more optimal investment decision-making and improve resource management effectiveness. Therefore, the hypothesis proposed in this study is:

H2: Environmental and Social Governance has a positive effect on investment efficiency.

From the results of the explanation of the relationship between the independent variables and the dependent variables above, the research model of this study is as follows:

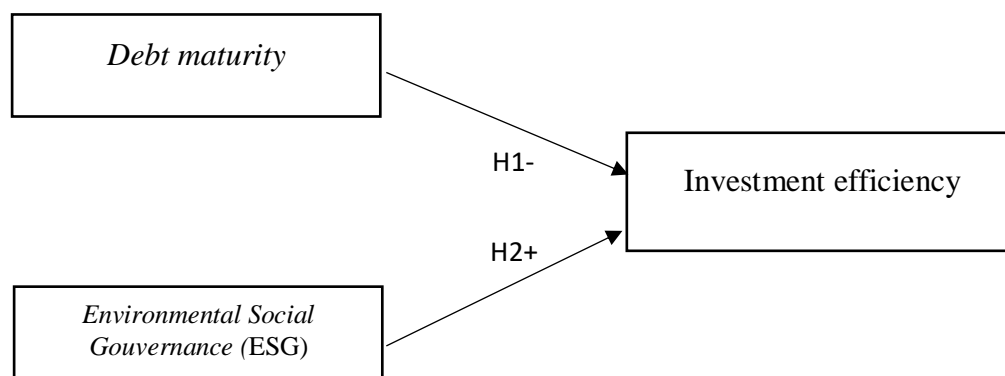


Figure 1. Research Model

Research methods

Research Type

This study uses a quantitative approach because the data analyzed are numerical, such as debt maturity and ESG scores, as well as investment efficiency results. A quantitative approach was chosen to allow for objective statistical analysis. This research is associative in nature because the focus is on assessing the influence or relationship between variables.

Population

The research population is a group of people or objects used in the study. In this study, the research object is the mining sector listed on the Indonesia Stock Exchange (IDX) for the period 2021-2024. Therefore, the population of this study is 75 mining companies listed on the IDX for the period 2021-2024.

Research Sample

In this study, the sample was drawn using a purposeful sampling technique, or taking samples according to the research needs and criteria. The sample criteria selected for the study are as follows:

Table 1. Research Sample Criteria

No.	Sample Determination	Criteria Number
1.	Mining companies consistently listed on the IDX during the 2021–2024 period	75
2.	Companies with complete and accessible annual financial reports for the entire study period.	68
3.	Companies disclosing information on Environmental, Social, and Governance (ESG) practices through annual reports or sustainability reports.	24
4.	Companies presenting data on debt maturity structure.	25
5.	Companies that did not experience delisting or suspension during the observation period.	70

The research sample used in this study consisted of 23 companies, spanning a four-year period, from 2021 to 2024. Therefore, the resulting sample size was 23 x 4 years, resulting in a total of 92 mining companies from 2021 to 2024.

Operational Definition and Measurement of Variables

Table 2. Operational Definitions and Measurement of Variables

No.	Sub variables	Definition	Size	Data source
1.	Investment efficiency (Y)	The company's ability to optimize its profits or income through investment without overinvestment or underinvestment (Biddle, Hilary, and Verdi (2009))	$Investment_i.t = \beta_0 + \beta_1 \text{ income growth}_i.t + \epsilon_i$ (Biddle. Et al. (2009))	Financial reports of mining companies on the IDX for the 2021-2024 period
2.	Debt maturity(X1)	Debt maturity is how a company manages the term of its debt. (Myers, 1977; Barclay & Smith, 1995)	$STDebt = \text{Short Term Debt} / \text{Total Debt}$ (Fransisca dan triani 2019)	Financial reports of mining companies on the IDX 2021-2024
3.	Environmental Social Gouvernance (X2)	ESG is a strategic framework that integrates environmental, social, and governance aspects into corporate decision-making to create long-term business	GRII	Sustainability report

No.	Sub variables	Definition	Size	Data source
		sustainability. (Apriliana 2025)		

Findings

Goodness of Fit Test

The results of the Goodness of Fit test are shown in the following table:

Table 3. Results of the F Statistic Test

ANOVA ^a							
Model		Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	1,186	4	,296	17,790	,000 ^b	
	Residual	1,449	87	,017			
	Total	2,635	91				

a. Dependent Variable: EFISIEN

b. Predictors: (Constant), SIZE, ESG

Source: SPSS 25 (Data processed, 2025)

Based on the data processing results, the calculated F-statistic test result is 17.790 with a probability of 0.000. This significance value is less than 0.05. Therefore, it can be concluded that the regression coefficients of the Debt Maturity (DB) and Environmental Social Governance (ESG) variables in this study are worthy of investigation.

Classical Assumption Test

Normality Test

The results of the normality test are shown in the following table:

Table 4. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		92
Normal Parameters ^{a,b}	Mean	,0000000
	Std. Deviation	,11145934
Most Extreme Differences	Absolute	,064
	Positive	,062
	Negative	-,064
Test Statistic		,064
Asymp. Sig. (2-tailed)		,200 ^{c,d}

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Source: SPSS 25 (Data processed, 2025)

Based on Table 4 above, the data is normally distributed. This is evident from the results of the one-sample Kolmogorov-Smirnov test, which is 0.200, which is greater than the probability value of 0.05. This means that the research data can be used for testing because it is normally distributed.

Multicollinearity Test

The results of the normality test are shown in the following table:

Table 5. Multicollinearity Test Results

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Tolerance	VIF
	B	Std. Error					
1	(Constant)	,973	,158		6,144	,000	
	DEBT	-,273	,032	-,701	-8,672	,000	1,252
	ESG	,077	,023	,456	3,393	,001	3,468

Source: SPSS 25 (Data processed, 2025)

Based on the data processing results in Table 5 above, it can be concluded that the VIF (Variance Inflation Factor) value is below 10, with values ranging from 1.252 to 2.660. The tolerance value is above 0.10, ranging from 0.799 to 0.374. From these results, it can be concluded that there is no multicollinearity.

Heteroscedasticity Test

The results of the heteroscedasticity test are shown in the following table:

Table 6. Heteroscedasticity Test Results

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1	(Constant)	-4,917	3,107	-1,583	,127
	DEBT	1,231	,730	,362	,105
	ESG	,019	,359	,018	,957

Source: SPSS 25 (Data processed, 2025)

Based on Table 6 above, it is clear that the data used did not exhibit heteroscedasticity, with a significance level greater than 0.05. Therefore, it can be concluded that the data processing results did not exhibit heteroscedasticity.

Autocorrelation Test

The results of the autocorrelation test are shown in the following table:

Table 7. Results of the autocorrelation test using the run test

Runs Test	
Unstandardized Residual	
Test Value ^a	-,00685
Cases < Test Value	45
Cases >= Test Value	46
Total Cases	91
Number of Runs	44
Z	-,526
Asymp. Sig. (2-tailed)	,599

a. Median

Source: SPSS 25 (Data processed, 2025)

Based on Table 7 above, the results of the autocorrelation test can be concluded that the test value is -0.00685, with a significance value greater than 0.05, namely 0.599. This indicates that there is no autocorrelation in the regression model.

Multiple Linear Regression Analysis

The results of the multiple linear regression test are shown in the following table:

Table 8. Results of the Multiple Linear Regression Test

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients Beta		
1	(Constant)	1,001	,163		6,138	,000
	DEBT	-,262	,034	-,671	-7,781	,000
	ESG	,040	,018	,238	2,183	,032

Source: SPSS 25 (Data processed, 2025)

Based on the results of the multiple linear regression analysis, the multiple linear regression equation is as follows:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$$

$$Y = 1,001 - 0,262 + 0,40 - 0,001 - 0,039 + \epsilon$$

Hypothesis Testing

The t-test results are shown in the following table:

Table 9. t-Test Results (Partial)

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients Beta		
1	(Constant)	1,001	,163		6,138	,000
	DEBT	-,262	,034	-,671	-7,781	,000
	ESG	,040	,018	,238	2,183	,032

Source: SPSS 25 (Data processed, 2025)

Coefficient of Determination Test

The results of the coefficient of determination test are shown in the following table:

Table 10. Coefficient of Determination Test

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	,853 ^a	,727	,715	,04875	

a. Predictors: (Constant), DEBT,ESG

b. Dependent Variable: Efisiensi

Source: SPSS 25 (Data processed, 2025)

Based on the results of the coefficient of determination (R²) test, the value was 0.715 with a standard error of 0.06288. This indicates that the variables Debt Maturity, Environmental Social Governance, Leverage, and Firm Size collectively explain 71% of the variation in Investment Efficiency, while the remaining 29% is influenced by factors outside this study.

Discussion

The Effect of Debt Maturity on Investment Efficiency

Based on the data analysis results above, it can be concluded that the Debt Maturity variable has a negative effect on investment efficiency, with a value of -7.781, with a probability of 0.000 < 0.05. Therefore, it can be concluded that Debt Maturity negatively impacts investment efficiency. However, the effect of debt maturity is negative. As explained earlier, the longer a company's maturity, the lower its investment efficiency.

The findings in this study indicate that long debt maturities have the potential to increase agency conflicts, where managers are encouraged to overinvest for personal gain, such as increasing company size or managerial reputation, even if the project does not provide optimal added value to the company. As a result, resource allocation becomes

less efficient and investment efficiency declines. From an agency theory perspective, differences in interests between owners (principals) and managers (agents) can influence investment decision-making. Long-term debt generally reduces short-term payment pressures, thereby reducing managerial discipline regarding the use of funds. This situation provides managers with greater flexibility in determining investment policies without strict oversight from creditors or owners.

The results of this study align with the agency theory proposed by Jensen and Meckling (1976), which states that managers' discretion in managing company resources can increase agency costs if not accompanied by effective monitoring mechanisms. Furthermore, these findings align with research by Desi Indriyani (2024), which concluded that debt maturity negatively impacts investment efficiency, particularly when the use of long-term debt is not balanced by adequate controls.

The Effect of Environmental Social Governance on Investment Efficiency

Based on the data analysis, the t-value for Environmental Social Governance (ESG) on investment efficiency was 2.183, with a probability of 0.032. This significance value is less than 0.05. This indicates that Environmental Social Governance (ESG) influences investment efficiency. Consequently, H_0 is rejected, and H_2 , which states that Environmental Social Governance (ESG) influences investment efficiency, is accepted.

The findings of this study indicate that companies that implement ESG effectively tend to manage investments more efficiently. For example, companies that regularly report ESG performance and integrate sustainability policies into decision-making encourage managers to consider social, environmental, and governance risks in every investment. This ESG implementation not only enhances the company's credibility with investors but also minimizes inefficient or overly risky decision-making. Thus, ESG serves as a concrete strategic mechanism that supports investment efficiency while maintaining a balance between the interests of managers and company owners. Based on agency theory, conflict between company owners (principals) and managers (agents) can arise when their goals and interests are incompatible. Managers sometimes focus more on personal interests or short-term targets, resulting in inefficient management of company funds and overinvestment. Implementing oversight mechanisms, clear managerial policies, and transparent reporting systems is crucial to aligning the interests of both parties. Environmental Social Governance (ESG), as one of these mechanisms, can increase transparency, accountability, and responsibility of managers towards company owners. Thus, ESG plays a role in mitigating potential conflicts and ensuring that investment decisions are made in line with owner objectives, thus achieving investment efficiency.

This research finding aligns with Garcia-Sanchez et al. (2020) and Anisa Dwi Sulistyowati and Ridwan Wahyudi (2024), which found ESG to have a positive effect on investment efficiency. This suggests that ESG effectiveness is highly dependent on the level of implementation, quality of disclosure, and the company's context.

Conclusion

The conclusion drawn from this study is that investment efficiency can be influenced by several internal company factors, not only by external factors such as the COVID-19 pandemic or inflation, but also by internal company factors. From the research findings presented above, the following conclusions can be drawn:

1. The Debt Maturity variable yields a significant and negative effect on investment efficiency, with a calculated t-value of -7.781. This indicates that the longer a company's debt maturity, the lower its investment efficiency.
2. The Environmental Social Governance (ESG) variable yields a significant and significant effect on investment efficiency, with a calculated t-value of 2.183. This indicates that Environmental Social Governance (ESG) does influence investment efficiency.

Future Research Agenda

Further research is unnecessary with the variables in this study, as the coefficient of determination is 71%. Therefore, future researchers can add other research variables or expand the observation period and sample size, either by including other industrial sectors or conducting inter-industry comparisons, to make the research results more generalizable. Furthermore, the use of more advanced analytical methods, such as dynamic panel models or robust regression, can be considered to address potential heteroscedasticity and autocorrelation issues and obtain more robust results. Future researchers are advised to expand the independent variables by adding Profitability to examine the effect of internal funding availability on investment decisions, and Growth Opportunity to examine the extent to which a company's future growth opportunities can mitigate the risks of overinvestment and underinvestment.

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