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The Effect Of Cash, Receivables, And Working Capital Turnover On Energy Mining Profitability, 2021–2025

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Abstract

This study examines the effect of cash turnover, accounts receivable turnover, and working capital turnover on the profitability of energy-sector mining companies listed on the Indonesia Stock Exchange during 2021–2025, a period of sharp commodity price fluctuations. Profitability is measured by Net Profit Margin (NPM) and Return on Assets (ROA). Using an associative-causal quantitative design and secondary data from annual financial reports, purposive sampling narrowed 90 listed companies to 30 rupiah-reporting companies, yielding 150 firm-year observations analyzed with panel data regression in EViews 14. The Chow, Hausman, and Lagrange Multiplier tests all indicated that the Common Effect Model was appropriate. Partial results show that cash turnover is significant for both NPM and ROA, accounts receivable turnover is significant only for ROA, and working capital turnover is significant for neither. Simultaneously, the three ratios jointly influence NPM but not ROA, and the coefficients of determination are low (0.056 for NPM and 0.322 for ROA). Current asset turnover therefore explains only a small part of profitability variation; managers and investors should read it alongside commodity prices, production costs, and other financial ratios.

Keywords: Cash Turnover, Accounts Receivable Turnover, Working Capital Turnover, Profitability, Energy Sector.

INTRODUCTION

Profit is the primary objective of every business, but it must be managed and measured. Profit does not come about by itself. It demonstrates how effectively a business converts sales, assets and capital into revenue. Profitability ratios help to achieve this objective (Kasmir, 2019; Viyanis et al., 2023). Higher ratios typically indicate

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better financial health and more efficient management. Two ratios are used in this study to measure profitability. Return on Assets (ROA) indicates how effectively a company utilises its assets to generate profit, whilst Net Profit Margin (NPM) indicates the proportion of every rupiah of sales that remains as net profit after costs, expenses and income tax (Nabela et al., 2023). Business decisions can be detrimental to operations without accurate profitability measurements, so this type of analysis must be carried out routinely.

One of the main drivers of the Indonesian economy is the mining sector. According to official data, between 2017 and 2021, the mining and quarrying sector consistently ranked amongst the top five contributors to GDP (Badan Pusat Statistik, 2022). National coal production increased during those years as coal remains a reliable and affordable source of energy in the Asia-Pacific region (Yuliyanti et al., 2025). Given the volatility of raw material prices and production patterns in this industry, financial management is of paramount importance. Cash conversion cycle, accounts receivable turnover and working capital turnover are three working capital efficiency ratios that are often regarded as factors influencing profitability.

Previous research on cash turnover has indicated that it is important for efficient operations and financial performance, as it demonstrates how effectively available funds are converted into revenue (Istiqomah & Indah, 2025). Several studies have reported a positive relationship with profitability (Puspita & Lisiantara, 2024; Rajaf et al., 2025). However, have found no significant effect (Akmalia, 2020; Suminar, 2025). These differences suggest that the relationship depends on industry characteristics, such as cash flow dynamics influenced by global demand and commodity prices.

Accounts receivable turnover is important because mining companies typically sell on credit; when clients pay on time, accounts receivable are converted into cash that supports operations (Puspita & Lisiantara, 2024). The positive impact on profitability has been documented by Rajaf et al. (2025) and Lorenza & Winedar (2025), but Juliana & Sidik (2020) and Fitriana et al. (2020) found that the effect was not significant. The speed at which a company turns over its working capital over time is indicated by the working capital turnover ratio (Kasmir, 2019). Brigham & Houston (2019) argued that profitability increases when working capital is turned over quickly and efficiently; subsequently, Viyanis et al. (2023) and Djemma (2022) reported positive results, whilst Yunita & Suratman (2022) and Cahyani & Sitohang (2020) reported negative and non-significant results.

These conflicting findings create a clear empirical gap, particularly for mining companies in the energy sector whose operations depend on the effective management of cash, receivables and working capital. There are many listed mining companies, particularly in the coal, minerals and metals industries, and they are regarded as a

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strategic means of boosting the regional economy (Setiawan, 2024). It is also worth examining the period 2021–2025 as it encompasses the recovery from the COVID-19 pandemic, which affected mining exports and production (Istiqomah & Indah, 2025), a period of fluctuating global commodity prices that affected operations and revenue (Sartini & Astuti, 2025) and changes in energy and environmental regulations that required companies to be more flexible (Nur et al., 2025). Analysing this timeframe helps businesses select tactics that safeguard profits amidst a volatile global economy (Wahyu Sekarini et al., 2024).

Furthermore, Figure 1 below provides an empirical summary of the profitability and efficiency of cash turnover, receivables turnover and working capital turnover across the 30 companies in the sample between 2021 and 2025.

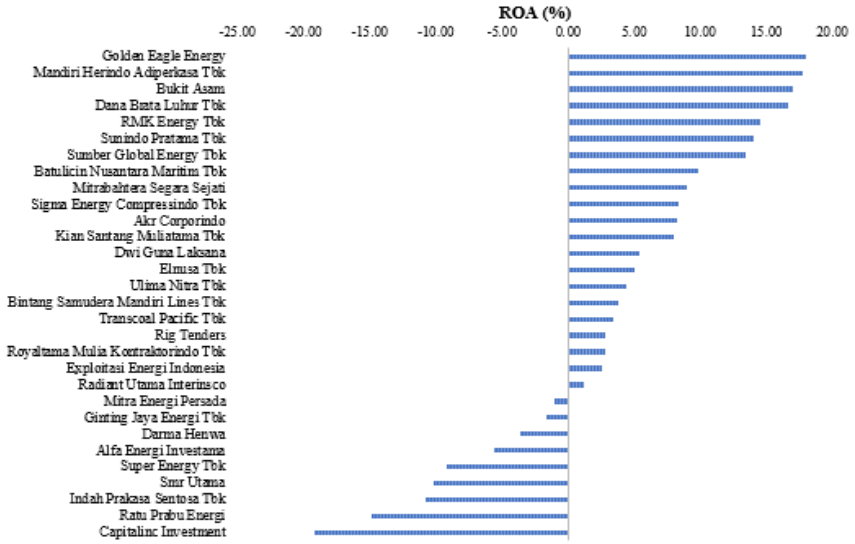


Figure 1. Average ROA for mining companies for the period 2021–2025
Source: Processed data

Figure 1 shows that the average ROA of the 30 companies in the sample over the period 2021–2025 varied considerably, ranging from the highest—Golden Eagle Energy at 18.0 per cent—to the lowest—Capitalinc Investment at –19.2 per cent. The graph indicates that 21 companies had a positive average ROA, whilst 9 had a negative one. This wide disparity in the ability to generate profit from assets indicates that the profitability of mining companies in the energy sector is not uniform; therefore, an analysis of the distinguishing factors—namely cash turnover, receivables turnover and working capital turnover—is required.

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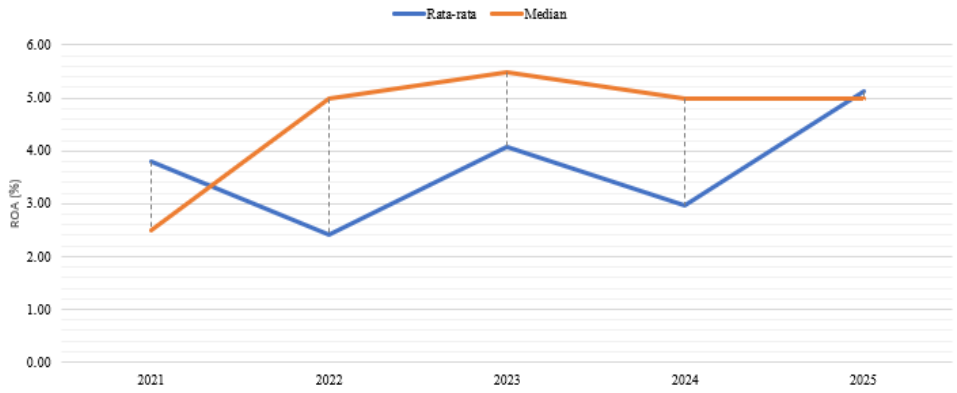


Figure 2. Average and Median ROA for the period 2021–2025

Source: Processed data

Furthermore, Figure 2 illustrates that the average ROA fluctuates; between 2021 and 2023, the trend was upward, whilst between 2024 and 2025 it tended to decline, as some companies were less effective in managing their assets and were therefore unable to generate optimal profits. The median ROA has remained stable at around 5.0–5.5 per cent since 2022. The difference between the average and the median indicates that a small number of companies with extreme figures are driving the average, meaning that profitability across companies is uneven from year to year.

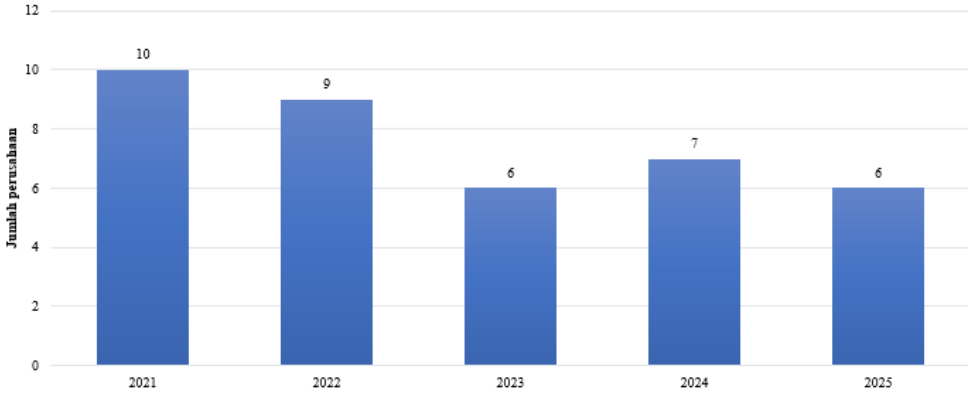


Figure 3. Number of companies with a negative ROA, 2021–2025

Source: Processed data

Figure 3 shows that there were 10 companies with a negative ROA in 2021, accounting for approximately 33.3 per cent, and that this figure fell to 6 companies, or approximately 20.0 per cent, in 2025. Although the situation has improved somewhat, there are still some companies that have not generated a return on their assets in the most recent year. A total of 38 out of 150 observations recorded a negative ROA.

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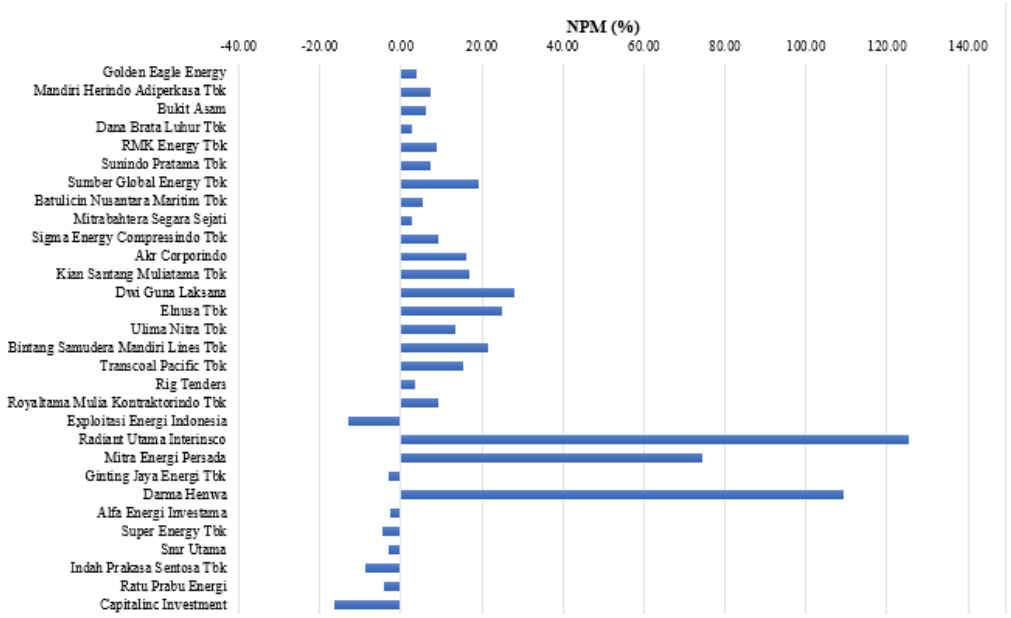


Figure 4. Median NPM for Mining Companies for the period 2021–2025

Source: Processed data

Figure 4 shows that the median NPM over the five-year period was highest for Radiant Utama Interinsco at 125.5 per cent and lowest for Capitalinc Investment at –16.3 per cent. A total of 22 companies had a positive median NPM, whilst 8 had a negative one. It can be concluded that companies with a high ROA do not necessarily have a high NPM, which underscores the need for both of these profitability measures.

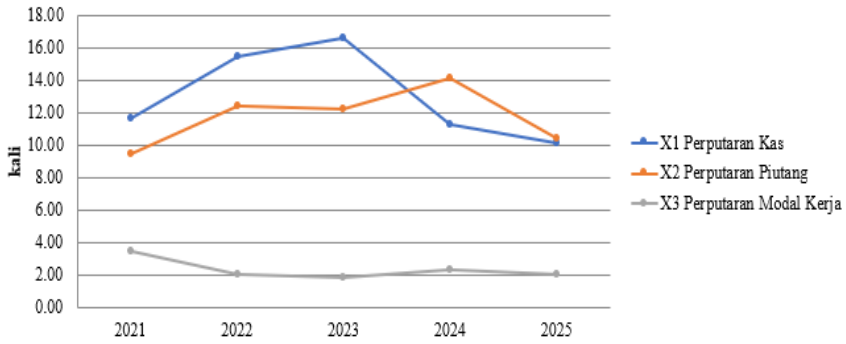


Figure 5. Median cash turnover, receivables and working capital for 2021–2025

Source: Processed data

Based on Figure 5 as a whole, the profitability of the energy mining companies in the sample is uneven and volatile, whilst the findings of previous studies have not been consistent. This situation has prompted research into the impact of cash turnover,

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receivables turnover and working capital turnover on the profitability (NPM and ROA) of mining companies in the energy sector listed on the Indonesia Stock Exchange during the period of commodity price fluctuations from 2021 to 2025. The research findings are expected to help management understand the role of cash, receivables and working capital management in maintaining profitability and supporting decision-making in a rapidly changing economic environment.

LITERATURE REVIEW AND HYPOTHESES

2.1 Signaling Theory

Signalling theory, first formulated by Spence (1973), explains how a firm can use financial statements, for example, to provide the market with reliable information about its quality. Effective management of cash, receivables and working capital, as evidenced in the financial statements of mining companies facing significant commodity price fluctuations, is a sign that resources are being managed well despite market instability (Melihana & Fransiskus, 2025). Efficient cash management reflects liquidity and sustainable operations (Istiqomah & Indah, 2025); accounts receivable that are settled promptly indicate strong control over cash flow; and healthy working capital demonstrates the ability to meet short-term obligations without disrupting production (Puspita & Lisiantara, 2024; Viyanis et al., 2023).

2.2 Agency Theory

Agency theory (Jensen & Meckling, 1976) describes the relationship between the principal (the owner) and the agent (the manager). Although managers and shareholders ultimately share the same objective—namely, to increase the value of the company—conflicts can arise when ownership and control are separated, and managers prioritise their own interests over those of the shareholders (Ersa, 2025). Amid fluctuating commodity prices, the turnover ratio serves as an indicator of whether management is managing financial risk in line with owners' expectations (Lailatus & Sari, 2025). Working capital that is not properly monitored can be misused; therefore, oversight and transparency are essential (Artila & Murtanto, 2025), and transparent financial statements enable owners to assess management objectively (Muhammad & Lela, 2025).

2.3 Profitability

Profitability is a company's ability to generate revenue from its sales, assets and capital (Fitriana et al., 2020; Kasmir, 2019), which reflects how well resources are managed to generate net profit after all costs (Zahro & Rizal, 2025). NPM is calculated by dividing sales by net profit after interest and tax. Businesses with high net margins

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typically demonstrate faster profit growth, and NPM indicates how effectively management controls sales and expenditure (Bekty, 2025; Rosyida et al., 2025).

$$\text{NPM} = \frac{Net\ Profit\ After\ Interest\ and\ Tax}{Sales}\ x\ 100\%$$

ROA is net profit divided by total assets and indicates how effectively management utilises the company's resources to generate profit (Kasmir, 2019); productive assets also help to stabilise profits during challenging market conditions (Kusuma & Buana, 2024). Using both of these ratios provides a more comprehensive picture of profitability.

$$\text{ROA} = \frac{Net\ Profit}{Total\ Assets}\ x\ 100\%$$

2.4 Cash Turnover

Cash is the most liquid current asset, and excess idle cash can reduce profitability; therefore, companies need to use it efficiently (Fuady & Rahmawati, 2019). The rate at which cash is used to finance operations and generate revenue is indicated by the cash turnover ratio, which is calculated by dividing net sales by cash and cash equivalents (Istiqomah & Indah, 2025). Effective cash management is not merely about accumulating cash, but also about using it to support sustainable growth (Prananda et al., 2023), and this ratio indicates the return on funds used as working capital (Fitriani, 2026).

$$\text{CTO} = \frac{Net\ Sales}{Cash\ and\ Cash\ Equivalents}$$

2.5 Accounts Receivable Turnover

Accounts receivable arise from credit transactions between creditors and debtors and form part of current assets after cash (Haq & Handayani, 2024). Effective management can increase profits and reduce the risk of bad debts. Accounts receivable turnover, calculated as net sales divided by average accounts receivable, assesses how quickly accounts receivable are converted into cash. (Lailatus & Sari, 2025). Well-implemented credit policies accelerate turnover without compromising liquidity (Merna et al., 2025; Zulna & Novianty, 2022).

$$\text{RTO} = \frac{Net\ Sales}{Avarage\ Receivables}$$

2.6 Working Capital Turnover

Working capital is a factor that supports production and, consequently, revenue (Prananda et al., 2023). Working capital turnover, calculated as net sales divided by current assets minus current liabilities, indicates how quickly working capital supports production and sales. A high ratio indicates efficient management of short-term resources (Alma et al., 2025), and an optimal level helps to avoid financial problems that could

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hamper operations (Cahyani & Sitohang, 2020). Balancing liquidity and profitability requires effective working capital management (Sigalingging et al., 2024).

$$WCTO = \frac{Net\ Sales}{Current\ Assets - Current\ Liabilities = Working\ Capital}$$

2.7 Hypotheses

H1a: Cash Turnover has a positive and significant partial effect on Net Profit Margin
H1b: Cash Turnover has a positive and significant partial effect on Return on Assets
H2a: Accounts Receivable Turnover has a positive and significant effect on Net Profit Margin
H2b: Accounts Receivable Turnover has a positive and significant effect on Return on Assets
H3a: Working Capital Turnover has a positive and significant effect on Net Profit Margin
H3b: Working Capital Turnover has a positive and significant effect on Return on Assets
H4a: Cash Turnover, Accounts Receivable Turnover, and Working Capital Turnover have a simultaneous effect on Net Profit Margin
H4b: Cash Turnover, Receivables Turnover, and Working Capital Turnover have a simultaneous effect on Return On Assets

RESEARCH METHOD

Table 1. Sample Selection Criteria

No.	Criteria	Number
1	Population: energy-sector mining companies listed on the IDX, 2021–2025	90
2	Companies in the Oil, Gas & Coal subsector, consistently during 2021–2025	86
3	Companies with complete data for X1, X2, X3, and Y	59
4	Companies using the rupiah as reporting currency	30
	Total sample (30 companies × 5 years)	150

The information is of a secondary nature, comprising annual financial statements compiled from documentation and sourced from the official IDX website and the companies' websites (Putu, 2021). Profitability (Y) is measured using ROA, the ratio of net profit to total assets, and NPM, the ratio of net profit to sales Amelia & Destian Andhani (2024) Cash turnover (X1) is net sales divided by cash and cash equivalents; receivables turnover (X2) is net sales divided by average receivables; and working capital

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turnover (X3) is net sales divided by working capital, which is defined as current assets minus current liabilities (Eryando Adinda et al., 2025).

The data were analysed using EViews 14, which supports the estimation of pooled, fixed-effect and random-effect panel models, along with the Hausman and Breusch–Pagan tests (Awaludin et al., 2023; Wibowo, 2025). The analysis was carried out in five steps: descriptive statistics; selection between the Common Effect Model (CEM), Fixed Effect Model (FEM) and Random Effect Model (REM) using the Chow, Hausman and Lagrange Multiplier tests (Dina Hidayat & Sarwo Edy Handoyo, 2024); testing of classical assumptions (Jarque-Bera normality, multicollinearity with VIF below 10, Glejser's test for heteroscedasticity, and the Durbin-Watson test for autocorrelation) (Mursyidin et al., 2023), panel regression, and hypothesis testing at the 5 per cent level (partial t-test, simultaneous F-test, and coefficient of determination). The two models estimated were:

$$ROA_{it} = \alpha + \beta 1CTO_{it} + \beta 2RTO_{it} + \beta 3WCTO_{it} + \varepsilon_{it}$$

$$NPM_{it} = \alpha + \beta 1CTO_{it} + \beta 2RTO_{it} + \beta 3WCTO_{it} + \varepsilon_{it}$$

CTO stands for cash turnover, RTO for receivables turnover, WCTO for working capital turnover, i for mining companies in the energy sector, t for the year (2021–2025), and ε for the error term.

RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 1.2 shows 150 observations. Average profitability is low: NPM has a mean of 71.94 but a median of only 8.63 with a standard deviation of 475.79, indicating that most companies have small margins whilst a few extreme observations (maximum 5,272.28; minimum −512.10) pull the mean upwards. The average ROA is 0.04 (approximately 4 per cent) with a median of 0.05, ranging from −0.62 to 0.34.

Table 2. Descriptive Statistics

Statistic	NPM (Y)	ROA (Y)	CTO (X1)	RTO (X2)	WCTO (X3)
Mean	71.94	0.04	73.24	31,952.15	441.80
Median	8.63	0.05	13.03	11.44	2.35
Maximum	5,272.28	0.34	2,052.62	2,925,350.73	56,862.02
Minimum	−512.10	−0.62	0.38	0.00	−170.97
Std. Dev.	475.79	0.13	248.78	280,374.13	4,664.45
Observations	150	150	150	150	150

Source: Secondary data processed using EViews 14 (2026)

The same skewed pattern emerges for the independent variables. The median cash turnover is 13.03 times, meaning that cash typically turns over around 13 times a

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year, although the mean (73.24) is skewed upwards by the maximum value of 2,052.62. The median accounts receivable turnover is 11.44 times, or approximately one collection cycle every 32 days, whilst the average (31,952.15) is influenced by an extreme maximum of 2,925,350.73. The median working capital turnover is 2.35 times, and the minimum of −170.97 indicates that some companies had current liabilities exceeding current assets in certain years. Owing to these extreme values, the median provides a more accurate picture of the typical company than the average.

4.2 Model Selection

Three tests were used to choose between CEM, FEM and REM (Table 1.3). The Chow test yielded probabilities of 0.7941 (cross-section F) and 0.6103 (cross-section chi-square), both of which were above 0.05; therefore, the general effects model is preferred over the fixed effects model. The Hausman test yielded a probability of 0.6630, also above 0.05, which supports the random-effects model over the fixed-effects model. The Breusch-Pagan Lagrange Multiplier probabilities for cross-section (0.2910), time (0.4618) and both (0.1981) all exceed 0.05, so the general effects model is preferred over the random effects model. Therefore, the General Effects Model is used in the subsequent analysis.

Table 3. Model Selection Test

Test	Statistic	Prob.	Decision
Chow (Cross-section F)	0.766038	0.7941	CEM
Chow (Cross-section Chi-square)	26.283140	0.6103	CEM
Hausman (Cross-section random)	2.397836	0.6630	REM over FEM
Breusch-Pagan LM (Cross-section)	1.115139	0.2910	CEM
Breusch-Pagan LM (Time)	0.541489	0.4618	CEM
Breusch-Pagan LM (Both)	1.656628	0.1981	CEM

Source: Secondary data processed using EViews 14 (2026)

4.3 Test of Classical Assumptions

The Jarque–Bera statistic of 60.588.18 (probability 0.0000) indicates that the residuals are not normally distributed, with a skewness of 9.49 and a kurtosis of 99.61, influenced by several outliers. As done by Ruth & Khairina (2023), non-normality is tolerated because, according to the central limit theorem, a sample of 30 or more (here 150 observations) approximates a normal distribution. Multicollinearity is not an issue, as the centred VIF values range between 1.01 and 1.05, well below 10. The

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heteroscedasticity tests yielded probabilities of 0.9252 (F), 0.9220 (Obs*R-squared) and 0.6854 (scaled explained SS), all above 0.05, indicating that the residual variance remains constant. Regarding autocorrelation, the probabilities of 0.9436 (F) and 0.9410 (chi-square) exceed 0.05, and the Durbin-Watson statistic is 2.019; therefore, no serial correlation was found.

4.4 Regression and Hypothesis Testing

Table 1.4 reports the results of the partial tests under the General Effects Model. In the NPM model, cash turnover is significant (probability 0.0180), whilst receivables turnover (0.8785) and working capital turnover (0.8970) are not significant. In the ROA model, cash turnover (0.0436) and receivables turnover (0.0035) are significant, whilst working capital turnover (0.9126) is not significant. The estimated coefficients for cash turnover are very small, at 0.000409 in the NPM model and −0.012398 in the ROA model, whilst the coefficient for accounts receivable turnover is approximately −1.50E-06 in the ROA model.

Table 4. Partial Test Results (t-test), Common Effect Model

Dependent	Variable	Coefficient	t-Statistic	Prob.	Decision
NPM	CTO (X1)	0.000409	0.002567	0.0180	Significant
NPM	RTO (X2)	−2.18E-05	−0.153158	0.8785	Not significant
NPM	WCTO (X3)	−0.001112	−0.129707	0.8970	Not significant
ROA	CTO (X1)	−0.012398	−0.067140	0.0436	Significant
ROA	RTO (X2)	−1.50E-06	−0.008219	0.0035	Significant
ROA	WCTO (X3)	−0.001109	−0.109961	0.9126	Not significant

Source: Secondary data processed using EViews 14 (2026)

The results of the simultaneous analysis are shown in Table 1.5. For NPM, an F-statistic value of 0.038501 was reported with a probability of 0.00048, which is below 0.05; therefore, the three ratios collectively influence NPM. For ROA, the F-statistic value of 0.0677633 has a probability of 0.900821, which is above 0.05; therefore, the three ratios do not collectively influence ROA. The coefficient of determination (R^2) is 0.056061 for NPM, meaning that approximately 5.6 per cent of the variation is explained by the model, and 0.321619 for ROA, or approximately 32.2 per cent; the remainder is explained by factors outside the model. Both adjusted R^2 values are negative (−0.0264 and −0.0769), indicating the models' weak explanatory power.

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Table 5. Simultaneous Test (F-test) and Coefficient of Determination

Dependent	R-squared	Adj. R-squared	F-statistic	Prob. (F)	Decision
NPM	0.056061	−0.026396	0.038501	0.00048	Significant
ROA	0.321619	−0.076886	0.067763	0.900821	Not significant

Source: Secondary data processed using EViews 14 (2026)

DISCUSSION

The Effect of Cash Turnover on Profitability

Cash turnover is significant for NPM (probability 0.0180) and ROA (0.0436). For NPM, the coefficient is positive, in line with expectations derived from signalling theory, namely that the efficient use of cash as reported in financial statements serves as a positive signal reflected in the net margin, even as commodity prices fluctuate. This is consistent with Viyanis et al. (2023) and Defany & Efrizon (2025), who found that cash turnover enhances profitability, as effective cash utilisation helps companies meet operational needs and generate profits.

Cash is one of the components of total assets for ROA; if a company can maintain the same level of sales with a lower cash balance, asset turnover will increase and ROA may rise provided that margins remain stable. Idle cash can be used to finance operations or repay interest-bearing debt (Kasmir, 2019). However, the ROA coefficient is negative in Table 1.4; therefore, the significant effect on ROA does not show a positive sign as hypothesised, and these results must be interpreted with caution.

The Effect of Accounts Receivable Turnover on Profitability

Accounts receivable turnover does not have a significant effect on NPM (probability 0.8785) but does have a significant effect on ROA (0.0035). The non-significant result for NPM is consistent with the findings of Sriaminah & Winarto (2018) and Fitriana et al. (2020). One possible reason for this is the very wide range of the variable, from 0 to 2,925,350.73 times, meaning that extreme values mask the true relationship; the sample also includes a mix of coal producers selling to large buyers with negotiated payment terms and service companies billing on a project-by-project basis, resulting in differing credit policies.

The significant ROA results are consistent with Rajaf et al. (2025) and Defany & Efrizon (2025), who explain that faster debt collection returns funds to cash—the most liquid asset—for use in operations, provided that credit policies are sound and liquidity is not compromised (Zulna & Novianty, 2022). As with cash turnover, the estimated ROA

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coefficient is negative, meaning the direction of the effect differs from the hypothesised positive direction.

The Effect of Working Capital Turnover on Profitability

Working capital turnover is not significant for either NPM (0.8970) or ROA (0.9126), in line with Yunita & Suratman (2022) and Arry & Dewi (2018). A high working capital turnover does not automatically increase profits in this sample. Some companies have negative working capital (minimum −170.97) whilst others have very small amounts of working capital, resulting in extreme ratios (maximum 56,862.02) that no longer reflect actual efficiency.

From an agency perspective, sound working capital management indicates that managers are acting in the owners' best interests; however, its impact on net profit may be masked by selling prices, production costs and royalty charges. Capital-intensive companies exposed to volatile prices require substantial amounts of cash, stock and trade receivables; therefore, a low turnover ratio may be a sound policy, whilst an extremely high turnover ratio may indicate pressure, such as an insufficient liquidity buffer, expensive short-term financing or a loss of sales.

Simultaneous Impact on Profitability

These three ratios collectively influence NPM, as the reported probability of the F-test is below 0.05, but they do not simultaneously influence ROA (probability 0.900821). Several explanations may apply. Firstly, turnover ratios merely reflect how quickly current assets generate sales, and their impact on profit may be overshadowed by far more significant factors; this is consistent with the very low explanatory power of these models. Secondly, the data contains outliers, with accounts receivable turnover ranging from 0.00 to 2,925,350.73 and working capital turnover from −170.97 to 56,862.02; this is often due to very small balances of accounts receivable or working capital in certain firms, which mask relationships that may exist in the majority of firms.

Thirdly, this sample is diverse, encompassing coal producers, mining contractors, oil and gas services, shipping, and energy distribution, whose cash and credit practices vary; energy companies also tend to hold cash as a buffer against price fluctuations and sell under long-term contracts, meaning that turnover is not directly linked to asset returns. Finally, the five-year period, which encompassed the post-pandemic recovery and the subsequent decline in commodity prices, means that turnover patterns follow price cycles rather than being driven solely by management decisions. These findings are consistent with those of Istiqomah & Indah (2025) and Yulianti et al. (2021), who also found no significant effect on mining companies.

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CONCLUSION

Based on a panel regression of 30 mining companies in the energy sector over the period 2021–2025, the General Effects Model is the most appropriate specification. Cash turnover has a statistically significant effect on NPM and ROA, and its effect on NPM is positive. Receivables turnover is significant for ROA but not for NPM, whilst working capital turnover is not significant for either. Taken together, these three ratios influence NPM but not ROA. The coefficients of determination are low (0.056 for NPM and 0.322 for ROA), so the cash, receivables and working capital turnover ratios account for only a small proportion of the variation in profitability, and other factors such as commodity prices and production costs have a greater influence in this sector.

This study is limited to 30 rupiah-reporting mining companies over five years, so the results cannot be generalised. The model uses only three turnover ratios and explains very little of profitability, and outliers remain in the data. Future research should add commodity prices, firm size, and capital structure, focus on similar firms such as coal producers, extend the period, and treat outliers transparently.

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