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Liquidity, Leverage, and Asset Utilization as Determinants of Profitability: Evidence from Indonesian Transportation Sector Firms (2019–2020, 2022–2023)

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ABSTRACT

This study investigates whether liquidity, leverage, and asset utilization explain profitability among transportation sector firms listed on the Indonesia Stock Exchange (IDX). Using secondary financial statement data for 15 firms over the years 2019, 2020, 2022, and 2023 (60 firm-year observations), profitability is proxied by return on assets (ROA), while liquidity is measured by the current ratio (CR), leverage by the debt-to-equity ratio (DER), and activity by total asset turnover (TATO). The dataset is analyzed using multiple linear regression with IBM SPSS Statistics (replicated with equivalent procedures). Descriptive statistics indicate substantial cross-firm dispersion, particularly for DER, reflecting heterogeneous capital structures and, in some cases, negative equity. The regression results show that CR and TATO have positive coefficients and DER has a negative coefficient, but none of the predictors are statistically significant at the 5% level. Classical assumption diagnostics suggest no serious multicollinearity and no evidence of heteroskedasticity, while residual normality is violated, implying that inference should be interpreted cautiously. Overall, the findings suggest that, during a period spanning pandemic and post-pandemic recovery, profitability in the sampled transportation firms is influenced by factors beyond simple ratio-based liquidity, leverage, and efficiency measures.

Keywords: *current ratio; debt-to-equity ratio; total asset turnover; return on assets; transportation sector; Indonesia; financial ratio analysis*

1. Introduction

Transportation and logistics firms are typically asset-intensive and operate under demand cyclicality, fuel price volatility, and high fixed costs. These characteristics can amplify the impact of financial policy (liquidity management and financing structure) and operational efficiency on profitability. In emerging markets, transportation companies also face structural constraints such as limited long-term financing, currency exposure for imported assets, and rapid shifts in consumer mobility patterns. The COVID-19 shock and the subsequent recovery further increased uncertainty in cash-flow planning, making financial ratio signals potentially unstable across years.

Financial ratio analysis remains a widely used approach to evaluate corporate performance and diagnose areas requiring managerial action. Liquidity ratios indicate the firm's capability to meet short-term obligations; leverage ratios describe the degree of debt

financing and the associated financial risk; and activity ratios capture efficiency in utilizing assets to generate revenue. Profitability, proxied by return on assets (ROA), represents management's effectiveness in generating earnings from the asset base.

This study examines whether liquidity (CR), leverage (DER), and asset utilization (TATO) influence ROA for IDX-listed transportation sector firms across 2019–2020 and 2022–2023. The research contributes by providing empirical evidence based on a balanced firm-year panel during an economically volatile period and by presenting SPSS-style outputs suitable for national journal reporting.

Beyond firm-level financial policies, profitability in transportation and logistics is increasingly shaped by network effects and service reliability: firms must synchronize fleet capacity, route schedules, and maintenance cycles to meet time-sensitive demand while preserving cash-flow resilience. In Indonesia, the sector's profitability is also exposed to infrastructure connectivity gaps between islands, regulatory requirements for safety and licensing, and the need to continuously invest in fleet renewal—factors that can magnify the importance of short-term liquidity buffers and financing flexibility.

From a theoretical perspective, the study draws on the liquidity–profitability trade-off in working capital management, capital structure perspectives (trade-off and pecking-order considerations), and efficiency arguments that link asset utilization to operating returns. Testing these relationships across the pandemic and post-pandemic years helps clarify whether commonly used accounting ratios remain informative when firms face large demand shocks and balance-sheet heterogeneity, including instances of high leverage or negative equity.

2. Literature Review and Hypotheses Development

2.1 Liquidity (CR) and profitability

Liquidity reflects the firm's ability to settle short-term liabilities using current assets. While adequate liquidity can prevent distress costs and operational disruption, excessive current assets may indicate inefficient working capital allocation and opportunity costs (Kasmir, 2019). Therefore, prior studies often report mixed results on the liquidity–profitability relationship, depending on sector structure and macroeconomic conditions.

Recent finance and working-capital literature emphasizes that liquidity supports profitability primarily through risk mitigation and operational continuity, but only up to an optimal level. Modern textbooks and practitioner guidance argue that excessive current assets can depress returns because idle cash and slow-moving receivables/inventory carry opportunity costs and may signal weak collection discipline (Gitman & Zutter, 2015). Evidence from emerging markets continues to show mixed results, with several studies highlighting that the sign and magnitude of the liquidity effect depend on business cycles and the structure of payables/receivables (Umenzekwe, et al., 2023). In transport services, where cash-flow timing is sensitive to contract terms and fuel/maintenance payments, the current ratio can therefore act as both a safety indicator and a proxy for working-capital inefficiency.

H1: The current ratio (CR) has a positive effect on ROA.

2.2 Leverage (DER) and profitability

Leverage captures the extent to which a firm finances assets through debt relative to equity. Debt can improve performance through tax shields and discipline effects; however, high leverage raises financial risk and potential distress costs, which may depress profitability (Fender & Lewrick, 2015). Empirical evidence also varies, but the leverage–profitability association is frequently negative in asset-intensive industries where revenue volatility increases default risk.

Contemporary capital-structure research frames leverage as a double-edged instrument. While debt can create tax benefits and managerial discipline, recent empirical work notes that the net performance effect becomes weaker or negative when cash flows are volatile and refinancing risk is material—conditions common in asset-intensive service industries (Ross, et al., 2022); (Ahmad, et al., 2024). Studies focusing on listed firms in different emerging markets also suggest that high leverage reduces strategic flexibility, limiting a firm's ability to respond to demand shocks or invest in operational upgrades (Khoa & Thai, 2021). Accordingly, experts increasingly recommend evaluating leverage together with coverage and liquidity indicators rather than relying on a single ratio in isolation, especially when equity values can turn negative and distort DER interpretation.

H2: The debt-to-equity ratio (DER) has a negative effect on ROA.

2.3 Asset utilization (TATO) and profitability

Total asset turnover measures the ability of the firm to generate sales from its asset base. For transportation firms, improving asset utilization (fleet capacity use, route optimization, and asset maintenance efficiency) can raise revenue per asset unit and support profitability (Kasmir, 2002). Accordingly, activity ratios are generally expected to correlate positively with ROA.

Recent operational and sector reports underline that profitability in logistics is strongly linked to utilization intensity—how effectively fleets, terminals, and supporting assets are deployed—because fixed costs are high and marginal utilization can materially change unit economics (KPMG Corporate Finance LLC., 2024). Financial analysis guides similarly treat total asset turnover as a core efficiency proxy, but warn that its interpretation should consider business models: firms using leased assets or outsourcing may exhibit higher turnover not necessarily because operations are superior, but because the asset base is lighter (Brigham, et al., 2019); (Singh, et al., 2017). For this reason, the expected positive association between TATO and ROA is theoretically plausible, yet may vary across transport sub-segments (e.g., airlines, shipping, and land logistics) with different asset structures.

H3: Total asset turnover (TATO) has a positive effect on ROA.

3. Conceptual Framework

Figure 1 presents the conceptual framework. ROA is modeled as a function of three financial ratio constructs: (i) liquidity (CR), (ii) leverage (DER), and (iii) activity/asset utilization (TATO). The framework assumes that transportation firms with healthier short-term solvency can avoid operational disruptions and obtain better supplier terms (supporting profitability). Conversely, excessive debt relative to equity is expected to reduce profitability due to higher interest burden and financial distress risk. Finally, higher asset turnover indicates more productive use of assets to generate revenue, which should improve ROA.

In empirical terms, the framework is tested using a multiple linear regression model: $ROA = \alpha + \beta_1 \cdot CR + \beta_2 \cdot DER + \beta_3 \cdot TATO + \varepsilon$.

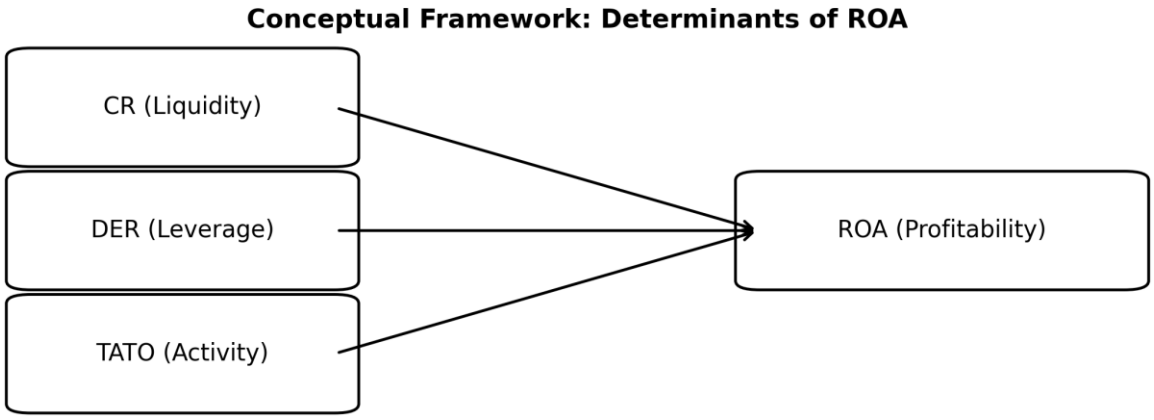

Figure 1. Conceptual framework of the study.

4. Research Methods

4.1 Research design and data

This research is quantitative and explanatory, using secondary data from published financial statements. The dataset comprises 15 transportation sector firms listed on the Indonesia Stock Exchange (IDX) observed in four fiscal years: 2019, 2020, 2022, and 2023, yielding 60 firm-year observations. The year 2021 is not included in the provided dataset.

4.2 Variable measurement

Return on Assets (ROA) is measured as net income divided by total assets. The current ratio (CR) is current assets divided by current liabilities. The debt-to-equity ratio (DER) is total debt divided by total equity. Total asset turnover (TATO) is net sales divided by total assets.

4.3 Analytical technique (SPSS)

Data processing follows typical procedures in IBM SPSS Statistics: descriptive statistics, Pearson correlation, and multiple linear regression. Classical assumption diagnostics are reported, including multicollinearity (tolerance/VIF), heteroskedasticity (Breusch–Pagan equivalent), autocorrelation (Durbin–Watson), and residual normality (Kolmogorov–Smirnov and Shapiro–Wilk tests). The significance level is set at 5% (two-tailed) (Ghozali, 2018).

4.4 Regression model

$$ROA\_it = \alpha + \beta_1 \cdot CR\_it + \beta_2 \cdot DER\_it + \beta_3 \cdot TATO\_it + \varepsilon\_it$$

i = firm.
t = year.

4.5 Population, sampling criteria, and unit of analysis

The population comprises all transportation and logistics firms listed on the Indonesia Stock Exchange (IDX). A purposive sampling approach is applied to include firms (i) classified in the transportation/logistics sector by IDX, (ii) with complete published annual financial statements for the observed fiscal years, and (iii) with data required to compute ROA, CR, DER, and TATO. The unit of analysis is the firm-year observation, producing a balanced panel of 60 observations (15 firms × 4 years) (Priyatno, 2009).

4.6 Data collection, coding, and treatment of extreme values

Financial statement items (net income, total assets, current assets, current liabilities, total debt, total equity, and net sales) are extracted from audited annual reports/financial statements and coded into a structured dataset. Ratio computations follow the definitions in Section 4.2. Because the transportation sector can exhibit negative equity in distress periods, DER may take negative or extreme values; these observations are retained to reflect the underlying capital-structure condition. Prior to estimation, the data are screened for input errors and outliers using boxplots and standardized residual diagnostics. As a sensitivity check, researchers may re-estimate the model after trimming or winsorizing extreme DER values, or after excluding negative-equity observations, to assess whether results are driven by leverage outliers.

4.7 Estimation procedure and robustness

The baseline model is estimated with ordinary least squares (OLS) multiple regression. Model fit is evaluated using R, R^2, and the F-test. Classical assumption checks include multicollinearity (tolerance/VIF), autocorrelation (Durbin–Watson), heteroskedasticity testing, and residual normality testing. Given that firm-level ratio data can violate normality, the study can complement parametric inference with bootstrapped standard errors and bias-corrected confidence intervals (e.g., 5,000 resamples in SPSS) to provide robustness against non-normal residuals. All tests are interpreted at the 5% significance level (two-tailed) (Darma, 2021).

5. Results

Table 1. Descriptive statistics (N = 60).

Variable	Mean	Std. Deviation	Minimum	Maximum
ROA	0.0293	0.1256	-0.2443	0.5993
CR	1.5937	1.9007	0.1033	11.7219
DER	1.4883	6.6568	-7.9404	41.6476
TATO	0.5837	0.3259	0.1383	1.4831

Note: DER exhibits wide dispersion, reflecting heterogeneous leverage and potential negative equity for certain observations.

Table 1 above, summarizes the descriptive statistics for 60 observations across profitability (ROA), liquidity (CR), leverage (DER), and asset efficiency (TATO). The figures report the mean, standard deviation, and the minimum and maximum values for each variable.

Key takeaways:

- ROA (Return on Assets) averages 2.93% with a standard deviation of 12.56%, ranging from -24.43% to 59.93%.
- CR (Current Ratio) has a mean of 1.5937 (SD = 1.9007), with values between 0.1033 and 11.7219.
- DER (Debt-to-Equity Ratio) averages 1.4883 but shows substantial variation (SD = 6.6568), spanning from -7.9404 to 41.6476. This indicates that leverage differs markedly across firms and may include cases of negative equity.

- TATO (Total Asset Turnover) averages 0.5837 (SD = 0.3259), ranging from 0.1383 to 1.4831, suggesting moderate dispersion in asset-use efficiency.

Table 2. Pearson correlation matrix (r with p-values in parentheses).

Variable	ROA	CR	DER	TATO
ROA	1.000	0.181 (p=0.165)	-0.027 (p=0.840)	0.134 (p=0.306)
CR	0.181 (p=0.165)	1.000	-0.051 (p=0.698)	0.379 (p=0.003)
DER	-0.027 (p=0.840)	-0.051 (p=0.698)	1.000	-0.060 (p=0.651)
TATO	0.134 (p=0.306)	0.379 (p=0.003)	-0.060 (p=0.651)	1.000

Note: Values show Pearson r; p-values are two-tailed.

Table 2 above, presents the Pearson correlation coefficients (r) among ROA, Current Ratio (CR), Debt-to-Equity Ratio (DER), and Total Asset Turnover (TATO), with two-tailed p-values shown in parentheses.

Key points:

- ROA shows weak, non-significant correlations with CR (r = 0.181; p = 0.165), DER (r = -0.027; p = 0.840), and TATO (r = 0.134; p = 0.306).
- CR and TATO are moderately and positively correlated, and this relationship is statistically significant (r = 0.379; p = 0.003).
- DER is not meaningfully related to the other variables in this matrix (all p-values > 0.05).
- Overall, the only statistically significant association observed is between liquidity (CR) and asset efficiency (TATO).

Table 3. Model summary (SPSS-style).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.195	0.038	-0.013	0.1265	1.991

Note: Dependent variable = ROA. Predictors = CR, DER, TATO.

Table 3 above, presents the summary of a multiple regression model where Return on Assets (ROA) is the dependent variable and the predictors are Current Ratio (CR), Debt-to-Equity Ratio (DER), and Total Asset Turnover (TATO).

Key interpretation:

- R = 0.195 indicates a weak overall relationship between the predictors and ROA.
- R Square = 0.038 means the model explains about 3.8% of the variation in ROA; Adjusted R Square = -0.013 suggests the predictors add little explanatory power after adjusting for the number of variables.
- The standard error of the estimate (0.1265) reflects the typical size of prediction errors in ROA units.
- Durbin-Watson = 1.991 (close to 2) suggests no meaningful autocorrelation in the residuals.

Table 4. ANOVA (overall model significance).

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.0355	3	0.0118	0.7408	0.5322

Residual	0.8955	56	0.0160		
Total	0.9310	59			

Note: The F-test evaluates whether CR, DER, and TATO jointly explain ROA.

Table 4 above, reports the ANOVA results for the multiple regression model with Return on Assets (ROA) as the dependent variable and Current Ratio (CR), Debt-to-Equity Ratio (DER), and Total Asset Turnover (TATO) as predictors.

Key interpretation:

- The regression sum of squares is 0.0355 (df = 3), while the residual sum of squares is 0.8955 (df = 56), giving a total sum of squares of 0.9310 (df = 59).
- The F-statistic is 0.7408 with a significance value (p-value) of 0.5322.
- Because p = 0.5322 is greater than 0.05, the model is not statistically significant overall. This indicates that CR, DER, and TATO do not jointly explain ROA in this sample.

Table 5. Coefficients and collinearity statistics.

Predictor	Unstandardized B	Std. Error	t	Sig.	Standardized Beta	Tolerance	VIF
const	-0.0034	0.0343	-0.1003	0.9205			
CR	0.0100	0.0094	1.0725	0.2881	0.1520	0.5028	1.9891
DER	-0.0003	0.0025	-0.1097	0.9130	-0.0144	0.9727	1.0280
TATO	0.0293	0.0546	0.5357	0.5943	0.0759	0.4945	2.0221

Note: Standardized Beta coefficients are based on z-scored variables.

Table 5 above, reports the estimated regression coefficients for the model explaining Return on Assets (ROA) using Current Ratio (CR), Debt-to-Equity Ratio (DER), and Total Asset Turnover (TATO), along with collinearity diagnostics.

Key interpretation:

- None of the predictors are statistically significant at the 5% level: CR (p = 0.2881), DER (p = 0.9130), and TATO (p = 0.5943). The intercept is also not significant (p = 0.9205).
- Direction of effects: CR shows a small positive association with ROA (B = 0.0100), DER shows a near-zero negative association (B = -0.0003), and TATO shows a positive association (B = 0.0293), but these effects are not reliable given the p-values.
- Based on standardized coefficients, CR has the largest relative effect (β = 0.1520), followed by TATO (β = 0.0759), while DER contributes negligibly (β = -0.0144).
- Collinearity statistics indicate no serious multicollinearity: tolerance values range from 0.4945 to 0.9727 and VIF values range from 1.0280 to 2.0221 (all well below common concern thresholds).

Table 6. Residual normality tests.

Test	Statistic	Sig.

Kolmogorov–Smirnov (Lilliefors)	0.2443	0.0012
Shapiro–Wilk	0.8061	0.0000

Note: Residuals deviate from normality; interpret inference cautiously.

Table 6 above, summarizes normality tests for the regression residuals. Two common diagnostics are reported: the Kolmogorov–Smirnov test with the Lilliefors correction and the Shapiro–Wilk test.

Key interpretation:

- Kolmogorov–Smirnov (Lilliefors): statistic = 0.2443 with p = 0.0012, indicating the residuals are not normally distributed.
- Shapiro–Wilk: statistic = 0.8061 with p < 0.001, also rejecting the assumption of normal residuals.
- Overall, both tests provide consistent evidence that residuals deviate from normality; therefore, statistical inference (e.g., t-tests and p-values) should be interpreted cautiously, and robust methods or transformations may be considered.

Table 7. Heteroskedasticity test (Breusch–Pagan equivalent).

Test	LM Statistic	LM Sig.	F Statistic	F Sig.
Breusch–Pagan	0.2197	0.9744	0.0686	0.9764

Note: p-values > 0.05 indicate no evidence of heteroskedasticity.

Table 7 above, presents the results of a heteroskedasticity test using the Breusch–Pagan procedure (or its equivalent) to assess whether the regression residuals have constant variance (Breusch & Pagan, 1979).

Key interpretation:

- The LM statistic is 0.2197 with a p-value (LM Sig.) of 0.9744.
- The F statistic is 0.0686 with a p-value (F Sig.) of 0.9764.
- Because both p-values are far greater than 0.05, there is no statistical evidence of heteroskedasticity. This suggests the homoskedasticity (constant variance) assumption is satisfied for this model.

5.1 Interpretation of regression results

The pooled regression model explains approximately 3.8% of the variation in ROA ($R^2 = 0.038$). The overall F-test is not significant ($p > 0.05$), indicating that the three ratio predictors do not jointly explain ROA in this sample.

Individually, CR has a positive coefficient, suggesting that higher liquidity is associated with higher ROA, but the relationship is not statistically significant. DER has a negative coefficient, consistent with the expectation that higher leverage may reduce profitability through financing costs and distress risk; however, the effect is not significant. TATO has a positive coefficient, consistent with efficiency arguments, but is also not significant.

Regarding diagnostics, VIF values are close to 2 for CR and TATO and near 1 for DER, suggesting no serious multicollinearity. The Breusch–Pagan test indicates no heteroskedasticity, and the Durbin–Watson statistic is close to 2, suggesting no residual autocorrelation. Residual normality tests are significant, likely driven by ratio outliers (e.g., extreme DER values), a common feature in firm-level financial data.

6. Discussion

The non-significant relationships may reflect the sector's structural and temporal dynamics during the observation window. Transportation profitability can be dominated by demand shocks, regulatory constraints, fuel costs, and capacity utilization, which are not fully captured by broad accounting ratios. Moreover, the presence of negative equity for some firms can produce extreme leverage ratios and distort linear model assumptions.

From a managerial perspective, the results do not imply that liquidity, leverage, and efficiency are irrelevant. Rather, they suggest that the incremental explanatory power of CR, DER, and TATO for ROA is limited when firms face extraordinary disturbances and heterogeneous balance-sheet conditions. For practitioners, a more granular approach—such as cash conversion cycle metrics, interest coverage ratios, and operational indicators (load factor, route profitability, fleet utilization)—may better explain profitability.

7. Conclusion, Implications, and Limitations

This study tested the effects of liquidity (CR), leverage (DER), and activity (TATO) on profitability (ROA) among 15 IDX transportation sector firms across 2019–2020 and 2022–2023. The estimated coefficients have the expected signs (CR and TATO positive; DER negative), yet none are statistically significant at the 5% level. Diagnostics indicate acceptable multicollinearity and homoskedasticity, but residual non-normality suggests that conclusions should be interpreted cautiously.

Implications: Financial managers should continue monitoring short-term liquidity, debt capacity, and asset utilization, but profitability improvement initiatives may require additional drivers beyond these ratios, particularly during volatile periods.

Limitations and future research: The dataset covers four years and excludes potential controls such as firm size, growth, fuel costs, and macroeconomic variables. Future studies could employ panel-data techniques with time and firm effects, robust estimators, and extended variables (e.g., interest coverage, operating margin, cash conversion cycle) to better explain transportation sector profitability.

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