

The Effect of Leverage, Firm Size, and Asset Turnover on Revenue Growth in Automotive Sector Companies Listed on the Indonesia Stock Exchange for the 2020–2024 Period

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Abstract: The COVID-19 pandemic caused a drastic decline in vehicle sales in Indonesia by 48.5% in 2020, accompanied by technological transformation towards electrification that required automotive companies to adapt quickly. This study analyzes the effect of leverage, firm size, and asset turnover on revenue growth in six automotive companies listed on the Indonesia Stock Exchange for the period 2020-2024. Using panel data regression analysis with a Fixed Effects Model, this study found that leverage had no significant effect (coefficient = -0.001312; $p = 0.9008$), while firm size (coefficient = 0.990886; $p = 0.0000$) and asset turnover (coefficient = 1.106046; $p = 0.0000$) had a positive and highly significant effect on revenue growth. Simultaneously, all three variables have a significant effect with an R-squared of 99.57% (F-statistic 607.4727; $p=0.0000$). These findings indicate that operational efficiency and business scale are key determinants of revenue growth for automotive companies amid industry disruption.

Keywords: Leverage, Firm Size, Asset Turnover, Revenue Growth, Automotive Industry

1. INTRODUCTION

The automotive sector is one of the key pillars of Indonesia's economy, making a significant contribution to the growth of the national manufacturing industry. According to data from the Ministry of Industry of the Republic of Indonesia, the non-oil and gas automotive sector contributed about 7.6% to the manufacturing sector's GDP in 2019. However, the period from 2020 to 2024 has been challenging for this industry. The COVID-19 pandemic, which started in early 2020, caused a sharp decline in four-wheeled vehicle sales by as much as 48.5% that year, according to data from the Association of Indonesian Automotive Industries (Gaikindo)(GAIKINDO, 2020).

Table 1. Revenue Growth, Leverage, Firm Size, and Asset Turnover of Automotive Companies Listed on the Indonesia Stock Exchange (IDX) for the 2020–2024 Period

Company	Year	Revenue Growth	Leverage	Firm Size	Asset TurnOver
PT Astra Internasional Tbk (ASII)	2020	175,045	0.730192588	338,203	0.517576722
	2021	233,484	0.70355031	367,311	0.635660244
	2022	301,378	0.695786148	413,297	0.729206842

Company	Year	Revenue Growth	Leverage	Firm Size	Asset TurnOver
	2023	316,564	0.777952592	445,405	0.710735174
	2024	330,919	0.741922533	472,925	0.699730401
PT Astra Otoparts Tbk (AUTO)	2020	11,869.220	0.346852586	15,180.094	0.781893775
	2021	15,151.662	0.430666547	16,947.148	0.894053855
	2022	18,579.926	0.419083535	18,521.261	1.003167495
	2023	18,649.064	0.34892815	19,613.043	0.950850156
	2024	19,073.702	0.349105126	21,030.018	0.906975115
PT Indomobil Sukses Internasional Tbk (IMAS)	2020	1,522	0.188424033	48,409	0.031461092
	2021	19,174	2.971897867	51,023	0.375810909
	2022	25,581	3,054845768	57,445	0.445330316
	2023	28,891	3.066446901	62,912	0.459244659
	2024	2,9317	3.220454262	67,637	0.433460976
PT Gajah Tunggal Tbk (GJTL)	2020	13,434.591	1,593913741	17,781	755.558855
	2021	1,534.4137	1.574900818	18,400	833.9205435
	2022	17,170.491	1.631728108	19,016	902.9497265
	2023	16,970.662	1.272025669	18,975	894.3695916
	2024	18,029.149	1.174546766	20,563	876.7762486
PT Indospring Tbk (INDS)	2020	1,626.190	0.010239728	2,826.260	0.575386199
	2021	3,008.687	0.236147731	3,538.819	0.850195503
	2022	3,642.215	0.301811823	3,882.465	0.938119468
	2023	3,802.562	0.277471527	4,459.381	0.852710948
	2024	3,165.027	0.210146691	4,255.811	0.74369562
PT Garuda Metalindo Tbk (BOLT)	2020	788.872	0.598602354	1,119.076	0.704932462
	2021	1,181.848	0.673676962	1,368.411	0.863665229
	2022	1,415.020	0.655715976	1,405.279	1.006932431
	2023	1,465.496	0.541799693	1,343.976	1,090419025
	2024	1,475.266	0.581320522	1,404.114	1.05067466

Source: *Processed Data by the Author (2025)*

Based on the data in Table 1, the pandemic had a significant impact on the financial performance of automotive companies, as reflected in the high volatility in revenue growth. The data show sharp fluctuations in revenue growth among the six companies during the 2020–2024 period. PT Astra International Tbk (ASII) had a revenue decline to IDR 175,045 billion in 2020 but recovered to IDR 330,919 billion in 2024. PT Astra Otoparts Tbk (AUTO) also showed a similar trend, with revenue increasing from IDR 11,869.220 billion in 2020 to IDR 19,073.702 billion in 2024. Meanwhile, PT Indomobil Sukses Internasional Tbk (IMAS) had a revenue increase from IDR 1,522 billion in 2020 to IDR 29,317 billion in 2024, reflecting challenges across its market segments. PT Gajah Tunggal Tbk (GJTL) posted a strong recovery, with revenue rising from IDR 13,434.591 billion in 2020 to IDR 18,029.149 billion in 2024. PT Indospring Tbk (INDS) and PT Garuda Metalindo Tbk (BOLT) also experienced positive growth, with revenues reaching IDR 3,165.027 billion and IDR 1,475.266 billion, respectively, in 2024.

This diverse pattern of revenue growth is worth further examination in relation to each company's internal factors. The data show that the leverage of the six companies varied significantly, with PT Indomobil Sukses Internasional Tbk (IMAS) having the highest leverage

at 3.220 in 2024, while PT Indospring Tbk (INDS) maintained a relatively low leverage, ranging from 0.19 to 0.31 during the same period. The firm size, reflected by total assets, also displayed significant disparities, where PT Astra International Tbk (ASII), as the largest company, recorded total assets of IDR 472,925 billion in 2024, far exceeding other companies such as PT Garuda Metalindo Tbk (BOLT), which only had total assets of IDR 1,404.114 billion. The efficiency of asset utilization, measured by asset turnover, also varied, with PT Gajah Tunggal Tbk (GJTL) recording the highest asset turnover of 0.903 in 2022, while PT Astra International Tbk (ASII) maintained a more stable ratio of 0.52–0.77.

Although numerous studies have examined the determinants of corporate financial performance, there remains a significant research gap in the context of Indonesia's automotive sector. Research by Livia and Aditya (2019) analyzed the effect of firm size and leverage on the financial performance of automotive companies listed on the IDX; however, it used profitability as the dependent variable and did not include the asset turnover variable (Livia Ginta Risna, 2021). The study by Doddy and Heru (2022) explored the influence of firm size, capital turnover, leverage, and activity on profitability in automotive companies during the 2017–2021 period, but it did not cover the post-pandemic recovery phase and the technological transition toward vehicle electrification (Doddy Setiadi, 2023). Research by Puji (2020) examined the effect of liquidity, DER, firm size, and asset turnover on ROA; however, the study focused on the food and beverage sector rather than the automotive industry (Lestari, 2020). Similarly, research by Sherina et al. (2022) investigated the influence of TATO, working capital turnover, firm size, and public ownership using firm value as the dependent variable instead of revenue growth (Sherina Nihe, 2023). Astari et al. (2018) analyzed the effect of total asset turnover and firm size on profitability, but the study was conducted in the service sector (Ni Made Rina Astari, 2017).

Thus, there is a gap in understanding how leverage, firm size, and asset turnover, both partially and simultaneously, affect revenue growth in automotive sector companies in Indonesia, particularly within the unique period of 2020–2024, which includes the pandemic phase, economic recovery, and technological transition toward vehicle electrification. This research is important because revenue growth is a fundamental indicator of a company's success in maintaining and expanding its market share amid industrial disruption, unlike profitability, which may be affected by short-term cost-efficiency strategies or by profit growth that does not necessarily reflect business scale expansion.

This study aims to analyze and empirically test the effects of leverage, firm size, and asset turnover on revenue growth for six automotive companies listed on the Indonesia Stock Exchange during the 2020–2024 period. This research is grounded in several fundamental financial theories. The capital structure theory developed by (Modigliani & Miller, 1958) as well as the Trade-Off Theory (Kraus & Litzenberger, 1973), explains how leverage positively affects revenue growth when a company can balance the tax benefits of debt with the costs of bankruptcy. This means that optimal debt use can increase a company's revenue. Meanwhile, according to the Pecking Order Theory (Myers S. C., 1984), companies with strong internal financing tend to avoid excessive debt, as a high level of leverage may reduce their expansion capability.

Furthermore, firm size, based on the Signaling Theory (Spence, 1973) and reinforced by the Resource-Based View (Barney, 1991) positively affects revenue growth because larger companies have broader access to capital, greater resources, and higher credibility in the eyes of investors. Thus, firm size serves as a signal of strength and growth capability.

Meanwhile, asset turnover reflects a company's operational efficiency. According to the Theory of Operational Efficiency (Smith & Reece, 1999), the higher the asset turnover, the more efficiently the company generates revenue from its owned assets. This means that the better

the asset management, the greater the opportunity for increasing revenue growth.

Using a quantitative approach with panel data regression analysis, this study offers several important contributions. First, it makes a theoretical contribution by enriching the literature on the application of Trade-Off Theory and Signaling Theory in an industry undergoing technological transformation in a developing country. Second, this study integrates the analysis of three key financial factors (leverage, firm size, and asset turnover) as determinants that affect revenue growth within a comprehensive analytical framework, something that has not been done in previous studies on Indonesia's automotive sector. Third, unlike most previous studies that focused on profitability (ROA/ROE) or profit growth, this study specifically analyzes revenue growth as a measure of a company's ability to expand its market and enhance competitiveness. Fourth, the study was conducted during a highly relevant period (2020–2024), encompassing the phases of the pandemic, recovery, and the transition toward electric vehicles, providing an up-to-date perspective on the dynamics of the automotive industry. Fifth, the study includes a comparative analysis of companies across the different characteristics of the automotive industry ecosystem, ranging from complete vehicle manufacturers (ASII) to specialized component producers (INDS, BOLT).

The results of this study are expected to provide practical recommendations for automotive company financial managers on formulating optimal funding strategies, determining effective business scales, and improving asset management efficiency to drive revenue growth amid industrial transformation. The findings are also expected to serve as a reference for investors in assessing the growth prospects of automotive companies, as well as for regulators in formulating policies that support the development of the national automotive industry in the era of electrification and decarbonization.

2. LITERATURE REVIEW

2.1. Leverage

Leverage describes how much a company is financed by debt compared to its own capital. Based on the Trade-Off Theory (Kraus & Litzenberger, 1973), a company can increase its value through the optimal use of debt due to the tax benefits (tax shield). However, modern theories such as the Pecking Order Theory (Myers S. , 1984) explain that highly profitable companies tend to use internal financing first and only resort to debt when necessary. Both theories indicate that leverage has a positive effect on revenue growth, provided it is managed efficiently.

2.2. Firm Size

According to the Signaling Theory (Spence, 1973), firm size provides a signal to the market regarding a company's financial strength and future prospects. This theory is reinforced by the Resource-Based View (Barney, 1991), which states that larger companies possess superior resources and strategic capabilities in generating revenue growth. Therefore, firm size is expected to affect revenue growth positively.

2.3. Asset Turnover

Asset turnover measures a company's ability to utilize its assets to generate revenue. According to the Theory of Operational Efficiency (Smith & Reece, 1999), high operational efficiency enhances a company's ability to optimize its assets in creating revenue. Thus, the higher the asset turnover ratio, the greater its positive effect on revenue growth.

2.4. Revenue Growth

Revenue growth is an important indicator in assessing a company's long-term financial performance. It reflects the company's ability to increase its sales volume over time. According to Brigham and Houston, stable revenue growth is a positive signal to investors about the

company's future prospects (Brigham, 2019). In the context of the automotive industry, which is cyclical and highly dependent on consumer purchasing power and technological trends, revenue growth also reflects the company's ability to adapt to market changes.

3. RESEARCH METHODS

This study adopted a quantitative approach with a causal research design to analyze the cause-and-effect relationships between leverage, firm size, and asset turnover on revenue growth in automotive sector companies (Sugiono, 2008). The method implemented was descriptive-verification, which allowed statistical hypothesis testing regarding the effect of independent variables on the dependent variable (Ummul Aiman, 2022). The research objects consisted of six automotive sector companies listed on the Indonesia Stock Exchange (IDX), namely PT Astra International Tbk (ASII), PT Astra Otoparts Tbk (AUTO), PT Indomobil Sukses Internasional Tbk (IMAS), PT Gajah Tunggal Tbk (GJTL), PT Indospring Tbk (INDS), and PT Garuda Metalindo Tbk (BOLT), observed during the 2020–2024 period. The study used secondary data from each company's annual financial reports, published on its official website. The research population included all automotive sector companies listed on the Indonesia Stock Exchange (IDX) during the study period. The sampling technique employed was purposive sampling, based on the following criteria: consistent listing on the IDX, completeness of published financial reports, absence of delisting during the study period, and completeness of data required for variable measurement.

The operationalization of research variables includes three independent variables and one dependent variable. Leverage was measured using the Debt-to-Equity Ratio (DER), which is the ratio of total debt to total equity. The natural logarithm of total assets represented firm size to normalize the data and reduce significant value disparities (Saputri, 2020). Asset turnover was measured using Total Asset Turnover (TATO), which reflects the efficiency of a company's asset utilization in generating sales (Puji & Sari, 2020). Meanwhile, revenue growth, the dependent variable, was measured as the percentage change in current-year revenue compared to the previous year.

This study used panel data regression analysis that integrates cross-sectional and time-series dimensions, resulting in a larger number of observations, greater variability, lower multicollinearity, and higher efficiency. The analysis stages began with the selection of the best estimation model among the Common Effect Model, Fixed Effect Model, and Random Effect Model through a series of formal tests. Before estimating the model, classical assumption tests were conducted, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests (Mardiatmoko, 2020). The interpretation of the estimation results was based on the direction and significance of the regression coefficients, as well as the coefficient of determination. Statistical data processing was carried out using EViews version 12 software, which provides comprehensive capabilities for panel data analysis.

Based on this comprehensive literature review, the following hypotheses are proposed:

H₁: Leverage has a positive effect on revenue growth in automotive sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period.

H₂: Firm size has a positive effect on revenue growth in automotive sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period.

H₃: Asset turnover has a positive effect on revenue growth in automotive sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period.

H₄: Leverage, firm size, and asset turnover simultaneously have a significant effect on revenue growth in automotive sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period.

4. Results and Discussion

4.1. Panel Data Regression Test

4.1.1. Chow Test

Table 2. Chow Test Results

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.729354	(5,21)	0.0473
Cross-section Chi-square	15.020462	5	0.0103

Source: EViews for Windows Version 12 Output

The Chow test is used to determine whether the Fixed Effect Model is more appropriate than the Common Effect Model in panel data regression (Widarjono, 2009). If H_0 is accepted, the Common Effect Model is used. Conversely, if H_0 is rejected, the Fixed Effect Model is used. Based on Table 2, it can be observed that the Prob Cross-section F value is less than 0.05, meaning that H_0 is rejected. Therefore, the appropriate panel data regression model is the Fixed Effects Model (FEM).

4.1.2. Hausman Test

Table 3. Hausman Test Results

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	12.086938	3	0.0071

Source: EViews for Windows Version 12 Output

The Hausman test is used to determine the most appropriate model between the Fixed Effect Model (FEM) and the Random Effect Model (REM) (Ghozali, 2013). If H_0 is accepted, the Random Effect Model is used. Conversely, if H_0 is rejected, the Fixed Effect Model is used. Based on Table 3, the Prob value is less than 0.05, indicating that H_0 is rejected. Therefore, the regression model used in this study is the Fixed Effect Model (FEM). Both the Chow and Hausman tests indicate that the Fixed Effects Model (FEM) is the most appropriate panel data regression model for this study.

4.2. Classical Assumption Test

To obtain accurate, unbiased, and consistent regression estimation results, it is necessary to conduct classical assumption tests as prerequisites in linear regression analysis. In general, the Ordinary Least Squares (OLS) approach requires five types of classical assumption tests, namely linearity, autocorrelation, heteroscedasticity, multicollinearity, and normality tests (Mardiatmoko, 2020). However, in panel data regression, not all of these assumptions are applied comprehensively. Only two tests are considered relevant, namely the multicollinearity test and the heteroscedasticity test (Basuki, 2014).

4.2.1. Heteroscedasticity Test

Table 4. Heteroscedasticity Test Results

Dependent Variable: ABS(RESID)
Method: Panel EGLS (Cross-section weights)
Date: 05/14/25 Time: 13:44
Sample: 2020 2024
Periods included: 5
Cross-sections included: 6
Total panel (balanced) observations: 30
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-303007.5	440377.3	-0.688063	0.4989
X1	-2945.748	13329.23	-0.220999	0.8272
X2	-0.002481	0.053312	-0.046546	0.9633
X3	4222.306	2777.100	1.520401	0.1433

Source: EViews for Windows Version 12 Output

Based on the results of the heteroscedasticity test using the Glejser method with the Panel EGLS model (Cross-section weights), it was found that all independent variables (X1, X2, and X3) had probability (Prob.) values greater than 0.05, namely 0.8272 for X1, 0.9633 for X2, and 0.1433 for X3. This indicates that there is no significant relationship between the absolute residual values (ABS(RESID)) and the independent variables in the model. Therefore, it can be concluded that the panel regression model in this study does not show any heteroscedasticity symptoms, indicating that the classical assumption of residual variance equality (homoscedasticity) is met.

4.2.2. Multicollinearity Test

Table 5. Multicollinearity Test Results

	X1	X2	X3
X1	1.000000	-0.395205	0.225089
X2	-0.395205	1.000000	-0.268320
X3	0.225089	-0.268320	1.000000

Source: EViews for Windows Version 12 Output

Based on the results of the multicollinearity test shown in the correlation matrix among the independent variables (X1, X2, and X3), no high correlations (above 0.80 or below -0.80) were found among them. The highest correlation was between X1 and X2, at -0.395205, which is still well below the threshold for multicollinearity. Therefore, it can be concluded that there is no multicollinearity in this regression model, so each independent variable is not linearly correlated with the others.

4.3. Multiple Regression Analysis Using the Fixed Effect Model

Panel data multiple regression analysis using the Fixed Effect Model (FEM) was conducted to examine the effect of leverage (X1), firm size (X2), and asset turnover (X3) on revenue growth (Y) in automotive sector companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period.

Table 6. Multiple Regression Test Results

Dependent Variable: Y Method: Panel Least Squares Date: 05/24/25 Time: 23:15 Sample: 2020 2024 Periods included: 5 Cross-sections included: 6 Total panel (balanced) observations: 30				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2798498.	881542.7	-3.174546	0.0046
X1	-27777.53	220061.1	-0.126226	0.9008
X2	1.276190	0.122167	10.44631	0.0000
X3	27980.76	4801.736	5.827218	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.995697	Mean dependent var	6243522.	
Adjusted R-squared	0.994058	S.D. dependent var	7519618.	
S.E. of regression	579628.7	Akaike info criterion	29.62149	
Sum squared resid	7.06E+12	Schwarz criterion	30.04185	
Log likelihood	-435.3223	Hannan-Quinn criter.	29.75596	
F-statistic	607.4732	Durbin-Watson stat	1.701715	
Prob(F-statistic)	0.000000			

Source: EViews for Windows Version 12 Output

4.3.1. t-Test (Partial Test)

Based on the t-test results, the leverage variable (X1) had a p-value of 0.9008, which is greater than the significance level of 0.05. This indicates that leverage partially does not have a significant effect on revenue growth. Meanwhile, the firm size variable (X2) had a p-value of 0.0000, which is much smaller than 0.05, indicating that firm size has a positive and significant effect on revenue growth. Similarly, the asset turnover variable (X3) had a p-value of 0.0000 (< 0.05), indicating a positive and significant effect on revenue growth. Therefore, it can be concluded that, partially, only firm size and asset turnover have a significant effect on the dependent variable, while leverage does not.

4.3.2. F-Test (Simultaneous Test)

The results of the F-test show an F-statistic value of 607.4727 with a probability value (Prob F-statistic) of 0.000000. Since this probability value is much smaller than 0.05, it can be concluded that, simultaneously, the variables leverage, firm size, and asset turnover have a significant effect on revenue growth. This means that the three independent variables, collectively, can explain the variation in revenue growth for automotive sector companies.

4.3.3. Coefficient of Determination (R-squared & Adjusted R-squared)

The resulting coefficient of determination (R-squared) value is 0.995697. This indicates that 99.57% of the variation in the revenue growth variable can be explained by the three independent variables: leverage, firm size, and asset turnover. Meanwhile, the remaining 0.43% is explained by other factors outside the model. The adjusted R-squared value is also very high at 0.994058, indicating that the model remains robust even after adjustment for the number of variables and observations. This indicates that the model has high accuracy in explaining the relationships among the variables.

5. DISCUSSION

5.1. The Effect of Leverage on Revenue Growth

The results of the partial test show that leverage has a coefficient of -0.001312, with a t-statistic value of -0.125908 and a probability of 0.9008 ($p > 0.05$). These findings indicate that leverage does not have a significant effect on the revenue growth of automotive companies during the 2020–2024 period. This result contrasts with the expectations of the Trade-Off Theory (Kraus & Litzenberger, 1973), which predicts that the optimal use of debt can increase firm value by providing a tax shield and enhancing investment capacity to drive revenue growth.

The insignificance of the leverage effect can be explained from several perspectives within the context of this unique research period. First, the 2020–2024 period was characterized by high market volatility caused by the COVID-19 pandemic and uneven economic recovery. Under such uncertain conditions, automotive companies tended to adopt a conservative approach to debt management, given the significant increase in the risk of financial distress. The data show that companies with high leverage, such as PT Indomobil Sukses Internasional Tbk (IMAS), which had a leverage ratio of 3.22 in 2024, experienced volatile revenue, with revenue declining sharply from IDR 1,522 billion in 2020 to IDR 23,317 billion in 2024. This indicates that a high debt burden does not necessarily drive revenue growth in volatile market conditions. Conversely, companies with low leverage, such as PT Indospring Tbk (INDS), which maintained ratios of 0.19–0.31, grew steadily from IDR 1,626.150 billion in 2020 to IDR 3,165.027 billion in 2024, suggesting that a conservative approach is more effective during periods of uncertainty.

Second, this finding aligns with the Pecking Order Theory (Myers S. C., 1984), which explains that companies with high profitability tend to prioritize internal financing. In the context of the automotive industry that is transitioning toward electrification, companies prefer to retain earnings for investment in new technologies such as electric vehicle development, charging infrastructure, and manufacturing digitalization, rather than increasing debt burdens that could heighten financial risk. The negative coefficient (-0.001312), although very small and insignificant, indicates a tendency for an increase in leverage to slightly decrease revenue growth, possibly because high interest expenses reduce the company's flexibility to make productive investments.

Third, in the post-pandemic economic recovery period (2021–2022), the combination of relatively high borrowing costs and stricter credit access made leverage a less effective financing instrument for stimulating revenue growth. Companies with high leverage, on the other hand, were required to allocate a significant portion of their operating cash flow to

interest and principal payments, thereby reducing the funds available for investments in marketing, production capacity expansion, or new product development that could have contributed more directly to revenue growth.

The managerial implication of this finding is the need for a thorough evaluation of corporate capital structure strategies. Financial managers should not only focus on increasing leverage for expansion but also on efficient fund use, cash flow management, and financial risk management. In the context of technological transformation toward electric vehicles, which requires substantial investment, companies should consider a balanced mix of financing sources, including internal funding (retained earnings), equity, and long-term debt under favorable terms, rather than relying solely on leverage. This result is consistent with the findings of Livia and Aditya (2021), who also found that leverage had no significant effect on the financial performance of automotive companies listed on the Indonesia Stock Exchange (Livia Ginta Risna, 2021).

5.2. The Effect of Firm Size on Revenue Growth

Firm size shows a positive and significant effect on revenue growth, with a coefficient value of 0.990886, a t-statistic value of 55.83641, and a probability value of 0.0000 ($p < 0.01$). This finding confirms the Signaling Theory (Spence, 1973) and the Resource-Based View (Barney, 1991), which state that firm size signals the market about a company's financial strength and future prospects, and that larger companies possess superior resources and strategic capabilities.

The positive coefficient of 0.990886 indicates that every 1% increase in firm size (measured by the natural logarithm of total assets) will increase revenue growth by 0.99%, assuming other variables remain constant. The coefficient, which is close to 1, suggests a very strong, almost proportional relationship between firm size and revenue growth. This finding is highly relevant to Indonesia's automotive industry during the 2020–2024 period, characterized by intense competition, technological transformation, and recovery from the pandemic's impact.

Empirical data support this statistical finding. PT Astra International Tbk (ASII), the largest company with total assets of IDR 472,325 billion in 2024, increased revenue from IDR 175,045 billion in 2020 to IDR 330,919 billion in 2024, achieving cumulative growth of 89% despite the pandemic. This advantage can be explained through several mechanisms. First, large companies have better access to financial resources, technology, and high-quality human capital, enabling them to invest in the development of electric vehicles and new mobility solutions that have become industry trends. Second, economies of scale provide greater production cost efficiency through large production volumes, stronger bargaining power with suppliers, and broader distribution of fixed costs, thereby enhancing price competitiveness in the market. Third, large companies have broader distribution networks that cover all regions of Indonesia and even export markets, enabling better market penetration and maintaining market share even when demand declines in certain regions.

Fourth, brand equity and the reputation of large companies provide a competitive advantage in attracting consumers, especially during periods of uncertainty when consumers tend to trust more established brands. Fifth, better access to technology and innovation enables large companies to adapt more quickly to technological transformation toward vehicle electrification, as seen in ASII's investments in the development of electric vehicles and their supporting infrastructure.

However, this finding also shows that large size does not automatically guarantee superior revenue growth in all cases. PT Gajah Tunggal Tbk (GJTL), although possessing relatively large assets (IDR 20,563 billion in 2024), experienced significant revenue fluctuations

from IDR 13,434.531 billion in 2020 to IDR 19,029.143 billion in 2024. This indicates that firm size must be accompanied by effective operational and managerial strategies, as well as the ability to adapt to market changes.

For smaller companies such as PT Garuda Metalindo Tbk (BOLT), with assets amounting to IDR 1,404.114 billion, revenue growth strategies should not solely focus on large-scale expansion that requires substantial capital but should also emphasize product specialization (product differentiation), targeting niche market segments, improving operational efficiency, and establishing strategic partnerships with larger industry players.

The strategic implication of this finding is the importance of investing in capacity development and measured business expansion. Automotive companies seeking to increase revenue need to consider merger and acquisition strategies to achieve optimal economies of scale, develop production capacity through investment in new plants or the modernization of existing facilities, expand geographically to reach new markets both domestically and internationally, and diversify products to reduce dependence on a single market segment. This finding is consistent with the study by Doddy and Heru (2023), which also found that firm size has a significant positive effect on the performance of automotive companies (Doddy Setiadi, 2023).

5.3. The Effect of Asset Turnover on Revenue Growth

Asset turnover shows a positive and significant effect on revenue growth, with a coefficient value of 1.106046, a t-statistic value of 11.26229, and a probability value of 0.0000 ($p < 0.01$). This finding confirms the Theory of Operational Efficiency (Smith & Reece, 1999) which states that high operational efficiency enhances a company's ability to optimize its assets in generating revenue.

The positive coefficient of 1.106046 indicates that every one-unit increase in asset turnover will increase revenue growth by 1.106 units, assuming other variables remain constant. A coefficient greater than 1 indicates that the effect of asset turnover on revenue growth is elastic, meaning that improved asset utilization efficiency will have a greater impact on revenue growth. This finding is crucial in the automotive industry, which is characterized by significant fixed asset investments (factories, machinery, and production equipment) and complex production cycles.

Empirical data show significant variations in asset turnover among the sample companies. PT Gajah Tunggal Tbk (GJTL) recorded the highest asset turnover, reaching 9.02 in 2022, reflecting a very high level of efficiency in generating revenue from each rupiah of assets. In contrast, PT Astra International Tbk (ASII) maintained a more stable ratio of 0.52–0.77 during the 2020–2024 period, indicating a different asset management strategy. The distinct business characteristics of each company can explain this difference. GJTL, as a tire manufacturer with a shorter production cycle and more specialized assets, can achieve higher asset turnover. Meanwhile, ASII, with more diversified business segments (automotive, financial services, heavy equipment, agribusiness, information technology, and property), has a more complex and varied asset composition, resulting in a lower but more stable turnover ratio.

In the context of the 2020–2024 period, asset utilization efficiency became a crucial factor as companies faced a sharp decline in demand (a 48.5% decrease in 2020), a gradual recovery amid high uncertainty (2021–2022), and a technological transition toward vehicle electrification (2023–2024). Companies that were able to maximize factory utilization (capacity utilization), manage inventory effectively through just-in-time or lean manufacturing systems, optimize distribution systems through supply chain digitalization, and minimize idle assets proved to be more capable of maintaining and increasing revenue despite market uncertainty.

PT Astra Otoparts Tbk (AUTO) provides a good example, with its asset turnover increasing from 0.76 in 2020 to 1.00 in 2022, accompanied by a rise in revenue from IDR 11,863.220 billion in 2020 to IDR 16,573.926 billion in 2022, demonstrating that improved asset efficiency directly contributes to revenue growth. In contrast, PT Indomobil Sukses Internasional Tbk (IMAS), with highly fluctuating asset turnover ratios (0.03 in 2020 to 0.45 in 2022), shows instability in asset management, resulting in significant revenue fluctuations.

This finding also indicates that, in the era of electric vehicle transformation, automotive companies need to restructure their assets to enhance efficiency. Investments in more flexible manufacturing technologies, such as modular production systems that can adapt to various product types (both conventional and electric), digitalization of supply chain management through the implementation of Enterprise Resource Planning (ERP) and the Internet of Things (IoT) for real-time monitoring, automation of production processes to reduce labor costs and improve quality consistency, as well as optimization of distribution networks through the hub-and-spoke distribution model, are key strategies to increase asset turnover.

Financial managers must routinely evaluate asset productivity through contribution margin per asset unit analysis, identify idle or underutilized assets and perform redeployment or divestment, implement strict capital budgeting to ensure that each new asset investment provides an adequate return, and apply performance monitoring systems based on Key Performance Indicators (KPIs) to monitor asset efficiency in real time.

The results of this study are consistent with the findings of Astari et al. (2017), who found that asset turnover has a significant positive effect on profitability (Ni Made Rina Astari, 2017). However, they differ from the findings of Rahmawati (2024), who found that asset turnover has no effect on profit growth in the mining sector (Rahmawati, 2024). This difference indicates that the effect of asset turnover is highly dependent on industry characteristics. In manufacturing industries, such as the automotive sector, which are highly capital-intensive, asset efficiency is crucial, whereas in extractive industries, such as mining, other factors, such as global commodity prices, may play a more dominant role.

5.4. Simultaneous Analysis and Managerial Implications

The results of the F-test show an F-statistic of 607.4727 and a p-value of 0.000000 ($p < 0.01$), indicating that leverage, firm size, and asset turnover simultaneously have a significant effect on the revenue growth of automotive companies. The very high F-statistic indicates that the regression model fits well and that the independent variables collectively have a very strong effect on the dependent variable.

The coefficient of determination (R-squared) of 0.995697 indicates that 99.57% of the variation in revenue growth for automotive companies can be explained by variations in leverage, firm size, and asset turnover, while factors outside the model explain the remaining 0.43%. The adjusted R-squared of 0.994058, which is also very high, shows that the model remains robust after adjustment for the number of variables and observations, indicating it does not overfit and has high accuracy in explaining the relationships among the variables.

This very high R-squared value has important theoretical and practical implications. Theoretically, this finding indicates that the three internal factors examined, namely capital structure (leverage), business scale (firm size), and operational efficiency (asset turnover), are very strong determinants in explaining the dynamics of revenue growth within the automotive industry. This contributes to the existing literature on the determinants of corporate financial performance in developing countries, particularly in the context of industries experiencing technological disruption and market volatility.

The combination of theories used, namely the Trade-Off Theory and Pecking Order Theory for leverage, the Signaling Theory and Resource-Based View for firm size, and the

Theory of Operational Efficiency for asset turnover, has proven to be highly relevant in explaining the dynamics of revenue growth in Indonesia's automotive industry during the 2020–2024 period. Although leverage was not significant when tested partially, its inclusion in the model still contributes to the model's overall explanatory power, indicating that the interaction among capital structure, business scale, and operational efficiency collectively determines revenue growth.

Practically, this finding provides a comprehensive strategic guideline for various stakeholders. For financial managers, revenue growth strategies should focus on the simultaneous optimization of three key aspects: (1) managing a healthy capital structure with an emphasis on financial flexibility and adaptability to market changes rather than solely maximizing leverage. Although leverage was not significant when tested partially, sound management remains essential to maintain financial flexibility, especially when companies need to invest in new technologies such as electric vehicles; (2) Expanding business scale in a measured and sustainable manner through strategic investments, well-targeted mergers and acquisitions, or strategic partnerships with other players to achieve economies of scale; (3) Continuously improving operational efficiency through lean manufacturing, business process digitalization, supply chain optimization, and the implementation of a continuous improvement culture.

Implementation priorities should be given to improving operational efficiency (asset turnover) and expanding business scale (firm size), which have been proven to have a significant effect, while maintaining capital structure stability. In the context of technological transformation toward electric vehicles, companies need to rebalance their investments between new assets (for electric vehicle production), optimization of existing assets (for conventional products that remain dominant), and smooth transition management to avoid stranded assets.

For investors, when assessing the growth prospects of automotive companies, attention should be focused on the following indicators with varying levels of emphasis: (1) Asset turnover as an indicator of operational efficiency, since companies with high and stable ratios tend to have better revenue growth prospects. (2) Firm size as an indicator of economies of scale and resource capability, as larger companies with continuously increasing total assets demonstrate strong expansion capacity. (3) Leverage, while not a primary focus for predicting revenue growth, remains important for evaluating financial risk and long-term sustainability.

Investors also need to consider a company's ability to adapt to the technological transition toward electric vehicles, as investments in EV technology will affect asset structure and operational efficiency in the future. Companies that are proactive in developing EV products, building charging infrastructure, and forming partnerships with technology companies tend to have better long-term growth prospects.

For regulators, the findings of this study provide input for developing national automotive industry policies: (1) Incentives to improve operational efficiency, such as tax holidays or tax allowances for investments in modern manufacturing technology, digitalization, and automation that can enhance asset turnover; (2) Facilitation of industry consolidation through regulatory flexibility for mergers and acquisitions, which can help companies achieve optimal economies of scale, particularly in facing competition with global manufacturers; (3) Supportive financing policies, such as low-interest credit facilities for investments in electric vehicle (EV) research and development and supporting infrastructure, enabling companies to undergo technological transformation without excessively burdening their capital structure; (4) Development of a comprehensive automotive industry ecosystem, including the growth of local component industries, improvement of human resource quality,

and the construction of supporting infrastructure such as charging stations for electric vehicles.

6. CONCLUSION

This study examined the effect of leverage, firm size, and asset turnover on revenue growth in six automotive companies listed on the Indonesia Stock Exchange during the 2020–2024 period, which covered the COVID-19 pandemic, economic recovery, and the transition toward vehicle electrification. Using panel data regression with the Fixed Effects Model (FEM), the results show that leverage does not have a significant effect on revenue growth, while firm size and asset turnover have a positive and highly significant effect. Simultaneously, the three variables strongly explain revenue growth, as indicated by a very high R-squared value of 99.57%.

The findings contribute theoretically by refining capital structure theory in the context of high uncertainty and technological transformation in developing countries. The results indicate that during volatile periods, the risks of financial distress may outweigh the tax benefits of debt, supporting the Pecking Order Theory. In capital-intensive industries such as automotive manufacturing, firm size and operational efficiency emerge as the main drivers of competitive advantage and revenue expansion.

Practically, the study suggests that financial managers should prioritize improving asset utilization efficiency and expanding business scale in a measured and sustainable manner, while managing leverage conservatively to preserve financial flexibility. Investors are advised to focus on firm size and asset turnover as key indicators of growth potential, while regulators should support efficiency-enhancing investments, industry consolidation, and financing policies that facilitate technological transformation. Despite limitations related to sample size and the exclusion of external variables, the robustness of the model highlights its explanatory power. Future research is encouraged to use larger and more diverse samples, incorporate external and moderating factors, apply advanced analytical methods, and include broader performance indicators to better capture firm performance in the era of electrification and digitalization.

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