



The Effect of Liquidity Ratio, Solvency, Profitability and Activity on Profit Changes in Automotive Companies Listed on the Indonesia Stock Exchange

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Abstract—This study aims to examine and determine the effect of the variables of liquidity ratio, solvability, profitability and activity on profit changes in automotive companies listed on the Indonesia Stock Exchange in 2017-2021. The method used in sampling is the purposive sampling method. The data analysis technique used testing assumptions, hypothesis testing, and multiple linear regression testing. The research results showed that partially independent variables, liquidity ratios and activity ratios did not significantly affect the profit changes with t-count values of 0.515 and 0.576 and significant values of 0.609 and 0.568. Meanwhile, the solvency ratio and profitability ratio have a negative and significant effect on changes in profit with t-count values of -2.368 and -2.574 and significant values of 0.022 and 0.013. Simultaneously, the ratio of liquidity, solvency, profitability and activity has a positive and significant effect on profit changes with an F-count value of 5.092 and a significant value of 0.002 for automotive companies listed on the IDX in 2017-2021.

Keywords—liquidity; solvency; profitability, activity, profit changes

I. INTRODUCTION

The company is always trying to increase the profits it generates to become a better company and keep it running smoothly. Likewise with companies in the automotive sector. Automotive companies increase competition in the world of work by launching new products, so that they can increase their income or profits to reduce the level of losses for the company. The automotive industry can make a significant contribution to the national economy. Today, automotive companies operate so fast that the competition is getting tougher. Entrepreneurs must be more inventive and possess a competitive advantage over their competitors. With a lot of competition, companies are increasingly improving their

performance between companies to achieve the goals to be achieved. The performance of the company can be assessed using financial statements that are presented periodically for each period.

Financial statements are essentially a result of the accounting process that can be used to inform interested parties about financial information or company activities [1]. The information in the financial statements can be used as a decision-making process carried out by the company. This financial report is used to determine the current financial position of the company or a certain period of time, and can be reported to the owner of the company and used to describe the level of operational efficiency of managers who run the company. Efficiency is carried out by a company to maximize profits to ensure its survival.

Profit can explain the performance of a company during a period in the past which is expected to increase in each period. Profit is generally used as a basis for making basic investment decisions and for predicting the future condition of the company. Company in earning profit for the coming year cannot be determined, it is necessary to predict changes in profit. In assessing changes in earnings, ratio analysis can be used as an important form of accounting information. Financial ratio analysis is used to test whether financial ratios are useful for predicting future earnings changes.

II. LITERATURE REVIEW

A. Financial Statements

A form of information used to view and assess the development of the company's performance is a financial report. The company is responsible for the presentation of

financial statements to related parties. These financial statements are basically the end result of an accounting process. Financial statements are reports that show a company's current financial condition or a certain period [2], summaries of company's operation and financial position at a specific time or period [3], and the outcome of an accounting process that can be used as a tool to communicate with parties who have an interest in financial data or activities of a company [4].

B. Financial Ratio

A set of technical analysis based on published financial statements is then developed to be able to interpret information that is relevant to the objectives and interests of its users. One of the technicians that is popularly applied in business practice, especially in predicting profits is financial ratio analysis.

The results of comparing one financial statement post to other posts that have a meaningful and significant relationship are numbers known as financial ratios. [3]. Similar to this, financial ratios are calculations that divide one number by another in order to compare the figures in the financial statements [2]. One component may be compared to other components found in the same financial statement or to components found in different financial statements.

C. Profit Changes

Every company wants profit or often referred to as profit. Profits are needed by companies to be able to continue to survive in the economy and continue the life of the company. Profit is the excess of income over expenses in connection with business activities [5]. Profit rewards the company's efforts to generate goods and services. The profit is defined as an excess of income over costs [6].

Every company strives to get the maximum profit. The company's ability to survive will be impacted by the profit made. The company undoubtedly wants to enhance the earnings it makes each year. Profit adjustments show both a gain and a loss in profit. Profit changes are relative changes in profits obtained based on the difference between profits in a certain period and the previous period and then divided by the profits of the previous period [7].

A change in profit is an increase or decrease in the company's profits from the prior year. The increase or decrease in profit will affect the investment decisions of investors who will invest in the company. Investors in assessing the company not only look at profits in each period but continue to monitor changes in profits from year to year.

Changes in financial statement elements like sales, cost of goods sold, operationan expenses, and other items have an impact on the profit. External variables including an increase in pricing owing to inflation and management freedom, which allows managers to select accounting procedures and make predictions that can boost profits, can also affect changes in earnings.

D. Hypothesis Development

Current Ratio shows the company's ability to pay off its short-term obligations from its current assets. The quick ratio shows the company's ability to meet or pay current liabilities or debts (long-term debt) with current assets. Rahmawati's research [8] show the Current Ratio has a significant effect on changes in earnings, while in Saputri's research [9] show that the Current Ratio has no significant effect on changes in earnings. Rahmawati's research [8] shows that Quick Ratio has a significant effect on profit changes, while in Dewi's research [10] it shows that Quick Ratio has no significant effect on earnings changes.

Debt to Asset Ratio (DAR) compares the total liabilities and total assets in the funding of the company, shows the importance of debt financing by showing the percentage of company assets that are supported by debt. Debt to Equity Ratio (DER) indicates that a large dependence on third parties or that the amount of capital possessed is less than the company's obligations. Saputri's [9] shows the results that DAR has a significant effect on changes in earnings, while Wardani et al. [11] shows DAR has no significant effect on changes in earnings. Rosyana's research [12] shows DER has a significant effect on earnings changes, while Dewi's research [10] shows DER has no significant effect on earnings changes.

Net profit margin used to measure the percentage of net profit on net sales or measure the company's ability to earn after-tax profit from net sales. A healthy company should have a positive Net Profit Margin which indicates that the company is not experiencing a loss. Gross profit margin is the percentage of gross profit generated by each company's income. The increasing Gross Profit Margin indicates the greater the level of return of gross profit obtained by the company on its net sales. Rosyana's research [12] show that Net Profit Margin has a significant effect on profit changes, while Yuigananda's et al. [13] show the results that Net Profit Margin has no significant effect on changes in profit while in the study. Rahmawati's research [8] show that Gross Profit Margin has a significant effect on profit changes, while Nababan and Genta's research [14] show that Gross Profit Margin has no significant effect on profit changes.

Total Asset Turnover is the difference between the company's total sales and its total assets. Total Asset Turnover is used to measure the effectiveness of the use of all its assets in generating sales for the company [15]. If the company can utilize its assets properly, the company's sales will increase. The higher the Total Asset Turnover, the higher the change in profits obtained by the company. If the higher the Total Asset Turnover, it is very good for the company for the company because high asset turnover can help maximize company profits. The higher this ratio indicates the more effective the management of its assets. Rosyana's research [12] show that Total Asset Turnover has a significant effect on profit changes, while Saputri's research [9] show that Total Asset Turnover has no significant effect on profit changes.

Based on the discussion that has been described above, the following hypothesis can be formulated:

- H1: Liquidity Ratio (Current Ratio and Quick Ratio) has a significant effect on profit changes in Automotive Companies listed on the IDX
- H2: Solvency Ratio (Debt to Asset Ratio and Debt to Equity Ratio) has a significant effect on profit changes in automotive companies listed on the IDX
- H3: Profitability (Net profit Margin and Gross Profit Margin) has a significant effect on profit changes in automotive companies listed on the IDX
- H4: Activity Ratio (Total Asset Turnover) has a significant effect on profit changes in automotive companies listed on the IDX
- H5: Liquidity ratio (Current Ratio and Quick Ratio), solvency ratio (Debt to Asset Ratio and Debt to Equity Ratio), profitability ratio (Net Profit Margin and Gross Profit Margin), and activity ratio (Total Asset Turnover) simultaneously has a significant effect on profit changes in automotive companies listed on the IDX

III. RESEARCH METHOD

This research was conducted on automotive companies listed on the Indonesia Stock Exchange (IDX) in 2017-2021. The source of data used in this study is the annual financial report of each company which can be accessed on the official website of the Indonesia Stock Exchange, IDN Financials or the company's official website. The sampling technique in this study was purposive sampling. The sample criteria used in this study are (1) an automotive company listed on the Indonesia Stock Exchange during the 2017-2021 periods, and (2) the company financial statements use the rupiah currency unit.

The author conducted a classical assumption test which aims to test the fulfillment of classical assumptions in order to avoid the occurrence of estimations, remembering that not all data can be applied regression so that the necessary conditions that meet the requirements are normally distributed data, no symptoms of multicollinearity, no autocorrelation, and no symptoms of heteroscedasticity. The regression model should give the Best Linear Unbiased Estimator (BLUE) results [16].

This study uses multiple linear regression analysis model.

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e \quad (1)$$

Where:

- a = Constant
- b₁, b₂, b₃, b₄ = Regression Coefficient
- Y = Change in Profit
- X₁ = Liquidity
- X₂ = Solvency
- X₃ = Profitability
- X₄ = Activity
- e = Factor outside the model

The stages of testing the research hypothesis are t-Test (Partial Test), F-Test (Simultaneous Test), and Coefficient of Determination (R²).

IV. RESEARCH RESULT

This study uses research objects on automotive companies listed on the Indonesia Stock Exchange in 2017-2021. The companies included in the object of this research are 10 companies.

A. Data Analysis

To analyze the effect of liquidity, solvency, profitability, and activity on earnings changes of automotive companies listed on the Indonesia Stock Exchange, statistical testing is used with multiple linear regression approach.

Before testing the regression model and testing the hypothesis, the classical assumption will be tested first so that later the model formed will provide a BLUE (Best Linear Unbiased Estimated) estimate.

1) Classic Assumption Test

a) Normality test results

The Kolmogorov Smirnov One-Sample normality test in Table 1 show that Asymp.sig (2-tailed) value is at 0.200.

TABLE I. NORMALITY TEST RESULTS

One-Sample Kolmogorov-Smirnov Test		Unstandardized Residual
N		50
Normal Parameters ^{a,b}	Mean	0.0000000
	Std. Deviation	1.25326764
Most Extreme Differences	Absolute	0.093
	Positive	0.063
	Negative	-0.093
Test Statistic		0.093
Asymp. Sig. (2-tailed)		0.200 ^{c,d}

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.
- d. This is a lower bound of the true significance.

The result mean that the data is normally distributed because the significance value is 0.200 > 0.05.

b) Multicollinearity test results

TABLE II. MULTICOLLINEARITY TEST RESULTS

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	LIQUIDITY	0.502	1.991
	SOLVENCY	0.431	2.321
	PROFITABILITY	0.816	1.226
	ACTIVITY	0.627	1.594

a. Dependent Variable: PROFIT CHANGE

Based on Table II, none of the independent variables has a Tolerance value < 0.10 and a Variance Inflation

Factor (VIF) > 10. There is no multicollinearity between independent variables in the regression model.

c) Autocorrelation Test Results

TABLE III. AUTOCORRELATION TEST RESULTS

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.558 ^a	0.312	0.250	1.30778	2.119

a. Predictors: (Constant), ACTIVITY, LIQUIDITY, PROFITABILITY, SOLVENCY
 b. Dependent Variable: PROFIT CHANGE

The results of the autocorrelation test showed the Durbin-Watson (DW) value of 2.119. This value is compared with the value in the DW table using a significance of 0.05. From the DW table, with the number of samples (n) 50 and the number of independent variables (k)4 the dU value is 1.7214 and dL is 1.3779. Based on the results obtained, the DW value is greater than dU and less than 4-dU, namely 4-1.7214 = 2.2786 or simply can be written as 1.7214 < 2.119 < 2.2786 (dU < DW < 4-dU). It can be concluded that the regression model does not occur autocorrelation between independent variables.

d) Heteroscedasticity Test Results

The heteroscedasticity test using the glejser test.

TABLE IV. HETEROSCEDASTICITY TEST RESULTS

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.026	0.571		1.795	0.079
	LIQUIDITY	0.003	0.069	0.009	0.050	0.961
	SOLVENCY	0.493	0.284	0.343	1.734	0.090
	PROFITABILITY	-0.396	0.820	-0.069	-0.483	0.632
	ACTIVITY	-0.515	0.364	-0.232	-1.415	0.164

a. Dependent Variable: ABS RES

Table IV show that all independent variables have a significance probability value above 0.05. There is no heteroscedasticity in the statistical model.

2) Multiple Regression Analysis

TABLE V. MULTIPLE LINEAR REGRESSION RESULTS

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.373	0.984		0.379	0.706
	LIQUIDITY	0.062	0.119	0.090	0.515	0.609
	SOLVENCY	-1.160	0.490	-0.446	-2.368	0.022
	PROFITABILITY	-3.636	1.412	-0.353	-2.574	0.013
	ACTIVITY	0.361	0.627	0.090	0.576	0.568

a. Dependent Variable: PROFIT CHANGE

Based on Table V, the following equation can be arranged:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

$$Y = 0.373 + 0.062X_1 - 1.160X_2 - 3.636X_3 + 0.361X_4 + e$$

3) Hypothesis Testing

a) Partial Test

TABLE VI. PARTIAL TEST RESULTS (T-TEST)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.373	0.984		0.379	0.706
	LIQUIDITY	0.062	0.119	0.090	0.515	0.609
	SOLVENCY	-1.160	0.490	-0.446	-2.368	0.022
	PROFITABILITY	-3.636	1.412	-0.353	-2.574	0.013
	ACTIVITY	0.361	0.627	0.090	0.576	0.568

a. Dependent Variable: PROFIT CHANGE

The results of the test and data processing for the t test can be interpreted as follows:

1) The liquidity ratio value significance at 0.609. A t-count > t-table (0.515 < 2.0141). The liquidity ratio variable has no significant effect on the change in earnings.

2) The solvency ratio value significance at 0.022. A t-count value of -2,368 and a t-table value of 2.0141. The solvency ratio variable has a significant negative effect on the change in earnings variable

3) The profitability ratio value significance at 0.013, and a t-count value of -2.574 and a t-table value of 2.0141. The profitability ratio variable has a significant effect on the income change variable.

4) The activity ratio value significance at 0.568, and a t-count value of 0.576 and a t-table value of 2.0141. The activity ratio variable has no significant effect on the income change variable.

b) Simultaneous Test

TABLE VII. SIMULTANEOUS TEST RESULTS (F-TEST)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.832	4	8.708	5.092	0.002 ^b
	Residual	76.963	45	1.710		
	Total	111.796	49			

a. Dependent Variable: PROFIT CHANGE
 b. Predictors: (Constant), ACTIVITY, LIQUIDITY, PROFITABILITY, SOLVENCY

Based on the table of simultaneous test results (F test) obtained F-count value of 5.092 which is greater than the value of F-table with a significant 0.05 (5%) of 2.57 and a significance value of 0.002. The variables of Liquidity, Solvency, Profitability, Activities together (simultaneously) have a significant effect on the variable profit changes.

c) *Coefficient of Determination Test*

TABLE VIII. DETERMINATION COEFFICIENT

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.558 ^a	0.312	0.250	1.30778

a. Predictors: (Constant), ACTIVITY, LIQUIDITY, PROFITABILITY, SOLVENCY

b. Dependent Variable: PROFIT CHANGE

Coefficient of determination based on the Adjusted R Square value is 25%, indicates the independent variables (liquidity, solvency, profitability, and activity) have an influence of 25% percent on the dependent variable Profit Changes while the rest is equal to 75% percent is explained by other variables outside the regression model of this study.

B. *Discussion*1) *The Effect of Liquidity on Profit Changes*

The liquidity ratio variable partially has no significant effect on changes in earnings. With a t-count value of 0.515 while the t-table value of 2.0141 so that t-count > t-table (0.515 < 2.0141) with a significance value of 0.609 greater than the 0.05 significance level (0.609 > 0.05). It can be concluded that the first hypothesis which states that the Liquidity Ratio partially has a significant effect on profit changes in automotive companies listed on the Indonesia Stock Exchange for the 2017-2021 period is rejected. Because the company's ability to fulfill its short-term obligations does not ensure that working capital would be available to fund its operational activities, the profits realized by the company are below expectations.

The results of this study are also supported by research conducted by Saputri [9] and Dewi [10] which states that the liquidity ratio partially has no significant effect on profit changes

2) *The Effect of Solvency on Profit Changes*

The solvency ratio variable partially does not have a significant negative effect on changes in earnings. With a t-count value of -2.368 while the t-table value of 2.0141 so that t-count < t-table (1.498 < 2.0141) with a significance value of 0.022 which is smaller than the 0.05 significance level (0.022 < 0.05). It can be concluded that the second hypothesis which states that the solvency ratio partially has a significant effect on profit changes in automotive companies listed on the Indonesia Stock Exchange for the 2017-2021 period is rejected.

From the analysis results indicate that the effect of solvency on earnings changes is a negative and significant effect. This means that there is an inverse relationship, when solvency increases, profits will decrease, and vice versa if solvency decreases, it is accompanied by an increase in profit on changes in profit, while the cause of the solvency ratio has a significant effect on profits is the

company's ability to utilize all assets owned in generating profit. A high ratio results in funding with greater debt, which makes it harder for the company to get new loans. Due to the limited ability of the company to enhance productivity due to the absence of funding from assets, the company's operations will be severely disrupted, which will ultimately result in a reduction in the level of income and profit changes.

The results of this study are also supported by research conducted by Rosyana [12] which states that the solvency ratio as measured by the Debt to Equity Ratio partially has a negative and significant effect on earnings changes.

3) *The Effect of Profitability on Profit Changes*

The profitability ratio variable partially has no significant effect on changes in earnings. With a t-count value of -2.574 while the t-table value of 2.0141 so that t-count < t-table (-2.574 < 2.0141) with a significance value of 0.013 which is smaller than the 0.05 significance level (0.013 < 0.05). The third hypothesis which states that the Profitability Ratio partially has a significant effect on profit changes in automotive companies listed on the Indonesia Stock Exchange for the 2017-2021 period is rejected.

From the analysis results indicate that the effect of profitability on profit changes is a significant negative effect. This means that there is an inverse relationship, when profitability increases, profits will decrease. This shows that the company does not spend production costs efficiently which will affect the cost of goods sold so that it will reduce the profit growth that will be received by the company.

The results of this study are also supported by research conducted by Rahmawati [8] which states that the profitability ratio partially has a negative and significant effect on profit changes.

4) *The Effect of Activity on Profit Changes*

The activity ratio variable partially has a positive and significant effect on changes in earnings. With a t-count value of 0.576 while the t-table value of 2.0141 so that t-count < t-table (0.576 < 2.0141) with a significance value of 0.568 which is smaller than the 0.05 significance level (0.015 < 0.05). The fourth hypothesis which states that the activity ratio partially has a significant effect on profit changes in automotive companies listed on the Indonesia Stock Exchange for the 2017-2021 period is rejected. It is because the company does not rotate its total assets effectively. This ineffectiveness is because the company does not use all of its assets to create sales that can generate profits. In addition, because the cost of goods sold or operating expenses borne by the company to generate sales is too large which affects the company's profit and causes the ratio of activities to changes in profit not to decrease too much.

The results of this study are also supported by research conducted by Saputri [9] which states that the activity ratio

as measured by Total Asset Turnover partially has no significant effect on changes in earnings.

V. CONCLUSION

Based on the research and analysis, it can be concluded that partially, the solvency ratio and the profitability ratio have a negative and significant effect on changes in profits of automotive companies listed on the Indonesian stock exchange for the 2017-2021 period, while the liquidity ratio and activity ratio have no effect on changes in profits of automotive companies listed on the Indonesian stock exchange for the 2017-2021 period. Meanwhile, if viewed simultaneously, then the ratio of liquidity, solvency, profitability and activity have a significant effect on the company's profit variable.

REFERENCES

- [1] Hery, "Mengenal dan Memahami Dasar-Dasar Laporan Keuangan," Jakarta: PT Grasindo, 2016.
- [2] Kasmir, "Analisis Laporan Keuangan," Jakarta: PT. Rajagrafindo Persada, 2016.
- [3] Sofyan Syafri Harahap, "Teori Akuntansi," Jakarta: PT. Rajagrafindo Persada, 2015.
- [4] Munawir, "Analisis Laporan Keuangan," Yogyakarta: Liberty, 2014.
- [5] Soemarso, "Akuntansi Suatu Pengantar," 5th edition, Jakarta: Rineka Cipta, 2010.
- [6] Suwardjono, "Teori Akuntansi Perekayasaan Pelaporan Keuangan," Yogyakarta: BPFY Yogyakarta, 2014
- [7] Sofyan Syafri Harahap, "Analisis Kritis atas Laporan Keuangan," Jakarta: PT. Rajagrafindo Persada, 2016.
- [8] Rika Rahmawati, "Pengaruh Rasio Profitabilitas Dan Likuiditas Terhadap Perubahan Laba pada Perusahaan Manufaktur 2013-2016," *Skripsi*, Banjarmasin: STIE Indonesia Banjarmasin, 2020.
- [9] Arifah Nur Saputri, "Pengaruh Rasio Likuiditas, Solvabilitas, dan Aktivitas terhadap Perubahan Laba Pada Perusahaan yang Terdaftar di Bursa Efek Indonesia (BEI)," *Skripsi*, Yogyakarta: STIE YKPN, 2019.
- [10] Winda Puspita Dewi, "Analisis Pengaruh Quick Ratio, Debt To Equity Ratio, Net Profit Margin, Price Earning Ratio, dan Ukuran Perusahaan Terhadap Perubahan Laba Pada Perusahaan Manufaktur Sektor Barang Konsumsi Yang Terdaftar di Bursa Efek Indonesia," *Jurnal Universitas Nisantara PGRI*, Volume 1, Nomor 3, pp. 1-14, 2017.
- [11] P. Puspa Wardani, M. Abdi Akbar Idris, dan Herman Sjahruddin, "Analisis Pengaruh Rasio Keuangan Terhadap Perubahan Laba Pada PT. Ultra Jaya Milk Industri Dan Trading Company Tbk," *Jurnal Niagawan*, Volume 9, Nomor 2, pp. 135-143, 2020.
- [12] Daejang Rosyana, "Pengaruh Likuiditas, Aktivitas, Solvabilitas dan Profitabilitas Terhadap Perubahan Laba Pada Perusahaan Retail Trade Di BEI," *Jurnal Ilmu Dan Riset Manajemen*, Volume 7, Nomor 4, pp. 1-16, 2018.
- [13] Amalia Yuigananda, Riana R. Dewi, dan Endang Masitoh, "Pengaruh Rasio Keuangan Terhadap Perubahan Laba," *Jurnal Universitas Pamulang*, Volume 2, Nomor 1, pp. 1-12, 2017.
- [14] Daniel Nababan dan Franklin Kharisma Genta, "Pengaruh Rasio Keuangan Dalam Memprediksi Perubahan Laba Pada Perusahaan Foods And Beverages Yang Terdaftar Di BEI," *Jurnal Ilmiah Akuntansi Dan Keuangan*, Volume 2, Nomor 1, pp. 51-60, 2019.
- [15] I Made Sudana, "Manajemen Keuangan Perusahaan," Jakarta: Erlangga, 2015 .
- [16] Imam Ghozali, "Aplikasi Analisis Multivariate dengan Program IBM SPSS 25," Semarang: Badan Penerbit Universitas Diponegoro, 2018.

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