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External and Internal Economic Drivers of Financial Performance

Evidence from PT Pertamina

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Abstract

This study aims to analyze the influence of external and internal factors on the financial performance of PT Pertamina (Persero) as measured using Return on Asset (ROA). External factors include world oil prices and inflation, while internal factors such as production expenses and total sales. The study used quarterly time series data for the period 2015Q1–2024Q4 with saturated sample technique and analyzed using multiple linear regression of the Ordinary Least Square (OLS) approach, which was preceded by stationarity test, classical assumptions, and hypothesis testing. The results show that world oil prices and total sales have a significant positive effect on ROA, while inflation and production expenses have a significant negative effect. Simultaneously, all independent variables have a significant effect with a high power to explain the model. These findings confirm that the asset profitability of strategic energy companies is influenced by macroeconomic dynamics and operational efficiency simultaneously. However, the study was limited to the use of specific variables, static OLS approaches, and single objects. Further research is recommended to include additional macroeconomic and structural variables and use dynamic econometric methods or comparative approaches to strengthen the generalization of findings.

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Introduction

The energy sector is one of the strategic sectors that has a fundamental role in supporting national economic growth (Obani et al., 2024). The dependence of industrial, transportation, and household activities on energy makes this sector very sensitive to fluctuations in global and domestic economic conditions (Pangestu & Ayuningsasi, 2024). In recent years, the energy industry has faced significant pressure due to the volatility of world oil prices, the COVID-19 pandemic, geopolitical instability, as well as global inflationary pressures that have an impact on the rising cost of energy production and distribution (Almutawa et al., 2025). This condition creates uncertainty for the stability of the financial performance of energy companies, including state-owned companies (Ayoub & Qadan, 2024).

As the largest energy company in Indonesia and a market leader in an oligopoly market structure with monopoly tendencies, PT Pertamina (Persero) has a strategic role in maintaining national energy security while making a major contribution to state revenue (Putri Fadillah, 2025). However, the market dominance it has does not automatically guarantee the stability of a company's financial performance (Cahyaningrum, 2025). Figure 1 shows that PT Pertamina's Return on Assets (ROA) has fluctuated significantly in the past decade, especially during the pandemic crisis period and global oil price turmoil. This phenomenon suggests that despite having great market power, the profitability of a company's assets remains vulnerable to the dynamics of external and internal factors (Aziz et al., 2024).

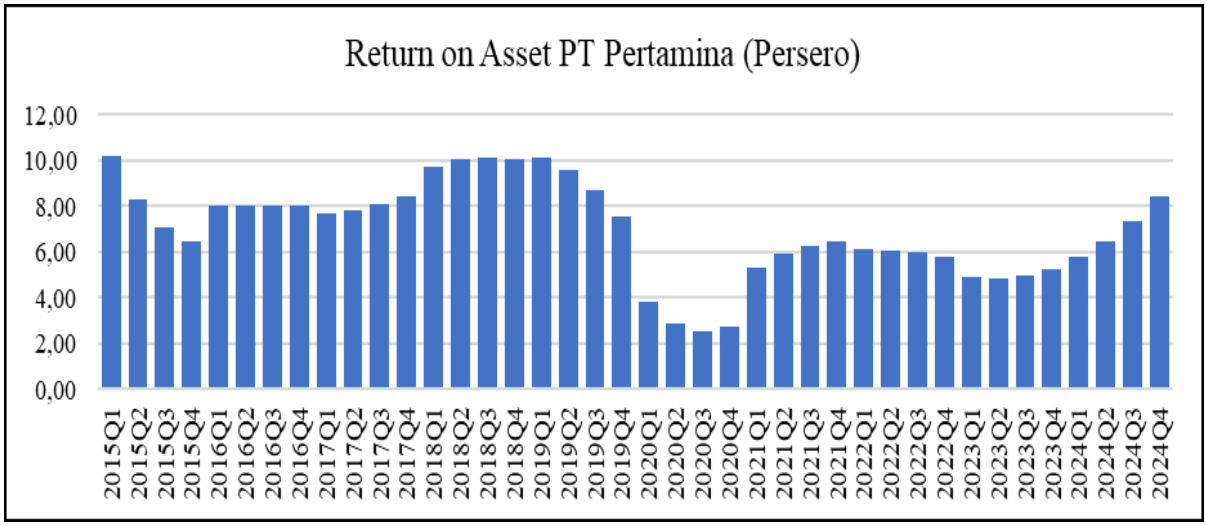

Figure 1 Development of PT Pertamina's (Persero) Return on Assets

Source: (PT Pertamina EP, 2024) (processed)

The main problem in this study is how external factors in the form of world oil prices and inflation, as well as internal factors in the form of production expenses and total sales, affect PT Pertamina's financial performance as measured using Return on Asset (ROA). The fluctuations in ROA that occur raise a fundamental question, whether changes in macroeconomic conditions and the operational efficiency of companies simultaneously really determine the stability of the profitability of the assets of state-owned strategic energy companies.

Empirically, previous research has shown results that are not completely consistent. Kharisma & Kusumastuti (9) found that world oil prices have a significant impact on the profitability of energy companies, while research conducted by Hardjanti et al. (10) shows that inflation does not always have a significant impact depending on the characteristics of the sector and the period of the study. On the other hand, research on internal factors such as production costs and total sales is mostly done in the manufacturing and banking sectors (Utami et al., 2025)-(Nurhana et al., 2024). Thus, it is still relatively limited to the context of state-owned energy companies that have different regulatory characteristics and market structures. In addition, most previous studies analyzed

internal and external factors separately and used annual data, so they have not been able to comprehensively capture short- and long-term dynamics.

This empirical gap is an important reason to re-examine the relationship between these variables in a different research object, namely PT Pertamina (Persero), using quarterly data for the period 2015Q1-2024Q4. This retest is important because the characteristics of Pertamina's market structure, price regulation, and strategic role in the national economy have the potential to produce different relationships compared to other sectors.

The novelty of this research lies in an integrative approach that combines external and internal factors in one empirical model to analyze the determinants of ROA in state-owned strategic energy companies. In addition, this study uses quarterly data over a long period of ten years, so that it is able to capture the dynamics of economic fluctuations in more detail. This research also places PT Pertamina not only as an object of an ordinary company, but as a market leader in a market structure that is not completely competitive, thus providing a new perspective that market dominance is not always synonymous with asset profitability stability (Amanda et al., 2025).

The urgency of this research is increasingly important considering PT Pertamina's strategic role in maintaining national energy stability and its contribution to state revenue. A comprehensive understanding of the determinants of corporate financial performance is needed as the basis for the formulation of managerial strategies, cost control, revenue optimization, and the formulation of sustainable national energy policies (Valencia, 2025). Without a strong empirical understanding, energy companies' management policies risk being ineffective in the face of global volatility (Qi & Zhao, 2025).

Based on this description, the purpose of this study is to analyze the influence of world oil prices, inflation, production expenses, and total sales on the financial performance of PT Pertamina (Persero) as measured using Return on Asset (ROA).

Research Methods

The population in the study specifically targets PT Pertamina's financial performance as measured through the Return on Asset (ROA) profitability indicator. The research sample is determined using the saturated sample technique, where all available and relevant time-lapse data is used as an object of analysis. The data used is in the form of quarterly time series data for the period 2015Q1-2024Q4, so that it can capture the short-term and long-term dynamics of the company's financial performance as well as the influence of fluctuations in internal and external factors on the ROA of PT Pertamina (Persero).

The data used is secondary, that is, data obtained from official sources and has been published before. The company's internal data in the form of Return on Asset (ROA), production expenses, and total sales were obtained from PT Pertamina (Persero)'s annual report. Meanwhile, external data such as world oil prices and inflation rates are obtained from the official website of the World Bank as an international institution that provides standardized and validated macroeconomic data. All data that has been collected is then processed using Microsoft Excel for tabulation process and preparation for further statistical analysis.

The analysis technique used is multiple linear regression analysis using the ordinary least square (OLS) method to estimate the influence of independent variables on dependent variables. To obtain a valid estimate model, it must go through several stages of systematic testing with a stationary test, then continue with a classical assumption test, and end with a hypothesis test (Saputra et al., 2024).

The research analysis began with a stationarity test to ensure that the time-lapse data was stationary to avoid a pseudo-regression model using the Augmented Dickey-Fuller (ADF) root unit test (Nnoje, 2024). If the variable is not stationary at the level level, then the data transformation is carried out in the form of first difference until stationary data is obtained (Ryan et al., 2025).

Based on the results of the stationarity test, the regression model is adjusted in the form of differences as follows:

$$\mathbf{D(Y) = \beta_0 + \beta_1 D(X_1) + \beta_2 D(X_2) + \beta_3 D(X_3) + \beta_4 D(X_4) + \varepsilon t} \quad \textbf{(1)}$$

Where:

D(Y): Return on Assets of PT Pertamina (Persero) for the period 2015q1-2024q4; D(X1): World Oil Prices for the period 2015Q1-2024Q4; D(X2): Inflation for the period 2015q1-2024q4; D(X3): Production Expenses for the period 2015q1-2024q4; D(X4): Total Sales for the period 2015q1-2024q4; β_0: Constant; $\beta_1, \beta_2, \beta_3, \beta_4$: Regression coefficient; ε: Error term; t: Time.

The second stage is the classical assumption test, which is performed to ensure that the regression model meets the Ordinary Least Squares (OLS) assumption (Nastiti et al., 2023). The classical assumptions that must be met in regression analysis are: the assumptions of multicollinearity, heteroscedasticity, autocorrelation, and normality. If the classical assumption test is met, the regression model has a β_i BLUE (Best Linear Unbiased Estimation) estimator and can be tested hypothesis through partial tests (t-test), simultaneous tests (F tests), and determination coefficients (Nurcahya et al., 2023).

Result

The results of the study are presented based on the stages of econometric analysis used, starting from testing the initial assumptions of the research data.

Stationarity Test

The stationarity test aims to find out whether the data used is stationary.The results of the stationary test can be seen in Table 1.

Table 1 Stationarity Test

Variable	Unit Root Test					
	Level		1st difference		2nd difference	
	ADF	Prob	ADF	Prob	ADF	Prob
D(ROA) (Y)	-2,39	0,1488	-3,28	0,0226	-3,82	0,0069
D(CRUDEOIL) (X1)	1,74	0,9995	-2,58	0,1067	-5,06	0,0003
D(INF) (X2)	-2,37	0,156	-3,14	0,0318	-7,48	0,0000
D(BP) (X3)	-0,75	0,8166	-2,00	0,2827	-3,92	0,0053
SALES (X4)	-3,02	0,0416	-3,15	0,0305	-7,62	0,0000

Source: (PT Pertamina EP, 2024)-(World Bank, 2024) (processed)

Based on Table 1, the variables ROA and INF are stationary at the first difference level with ADF Probability values of 0.0226 and 0.0318. Meanwhile, the variables of CRUDEOIL and stationary BP are at the second difference level with ADF Probability values of 0.0003 and 0.0053. Meanwhile, the SALES variable is stationary at the level level with an ADF Probability value of 0.0416. Therefore, the model used in this study is as follows:

$$\mathbf{D(Y) = \beta_0 + \beta_1 D(X_1) + \beta_2 D(X_2) + \beta_3 D(X_3) + \beta_4 X_4 + \varepsilon t} \quad \textbf{(2)}$$

Classic Assumption Test

Multicollinearity Test

The multicollinearity test aims to find out whether there is a high linear relationship between independent variables in the regression model. The results of the multicollinearity test can be seen in Table 2.

Based on Table 2, the VIF value for each variable shows a result that is below the general allotment of 10 (VIF value < 10). These results show that no independent variable has a strong linear relationship with each other.

Table 2 Multicollinearity Test

Variable	Centered VIF
C	OR
D(CRUDEOIL) (X1)	1.541117
D(INF) (X2)	2.812354
D(BP) (X3)	2.339216
SALES (X4)	1.246538

Source: (PT Pertamina EP, 2024)-(World Bank, 2024) (processed)

Heteroscedasticity Test

The heteroscedasticity test aims to test whether the residual variance in the regression model is constant or not across observations. A good regression model requires that the residual variance be homogeneous (homoskedasticity). The results of the heteroscedasticity test can be seen in Table 3.

Table 3 Heteroscedasticity Test

Heteroskedasticity Test Null hypothesis: Homoskedasticity			
F-statistic	2.306291	Prob. F(4.34)	0.0782
Obs*R-squared	8.323424	Prob. Chi-Square(4)	0.0804

Source: (PT Pertamina EP, 2024)-(World Bank, 2024) (processed)

From the test results in Table 3, the Prob value was obtained. Chi-Square of 0.0804 > 0.05, so that the model does not experience homoscedasticity was accepted.

Autocorrelation Test

The autocorrelation test aims to be used to find out whether there is a correlation between the error term in a certain period and the previous period.
The results of the autocorrelation test in Table 4.

Table 4 Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	1.497313	Prob. F(2.32)	0.2390
Obs*R-squared	3.337382	Prob. Chi-Square(2)	0.1885

Source: (PT Pertamina EP, 2024)-(World Bank, 2024) (processed)

Based on the results of the Breusch-Godfrey Serial Correlation LM Test in Table 4, a Prob value was obtained. Chi-Square is 0.1885 > 0.05. This means that there is no autocorrelation in the residual regression model.

Normality Test

Normality tests are useful for determining whether the data collected is normally distributed or taken from normal populations. The results of the normality test in Table 5.

Table 5 Normality Test

Normality Test	
Jarque-Bera	2,509565
Probability	0,285138

Source: (PT Pertamina EP, 2024)-(World Bank, 2024) (processed)

Based on Table 5, the value of Prob. Jarque–Bera by 0.285138 > 0.05. This shows that the residuals in the regression model are normally distributed.

Hypothesis Test

The regression results can be seen in Table 6.

Table 6 Time Series Data Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.317503	0.596529	-5.561346	0.0000
D(CRUDEOIL) (X1)	0.156016	0.012563	12.41821	0.0000
D(INF) (X2)	-0.824935	0.193755	-4.257617	0.0002
D(BP) (X3)	-9.56E-06	2.79E-06	-3.428466	0.0016
SALES (X4)	1.12E-06	2.10E-07	5.310280	0.0000
R-squared	0.859311			
Adj R-squared	0.842759			
F-statistic	51.91685			
Prob(F-statistic)	0.000000			

Source: (PT Pertamina EP, 2024)-(World Bank, 2024) (processed)

Based on the regression results shown in Table 6, the following is the formula for the regression equation and the interpretatif each independent variable against the dependent variable:

$$\mathbf{D(Y) = -3.317503 + 0.156016X_1 - 0.824935X_2 - 9.56E06X_3 + 1.12E06X_4} \quad \text{..... (3)}$$

Partial Test Results (t-test)

The constant in the regression result has a significant negative value, which indicates that when all independent variables are at the reference point (zero), then the ROA is estimated to decrease by -3.317503. The variables X1 and X4 have a significant positive influence on ROA with p-values of 0.156016 and 1.12E06, which indicates that every increase in the units of variables X1 and X4 will increase the ROA. Meanwhile, the variables X2 and X3 have a significant negative influence on ROA with p-values of -0.824935 and -9.56E06, reflecting that every increase in the units of variables X2 and X3 will decrease ROA.

Simultaneous Test Results (F Test)

The F-statistic value in the regression result is 51.91685 with a probability of 0.000000 (<0.05) which means rejecting H0 and accepting H1. This shows that the regression model has a significant effect, so that all independent variables together are able to explain the dependent variables.

Coefficient of Determination

The Adjusted R-Squared value of 0.842759 indicates that about 84.27% of the variation of the dependent variables can be explained by the independent variables present in the model. This figure is very high for economic research, so it can be concluded that the model has an excellent ability to explain changes in dependent variables. While the rest, around 15.73%, is explained by other factors outside the model.

Discussion

The Influence of External Factors on Financial Performance as measured using Return on Asset (ROA)

The results of the study show that world oil prices have a positive and significant effect on the ROA of PT Pertamina (Persero). These findings indicate that the rise in world oil prices is consistently followed by an improvement in the company's financial performance. Theoretically, these results are in line with the Arbitrage Pricing Theory (APT) which asserts that asset returns are influenced by systematic risk factors, including global commodity prices such as oil (Daariy et al., 2023). From an operational perspective, as an integrated oil and gas company, Pertamina benefits from the

increase in oil prices through increased revenue in the upstream business segments, downstream, and export activities, although it still faces domestic price regulations (Putri & Sijabat, 2024). The results of this study are consistent with the findings Kharisma & Kusumastuti (9) that world oil prices are the most dominant external factor in influencing the financial performance of energy SOEs, thus strengthening the conclusion that fluctuations in world oil prices are a strategic determinant of PT Pertamina's ROA during the period 2015Q1–2024Q4.

In addition to fluctuations in world oil prices, PT Pertamina's financial performance is also influenced by other macroeconomic conditions that are external, especially the inflation rate. In contrast to world oil prices, which provide opportunities to increase income, inflation is actually an external factor that has the potential to suppress profitability. The estimated results show that inflation has a negative and significant effect on PT Pertamina's ROA, which indicates that the increase in inflation significantly suppresses the company's financial performance. These findings are consistent with the Cost-Push Inflation Theory, where inflation increases production and operational costs such as energy, logistics, maintenance, and labor costs (Maharani et al., 2024). An increase in inflation can reduce profits if the cost of production rises faster than the ability to raise the selling price, resulting in decreased profitability (Erika et al., 2025). This impact becomes more complex for PT Pertamina due to limitations in passing on the increase in costs to consumers due to energy price regulations (Ruslan et al., 2024). In addition, high inflation also has the potential to suppress energy demand through a decrease in people's purchasing power (Syafitri & Rozalinda, 2024). The results of this study are in line with the findings Febriyanti et al. (28) that inflation exerts significant pressure on ROA through increased costs and decreased profit margins, thus confirming the role of inflation as an external factor that negatively impacts the financial performance of oil and gas companies.

The Influence of Internal Factors on Financial Performance as measured using Return on Asset (ROA)

The internal factor of production costs has a significant negative effect on PT Pertamina’s ROA, as indicated by a coefficient value of -9.56E-06. This small coefficient value is due to a difference in measurement scales, as ROA is expressed as a percentage while production costs are measured in monetary units. This small value does not indicate a weak effect, because economically speaking, an increase in production costs still reduces ROA. These findings are in line with the Production and Cost Theory, which asserts that increasing production costs without being accompanied by efficiency or increased revenue will decrease profits and profitability of assets (Azizah et al., 2025). In the context of the capital-intensive and high-risk oil and gas industry, PT Pertamina's high production load is also influenced by the obligation to maintain national energy supply, so that the company continues to operate even though costs increase and have a direct impact on ROA (Meliza et al., 2024). Comparatively, the results of this study are consistent with findings Jamil et al. (31) that prove that operating costs and production expenses have a significant negative effect on ROA, thus confirming that cost efficiency is the main key in improving the company's financial performance amid economic pressures and fluctuations in global energy prices.

Meanwhile, total oil and gas sales had a positive and significant effect on PT Pertamina's Return on Assets (ROA), which was reflected in the positive coefficient and high level of significance. These findings indicate that the increase in oil and gas sales directly increases the company's revenue and asset utilization efficiency (Arif et al., 2024). Theoretically, the results of this study are in line with Market Orientation Theory which emphasizes the importance of a company's ability to meet market needs to create economic value (Rahayu & Nuvriasari, 2025). In an empirical context, the increase in sales reflects the company's success in maintaining its domestic market share and taking advantage of export opportunities in the post-pandemic economic recovery period, while helping to reduce the impact of high production costs (Ristanti et al., 2024). These results are consistent with the findings Dharma et al. (35) that revenue and sales growth have a significant positive effect on ROA, thus confirming that oil and gas sales are one of the main factors driving the company's financial performance.

The results of this study provide theoretical implications that the financial performance of strategic energy companies is not solely determined by market dominance but is more strongly influenced by the simultaneous integration of external and internal factors. The positive influence of world oil prices on ROA strengthens *the Arbitrage Pricing Theory* which emphasizes the importance of global systematic risk in determining asset returns, while the negative influence of inflation and production expenses supports *the Cost-Push Inflation Theory* and the Production and Cost Theory which places cost pressures as the main determinants of profitability. On the other hand, the positive influence of total sales affirms the Market Orientation Theory that the response to market demand and expansion contributes to the creation of economic value. These findings enrich the literature with empirical evidence that the stability of ROA in state-owned energy companies is contextual and is strongly influenced by macroeconomic dynamics and the effectiveness of operational management.

Practically, the results of this study imply that the management of PT Pertamina (Persero) needs to strengthen the oil price risk management strategy, improve the efficiency of production expenses, and optimize sales to maintain the stability of asset profitability. In addition, corporate and government policies need to be directed at cost control that is adaptive to inflationary pressures and global volatility, so that the sustainability of financial performance and the resilience of the national energy sector can be maintained in a sustainable manner.

Maximum Profit and Loss Curve in a Monopoly Market

In determining maximum profit, the company must determine the price and output balance that will result in a large profit. A company's maximum profit is achieved when a company produces output that has a marginal acceptance value (MR) equal to marginal cost (MC). The maximum profit is shown at the point of MR and MC produced by Q. The maximum profit area obtained by the company is the OQPA (TR) area minus the OQBC (TC) area, which is shown in the APBC area which can be seen in Figure 2.

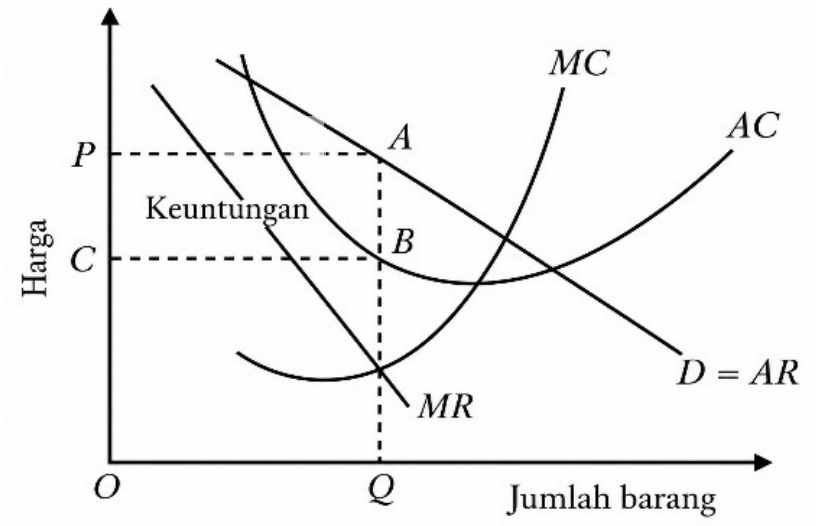

Figure 2 Monopoly Companies Make Profits

Changes in world oil prices affect the company's revenue side. The increase in world oil prices increased the selling price of oil and gas products so that the AR curve shifted upwards. Since the MR is derived from the AR, the shift in the AR is followed by the shift of the MR in the same direction. This shift causes the intersection points of MR and MC to result in greater acceptance rates, widening the distance between AR and AC, thus increasing the company's profitability. This condition is in line with the regression results which show that world oil prices have a positive and significant effect on ROA.

In addition to prices, the increase in oil and gas sales also strengthens the company's revenue side. An increase in volume or sales value drives an upward shift in AR and MR, which at optimal output

levels widens the gap between AR and AC. This reflects an increase in profits and efficiency of asset utilization, so it is consistent with regression results that show that oil and gas sales have a positive and significant effect on ROA.

Figure 3 shows the condition of monopoly companies that experience minimum losses at the Q1 output level, which is when Marginal Revenue (MR) is equal to Marginal Cost (MC). At this level of production, the average cost (AC) is above the price (P), so the total cost (TC) is greater than the total revenue (TR). As a result, the company suffers losses indicated by the shaded rectangular plane. These losses are the minimum losses, because higher or lower production than Q1 will actually magnify the company's losses.

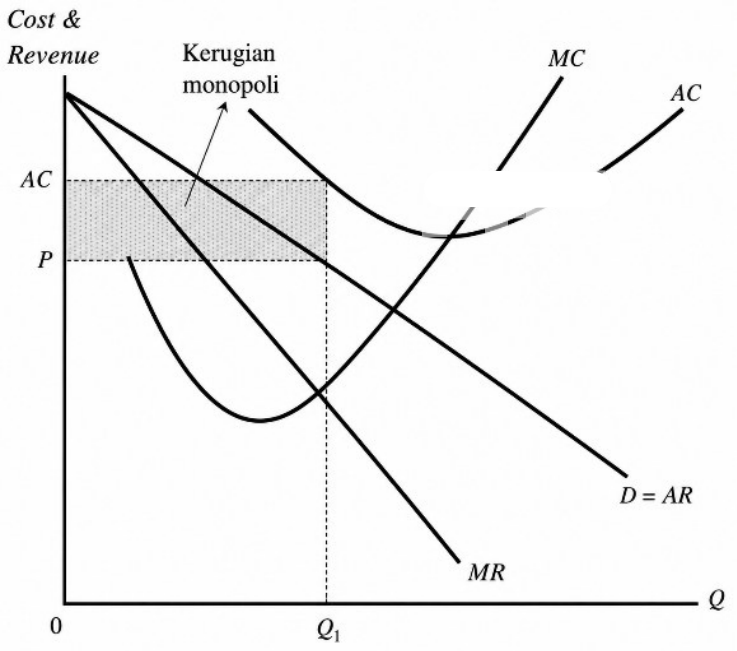

Figure 3 Monopoly Companies Suffer Losses

This condition can be exacerbated by external factors such as inflation. Inflation increases the price of production inputs, including raw materials, energy, and labor, which causes the Marginal Cost (MC) to shift upwards. The increase in MC is followed by an increase in the Average Cost (AC), so that the equilibrium points of MR = MC is reached at a higher cost level and the distance between AR and AC is narrowing even more. This condition explains the empirical finding that inflation has a negative and significant effect on ROA, because cost pressures erode the company's profitability.

In addition to inflation, production expenses as an internal factor also pressure the company's performance. Increased operational, maintenance, and overhead costs are driving an upward shift in MC and AC. This shift causes the difference between AR and AC to get smaller at the point of MR = MC, so the company's profitability decreases. Thus, the empirical finding that production expenses have a negative and significant effect on ROA can be explained by an increase in cost structures that are not offset by an increase in revenue.

Conclusion

This study aims to analyze the influence of external factors in the form of world oil prices and inflation, as well as internal factors in the form of production expenses and total sales on the financial performance of PT Pertamina (Persero) as measured using Return on Asset (ROA) during the period 2015Q1–2024Q4. The results of the regression analysis show that world oil prices and total sales have a positive and significant effect on ROA, while inflation and production expenses have a negative and significant effect. Simultaneously, all independent variables were proven to be able to explain the variation in ROA with a high level of determination coefficient, which shows

that PT Pertamina's financial performance is strongly influenced by a combination of internal and external factors. These findings confirm that although PT Pertamina has a dominant position in the structure of the national energy market, the stability of fixed asset profitability is greatly influenced by global macroeconomic dynamics and the efficiency of internal cost management. Market dominance does not automatically guarantee the stability of financial performance without cost control and risk management strategies that are adaptive to world oil price volatility and inflationary pressures.

However, this study has some limitations. First, the research model only includes two external variables and two internal variables, so it does not fully capture the complexity of the determinants of the financial performance of strategic energy companies. Second, this study uses an OLS-based multiple linear regression approach, which has not considered the possibility of long-term dynamic relationships such as cointegration or the Error Correction Model (ECM) model. Third, the research focuses on one company (single case study), so the generalization of results to other energy companies needs to be done carefully. Based on these limitations, further research is recommended to expand the model to include other variables such as exchange rates, energy subsidy policies, interest rates, capital structure, or technology-based operational efficiency indicators. In addition, the use of more dynamic econometric methods such as VAR/VECM, ARDL, or data panel approaches in some energy companies can provide a more comprehensive picture of the short-term and long-term relationships between variables. Comparative research between energy SOEs or across countries can also be a further development to strengthen the generalization of empirical findings.

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