

Implementation of Fundamental Analytical Dashboard and Stock Price Forecasting of ADRO, ANTM, INCO with Arima Approach

Nur Aulia Cahyani¹, Marhawati Najib^{2*}, Syamsu Alam¹

¹Digital Business Study Program, Faculty of Economics and Business, Universitas Negeri Makassar, Makassar, Indonesia

²Economic Study Program, Faculty of Economics and Business, Universitas Negeri Makassar, Makassar, Indonesia

Corresponding Author: marhawati@unm.ac.id^{2*}

Abstract. This study aims to compare the financial performance of ADRO, ANTM, and INCO and project the stock prices using fundamental analysis and the ARIMA approach. The background of this study is based on the phenomenon of herding behavior and overconfidence of investors who often ignore fundamental analysis in making investment decisions. This study adopts a quantitative method using financial ratio data and historical stock prices and a qualitative method through visualization in the form of an analytical dashboard. The results of the study show that ADRO has an advantage in terms of profitability, INCO stands out in liquidity, and ANTM experiences fluctuations in financial performance. The ARIMA model can project the stock prices of the three companies by showing a positive trend for INCO and ANTM, while ADRO tends to be stable. The analytical dashboard developed helps investors understand financial performance and stock price projections, thus supporting more accurate investment decision-making.

Keywords: Arima, Dashboard, Fundamental Analysis, Forecasting

1 Introduction

Investment means putting funds or making capital investments to obtain results or benefits during a certain period [1]. The definition of investment stated in [2] is an activity carried out by utilizing current cash to obtain goods in the future. While price is price is one of the variables of marketing and sales [3]. In addition, price is the seller's estimate of the value related to the usefulness and quality of a product or service [4].

A paper or certificate proving ownership of a firm is called a share. PT. Adaro Energy Indonesia Tbk., ANTM (PT. Aneka Tambang Tbk.), and INCO (PT. Vale Indonesia Tbk.) are a few stock issuers listed on the capital market. An Indonesian vertically integrated energy corporation, PT Adaro Energy Indonesia Tbk. (ADRO), operates in the coal, energy, utilities, and supporting infrastructure sectors. Using information obtained from the Indonesia Stock Exchange, ADRO, ANTM, and INCO come from the largest mining companies in Indonesia and are among the 50 biggest market capitalizations for the April 2024 period. The three stocks are included in the LQ45 stock list for the January - July 2024 period. This shows that the three issuers come from large companies that have strong fundamentals, large market capitalization, reputation, and high liquidity [5].

The supply and demand for shares affect the price at which they are sold. The share price increases with increasing demand. In a similar vein, the share price decreases with increased supply [6]. This causes the movement of share prices to fluctuate. There are no shares that continue to increase and there are no shares that continue to decrease. This change also occurs in ADRO, ANTM, and INCO shares as shown in Figure 1 regarding the trend of the share prices of the three companies over the past year. Where ADRO and ANTM shares show a stagnation trend or share prices tend to be stable and have not changed significantly over the past year. Meanwhile, INCO shares show a downward trend or share prices tend to decrease.

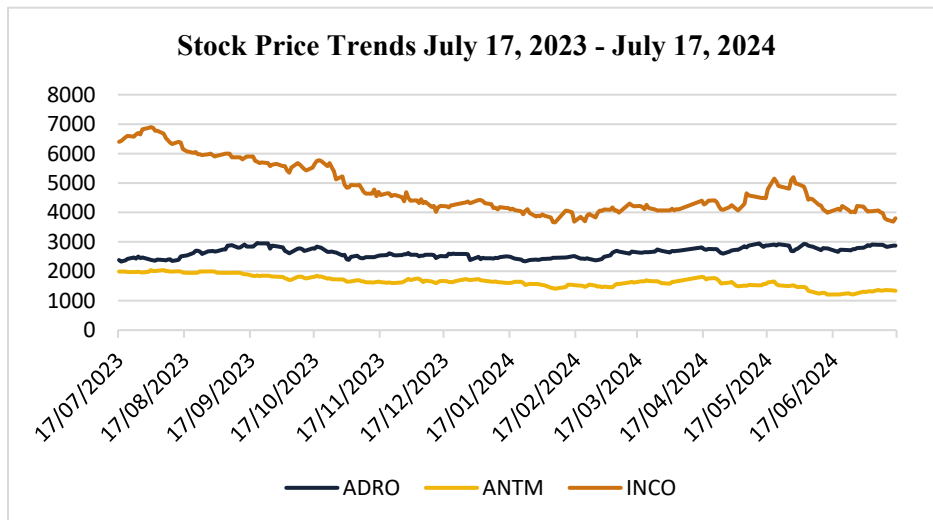


Figure 1. Stock Price Trend Over the Past Year
Source: finance.yahoo.com

Stock investment decisions are a complex process involving various factors, including psychological factors and irrational investor behavior. Dynamic changes in stock price movements require investors to be more careful in making decisions. However, investors do not always act rationally because they are often influenced by cognitive and emotional biases, which lead to suboptimal investment decisions. This phenomenon is known as behavioral finance, which examines the influence of psychology on individual financial behavior and the market as a whole. One behavior that is often encountered is herding behavior, which is the tendency of investors to follow the actions of the majority without conducting an in-depth fundamental analysis.

Herding behavior can produce inefficient markets and potentially create high-risk speculative bubbles. Research conducted by [7] found that most investors make investment decisions based solely on imitation or speculation, without considering the fundamental conditions of the company. This condition shows that herding behavior can cause investors to ignore relevant information and rely more on collective decisions without careful consideration of the company's condition.

In addition to herding behavior, overconfidence also affects investment decision-making. Overconfidence is a condition when investors have excessive confidence in their ability and knowledge to make investment decisions, so they tend to take risks that are not commensurate with realistic profit expectations [8]. This attitude has the potential to reduce investment returns because risks are ignored or underestimated. These two behavioral phenomena emphasize the importance of comprehensive and objective analysis in investment decision-making. Fundamental analysis is one of the main approaches in stock evaluation because it uses the company's financial data to calculate the intrinsic value of the stock. The largest part of this analysis includes the evaluation of financial statements and analysis of financial ratios such as Current Ratio (CR), Return on Equity (ROE), and Debt to Equity Ratio (DER) which provide an overview of the company's future performance [9].

In addition to fundamental analysis, stock price projections are also needed to support the right investment decision-making. The ARIMA (Autoregressive Integrated Moving Average) model is one of the widely used forecasting methods because of its ability to predict stock market trends by processing historical data [10]. Meanwhile, [11] in his research emphasized that the ARIMA model is a significant tool for investors who want to make decisions based on short-term market trend analysis. This model provides important insights into investment planning by analyzing past data patterns to project future stock price movements.

2 Method

This study uses quantitative and qualitative approaches. The quantitative approach is applied through the use of numerical data from financial statements and stock price data for fundamental analysis and forecasting. Meanwhile, the qualitative approach is used to analyze and present data in the form of dashboard visualizations, which provide a comprehensive overview of the information collected.

2.1 Population and Sample

The Indonesia Stock Exchange (IDX) lists the three mining companies: PT Adaro Energy Indonesia Tbk (ADRO), PT Aneka Tambang Tbk (ANTM), and PT Vale Indonesia Tbk (INCO). The population under study includes all daily stock price data, annual financial reports. The study's sample included daily stock price data from January 1, 2014, to April 30, 2024, as well as yearly financial report data from 2014 to 2023. In order to comprehend the historical fluctuations in the stock price and financial performance of the company, this data was selected to be representative of the total population.

2.2 Data Collection Techniques

Among the secondary data used in this study are the annual financial reports, which provide a thorough overview of the business's financial performance and include details on profit and loss, balance sheet, cash flow, and shareholders' equity. Official sources like the Indonesia Stock Exchange (IDX) and financial websites like Stockbit provided this data.. This research also uses daily stock price data that includes closing prices, trading volume, and daily stock price fluctuations, which are important for analyzing market trends. This data was obtained from platforms such as Yahoo Finance.

2.2.1 Fundamental Analysis

This analysis uses several key financial ratios calculated based on annual financial report data, namely:

A. Current Ratio (CR)

One measure that's used to evaluate a company's ability to meet short-term obligations that is, debt that has an approaching due date is the current ratio. To calculate this ratio, divide the total current assets by the total current debt. The current ratio number increases with the strength of the company's capacity to meet its short-term obligations. Because it demonstrates the company's strong ability to pay its debts that are coming due soon, a high current ratio decreases financial risk and increases investor trust [12]. It illustrates the degree to which assets that can roughly be converted into liabilities in the same time frame as the claims can cover the demands of short-term creditors [13]. The formula can be used to compute the current ratio (1).

$$CR = \frac{\text{Current Assets}}{\text{Current Liabilities}} \quad (1)$$

B. Return on Equity (ROE)

The ratio known as return on equity, or ROE, gauges a company's capacity to produce profits that are distributed to shareholders. The ROE number is also influenced by the amount of debt held by the company; a higher percentage of debt can result in a higher ROE score [14]. Return on Equity can be calculated by the formula (2).

$$ROE = \frac{\text{Net profit after tax}}{\text{Total Equity}} \quad (2)$$

C. Ratio of Debt to Equity (DER)

The Ratio of Debt to Equity (DER) is a ratio that illustrates the amount equity is used to guarantee the total amount of debt held by the organization. Furthermore, DER also displays the level of financial risk that the business is exposed to. The likelihood of the business going bankrupt increases with the DER value since a high debt load may make it more difficult for the business to make its long-term payments. As a result, a high DER value may suggest that the business is exposed to financial risk and has an uneven financial structure [15]. The algorithm can be used to determine the debt to equity ratio (3).

$$DER = \frac{\text{Total Debt}}{\text{Total Assets}} \quad (3)$$

D. Return on Assets (ROA)

An organization's ability to generate profit from its assets is measured by a ratio known as return on assets (ROA) [16]. The Return on Assets raises the business's capacity to earn a profit. The formula can be used to calculate return on assets. (4).

$$ROA = \frac{\text{Net Income}}{\text{Total Aset}} \quad (4)$$

E. Earnings Per Share (EPS)

The term earnings per share, or EPS, refers to this ratio is used to evaluate management's capacity to produce large gains for shareholders. EPS gives a summary of the company's capacity to produce earnings per share and measures the net income delivered to shareholders [17]. Earnings Per Share can be calculated with the formula (5).

$$EPS = \frac{\text{Net Income}}{\text{Number of shares outstanding}} \quad (5)$$

F. Price Earnings Ratio (PER)

Stock prices and net income per outstanding share are compared using the Price Earnings Ratio (PER). The price-to-earnings ratio, or PER, indicates the weight that investors place on a stock in relation to its profit margin. Furthermore, PER is employed to determine a stock's rate of return on capital put in it or to evaluate its potential for profit-making [18]. The algorithm can be used to determine the Price Earnings Ratio (6).

$$PER = \frac{\text{Stock Price}}{\text{EPS}} \quad (6)$$

2.3 ARIMA Method

Moving average (MA), differencing (I for Integrated), and autoregressive (AR) are the three primary parts of the ARIMA time series model [19]. The order of each components of moving average sequence (q), differencing sequence (d), and autoregressive sequence (p) must be determined in order to apply the ARIMA method. The determination of this order is done through Akaike Information Criterion (AIC) and stationarity test. This process allows the ARIMA model to predict future values more accurately, as it can capture patterns and trends in the time series data. In addition, determining the right order also allows the ARIMA model to reduce the prediction error and increase the reliability of the prediction results. The equation can be seen through the equation (7)

$$x_t = c + \varepsilon_t + \sum_{i=1}^p \varphi_i x_{t-i} + \sum_{i=1}^p \theta_i \varepsilon_{t-i} + \delta t \quad (7)$$

Description:

x_t the value of the time series at time t

C is unchanging

ε_t is the random error or disturbance at time t

φ_i is the coefficient value of the Autoregressive (AR) component at lag i

x_{t-i} is the observation value at time $t-i$ (lagged value)

θ_i is the moving average (MA) component's coefficient at lag i .

ε_{t-i} is Random error at time $t-i$ (lagged error)

δ is the linear deterministic trend coefficient

t is the time or period

The first step in the ARIMA approach is model identification which begins by entering daily stock price data and conducting a stationarity test using Augmented Dickey-Fuller (ADF) [20]. This stationarity test aims to determine whether the stock price data has a unit root, that is, whether the data has a stable pattern and does not substantially alter over time. Differentiating must be done if the data is not stationary. to make the data stationary. After that, identification of the ARIMA model that fits the data can be done, namely determining the optimal p, d, and q values

to model stock price data. The moving average (MA) component's lags are indicated by the q value, the stationarity requiring number of differencing is shown by the d value, and the number of lags in the autoregressive (AR) component is indicated by the p value. Using Auto ARIMA, the best ARIMA model is chosen based on the lowest Akaike Information Criterion (AIC) value. Furthermore, model formation is carried out, namely the ARIMA (p, d, q) model is formed with parameters determined from the stationarity test results and the AIC value [21]. After that, predict stock prices with the selected ARIMA model to project future stock prices, which are then analyzed so as to predict opportunities and risks in stock trading.

2.4 Analyzing Descriptively

Utilizing descriptive analysis, data is presented numerically. and graphical form, describing the characteristics of the center, spread, and distribution of ADRO, ANTM, and INCO stock price data. These descriptive statistics are used as a basis for understanding long-term trends and comparing the performance of each stock within the study period. Data visualization is done using a dashboard that displays graphs and charts such as bar, line, and histogram charts. This dashboard is designed to present the results of fundamental analysis and stock price predictions, making it easier to understand and make decisions based on the data that has been analyzed.

3 Results and Discussion

3.1 Financial Performance Comparison

3.1.1 Current Ratio

The current ratio evaluates how well a corporation can use its current assets to pay off short-term debt. based on information from 2024's first quarter, INCO has the highest Current Ratio of 5.75, followed by ANTM at 2.63, and ADRO with a value of 2.44. This shows that INCO has better liquidity compared to ANTM and ADRO, which means INCO is better able to fulfill its short-term obligations than the other two companies.

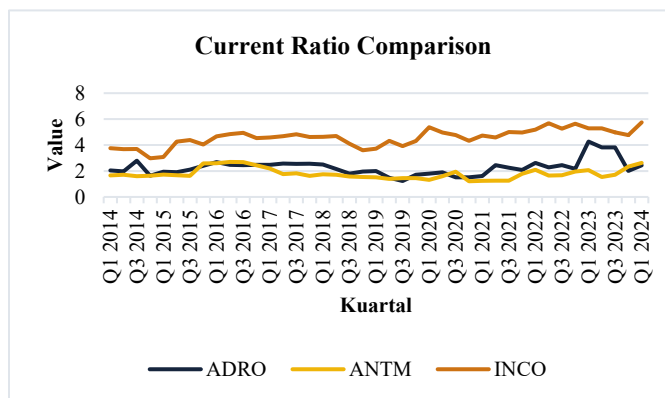


Figure 2. Current Ratio Comparison

3.1.2 Ratio of Debt to Equity (DER)

Equity to Debt Ratio The ratio indicates how much debt to equity a corporation has.. ADRO showed a decline in DER from 1.00 in Q3 2014 to 0.21 in Q1 2024, indicating good debt management. ANTM also showed a significant decline after 2020, with DER reaching 0.05 in the first quarter of 2024. INCO shows a very low DER, reaching 0 in Q2 2019 and remaining at 0 until Q1 2024, signaling no debt and excellent financial stability. This shows INCO has the best debt management among the three companies, followed by ADRO and ANTM. This good debt management indicates that INCO has a good ability to manage its debt.

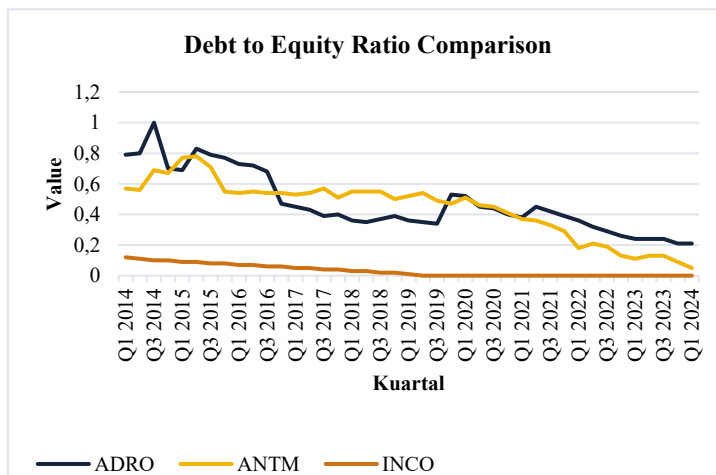


Figure 3. Debt to Equity Ratio Comparison

3.1.3 Return on Invested Capital (ROA)

A company's ability to use its assets profitably is demonstrated by its return on assets, or ROA. ADRO shows better performance in generating profits from its assets compared to ANTM and INCO. In 2020-2024, ADRO's ROA experienced a significant increase, with the highest peak in the 2nd quarter of 2022 (9.41%). Although there were some dips thereafter, ADRO's ROA remained high in quarter 1 of 2023 (4.66%) and quarter 4 of 2023 (4.00%). Meanwhile, ANTM showed a lower performance in generating profit from its assets. In 2014-2016, ANTM's ROA was variable with many negative periods, and despite a slight improvement in 2017-2019, ANTM's ROA remained low. In 2020-2024, ANTM's ROA showed a significant improvement in the 3rd quarter of 2020 (2.42%), but there were some declines in the 2nd quarter of 2023 (0.62%) and 1st quarter of 2024 (0.58%).

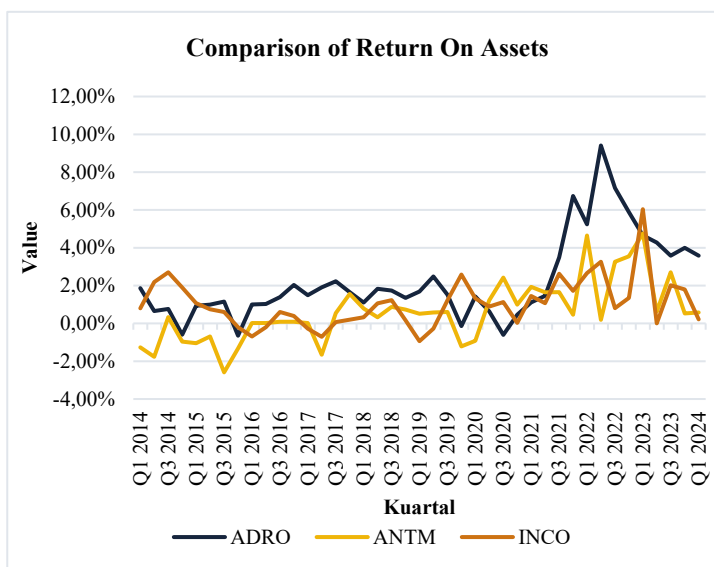


Figure 4. Comparison of Return On Assets

3.1.4 Return on Equity (ROE)

ADRO's Return on Equity (ROE) shows significant fluctuations, with the highest peak of 16.25% in quarter 2 of 2022. Despite the decline, ADRO's ROE value remains higher than the previous period. Meanwhile, ANTM's ROE was more negative or close to zero at the beginning of the period, but showed significant improvement after 2020. INCO has a relatively stable ROE, with a significant improvement in 2021-2023. This shows ADRO has the best ROE performance, followed by INCO which is stable, and ANTM which shows improvement after a poor initial period. Nonetheless, all three companies show a decline in ROE by the end of the period, with ADRO ending at 5.25%, ANTM at 0.77%, and INCO remaining positive with a fairly high value.

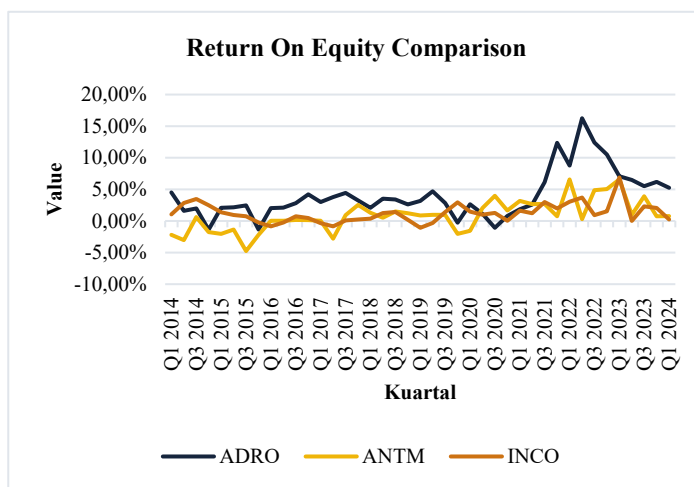


Figure 5. Return On Equity Comparison

3.1.5 Earnings Per Share (EPS)

ADRO's Earning Per Share (EPS) shows significant fluctuations, with the highest peak of 384.64 in the 2nd quarter of 2022. ANTM had lower EPS at the beginning of the period with negative values, but showed good recovery in the following years. Meanwhile, INCO shows good stability in EPS with consistent growth, reaching a highest peak of 254.31 in quarter 1 of 2023. This shows ADRO has the best EPS performance, followed by INCO which is stable, and ANTM which shows improvement after a poor initial period. Nonetheless, all three companies showed a decline in EPS by the end of the period, with ADRO ending at 185.77, ANTM at 9.92, and INCO at 9.89 in the first quarter of 2024.

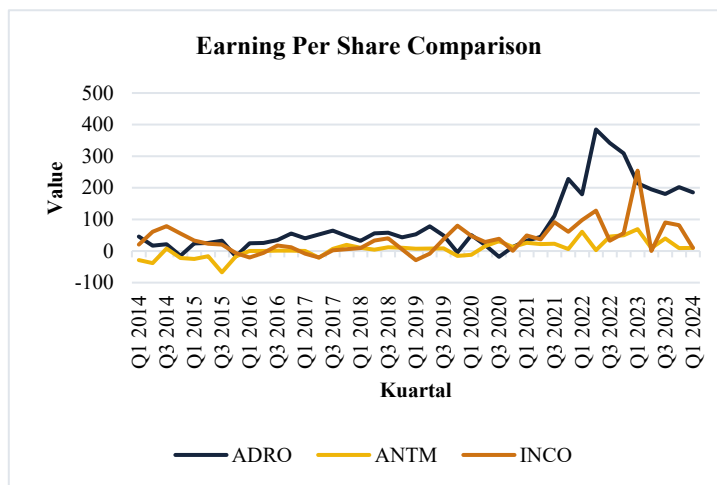


Figure 6. Earning Per Share Comparison

3.1.6 Price Earnings Ratio (PER)

Price Earnings Ratio (PER) measures a company's stock valuation in the market compared to its earnings per share. ADRO shows a steady and strong upward trend in PER, reflecting solid long-term growth prospects. ANTM showed a strong recovery and significant improvement in recent quarters after a negative period. INCO, on the other hand, shows a very high variation in PER with some extreme values, reflecting its volatile performance.

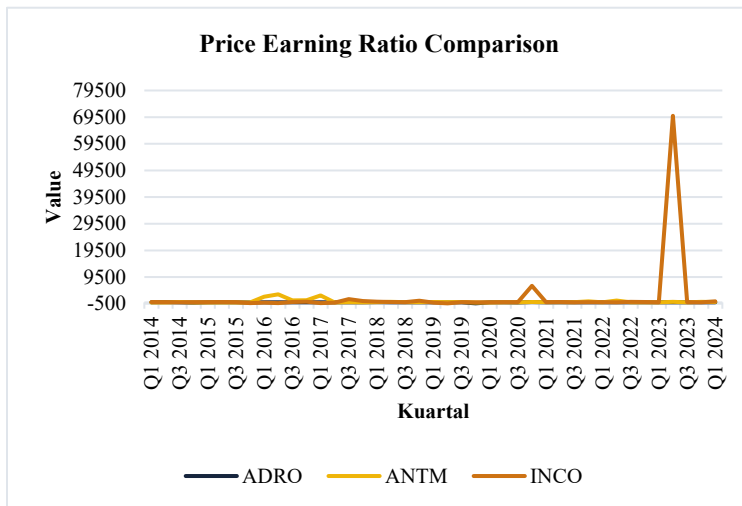


Figure 7. Price Earning Ratio Comparison

3.2 Stock Price Projections

3.2.1 ADRO Stock Price Projection

After going through the ARIMA process, it was found that the best model chosen for ADRO stock price ARIMA projections were made using the AIC (Akaike Information Criterion) value (2,1,3), with an AIC value of 19698.573. This AIC value is lower than the other models, so it is chosen as the most suitable model to model this time series data.



Figure 8. ADRO Stock Price Projection

In the ARIMA model, Data is separated into validation and training sets. Validation data is used to assess the model's performance after it has been trained using training data. This division allows optimization of the training process and objective evaluation of the model's predictive ability. The prediction results show a drastic decline and stabilization of ADRO's share price in July-August 2024. The following is a table of ADRO stock price projections :

Table 1. ADRO Stock Price Projection

Date	Stock Price
7/27/2024	1274
7/28/2024	1274
7/29/2024	1274
7/30/2024	1274
7/31/2024	1274
8/1/2024	1274
8/2/2024	1274
8/3/2024	1274
8/4/2024	1275
8/5/2024	1275
8/6/2024	1275
8/7/2024	1275
8/8/2024	1275

3.2.2 ANTM Stock Price Projection

After going through the ARIMA process, it was found that the best model chosen for ADRO stock price ARIMA projections were made using the AIC (Akaike Information Criterion) value (1,1,3), with an AIC value of 18318.147. This model provides the lowest AIC value compared to other model configurations, which indicates that this model can be used to produce predictions depending on data from time series that has been stationary.



Figure 9. ANTM Stock Price Projection

Based on the prediction results, ANTM's share price is expected to gradually increase from 3,024 on July 27, 2024 to 3,033 on August 8, 2024. The following is a table of ANTM stock price projections:

Table 2. ANTM Stock Price Projection

Date	Stock Proce
7/27/2024	3024
7/28/2024	3024
7/29/2024	3025
7/30/2024	3026
7/31/2024	3027
8/1/2024	3028
8/2/2024	3029
8/3/2024	3029
8/4/2024	3030
8/5/2024	3031
8/6/2024	3032
8/7/2024	3033
8/8/2024	3033

3.2.3 INCO Stock Price Projection

After going through the ARIMA process, it was found that the best model chosen for INCO stock price ARIMA projections were made using the AIC (Akaike Information Criterion) value (0,1,1), with an AIC value of 23061.228. This model has the lowest AIC value among all model configurations tested, indicating that this model can be used to make predictions depending on data from time series that has been stationary.



Figure 10. INCO Stock Price Projection

Based on the prediction results, ANTM's share price is expected to increase slightly from the previous day, from 5,426 on July 27, 2024 to 5,444 on August 8, 2024. The following is the INCO share price projection table 3

Table 3. INCO Stock Price Projection

Date	Stock Price
7/27/2024	5426
7/28/2024	5428
7/29/2024	5429
7/30/2024	5431
7/31/2024	5432
8/1/2024	5434
8/2/2024	5435
8/3/2024	5436
8/4/2024	5438
8/5/2024	5439
8/6/2024	5441
8/7/2024	5442
8/8/2024	5444

3.3 Dashboard of Fundamental Analysis Results and Stock Price Forecasting

Figure 11 displays a dashboard that displays the findings of the fundamental analysis and stock price predictions for ADRO, ANTM, and INCO. The dashboard shows data in the form of graphs pertaining to the findings of fundamental analysis and comparison to evaluate the three companies under investigation's financial performance. In addition to fundamental analysis, the dashboard also presents information on the results of stock price projections of the three companies displayed in graphical form and supported by daily stock price data in tabular format.

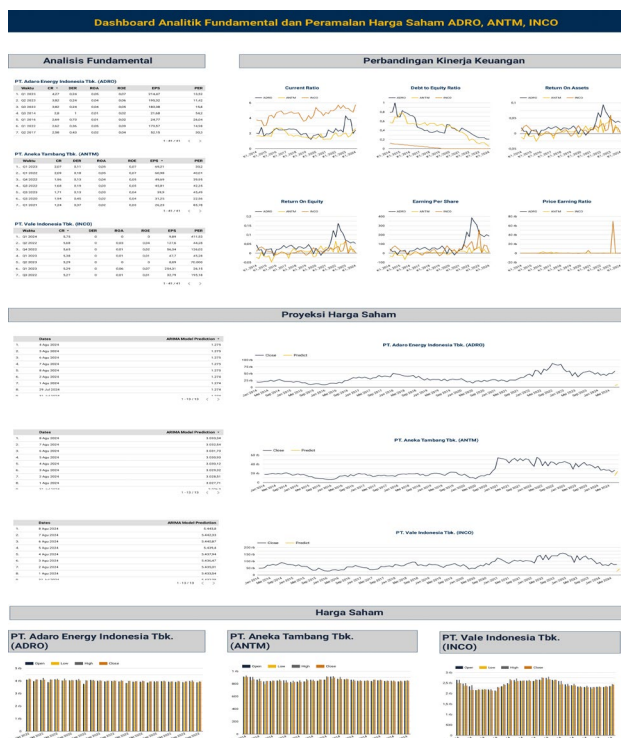


Figure 11. Dashboard of Fundamental Analysis Results and Stock Price Forecasting

4 Conclusions

Considering the financial performance examination of ADRO, ANTM, and INCO, ADRO shows the best performance among the three companies with an advantage in profitability characterized by higher ROA and ROE in the first quarter of 2024, as well as having the highest EPS and PER. INCO came in second with very strong liquidity and conservative capital structure, characterized by high Ratios of current and debt to equity that reached 0 since Q2 2019. Meanwhile, ANTM shows significant fluctuations in various financial ratios, indicating performance instability, despite improvements in recent years. In terms of stock price forecasting, INCO and ANTM show positive growth trends, with INCO more suitable for investors seeking short-term dynamic growth and ANTM for more stable growth. ADRO is more recommended for investors who prioritize price stability. Visualizing the results of fundamental analysis and stock price forecasting through an interactive dashboard also strengthens the understanding of the performance of the three companies.

As a suggestion, further development of the ARIMA model is needed to improve the accuracy of stock price predictions, especially in dynamic market conditions, by evaluating various model parameters. In addition, the development of interactive dashboards using tools such as Power BI or Tableau can help investors monitor financial performance and stock price projections in real-time, facilitating investment decision-making. Periodic evaluation and adjustment of the model is also very important to ensure that the predictions remain relevant and accurate, so that they can adjust to the latest changes in market conditions. The implementation of innovative technology in stock analysis and prediction will increase the effectiveness and accuracy of investment decision making.

References

- [1] W. W. Hidayat, *Konsep Dasar Investasi dan Pasar Modal*. 2019.
- [2] A. Mappadang, *Buku Ajar Manajemen Investasi & Portofolio*. 2021.
- [3] S. Effendi, "Penetapan Harga dalam Perspektif Ekonomi Islam," pp. 26–35.
- [4] D. N. Pane, M. EL Fikri, and H. M. Ritonga, "Pengaruh Harga dan Kualitas Pelayanan Terhadap Kepuasan Pelanggan Pada Rumah Makan Sidempuan Medan," *J. Manaj. Tools*, vol. 9, no. 1, pp. 1–11, 2018, doi: 10.1017/CBO9781107415324.004.
- [5] R. I. Wijayanti, "Deretan Saham Blue Chip 2023 Indeks LQ45, Cocok untuk Investasi Jangka Panjang." [Online]. Available: <https://www.idxchannel.com/market-news/deretan-saham-blue-chip-2023-indeks-lq45-cocok-untuk-investasi-jangka-panjang>
- [6] B. D. Prasetya, F. S. Pamungkas, and I. Kharisudin, "Pemodelan dan Peramalan Data Saham dengan Analisis Time Series menggunakan Python," *Prism. Pros. Semin. Nas. Mat.*, vol. 3, pp. 714–718, 2020, [Online]. Available: <https://journal.unnes.ac.id/sju/index.php/prisma/article/view/38116>
- [7] Y. A. Fitra, "Pengaruh Bias Perilaku Investor Terhadap Keputusan Investasi Di Pasar Saham," *J. Cap. Kebijakan. Ekon. Manaj. dan Akunt.*, vol. 5, no. 1, pp. 88–98, 2023, doi: 10.33747/capital.v5i1.185.
- [8] L. S. Loppies, M. J. . Maria J.F Esomar1, and I. N. Janah, "Herding Behavior, Overconfidence, Regret Aversion Bias On Investment Decisions," *Int. J. Econ. Soc. Sci. Entrep. Technol.*, vol. 1, no. 5, pp. 345–352, 2022, doi: 10.55983/ijeset.v1i5.357.
- [9] A. M. Zaimsyah, S. Herianingrum, and Najiatun, "Analisis Fundamental Terhadap Harga Saham yang Terdaftar di Jakarta Islamic Index Tahun 2010-2017," *J. Ilm. Ekon. Islam*, vol. 5, no. 2, pp. 113–119, 2019, doi: 10.29040/jiei.v5i2.517.
- [10] M. Tamerlan, "Stock Market Price Forecasting Using the Arima Model: an Application to Istanbul, Turkiye," *J. Econ. Policy Res. / İktisat Polit. Arařturmaları Derg.*, vol. 9, no. 2, pp. 439–454, 2022, doi: 10.26650/jepr1056771.
- [11] A. Ganesan and A. Kannan, "Stock Price Prediction Using Arima Model," *Int. J. Mark. Hum. Resour. Res.*, vol. 2, no. 2, pp. 2746–4040, 2021.
- [12] P. B. Sari and H. Dwilita, "Financial Management." p. 212, 2019.
- [13] Christina, S. Halim, V. Angrensia, and A. P. Putri, "Analisis Fundamental dan Teknikal terhadap Harga Saham pada Perusahaan Utilitas dan Transportasi," *E-Jurnal Akunt.*, vol. 31, no. 2, p. 499, 2021, doi: 10.24843/eja.2021.v31.i02.p19.
- [14] Rahayu, *Kinerja Keuangan Perusahaan*. 2020.
- [15] E. Siswanto, *Buku Ajar Manajemen Keuangan Dasar*, no. 112. Universitas Negeri Malang, 2019.
- [16] A. Husna and I. Satria, "Effects of Return on Asset, Debt To Asset Ratio, Current Ratio, Firm Size, and Dividend Payout Ratio on Firm Value," *Int. J. Econ. Financ. Issues*, vol. 9, no. 5, pp. 50–54, 2019, doi: 10.32479/ijefi.8595.

- [17] C. Choiriya, F. Fatimah, S. Agustina, and F. A. Ulfa, "The Effect Of Return On Assets, Return On Equity, Net Profit Margin, Earning Per Share, And Operating Profit Margin On Stock Prices Of Banking Companies In Indonesia Stock Exchange," *Int. J. Financ. Res.*, vol. 1, no. 2, pp. 103–123, 2020, doi: 10.47747/ijfr.v1i2.280.
- [18] F. Saputra, "Analysis Effect Return on Assets (ROA), Return on Equity (ROE) and Price Earning Ratio (PER) on Stock Prices of Coal Companies in the Indonesia Stock Exchange (IDX) Period 2018-2021," *Dinasti Int. J. Econ. Financ. Account.*, vol. 3, no. 1, pp. 82–94, 2022, [Online]. Available: <http://repository.uph.edu/41805/%0Ahttp://repository.uph.edu/41805/4/Chapter1.pdf>
- [19] W. Y. Rusyida and V. Y. Pratama, "Prediksi Harga Saham Garuda Indonesia di Tengah Pandemi Covid-19 Menggunakan Metode ARIMA," *Sq. J. Math. Math. Educ.*, vol. 2, no. 1, p. 73, 2020, doi: 10.21580/square.2020.2.1.5626.
- [20] Ajewole, Adejuwon, and Jemilohun, "Test for Stationarity on Inflation Rates in Nigeria using Augmented Dickey Fuller Test and Phillips-Persons Test," *IOSR J. Math.*, vol. 16, no. 3, pp. 11–14, 2020, doi: 10.9790/5728-1603031114.
- [21] A. Rufaidah and E. M. Afif, "Analisis Time Series untuk Menentukan Model Terbaik Produk Songkok Nasional di Kabupaten Gresik," *Pros. Semin. Nas. Mat. dan Ter.*, pp. 1–16, 2018.