



*Volatility and Investment Risk Analysis  
of BMRI Stock:*

# A Value at Risk (VaR) and Monte Carlo Simulation Approach

BY INDRA MUSTAFA

# *About me*

I am a Web Developer transitioning into a Data Analyst, with a strong foundation built through an intensive 3-month bootcamp focused on Excel, SQL, Python, Power BI, and Exploratory Data Analysis (EDA). I excel at bridging the gap between technical IT aspects and business needs by translating complex data into actionable insights that support informed decision-making.



**1. Data Cleaning  
and EDA**

**2. Volatility Estimation**

**3. Risk Analysis (VaR)**

**4. Interpretasi**



# Problem

In this project, I conducted an analysis of BMRI stock volatility and investment risk using Exploratory Data Analysis (EDA), volatility estimation, and Value at Risk (VaR). The main objective of this analysis was to answer the following question:

How can the volatility and investment risk of BMRI stock be analyzed through closing price trends, return estimation, and Value at Risk (VaR) measurement using Historical, Parametric, and Monte Carlo methods, and what are the implications for investment risk management?

The dataset used was BMRI stock data from Kaggle. The analysis was carried out using Python (libraries: Pandas, NumPy, Matplotlib, SciPy, OS, Sys) on Google Colab.

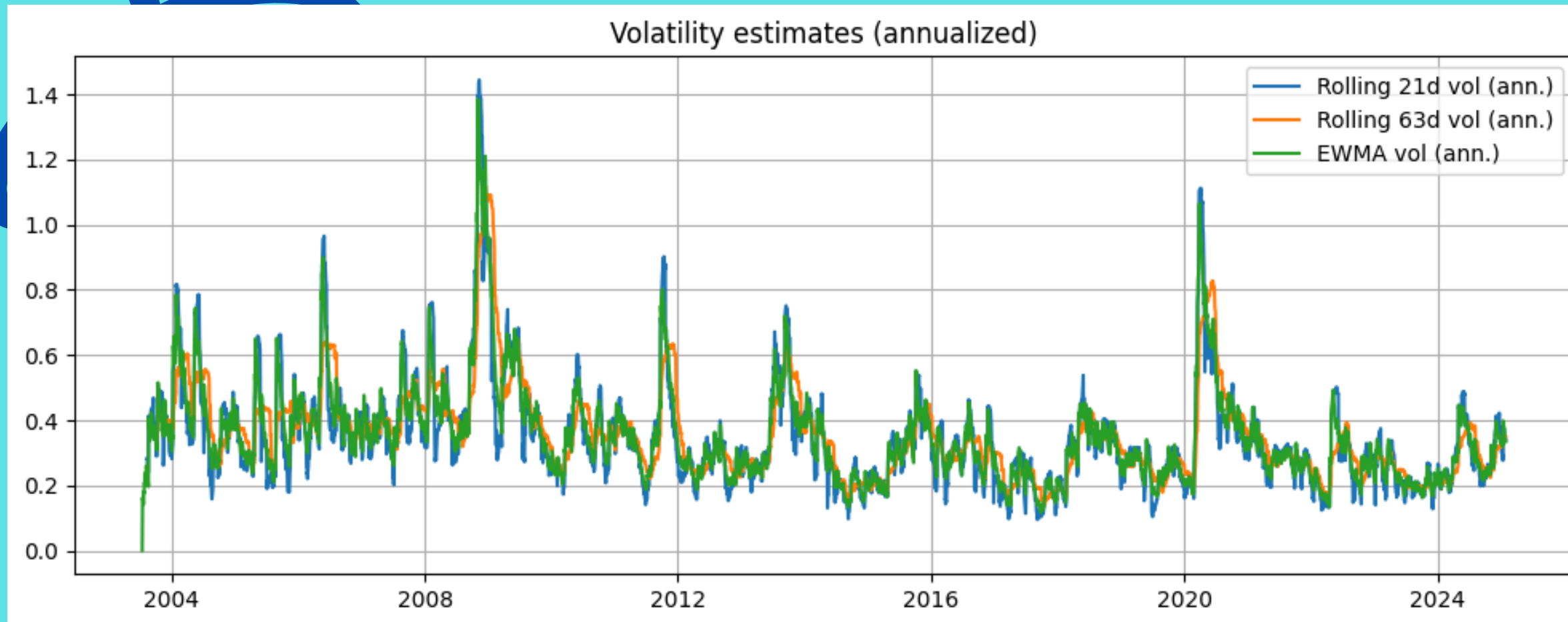


## Disclaimer

⚠ This analysis is for educational purposes and data analysis practice only, not an investment recommendation.

## Interpretation of BMRI Stock Price Chart

- A strong uptrend is observed since the beginning of the period (2003, price < IDR 500) until it peaked above IDR 7,000 in 2024.
- This indicates that BMRI stock has provided significant long-term capital gains.
- 2008–2009: A sharp decline occurred due to the global financial crisis.
- 2020: A downturn was recorded during the COVID-19 pandemic.
- Afterward, the stock recovered quickly and reached a new all-time high.

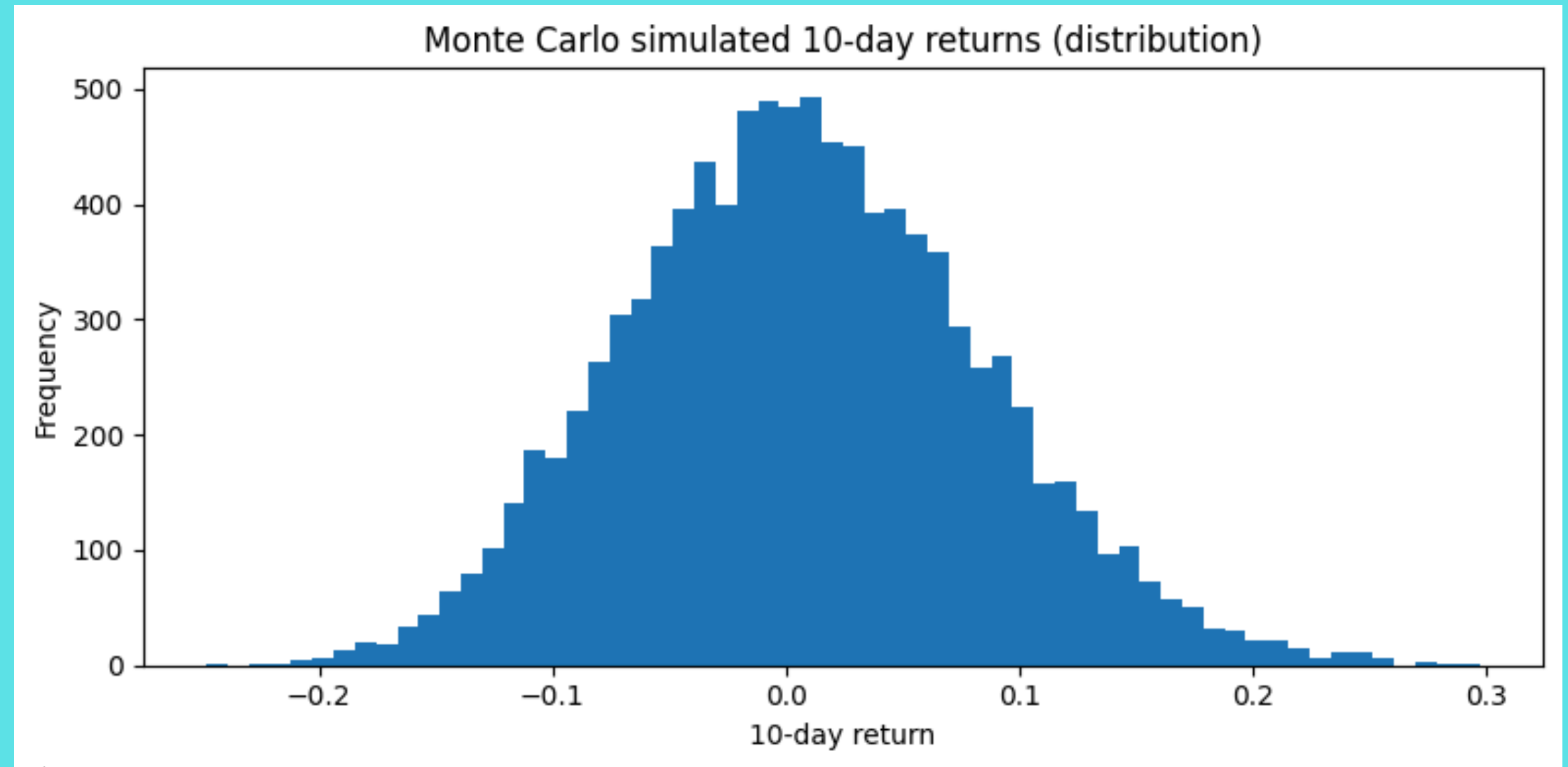


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## Volatility Interpretation of BMRI Stock

- 2008–2009: Peak above 1.4 during the global financial crisis.
- 2020: Significant spike caused by the COVID-19 pandemic.
- These reflect turbulent market periods that sharply increased investment risk.
- Normal periods (2013–2019): Volatility remained around 0.2–0.4, indicating relatively moderate risk.
- 2023–2024: Volatility started to rise again (0.3–0.4), signaling market uncertainty despite BMRI stock reaching record highs.



## Distribution Shape of BMRI Stock Returns

- Shape: The distribution is close to a normal curve (symmetric around 0), suggesting that most short-term returns are relatively stable.
- Majority outcomes: 10-day returns are concentrated between -5% and +5%, with the highest frequency around 0%.
- Tail risk:
  - Extreme losses ( $\leq -20\%$ ) are rare, but still possible.
  - Large gains ( $\geq +20\%$ ) may also occur, though infrequently.

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# Terima Kasih

## SUMBER

*<https://www.kaggle.com/datasets/cgyputra/bmri-jk-stock-data>*

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## PORTOFOLIO

*[https://github.com/inmus/Dibimbing\\_Protofolio/blob/main/analisis\\_volatil\\_BMRI](https://github.com/inmus/Dibimbing_Protofolio/blob/main/analisis_volatil_BMRI)*

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