UNIVERSITI TEKNOLOGI MARA

I-URID 2025

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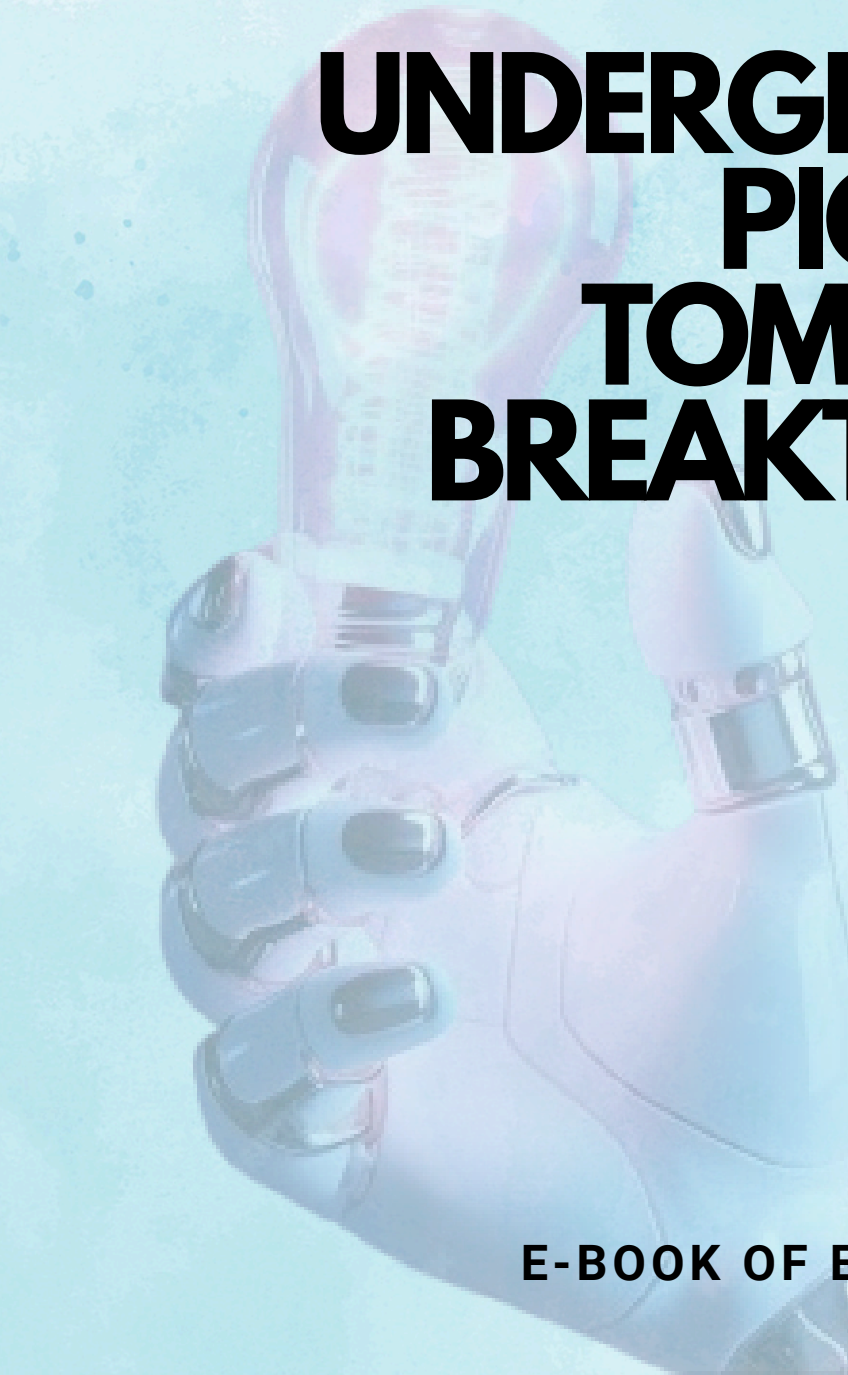

E-BOOK OF EXTENDED ABSTRACTS

OPTIMIZATION OF GOLD INVESTMENT RETURNS IN PEGADAIAN INDONESIA USING ARIMA MODEL AND INVESTOR RISK PROFILES

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ABSTRACT

This study classifies gold investors at Pegadaian based on their risk profiles: conservative, moderate, and aggressive. Conservative investors prioritise capital safety by choosing fully paid gold savings to avoid debt risks and price fluctuations. Moderate investors combine cash purchases with short-term installments (6–12 months) to potentially gain when gold price increases exceed installment costs. Aggressive investors use leverage to expand assets, thus increasing both profit and loss potential. In addition to these types, there are also Sharia-compliant investors who prefer instruments free from riba, gharar, and maysir, such as cash-based gold purchases. Gold price prediction for Antam and gold savings is conducted using the ARIMA model based on daily data from sahabat.pegadaian.co.id, analysed with Minitab and Python. Results indicate that the ARIMA model can predict price movements. After obtaining the predictions, margin comparisons are made by calculating the difference between buying and selling prices of Antam gold and gold savings. These margin differences assist in classifying investor characteristics by highlighting their risk levels and capital utilisation preferences.

Keywords: Investor Profile, Gold Savings, ARIMA Model, Gold Price Prediction, Investment Margin

INTRODUCTION

Pegadaian Indonesia is a government-owned non-bank financial institution established in 1901 during the Dutch colonial era as a provider of pawn-based credit. After independence, it became a state-owned enterprise and has held the status of PT Pegadaian (Persero) since 2012. In 2019, Pegadaian joined the ultra-micro holding ecosystem under the BRI Group to strengthen national financial service synergies (Karnawijaya & Rokhaniyah, 2021; Amelia, Apriani, & Finanto, 2024). Over time, Pegadaian expanded into micro-financing, Sharia services, and gold investment. Digital innovations have also enhanced customer satisfaction and loyalty through E-ServQual-based services emphasising efficiency, system reliability, service resolution, and privacy (Amelia, Apriani, & Finanto, 2024). Gold is a popular investment instrument in Indonesia due to its safe, stable, and liquid nature; during economic uncertainty, it serves as a safe haven and a hedge against inflation (Arianti & Nurfadillah, 2022; Hermawan & Wahyuni, 2021). Research indicates that gold can deliver competitive returns compared to stock indices in the long term (Gunawan & Setiawan, 2020) while maintaining stability during crises, including the COVID-19 pandemic (Yuliana & Robiyanto, 2021). The consistent rise in gold prices reinforces its perception as a stable long-term investment, particularly during periods of high inflation and rupiah depreciation (Siagian, 2025). Public interest is also influenced by financial literacy, especially through pawnshops and Islamic banks (Ramadhani & Lestari, 2023; Mardiya, Amani, & Vidiyastutik, 2025). Beyond security and accessibility, long-term motivation and adherence to Sharia principles encourage Muslim investors to choose Sharia Pawnshop products (Rosilawati, 2024). Thus, gold investment in Indonesia, particularly through pawnshops, plays a dual role as a safe and liquid financial instrument while also enabling broader community participation in long-term investment.

In this research, investors are classified into conservative, moderate, and aggressive groups based on their risk preferences in gold investment. Conservative investors prioritise capital security and avoid volatility.

Moderate investors balance safety and growth by combining cash purchases with short-term installments (6–12 months) to lock in prices, though profitability depends on price increases exceeding installment costs. Aggressive investors accept volatility for higher returns, often using leverage or credit (30–40% down payment) to magnify gains or losses, thus requiring strong market knowledge and financial resilience. Islamic investors reject riba, gharar, and maysir, preferring cash-based savings or physical gold aligned with Sharia (ICDX, 2025). Moreover, understanding gold price forecasts is crucial since gold is considered a safe instrument against inflation and global economic fluctuations; predictions guide timing, strategy, and portfolio adjustment (Jana Kane, 2025).

This study applies time series analysis to model daily Antam gold prices and gold savings at pawnshops using Autoregressive Integrated Moving Average (ARIMA), which captures short-term patterns and long-term trends. Since gold prices fluctuate due to factors such as inflation, exchange rates, and economic conditions, forecasting is essential to anticipate future movements and reduce uncertainty (Surahman et al., 2025). ARIMA is commonly referred to as the Box-Jenkins method, which is a forecasting method based on time series (Maharani, 2024). The data used consists of daily selling price data obtained from the website www.sahabat.pegadaian.co.id. The modeling was conducted with the assistance of Minitab and Python software to support statistical analysis and data visualisation. The forecasting process begins with data collection, stationarity testing, ARIMA model formation. Stationarity is tested through two approaches, namely Box-Cox transformation and differencing. Box-Cox was used to stabilise the variance of non-stationary data. Differencing is a method employed to stabilize the mean of non-stationary data (Nurman & Nusrang, 2022). The Box-Cox transformation and differencing method is formulated as:

$$Z_t^{(\lambda)} = \frac{Z_t^{(\lambda)} - 1}{\lambda} \tag{1}$$

$$\Delta Z_t = Z_t - Z_{t-1} \tag{2}$$

$$\Delta^2 Z_t = \Delta Z_t - Z_{t-1} = (Z_t - Z_{t-1}) - (Z_{t-1} - Z_{t-2}) \tag{3}$$

Z_t = value at time t
λ = Box-Cox transformation parameter

Model identification is carried out through the analysis of the Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) to identify autocorrelation patterns and determine the appropriate orders in ARIMA modeling, namely the autoregressive order (p), differencing (d), and moving average (q). In general, the ARIMA model is expressed as:

$$(1 - B)^d Z_t = \varphi_1 Z_{t-1} + \ldots + \varphi_p Z_{t-p} + e_t + \theta_1 e_{t-1} + \ldots + \theta_p e_{t-p} \tag{4}$$

Z_t = value at time t; q = MA order; d = differencing order; θ = parameter in MA
B = backshift operator; e_t = error at time t; p = AR order; φ = coefficient in AR

Moreover, margin analysis between gold's buying and selling prices is conducted to estimate the time required for investors to resell their gold and generate profit using the following formula:

$$Margin = \frac{selling\ price - purchase\ price}{purchase\ price} x\ 100\% \tag{5}$$

RESULTS AND DISCUSSION

This research was conducted by collecting price data for two gold instruments, namely savings gold and Antam Pegadaian bullion, in the form of daily data taken from August 2024 to August 2025. This period

was chosen to represent price movements over a full year, allowing for data that reflects the dynamics of the gold market over a sufficiently long timeframe. This mapping provides an overview of the trends, fluctuation patterns, and price movement differences between the two gold instruments, serving as a foundation for further analysis. Subsequently, price forecasting is conducted using ARIMA method on four types of price data collected, with a forecasting horizon of five days following the conclusion of the data collection period. The forecasting results indicate the short-term price movement tendencies for each instrument, which then serve as a reference for profitability analysis.

Based on the margin analysis results, Antam Pegadaian gold bars have a larger margin compared to savings gold, with an average of 7.28 and a standard deviation of 2.57, while savings gold has an average of 3.83 and a standard deviation of 0.04. This larger margin leads to a longer duration required to reach the break-even point and necessitates a more substantial price increase to begin generating profits. Conversely, savings gold, with a lower margin, holds the potential to achieve the break-even point and profitability in a relatively shorter period. Nevertheless, if the trend of bullion gold price increases shows a more pronounced uptick, the break-even point and profit potential may be realised more swiftly than initially projected.Gold investment has become a preferred choice for many people due to its perceived safety and profitability. However, each investor possesses distinct characteristics and varying levels of risk tolerance.

Table 1: Predictions for Gold Selling and Buying Prices

Gold Savings Price (Buy)	Gold Savings Price (Sell)	Antam Gold Price (Buy)	Antam Gold Price (Sell)
1.800.050	1.867.535	1.987.506	2.002.414
1.801.880	1.869.685	1.986.986	2.008.853
1.803.180	1.870.853	1.986.929	2.014.210
1.804.550	1.872.390	1.986.923	2.018.952
1.805.910	1.873.788	1.986.922	2.023.255

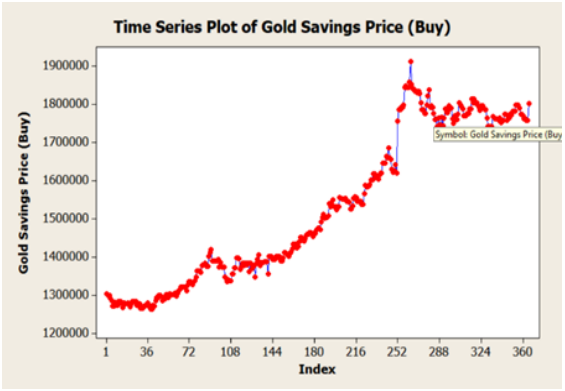

Figure 1: Time Series Plot of Gold Savings Price (Buy)

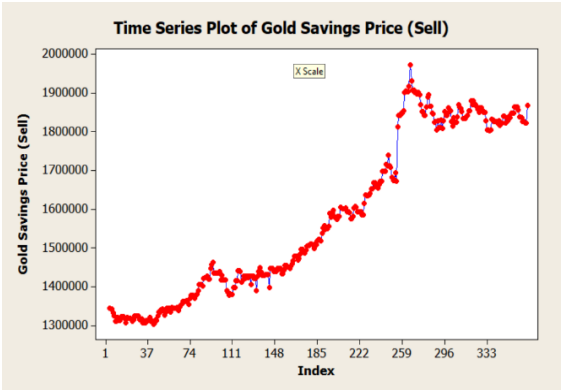

Figure 2: Time Series Plot of Gold Savings Price (Sell)

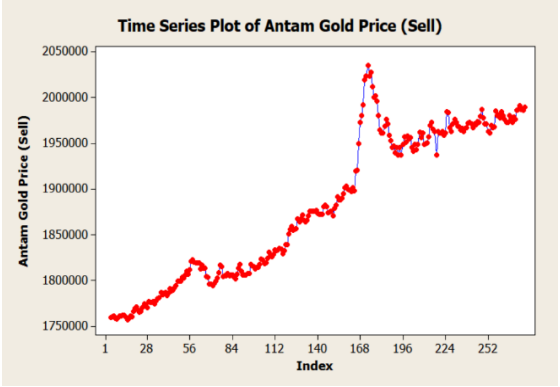

Figure 3: Time Series Plot of Antam Gold Price (Sell)

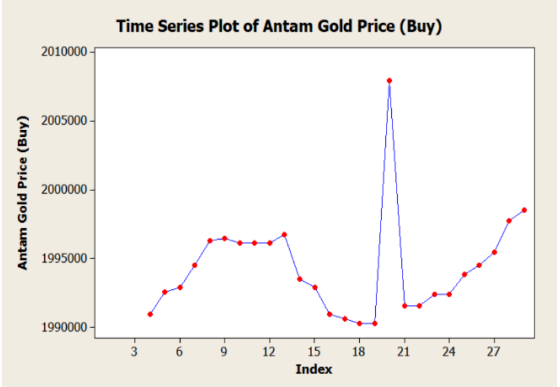

Figure 4: Time Series Plot of Antam Gold Price (Buy)

Table 2 compares options for gold savings and gold bullion based on conservative, moderate, aggressive, and sharia-compliant investor profiles.

Table 2: Investment Option Based on Characteristics of Investor

Gold Savings	Gold Bar
Conservative	
Cash gold savings are highly recommended for conservative investors as they prioritise safety. Without interest or installments, all gold price increases become net profit with very low risk.	Buying gold bullion in cash is advisable as it ensures full ownership, provides profit from long-term price appreciation, and involves no extra costs like interest or installments. Installments may benefit if interest is lower than gold's price increase, but they are still less recommended since conservative investors usually avoid debt risks.
Characteristic of investor: Moderate	
Gold savings are less recommended for moderate investors, as they usually seek higher returns, while savings offer only small gains without leverage.	Cash purchase of gold bullion is more suitable for moderate investors, as it offers higher profit potential from price increases and better resale margins than gold savings. Installments can benefit moderate investors if the 6–12 month gold price increase exceeds the interest cost, allowing them to lock in a lower initial price and gain from appreciation.
Characteristic of investor: Aggressive	
It is not highly recommended due to limited returns. Aggressive investors are better suited for instruments that offer high profit potential.	Cash gold can give profits from price increases, but it is less recommended for aggressive investors since returns are relatively stable and not optimal. Aggressive investors may benefit from installments or credit using low-interest external loans. If gold returns exceed loan interest, leveraging debt allows significant profit from large purchases.
Characteristic of investor: Sharia	
Cash, because it is advantageous in accordance with Islamic principles: without interest, without installments, and immediately benefiting from the increase in gold prices.	Cash because of pure profit from the increase in gold prices without any element of usury. Suitable for investors with a shariah-oriented focus.

CONCLUSION

Based on the research findings, it can be concluded that there are four types of gold investors in Pegadaian Indonesia, namely conservative, moderate, aggressive, and sharia. Each type of investor has different characteristics and levels of risk tolerance in managing their investments. On the other hand, the trend of gold prices, both in the form of gold bars and gold savings, shows an increasing tendency, thus reinforcing gold as an attractive investment instrument. Each investor needs to understand their risk profile accurately so that the chosen investment strategy aligns with their goals and level of comfort, thereby maximising the potential return on investment.

ACKNOWLEDGEMENT

The authors would like to express the sincere gratitude to Universitas Negeri Malang and all related parties for their support and facilitation, which greatly contributed to the successful completion of this research.

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