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COMPARATIVE ANALYSIS OF VALUE INCREASE AND PREDICTION ASSET GROWTH BETWEEN BITCOIN, GOLD, AND WORLD STOCK INDEX

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ABSTRACT.

Technological developments have transformed nearly every aspect of society, including investment methods. The types of investments that frequently attract investors are digital assets in the form of cryptocurrencies, stock indices, and gold. Comparative research on these three types of investments is still limited, particularly regarding Bitcoin. Therefore, this study analyzes the asset values of these three types of investments and their predicted growth as considerations in determining promising investments. This quantitative descriptive study analyzes variables using the CAGR (Compound Annual Growth Rate) and AAGR (Average Annual Growth Rate) parameters for Bitcoin, gold, and stock indices in the United States, China, Germany, and Indonesia for the 2020–2024 period. The data is then used to predict asset growth over the next five years (2025–2029). The results show that the three types of assets studied for the 2020–2024 period exhibited growth in value with distinct profile characteristics. Bitcoin, the most volatile asset, offers the potential for significant long-term returns. Meanwhile, the assets with the best potential for growth in the 2025–2029 period, starting with the highest ranking, are Bitcoin, the S&P 500 (United States), and Gold. The predicted values based on AAGR and CAGR for Bitcoin assets in 2029 are Rp75,664,861,688 and Rp7,575,357,132, respectively. Consideration of macroeconomic factors, along with strengthening government regulations and market education, is necessary for successful economic growth. Future research on digital assets such as Ethereum or stablecoins, and analysis of the impact of crypto adoption by countries as national reserves using other parameters, are needed to strengthen references and considerations for future investment options, taking technological advancements into account.

Keywords: AAGR, CAGR, Bitcoin, Gold, Stock index

INTRODUCTION

In the development of the investment world, there are numerous instruments available to investors, both institutional and individual. Generally, investment instruments can be divided into two categories: short-term and long-term. Short-term investments are

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investments with a relatively short time horizon, usually less than one year. This type of investment has high liquidity, making it easy to access when needed. Some types of investments in this category include deposits, money market mutual funds, short-term bonds, Government Securities (SUN), High-Rate Savings, Dividend Stocks, and Retail Sukuk. Meanwhile, long-term investments are investments made to achieve significant growth in value over a long period of time. Some of these investment products include stocks, bonds, mutual funds, property, unit-linked insurance, gold, and cryptocurrency.(Paningrum, 2022; Raharjo, 2022).

There are several factors to consider when determining the type of investment. The most fundamental thing to understand is the risk that always follows return (risk-return trade-off). Return, often referred to as yield, is the result obtained from an investment. This can be either a realized return/return that has already occurred or an expected return that will occur in the future. This return typically takes the form of interest, capital gains, and dividends. Meanwhile, risk is defined as the chance of not achieving one's investment objectives due to uncertainty over time. This risk is classified into two types: systematic risk (market risk) and unsystematic risk (risk arising from company policy). It is known that there is a direct or linear relationship between return and risk, indicating that the greater the risk borne, the greater the expected return. (Adnyana, 2020).

In the era of globalization, technology is advancing rapidly, with the advent of technologies such as 5G networks, the internet of things (IoT), cloud computing, artificial intelligence (AI), and blockchain, resulting in an unavoidable downstreaming of the economy. Technology has transformed nearly every aspect of society, including the way people invest. Recently, blockchain technology has captured the attention of the Indonesian public. Bitcoin, as a blockchain-based investment product, is a relatively new investment option compared to other investment options such as gold and stock indices.

The three types of investments that often attract investors are digital assets in the form of cryptocurrencies, stock indices, and gold. 2008 marked the beginning of the cryptocurrency era with the release of a paper by someone under the pseudonym Satoshi Nakamoto. The first cryptocurrency introduced was Bitcoin, which began operating in 2009.

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Due to Bitcoin's popularity, other cryptocurrencies became popular among retail investors.(Noh and Bakar, 2020; Raharjo, 2022).

Meanwhile, stock indices are one of the investment instrument options available to the public to maintain or increase the value of their assets in the future. Index values can be considered as indicators that reflect the collective views of all market participants. In 2022, besides China, the United States and Japan became the three largest economies in the world, with Gross Domestic Products (GDP) reaching US$25.04 billion, US$18.32 billion, and US$4.03 billion, respectively (www.imf.org). The stock exchanges in these three countries were also the largest in the world by market capitalization. Meanwhile, in the same year, Germany, with its DAX30 stock index, was one of the European countries included in the top ten world stock indices popular with foreign investors.(Madyan et al., 2019; Putra and Nurmatias, 2024).

Meanwhile, gold investment, the precious metal most commonly used as an investment instrument, is based on its higher value compared to other precious metals. Furthermore, gold is often considered a valuable asset for protecting wealth. Furthermore, the gold business is considered a safe haven against uncertain risks such as inflation, economic crises, and geopolitics, and is compliant with Sharia principles. As a safe haven, gold is believed to be a safe haven compared to other assets. Gold prices tend to rise during times of crisis and economic uncertainty. From a hedging perspective, gold investments generally offer protection against Rupiah depreciation and inflation. However, like Bitcoin, gold has an international price standard that is also volatile, influenced by several factors, including the global economy.(Witjaksono et al., 2022).

Based on historical data on investment instruments such as gold, stocks, and Bitcoin, the price of gold has increased significantly over the past three years. In early 2022, gold opened at Rp 27,812,568 per troy ounce, or approximately 31.1 grams, while at the end of 2024, it closed at Rp 45,477,716 per troy ounce. This indicates that gold experienced a significant price surge as an investment asset, despite a decline to Rp 25,408,944 in early September 2022. However, gold managed to recover by the end of 2024. Meanwhile, stocks, which are included in the S&P 500 index, opened at Rp 65,162,672 in early 2022, but declined to Rp 56,194,114 in June 2022. However, this asset rebounded to Rp 94,983,453 by

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the end of 2024. As is known, the S&P 500 index price fluctuations are largely influenced by various factors such as government policies and macroeconomic conditions. Meanwhile, Bitcoin opened at Rp 659,082,514 in early 2022 and experienced a sharp decline, reaching Rp 258,743,244 by the end of 2022. This was due to several factors, particularly the Bitcoin halving cycle, which had passed 500 days, and the dynamics of the crypto industry, particularly the collapse of the FTX exchange and the Terra Luna cryptocurrency. Thus, each asset type experiences different growth rates in each time sequence.

Fundamentally, the availability of various types of investments, including gold, stock indexes, and bitcoin, requires in-depth analysis regarding their advantages and disadvantages (risk and reward), macroeconomic factors, geopolitical conditions, and other dominant factors. To date, comparative research on these three types of investments remains limited, particularly regarding bitcoin. Studies on bitcoin have focused on literature reviews, discussing only cryptocurrencies, analyzing them from various perspectives, and only regarding investor behavior in digital assets.(Afrizal, 2021; Huda and Hambali, 2020; Liestyowati et al., 2023; Widyastuti and Hermanto, 2021)Therefore, this study analyzes these three types of investments using value increase parameters and growth predictions based on CAGR (Compound Annual Growth Rate) and AAGR (Average Annual Growth Rate) as considerations in determining promising investment options.

RESEARCH METHODS

This research is a quantitative descriptive study that analyzes each research variable without correlating one variable with another. The research variables include the increase in the value of Bitcoin assets, the value of gold assets, and stock indices in several countries, including the United States, China, Germany, and Indonesia, respectively, between 2020 and 2024. This data is then used to obtain predicted asset growth data for the next five years. This study uses secondary data available on trusted websites. The gold asset value data was obtained from the international asset graph data website.(TradingView, 2026a). Likewise, Bitcoin asset data was obtained from the same website specifically for Bitcoin market research.(TradingView, 2026b).

Meanwhile, stock index asset data in Indonesia is also available on the same website.(TradingView, 2026c), United States of America (TradingView, 2026d), China SSE Composite Index can also be accessed on the same website(TradingView, 2026e). Similar to

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accessing other asset data, stock index data in Germany is also listed on the same website.(TradingView, 2026f)All of this data is in the form of ratios presented in chart form. This asset value data was collected from 2020 to 2024. This data is then used to predict the growth of each asset type over the next five years based on the Compound Annual Growth Rate (CAGR) and Average Annual Growth Rate (AAGR). The resulting prediction data is also in the form of ratios.

The population and sample in this study collected all data on the value of Bitcoin, gold, and stock index assets in the United States, China, Germany, and Indonesia during a predetermined period. At this stage, the data was analyzed based on the classification of the value of the three types of assets per quarter during the period 2020 - 2024 using the CAGR (Compound Annual Growth Rate) and AAGR (Average Annual Growth Rate) formula approaches. CAGR stands for Compound Annual Growth Rate, which is a metric to measure the average annual growth of an investment over a certain period of time assuming profits are reinvested (compound interest effect), providing a more accurate picture of growth to assess the performance of long-term investments, such as stocks or mutual funds, with the basic formula (ValueCAGR $=$ (Nilai akhir /Nilai Awal)$^{1/n} - 1$

AAGR (Average Annual Growth Rate) is the average annual growth by calculating the annual growth (Growth Rate) without taking into account the compound interest effect according to the period that will be used as the basis for the calculation.

$$AAGR = \frac{GR1 + GR\ 2 + GR\ 3 + GR\ 4 + GR\ 5}{\text{n}}$$

How to use AAGR to predict future asset values with the formula Predicted Value = Present Value x (1+AAGR).

RESULTS AND DISCUSSION

ASSET PRICE PREDICTION CALCULATION FOR THE NEXT 5 FIVE YEARS

Calculation of pAsset growth predictions between Bitcoin, Gold, S$P 500, SSE China, DAX and IHSG in the next 5 (five) yearsperiod 2025 to 2029 After knowing each AAGR and CAGR using the following formula,

Price Prediction based on AAGR = Current Price x (1+AAGR)

Price Prediction based on CAGR = Current Price x (1+CAGR)

The data illustration will begin by presenting the AAGR and CAGR values for each asset value in the 2020 – 2024 period.

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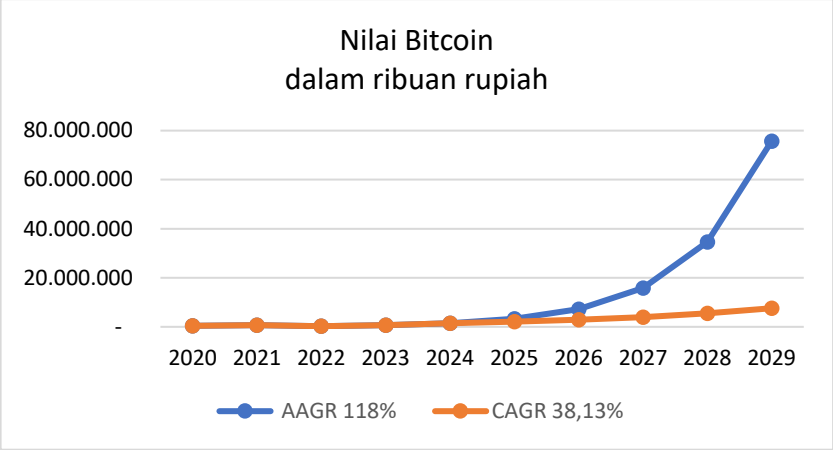

Figure 1. Bitcoin price prediction for 2025 - 2029

Bitcoin price prediction analysis using the AAGR formula appears higher when compared to using the CAGR formula, so that in 2029 if using AAGR then bitcoin is predicted to reach a price of Rp. 75,664,861,688 / Bitcoin while if using CAGR then in 2029 bitcoin is predicted to reach a price of Rp. 7,575,357,132 / Bitcoin, the difference in price predictions appears very different, the use of calculations using AAGR is higher than CAGR there is a difference of Rp. 68,089,504,556 this is because the AAGR formula does not take into account the effect of compound interest.

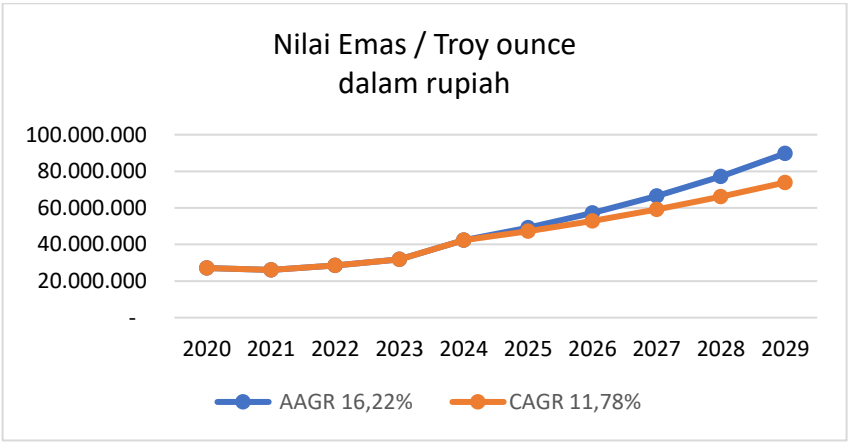

Figure 2. Gold price prediction for 2025 - 2029

The predicted gold price in 2029 using AAGR (Average Grain Price Index) is Rp 89,746,734 per troy ounce, higher than the predicted gold price using CAGR (Rp 73,684,340 per troy ounce). The difference between the AAGR and CAGR calculations is Rp 16,062,394.

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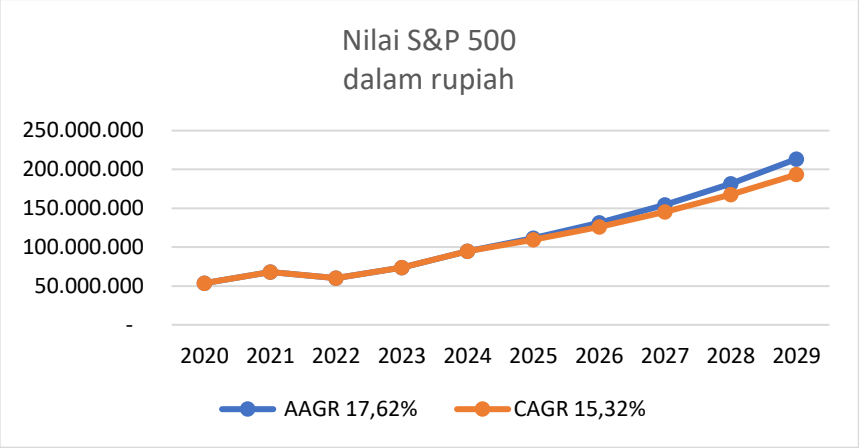

Figure 3. S&P 500 price prediction for 2025 - 2029

The assets of the United States S&P 500 stock index in 2029 are predicted to reach Rp 213,555,626 if calculated using AAGR, while if calculated using CAGR, in the same year it will reach a price of Rp 193,476,538 with a different calculation approach, AAGR is greater than the CAGR calculation, there is a difference of Rp 20,079,088.

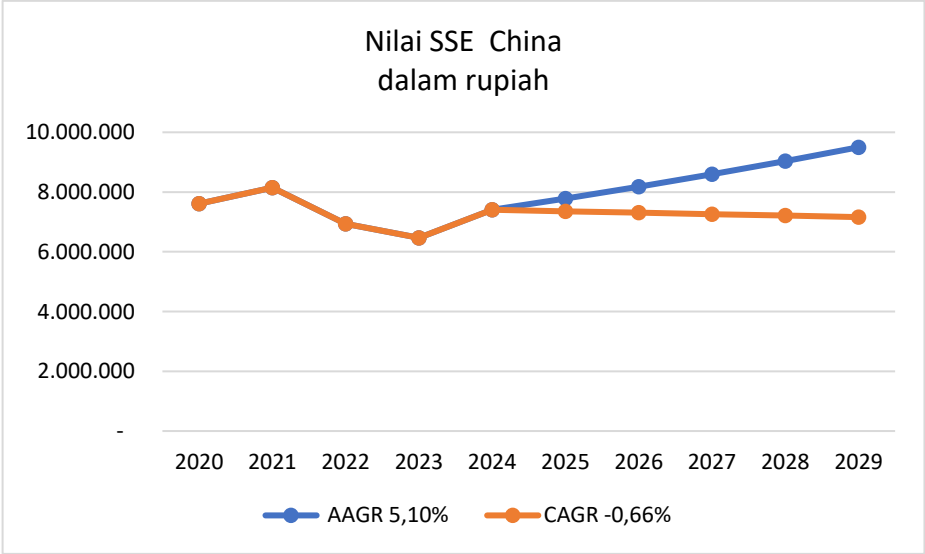

Figure 4. China SSE price prediction for 2025 - 2029

An interesting thing happened to the SSE China stock index assets where the AAGR results experienced positive growth of 5.10% but the CAGR experienced negative growth of -0.66%, so in 2029 the SSE if using the AAGR calculation the SSE value will be IDR 9,498,597 while the calculation using CAGR with the same year the SSE price of IDR 7,165,833 there is a difference of IDR 2,332,764.

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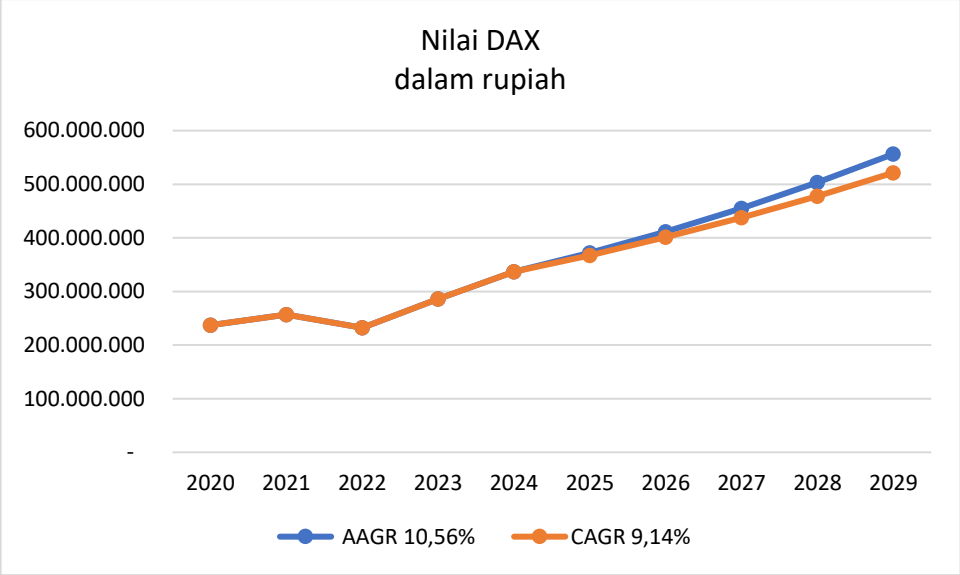

Figure 5. German DAX price prediction for 2025 - 2029

The German DAX index as a representation of the European continent shows stability when calculated using AAGR with CAGR, so the predicted DAX asset price if calculated using AAGR will result in IDR 556,274,274, while if calculated using CAGR, in the same year it is predicted to reach IDR 521,457,085, so the AAGR calculation is larger, there is a difference that is not too far amounting to IDR 34,817,189.

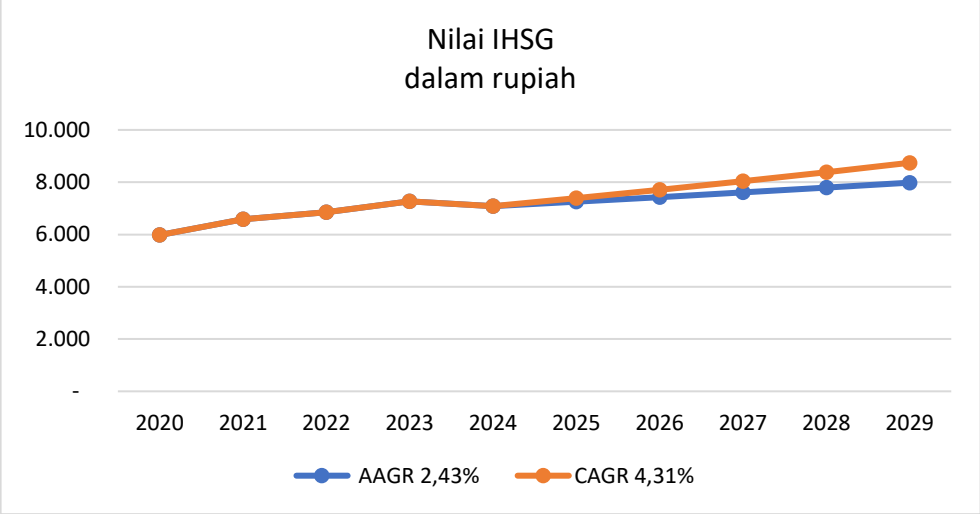

Figure 6. JCI price prediction for 2025-2029

Interestingly, the JCI's CAGR is actually higher than its AAGR. This typically occurs when historical data includes years with deep negative growth, which pulls the AAGR

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average downward, while the CAGR remains focused at the beginning and end of the period. This indicates more solid cumulative growth. Calculating the JCI price prediction for 2029 using the AAGR calculation would result in a value of Rp 7,982, while using the CAGR for the same year would result in a value of Rp 8,742. Only the JCI has a higher CAGR calculation than the AAGR calculation, with a difference of Rp 760.

Based on the calculation of AAGR and CAGR from 2020 to 2024, Bitcoin has the highest AAGR and CAGR of any asset, despite extreme price fluctuations, which aligns with the principle of high-risk, high-return investment. Bitcoin's value could still be higher due to several factors, including the limited supply of 21 million bitcoins, which at the time of this writing has been mined at 20 million, leaving 1 million bitcoins to be mined until 2140. Over a period of approximately 115 years, only 1 million bitcoins will be mined, with each halving cycle decreasing in size. The cost of mining 1 bitcoin will naturally become increasingly expensive. If the 3rd halving cycle, from May 2020 to April 2024, costs Rp 1,000,000,000 to obtain 1 bitcoin, then the 4th cycle, from mid-April 2024 to around early 2028, will cost Rp 2,000,000,000, provided electricity costs or energy operating costs do not increase. This occurs because each Bitcoin cycle reduces its supply by 50% compared to the previous cycle. Another factor contributing to Bitcoin's continued price peaks is the presence of several large US institutions issuing Bitcoin ETFs.

The value of gold is predicted to continue to strengthen as many central banks purchase large amounts of gold amidst future economic and geopolitical uncertainty. Gold is the most conservative option in the face of uncertainty, with an AAGR of 16.22% and a CAGR of 11.78%, making it an excellent investment portfolio alternative compared to holding cash in savings.

From 2020 to the end of 2025, central banks worldwide demonstrated a very aggressive gold accumulation trend. According to data from the World Gold Council and recent market reports, this period marked the highest institutional buying rate since the gold standard era (the 1970s).

CONCLUSION AND SUGGESTIONS

Based on the analysis of historical data for the 2020–2024 period and asset growth projections, the following can be concluded: Comparison of Asset Values (2020–2024): The three assets, namely bitcoin, gold, and stock indexes, show growth in value, but with different characteristics, in order from the highest, namely bitcoin, S&P 500 (United States), Gold. Bitcoin recorded the highest volatility but provided the potential for very significant returns in the long term with the very dynamic character of the crypto industry in 2024, bitcoin reached a value of IDR 1,506,478,899. Prediction of Asset Growth for the Next 5 Years (2025–2029): Growth predictions show that assets with the best potential are indicated by

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the highest order, similar to the findings based on the 2020-2024 period, namely bitcoin, S&P 500 (United States), Gold. The predicted value based on AAGR and CAGR on bitcoin assets in 2029 is IDR 1,506,478,899, respectively. 75,664,861,688 and Rp 7,575,357,132, respectively.

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