THE INFLUENCE OF UNITED STATES' INFLATION RATE, INTEREST RATE AND BITCOIN TOWARDS GOLD PRICE

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ABSTRACT

The purpose of this paper is to investigate the influence of inflation rate and interest rate of The United States towards the gold's price. Besides that, the movement of Bitcoin and gold has also been examined in this paper. The past 30 years of historical data of the inflation rate, interest rate and the gold's price has been applied in this study to examine the effect of inflation and interest rate towards the gold price. Other than that, the past 30 months of the Bitcoin's price has also been applied in the research. Through the research, it has found that the inflation rate and the interest rate have a negative relationship with the gold's price. In addition, this paper has also shown that the movement of Bitcoin's price and gold's price is in a same direction. In other words, the movement of these assets is positively correlated in which when the Bitcoin price's increase, the price of gold is also increase.

Keywords: Gold Price, Inflation Rate, Interest Rate

INTRODUCTION

Gold has been one of the best instruments to hedge against inflation. Besides that, the gold is considered as one of the most liquid assets. This is because people are believing that the price of the gold is relatively stable as compared to other assets such as the stocks and cryptocurrency. Back in the days, the United States had adopted a concept in which the United State Dollar (USD) is pegged with the gold. This concept is also known as the Gold Standard. The concept behind is assume that the value of a currency is fixed relatively to gold. However, this concept was abandoned by the U.S. in 1971 due to the U.S would like to control inflation and avoid foreign countries overloading the system by exchanging their dollars for gold. Today, there are many investors still choose gold as the preferable assets to invest because there confident on the dollar is not as high as before when the States is still adopting the gold standard. According to Winters (2022), he had shared the words from Jim Cramer the host for CNBC's Mad Money and Investing Club. As outlined by Jim Cramer, due to its uniqueness as a commodity and its long history as a reliable medium of exchange, gold has a stable value. Hence, the gold market would also considered as one of the high volatile markets.

From the aspect of the foreign currency (FOREX) market, gold is denoted as XAU in the FOREX market, and it is paired with the USD become the pairing called XAU/USD. The XAU/USD is represented the spot gold price in troy ounce digitally because any position in the market is not trading the physical gold. In the trading of XAU/USD, it usually influenced by the inflation and interest rate in the U.S. Other than that, the relationship between the Bitcoin and XAU/USD is also compared in this research. Bitcoin is one of the largest market caps as

compared to the others cryptocurrency. It usually been called as the digital gold due to its scarcity and the difficulties to obtain it is high.

The study of the XAU/USD has remained relatively unpopular studied topics as compared to the stock market. This is due to the exposure of the XAU/USD as well as the FOREX market in Malaysia is relatively unpopular among the people. Other than that, there are restrictions for the Malaysians to trade in the FOREX market unless with the authorised dealers such as banks and licensed money changer. However, gold was one of the assets in which people prefer to purchase due to stability of price. Hence, studying the effect of the inflation rate and interest rate towards the XAU/USD is important so that it may reflects the effect caused to the overall gold market.

Due to the pandemic of COVID-19, the Fed of the United States had announced the unlimited quantitative easing (QE) in order to stimulate the economics of the U.S. The QE is a monetary policy that lowering down the interest rate on the savings and loans to increase the economics activities in the nation. Hence, it has driven the price of the gold as well as the XAU/USD hikes. This is because the willingness of the people to take money to invest is relatively high as compared to save it in normal saving accounts.

Recently, due to the unlimited QE and the conflict between the Russia and Ukraine, it has cause severe inflation in the U.S. Hence, the Fed has started to conduct a move called tapering to control the nation's inflation. Tapering can be known as the action of contractionary monetary policy in which started to withdraw the monetary stimulus plan that been used to stimulate the economics. Therefore, the Fed has started to hike the interest in the country and causing most of the assets' price such as stocks and gold as well as the rate of XAU/USD to fall. Up to November, the Fed has hiked the interest rate sixth times consecutively and it has hiked up to 75 basis point for the latest announcement.

On the other hand, the so-called digital gold, Bitcoin has also gone to the same direction as the XAU/USD in this event. However, as compared to the XAU/USD, there are other factors that may also affect the price of Bitcoin such as the regulatory problems that has been unsolved until now. Other than that, the collapse of the exchange has also created panic sell on the digital assets. Hence, this study may also study the relationship of Bitcoin with the XAU/USD.

In this research, the affection of the changes of the inflation rate and interest rate as well as the movement of Bitcoin towards the XAU/USD will be studied. However, the studied on the relationship between the chosen variables and the XAU/USD are limited. This is due to the data obtained might not provide an accurate result.

LITERATURE REVIEW

Inflation rate is one of the macroeconomics factors that will affecting the gold price. As outlined by (Seng Ling & Kueh, 2020), the inflation rate will be affecting the gold prices directly and it is proven by the scholars by using the Granger Causality test. Besides that, there is also another research done by scholars has also shows that the inflation rate does not affect the XAUUSD significantly. Based on (Shafiee & Topal, 2010), the correlation between inflation rate and nominal gold price is around 9% in which says that the positive relationship was not significant. Hence, it can conclude that the sensitivity of gold price towards inflation was low. Moreover, there is also another scholar also found the same result regards the correlation between the inflation rate and gold price. As outlined by (Liya et al., 2021), the result of correlation analysis that obtained by them has also shown that only 10% of significant and it is a positive relationship.

However, there is a study has shown that the inflation rate does not has a significant effect to the gold price in Malaysia. According to (Saadah & Abidin, 2015), the gold price in Malaysia is not impacted by the inflation rate. Hence, the gold price is not affected by the inflation rate in Malaysia. Furthermore, they have also mentioned that the previous study has also obtain strong evidence regards the impact of the inflation towards the gold price.

In conclusion, it can conclude that the inflation rate and the XAUUSD has a positive relationship among these variables.

Interest rate is one of macroeconomics tools for the central bank to control the economy of the country. The increment or decrement of interest rate is control by the central bank by using the monetary policy. Increment of interest rate is the contractionary monetary policy while decrement of interest rate is the expansionary monetary policy. These actions may be able to stimulate or curb the economy problems such as inflation or recession by controlling the demand and supply of money in the market. Hence, it will also affect the financial market such as the gold market and FOREX market.

As outlined by (Qian et al., 2019), the interest rates and gold prices are negatively correlated generally. In other words, it means that as interest rates rise, the return on monetary assets increases, then the demand for gold is declining and causing the gold prices decrease as well. On the other hand, if the interest rate fall, the return on monetary assets become less attractive to investor. Thus, the demand for gold will increase and the gold prices will increase.

According to (Yakean, 2022), the result obtained from the hypothesis test has shown that the interest rate and gold price has a negative relationship due to the correlation of the interest rate and gold price is -0.62. Other than that, the significance of interest rate and gold price has also been test and its result is significance and there is relationship between interest rate and gold price (Yakean, 2022). Besides that, based on the (Valadkhani et al., 2022), the scholars found that the interest rate of the US ten-year Treasury and the gold price are react inversely. In other word, the gold price and the Treasury's interest rate has a negative relationship among them.

Bitcoin is one of the cryptocurrencies in which been classified as digital financial assets that created in the digital era. Besides that, there are difference between the cryptocurrency and the fiat currency, which is the anonymity of transaction, controllability of central bank etc. Due to the characteristic of controllability of central bank, cryptocurrency does not control by any legal institution such as central bank. Hence, there is a term for this which is called decentralised. However, people tend to worry that the characteristic of decentralised would cause exploitation and wrongdoing using the cryptocurrency. Furthermore, according to (Schilling & Uhlig, 2019), the market value of cryptocurrencies has surpassed 400 billion dollars, or 11% of M1 in the United States back in the day in December 2018. For the context of Bitcoin, the current circulation of Bitcoin has more than 13.4 million and having a total market value of $4.6 billion. (Yelowitz & Wilson, 2015).

As people tend to assume Bitcoin as the digital gold nowadays, people start to believe in the technology behind cryptocurrency and start to invest their money in it. As outlined by (Jareño et al., 2020), Bitcoin may be viewed as a safe haven in a situation of extreme Economic Policy Uncertainty (EPU) shocks because of the positive correlation between Bitcoin and gold price returns. Controversially, there are scholars found that Bitcoin is not as good as the gold from some of the price influencing factors. According to (Luo, 2021), due to the price of Bitcoin fluctuate too fast, the scholar refers it as a high-risk and high-return speculative product, and it is not a great product for hedging. On the other hand, (Luo, 2021) say that the gold would be an effective instrument for hedging as its price is relatively stable as compared to Bitcoin.

The theory that is related in this paper is the Efficient Market Theory (EMH). If the price "fully reflects" all the information that is known about the securities, the market is said to

be informationally efficient. One of the most prominent and well-known modern financial theories, the Efficient Market Hypothesis (EMH), makes the quick incorporation of all pertinent information into security prices as soon as it is released (Naseer & Tariq, 2016).

In the EMH theory, there are three types of EMH. The types of EMH are the weak form, semi-strong form, and strong form. Each of the EMH is reflect the how did the information affect the financial market. For the weak form of EMH, it is referred to the market prices has contained all the information that record in the past prices. If the weak form of efficiency holds, it can be concluded as the prices has followed the random walk theory. Random walk theory can be described as the proponents of it posit that the current market price of a given instruments such as stock is independent of and unrelated to previous market-price patterns. According to this theory, a sequence of stock price changes has no memory, and one cannot forecast future market prices based on the past behaviour of prices (van Horne & Parker, n.d.).

Besides that, the second type of EMH is the semi-strong form of efficiency. It is referring to the market prices will reflect immediately when there is any new public information such as political announcement, economic announcement as well as the announcements of the global economic development. Lastly, the third type of EMH is the strong form of efficiency. It can be described as the market prices will reflect to all information such as the public and the private information.

METHODOLOGY

In this paper, all the data collected are quantitative and it is in numerical. It is either percentage or in the currency form (USD). Besides that, this study is to examine the relationship between the inflation rate and interest rate toward the XAUUSD as well as the direction of movement between the Bitcoin and XAUUSD. Hence, there will be two estimation model have been conducted for the study. There will be one dependent variable and three independent variables. The dependent variable is XAUUSD while the independent variables are inflation rate, interest rate and the price of Bitcoin. In this study, the data will be used are the secondary data collected from online sources. The data are obtained via World Bank (inflation rate and interest rate) and an online website called Investing.Com (XAUUSD and Bitcoin). The numbers of data will be collected is thirty data and it is subject to the estimation model. Estimation models have been constructed for the analysis. There will be two estimation models which are the multi regression model and simple linear regression model.

$$\log XAU_T = \beta_0 + \beta_1 IFR_t + \beta_2 ITR_t + \varepsilon_t$$

Where:
β_0, β_1, β_2 = Coefficient of the independent variables to be estimated log
XAU_T = Logarithm of XAUUSD at period t
IFR_t = Inflation Rate at period t
ITR_t = Interest Rate at period t
ε_t = Error Term

$$E(y) = \beta_0 + \beta_1 x$$

Where:
y = Logarithm of XAUUSD at period t x
= Logarithm of Bitcoin at period t
β_0 = y-intercept of the regression line
β_1 = Slope of the regression line

In this research, the data are time series data which are the data of XAUUSD, inflation rate, interest rate and Bitcoin. The time frame will be subject to the specific model. In addition, the purpose of this study is to observe the linkage between inflation rate, interest rate and XAUUSD as well as the direction of movement between Bitcoin and XAUUSD.

EMPIRICAL FINDINGS AND DISCUSSION

Table 1:Estimation Result of First Estimation Model

Ordinary Least Square Regression Result				
Variables	**Coefficient**	**Standard Error**	**t-Statistic**	**Probability Value**
IFR	-0.080331	0.077633	-1.034749	0.3100
ITR	-0.230242	0.045717	-5.036187	0.0000**
C	7.490376	0.217653	34.41423	0.0000**

Notes: ** indicates the significance level of 5% (Confidence Level of 95%)

The table above show the result of the estimation from the first estimation model. Based on the result obtained, the probability of the variable IFR (inflation rate) is 0.31. Besides that, the result also shows that the influenced of IFR towards the XAUUSD. According to the result, it can conclude that 1 unit increased in IFR, the XAUUSD will decrease by 8.03%. However, due to the probability obtained is more than 0.05 in which more than the rejection rule ($p>0.05$), it can say we do not reject the null hypothesis and the influenced is insignificant. Other than that, the probability of the variable ITR (interest rate) is 0 ($p<0.05$). It can conclude that we reject the null hypothesis and the influenced is significant. In addition, the coefficient has shown that 1 unit increase in ITR, XAUUSD will decrease by 23.02%. To summarise, both variables have inverse relationship with the XAUUSD.

Table 2: Result of Granger Causality Test

Pairwise Granger Causality Test			
Null Hypothesis	**F-Statistic**	**Probability Value**	**Do Not Reject/Reject**
IFR↛LNXAU	0.15507	0.8572	Do Not Reject
LNXAU↛IFR	4.14592	0.0290**	Reject
ITR↛LNXAU	0.73093	0.4923	Do Not Reject
LNXAU↛ITR	2.83558	0.0793	Do Not Reject
ITR↛IFR	1.92093	0.1692	Do Not Reject
IFR↛ITR	0.52648	0.5976	Do Not Reject

Notes: ** indicates the significance level of 5% (Confidence Level of 95%)

From the table above, it shows the test result of the Pairwise Granger Causality between the explained and explanatory variables as well as the causality among the explanatory variables. From the results, it obtains that we do not reject the null hypothesis of IFR does not

Granger Cause LNXAU at the significance level of 0.05. However, we reject the null hypothesis of LNXAU does not Granger Cause IFR at the significance level. Hence, it can conclude that the LNXAU Granger Cause the IFR, and the causality result is unidirectional causality.

Besides that, we do not reject the null hypotheses of ITR does not Granger Cause LNXAU and LNXAU does not Granger Cause ITR. Therefore, it can be concluded as the causality of these hypotheses is independence.

Other than that, we also do not reject the null hypotheses among the explanatory variables which are ITR does not Granger Cause IFR and IFR does not Granger Cause ITR. Hence, the causality for this scenario is also independence.

The result of the Pairwise Granger Causality Test can be shown in a directional diagram. It is as depicted as below:

Figure 1: Result of Pairwise Granger Causality Test

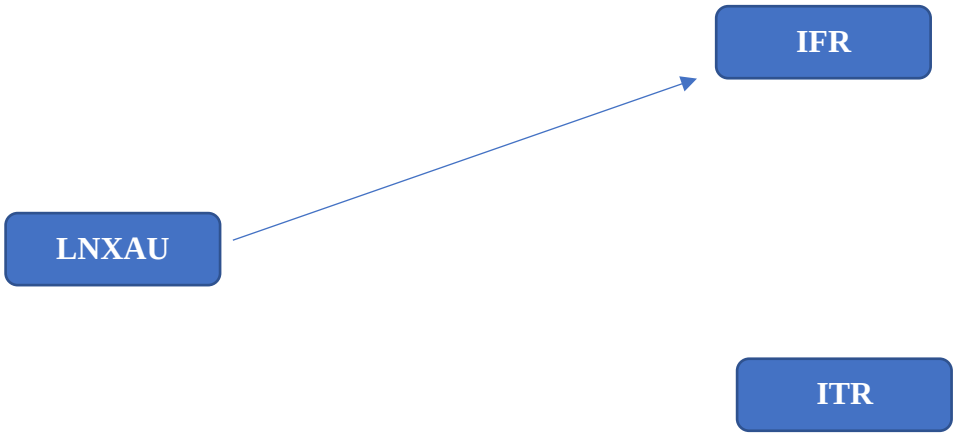

Table 3: Estimation Result of Second Estimation Model

Ordinary Least Square Regression Result				
Variables	**Coefficient**	**Standard Error**	**t-Statistic**	**Probability Value**
LNBTC	0.253454	0.045389	5.584033	0.0000**
C	5.029568	0.409033	12.29625	0.0000**

Notes: ** indicates the significance level of 5% (Confidence Level of 95%)

The table above depicts the result of the estimation from the second estimation model. Based on the result obtained, the probability of the variable LNBTC (price of Bitcoin) is 0 ($p<0$). According to the rejection rule, the probability for the variable LNBTC is less than the significance level of 0.05. Hence, it can conclude that we reject the null hypothesis, and the variable is significant towards the explained. By extracting the result of the coefficient, it can be explained as 1% increase in BTC, the XAUUSD will increase by 0.2535%.

Table 4: Result of Granger Causality Test

Pairwise Granger Causality Test			
Null Hypothesis	**F-Statistic**	**Probability Value**	**Do Not Reject/Reject**
LNBTC↛LNXAU	0.27787	0.7599	Do Not Reject
LNXAU↛LNBTC	5.74733	0.0095**	Reject

Notes: ** indicates the significance level of 5% (Confidence Level of 95%)

From the table above, it shows the test result of the Pairwise Granger Causality between the explained and explanatory variables. Due to there is only one independent variable in the second estimation model, hence, there does not have the Granger Causality among the independent variables. From the results, it shows that we do not reject the null hypothesis of LNBTC does not Granger Cause LNXAU at the significance level of 0.05. However, we reject the null hypothesis of LNXAU does not Granger Cause LNBTC at the significance level. Hence, it can conclude that the LNXAU Granger Cause the LNBTC, and the causality result is unidirectional causality.

A directional diagram can be applied to illustrate the Pairwise Granger Causality Test result. It is shown as follows:

Figure 2: Result of Pairwise Granger Causality Test

The very beginning of the paragraph states that the results of the estimation using the first estimation model are displayed in the table above. IFR (inflation rate) has a 0.31 probability, which means that it has some impact on the XAUUSD. The probability is greater than 0.05, so the influence is nonetheless regarded as insignificant. Though its probability is less than 0.05, the variable ITR (interest rate) has a significant impact. The relationship between the two variables and XAUUSD is inverse. The normality of residuals, serial correlation test, and heteroskedasticity test are then covered in the next section. It is discovered that the residuals are normally distributed. The serial correlation test indicates that autocorrelation exists at two lags. The heteroskedasticity test, however, shows that there is no heteroskedasticity issue. The estimation model's stability tests are then described. The blue line crosses the red dotted line in the first stability test, suggesting that the model may not be stable. The blue line fluctuates within the red dotted line in the second stability test, indicating that the model may be stable. According to the results of the Pairwise Granger Causality test, LNXAU Granger causes IFR in a unidirectional manner, whereas ITR and LNXAU are without a causal connection and thus it causality is independence. In addition, ITR and IFR also behave similarly in which its causality has indicated that there is no causality and hence the causality is independence. The outcomes of various tests and analyses have been presented by applying the second estimation model. The serial correlation test suggests that there is autocorrelation at two

lags, and the normality histogram indicates that the residuals can be regarded as normally distributed. The heteroskedasticity test, however, finds no evidence to prove that there is heteroskedasticity problem. The results of the stability tests are inconsistent, with one test suggesting that the model may be unstable and the other suggesting stability. Overall, these findings shed light on the estimation model's stability, autocorrelation, heteroskedasticity, and residual normality. The results of the Pairwise Granger Causality test between the explained and explanatory variables are shown. There is no Granger Causality among the independent variables in the second estimation model with just one independent variable. According to the findings, the null hypothesis that LNBTC is not Granger's cause of LNXAU is not rejected but the null hypothesis that LNXAU is not Granger's cause of LNBTC is. As a result, it can be said that LNXAU Granger causes LNBTC in a unidirectional causality.

CONCLUSION

In conclusion, through this paper, it is found that The State's inflation rate is not statistically significant to influence the price of gold. However, the outcome for The State's interest rate is not the same as the inflation rate. The result for the interest rate of The State's is statistically significant in influencing the price of the gold. Therefore, it can conclude that the inflation rate in The State's is not expected to influence the gold's price. Meanwhile, the interest rate in The State's is expected to influence the price of the gold in through the estimation model. On the other hand, the estimation by comparing the price of Bitcoin and gold has also been done in this paper. From the result, it has shown that the price of Bitcoin is correlated statistically significant with the gold price. With this result, it can summarise that the movement of the price of the Bitcoin is moving together with the price of the gold. This result has been proven by using the estimation model in which comparing both assets prices' movement.

Besides that, the objective of this paper is achieved as it is investigating the linkage between the inflation rate and interest rate towards the gold's price as well as the movement of the price of the Bitcoin with the gold's price. Though the first estimation, it has depicted that The State's inflation rate and interest rate has an inverse relationship with the gold's price. Moreover, the movement of Bitcoin's price and gold's price has shown that both of these assets have a positive relationship among each other. Therefore, it can be said that when the price of Bitcoin increase, the price of gold will also follow the price of Bitcoin to increase.

To summarise, the result obtained was slightly different with the previous study by Seng Ling & Kueh (2020). The result obtained by the scholars was shown that the inflation rate in The State's has a positive relationship while the interest rate in The State's has negative linkage with the gold's price (Seng Ling & Kueh, 2020). Contrarily, the result obtained in this paper was portrayed that both variables are having a negatively relationship with the gold price. On the other hand, the result of Bitcoin and gold is aligned with the research done by Jareño et al. (2020). These scholars have found that the bitcoin's price and gold's price is positively correlated. Hence, the result obtained in this paper is also agreed with this statement.

The topic of this research is anticipated that there will be an extended and detailed research in future. This is because investment has been a hot topic that started during the pandemic of Covid-19. Currently, most of the people has found the importance of investment in their life. Hence, further research is required so that all the investors could have a better strategic in investment. Other than that, Bitcoin has been assumed as an asset that can be replaced the gold. Therefore, the movement and the influence any other factor is recommended including in the future research so that a better and clearer clarification of the Bitcoin is clarified.

Furthermore, as the time goes, more detailed data of Bitcoin will be available in future. Hence, the future researcher can be used to a better estimation and forecasting.

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