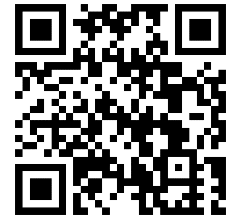# The Role of Inflation in Moderate Interaction of Gold Rolling Spots and Macroeconomic Variables on the ICDX Exchange

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ABSTRACT: Gold has played an essential role in building payment systems in the past and remains a popular investment product today. One such investment product is the Gold Rolling Spot, a variation of a futures contract derivative transaction traded on the Indonesian Commodity and Derivatives Exchange (ICDX). Nevertheless, no research has been done since this sort of investment is exclusive to ICDX. This study uses inflation as the moderation to analyze the effect of the Indonesia Composite Index (ICI) return, Interest Rate, and Exchange Rate (USD/IDR) return on the Gold Rolling Spot return. This study used monthly data for the period January 2020 until December 2023. The analysis technique used is Moderated Regression Analysis (MRA). The results concluded that ICI return has a significant positive effect on Gold Rolling Spot return, while interest rate, exchange rate (USD/IDR) return, and Inflation, have a significant negative impact on Gold Rolling Spot return. Inflation moderates the effect of interest rate and exchange rate (USD/IDR) return on Gold Rolling Spot return. However, Inflation does not moderate the impact of ICI return on Gold Rolling Spot return.

KEYWORDS: Derivatives; Gold Rolling Spot; Macro variables; ICDX

I. INTRODUCTION

Gold is considered one of the most valuable assets in today's world. It is a precious metal and has played a crucial role in building payment systems in the past. Even today, gold is a popular investment product. Precious metals like gold have traditionally been priced much higher than common metals. From 1991 to 2011, the price of gold showed a pattern of increasing dramatically.

Figure 1. International Gold Price Chart (USD/troy ounce)
Source: (LBMA, 2023)

Gold is a strategic investment choice because of its stability in value over time. It tends to increase in value over time. The price of gold is a good indicator of the health of the economy. It reflects the anticipated level of inflation, which is a key indicator of the public health of the economy (Purnawan & Puspitasari, 2021).

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Gold is a safe haven for investment and exchange, yet studies indicate that its function as a hedge is diminishing (Zhu et al., 2017). Gold functions as an inflation hedge when inflation conditions, expectations, or uncertainty are high. Balcilar et al. (2016); Beckmann et al. (2017); Bilgin et al. (2018); Bouoiyour et al. (2018) shows that gold has been a popular safe haven asset due to its ability to hedge against volatility in the stock market, oil prices, exchange rates, and inflation rates

One type of financial innovation that has emerged recently in Indonesia is the development of futures trading, such as the Gold Rolling Spot (GRS) available on the Indonesia Commodity and Derivative Exchange (ICDX). The Gold Rolling Spot is unique because it has no expiry date like regular futures contracts. Instead, it offers the current daily price (spot price) rather than a specific price in the future (forward price). The contract is automatically renewed each day until it eventually closes. The Gold Rolling Spot is beneficial for hedging and investing in gold commodities due to its distinctive features.

Various macroeconomic factors, such as interest rates, influence gold prices. According to Wang & Chueh (2013), there is a dynamic relationship between interest rates, the US dollar, and gold prices. Additionally, Batten & CIner (n.d.) has found strong evidence of time variation in the correlation between inflation and gold and that changes in interest rates are the primary reason for gold's sensitivity to inflation. Furthermore, Bampinas & Panagiotidis (2015) conducted a study on the relationship between gold and inflation rates over the past two hundred years and found that gold has served as an inflation hedge in the United States and the United Kingdom in the long run.

The macro variables studied in this research are inflation, currency exchange rates, interest rates, and ICI. This study is the first to investigate the macroeconomic variables affecting Gold Rolling Spots in Indonesia and globally because Gold Rolling Spot transactions are unique to the ICDX futures exchange.

This research aims to determine the impact of the independent variables studied, including ICI, interest rates, and the USD/IDR exchange rate, as well as the moderating variable of inflation, on the return of the Gold Rolling Spot on ICDX. The study specifically focuses on the period from 2020 to 2023.

The primary objective of this study is to analyze and estimate the impact of various macroeconomic independent variables, specifically ICI, interest rates, and USD/IDR exchange rates, along with the moderating variable of inflation on the return of Gold Rolling Spots on ICDX from 2020 to 2023. Additionally, this study aims to determine whether inflation moderates the impact of the independent variables ICI, interest rates, and USD/IDR exchange rates on the return of the Gold Rolling Spot on ICDX from 2020 to 2023.

II. LITERATURE REVIEW

2.1. Commodity Exchange

According to Roche (2020), an exchange is a market where hard and soft commodities are bought, sold, and traded. It also serves as an intermediary that reduces credit risk between buyers and sellers. On the other hand, a futures exchange is where buyers and sellers meet to enter into derivative contracts, specifically futures contracts (Syarif & Fauziah, 2023). Future exchanges are where price discovery is efficient and transparent, and the resulting price data can provide valuable information to many parties. Futures trading is a way for businesses to protect their profits from potential losses due to price fluctuations, and this activity is called hedging.

One of the futures exchanges in Indonesia is ICDX (Syarif & Fauziah, 2023). ICDX has three types of markets: physical markets, futures market, and sharia market. In the futures market, ICDX offers two trading mechanisms: trading on the exchange (multilateral trading), which involves trading standard contracts on the exchange platform, and trading outside the exchange (bilateral trading or OTC), which involves direct negotiation between two parties without the involvement of the exchange. Gold Rolling Spots can be traded on and off exchanges. Goss & Yamey (1976) explains that futures trading involves the sale and purchase of standard contracts to deliver a commodity at a specified date in the future.

Futures contracts do not require physical delivery since they can be closed before expiration. When trading futures, only the difference in price between the start and end of the trade is considered. The specifications of futures contracts include a settlement period during which no further trades can be made. The traded price in a futures contract is the future price, while in a Rolling Spot contract, it is the current price. Rolling Spot contracts do not have an expiration date and will be automatically extended until the trader or the investor closes the transaction.

2.2. Investment

Investment is classified as capital with a defined objective, and investment activity is placing this capital (Umarova & Uaysovich, 2022). Furthermore, investment is defined as an activity where money is invested in a type of asset with a maturity date to obtain profits and increase the value of the investment in the future (Azis, 2010). In reality, investment funds, typically obtained from public funds, deposited in financial institutions, and then distributed to companies, are the primary source of investment capital. On the other hand, Jogiyanto (2003) argued that investment delays the allocation of current consumption so that it can

be used for more efficient production activities at a particular time. Investment is a commitment to a group of funds currently managed to generate profits in the future (Tandelilin, 2001). Investment refers to the act of spending money on activities that lead to the production of goods and services in the economy (Sasana, 2008). Capital investment plays a crucial role in creating national value and can be utilized to purchase goods that increase the production of goods and services. According to Setiawan (2015), investment can be divided into two categories: investment in the real sector and investment in the non-real sector. The real sector includes physically visible industries, such as manufacturing or real estate. In contrast, the non-real sector pertains to investment instruments in financial markets, such as shares and bonds, which are not physically tangible.

2.3. ICI (Indonesia Composite Index)
The ICI or IHSG (Indeks Harga Saham Gabungan), a stock market index that measures the overall percentage of all shares on the IDX (Indonesia Stock Exchange), is more than just a number. It is a crucial indicator that reflects the development of the national economy. It can indicate market conditions when they are increasing, stable, or decreasing. Investors can use ICI to see the price movements of shares listed on the IDX. Several factors influence the ICI, including interest rates, exchange rates, and world market indices, especially the American market index (Dow Jones) and the Japanese market index (Nikkei 225).

Studies have shown that macroeconomic factors such as Gross Domestic Product (GDP), SBI interest rates, RER, and Money Supply significantly impact the Indonesian stock market (ICI). Global factors such as World Oil Prices also influence the ICI (Hakim, 2019). On the other hand, the exchange rate of the United States Dollar (USD) to the Indonesian Rupiah (IDR) has a negative effect on the Jakarta Composite Index (ICI) movement (Desfiandi & Marantika, 2015). On the contrary, some research suggests that the Rupiah exchange rate does not affect the ICI. Instead, factors such as GDP growth and the Dow Jones index positively affect the Indonesian stock market (Oktavia & Handayani, 2018).

According to a statement by Fuad & Yuliadi (2021), the ICI was negatively affected by inflation and exchange rates, while interest rates and world oil prices positively impacted it. The conclusion made in a statement by Yusuf et al. (2021) was that the ICI is significantly impacted by the BI Rate, FED Rate, and inflation collectively. However, the BI Rate and inflation had a negative effect on the ICI.

2.4. Interest Rate
The interest rate is a premium on current cash over deferred cash, influencing the present value of future dividends (Roos & Szeliski, 1942).Monetary policy can manipulate interest rates to influence economic activity and unemployment levels (Mills & Wood, 1988). Determining interest rates in various countries is influenced by a combination of domestic and external factors. In India, real government spending, real money supply, foreign interest rates, and future premiums affect real interest rates (Dua & Pandit, 2002). In the Philippines, market players influence interest rates. At the same time, factors such as demand and supply of loanable funds, inflation, securities in circulation, balance of payments, and stock price indices can also affect interest rate movements (Cantoria, 1984). However, other factors such as time preferences, economic expansion, credit inflation, and the interaction of gold and the price level can also determine interest rates (Davies, 1920).

2.5. Exchange Rate
The exchange rate, as defined by Harrison (1993), is the rate at which one currency can be exchanged for another currency. Market forces can determine it in a floating exchange rate system or by authorities in a fixed exchange rate system. Meanwhile, according to Heipertz et al. (2022), the exchange rate is a factor that influences stock market and money market activities. Johnson (1980) suggests that interest rate rules can determine a stable equilibrium without explicitly reacting to the exchange rate. Factors such as productivity differences, terms of trade, real oil prices, and reserve differentials play a role in determining the real exchange rate. However, their impact varies across economies, as found by Fahlevi et al. (2020). Heipertz et al. (2022) shows that using exchange rates as a policy tool can effectively stabilize business cycle fluctuations and reduce volatility in output and inflation. In addition, Johnson (1980) discusses the real effects of exchange rate changes in developing countries, highlighting short-run balance of payments and relative price effects.

2.6. Inflation
Inflation is a continuous rise in the prices of goods, in contrast to temporary price increases or seasonal fluctuations (Fahlevi et al., 2020). It can also be defined as a process of continuous price increases or a decrease in the value of money (Laidler & Parkin, 1975). This is due to the expanding role of money in the economy, which can significantly impact individual well-being, a factor that should concern all. Research has found that increasing the trend, inflation rate beyond 3% can lead to a decline in macroeconomic performance (Ashraf et al., 2012). Studies also suggest that a higher average inflation rate leads to a decrease in the growth rate of real GDP per capita and a decrease in the investment to GDP ratio (Barro, 1995). However, there are several

solutions to control high inflation (Vegh, 1991). For instance, using the exchange rate as a nominal anchor can effectively stop hyperinflation with minimal output costs.

2.7. Gold Price

Gold is a highly liquid investment that can be accepted in any region or country (Prawisoraputro & Hapsari, 2017). Furthermore, Sunariyah (2006) suggests that gold is an essential commodity that can influence stock market movements. Several studies explain various factors that can determine the price of gold. For instance, Levin & Wright (2006) highlights that gold prices have a long-term positive relationship with inflation and can act as a hedge against inflation, primarily in gold-consuming countries. Additionally, Erdoğdu (2017); Toraman et al. (2011) found a positive correlation between gold and oil prices. However, according to Hashim (2022), inflation and exchange rates significantly impact gold prices in Malaysia, while interest rates are not statistically significant. In summary, many studies indicate that factors such as the US exchange rate, oil prices, inflation, and exchange rates play a crucial role in determining the price of gold.
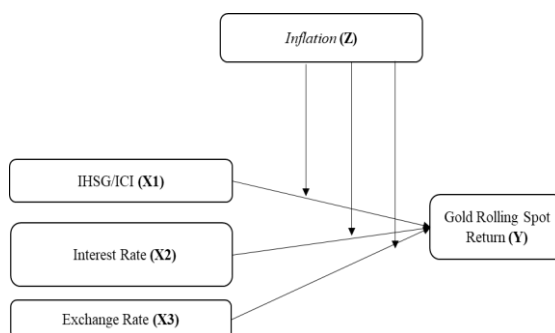
2.8. Framework

Figure 2. Framework

2.9. Hypothesis Development
2.9.1.   The effect of ICI on Gold Rolling Spot Return.
Gold prices and stock indices have a complex relationship that can influence each other. A study by Patel (2013) found a causal relationship between gold prices and the Nifty index in India, indicating that gold prices can predict Nifty returns. Another study by Boako et al. (2019) identified significant spikes between gold and stock market returns, indicating a dynamic dependency between the two. Two other studies by Dewi et al. (2011) and Miyazaki (2019) found evidence of unidirectional causality from stocks to gold, particularly during the financial crisis, and highlighted gold's role as a safe-haven asset during market volatility.
H1 : ICI significantly affects Gold Rolling Spot Return.
2.9.2.   The Effect of Interest Rates on Gold Rolling Spot Return
The returns on futures contracts or derivative contracts are affected by interest rates. Research suggests that SBI interest rates negatively correlate with gold index rolling spot return (Dewi et al., 2011b). However, another study found that the SBI interest rate positively and significantly correlated with the yield on the Olein futures contract (Dewi et al., 2011a). On the other hand, interest rates have no impact on forex rolling spot return (Syarif & Fauziah, 2023).
H2: The interest rate significantly affects the Gold Rolling Spot Return.
2.9.3.   The Effect of the USD/IDR Exchange Rate on the Gold Rolling Spot Return
It is important to note that the exchange rate between the US dollar and the Indonesian rupiah (USD/IDR) can impact gold returns. The USD/IDR exchange rate changes can affect overall market sentiment. A study by researchers Anu (2022) and Gozgor et al. (2019) found that changes in exchange rates, particularly the US real effective exchange rate, can impact gold returns. Another study by Wang (2013) further explored this relationship and argued that gold can effectively hedge against exchange rate risk, especially in specific exchange rate regimes. A study by Wei & Wu (2020) also found a long-run relationship between gold prices and exchange rates and a causal relationship between gold prices and stock prices.
H3: The USD/IDR exchange rate significantly affects the Gold Rolling Spot Return.
2.9.4.   The Effect of Inflation on Gold Rolling Spot Return
One study found that inflation negatively and significantly impacts gold futures contracts (Nurmala & Aminudin, 2021). However, another study found a positive relationship between inflation and futures contracts, attributing to the growth of the futures exchange market (Gorton and Rouwenhorst, 2005). Interestingly, a separate research result showed that inflation does not

influence the returns of the Gold Index Rolling Spot contract (Dewi et al., 2011b). Similarly, another study found that foreign exchange rolling spot contracts are not affected by changes in the inflation rate (Syarif & Fauziah, 2023).

H4: Inflation significantly affects the Gold Rolling Spot Return.

2.9.5.   The influence of inflation in moderating the ICI on the Gold Rolling Spot Return

Inflation can affect the ICI (Indonesia Composite Index) and gold returns through several mechanisms. A country's currency exchange rate usually weakens if inflation is high. Since gold is often considered a hedge against a currency exchange rate decrease, this can impact the price of gold. Investors frequently buy gold to protect their wealth from inflation. Gold prices may soar due to this increase in demand, but ICI may not always respond directly to changes in inflation. Inflation can affect ICI because company operational costs will increase, affecting stock performance in the market.

H5: Inflation moderates the effect of the ICI on the Gold Rolling Spot return.

2.9.6.   The effect of inflation in moderating interest rates on the rate of return of Gold Rolling Spots.

Inflation can moderate the interest rates of gold returns through various complex economic mechanisms. Central banks tend to raise benchmark interest rates to control inflation when the inflation rate increases. Conventional financial instruments such as bonds can become more attractive to investors when interest rates rise due to their higher yields. However, gold, which does not earn interest, can become less attractive to investors. High inflation can also weaken the value of a country's currency. Investors can buy gold as a hedge against falling currency values. Investors see gold as a refuge from falling currency values, so gold returns may be attractive even if interest rates rise.

H6: Inflation moderates the effect of interest rates on the Gold Rolling Spot return.

2.9.7.   The influence of inflation in moderating the USD/IDR exchange rate on the rate of return of the Gold Rolling Spot

Inflation can impact the relationship between the USD/IDR exchange rate and gold returns. This happens because inflation can cause the depreciation of the local currency (IDR) against the US dollar (USD) and vice versa. When there is high inflation in Indonesia, the rupiah depreciates against the dollar. As a result, the return on gold investments in local currency will tend to be higher because the price of gold in the rupiah will rise.

H7: Inflation moderates the effect of the USD/IDR exchange rate on the Gold Rolling Spot return.

III.   RESEARCH METHODOLOGY

3.1. Population and Sample

The population for this research includes all Rolling Spot Contract products transacted on the ICDX exchange from 2019 to 2023. The sample for this research is taken from the Gold Rolling Spot product with the code GOLDUD.

3.2. Data Types and Data Collection Methods

Data this research relies on quantitative and secondary data, with monthly panel data from 2020 to 2023. The secondary data used in this research comes from ICDX, Bank Indonesia (BI), and Yahoo Finance. The following secondary data were used in this research: (a) Gold Rolling Spot closing price data, taken from ICDX (www.icdx.co.id), (b) ICI closing price data, taken from Yahoo Finance (www.finance.yahoo.com), (c) Inflation data, taken from Bank Indonesia, (d) BI rate data, also taken from Bank Indonesia, and (e) USD/IDR exchange rate data, taken from Bank Indonesia.

The data collection methods used in this research are documentation and library research. The documentation used in this research is documents owned by BI, Yahoo Finance, and ICDX such as ICI closing price data, exchange rates, inflation, closing prices for Gold Rolling Spots, and BI rates related to research. Meanwhile, library research is carried out by searching, collecting, and processing data by conducting theoretical studies as well as studying references from literacy, books regarding theories and problems to be researched.

3.3. Data analysis method

3.3.1.   Descriptive Analysis

Descriptive analysis is an analysis used to discuss quantitative data. Analysis of the ratios was carried out to find the values or numbers of variable X (ICI, interest rates, inflation and USD/IDR exchange rate) and variable Y (Gold Rolling Spot returns).

3.3.2.   Inferential Statistical Analysis

The inferential statistics in this research are parametric.

➢   **Classic assumption test**

Before testing the proposed regression equation, classical assumptions, namely normality, multicollinearity, heteroscedasticity, and autocorrelation, are tested. The multiple linear regression equation model is tested if all classical assumptions have been fulfilled.

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➢ **Moderated Regression Analysis (MRA)**

Moderated Regression Analysis (MRA) is an approach that maintains sample integrity and provides a basis for controlling moderator effects. Multiple linear regression analysis was used to test the influence of the ICI, Interest Rate, and USD/IDR Exchange Rate on the return of the Gold Rolling Spot and to test whether inflation could moderate the influence of the ICI, Interest Rate and the USD/IDR Exchange Rate on the return of the Gold Rolling Spot. Multiple regression analysis was used in this research to test the influence of the independent variable on the dependent variable. An interaction test, Moderated Regression Analysis (MRA), is used to test the influence of moderating variables.

IV.   RESULT AND DISCUSSION

4.1. Indonesia Commodity & Derivatives Exchange (ICDX)

Indonesia Commodity & Derivatives Exchange (ICDX) is a commodity exchange with an integrated clearing house and bonded logistics center. ICDX provides facilities and infrastructure to carry out prime commodity transactions and enforces laws and regulations as a platform for establishing accountable and credible prices, as well as a hedging tool.

The Gold Rolling Spot Product is one of the various investment products on ICDX. There are two Gold Rolling Spot products on ICDX: GOLDUD and MICRO GOLDUD. GOLDUD is a Gold Rolling Spot product with a lot unit of 10 troy ounces, while MICRO GOLDUD has a smaller lot, namely one troy ounce; meanwhile, one troy ounce = 31.1035 grams. The image below shows the development of the Gold Rolling Spot transaction volume in lots for the research period from 2020 to 2023.
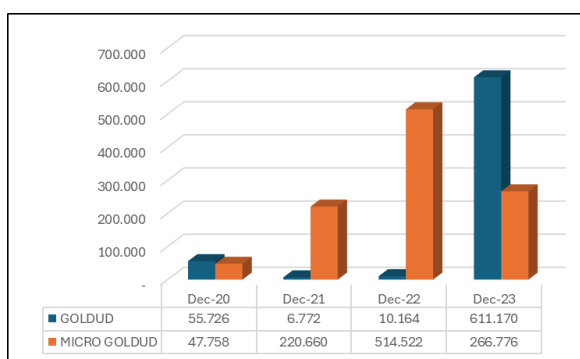

Figure 3. Gold Rolling Spot Transaction Volume on ICDX (lot)
Source: ICDX (compiled by the Researcher)

The picture above shows that the development of GOLDUD transaction volume in 2023 will increase almost six times from the previous year. On the other hand, in 2023, there will be a decrease in the volume of Micro GOLDUD transactions by 48% from 2022. The decrease is due to a shift in transactions from investors, who previously transacted on Micro GOLDUD contracts measuring one troy ounce; in 2023, investors moved their investments to Rolling Spot Contracts. The larger size of gold is GOLDUD, which measures ten troy ounces.

4.2. Descriptive Analysis

This research consists of 5 variables: 3 independent variables, ICI Return (X1), Interest Rate (X2), USD/IDR Exchange Rate (X3), one moderating variable, Inflation (Z), and one dependent variable, return from the Gold Rolling Spot (GRS) from 2020 – 2023. The descriptive empirical description of the statistics used in this research is the minimum value, maximum value, average value (mean), median value, and standard deviation.

Table 1. Descriptive Statistics

	IHSG/ICI (X1)	Interest Rate (X2)	Exchange Rate (X3)	Inflation (Z)	GRS Return (Y)
Minimum	- 0,1676	0,0350	- 0,0816	0,0133	- 0,0717
Maximum	0,0944	0,0575	0,1388	0,0595	0,1075
Mean	0,0039	0,0406	0,0023	0,0309	0,0073
Median	0,0068	0,0375	- 0,0003	0,0264	- 0,0027
Std.Deviasi	0,0427	0,0073	0,0294	0,0162	0,0419

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The ICI Return variable had the lowest value of -0.1676 in March 2020. The widespread spread of the Coronavirus (COVID-19) pandemic became a negative sentiment that affected global financial markets throughout March 2020. Meanwhile, the highest value of the ICI return was at 0.0944 in November 2020. This increase was supported by positive sentiment from, among other things, the election of Joe Biden as President of the United States (US), the development of the COVID-19 vaccine, and the reduction in the benchmark interest rate by the Indonesia Central Bank.

The interest rate taken from the Indonesia Central Bank Rate variable hit its lowest value of 0.0350 from February 2021 – July 2022, reflecting low inflation and maintaining Rupiah stability. In contrast, the BI Rate peaked at 0.0575 from January 2023 to September 2023, a direct result of the very aggressive increase in the US benchmark interest rate by the FED.

The USD/IDR return variable saw its lowest value at - 0.0816 in May 2020, reflecting the strengthening of the rupiah exchange rate in line with easing global financial market uncertainty and maintaining confidence in Indonesia's economic conditions. In contrast, the highest return value for the USD/IDR exchange rate was 0.1388 in April 2020, a result of the weakening of the USD/IDR exchange rate due to the impact of Covid 19.

The Moderating Variable, Inflation, had the lowest value of 0.0133 in June 2021, which was the impact of falling prices in several commodities. The highest inflation value was 0.0595 in September 2022 due to adjustments in fuel prices and price increases for several commodities.

The Gold Rolling Spot Return Variable had the lowest return value at -0.0717 in June 2021 due to pressure from the Federal Reserve's announcement, which significantly increased inflation expectations and subsequently increased interest rates. The highest return value for the Gold Rolling Spot was 0.1075 in July 2020, caused by the coronavirus pandemic and soaring gold prices.

4.3. Data Analysis Result

4.3.1. Classic Assumption Test

i.   The normality test results show that the probability value of the Jarque Bera normality test is 0.484; because the value obtained is >0.05, it is concluded that the regression residuals have a normal distribution of data.

ii. The analysis of the Multicollinearity test shows that all independent variables have a VIF value > 10. Hence, there is no multicollinearity in the regression model.

iii. The heteroscedasticity test shows that all independent variables in the regression model have a significance value of the Gletsjer test > 0.05, so there is no heteroscedasticity in the regression model.

iv. The autocorrelation test shows the Durbin-Watson model value of 2.094, which means there is no autocorrelation in the regression model.

4.3.2. Multiple Linear Regression Analysis

In the MRA regression equation, the independent variable is multiplied by the moderator variable in this study the equation is as follows:

$$Y = \alpha + \beta_1 ICI + \beta_2 RATE + \beta_3 EXCRATE + \beta_4 INF + \beta_5 (ICI*INF) + \beta_6 (RATE*INF) + \beta_7 (EXCRATE*INF) + ⊡$$

Table 2. Moderated Regression Analysis Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.651826	0.281043	2.319309	0.0276
X2	-4.058598	1.158871	-3.502201	0.0015
X3	-1.531099	0.367031	-4.171582	0.0003
Z	-7.366744	1.488449	-4.949276	0.0000
X1Z	-13.76210	10.01057	-1.374757	0.1797
X2Z	160.4094	33.06215	4.851755	0.0000
X3Z	69.76692	13.19917	5.285707	0.0000
C	0.181034	0.048656	3.720704	0.0008
R-squared	0.690776	Mean dependent var		0.006411
Adjusted R-squared	0.616135	S.D. dependent var		0.034674
S.E. of regression	0.021483	Akaike info criterion		-4.654307
Sum squared resid	0.013384	Schwarz criterion		-4.306000
Log likelihood	94.10468	Hannan-Quinn criter.		-4.531513

F-statistic	9.254715	Durbin-Watson stat	2.045300
Prob(F-statistic)	0.000006		

Source: EViews (compiled by the Researcher)

The regression equation obtained from the data processing results is as follows:

$$\text{GRS} = 0{,}1810 + 0{,}6518\ \text{ICI} - 4{,}0586\ \text{RATE} - 1{,}5311\ \text{EXCRATE} - 7{,}3667\ \text{INF} - 13{,}762\ (\text{ICI*INF}) + 160{,}4094\ (\text{RATE*INF}) + 69{,}767\ (\text{EXCRATE*INF})$$

4.3.3. Simultaneous Test (F)

Significance Test Results Simultaneous (F-test)

The F test determines the collective influence of the independent variables on the dependent variable. Our best model analysis reveals a Prob value of 0,000006 < 0,05, confirming that the value of ICI return, interest rate, exchange rate return, and inflation together significantly affect GRS returns.

4.3.4. Coefficient of Determination (R^2)

Based on the best model analysis R^2 value is 0.690776. This means the ability of ICI return, interest rate, exchange rate return, and inflation to explain the variation of the GRS return variable is 68.08%, and other factors explain the remaining 31.92%

4.4. Discussion

Similar journals to this research do not exist today because this is the first global research. As a result, we use another issue, almost the same as this research, as journal references: the association between independent variables with various kinds of Rolling Spot contracts, the price of gold, or futures contracts.

4.4.1. The Influence of ICI Returns on Gold Rolling Spot Returns

The research results show that the ICI return value positively influences GRS returns, with a regression coefficient of 0.6518 and a probability value of 0.0276 < 0.05. This means that hypothesis H1 is accepted. Research by Utama & Puryandani (2020) found that gold positively affected the return of the composite stock index for Australia, Canada, and Japan. This shows a positive relationship between stock index returns and gold futures returns in that market. Additionally, (60) highlights evidence of a relationship between gold returns and stock market returns/volatility during the global financial crisis, indicating a potential positive relationship between the two.

Ahmed & Vveinhardt (2018) presents a strong case for a positive relationship between gold prices and equity markets in India, underlining the importance of equity returns and gold prices in mutual prediction. This robust evidence further bolsters the idea of a positive relationship between gold prices and stock market returns. Additionally, Hood & Malik (2013) found that gold did not have a negative correlation with the US stock market during periods of very low or high volatility, thus indicating a potential positive relationship between the two. In the context of the influence of ICI returns on rolling spot contract returns, this research aligns with Jogiyanto (2003), which states that ICI returns have a positive influence on foreign currency rolling spot contract returns.

4.4.2. The Effect of Interest Rates on Gold Rolling Spot Returns

The research results show that interest rates negatively influence GRS returns with a regression coefficient of 4.0586 and a probability value of 0.0015 < 0.05. This means that hypothesis H2 is accepted.

Moussa et al. (2020) find that gold returns are inversely related to movements in US interest rates, although this relationship remains weak over the study period. The same thing is also done by Sun (2022), which shows that interest rates have limited explanatory power on gold returns and a limited relationship between gold prices and interest rates.

On the other hand, Ghalayini & Farhat (2020) highlights that US interest rates, among other factors such as FTSE cash, the US dollar, and the UK consumer price index, influence the price of gold, both in the cash and futures markets. This shows a more complicated relationship where interest rates play a role with other economic indicators in determining the price of gold. In addition, Kan & Serin (2022) reveals a negative relationship between gold prices and interest rates, indicating that gold prices tend to decrease when interest rates rise. This finding aligns with the general understanding that gold is often seen as a hedge against inflation and economic uncertainty, causing an inverse relationship with interest rates. In addition, another reset found that interest rates negatively correlate with the gold index rolling spot return (Dewi et al., 2011b). However, another study found that the interest rate positively and significantly correlated with the yield on the Olein futures contract (Dewi et al., 2011a).

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4.4.3. The Effect of USD/IDR Exchange Rate Returns on Gold Rolling Spot Returns

The research results show that the USD/IDR exchange rate return has a negative influence on GRS returns with a regression coefficient of 1.5311 and a probability value of 0.0003 < 0.05. This means that hypothesis H3 is accepted. Chang et al. (2020) emphasizes the negative relationship between gold and exchange rates, suggesting that gold can hedge against exchange rate risks. This finding is in line with the results of Sun (2022) which show that the effective dollar exchange rate has an influence in influencing the mean return on gold. Baur & McDermott (2010) state that gold can act as a hedge against exchange rate risk for investors holding dollar-denominated assets, indicating that exchange rate fluctuations can affect the value of gold futures, thereby negatively affecting returns. Additionally, Beckmann et al. (2015) emphasizes that gold can function as a safe haven asset, potentially leading to an inverse relationship between exchange rates and gold prices during economic uncertainty or currency devaluation periods. Beckmann et al. (2015) note that exchange rate depreciation usually has a negative impact on gold prices, which can result in a decrease in gold futures returns in the short term. Research Wei & Wu (2020) shows that gold can act as a hedge for exchange rates in France, India, Japan, England, and the United States because they have a negative relationship with each other. This negative correlation between exchange rates and gold prices was further corroborated by research Szczygielski et al. (2018) which identified a strong and growing relationship between gold prices, exchange rates, and gold mining industry profits. Furthermore, Wang (2013) raises the question of whether gold can effectively hedge against risks associated with exchange rate fluctuations, stating that the negative impact of exchange rates on gold futures returns may arise from the limited ability of gold to mitigate the risks posed by currency movements fully. Potentially causing reduced returns on gold futures investments.

4.4.4. The Effect of Inflation on Gold Rolling Spot Returns

The research results show that inflation negatively influences GRS returns with a regression coefficient of 7.3667 and a probability value of 0.0000 < 0.05. This means that hypothesis H4 is accepted. Gold is generally considered a hedge against inflation, and research supports a positive relationship between gold prices and inflation expectations (Baur & McDermott, 2010; Sindhu, 2013). However, the impact of inflation on gold futures returns can vary. Although some studies suggest that gold may not consistently act as a hedge against inflation over the long term (Hoang et al., 2016).

The relationship between inflation and gold prices is complex, and empirical evidence sometimes provides inconclusive results regarding the short-term impact of inflation on gold returns (Zhu et al., 2017). Additionally, research has explored the impact of macroeconomic factors, including inflation, on gold futures volatility, and suggests that certain macroeconomic announcements, such as inflation reports, can significantly influence gold volatility (Chen, 2020; Elder et al., 2012).

Analysis of the relationship between inflation and gold prices in Turkey and Vietnam, Duong (2023) dan Ojaghlou & Satvati (2021) shows a negative correlation between inflation and gold prices. In particular, research shows that inflation can have an adverse impact on gold prices. Ojaghlou & Satvati (2021) found a weak and negative relationship between inflation, interest rates, world oil prices, exchange rates, and gold prices in Turkey. On the other hand, Duong (2023) shows through VECM analysis that inflation shocks cause a negative response to gold prices in Vietnam in the long run.

Indonesian inflation can have a negative relationship with GRS returns. Several factors can influence this. When inflation increases, the value of the local currency, in this case the Rupiah, tends to decrease because consumer purchasing power decreases. When the value of a local currency falls, gold tends to rise because gold is priced in that currency. High inflation also tends to encourage investors to look for investment instruments that are more profitable and safer from inflation. Although gold is considered a hedge against inflation, investors may be more interested in other investment instruments that can provide higher returns or are more liquid than gold.

Furthermore, the response to inflation by central banks and governments can also influence gold prices. If central banks raise interest rates to curb inflation, this could make alternative investments such as bonds more attractive compared to gold, which does not provide returns equivalent to higher interest rates. Moreover, high inflation can significantly reduce consumer purchasing power, which in turn can reduce demand for gold as a consumer or investment good, a practical implication that should be of concern.

4.4.5. The Influence of ICI on GRS Returns with Inflation as a Moderating Variable

The research results show that inflation cannot moderate the influence of the ICI on GRS returns due to its probability value of 0.1797 > 0.05. This means that hypothesis H5 is rejected. This research is the first research, so journal references were taken by synthesizing several journals regarding the relationship between inflation, ICI, and stock returns. In this case, stock returns are assumed to represent GRS because they are both investment products.

Sugito et al. (2020) studied the impact of profitability on stock returns with inflation as a moderating factor and found that inflation was unable to moderate the effect of profitability on stock returns. Furthermore, Mubarok et al. (2020) analyzed the

resilience of the Indonesian Sharia Stock Index (ISSI) to economic shocks, including the effect of inflation on the index in both short-term and long-term scenarios. The VECM estimation results show that gold prices have a significant effect in the short and long term, while inflation has a significant effect in the long term. Gold prices dominate the diversity of ISSI performance.

Although inflation can influence the relationship between ICI returns and GRS returns, it is sometimes in different directions or in an easily predictable way. There are several reasons why inflation may not be able to moderate the influence of ICI returns on GRS returns. Market sentiment and investor perceptions of economic conditions and financial markets are significant determinants of stock and gold price movements. These factors, which are not necessarily tied to the inflation rate, can heavily influence the direction of these markets.

Additionally, the monetary policy implemented by the central bank can also sway stock and gold prices. For instance, raising interest rates to curb inflation can negatively impact stock prices, but can drive investors towards safe haven assets like gold. Furthermore, external factors such as geopolitical events, global economic conditions, exchange rate fluctuations, and other variables can also exert influence on the stock and gold markets, irrespective of the inflation rate. Thus, although inflation can play a role in moderating the relationship between ICI returns and gold futures contract returns, many other factors can make inflation unable to moderate the influence of ICI returns on GRS returns.

4.4.6.   The Effect of Interest Rates on GRS Returns with Inflation as a Moderating Variable

The research results show that inflation can moderate the influence of the interest rate on GRS returns due to its probability value of $0.0000 < 0.05$. This means that hypothesis H6 is accepted. The type of moderation is Quasi Moderator with strengthening moderation properties, indicated by a positive moderation effect regression coefficient (160.4094). Since this is the first study worldwide, journal references are taken from several journals regarding the relationship between inflation, interest rates, and gold prices or gold futures return.

Gold is often considered a hedge against inflation, and research shows that as inflation expectations rise, nominal interest rates rise, resulting in greater returns in holding gold (Xu et al., 2019). Evidence suggests that inflation can moderate the impact of interest rates on gold futures returns. Gold's role as a hedge against inflation is supported by various studies highlighting the importance of gold in diversifying portfolios and mitigating risks associated with inflation fluctuations.

Gold is generally viewed as a safe haven asset, with zero beta asset characteristics, indicating that gold does not bear market risk (Baur & McDermott, 2010). However, the relationship between gold prices and inflation rates is positively correlated, indicating that gold can act as a hedge against inflation (Sindhu, 2013). When the inflation rate rises, gold returns can potentially cover losses due to the increase in the inflation rate (Khair-Afham et al., 2017). Although gold is affected by various factors such as macroeconomic indicators, unexpected news releases regarding economic indicators, and changes in interest rates, its sensitivity to inflation and its role as a hedge against inflation remain prominent (Moussa et al., 2020). Inflation can moderate the effect of interest rates on GRS returns because when the inflation rate rises, actual interest rates can fall, making interest-free gold more attractive relative to other interest-bearing instruments. The central bank's reaction to inflation can also affect the relationship between interest rates, inflation, and the price of gold. If central banks raise interest rates to control inflation, this could put negative pressure on gold prices. However, if inflation rises and real interest rates remain low or negative, investors may still seek refuge in gold.

4.4.7.   The Influence of the USD/IDR Exchange Rate on GRS Returns with Inflation as a Moderating Variable

The research results show that inflation can moderate the influence of the USD/IDR exchange rate on GRS returns due to its probability value of $0.0000 < 0.05$. This means that hypothesis H7 is accepted. The type of moderation is Quasi Moderator with strengthening moderation properties, indicated by a positive moderation effect regression coefficient (69.76692).

Inflation can moderate the influence of the USD/IDR exchange rate return on GRS returns because gold is often considered a hedge against inflation. When inflation increases, the local currency exchange rate tends to fall, but the price of gold tends to rise. Therefore, in the context of inflation, investors often use gold as a hedge against a decline in the value of the local currency. In this case, an increase in gold prices can moderate the impact of a decline in the exchange rate on investors' portfolios.

Additionally, during periods of high inflation or economic uncertainty, gold is often considered a "safe haven" asset that is relatively stable. As a result, demand for gold as a hedge may increase, even when local currency exchange rates fall. This can cause gold prices to remain strong or even rise, even if the local currency exchange rate falls.

Investors often use gold as a portfolio diversification instrument. When inflation rises, and local currency exchange rates fall, investors may be inclined to maintain a gold allocation in their portfolios because gold can provide stability or appreciation in value amidst economic uncertainty.

In the context of monetary policy, responses to inflation by central banks can influence gold prices and local currency exchange rates. For example, if the central bank raises interest rates to control inflation, this may strengthen the local currency

and reduce the attractiveness of gold as an alternative investment. Conversely, looser monetary policy responding to high inflation could encourage gold prices to remain strong or rise.

Thus, in high inflation, gold can function as a hedge against declines in local currency exchange rates and help moderate the influence of exchange rate returns on gold futures contract returns. However, it is essential to remember that various economic and financial factors can influence the relationship between inflation, currency exchange rates, and gold prices and may vary depending on specific market conditions.

V. CONCLUSION

1) The ICI return has a positive influence on Gold Rolling Spot return.
2) The Interest Rate has a negative influence on Gold Rolling Spot return.
3) The Exchange Rate (USD/IDR) return has a negative influence on Gold Rolling Spot return
4) Inflation has a negative influence on Gold Rolling Spot return.
5) Inflation is unable to moderate the influence of the ICI return on Gold Rolling Spot returns.
6) Inflation can moderate the influence of interest rates on Gold Rolling Spot return.
7) Inflation can moderate the influence of Exchange Rate (USD/IDR) return on Gold Rolling Spot return.

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