Information Management and Business Review (ISSN 2220-3796)
Vol. 16, No. 3S(a), pp. 799-816, Oct 2024

Reflections of Economic Shocks and Price of Crude Oil on Gold Price Volatility within Asian Nations

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Abstract: The focus of this study is to examine the effects of economic shocks along with the crude oil price on gold prices in Asian countries. This study utilizes a regression analysis to measure the relationship between the macroeconomic indicators, crude oil price, and gold price in six selected nations from 1990 until 2022. The validity of the data was diagnostically checked by performing a VIF procedure, autocorrelation test, and normality test on residual, and data were analyzed via EViews software. The analysis showed mixed findings, however, a major variable that positively affects the fluctuation of the gold price is "the crude oil price" and it reflects global economic stability in the six countries. A sudden rise in crude oil prices might trigger conflicts in oil-exporting countries and limit access to material sources. This situation may force investors to move their funds into a safe-haven commodity like gold. The fluctuations in crude oil prices are not only a response to current market conditions but also alarming a lot more fundamental problems in an economy, which include approaching economic recessions, currency devaluation and a major financial crisis. For practical implications, this study suggests that policymakers pay extra attention to this commodity besides other economic indicators like inflation, interest and currency rates, and a GDP rate to ensure a sustainable economic condition. To the best of the authors' knowledge, this study is the first that examines the economic shocks along with crude oil prices pre-and-post COVID-19 pandemic focusing on a few Asian countries.

Keywords: *Economic Shocks, Crude Oil Price, Gold Price, Asian*

1. Introduction and Background

Gold is a yellow metal with a delicate structure, is resistant to erosion, and is highly malleable, making it a precious asset and valuable possession. Md Hashim (2022). This commodity plays a significant role in the economy and is extensively used in the financial system for purposes such as monetary policy and asset reserves. (Lubis et al., 2021). Beyond its role in financial assets, gold is often seen as a safer investment during times of economic uncertainty, such as during a Corona Virus Disease 2019 (COVID-19) pandemic. (Hoong, 2021). Its importance is further highlighted during financial crises and periods of market instability, such as the European sovereign debt crisis from 2010 to 2013 and the global financial crisis (GFC) from 2007 to 2008 (Yousaf et al., 2021). Moreover, Golubova (2021) Suggests that the COVID-19 pandemic has changed some variables affecting global gold prices. This study investigates what ways macroeconomic factors affect the movement of gold prices in six selected Asian countries Malaysia, Indonesia, Thailand, Vietnam, Sri Lanka, and China.

In the realm of Asian macroeconomics, gold price volatility is intricately linked to various key variables. These include global economic performance indicators such as gross domestic product (GDP) growth rates, inflation as well as interest rates that influence the demand for gold as a safe-haven asset. Uncertainty due to fluctuations in currency exchange rates, geopolitical tensions, and political instability in Asia and all over the globe play a critical role in driving demand for gold as a hedge against this price volatility. Moreover, monetary policies set by central banks, inflationary pressures within Asian economies, investor sentiment, and trends in other commodity markets further contribute to the volatility observed in gold prices across the region. Employing a quantitative research methodology is essential for comprehensively examining the relationship between these macroeconomic factors and the fluctuations in gold prices in selected Asian countries. (Mainal et al., 2023).

As we know, gold endures as an appealing asset especially during economic and political uncertainty, attracting investors seeking stability. In the short term, fluctuations in gold prices are primarily driven by investor confidence shifts during economic crises and multinational corporations' use of gold to hedge against currency risks. On the other hand, long-term price trends reflect rising mining costs and persistent market uncertainty,

prompting investors to allocate gold as a safety measure in their portfolios. With its liquidity and resilience against economic instability, gold maintains its marketability even in volatile financial conditions.

Motivated by the intriguing interplay between macroeconomic variables, crude oil prices, and gold prices, this research delves into the influence of these external factors on gold prices across six countries. Specifically, we aim to investigate and quantify the impact of inflation rate, interest rate, economic growth, exchange rate, and crude oil price on gold price volatility in Malaysia, India, Thailand, Vietnam, Sri Lanka, and China. This study employs a regression analysis to assess the significant relationship of the mentioned variables in shaping gold price movements across the six Asian economies. This study will improve a better understanding and acquire better insight into the influence of crude oil prices and macroeconomic indicators on the Asian gold market. The first significant contribution to investors is in the sense that it could leverage this knowledge and make more informed decisions after understanding a movement of crude oil price and macroeconomic effects. In addition, the findings can be utilized by policymakers in developing more appropriate and suitable policies that match the macroeconomic measures after considering a country's gold reserves. Last but not limited to, this study could also benefit a broader audience that includes fund managers, analysts, and stockbrokers, by equipping them with a stronger decision-making framework surrounding a gold market. This research contributes valuable knowledge for future researchers investigating the factors affecting the gold prices market.

Since ancient times, gold has served as a representation of wealth and prosperity. Originally the invention of fiat money, gold was used as a medium of exchange. Today, it is an investment in jewellery and computers. Gold buyers do it primarily as a hedge against political upheaval and inflation for their investment since gold as a commodity might reduce portfolio risk. As a result, most financial advisors advise clients to allocate a significant portion of their portfolio to these commodities.

Gold holds significant historical and cultural importance in Malaysia, deeply intertwined with its economy, traditions, and heritage. This precious metal is revered not just for its financial worth, but also for its artistic beauty and symbolic meanings. In Malaysian culture, gold symbolizes wealth, prosperity, royalty, and divine blessings, reflecting core values, beliefs, and aspirations (Kwok, 2023). According to Aziz (2021), gold prices are experiencing downward pressure, and analysts forecast that gold prices could drop below RM6,576 per 12 troy ounces in the future. Despite a significant decline, the gold market continues to exhibit volatility. Aziz advises Malaysian investors to consider including gold in their portfolios as a hedge against the ongoing global economic slowdown. According to a Malaysian magazine named StashAway dated January 15, 2024, gold investment is still a popular option in Malaysia, where economic diversity and growth offer special prospects. This is especially true given that the price of gold has increased by 88% in the last five years, or 12.9% in annualized returns (StashAway, 2024).

Furthermore, in India, the gold market has experienced significant transformations primarily due to the liberalization of the economy by the Indian government after the economic crisis of 1991. Gold's applications and advantages permeated the Indian market. The Indian gold market has consistently experienced an extraordinary growth rate, despite the country's sluggish income development. The Economic Times dated May 6, 2019, reported that the yearly demand for gold accounts for approximately 25 percent of the global physical demand. The persistent escalation in gold prices and the significant fluctuations in gold prices, which correspond to the high levels of volatility observed in the stock market, engender confusion among investors when contemplating gold investment decisions. Consequently, an examination of the volatility of gold prices within the Indian economy has emerged (Pachiyappan, 2022).

On the other hand, the current economic landscape of Thailand reflects sluggish GDP growth and an unappealing stock market, leading many investors to hesitate due to the susceptibility of stocks to rumors and news, especially during periods of political instability such as coups. Before the establishment of the Gold Traders Association, gold traders operated independently, resulting in inconsistencies in the quality, purity, business hours, and fees associated with gold trading. To address these issues, 11 gold traders formed the "11 Gold Traders Club" in 1983, aiming to standardize the quality of gold by adopting a 96.5% gold purity standard, thereby ensuring better outcomes for customers and promoting trust in the industry (Jaraskunlanat & Kijboonchoo, 2016).

In general, Vietnam ranks among the world's top gold-consuming nations, according to the World Gold Council's reports from 2011, 2012, and 2015. Therefore, if inflation occurs, the effect on the domestic gold price in Vietnam is expected to be more pronounced compared to smaller gold markets. In contrast to wealthy nations, Vietnam, as an emerging economy, has encountered intermittent episodes of significant inflation. During the 2008 GFC, the CPI in Vietnam experienced a significant surge, reaching 23.11% annually. Following the crisis, the CPI stabilized at approximately 10%. Furthermore, the gold market in Vietnam has observed notable correlations between the gold price index and the CPI. It is plausible to anticipate a probable correlation between these two fundamental variables in Vietnam (Duong, 2023).

While in Sri Lanka, most investors have converted them into gold to ensure the stability of their money. In 2017, the gold price climbed by 4% compared to the fourth quarter of 2016. The primary cause of rising gold demand was increased gold demand by central banks and other organizations. However, central banks and other organizations need gold at a 25% yearly growth. It has affected the growth of gold demand in the gold market. The high demand and constraint of gold output have boosted the price of gold (Street et al., 2016).

Finally, China was already an important participant in the gold markets, but during the recent price surge, which has seen a global price increase of about 50% since late 2022, it has taken the forefront. Gold prices kept rising even after the US Federal Reserve indicated that it would keep interest rates higher for a longer period. Moreover, even though the dollar has strengthened versus most other major currencies this year, gold has benefited. For the 17th month, the People's Bank of China continued to increase its gold reserves in March. It bought more gold last year than any other central bank, generating larger reserves than it has in 50 years. The goal of Beijing's acquisitions is to lessen its dependency on the US dollar and diversify its reserve assets. China has been gradually lowering the amount of US Treasury securities it owns over the last ten years. Its holdings decreased from almost $1.1 trillion in 2021 to about $775 billion as of March (Wakabayashi, 2024).

The main question is "*Which economic shocks will have high influences on the fluctuation of gold prices in selected Asian countries*?" The fascinating aspect comes when one compares the price of gold on its own to the other macroeconomic components. We aim to discover how these six Asian countries' gold prices are impacted by the economic shocks that include the fluctuations of the macroeconomic indicators and a crude oil price. Historically, the gold price has responded to economic factors several times during the 2008 GFC and COVID-19 pandemic. The major crises are two prominent instances of how these external factors affect the gold price. Gold prices spiked in both instances as investors looked for safe havens. Accordingly, this research adopts a Multiple Linear Regression (MLR) model to delve into the influence of selected macroeconomic variables together a crude oil prices towards gold prices within specific Asian economies. These variables encompass inflation rate, interest rate, economic growth, exchange rate, and crude oil price. Several theories related to this study are discussed to grasp an appropriate concept in developing a theoretical framework.

In general, an increase in the demand for gold inevitably increases the price of gold. The demand for gold is driven by factors such as GDP growth, supply and demand, inflation rate, interest rate, jewellery market trend, and geopolitical developments. All these factors have a significant impact on a gold price trajectory. Recent studies conducted across these Asian nations underscore the sensitivity of gold prices to shifts in macroeconomic indicators, demonstrating that even subtle changes can exert pronounced effects on market valuations. These economic variables affect the gold prices and its indexes by the change in fundamentals of the economy and expectations about prospects. A few studies were undertaken in some Asian countries to understand the connection between macroeconomic indicators, crude oil prices and the fluctuation of gold prices. The findings of the studies show that even slight changes in macroeconomic indicators have a considerable influence on gold prices. These types of results serve as a tool for investors to make better predictions on the gold price caused by the movement of considerable economic factors (Morgan, 2024).

In Malaysia, the news on the global price of gold reached an all-time high contributed to the surge of gold price in Malaysia, reaching US$2,420 per ounce, which translates to RM370.93 per gram (Halimy, 2024). The surge in gold price is expected to stay high due to prolonged global economic uncertainty and during periods of inflation since inflation reduces the purchasing power of the currency, whereas gold retains its worth. This impressive trend has also impacted other countries like India (Jadhav, 2024), Thailand, and Vietnam (Trang,

2023).

On the other hand, the gold prices in Sri Lanka were down amid a global surge. According to the newspaper The Sunday Morning Business in April 2024, local gold prices had remained below the all-time highs observed in 2022 and were trailing behind global highs due to the Sri Lankan rupee's unpredictable appreciation. In China, despite ever-growing domestic market demand, Chinese gold buyers show remarkable resilience unfazed by high prices and low confidence in the nation's shaky economic recovery state, resulting in selling more gold to guaranteed safety assets such as jewellery and bullion (Gross, 2024).

Every country has its own set of benchmarks that place them on the top of the global list. The most common way is by looking at the country's GDP, but recently the performance of a gold market has become a yardstick in measuring the country's economic health. In addition, a healthy and strong stock market also plays an important role in influencing the investor's decision-making when it comes to investing in a specific country. Consequently, the stock market holds a significant role in supporting the growth of the industry as well as the economy of the country.

Due to different reactions by selected Asian countries towards the recent surge in gold prices post-COVID-19, this study intends to investigate the macroeconomic conditions towards the movement of a gold price in Asian countries. Specifically, this study aims to investigate the relationship between macroeconomic indicators (inflation, interest rate, economic growth, exchange rate, and crude oil price) and the fluctuation of a crude oil price towards a gold price that may offer insights into the unique characteristics and common trends across the Asian countries. By conducting an individual regression analysis for each country, this study seeks to identify any similarities and differences in the impact of macroeconomic factors on gold price volatility in the studied nations. Additionally, this study aims to provide policymakers and investors as market participants with valuable insights and recommendations for managing and mitigating the effects of these variables on gold prices in the Asian context. This research endeavors to contribute to a deeper understanding of the dynamics of the gold market in Asian regions and facilitate informed decision-making in the face of economic uncertainties and market fluctuations. The accuracy and reliability of the study depend on the data that we sourced from. We need to narrow down the scope of the study and restrict the year of investigation to the year 2022 because of the data lacking.

The first significant contribution of the study is to the market participants. Prospective and existing **investors** alike must comprehend the volatility of gold prices in Asian markets caused by several crucial factors such as the state of the world economy, rising inflation, central bank policies, currency changes, and demand-supply dynamics, as well as investor conduct. For example, gold's price tends to rise when there is inflation or economic instability because people see it as a safe-haven asset. In the same way, changes in central bank policy, such as quantitative easing or interest rate reductions, can increase the appeal of gold as a hedge against currency depreciation. Gold prices can also be impacted by fluctuations in the market for gold, industrial use, and industrial output. Investors can negotiate the volatile character of the Asian gold markets and personalize their investing strategy by keeping an eye on these variables. Concerning this, we believe that the data presented in this study will help financial institutions and investors gain a better understanding of the macroeconomic variables affecting the volatility of gold prices in Asian countries.

The second contribution of the study is to the policymakers as they can utilize the findings of this study, particularly on the relationship between inflation rates and gold prices. This is significant for the countries like India, Thailand, and Sri Lanka due to cultural and economic factors. In India for instance, gold is deeply ingrained in the culture as both an investment and a symbol of wealth, making it a crucial hedge against inflation. The Reserve Bank of India closely monitors gold prices as a signal of inflationary pressures, influencing its monetary policy decisions. Similarly, in Thailand, gold is a popular investment, and its price movements are often reflective of inflation expectations and economic sentiment, guiding the Bank of Thailand's policy actions. In addition, Sri Lanka has frequently faced inflation and currency depreciation, and also views gold as a vital economic indicator, with the Central Bank of Sri Lanka using gold price trends to anticipate and address inflationary trends and economic instability. Conversely, the relationship between inflation rates and gold prices is less significant for Malaysia, China, and Vietnam due to their more diversified economies and different economic priorities. In Malaysia, BNM relies on a range of indicators such as *oil prices*

and trade balances rather than gold prices. While in China, the People's Bank of China manages a controlled economy with *diverse assets in its foreign reserves*, reducing the relative impact of gold prices on policy decisions. On the other hand, Vietnam's emerging economy focuses more on *agricultural* prices, *manufacturing* output, and *foreign investment*, with the State Bank of Vietnam placing less emphasis on gold prices when managing inflation and economic growth.

Thirdly, future researchers will benefit from this study. This study is significant because it serves as a reference for future researchers to get consistent proof and an exceptional outcome, which will improve the present knowledge. This can assist scholars in gaining a better grasp of the impact of crude oil prices and macroeconomic variables affecting the volatility of gold prices in countries under investigation. Future scholars can enhance their comprehension of how inflationary pressures, domestic and global economic conditions, currency fluctuations, demand-supply dynamics, investor sentiment, monetary policies, and macroeconomic data releases influence local fluctuations in gold prices. Such studies can provide important new insights into the dynamics of the Asian gold markets, laying the basis for the creation of risk management plans, investment guidelines, and prediction models specific to investors in this market sector. Furthermore, by defining the primary causes of gold price volatility in Asia, scholars may improve the larger discussions on financial markets and macroeconomic stability, thereby increasing our understanding of the correlation between economic factors and asset values in the area.

The COVID-19 pandemic has changed some of the macroeconomic variables affecting Asian and global gold prices. (Golubova, 2021). The intriguing interplay between macroeconomic variables and crude oil prices has become our motivation to delve into the influence of these economic shocks on gold price fluctuation across six Asian countries. We are motivated to figure out which economic shock(s) has the highest influence on the fluctuation of a gold price in Asian countries. This is crucial because the outcome could benefit a broader audience such as fund managers, investment analysts, stockbrokers, and individual investors with a strong decision-making framework for the post-COVID-19 pandemic. The remainder of the paper is structured into five distinct sections. *Section 2* outlines the review of prior studies. *Section 3* details the methodology adopted. *Section 4* presents the answers to our hypotheses. Finally, *Section 5* outlines our conclusions and a recommendation for future potential research.

2. Literature Review

Gold is an exceptionally valuable metal utilized for both practical and financial purposes. Presently, gold holds intrinsic worth and serves a versatile range of applications. Historically, gold served as the cornerstone of monetary systems and later became a reserve asset tied to the Dollar under the Bretton Woods regime. These shifts influenced the Dollar's exchange rate and its convertibility relative to gold.

After the end of 1973, some European countries decided to let the exchange rate float. So, the gold stopped having properties as a medium of exchange, and then it became a personal saving tool as well as a part of the Central Bank reserves. For the last few years there has emerged a rising demand for gold with the use of gold amid large-scale production in the industry products as well as in jewellery manufacturing. In addition, financial market evolution leads to the changing role of gold as a haven, while new financial instruments create a variety of future investments. Lastly, generally, after the financial crises and crisis periods are over individuals more often decide to invest in gold, as this is a more secure period to do so. As a result, the price of gold rejuvenated once more in the bad economy (Toraman et al., 2011). Now we will be looking at the relevant theories that could relate the macroeconomic impacts towards the fluctuations of gold price.

Firstly, a Modern Portfolio Theory by Harry Markowitz offers a practical framework for investment selection. It uses mathematical techniques to create portfolios that achieve the highest expected return for a chosen level of risk tolerance. This theory assists investors in constructing portfolios that aim to maximize potential profits while managing risk effectively. (Baldridge & Curry, 2024). The first theoretical foundation for the relationship between ex-ante inflation and asset returns was proposed by Fisher in 1930. He argued that the expected nominal asset return includes both the expected real return and the expected inflation rate. As expected, inflation *increases*, asset returns will also increase but the purchasing power of a currency declines (Ghazali, 2015). Consequently, during prolonged periods of high inflation, the purchasing power of the domestic

currency weakens, eroding consumer confidence in investing in financial assets (shares). As gold possesses inherent value, its price tends to *rise* alongside inflation. Consequently, holding gold has become a popular strategy to mitigate inflation risk (Li, 2023). Therefore, an alternative hypothesis has been built.
H1: There is a positive relationship between inflation and gold prices.

Previous research supports the idea of a positive link between gold prices and inflation. One study confirmed the enduring link between gold prices and inflation. Their analysis of monthly data spanning 1945 to 2006 revealed a *positive* relationship between these factors, implying that gold might serve as a safeguard against inflation (Worthington & Pahlavani, 2007). In addition, Oner (2012) Stated that inflation refers to the rate at which prices rise within a given timeframe. It is commonly described as a general increase in wages or the overall cost of living within a nation. High inflation can harm the economy, but so can deflation and declining prices. When prices fall, consumers postpone purchases and wait for further price reductions. Thus, inflation is one of the macroeconomic factors that has a major impact on gold prices (Ernst, 2023).

One recent study by Duong (2023) examined the short- and long-term relationships between gold prices and inflation in Vietnam. Based on the ARDL model, the results indicate that there is a co-integration (*long-run relationship*) effect between Vietnam's inflation rate and the price of gold, while the short-term effects of inflation on gold are negligible. On the other hand, another study provides light on the complex relationship between global economic conditions and socio-cultural elements and gold in India, providing valuable information for investors and policymakers alike. By emphasizing the gold market's cultural relevance and function as an inflation hedge, this research advances our understanding of the Indian gold market and adds to the growing body of knowledge on gold's place in the global economy. The study chose to concentrate on the United Kingdom and Japan in addition to the United States of America due to the lack of reliable data and the relative significance of the demand for physical gold as opposed to gold acquired through a controlled exchange. It has presented a time-series visualization of the evolution of the *cointegration* between inflation and gold. This method makes it simple for scholars and policymakers to determine when gold provided inflation protection (Lucey et al., 2017).

Secondly, an Interest Rate Expectations Theory explains that the prices of financial assets including bonds, currencies, and commodities like gold, are influenced by expectations regarding future interest rates. This theory aims to aid investors in making decisions by predicting future movements in interest rates as stated by Murphy (2024), and much higher interest rates imply higher opportunity costs of holding gold because gold does not provide any interest or yield. A real interest rate plays the most predominant role when it comes to investment holding. When the real rate of interest falls, the alternative assets get in the picture and the competition becomes tough thus the trend is higher for lower interest. Gold is considered a safe-haven asset that can be utilized when investor confidence is low because it can serve as an alternative investment option to investors in times of distress. As a result, when the interest rate *rises*, the attractiveness of holding gold decreases relative to interest-bearing assets, leading to a potential *decline* in gold prices. This theory offers a structured approach to comprehending how shifts in expectations regarding interest rates can impact the demand for gold and, consequently, its pricing in financial markets. Therefore, an alternative hypothesis two has been built.
H2: There is a negative relationship between interest rate and gold price.

Real interest rates are the main component of market movements that trigger changes in gold prices as many studies show consistently significant coefficients across all the countries of the world. The study indicates that the gold price can effectively compensate for real interest rate movements, although they form a major target of hedging primarily during depressions. Investors interest in gold varies depending on the expected returns from other types of investments. When interest rates increase, investors are motivated to allocate more of their assets to interest-bearing financial products in pursuit of potentially greater profits. Conversely, when interest rates decline, investors may increase their exposure to gold in their portfolios. This situation implies an *inverse* correlation between interest rates and gold prices (Toraman et al., 2011).

In addition, a rise in interest rates can incentivize investors to rebalance their portfolios towards fixed-income investments, such as bonds, which offer a guaranteed return (Pachiyappan & Chandrakala, 2022), This shift in investor preference occurs because gold, unlike bonds, does not provide a regular stream of income. As a result,

high interest rates could reduce the demand for gold, potentially causing gold prices to remain lower or even decrease. This illustrates the *negative* correlation between interest rates and gold prices. Thus, gold which is often used in the form of jewellery as standard currency is an important informational factor for the activity and process of the economy and the decision regarding monetary policy. The gold's intrinsic characteristics which always draw investors into holding more stocks during the crisis demanded a careful study of gold prices and their relationship to real interest rates. On the other hand, this essay aims to determine the exact nature of the connection between the nominal or 'real' interest rate and gold prices (Apergis et al., 2019).

Thirdly, a Classical Growth Theory by Adam Smith explains an economic expansion is driven by accumulating capital and reinvesting profits. This process is fuelled by specialization, division of labor, and the pursuit of comparative advantage (Kenton, 2024). According to Li (2023), stable and high economic growth fosters rising consumer income, leading to increased consumption and potentially higher investment demand. This translates to a greater demand for gold, both for jewellery and as an investment, pushing up gold prices. Conversely, economic recessions reduce consumer purchasing power, leading to a decline in gold demand and a subsequent drop in gold prices. This impact is particularly pronounced in countries with a high cultural affinity for gold and those with wealthier populations. GDP quantifies the total market worth of all finalized goods and services produced within a country over a defined period. A strong GDP typically signals a thriving economy, whereas a weak GDP indicates a less dynamic economic condition (Fernando, 2024). Therefore, an alternative hypothesis three has been built.
H3: There is a positive relationship between economic growth rate and gold price.

Several other researchers have empirically investigated the gold hedging feature and came to the same conclusion and confirmed a *positive* relationship among real GDP, crude oil prices, and gold prices. (Dalam et al., 2019; Sukri et al., 2015). Specifically, the study by Sukri et al. (2015) had approached the problem from a domestic standpoint, although the prior study by Dalam et al. (2019) Noted a *positive* correlation between Malaysia's GDP and gold prices. Research examines gold investment from an international one. The research employed an auto-regressive distributed (ARDL) lag model in exploring the correlation between gold returns and the stock market as well as the variations in the intervals between successive events that resulted in negative market returns for a Malaysian developing market using 2261 daily data between August 1, 2001, and March 31, 2010. The findings indicate that gold and once-lagged stock returns have a small but statistically significant *positive* association.

Prior research has employed fuzzy multiple linear regression (MLR) to examine how financial variables relate to the price of gold. This study was motivated by global economic uncertainty and stock market volatility, leading to increased investor interest in gold during bullish market conditions. (Pushpa & Muruganandam, 2014). The research aimed to identify which financial variables influence changes in gold prices. The result, however, indicated that a *decrease* in the GDP growth rate is associated with higher gold prices.

Fourthly, a Purchasing Power Parity (PPP) theory discusses a concept in economics that intends to compare the relative value of several currencies by calculating the exchange rate at which consumers may purchase identical goods or services in two different countries. (Eldridge, 2024). This PPP Theory suggests that deviations in the price of gold between currencies should be corrected by exchange rate movements. If gold is consistently cheaper in one currency compared to another, it implies that the currency with the cheaper gold price should appreciate relative to the other currency to eliminate the price differential. Moreover, gold is priced globally in USD. When the USD strengthens relative to other currencies, it becomes more expensive for holders of those currencies to buy gold. As a result, this may decrease the demand for gold, leading to a decline in its price. Therefore, an alternative hypothesis four has been built.
H4: There is a negative relationship between the currency exchange rate and gold price.

The exchange rate indicates how much one currency is valued relative to another. The exchange rate serves as a measure of a currency's buying power over another currency (Steinberg & Walter, 2013). According to Li (2023), like many other commodities, gold is priced in USD. Therefore, there is an *inverse* relationship between the dollar and the gold price. When the dollar depreciates and loses value, gold prices typically rise, whereas when the dollar appreciates, gold prices fall. In addition, a study by Seemuang and Romprsert (2013) about the connection between different macroeconomic factors and gold prices in the United States indicated that

fluctuations in the U.S. dollar index are the most influential factor in forecasting changes in gold prices. While there is a mutual influence between gold prices and the USD index, the impact on gold prices is minor. Overall, the PPP Theory offers a model to explain the long-term connection between gold prices and exchange rates. While it posits that exchange rate movements should align with price disparities of globally traded commodities such as gold, real-world market dynamics often introduce complexities that impact these associations.

A long time ago, it was proven that in the short term, gold prices significantly affect the exchange rate. The link between the return on gold and the exchange rates of the US dollar versus the euro, Japanese yen, and UK pound sterling, respectively, is evaluated by the research period spanning from January 2, 1971, to December 10, 2009. Granger causality's findings demonstrate that future gold returns are influenced by the lagged values of exchange rate fluctuations. Furthermore, the US dollar's exchange rate versus the euro, the Japanese yen, and the British pound sterling, respectively, show a *negative* correlation with the return on gold. Currency depreciation and an increase in the gold return are related (Wong, 2014).

Prior studies investigated the connection between gold prices and the exchange rate of the US dollar by employing the six distinct GARCH family models. Their analysis concludes that an APGARCH model fits the datasets utilized in the study the best, which included data for a variety of economic factors across the 1983–2003 time frame as well as average and spot gold futures prices. (Tully & Lucey, 2007). The study confirms that the US dollar is the predominant factor exerting a significant influence on gold prices, even if only a small number of macroeconomic factors have a statistically significant impact on gold prices (Dalam et al., 2019; Madhushan et al., 2012).

Fifthly, a Cost-Push Inflation Theory explains that an increase in production cost is often due to higher wages or raw material prices. This can lead to businesses producing less while demand stays the same. To keep making a profit, businesses raise prices for consumers, which creates inflation (Kenton, 2024). In addition, this theory posits that a rise in the cost of production inputs, exemplified by crude oil, can trigger a subsequent increase in other good prices such as gold across the entire economy. This phenomenon arises as producers are incentivized to elevate their pricing structures to preserve their profit margins when faced with escalating input costs. Therefore, an alternative hypothesis five has been built.
H5: There is a positive relationship between crude oil price and gold price.

Crude palm oil (CPO) constitutes a significant global commodity, actively traded on international marketplaces in various forms, including immediate delivery and agreements for future delivery called derivatives contracts. Moreover, crude oil is widely recognized by economists as the world's preeminent commodity, due to its critical role as the primary source of global energy production. (Liberto, 2024). There is a direct connection between crude oil prices and gold prices. They assert that this correlation stems from crude oil's substantial role as an energy source in the context of gold mining operations. Therefore, an *increase in crude oil prices* raises mining expenses, which could lead to *higher gold prices.* (San et al., 2012; Wang & Chueh, 2013; Zhang & Wei, 2010).

Additionally, Abdullah and Abu Bakar (2015) Had investigated factors influencing gold prices using simple and multiple linear regression. He analyzed quarterly data from 1971 to early 2011, which was sourced from International Financial Statistics (IFS) and Global Financial Data (GFD). The study identified inflation, silver prices, US dollar trade-weighted index, and Brent crude oil prices as key variables that are *positively* correlated with gold prices. In conclusion, the Cost-Push Factor Theory explains how rises in production expenses, like increasing crude oil prices, can generate inflationary pressures that indirectly influence gold prices. Nevertheless, a *positive* relationship between crude oil prices and gold prices is intricate and shaped by diverse economic, geopolitical, and market-specific elements.

Similarly, Pruchnicka-Grabias (2021) Has employed a vector autoregressive (VAR) model with variables including oil, gold, silver, US industrial output, EURUSD currency rate, and a 3-month interest rate. His study revealed a *short-term connection* between crude oil and gold, whereby changes in the returns on crude oil prices showed a strong and linear Granger-cause relationship with the percentage changes in the returns on gold prices. Since we can see that the link between the price of gold and CPO is not constant over time, the issue may get even more convoluted. For example, In the 1970s, the price of crude oil may have had a more pronounced

influence on the price of gold compared to its current impact (Le & Chang, 2012).

3. Research Methodology

This research aims to determine and understand the underlying mechanisms that drive changes in gold prices based on variations in selected macroeconomic factors such as inflation rates, interest rates, exchange rates, economic growth as well as crude oil or CPO prices. This study takes annual observations over thirty-three years, from 1990 to 2022. This design involves the formulation and testing of hypotheses to determine whether changes in these independent variables lead to significant fluctuations in the dependent variable, which is the volatility of gold prices for the selected six Asian countries. We employ a quantitative approach to construct and validate relationships and develop generalizations that add to the theory (Jansen, 2021).

The link between numerous independent or predictor variables and a single dependent or criterion variable is known as multiple regression in analysis. Multiple linear regression (MLR) expresses the linear correlation between the independent and dependent variables. A theoretical framework is established to classify the variables and enhance comprehension of the relationship between independent and dependent variables. Our research design utilizes MLR analysis to quantify the impact of each variable on gold price. The study includes detailed methods for data collection from reliable financial databases such as World Bank and Federal Reserve Economic Data (FRED) and rigorous procedures for data analysis to ensure the accuracy and robustness of the results. By controlling for potential confounding variables, the research aims to isolate the specific impact of each macroeconomic factor. The findings of this study are intended to provide valuable insights for market participants (investors and financial institutions), policymakers, and financial analysts, assisting them to make informed decisions and develop strategies to stabilize gold markets in response to macroeconomic changes.

The experimental approach involves manipulating independent variables to observe their effect on gold price volatility. Although conducting true experiments in macroeconomic studies is challenging due to the complexity of economic systems, quasi-experiments or natural experiments can be utilized. This extensive data analysis helps uncover trends, patterns, and correlations that might not be apparent through experimental methods alone. This strategy is to ensure a robust investigation, enhancing the validity and reliability of the research findings. (Chetty, 2020). Below is a model equation that has been constructed.

Model Equation:

$$\mathbf{PGold = \alpha + \beta_1 CPI + \beta_2 IR + \beta_3 GDP + \beta_4 ER + \beta_5 CO + \varepsilon_t} \quad (1)$$

Where:
DV = LNGP = Logarithm Price of Gold (**PGold**)
Alpha = **α**
Beta Coefficient for $IV_1 - IV_5$ = $\boldsymbol{\beta_{1\text{-}5}}$
IV_1 = LNCPI = Logarithm Consumer Price Index (**CPI**)
IV_2 = LNIR = Logarithm Real Interest Rate (**IR**)
IV_3 = LNGPD = Logarithm Gross Domestic Product (**GDP**)
IV_4 = LNER = Logarithm Real Exchange Rate (**ER**)
IV_5 = LNCO = Logarithm Crude Oil (**CO**)
Error term at time t = ε_t

All variables are in a logarithm form. A dependent variable in Equation 1 above is *PGold*, which stands for the Price of Gold. In addition, the first independent variable is the inflation rate, proxy by the log of the Consumer Price Index (CPI) (Tufail & Batool, 2013); second independent variable is the interest rate, proxy by the log of Real Interest Rate (IR) (Abdullah & Abu Bakar, 2015); third independent variable is economic growth, proxy by log of Gross Domestic Product (GDP) (Pushpa B. & Muruganandam, 2014); fourth independent variable is the currency exchange rate, proxy by the log of Real Exchange Rate (ER) (Bapna et al., 2012); and the fifth independent is the price of crude oil, proxy by the log of crude palm oil price (CO) (San et al., 2012) Will be utilized. Below is the theoretical framework based on the literature that has been referred to.

Figure 1: Theoretical Framework for A Gold Price Volatility

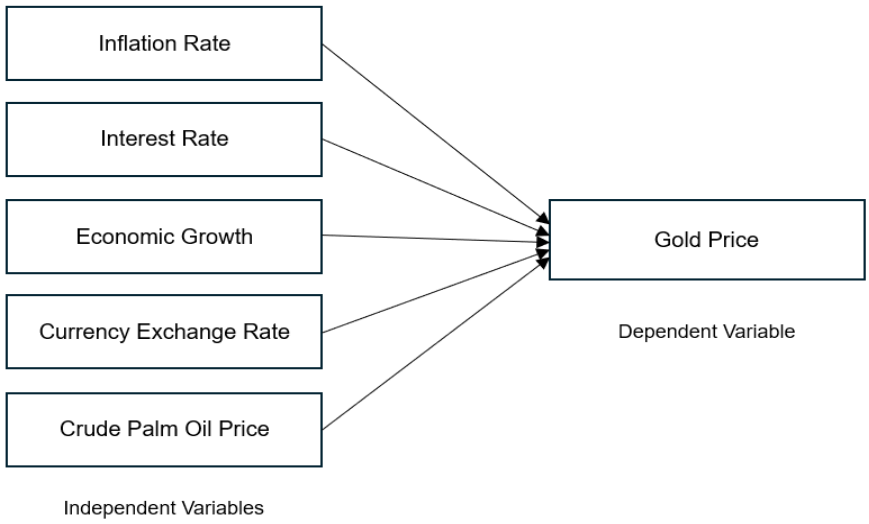

Figure 1 depicts a theoretical framework that relates potential determinants of selected macroeconomic factors on gold prices. The scope of the study covers six distinct Asian countries such as Malaysia, India, Thailand, Vietnam, Sri Lanka, and China. This study examines the reaction of the dependent variable under investigation towards external factors. Furthermore, a statistical procedure will be utilized to analyze the numerical and publishable data that we gather. At first, we will be eliminating the outliers that would disclose the underlying signal by constructing the research utilizing a Time Series Regression and specific software named EViews. Annual data ranging between 1990 and 2022 that represents the 6-Asian countries are analyzed individually.

Before we can proceed with a time-series modelling, we should perform a diagnostic check to detect any outliers, and it aids in the elimination of ambiguities in research processes. Three general checks need to be performed for time-series data that run using a regression or ordinary least square (OLS). The first one is the Variance Inflation Factor (VIF) procedure, which is to measure a multicollinearity. This phrase describes the statistical hypothesis that a regression coefficient's variance increases with collinearity. A multicollinearity occurs in OLS regression when independent variables are linearly related. This correlation can lead to perfect multicollinearity, affecting the reliability of regression coefficients due to inflated standard errors. Additionally, the VIF is commonly used to quantify the inflation in regression coefficient variance due to collinearity. Thus, no multicollinearity in the model is suggested if VIF or tolerance equals 1. Tolerances less than 0.1 or VIFs higher than 10 indicate severe multicollinearity, which calls for remedial action and raises concerns (CFI Team, 2024).

The second one is the Serial Correlation (autocorrelation) test, which arises when regression residuals exhibit correlation with each other, indicating a lack of independence in the errors. This phenomenon often occurs due to factors like model misspecification, non-randomly distributed data, or errors in the error term. Particularly prevalent in time-series data, serial correlation reflects a tendency for prices to move together over time. This correlation can be quantified using the autocorrelation coefficient, which measures the degree of relationship between successive data points in a series (Frost, 2024). Moreover, regression residual autocorrelation statistics is referred to as the Durbin-Watson test. Autocorrelation is the similarity of a timeline across many periods. It might lead to an overestimation of the standard error and the false perception that predictors are important. The test statistic DW is compared to lower and higher critical values to test for positive autocorrelation at significance level α (alpha). The test is deemed inconclusive if 4-DW falls between the lower and higher critical levels. (CFI Team, 2024).

The final one is the Normality Test on Residuals. In regression analysis, the residuals are assumed to have a normal distribution according to the normality assumption. Such a test has a null hypothesis that could be rejected if a non-normality in the residuals is indicated when the test produces a *p*-value below the significance

level. A *p*-value over the significance threshold, on the other hand, indicates that the residuals are normally distributed even though it is unable to reject the null hypothesis. Furthermore, only when sample sizes are small does a breach of the normalcy assumption become problematic. Due to the central limit theorem and the fact that the *F* and *t*-tests, which are used to test hypotheses and create confidence intervals, are very resistant to even small departures from normality, the assumption becomes less significant for large sample sizes (Frost, 2024).

4. Results

Our discussion starts with a diagnostic check for each country. Since the centered VIF for all independent variables in the four countries (Malaysia, India, Thailand, China) have scored below 5, hence all five independent variables such as inflation rate (CPI), interest rate (IR), economic growth (GDP), exchange rate (ER), and crude oil price (CO) can be remained in the time-series model. Vietnam and Sri Lanka, however, only four independent variables can be maintained in the model excluding an exchange rate because it violates the specified rule of thumb. The Watson's Durbin Statistic for all countries has scored lower than a lower Durbin (dL) at the first order, which indicates the error term has severe serial correlation. However, we have enough evidence to reject the H0 at second order when the error terms do not suffer a severe serial correlation at this level. Overall, all residuals of the six countries under investigation are normally distributed.

Regression analysis for Malaysia: Table 1 displays a summary of the regression results of the study.

Table 1: Summary of the regression results for Malaysia

Malaysia	CPI (X_1)	IR (X_2)	GDP (X_3)	ER (X_4)	CO (X_5)
t-statistic (p-value)	-0.599708	0.897255	-1.254913	-0.087137	7.620642***
Beta Coefficient	Nil	Nil	Nil	Nil	Positive
Adj. R^2	72.7% (Strong model)				

Based on a *t*-test, we have enough evidence to reject the fifth H_0 since the p-value is significant at 1%. Referring to a theoretical finding, the conclusion that "there is a positive relationship between crude oil price and gold price" is true in the case of Malaysia. Moreover, the value of adjusted R-squared equals 0.72727 implies that 72.7% of the variation in the price of gold in Malaysia is highly influenced by the movement of the CPO or crude oil price.

Regression analysis for India: Table 2 displays a summary of the regression results of the study.

Table 2: displays a summary of the regression results for India

India	CPI (X_1)	IR (X_2)	GDP (X_3)	ER (X_4)	CO (X_5)
t-statistic (p-value)	2.483406**	-0.789714	-1.679248	3.931891***	5.200325***
Beta Coefficient	Positive	Nil	Nil	Positive	Positive
Adj. R^2	83.5% (Strong model)				

Based on a *t*-test, we have enough evidence to reject the first, fourth, and fifth H0 since the p-value is significant at 5%, 1%, and 1%, respectively. Referring to a theoretical finding, a conclusion that "there are positive relationships between inflation rate and crude oil price with gold price" is true in the case of India. However, a positive relationship between Indian rupees and gold price seemed to be against the theory but aligned with a study by (Pachiyappan & Chandrakala, 2022). Finally, the value of adjusted R-squared equals 0.835439 implies that 83.5% of the variation in the price of gold in India is highly influenced by the movement of the inflation rate and exchange rate as well as a CPO price.

Regression analysis for Thailand: Table 3 displays a summary of the regression results of the study.

Table 3: Displays a summary of the regression results for Thailand

Thailand	CPI (X_1)	IR (X_2)	GDP (X_3)	ER (X_4)	CO (X_5)
t-statistic (p-value)	-5.693522***	-.286770***	-.162721***	-6.834586***	7.417607***
Beta Coefficient	Negative	Negative	Negative	Negative	Positive
Adj. R^2	90.7% (Strong model)				

Based on a *t*-test, we have enough evidence to reject all five H0 since the p-values are significant at 1%. Referring to a theoretical finding, the conclusion that "there is a positive relationship between crude oil price and gold price" is true in the case of Thailand. Additionally, the conclusion that "there are negative relationships between real interest rate and Thai Baht with a gold price" is also true in the case of Thailand. However, a negative relationship between inflation rate and economic growth with a gold price seemed to be against the theory but consistent with the study by Md Hashim et al. (2017). Moreover, the value of adjusted R-squared equals 0.907293 implying that 90.7% of the variation in the price of gold in Thailand is highly influenced by the movement of the inflation rate, real interest rate, economic growth, exchange rate as well as crude oil price.

Regression analysis for Vietnam: Table 4 displays a summary of the regression results of the study.

Table 4: Displays a summary of the regression results for Vietnam

Vietnam	CPI (X_1)	IR (X_2)	GDP (X_3)	CO (X_5)
t-statistic (p-value)	1.136000	-3.993836***	0.276455	**3.015177*****
Beta Coefficient	Nil	Negative	Nil	Positive
Adj. R^2	82.2% (Strong model)			

Based on a *t*-test, we have enough evidence to reject the second and fifth H0 since the p-values are both significant at 1%. Referring to a theoretical finding, a conclusion that "there is a negative relationship between interest rate and gold price" is true in the case of Vietnam and consistent with the study by Toraman (2012). In addition, the conclusion that "there is a positive relationship between crude oil price and gold price" is also true in Vietnam's case and consistent with the findings by Zhang and Wei (2010), San et al. (2012), Wang and Chueh (2013), and Abdullah and Abu Bakar (2015). Moreover, the value of adjusted R-squared equals 0.822006 implies that 82.2% of the variation in the price of gold in Vietnam is highly influenced by the movement of the real interest rate and crude oil price.

Regression analysis for Sri Lanka: Table 5 displays a summary of the regression results of the study.

Table 5: Displays a summary of the regression results for Sri Lanka

Sri Lanka	CPI (X_1)	IR (X_2)	GDP (X_3)	CO (X_5)
t-statistic (p-value)	-0.622446	-3.941264***	-1.845813*	3.827711***
Beta Coefficient	Nil	Negative	Negative	Positive
Adj. R^2	86.1% (Strong model)			

Based on a *t*-test, we have enough evidence to reject the second, third, and fifth H_0 since the *p-values* are significant at 1%, 10%, and 1%, respectively. Referring to a theoretical finding, the conclusion that "there is a negative relationship between interest rate and gold price" and "there is a positive relationship between crude oil price and a gold price" is true in Sri Lanka's case. However, a negative relationship between economic

growth and gold price seemed to be against the theory but consistent with the study by Md Hashim et al. (2017). Moreover, the value of adjusted R-squared equals 0.860899 implying that 86.1% of the variation in the price of gold in Sri Lanka is highly influenced by the movement of the real interest rate, economic growth, and crude oil price.

Regression analysis for China: Table 6 displays a summary of the regression results of the study.

Table 6 displays a summary of the regression results for China

China	CPI (X_1)	IR (X_2)	GDP (X_3)	ER (X_4)	CO (X_5)
t-statistic (p-value)	0.147804	-1.812900*	-3.849898***	-1.396665	9.926507***
Beta Coefficient	Nil	Negative	Negative	Nil	Positive
Adj. R^2			82.5% (Strong model)		

Based on a *t*-test, we have enough evidence to reject the second, third, and fifth H_0 since the *p-values* are significant at 10%, 1%, and 1%, respectively. Referring to a theoretical finding, the conclusion that "there is a negative relationship between interest rate and gold price" and "there is a positive relationship between crude oil price and gold price" is true in China's case. However, a negative relationship between economic growth and gold price seemed to be against the theory but consistent with the study by Md Hashim et al. (2017). Moreover, the value of adjusted R-squared equals 0.825428 implies that 82.5% of the variation in the price of gold in China is highly influenced by the movement of the real interest rate, economic growth, and crude oil price.

Discussion

Based on the analysis, it turned out that the inflation rate has a positive and highly influential impact on a gold price only in India. Empirical evidence suggests that when inflation rises in India, gold prices are likely to increase due to gold's role as a hedge against inflation. This relationship is culturally reinforced in India, where gold is traditionally viewed as a protection against inflationary pressures. Rising inflation drives up gold prices as people turn to gold to preserve their purchasing power, reflecting common economic behavior in emerging markets. On the other hand, inflation has a negative influence on a gold price in Thailand, which is against the theory. The relationship between inflation and gold prices is inversely related, which is consistent with a study by Md Hashim et al. (2017), suggesting that a hike in the inflation rate will reduce a gold price due to other dominant economic factors like strong government controls in Thailand.

After analyzing the data, it was found that Thailand, Vietnam, Sri Lanka, and China showed a significant and negative relationship between real interest rates and a gold price. All countries exhibited a very strong significance with a 1% significant level, except for China only a 10% significant level. Empirical evidence indicates that when the real interest rate rises, gold prices are likely to decrease since the cost of borrowing becomes expensive. In the case of Malaysia and India, however, the results indicate an insignificant relationship among the variables. There is insufficient evidence to support a meaningful connection between the real interest rate and a gold price based on the data gathered. This suggests that changes in real interest rates do not have any impact on the movement of gold prices in those countries.

After the analysis is completed, our findings indicate that there is a notable significant relationship between the economic growth (proxy by GDP) and the gold price in three Asian countries that are Thailand, Sri Lanka, and China. However, the beta coefficient results for these three countries indicate a negative relationship with the gold price, which is against the theory. These findings demonstrate that the economic growth rates in Thailand and China have a strong influence on the fluctuation of gold prices (1% significant level), with a small impact in China's case (10% significant level). This observation leads us to conclude that when economic growth is notable, the gold price will remain low in these three countries. The correlation suggests that as these economies are strengthened, the price of gold will react oppositely. Simply, a country's significant role in global economic trends and commodity markets hurts a gold price movement. This finding aligns with a previous study such as Md Hashim et al. (2017) which also identified a negative beta coefficient amongst the variables

investigated. On the other hand, in the case of Malaysia, India, and Vietnam, the coefficient results were insignificant. This suggests that our statistical findings are insufficient evidence to support a meaningful connection between the GDP and gold price fluctuation in these countries. As a conclusion, these countries should consider broader economic implications, such as inflation management, currency stability, and international trade dynamics, to ensure sustainable economic development and financial resilience in the face of global economic uncertainties.

After the analysis, the results showed that only two out of six countries, which is Thailand with a negative beta coefficient, while India with a positive beta coefficient between the relationship between domestic currency rate and gold price. Finding a negative relationship in Thailand indicates that when the Thai Baht is weakened against the US dollar, the gold price in Thailand becomes expensive due to lower demand for this asset. Simply, when the exchange rate depreciates or when the native currency depreciates it leads to higher gold prices domestically. On the other hand, finding a positive relationship in India indicates that when the Indian rupee is weakened against the US dollar, the gold price in the Indian market becomes expensive but the demand for gold increases because local people worry and quickly stock up more gold as a preparation for the worst economic impact. The strong and positive correlation between exchange rates and gold prices in India is largely due to their reliance on imported gold, the cultural importance of gold as an investment, and the economic impact of exchange rate fluctuations, although a currency depreciation increases import costs, it still boosts a gold demand to hedge against inflation. To conclude, other countries like Malaysia, Vietnam, Sri Lanka, and China exhibit an insignificant relationship between exchange rates and gold prices. It might be because the gold price is diluted. If the economy is not heavily reliant on gold imports or exports, changes in exchange rates may not significantly affect gold prices. Moreover, this may be due to diversified economies, local gold production (especially in China), stable exchange rates, government policies that protect the gold market, and a range of alternative investment options. These factors collectively lessen the direct influence of exchange rate changes on gold prices in those said countries.

All the countries under investigation have accepted Crude Oil as the most crucial indicator amongst other economic shocks since this variable has the strongest and most significant impact on the fluctuations of gold prices in each of the countries. The strong and positive correlation between crude oil price and gold price in those countries is largely due to a stability of economic growth that is paramount in the accused strategy, the price of crude oil is a significant parameter that is associated with it. The findings are consistent with San et al. (2012), Zhang and Wei (2010), Wang and Chueh (2013), and Abdullah and Abu Bakar (2015). Therefore, if any given country's economy is good, that is why the production of crude oil as an intermediate will be done and offered in the market at a lower cost. Hence, it can reduce inflation for a country, thanks to its capacity to regulate prices in the gold market. This finding is supported by Kenton (2024), who states that the Cost-Push Inflation theory explains when the cost of production goes up are will be increases in the cost of wages and raw materials. This scenario can result in social organizations delivering lower volumes to consumers while demand is constant. Since they intend to continue generating a large profit, firms will charge consumers more resulting in inflation. Also, according to this theory, an increase in the price of inputs of production such as crude oil is likely to lead to a corresponding rise in the price level. This emerges as producers are motivated to raise their prices as they seek to ensure they do not compromise on their profit despite high input prices.

5. Managerial Implications and Recommendations

Most people are aware that interest rates raise the cost of their lives and depreciate the worth of their money. The interest rate impacts all sectors of the economy, and it can have an enormous impact on our investment profits over time, especially for investors. Therefore, this research is important for investors to ensure that they will be able to create a better investment strategy. However, the buying power decreases when a borrowing interest rate rises because the investor must pay extra on the borrowed fund, they apply for purchasing physical gold. Based on our findings, show that the interest rates in Thailand, Vietnam, and Sri Lanka are negatively related and highly significant in influencing the fluctuation of gold prices, while only having a slight impact on China. Therefore, domestic investors in these four countries will consider a “buy signal to invest in gold” when the market interest rate is decreasing.

In addition, the crude oil price in all countries shows a significantly high relationship with the movement of

gold price. This is crucial because domestic investors in all countries will consider a "buy signal to invest in gold" when a crude oil price is in an uptrend due to a significant and positive relationship among them. Taking an opportunity in gold investment during this period will enhance the profit gaining and benefit investors' portfolios. Moreover, a stronger local currency in a country like India can double up the profit-making amongst investors due to an increase in demand and strengthen the Indian rupee. Moreover, gold is a favored investment and savings option in India. Any dramatic changes in gold prices and the value of the rupee can influence investment choices, leading individuals to potentially buy more gold as protection against currency depreciation. The interplay between exchange rates and gold prices can inform investment strategies across financial markets, impacting commodities like gold.

The implication of the study to the Central Bank as a policymaker since it highlights the true relationship between economic shocks, crude oil prices, and a gold price. Gold acts as an "inflation hedge", meaning that rising gold prices often signal higher inflation expectations. Central banks can adjust their monetary policy proactively by raising an interest rate or tightening monetary policy to curb inflationary pressures. Fluctuations in gold prices can also impact market confidence and the stability of the national currency. A significant rise in gold prices and a "currency devaluation" can indicate a loss of confidence in the currency, prompting central banks to intervene in the foreign exchange market or adjust reserve management strategies. In addition, a high level of association between "crude oil" and gold prices can be used as a forecasting model of inflation undoubtedly pointing to the fact that when the crude oil price rises, the gold price may also rise as investors are afraid of the economic upset that is likely to accompany the high oil price.

Moreover, the sudden rise of the prices for "crude oils" might be triggered by conflicts in oil exporting countries, limitations to access to material sources, or shifts in demand and consumption rates. Such elements in global markets may result in investors moving resources and funds into gold and other safer products. Fluctuations in commodity prices are not only a response to current market conditions but can also be a signal of a range of fundamental problems in an economy that can include approaching recessions, devaluation of currencies, or even, financial crises. Judging these price changes is especially important, especially for those in charge of formulating economic policies as these could indicate the need for interference. For instance, a Central Bank will adopt a hike in the interest rate if there is high inflation while there will be a decrease in interest rates in the event of slow growth in the economy. Comprehension of the interaction between the "prices of crude oil" and gold prices assists the policymakers in preparing and countering any economic shocks, in line with the predetermined strategic policies meant to enhance the growth of the economy. Such interconnection increases the relevance of these commodities as an indicator of the economic trends throughout the world affecting decisions related to the monetary policy on the national levels as well as the international ones.

The findings can serve the future researchers, serving as a valuable reference for researchers in several ways. Understanding the relationships evaluated in research can facilitate easier analysis of theoretical implications and literature reviews in related fields. As a consequence, future studies can employ and apply the same model to investigate the relationship between the economic variables, enhancing clarity in their respective studies in other regions such as MENA, Europe, and the Middle East to highlight differences among the countries. Moreover, based on the preceding findings, the connection between gold prices and economic indicators as well as crude oil price growth in these Asian countries is notable. This research can aid upcoming researchers in comprehending the relationship between gold prices, economic shocks, and a crude oil price, fostering their analytical skills and serving as a valuable reference for subsequent studies. Understanding the negative and positive relationships between those economic shocks, crude oil price, and the gold price can inform investment strategies, especially during economic expansions when gold can be considered for portfolio diversification or as a safe-haven investment.

Future research could explore the relationship between gold prices and the performance of other major asset classes, such as stocks, bonds, and other commodities. Understanding the extent and nature of these correlations is crucial, as it can provide valuable insights into how gold prices behave in different market conditions. The correlation between gold and other assets can be complex and dynamic, often shifting over time, with gold exhibiting a stronger negative correlation with riskier assets during periods of economic uncertainty, and a weaker or even positive correlation in more stable environments. By quantifying these correlations, researchers can better understand the role of gold as a portfolio diversifier and hedge against

market risks, informing investment strategies, risk management practices, and the development of financial products linked to gold. Analyzing how these correlations evolve in response to changes in macroeconomic conditions, monetary policies, and geopolitical events can also provide valuable insights for policymakers, central banks, and market participants.

Conclusion

In conclusion, a study finds that the interrelationship between the crude oil price and the fluctuations in gold prices is crucial and reflects global economic stability in Asian countries. Large volatility in gold as a commodity is normally in line with other broad economic aspects. For example, the sudden rise of the prices for crude oils might be triggered by conflicts in oil exporting countries, limitations to access to material sources, or shifts in demand and consumption rates. Such elements in global markets may result in investors moving resources and funds into gold and other safer products. Fluctuations in commodity prices are not only a response to current market conditions but can also be a signal of a range of fundamental problems in an economy that can include approaching recessions, devaluation of currencies or even, financial crises.

Judging these price changes is especially important, especially for those in charge of formulating economic policies as these could indicate the need for interference. For instance, a central bank will adopt a hike in the interest rate if there is high inflation while there will be a decrease in interest rates in the event of slow growth in the economy. Comprehension of the interaction between the prices of crude oil and gold prices assists the policymakers in preparing and countering any economic shocks, in line with the predetermined strategic policies meant to enhance the growth of the economy. Such interconnection increases the relevance of these commodities as an indicator of the economic trends throughout the world affecting decisions related to the fiscal and monetary policy on the national levels as well as the international ones.

Furthermore, crude oil and gold prices serve as multifaceted indicators of inflation and economic stability. Crude oil as a fuel is widely used in industrial economies, especially in the production and transportation industries. When the price of oil rises, the cost of producing articles and the costs of transportation also rise, thereby pushing the general inflation rates in an economy. Such inflation is called 'Cost-push inflation,' the effects of which are multifold. Fluctuating oil prices mean fluctuating prices of gasoline, heating, and electricity which in turn means increments in the costs of running households and businesses. This can lower the amount of disposable income that is available to the consumers and thus decrease the rate of consumption affecting the growth of the economy. On the other hand, gold which is believed to hold the status of being an inflation hedge performs well especially when there is inflation. Bullion is bought to function as insurance against potential threats to the purchasing power of money, as an inflation hedge. Hence, a high level of association between crude oil and gold prices can be used as a forecasting model of inflation undoubtedly pointing to the fact that when the crude oil price rises, the gold price may also rise as investors are afraid of the economic upset that is likely to accompany the high oil price.

References

Abdullah, A., & Abu Bakar, M. J. (2015). The Application of Gold Price, Interest Rates and Inflation Expectations in Capital Markets. *International Journal of Economics and Finance*, *7*(2), 293-302.

Apergis, N., Cooray, A., Khraief, N., & Apergis, I. (2019). Do Gold Prices Respond to Real Interest Rates? Evidence from the Bayesian Markov Switching VECM Model. *Journal of International Financial Markets, Institutions and Money*, *60*. https://doi.org/https://doi.org/10.1016/j.intfin.2018.12.014

Aziz, A. (2021). Gold Prices Remain Under Pressure Despite New Rush *The Malaysian Reserve*. Retrieved 10 March 2021, from https://themalaysianreserve.com/2021/03/10/gold-prices-remain-under-pressure-despite-new-rush/

Baldridge, R., & Curry, B. (2024, 10 June 2024). *Understanding Modern Portfolio Theory*. Forbes Advisor https://www.forbes.com/advisor/investing/modern-portfolio-theory/

Bapna, I., Sood, V., Totala, N. K., & Saluja, H. S. (2012). Dynamics of Macroeconomic Variables Affecting Price Innovation in Gold: A Relationship Analysis *Pacific Business Review International*, *5*(1), 1-11.

CFI Team. (2024). *Variance Inflation Factor (VIF): A Measure of the Severity of Multicollinearity in Regression Analysis*. Retrieved July 13, 2024, from https://corporatefinanceinstitute.com/resources/data-science/variance-inflation-factor-vif/

Chetty, A. W. P. (2020). *How To Formulate a Research Strategy?* Project Guru. Retrieved 13 July from https://www.projectguru.in/how-to-formulate-a-research-strategy/

Dalam, A., Kulub Abd Rashid, N., & Padli, J. (2019). Factors Determining Gold Prices in Malaysia. *Universiti Malaysia Terengganu Journal of Undergraduate Research*, *1*(2), 75-82.

Duong, T. H. (2023). The Gold Price – Inflation Relation in the Case of Vietnam: Empirical Investigation in the Presence of Structural Breaks. *Asian Journal of Economics and Banking*, *7*(2), 217-233.

Eldridge, S. (2024). Purchasing Power Parity In *Britannica*. United States: Encyclopædia Britannica, Inc.

Ernst, K. (2023, 13 June 2023). How Does Inflation Affect Gold Prices? *CBS News*. https://www.cbsnews.com/news/how-does-inflation-affect-gold-prices/

Fernando, J. (2024, June 03, 2024). *Gross Domestic Product (GDP) Formula and How to Use It*. Dotdash Meredith Publishing https://www.investopedia.com/terms/g/gdp.asp

Frost, J. (2024). *How To Interpret R-squared in Regression Analysis?* https://statisticsbyjim.com/regression/interpret-r-squared-regression/

Ghazali. (2015). Is Gold a Good Hedge Against Inflation? Empirical Evidence in Malaysia. *Universiti Sains Malaysia*, *33*, 69-84.

Golubova, A. (2021). The Pandemic 'Changed the World' and Gold Price Will Reap the Benefits https://cpmgroup.com/the-pandemic-changed-the-world-and-gold-price-will-reap-the-benefits/

Gross, S. (2024, 7 March 2024). *China Splurges on Gold for a 16th Month as Price Hits Record*. Bloomberg Press https://www.bloomberg.com/news/articles/2024-03-07/china-s-gold-splurge-reaches-16th-month-as-prices-hit-record

Halimy, N. N. A. (2024, 17 April 2024). Global Gold Shines Brightest in History As Price Hits All-time High. *Sinar Daily*. https://www.sinardaily.my/article/217263/focus/national/global-gold-shines-brightest-in-history-as-price-hits-all-time-high

Hoong, T. B. (2021, 18 February 2021). Does Gold Still Matter Post-Pandemic? *New Straits Times* https://www.nst.com.my/opinion/letters/2021/02/666638/does-gold-still-matter-post-pandemic

J.P. Morgan. (2024, July 15, 2024). *Will Gold Prices Hit Another All-Time High in 2024?* JPMorgan Chase & Co. . https://www.jpmorgan.com/insights/global-research/commodities/gold-prices

Jadhav, R. (2024). *India Gold Prices Soar to Record High, Dampening Demand* Thomson Reuters https://www.reuters.com/markets/commodities/india-gold-prices-soar-record-high-dampening-demand-dealers-say-2024-04-01/

Jansen, D. (2021). *How To Choose Your Research Methodology* https://gradcoach.com/choose-research-methodology/

Jaraskunlanat, N., & Kijboonchoo, T. (2016). A Study of Factors Affecting the Gold Price in Thailand During 2005–2015. *International Research E-Journal on Business and Economics*, *2*(2). http://www.assumptionjournal.au.edu/index.php/aumitjournal/article/view/3683/2256

Kenton, W. (2024, April 1, 2024). *Cost-Push Inflation: When It Occurs, Definition, and Causes*. Dotdash Meredith Publishing https://www.investopedia.com/terms/c/costpushinflation.asp

Kwok, R. (2023). *What Is the Role of Gold In Malaysia's Cultural and Historical Heritage? Gold Investment* Gold Investment Malaysia. https://goldinvestment.com.my/what-is-the-role-of-gold-in-malaysias-cultural-and-historical-heritage/

Le, T.-H., & Chang, Y. (2012). Oil Price Shocks and Gold Returns. *International Economics*, *131*, 71-103.

Li, B. (2023). An Empirical Study on the Factors Influencing China's Gold Price. *Frontiers in Business, Economics and Management*, *9*(1), 148-154. https://doi.org/10.54097/fbem.v9i1.8588

Liberto, D. (2024, July 18, 2024). *What Is Crude Oil, and Why Is It Important to Investors?* Dotdash Meredith Publishing https://www.investopedia.com/terms/c/crude-oil.asp

Lubis, S. W., Alfarisi, M. F., & Adrianto, F. (2021). The Effect of Oil Prices, Gold and Exchanges on JCI During the COVID-19 *Enrichment: Journal of Management* *12*(1). https://doi.org/10.35335/enrichment.v12i1.167

Lucey, B. M., Sharma, S. S., & Vigne, S. A. (2017). Gold and Inflation(s) – A Time-Varying Relationship. *Economic Modelling*, *67*. https://doi.org/https://doi.org/10.1016/j.econmod.2016.10.008

Madhushan, R. M. K., Rathnayaka, R. M. A. C., Sandaruwan, T. M. D. M., Maduranga, A. D., & Gunarathne, A. V. C. H. (2012). *Relationship Between Gold Price and Determinants of Gold Price in Sri Lanka* University in Nugegoda, Sri Lanka. https://mgt.sjp.ac.lk/acc/wp-content/uploads/2018/12/Group-30-Article.pdf

Mainal, S. A., Selamat, A. H. M., Majid, N. D. S. M., & Noorzee, K. N. I. (2023). Factors Influencing the Price of Gold in Malaysia. *Information Management and Business Review*, *15*(3), 195-205.

Md Hashim, S. L. (2022). Analysis of Factors Influence the Price of Gold in Malaysia *Advanced International Journal of Business, Entrepreneurship, and SMEs*, *4*(11), 16-22.

Md Hashim, S. L., Ramlan, H., Ahmad Razali, N. H., & Mohd Nordin, N. Z. (2017). Macroeconomic Variables Affecting the Volatility of Gold Price *Journal of Global Business and Social Entrepreneurship (GBSE), 3*(5), 97-106.

Murphy, C. B. (2024). *What is the Expectations Theory? Predicting Short-Term Interest Rates*. Dotdash Meredith Publishing https://www.investopedia.com/terms/e/expectationstheory.asp# :~:text= Expectations%20theory%20attempts%20to%20predict,one%20two%2Dyear%20bond%20today.

Oner, C. (2012). Inflation on the Rise. *Finance & Development Magazine for IMF*. https://www.imf.org/en/Publications/fandd/issues/Series/Back-to-Basics/Inflation

Pachiyappan, S., & Chandrakala, G. (2022). Do the Macroeconomic Factors Influence the Volatility of Gold Price? An Empirical Study *Journal of Commerce and Accounting Research*, *11*(2), 37-44.

Pruchnicka-Grabias, I. (2021). The Relationship Between Gold and Brent Crude Oil Prices: An Unrestricted Vector Autoregression Approach. *International Journal of Energy Economics and Policy*, *11*(4), 276-282.

Pushpa B., & Muruganandam. (2014). Estimation of Relation between Financial Variables and Gold Price Using Fuzzy Multiple Linear Regression. *IOSR Journal of Business and Management*, *16*(2).

San, C. P., Yee, K. P., Keai, P. C., & Xuan, W. W. (2012). *Determinants of Gold Price: Using Simple and Multiple Linear Regression,* Universiti Tunku Abdul Rahman]. http://eprints.utar.edu.my/1097/1/BF-2012-0905944.pdf

Seemuang, A., & Romprsert, S. (2013). Gold Value Movement and Macroeconomics. *Journal of Business and Economics*, *4*(8), 752-760. http://www.academicstar.us/issueshow.asp?daid=675

StashAway. (2024). *The Golden Opportunity: A Comprehensive Guide to Gold Investment in Malaysia*. StashAway. Retrieved 13 July from https://www.stashaway.my/r/gold-investment-guide

Steinberg, D., & Walter, S. (2013). The Political Economy of Exchange Rates. In *Handbook of Safeguarding Global Financial Stability: Political, Social, Cultural, and Economic Theories and Models,* 2, 27-36.

Street, S., Gopaul, K., Kumar, M., Lu, C., & Hewitt, A. (2016). *Gold Demand Trends Full year 2015*. World Gold Council. https://www.spdrgoldshares.com/media/GLD/file/GDT_Q4_2015v2.pdf

Sukri, M. K. A., Mohd Zain, N. H., & Zainal Abidin, N. S. (2015). The Relationship Between Selected Macroeconomic Factors and Gold Price in Malaysia *International Journal of Business, Economics and Law*, *8*(1). https://ijbel.com/wp-content/uploads/2016/01/Acc-42.pdf

Toraman, C., Başarır, Ç., & Bayramoglu, M. F. (2011). Determination of Factors Affecting the Price of Gold: A Study of MGARCH Mode. *Business and Economics Research Journal*, *2*(4). https://www.researchgate.net/publication/283409542_Determination_of_Factors_affecting_the_Price_of_Gold_A_Study_of_MGARCH_Mode

Trang, Q. (2023, 28 December 2023). Why Vietnam's Gold Prices Skyrocket, Widening Disparity with Global Rates

By December 28, 2023. *VnExpress International* https://e.vnexpress.net/news/markets/why-vietnams-gold-prices-skyrocket-widening-disparity-with-global-rates-4694426.html

Tufail, S., & Batool, S. (2013). An Analysis of the Relationship between Inflation and Gold Prices Evidence from Pakistan.

Tully, E., & Lucey, B. M. (2007). A Power GARCH Examination of the Gold Market. *Research in International Business and Finance*, *21*(2), 316-325. https://doi.org/https://doi.org/10.1016/j.ribaf.2006.07.001

Wakabayashi, D. (2024, 5 May 2024). China is Buying Gold Like There's No Tomorrow *The New York Times*, 3. https://www.nytimes.com/2024/05/05/business/china-gold-price.html

Wang, Y. S., & Chueh, Y. L. (2013). Dynamic Transmission Effects between the Interest Rate, the US Dollar, and Gold and Crude Oil Prices. *Economic Modelling*, *30*, 792-798.

Wong, H. T. (2014). Exchange Rate and Gold Price: Evidence from Malaysia. *Labuan Bulletin of International Business and Finance (LBIBF)*, *12*(1), 1-18.

Worthington, A., & Pahlavani, M. (2007). Gold Investment as an Inflationary Hedge: Cointegration Evidence with Allowance for Endogenous Structural Breaks. *Applied Financial Economics Letters*, *3*(4), 15.

Yousaf, I., Bouri, E., Ali, S., & Azoury, N. (2021). Gold Against Asian Stock Markets during the COVID-19 Outbreak. *Journal of Risk and Financial Management*, *14*(4), 1-23. https://doi.org/10.3390/jrfm14040186

Zhang, Y.-J., & Wei, Y.-M. (2010). The Crude Oil Market and the Gold Market: Evidence for Cointegration, Causality and Price Discovery. *Resources Policy*, *35*(3), 168-177.