# Correlation Analysis Between Gold Prices and Stock Prices

## - A Case Study of the Chinese Market

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**Abstract.** As crucial financial assets, the correlation between the price of gold and stocks has long been a central topic in financial research. Against the backdrop of the Chinese market, this paper aims to explore the dynamic connection between gold prices and the stock market. Using a vector autoregression (VAR) model combined with impulse response functions and Granger causality tests, the immediate term shock effects and connection of long-term equilibrium between the two are analyzed. The results show a strong relationship between gold prices and the stock market: fluctuations in gold prices play a safe-haven role for the stock market, while changes in the stock market also feedback into gold prices. The conclusions of this study contribute to revealing the risk transmission mechanisms within China's financial market and provide references for portfolio optimization and policy formulation.

**Keywords:** Gold Prices, Stock Prices, Capital Market

## 1 Introduction

In recent years, gold prices have experienced significant fluctuations, repeatedly reaching new highs. From 2000 to the present, gold prices have undergone several rounds of increases, particularly during periods of heightened global economic uncertainty, where its safe-haven attributes have driven prices upward. On July 10, 2025, the latest price of domestic Shanghai gold futures was reported at RMB 770.96 per gram, an increase of 0.19% compared to the previous period, continuing to refresh periodic highs.

The stock market and gold prices represent investors' expectations regarding economic growth and risk aversion, respectively, and their relationship can be viewed as a market signal. In the post-pandemic era, the global economic landscape has undergone profound changes, and international financial markets face numerous uncertainties, including geopolitical conflicts, inflationary pressures, and adjustments in macroeconomic policies such as the Federal Reserve's interest rate hikes and balance sheet reduction. These factors collectively influence the volatility of capital markets. Against this backdrop, the dynamic relationship between gold prices and the stock market in China has also undergone new changes, with potential structural adjustments in their



P. S. Borah et al. (eds.), *Proceedings of the 2026 6th International Conference on Enterprise Management and Economic Development (ICEMED 2026)*, Advances in Economics, Business and Management Research 394,
https://doi.org/10.2991/978-94-6239-719-4_3

interactivity, substitutability, and risk transmission mechanisms. Therefore, an in-depth exploration of the interaction mechanism between gold prices and the stock market, along with an analysis of their changing patterns, not only contributes to understanding the operational characteristics of China's financial market but also holds significant practical importance for optimizing asset allocation, enhancing financial market resilience, and improving national macroeconomic regulation policies.

On this basis, this paper aims to systematically examine the dynamic relationship between Chinese stock market prices and gold prices using a vector autoregression (VAR) model, focusing on short-term shocks and long-term equilibrium connections, and to reveal the impact pathways of gold price fluctuations on the stock market, as well as changes in the stock market's feedback impact on gold prices.

## 2 Literature Review

The relationship between gold prices and stock prices has always been an important research topic in the field of finance, especially against the backdrop of increasing global economic uncertainty. However, the academic community has not yet reached a consensus regarding the correlation between the gold and stock markets.

A few academics argue that there is a positive correlation between gold and the stock market. Since the futures market is the primary trading vehicle for gold, futures trading has a significant impact on spot prices and possesses price discovery functions (Yang Yanfeng & Liu Guowei, 2023) [1]. Some studies suggest that during specific periods, there exists a phenomenon of synchronous increases between gold and the stock market. During the global economic recovery period from 2009 to 2011, gold and stock prices rose together, reflecting investors' dual demand for asset preservation and appreciation. Chen and Wang (2021) also pointed out that during non-bear market phases in China, the relationship between gold and the stock market often exhibits a positive correlation, indicating that gold possesses certain investment attributes under specific macroeconomic conditions [2].

On the other hand, most studies suggest that gold possesses safe-haven functionality, particularly during periods of high stock market volatility or bear markets. Yang Liuyong and Shi Zhentao (2004) argue that there exists a substitutive relationship in asset allocation between the gold market and global capital markets [3]. Zhai Xitong (2023), employing a DCC-GARCH model, found that in the Chinese market, gold prices exhibit a dynamic negative correlation with the Shanghai Stock Exchange sector indices, demonstrating strong safe-haven functionality during extreme market fluctuations [4]. Kang Yizhi (2022) reviewed and summarized various factors influencing gold prices, identifying the US dollar index as a significant factor of gold prices and revealing a strong negative correlation between the US dollar index and gold prices [5]. Internationally, Smith (2001) discovered a significant negative correlation between gold prices and major industrial countries' stock indices [6], while Ranson et al. (2005) also regarded gold as an important indicator for predicting inflation and interest rates [7]. Additionally, some scholars, from the perspective of commodity attributes, argue that gold prices are influenced by fundamental factors such as reserves, production, and

consumption. Liu Shuguang (2008) and Gong Cailin (2023) respectively pointed out that with the collapse of the Bretton Woods system, the financial attributes of gold have become increasingly prominent[8]. Ni He and Yu Lu found that the Chinese gold market possesses certain safe-haven functionality in the short term, but this effect is weaker in the long run [9]. In situations of international turmoil, the safe-haven value of gold becomes prominent, offering irreplaceable advantages (Wang Bin, 2023) [10].

Another group of scholars emphasize that the correlation between gold and stock prices may be unstable, characterized by periodicity, nonlinearity, or dependency on specific contexts. Zhou Junzhi and Chen Yi (2023) argue that US real interest rates significantly influence gold prices, but the relationship is not linear [11]. Tan Dekai (2022) pointed out that financialization trends have weakened traditional safe-haven attributes of gold, and during periods of monetary liquidity tightening, gold and stocks may be sold off simultaneously [12]. Furthermore, Chkili's research shows that during crises in BRICS countries, the correlation between gold and stocks shifts from positive to negative, reflecting the periodic nature of its safe-haven functionality [13].

To sum up, existing research primarily focuses on international markets, and discussions on the interaction mechanisms between the Chinese market, particularly gold spot and stock markets, remain insufficient. Additionally, studies on the dynamic relationship between the two under different economic conditions are not systematic enough. Therefore, this paper will investigate the correlation between the prices of gold and stocks in the Chinese capital market.

## 3 Research Design

### 3.1 Research Hypotheses

Based on the above discussion, the total capital in the market is fixed. Therefore, when the economic environment is favorable, investors tend to allocate more speculative assets such as stocks rather than gold assets with stronger safe-haven attributes. According to supply and demand theory, the price of gold assets will be relatively lower under such conditions. Conversely, when the economic environment deteriorates, the price of gold assets will rise.

Thus, this paper proposes the following research hypothesis:

There exists a significant negative correlation between gold prices and Chinese stock market prices.

### 3.2 Variable Selection

Based on the research content of this paper, Chinese gold futures prices and the Shanghai Composite Index are selected as research variables.

Chinese gold futures prices. As a typical measure of the price level in the Chinese gold market, the closing price of the main gold futures contract on the Shanghai Futures Exchange (SHFE) is selected. Gold futures prices not only reflect the supply and demand conditions in the gold spot market but also embody investors' expectations regarding future macroeconomic trends and safe-haven demand. Compared to spot prices,

futures prices are more forward-looking and market-sensitive, enabling them to more effectively capture the shock effects of gold price fluctuations on financial markets.

The Shanghai Composite Index (SCI) is a crucial metric that shows how well the Chinese stock market is performing overall. This index covers all stocks listed on the Shanghai Stock Exchange, possessing broad market representativeness and authority. The Shanghai Composite Index is widely used to gauge the overall trend of the Chinese stock market, formulate investment strategies, and conduct macroeconomic analysis.

This paper selects two sets of time series data: the monthly closing prices of the main gold futures contract (GOLD) and the monthly closing prices of the Shanghai Composite Index (SCI) from January 2013 to December 2023, resulting in a total of 130 pairs of sample data.

### 3.3 Model Construction

Considering the bidirectional and lagged characteristics of the mechanism by which gold and the stock market interact, this paper employs a vector autoregression (VAR) model to study the relationship between gold asset prices and stock prices. The VAR model adopts a simultaneous multi-equation form, estimating the dynamic relationships among all variables by regressing each endogenous variable on the lagged terms of all variables in each equation. Therefore, this model can simultaneously capture dynamic causal relationships and shock transmission paths among multiple variables, making it suitable for analyzing complex financial market linkages. Additionally, the VAR model overcomes the limitation of fixed structure in classical simultaneous equation models, elevating empirical analysis to a new level. The VAR model can be expressed generally as follows:

$$y_t=A_1y_t+...A_py_{t-p}+Bx_t+\varepsilon_t \tag{1}$$

where the vectors $x_t$ and $y_t$ are d-dimensional and k-dimensional, respectively, and symbolize both extrinsic and endogenous factors; p is the lag order; $A_1$, ..., $A_p$ and B are a matrix of estimated coefficients; $\varepsilon_t$ is a vector of disturbances, which may be contemporaneously connected with one another, but must not be correlated either with the variables on the right side of the equation or with their own lagged values. A bivariate VAR model can be expressed as:

$$y_{1,t}=A_{1,1}y_{t-1}+...+A_py_{t-p}+\varepsilon_{1,t} \tag{2}$$

$$y_{2,t}=A_{1,2}y_{t-1}+...+A_p,2y_{t-p}+\varepsilon_{2,t} \tag{3}$$

Where:

$$\varepsilon_{1,t},\varepsilon_{2,t}\sim I.I.D.(0,\sigma^2)$$

$$Cov\ (\varepsilon_{1,t},\varepsilon_{2,t})=0$$

To further analyze the correlation between international gold prices and the US dollar index, this study employs a vector autoregression (VAR) model to model the time series data of GOLD and USDI. Before and after modeling, it is necessary to establish

a long-term equilibrium model and perform stationarity tests, impulse response analysis, Granger causality tests, and other procedures on the time series data of the relevant variables.

# 4 Empirical Analysis

## 4.1 Basic Data Processing

This study utilizes Eviews 13.0 statistical software to construct a VAR model for processing and testing the time series of domestic gold prices and the gold index. To ensure the stationarity of the time series, the original gold price and Shanghai Composite Index data were subjected to logarithmic transformation and first-order differencing.

Figure 1 displays the differenced time series of Chinese gold prices, while Figure 2 shows the differenced time series of the Shanghai Composite Index. From the figures, it can be observed that both sets of data exhibit relatively stable fluctuations after differencing, with no apparent trend components or periodic fluctuations, providing a foundation for further VAR modeling analysis.

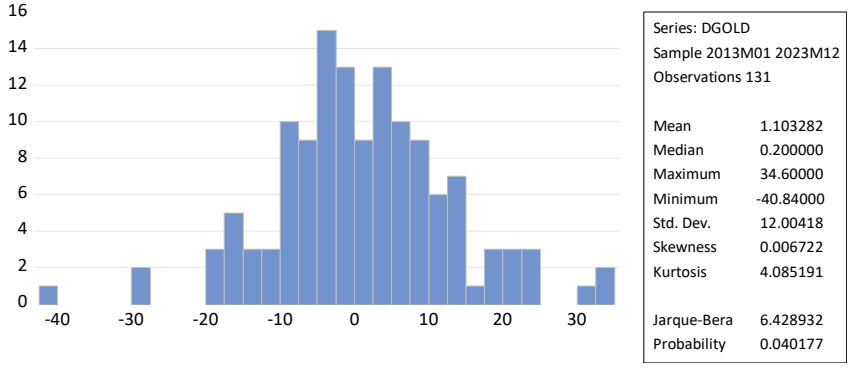


**Fig. 1.** Characterization of the Differenced Time Series of Domestic Gold Prices

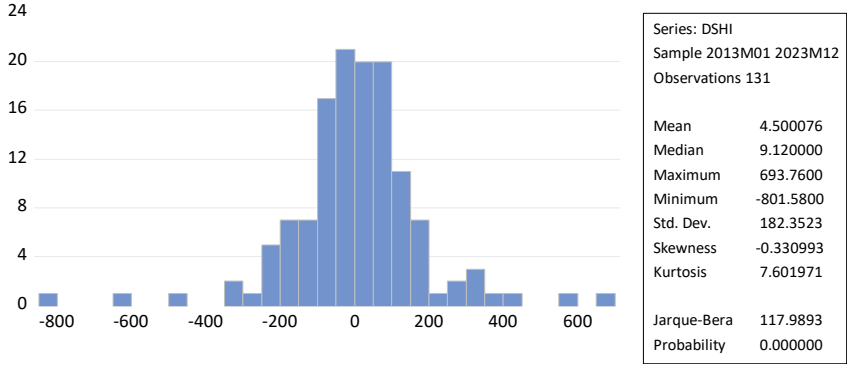


**Fig. 2.** Characterization of the Differenced Time Series of the Shanghai Composite Index

### 4.2 Unit Root Test

Stationary time series data are a prerequisite for establishing a VAR model. Therefore, the ADF unit root test was employed to conduct stationarity tests on the original time series data of domestic gold prices (GOLD) and the Shanghai Composite Index (SHI), as well as their first-order differenced data.

The ADF unit root test results indicate that the original time series data of GOLD and SHI are non-stationary, while the first-order differenced data are stationary. The specific test results are shown in Table 1.Thus, the time series of international gold prices and the US dollar index are both first-order integrated processes.

**Table 1.** ADF Unit Root Test for the Time Series of Chinese Gold Prices and the Shanghai Composite Index

| Time Series | ADF Test Statistic | 5% Critical Value | P-value |
|---|---|---|---|
| Log (gold) | 0.369317 | -2.883579 | 0.9809 |
| D (gold) | -11.98543 | -2.883753 | 0.0000 |
| Log (shi) | -2.879973 | -2.883753 | 0.0505 |
| D (shi) | -9.14276 | -2.578694 | 0.0000 |

### 4.3 Cointegration Test

This paper first constructs a long-term equilibrium equation and then employs the Engle-Granger cointegration analysis method (EG test) to perform cointegration analysis on the first-order differenced series of the two variables. Considering domestic gold prices as the dependent variable and the Shanghai Composite Index as the independent variable, the relationship between international gold prices and the US dollar index is estimated using ordinary least squares (OLS), preliminarily constructing the following long-term equilibrium equation:

$$LOG\ (GOLD)=\alpha\ +\beta*LOG\ (SHI)$$

Using Eviews, the data are substituted into the formula, yielding:

$$\alpha\ =1.0865$$

$$\beta\ =0.0037$$

Specifically:

$$LOG\ (GOLD)=1.0865+0.0037*LOG\ (SHI)$$

The residuals of the above equation are subjected to an ADF test, and the results are summarized in Table 2.

**Table 2.** ADF Test for Residuals

| Time Series | ADF Test Statistic | 5% Critical Value | P-value |
|---|---|---|---|
| Residuals | -11.89832 | -2.578694 | 0.9809 |

From the test results of the residuals of the equilibrium equation, it can be concluded that at the significance level of five percent, the hypothesis that the residual series has a unit root is rejected, meaning the residual series is motionless., indicating that the EG test is passed. Therefore, there is a cointegration link, or long-term balance, between domestic gold prices and the Shanghai Composite Index.

### 4.4 VAR Model Estimation

Based on the presence of a cointegration relationship between the time series data of international gold prices and the US dollar index, a VAR model is further constructed to examine the dynamic connection between international gold prices and the US dollar index.

First, a stationarity test is conducted for the VAR model. The stationarity test of the VAR model is conducted. According to the Akaike Information Criterion, a VAR(2) model is constructed using the variables of international gold prices and the US dollar index. The results show that all characteristic roots fall within the unit circle (see Figure 3), indicating that the stationarity test is passed.

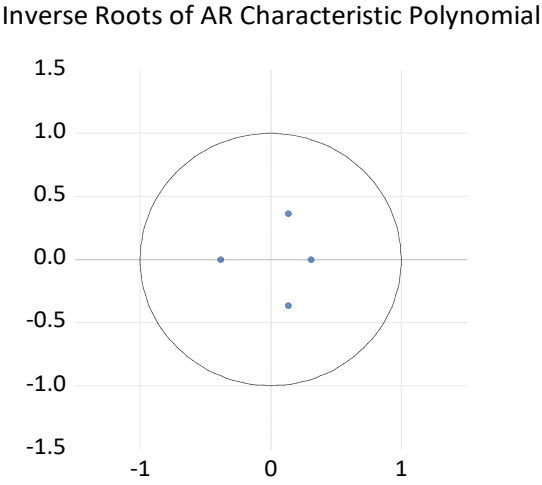


**Fig. 3.** Characteristic Roots of the VAR Model Stationarity Test

Second, impulse response analysis is performed. The impulse response function is primarily used to analyze the effects of modifications in one endogenous variable on another endogenous variable. This paper employs the Shanghai Composite Index and domestic gold prices as impulse variables, respectively, and the results are shown in Figure 4 and Figure 5.

Figure 4 shows the response of domestic gold prices to shocks from the Shanghai Composite Index. When the Shanghai Composite Index (DSHI) experiences a positive shock (i.e., an increase), gold prices (DGOLD) show a negative response from period 2 to period 4 and stabilize after period 4. This response path is brief and rapid. This

indicates that when the stock market rises, gold prices typically decline for a short period, reflecting the function of gold as a safe-haven asset, i.e., when investor confidence strengthens and risk appetite increases, funds are more inclined to flow into the stock market, thereby reducing the demand for gold allocation.

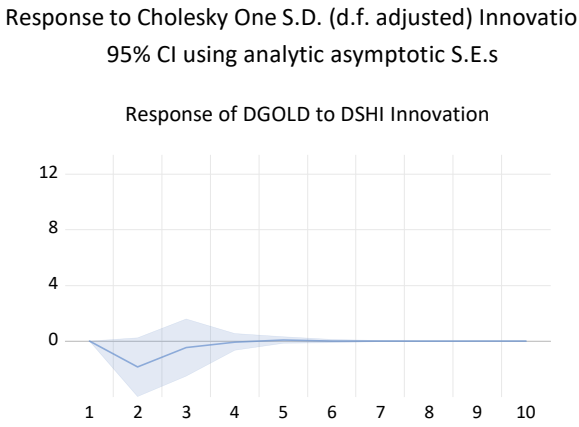


**Fig. 4.** Impulse Response of Chinese Gold Prices to Shocks from the Shanghai Composite Index

Figure 5 shows the response of the Shanghai Composite Index to shocks from Chinese gold prices. The observation results indicate that when gold prices experience a positive shock, the response of the Shanghai Composite Index (DSHI) is weak and insignificant. Although there is a slight downward trend from period 1 to period 5, the reaction intensity is much smaller than that in Figure 4. This suggests that changes in gold prices do not significantly alter stock market trends, and gold does not have a dominant or predictive role in the stock market.

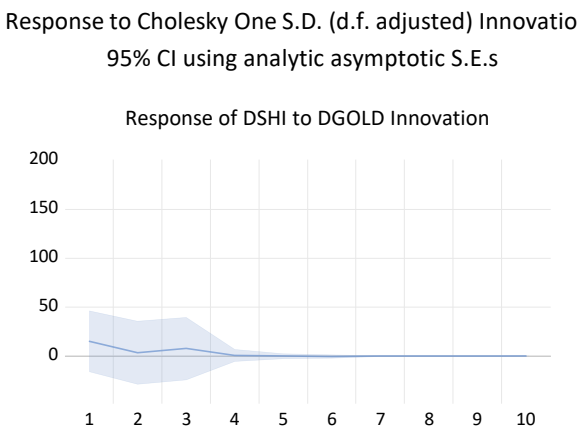


**Fig. 5.** Impulse Response of the Shanghai Composite Index to Shocks from Chinese Gold Prices

To sum up, in China's financial structure, where the stock market dominates and gold plays a subordinate role, fluctuations in the stock market can trigger sentiment and price changes in the gold market, while the gold market primarily assumes the role of a responder. Particularly during periods of market instability, gold serves as a short-term safe-haven tool for investors. However, during stable periods, the market weight of gold and its impact on the stock market are extremely limited.

### 4.5 Granger Causality Test

A Granger causality test was conducted on the time series GOLD and USDI, and the results are shown in Table 3.

**Table 3.** Granger Causality Test for Time Series DGOLD and DSHI

| Null Hypothesis | Sample Size | F-Statistic | P-Value |
|---|---|---|---|
| DSHI does not Grander Cause DGOLD | 130- | -2.883579 | 0.9809 |
| DGOLD dose not Grander Cause DSHI | | -2.883753 | 0.0000 |

The results demonstrate that the Shanghai Composite Index (DSHI) possesses a certain predictive ability for domestic gold prices (DGOLD), meaning that stock market fluctuations are the Granger cause of gold price changes, but the reverse does not hold true. This result demonstrates that, during the sample period, gold prices largely passively responded to changes in the stock market rather than actively leading market trends.

## 5 Conclusion

This study analyzes the dynamic relationship between domestic gold futures and the Shanghai Composite Index using monthly data from December 2013 over 12 months, employing a VAR model. The results show that gold prices and the stock market exhibit a long-term negative correlation, reflecting safe-haven attributes of gold; in the short term, the stock market has a significant impact on gold prices, but this effect rapidly diminishes within 3 to 6 periods; the Granger causality test indicates that the stock market possesses a certain predictive ability for gold prices.

Based on the above conclusions, the following insights can be drawn. First, it is essential to strengthen risk hedging mechanisms in asset allocation. Gold exhibits safe-haven attributes in the Chinese market and can play a risk hedging role during periods of stock market volatility and heightened macroeconomic uncertainty. Appropriately increasing gold asset allocation can enhance the robustness of investment portfolios.

Second, attention should be paid to policy coordination and risk early warning under short-term fluctuations. The significant short-term shock effects of the stock market on gold prices indicates that macroeconomic policy adjustments can quickly transmit to the gold market. Financial regulatory authorities should comprehensively consider The relationship between the stock market and gold, improving risk monitoring and early warning mechanisms to enhance the resilience of the financial system.

## References


1. Yang Yanfeng, Liu Guowei Empirical Analysis on the Price Discovery Function of China's Gold Futures Market [J]. Modern Business, 2023(12):132-136.
2. Chen K,Wang M. Does Gold Act as a Hedge and a Safe Haven for China's Stock Market? [J]. Financ. Stud. 5, 18 (2017).
3. Yang Liuyong, Shi Zhentao. Analysis of Long-term Determinants of Gold Price [J]. Statistical Research, 2004(6):4.
4. Zhai Xitong. Research on the Dynamic Correlation between China's Gold and Industry Stock Markets: Based on the DCC-GARCH Model [J]. Science & Technology and Industry, 2023, 23(24):51-56.
5. Kang Yizhi. Analysis of the Historical Fluctuation Trajectory Characteristics and Influencing Factors of Gold Prices [J]. Modern Enterprise, 2022(9):94-96.
6. Smith G .The Price of Gold and Stock Price Indices for the United States[J]. 2001.
7. Why Gold, Not Oil, Is The Superior Predictor of Inflation. World Gold Council https://www.gold.org/goldhub/research/why-gold-not-oil-superior-predictor-inflation (2005).
8. Gong Cailin. Global Central banks' Increase in Gold Reserves: History, Trends and Impacts [J]. China Foreign Exchange, 2023(17):32-35.
9. Ni He, Yu Lu. Analysis of the Safe-haven Capacity of Gold in the Chinese Stock Market Based on the BEKK-GARCH Model [J] Finance and Economics Forum, 2012(5):9.
10. Wang Bin. Gold Price Trends under Geopolitical Risk Events [J]. China Foreign Exchange, 2022(6):74-75.
11. Zhou Junzhi, Chen Yi. Gold Pricing: Old Framework and New Variables [J]. China Money Market, 2023(8):6-10.
12. Tan Dekai, Tian Lihui. Is gold a "safe haven" in the stock market? -- Sampling Model Based on Dynamic Conditional Correlation of mixed-frequency Data [J]. Chinese Journal of Management Science, 2022, 30(10):11.
13. Chkili W Dynamic correlations and hedging effectiveness between gold and stock markets: Evidence for BRICS countries[J]. Research in International Business & Finance, 2016, 38(sep.):22-34.