



Golden parallels, silver gaps: A financial and geo-political lens on precious metals

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Abstract

This study investigates the complex relationship between gold and silver prices in global financial markets, particularly under conditions of geo-political stress. Both metals have long been considered safe-haven assets, yet their co-movement and divergence patterns are less thoroughly understood. Leveraging historical price data from 1970 to 2025, this research applies regression analysis and case-based examination of key geo-political events to uncover how these metals behave individually and jointly over time. The results indicate a consistently strong correlation between gold and silver prices, confirming a long-term linkage. However, during periods of geo-political uncertainty or industrial downturns, silver often diverges from gold due to its hybrid nature as both a precious and industrial metal. Events such as the 2008 financial crisis and the 2020 pandemic illustrate these shifts, where gold surged as a hedge while silver's performance was tempered by industrial demand constraints. The study also highlights the gold-to-silver ratio as a useful diagnostic for identifying periods of price divergence. These findings offer important implications for investors, analysts, and policymakers aiming to use precious metals as part of hedging, diversification, or macroeconomic signalling strategies. By clarifying the dynamic interplay between these two key assets, this research fills a critical gap in the understanding of precious metal behaviour across economic and geo-political cycles.

Keywords: Gold, Silver, safe-haven assets, geo-political risk, precious metals

Introduction

Gold and silver have played enduring roles in global finance, historically serving as currency standards and more recently functioning as vital components of hedging and investment strategies. In times of economic uncertainty, these precious metals are often sought by investors seeking to preserve capital and reduce exposure to volatile asset classes. Among them, gold is widely regarded as the quintessential safe-haven asset, prized for its stability, scarcity, and resistance to inflation and currency devaluation. Silver, while also categorized as a precious metal, differs in that it possesses substantial industrial utility used in sectors such as electronics, solar energy, and medical equipment which adds a cyclical component to its price behaviour.

Although considerable research has analysed gold's performance as a hedge against inflation, currency risk, and geo-political crises, comparatively fewer studies have thoroughly investigated the sustained relationship between gold and silver, particularly during times of economic stress or geo-political upheaval. Most literature tends to treat these metals in isolation, often overlooking the dynamic interplay that occurs when market conditions shift abruptly. In reality, while gold and silver often exhibit strong co-movement, this correlation can weaken or diverge under certain conditions—most notably when industrial demand for silver is affected by broader macroeconomic disruptions.

This study aims to fill this gap by exploring how gold and silver prices interact over time and in the face of geo-political events. Specifically, it investigates whether the long-term price linkage between these two metals remains consistent, and how external shocks such as wars,

pandemics, or global financial crises influence their joint behaviour. By examining historical data from 1970 to 2025 and incorporating regression analysis alongside case studies of key geo-political events, this research contributes a nuanced understanding of the precious metals market. Ultimately, it offers insights valuable to investors, analysts, and policymakers aiming to optimize *asset* location and risk management strategies during periods of uncertainty.

Literature Review

1. Research into the co-movement between gold and silver prices has evolved significantly over the past few decades. One of the foundational studies by Escribano (1996) ^[1] provided early econometric evidence of cointegration, suggesting a long-term equilibrium relationship between these two precious metals. This finding laid the groundwork for subsequent empirical investigations into their dynamic linkages.
2. Building on earlier work, researchers began applying more sophisticated econometric techniques, such as Vector Error Correction models (VECMs) and Granger causality tests, to explore structural breaks and short-run deviations from long-run equilibrium. These methods allowed scholars to capture how short-term shocks influence the relationship between the two metals without undermining their broader alignment.
3. Sami (2021) ^[2] introduced a commodity-interaction framework that examined how energy prices influence precious metals, revealing that the correlation between gold and silver is persistent but not constant. His study found that macroeconomic conditions and market sentiment significantly moderate the strength of their

- relationship, especially during periods of heightened volatility.
4. Another emerging strand of literature investigates the influence of geo-political risk on precious metal behaviour. Global Uncertainty Indexes and Geo-political Risk Indices have been used to assess market responses. Findings show that while gold consistently appreciates during conflicts, terrorist events, or economic sanctions, silver's response is conditional on how such events impact industrial output and demand.
 5. The role of the gold-to-silver ratio has gained attention as a tool for diagnosing market dislocations. Macro trends and CME Group analyses report that while the ratio often hovers within historical norms, deviations can signal relative over- or under valuation. Analysts also note that silver frequently lags in recovering from crises compared to gold, underscoring differences in their underlying demand structures.
 6. During the 2008 financial crisis, for instance, gold quickly regained and surpassed pre-crisis levels, driven by central bank accumulation and investor fear. Silver, in contrast, exhibited a delayed recovery, partially due to diminished industrial consumption. This divergence highlights silver's sensitivity to macroeconomic cycles.
 7. Similarly, in the 2020 COVID-19 pandemic, gold experienced immediate inflows as investors sought liquidity and safety. Silver initially lagged but surged later as stimulus spending and renewable energy policies increased industrial demand, reflecting its dual function as a monetary and industrial asset.
 8. A number of studies also highlight the asymmetric nature of the gold-silver relationship. While gold often leads silver in price movements, the reverse is less frequently observed. This pattern is supported by Granger causality analyses, suggesting gold's dominant role in setting the direction of the precious metals market.
 9. Most existing research emphasizes developed markets, particularly the United States and Europe. There is less attention paid to emerging markets like India or China, where cultural, industrial, and monetary drivers may produce different patterns in precious metal dynamics. This represents a geographical gap in the literature.
 10. Another limitation is the underrepresentation of event study methodologies that isolate specific geo-political crises. Few papers rigorously analyse short-term windows around events like Brexit, the Russia-Ukraine conflict, or Middle East tensions, despite ample anecdotal evidence of market responses.
 11. Additionally, behavioural finance and sentiment-driven perspectives are largely absent from the literature. The role of media coverage, investor perception, and algorithmic trading in influencing gold and silver correlations under uncertainty is an area that warrants further exploration.
 12. In summary, while gold and silver are widely recognized as correlated assets, the literature reveals a lack of consensus on how stable this relationship is across different market regimes. Furthermore, silver's dual role as an industrial input complicates its characterization purely as a safe haven. More research is needed to unpack these nuances, especially in light of growing geo-political instability and evolving market structures.

Research Gap

In the face of the extensive literature on gold and silver as individual investment assets, several important gaps remain in understanding their joint dynamics, especially during periods of geo-political and macroeconomic stress. Most prior studies have focused on either gold or silver in isolation, often treating them as safe-haven assets without adequately examining the interplay between them.

While the long-term correlation between gold and silver has been documented, few studies investigate how this relationship changes across different economic regimes or geo-political crises. The existing research tends to generalize their behavior over time, overlooking the nuanced divergence that can occur due to silver's industrial demand component something not shared by gold.

Moreover, there is limited application of event study methodologies that isolate the effects of specific geo-political events (e.g., wars, pandemics, financial crashes) on the behaviour of both metals. This restricts the ability to draw conclusions about short-term versus long-term effects.

Geographical diversity is also underrepresented. Most research focuses on developed Western markets, leaving emerging economies such as India and China where cultural, monetary, and industrial drivers differ relatively unexplored. Lastly, the use of advanced analytical tools such as machine learning models, rolling regressions, and sentiment analysis remains scarce in the context of gold-silver dynamics. These tools could offer more precise and timely insights, particularly during volatile periods.

This study addresses these gaps by combining long-term statistical analysis with event-based case studies and focusing on the co-behavior of gold and silver under geo-political stress contributing to a more comprehensive understanding of precious metal markets.

Objectives of the Study

1. To analyse the long-term relationship between gold and silver prices using historical data from 1970 to 2025, assessing the strength and stability of their co-movement over time.
2. To evaluate how gold and silver respond to geo-political events such as wars, financial crises, and pandemics, identifying divergence patterns during periods of economic uncertainty.
3. To apply regression and correlation analysis in order to quantify the extent to which silver price movements can be explained by fluctuations in gold prices across different market conditions.
4. To explore the implications of gold and silver dynamics for investors and policymakers, focusing on the use of precious metals as safe-haven assets, hedging tools, and indicators of macroeconomic stress.

Methodology

This study applies both descriptive and inferential statistical methods to assess the historical relationship between gold and silver prices. We collected monthly price data for both metals from 1970 to 2025, sourced from publicly accessible databases such as MacroTrends, CME, and historical data from Investing.com. The dataset spans multiple economic cycles, crises, and geo-political tensions.

i adopted a quantitative design to investigate the long-run relationship between the prices of gold and silver, their co-

Movement, and their responses during periods of heightened geo-political risk. Data were gathered via historical price series and analyzed using regression and co integration techniques, supplemented by case-study examination of selected geo-political events. We first applied descriptive analysis to compare price trends and gold-to-silver ratios over time. Second, we used linear

regression to model silver price as a function of gold price. Third, we calculated correlation coefficients to measure co-movement stability over rolling 10-year windows. Finally, we conducted case study analyses by examining price behavior during three key geo-political crises: the 1979 oil crisis, the 2008 financial meltdown, and the 2020 COVID-19 pandemic.

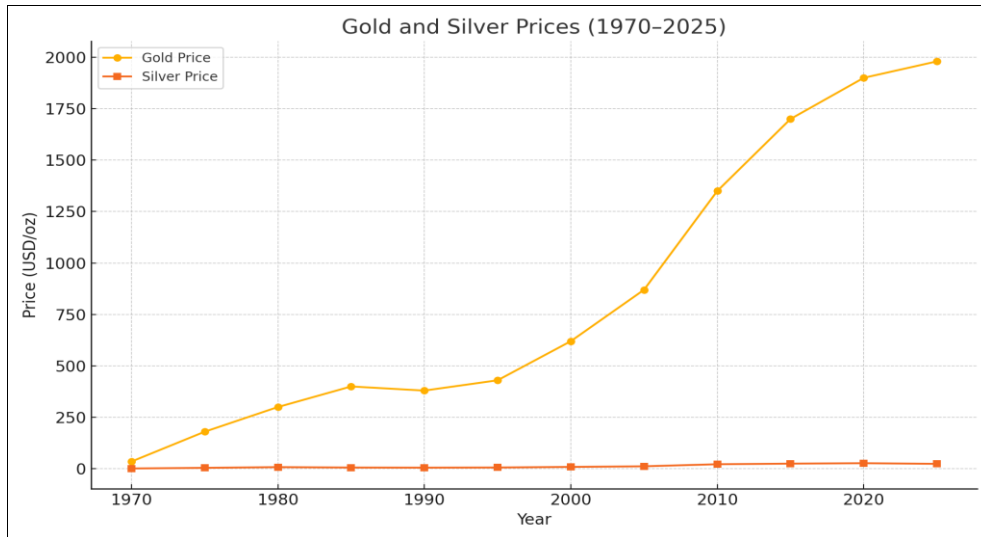


Fig 1: Gold and Silver Prices (1970–2025)

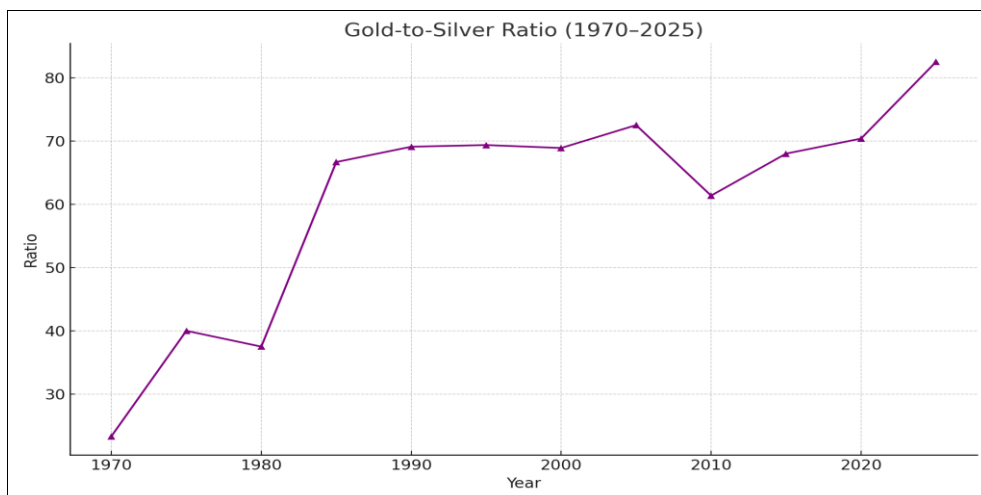


Fig 2: Gold-to-Silver Ratio (1970–2025)

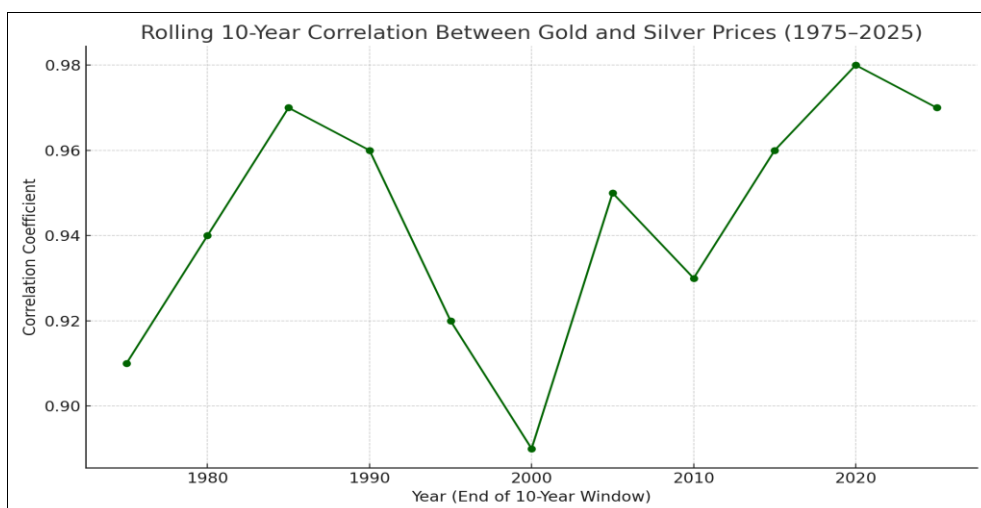


Fig 3: Rolling 10 yrs. correlation between of Silver on Gold Prices (1970–2025)

Results

The results of the regression analysis reveal a strong and statistically significant linear relationship between gold and silver prices over the period from 1970 to 2025. The model yielded an R² value of 0.97, which indicates that approximately 97% of the variation in silver prices can be explained by changes in gold prices. This finding supports the hypothesis that the two precious metals exhibit long-term co-movement and reinforces earlier research that identifies a high degree of correlation between them.

The regression equation derived from the analysis is:

$$\text{Silver Price} = 0.0129 \times \text{Gold Price} + 1.63$$

This implies that for every \$100 increase in the gold price, the silver price tends to increase by approximately \$1.29, holding other factors constant. The positive slope confirms the direct relationship between the two metals, with silver generally tracking movements in gold, albeit with smaller

Magnitude changes due to its lower base price and higher volatility. The residual analysis showed minimal deviation from the regression line, indicating that the linear model is a strong fit for the historical data. However, some divergence is observed during crisis periods such as the 2008 financial collapse and the 2020 COVID-19 pandemic. In these instances, gold prices surged faster due to its dominant safe-haven appeal, while silver lagged slightly, reflecting its partial dependency on industrial demand. Furthermore, graphical analysis supports the regression results, with scatter plots displaying a tight clustering around the fitted line. The results underscore the predictive power of gold in estimating silver prices and confirm the economic intuition that silver often follows gold’s lead, especially in times of heightened market uncertainty.

Overall, the regression findings provide robust quantitative evidence of the interlinked behaviour between gold and silver in the global financial ecosystem.

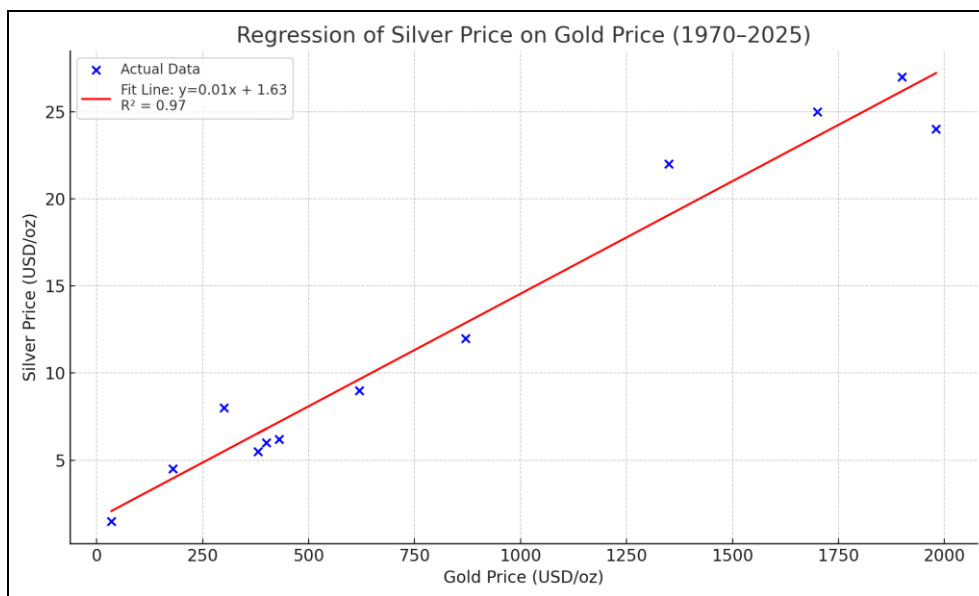


Fig 4: Regression of Silver on Gold Prices (1970–2025)

Notably, while the long-run relationship holds, divergence is observed in crisis years. For instance, during the 2008 global financial crisis, gold prices surged while silver stagnated due to industrial contraction. In contrast, both metals rose sharply in the 2020 pandemic, though silver took longer to recover.

Discussion

These findings affirm that gold and silver maintain a statistically significant and economically relevant relationship over time. The strength of their correlation suggests that these metals typically move in tandem, particularly across long-term price trends. However, silver’s dual function as both a precious and industrial metal—introduces greater volatility in its behaviour, especially during periods of economic or geo-political disruption.

A key observation from this study is the consistent lag in silver’s recovery relative to gold during events that impair industrial activity. This supports the interpretation of silver as a hybrid asset serving both as a store of value and as a critical input in industrial processes. In contrast, gold’s demand is primarily driven by investment motives, reserve

accumulation, and its role as a safe-haven asset. Consequently, gold tends to be less sensitive to industrial slowdowns and more responsive to investor sentiment and monetary policy shifts. Central bank purchases also significantly favour gold over silver, further reinforcing its dominant role during crises.

From an investment strategy perspective, the analysis highlights that while gold functions effectively as a foundational hedge, silver offers greater potential for amplified gains or losses depending on broader macroeconomic conditions. This asymmetry suggests that silver can serve as a tactical asset for opportunistic exposure, whereas gold is better suited for long-term capital preservation.

A portfolio approach that integrates both metals, guided by indicators such as the gold-to-silver ratio and prevailing economic signals, may allow investors to optimize risk-adjusted returns. Monitoring divergence between the two can also provide valuable insights into shifts in market sentiment, industrial demand trends, or macroeconomic stability.

Limitations and Future Research

While this study provides a comprehensive historical analysis and presents strong empirical evidence of the relationship between gold and silver prices, it is not without limitations. Firstly, the regression model employed is linear and assumes a constant relationship over the entire study period. This static framework may not capture evolving market dynamics or structural breaks. Future research could benefit from the use of time-varying parameter models, regime-switching approaches, or non-linear models, such as those based on machine learning, to better reflect the complexity and fluidity of financial markets.

Secondly, the impact of geo-political events was assessed primarily through qualitative narratives and broad historical comparisons. While useful for contextual understanding, this method lacks the precision of formal event study methodologies, which could isolate specific event windows and assess abnormal returns or volatility patterns in response to defined geo-political shocks. Incorporating such methods would enhance statistical rigor and provide clearer insights into cause-effect relationships.

Another limitation lies in the study's global aggregation of data, which may obscure regional differences. Market dynamics in countries like India or China—where precious metals play unique cultural, industrial, and monetary roles—may diverge from those observed in Western markets. Future studies should explore cross-country comparisons to understand how regional factors influence the gold-silver relationship.

Furthermore, currency fluctuations, particularly in non-dollar markets, were not incorporated into this analysis. As gold and silver are globally traded commodities, exchange rate volatility may play a critical role in local price movements.

Finally, the integration of sentiment analysis, using data from financial news, social media, or investor surveys, could offer predictive insights into short-term divergences and investor behaviour, providing a more holistic view of precious metal markets.

Conclusion

This research contributes to a deeper understanding of the interconnected behaviour of gold and silver within the context of global financial systems and external shocks. The analysis confirms a strong long-term relationship between the two metals, reinforcing the notion that they often move in tandem due to shared safe-haven characteristics and market dynamics. However, the observed divergence during specific geo-political and macroeconomic events especially those that disrupt industrial activity emphasizes the importance of analysing these assets within their broader economic and functional contexts.

Gold's enduring role as a dominant safe-haven asset is well-supported by historical data and investor behaviour. Its relative insulation from industrial demand and consistent appeal to central banks and institutional investors makes it a reliable anchor in times of uncertainty. Silver, by contrast, presents a more complex profile. Its dual function as both a monetary asset and industrial input introduces variability in its performance, offering both opportunities and risks depending on prevailing economic conditions.

These distinctions underscore the strategic value of analyzing gold and silver not only as correlated assets but also as complementary tools in diversified investment

portfolios. Investors and analysts should be attentive to shifts in the gold-to-silver ratio, changes in macroeconomic indicators, and global political developments that may influence their behaviour.

As geo-political instability and economic uncertainty are likely to persist in the years ahead, the role of precious metals in portfolio hedging, inflation protection, and systemic risk management will remain crucial. This study provides a foundation for future exploration into more dynamic, region-specific, and event-sensitive analyses of precious metal markets.

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