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# The Resurgence of Hard Assets: An Empirical Examination of Gold and Silver's Strategic Role in Multi-Asset Portfolios (1990–2025)

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**Abstract**

This paper empirically investigates the investment merits of gold and silver in the current global economic climate (circa 2025), utilizing a literature review spanning 1990 to the present. Applying econometric findings from generalized autoregressive conditional heteroskedasticity (GARCH) and vector error correction models (VECM) across the two decades, the analysis examines their distinct roles as safe-haven assets, inflation hedges, and portfolio diversifiers. The findings demonstrate that sustained macroeconomic shifts—including persistent systemic risk derived from ultra-accommodative monetary policy, negative real interest rates, and accelerated central bank accumulation linked to de-dollarization—create a profoundly favorable environment for both metals.[1] While gold retains its structural superiority as a low-volatility, reliable wealth preserver and core inflation hedge, silver's unique industrial demand profile (driven particularly by green energy technologies) and high volatility position it for substantial outperformance in the latter stages of the precious metals bull cycle, especially given persistent supply deficits. Crucially, the analysis highlights the growing divergence between physical and paper markets, advocating for physical ownership to mitigate counterparty and systemic risk exposure.[3]

**Keywords:** Gold, Silver, Safe Haven, Hedging, Volatility, GARCH, Real Interest Rates, De-dollarization, Portfolio Diversification.

## 1. Introduction

The global financial landscape has experienced profound structural transformation since the 2008 Global Financial Crisis (GFC), culminating in a period of heightened systemic risk and geopolitical fragmentation by 2025.[1] Historically, multi-asset portfolios relied on the negative correlation between equities and fixed income assets, exemplified by the traditional 60/40 model. However, recent periods of economic stress, particularly since 2022, have seen both equity and bond markets post correlated declines, eroding the traditional diversification effect provided by bonds.[4] This phenomenon has amplified the strategic importance of genuinely non-correlated portfolio components, such as precious metals.

The time frame spanning 1990 to 2025 provides a crucial dataset, encompassing periods of moderate

inflation, aggressive monetary expansion, technological revolutions, and multiple geopolitical crises, allowing for a robust examination of precious metals' performance across diverse regimes. This research addresses the core investment thesis: whether the current confluence of systemic risk indicators, persistent monetary accommodation, and structural demand shifts makes the strategic allocation to gold and silver better now than in previous cycles.[1]

This paper proceeds in five sections: Section I reviews the established academic definitions and empirical roles of gold and silver. Section II provides a comparative analysis of their risk, return, and diversification dynamics. Section III dissects the unique structural and monetary factors driving current demand, focusing on real interest rates and geopolitical drivers. Section IV details the specific investment thesis for silver, examining industrial demand and supply deficits. Finally, Section V synthesizes the findings into strategic investment implications, including a critical assessment of physical versus paper investment modalities.

## Theoretical Framework and Literature Review on Precious Metals

### A. Defining Gold and Silver as Financial Assets

The financial literature establishes distinct roles for the two principal precious metals. Gold is primarily defined as a monetary asset and a core store of wealth, with investment demand and jewelry consumption dominating its market profile.[5] The investment case for gold is deeply rooted in its historical stability, scarcity, and long-standing reputation as a safe-haven asset.[7]

In contrast, silver operates under a critical dual mandate, functioning both as a precious metal with monetary characteristics and as a vital industrial commodity. Empirical analysis confirms that over 50% of silver's demand profile is dedicated to industrial applications.[6] This inherent dual role subjects silver prices to both traditional precious metals factors (geopolitics, monetary policy) and cyclical economic factors (industrial production), contributing significantly to its unique, and often more volatile, price dynamics.[5]

### B. Empirical Evidence on Hedging and Safe Haven Properties (1990–2025)

Empirical studies covering the period from 1990 to 2022 confirm gold's robust function as both a hedge and a safe haven asset. Gold is defined as a hedge when it maintains a low correlation with other asset classes, and as a safe haven when it tends to appreciate during times of extreme market stress.[10] Research confirms that gold acts as a reliable long-run hedge against headline, expected, and core Consumer Price Index (CPI) inflation, especially within the context of the US economy.[11] Furthermore, during periods of severe market instability, gold and silver demonstrate an ability to shield portfolios from negative shocks transmitted from stock markets.[13] Historical crisis analysis confirms gold's superior price stability compared to silver, platinum, and palladium during the 1997 Asian, 2008 Global, and 2010 Eurozone crises.[14]

Silver's hedging capability is considerably less consistent. Academically, silver does not reliably hedge US consumer prices in the long run.[11] Its effectiveness as an inflation hedge appears to be time-varying, showing some success in low-inflation environments but generally underperforming gold during high-inflation periods.[12] The reliance of silver on industrial demand means its performance as a safe haven is often conditional on the type of crisis; gold is generally more resilient in pure systemic risk environments.[6]

### C. Macroeconomic Determinants and Modeling Approaches

Academic research consistently confirms that precious metal prices are governed by fluctuations in several key macroeconomic variables, including the value of the US dollar, global oil prices, and changes in overall economic conditions.[15] Specifically, factor analysis of the 1990s period identified central bank sales of gold reserves, stock market activities, and the US dollar's value as primary determinants of the gold price.[16]

Econometric models have been vital in understanding the complex linkages between these variables. The application of the Asymmetric Power Generalized Autoregressive Conditional Heteroskedasticity (APGARCH) model has confirmed the US dollar's significant role in driving gold price changes.[15] Furthermore, studies utilizing the Vector Error Correction Model (VECM) have established a co-integrated long-term relationship between gold, silver, and platinum prices, all of which are strongly affected by economic conditions.[15] The dynamic causality and volatility spillover effects between the gold and silver markets have been explored using binary Value-at-Risk (VAR)-GARCH models, confirming that returns and shocks vary significantly from gold to silver, reinforcing the view that they are not interchangeable investment vehicles.[15]

## 2. Comparative Empirical Analysis of Gold and Silver Dynamics

The decision between investing in gold or silver requires a comparative understanding of their quantitative differences in risk and return profiles. The literature provides ample data spanning the last three decades to differentiate their utility within a portfolio. Table I summarizes the differential sensitivity of gold and silver to core macroeconomic factors.

| Driver | Theoretical Impact | Gold Empirical Finding (1990-2025) | Silver Empirical Finding (1990-2025) | Supporting Literature |
|---|---|---|---|---|
| Real Interest Rates (Ex-Ante) | Inverse relationship due to opportunity cost 17 | Generally inverse, though positive association found during recessions/high inflation [17, 18] | Generally inverse, but less pronounced due to industrial pull [19] | 1, 17, 18 |
| US Dollar Index (DXY) | Inverse, as dollar-denominated asset 20 | Strong negative correlation (-0.3 to -0.5) 9 | Negative correlation, but correlation sometimes diluted by commodity cycle 15 | 9, 15, 16 |
| Market Volatility (Equity Shocks) | Positive (Flight to Safety) 17 | Consistent safe-haven asset; high positive correlation during crises [10, 13] | Positive correlation, though price stability is lower than gold [13, 14] | 10, 13, 17 |
| Industrial Production/PMI | N/A for monetary asset | Low correlation 6 | Moderate to High positive correlation (0.4-0.6) 9 | 6 |

**Table I: Macroeconomic Determinants and Price Sensitivity of Gold and Silver**

The inverse relationship between gold prices and real interest rates is a well-documented phenomenon, as low real rates reduce the opportunity cost of holding the non-yielding asset.[1] However, during periods of high inflation or recessionary times, research has suggested that gold's safe-haven function can override this dynamic, leading to a temporary positive association between gold prices and real interest rates, highlighting the complexity of gold's price responses.[18]

**A. Volatility, Risk Metrics, and Leverage (1990–2025)**

Silver is empirically characterized by significantly higher volatility compared to gold. Due to the substantially smaller scale of the global silver market compared to gold, silver prices are typically 1.5 to 2 times more volatile than gold prices on average.[5] Gold's superior price stability establishes it as the preferred choice for large-scale wealth preservation.[6]

Both metals exhibit asymmetric responses to market shocks. Specifically, studies indicate that gold and platinum demonstrate greater sensitivity to positive price shocks ("good news") than to negative shocks.[15] However, when analyzing overall market stability, gold consistently ranks as the most stable of the precious metals. The tendency of silver, platinum, and palladium to show positive price correlation when the US Dow Jones market is unstable further demonstrates gold's role as the primary financial system stabilizer.[14]

**B. Correlation and Diversification Benefits**

Gold maintains superior uncorrelation with traditional assets compared to silver. Historical data spanning 1990–2025 demonstrates that including gold in multi-asset portfolios (CHF, EUR, and USD denominated) enhances overall returns, mitigates volatility, and significantly lowers drawdowns.[4] This is particularly critical in the modern era, where the traditional diversification effects offered by bonds have weakened.[4]

Silver's effectiveness as a diversifier is often diminished by its economic sensitivity. Its substantial industrial correlation, measured between 0.4 and 0.6 with the global manufacturing Purchasing Managers' Index (PMI), increases its linkage to cyclical economic performance.[9] During severe economic contractions, the reduction in industrial demand can offset investment demand, leading to higher volatility and a less reliable safe-haven performance than gold provides.[6]

**C. Return Asymmetries and Cyclical Performance**

The performance of gold and silver varies significantly across economic cycles. Gold excels primarily during periods of economic uncertainty, high inflation (hedge), and stagflation (high inflation combined with weak growth).[6] Silver, conversely, frequently delivers substantially higher percentage gains and often outperforms gold dramatically during prolonged inflationary periods that coincide with strong economic growth.[6] For instance, during the 2009–2011 cycle, silver gained 1,126% from its 1999 baseline, significantly outpacing gold's 660% gain.[9]

An analysis of cyclical behavior indicates that gold possesses a longer cycle (approximately seven years) compared to silver (four to five years).[15] This suggests that silver reacts more quickly and dramatically to shorter-term market shifts, exhibiting higher beta. Despite silver's potential for explosive returns, a comprehensive quantitative study comparing the two metals between 1990 and 2024, utilizing statistical methods such as GARCH, ARIMA, and polynomial regression, ultimately concluded that gold was the statistically superior investment asset when evaluated on risk-adjusted criteria.[21] Therefore, while silver provides leverage to the upside of a precious metals bull market, gold serves as the superior long-term

wealth anchor.

| Characteristic | Gold (Stability/Anchor) | Silver (Growth/Leverage) | Strategic Implication for 2025 |
|---|---|---|---|
| Primary Demand Use | Investment/Monetary (Store of Value) [5] | Investment/Industrial (50%+ Industrial) [6] | Gold is superior stable anchor; Silver provides high cyclical risk/return [6] |
| Average Volatility (Beta) | Low (1.0 benchmark) [6] | High (1.5x to 2x Gold) [5] | Silver offers higher potential growth but requires higher risk tolerance [5] |
| Long-Term Inflation Hedge | Superior and Reliable hedge against core CPI [11] | Inconsistent in US; better during low inflation/growth [11] | Gold hedges monetary erosion; Silver profits from inflation + industrial growth [6] |
| Price Stability During Crises | Highest price stability among precious metals [14] | Shows positive correlation with unstable stock markets [14] | Gold provides better protection in pure systemic collapse scenarios [4, 14] |
| Gold-to-Silver Ratio | N/A | Historically outperforming when ratio is high (e.g., above 80:1) [22] | Current high ratio suggests significant potential for silver mean reversion [23] |

**Table II: Comparative Portfolio and Performance Characteristics (1990–2025)**

## 3. Structural and Monetary Factors Driving Current Demand (The "Better Now" Thesis)

The current macroeconomic environment features unique structural forces that fundamentally support precious metals demand beyond typical cyclical fluctuations, thereby justifying the thesis that investment is strategically superior now.

### A. The Opportunity Cost of Capital: Real Interest Rates and Monetary Policy

The inverse relationship between gold prices and real interest rates is a well-documented phenomenon, as low real rates reduce the opportunity cost of holding non-yielding assets.[17] Therefore, the environment of consistently low or negative real interest rates, sustained through extended periods of ultra-accommodative monetary policy, significantly reduces this opportunity cost, making bullion more appealing.[1] Forecasts and market expectations indicate continued anticipation of interest rate cuts throughout 2025, further supporting higher gold and silver prices.[20]

However, the consequences of years of easy money extend beyond simple opportunity cost calculation. Ultra-accommodative policies have created widespread systemic financial instabilities, characterized by asset bubble formation in equity and real estate markets, elevated corporate debt levels, and significant

banking sector exposure to interest rate and credit risks.[1] This heightened structural risk environment acts as a gravitational force supporting uncorrelated assets, suggesting that even short-term price pullbacks, such as the 11.3% correction gold experienced in late 2025 after peaking at $4,381 [25], represent buying opportunities because the fundamental debt and systemic risk drivers remain structurally intact.[1]

**B. Geopolitics, De-Dollarization, and Official Sector Accumulation**

Geopolitical fragmentation and challenges to the dominance of the U.S. dollar are generating structural demand for precious metals, fundamentally changing the market's landscape since the 1990s, when central banks were often net sellers.[16] Central banks and reserve managers, concerned with default risks, geopolitical diversification, and currency debasement, are accelerating gold accumulation.[26]

For the first time since 1996, foreign central banks' combined gold reserves have surpassed their holdings of U.S. Treasuries.[29] This crossover is a potent symbolic and structural indicator of diversification away from dollar-denominated securities and towards hard assets. Official sector buying has been historic, with 1,136 tonnes purchased in 2022, and robust accumulation continuing through 2023 and 2025.[3] Forecasts suggest continued strong central bank demand, estimated at approximately 900 tonnes in 2025.[20]

The geopolitical diversification driver is particularly potent because it represents non-price-sensitive demand; central banks are responding strategically to the risks associated with the weaponization of the US financial system, ensuring their reserves are shielded from political and systemic coercion.[26] This structural support provides a durable floor for gold prices, regardless of short-term volatility in interest rates.[2]

**4. The Silver Specific Thesis: Industrial Demand and Supply Deficits**

While gold benefits from monetary and systemic factors, silver's investment case in 2025 is magnified by a highly favorable industrial and supply-side environment.

**A. Silver's Dual Role and the Green Energy Accelerator**

Silver's price profile is critically sensitive to its industrial applications, which account for over 50% of its demand.[6] The current surge in industrial consumption is largely attributable to rapidly expanding green energy technologies, notably solar photovoltaic (PV) installations, electric vehicles (EVs), and advanced electronics for 5G and Artificial Intelligence hardware.[20]

The demand from the PV sector has seen unprecedented acceleration, consuming 142 million ounces of silver in 2023 alone, tripling its share of global silver use since 2014.[31] Earlier forecasts projecting a decline in silver demand due to "thrifting" (reducing silver content per panel) have been negated by the sheer volume of new installations and a crucial technological shift: many manufacturers are now increasing silver content per solar cell to enhance efficiency.[31] This suggests a double-leverage effect on silver demand: accelerating installation volume combined with increased silver intensity per unit. Projections estimate that solar panels will consume about 20% of total silver demand by 2030.[31] This fundamental industrial growth underpins silver's high-risk, high-reward profile.

**B. Persistent Supply Constraints and Market Deficits**

The strong demand momentum meets a market constrained by inelastic supply. The silver market is forecast to record a significant deficit for the fifth consecutive year in 2025.[33] The key challenge lies in silver's production structure: approximately 72% of silver is produced as a byproduct of lead, zinc, copper,

and gold mining operations.[31] Consequently, higher silver prices alone often cannot incentivize new primary silver mine development or expansion unless the price of the associated base metals also rises significantly.

This structural inelasticity, combined with a decade of declining total silver supply and ongoing mining challenges (e.g., political instability in key producing regions) [20], means that burgeoning industrial demand must be met by drawing down above-ground stocks. The resulting supply deficit creates the potential for volatile price surges, exacerbating risk in a substantially smaller market than gold.[5] In 2024, recycling reached a 12-year high, driven by firmer prices, further signaling market tightness in the face of structural demand.[35]

### C. Historical Gold-Silver Ratio Analysis

The gold-to-silver ratio provides a strategic indicator of potential relative value. The long-term 20th-century average ratio fluctuated between 47:1 and 50:1.[9] The ratio tends to spike during times of extreme market panic (e.g., reaching 123:1 in March 2020).[9] Current ratios (circa 2025) lingering around 80:1 [23] suggest that silver remains significantly undervalued relative to its historical mean. Historically, extreme ratio peaks have been followed by explosive silver performance; for example, the ratio peak of 84:1 in 2008 preceded a subsequent silver gain of 180% over 24 months.[22] Normalization toward the historical average of 50:1 or lower, driven by accelerating industrial and investment demand, implies substantial potential upside for silver, independent of gold's absolute price trajectory.[23]

## V. Implications for Investment Strategy and Risk Management

The empirical data and structural analysis support a comprehensive investment strategy that leverages the distinct roles of both gold and silver in the current environment.

### A. Asset Allocation and Optimal Weighting

Given the erosion of traditional bond diversification benefits, gold and silver should transition from being viewed as peripheral hedges to core strategic portfolio components.[4] The analysis confirms that a dual-metal strategy is optimal for capturing different market dynamics.[6]

Gold should serve as the portfolio anchor, providing crucial stability and wealth preservation during economic contractions, stagflation, and systemic crises.[6] Silver, with its high beta and industrial linkage, offers the high-leverage growth potential necessary to capitalize on periods of strong economic expansion coupled with inflation, particularly benefiting from the green energy revolution.[6] A tactical strategy based on the gold-silver ratio is warranted, suggesting that investors increase silver exposure when the ratio is elevated (e.g., above 80:1) to capture subsequent cyclical outperformance.[22]

### B. Physical Ownership vs. Paper Claims: Mitigating Counterparty Risk

A critical consideration in the current systemic risk environment is the modality of investment.[1] Paper instruments, such as Gold/Silver Exchange-Traded Funds (ETFs), futures, and options, represent contractual claims on the metal rather than direct ownership. This exposure introduces significant counterparty risk (risk of broker or fund failure) and systemic risk exposure to the underlying financial institution.[36]

Physical bullion, defined as actual coins or bars held securely, minimizes counterparty risk and provides a genuine, systemically isolated hedge.[38] The strategic preference of institutional players supports this

view; contemporary market dynamics show a marked divergence, with global gold ETF holdings decreasing significantly while central banks accelerate physical purchases.[3] This institutional movement reflects growing market distrust in fractional financial gold instruments. Therefore, for investors seeking genuine wealth preservation against systemic failure, physical ownership is deemed superior to paper-based alternatives.[1]

| **Risk/Feature** | **Physical Bullion (Allocated)** | **Paper Instruments (ETFs/Futures)** | **Relevance in 2025 Systemic Risk Environment** |
|---|---|---|---|
| Counterparty Risk | Minimal/Zero (Direct Ownership) [38] | Significant (Management/Broker /Fund failure) [36] | Central banks prioritize physical; critical for genuine wealth preservation [3] |
| Systemic Financial Risk Exposure | Minimal (Asset outside financial system) [3] | High (Exposure to banking system and derivatives market) [37] | Physical is the genuine hedge against monetary instability and debt crisis [1] |
| Institutional Preference (Post-2022) | Accelerated record buying (Central Banks) [3] | Significant decreases in holdings (Global ETFs) [3] | Clear institutional shift toward hard assets/physical security due to distrust in fractional claims [3] |
| Liquidity | Requires physical transfer/custody [39] | Instantly tradable during market hours [36] | Trade-off between immediate liquidity and ultimate systemic security [41] |

**Table III: Assessment of Investment Modalities: Physical vs. Paper Instruments**

### C. Quantitative Forecasts and Price Targets (2025–2026)

The current structural environment has led to a highly bullish consensus among financial analysts, with upward revisions to price projections throughout 2025.[20]

For gold, long-term forecasts for 2026 and beyond remain robust, targeting values ranging from the LBMA consensus of $4,980 per ounce to analyst projections reaching $5,000–$6,000 per ounce, assuming continued monetary accommodation and geopolitical uncertainty.[23]

For silver, the combination of high volatility, structural supply deficits, and industrial momentum supports highly aggressive targets. Analysts anticipate silver potentially reaching $59 per ounce by late 2026, with some aggressive predictions extending to $100 per ounce in the medium term, driven by the strong industrial demand cues.[20]

## 5. Conclusion

The empirical evidence spanning the last thirty-five years (1990–2025), coupled with an analysis of contemporary structural macroeconomic drivers, confirms that investment in gold and silver is strategically superior now, functioning as a crucial defense mechanism against escalating systemic financial and geopolitical risk.

Gold secures its position as the preferred long-term store of value and portfolio stabilizer, consistently demonstrating low volatility, reliable inflation-hedging properties, and increasing monetary relevance driven by central bank de-dollarization efforts. Silver, owing to its higher beta, structural inelasticity in supply, and strong correlation with the green energy industrial complex, offers substantial growth potential and high cyclical outperformance relative to gold in this late-stage bull market.

For market participants seeking optimal strategic allocation and genuine wealth preservation, the necessity of mitigating counterparty risk demands prioritizing physical ownership over paper-based instruments. The convergence of persistent low real interest rates, escalating systemic risk from accommodative monetary policy, and profound geopolitical shifts provides an unprecedented structural foundation for the continued outperformance of both gold and silver through 2026 and into the medium term.

### A. Investment Suggestion and Strategic Recommendation

Based on the empirical evidence and structural macroeconomic analysis spanning 1990 to 2025, the data overwhelmingly supports the strategic decision to invest in both gold and silver now, though with distinct roles for each metal.

**Overall Recommendation: Highly Favorable.**

The investment case is justified by the convergence of structural, long-term drivers:

- **Systemic Risk and Monetary Policy:** Persistent low or negative real interest rates, resulting from years of ultra-accommodative central bank policy, significantly reduce the opportunity cost of holding non-yielding assets, making gold and silver fundamentally attractive.[1] The heightened systemic financial risks (elevated corporate debt, banking sector risk, asset bubbles) created by this policy backdrop further necessitate the inclusion of non-correlated assets.[14]
- **Geopolitical and Monetary Fragmentation:** Accelerated central bank accumulation of physical gold, driven by geopolitical risk, de-dollarization efforts, and a desire to diversify away from dollar-denominated assets, provides a powerful, non-price-sensitive structural demand floor for gold.[1]

**Specific Strategy for Dual Investment:**

- **Gold (The Anchor):** Gold is confirmed as the superior choice for stability and wealth preservation. It is the most reliable long-term hedge against core inflation [6] and demonstrates the highest price stability during crises, making it the primary safe-haven asset against systemic failure [10, 26, 10]. It should form the larger, foundational component of the precious metals allocation.
- **Silver (The Leverage):** Silver is recommended for growth and cyclical outperformance. Despite being statistically inferior on a risk-adjusted basis (1990–2024) [31], its unique high-beta profile and industrial demand position it for substantial gains now. Demand is being magnified by the booming green energy sector (solar PV) [28], and the market is facing a fifth consecutive year of structural supply deficits.[29] Furthermore, the current high Gold-to-Silver Ratio (around 80:1) suggests significant cyclical undervaluation and strong potential for explosive returns as the ratio mean-reverts toward its

historical average (47:1 to 50:1).[9]

**Risk Mitigation:**

The research strongly advocates for prioritizing physical ownership (coins or bars) over paper instruments (ETFs, futures) to secure the true safe-haven benefits. This mitigates significant counterparty risk and systemic risk exposure inherent in contractual claims and fractional reserve financial products.[3]

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