A Comparative Analysis of Gold and Silver as Investment Assets in India: Evidence from Historical Price Trends (1981–2026)

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***Abstract*—Gold and silver occupy a distinctive position in the Indian household portfolio, functioning simultaneously as ornamental goods, socio-cultural symbols and financial assets. Although both are classified together as precious metals, their economic behaviour diverges considerably because silver carries a substantial industrial demand component while gold remains predominantly a monetary and store-of-value asset. This study undertakes a comparative evaluation of gold and silver as investment avenues in India using average annual price data for the forty-six-year period from 1981 to 2026. Compound annual growth rates, year-on-year returns, dispersion measures, coefficients of variation, drawdown magnitudes, the gold–silver ratio, and correlation and regression statistics are computed to assess relative performance. The results indicate that gold delivered a compound annual growth rate of 10.62 per cent against 10.47 per cent for silver over the full period, a statistically indistinguishable difference (Welch $t = -0.490$, $p = 0.626$). Risk, however, differed sharply: the standard deviation of annual returns was 13.89 per cent for gold and 34.53 per cent for silver, significant at the one per cent level ($F = 6.179$, $p < 0.001$). Gold recorded positive returns in 37 of 45 years against 27 for silver, and its maximum drawdown was −21.61 per cent against −34.99 per cent for silver. The two metals are moderately and positively correlated ($r = 0.535$, $p < 0.001$), with silver exhibiting a beta of 1.331 relative to gold. The study concludes that gold is the superior risk-adjusted store of value for the conservative Indian investor, whereas silver behaves as a high-beta satellite holding whose returns are episodic and concentrated in a small number of exceptional years.**

***Index Terms*—Gold, silver, precious metals, investment performance, compound annual growth rate, volatility, gold–silver ratio, India.**

I. INTRODUCTION

Precious metals have retained their monetary relevance across every phase of economic organisation, from commodity money to fiat currency regimes to the contemporary era of digital finance. In India, this relevance is amplified by cultural practice. Gold is embedded in marriage customs, religious observance and intergenerational wealth transfer, and India has consistently ranked among the two largest consumers of the metal in the world. Silver, though less conspicuous in the literature, occupies a comparable position in rural and semi-urban households, in temple economies and in the ornament market at lower price points. For a very large proportion of Indian savers, particularly those outside the formal financial system, these two metals constitute the primary and sometimes the only long-term savings instrument.

The investment case for gold and silver rests on three arguments. The first is inflation protection: because both are real assets in limited supply, their nominal prices are expected to rise in step with the general price level, preserving purchasing power over long horizons. The second is portfolio diversification: precious metal returns are imperfectly correlated with equity and debt returns, so their inclusion can lower total portfolio variance for a given expected return. The third is the safe-haven property: during episodes of acute financial stress, capital migrates towards assets carrying no counterparty risk, driving precious metal prices upward exactly when financial assets are falling [1], [2].

These three arguments do not, however, apply equally to both metals. Gold's demand is dominated by jewellery fabrication, investment and official sector reserves, and its industrial usage is marginal. Silver, by contrast, derives a substantial share of its demand from industrial applications: photovoltaic cells, electrical contacts, brazing alloys, electronics and, increasingly, energy-transition technologies. This dual character means that silver prices respond not only to monetary and safe-haven considerations but also to the industrial cycle. Silver therefore behaves as a hybrid of a monetary metal and an industrial commodity, and its price series is correspondingly more volatile. The practical consequence for the Indian investor is that the choice between gold and silver is not a choice between two versions of the same asset, but between two assets with materially different risk profiles.

Despite the centrality of both metals to Indian household wealth, the empirical literature is heavily skewed towards gold. Studies examining gold's relationship with inflation, the exchange rate, crude oil and equity indices in India are numerous [3], [4]; comparable long-horizon assessments of silver, and particularly direct comparisons of the two metals on a common return-and-risk framework, are far fewer. Where comparative work exists it typically covers a window of ten to twenty years, which is insufficient to capture the full cycle behaviour of assets whose bull and bear phases can extend across a decade. The 1990s in India, for instance, were a prolonged period of stagnation for both metals; a study confined to that decade would reach conclusions diametrically opposed to one confined to 2001–2010.

The present study addresses this gap by constructing a comparative performance assessment of gold and silver in the Indian market across forty-six years from 1981 to 2026. This period spans several distinct macroeconomic regimes: the closed, licence-controlled economy of the 1980s; the balance-of-payments crisis and liberalisation of 1991; the disinflationary and dollar-strong 1990s; the commodity supercycle of the 2000s; the post-2008 monetary expansion; the corrective phase of 2013–2019; the pandemic shock of 2020; and the inflationary and geopolitically strained environment of the 2020s. Evaluating the two metals across all of these regimes permits conclusions that are robust to the choice of starting point, which shorter studies cannot claim.

The remainder of the paper is organised as follows. Section II reviews four significant empirical contributions and identifies the research gap. Section III states the objectives and hypotheses. Section IV sets out the data and methodology. Section V presents and discusses the results. Section VI summarises the findings, Section VII draws conclusions and implications, and Section VIII notes limitations and directions for further research.

II. REVIEW OF LITERATURE

The literature on precious metals as investment assets is extensive. The four studies discussed below are selected because each addresses a dimension directly relevant to the present comparison: the causal linkage between the two metals in the Indian market, the inflation-hedging capacity of gold in India, the differential regime behaviour of gold and silver under inflation, and the comparative hedging performance of the two metals against Indian equity and price indices.

A. Pradhan, Mishra, Tiwari and Hammoudeh (2020)

Pradhan, Mishra, Tiwari and Hammoudeh [5], writing in Resources Policy, examined the relationship between gold and silver returns in India using monthly data for May 1991 to June 2018. Their methodological contribution lies in the application of frequency-domain rolling-window causality analysis alongside Toda–Yamamoto and frequency-domain Granger causality tests, examined in both conditional and unconditional frameworks. Three macroeconomic variables — the interest rate, the BSE stock index and the inflation rate — were introduced as control variables. The authors reported significant bi-directional causality between the gold and silver markets at both high and low frequencies, though the causal episodes differed in duration. Importantly, once macroeconomic information was conditioned upon, gold returns could not be predicted from silver returns, a result interpreted as supporting the semi-strong form of market efficiency: macroeconomic information is absorbed into precious metal prices rapidly enough to eliminate exploitable predictability. The significance of this work for the present study is twofold. It establishes that gold and silver in India are genuinely linked rather than independent, justifying their treatment as comparable members of an asset class; and it simultaneously shows the linkage to be

frequency-dependent and unstable, implying that the two cannot be regarded as substitutes at any given horizon.

B. Singh and Joshi (2019)

Singh and Joshi [6], in Business Perspectives and Research, investigated whether gold functions as a hedge against inflation in the Indian context. They noted that average monthly gold prices in India had grown by approximately 1,588 per cent over 1979 to June 2017, and analysed the relationship between gold prices and the consumer price index for the sub-period 2011 to March 2017. Johansen's cointegration procedure was employed to test for long-run equilibrium, and the vector error correction model together with the Wald test was used to establish the direction and horizon of causality. The results confirmed that gold prices and the CPI series are cointegrated and share a long-run equilibrium relationship. Both the VECM and the Wald test indicated that causality between the CPI and gold prices operates only in the long run, with no evidence of a short-run causal relationship. The implication is that gold's inflation-hedging property is a long-horizon phenomenon: an investor holding gold for a few quarters cannot rely on it to track inflation, whereas an investor holding across a full cycle can. This finding directly motivates the present study's use of a forty-six-year window and provides a theoretical basis for expecting gold's compound growth rate to approximate or exceed long-run Indian inflation.

C. Valadkhani and O'Mahony (2024)

Valadkhani and O'Mahony [7], in the International Review of Economics and Finance, examined the impact of inflation on gold and silver returns using a Markov regime-switching vector autoregressive model supplemented by threshold regression, applied to monthly data from January 1975 to October 2023. The regime-switching framework was chosen to address the endogeneity problem and to accommodate the possibility that the relationship between metal returns and inflation is not stable but subject to regime shifts. Their central finding is a pronounced asymmetry between the two metals. Gold returns exhibited sharp and sustained responses to inflation during high-inflation regimes, with these responses becoming subdued in low-inflation periods; the authors identified a window of approximately four to five months following the onset of intensified inflationary pressure during which gold's hedging value is greatest. Silver's response was materially weaker and less consistent, attributed to its dual role as both an investment asset and an industrial commodity, since industrial demand is procyclical and can offset the monetary demand impulse that drives prices during inflationary episodes. They concluded that gold, by virtue of its established role as a store of value, is the more reliable inflation hedge, while silver constitutes a second-best alternative. This asymmetry provides a direct theoretical explanation for the divergence in volatility documented empirically in the present study.

D. Shihabudheen and Santhosh Kumar (2025)

Shihabudheen and Santhosh Kumar [8], in the SDMIMD Journal of Management, evaluated the investment prospects of gold and silver in India with specific reference to their functionality as hedging instruments against inflation and market volatility. Using a GARCH-DCC framework over 2003 to 2023, they analysed the time-varying correlation between the Nifty index, inflation, gold and silver, giving explicit attention to the market disruptions of the 2008 global financial crisis and the COVID-19 pandemic. Their results revealed a statistically significant positive correlation between silver and inflation, on the strength of which they argued that silver may function as an inflation hedge at least as effectively as gold. Simultaneously, gold's correlation with the Nifty index turned significantly negative during the financial crisis, demonstrating that gold operates as a strong hedge against equity market declines, with the 2008 episode highlighted as the clearest demonstration of this property. The study is notable for being one of the few Indian works to treat both metals within a single dynamic conditional correlation framework, and its finding that the two metals hedge different risks — silver against price inflation, gold against equity drawdowns — supports the view advanced here that they are complements rather than substitutes.

E. Research Gap

The reviewed literature establishes that gold and silver are causally linked in India, that gold hedges inflation over long horizons, that gold's inflation response is regime-dependent and stronger than silver's, and that the two metals hedge distinct categories of risk. What

remains absent is a direct, long-horizon comparison of the two metals on the elementary investment metrics that matter to the ordinary Indian saver: how much wealth each generated, how reliably, with what frequency of loss, and with what depth of drawdown. Existing Indian studies are dominated by causality and cointegration testing over windows of ten to twenty-seven years and rarely report compound growth rates, coefficients of variation, drawdown magnitudes or the gold–silver ratio in a comparative frame. Furthermore, no reviewed study extends beyond 2023, and therefore none captures the extraordinary precious metal repricing of 2024–2026. The present study addresses these gaps by evaluating both metals on a common performance-and-risk framework across forty-six years of Indian rupee price data.

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III. OBJECTIVES AND HYPOTHESES

A. Objectives of the Study

1) To examine the long-run price trends of gold and silver in India over 1981 to 2026 and to compute their respective compound annual growth rates.
2) To compare the year-on-year return performance of the two metals in terms of central tendency, consistency and frequency of positive outcomes.
3) To measure and compare the investment risk associated with each metal using standard deviation, coefficient of variation and maximum drawdown.
4) To assess the risk-adjusted performance of gold relative to silver and to examine how this relationship varies across sub-periods.
5) To analyse the degree of co-movement between the two metals through correlation and regression analysis, and to examine the behaviour of the gold–silver ratio as an indicator of relative valuation.

B. Hypotheses

H01: There is no significant difference between the mean annual returns of gold and silver in India during the study period.

H02: There is no significant difference between the return variances of gold and silver in India during the study period.

H03: There is no significant relationship between the annual returns of gold and the annual returns of silver in India during the study period.

IV. RESEARCH METHODOLOGY

A. Nature and Source of Data

The study is analytical and quantitative in nature and is based entirely on secondary data. The dataset comprises average annual price observations for standard gold, quoted in rupees per ten grams, and silver, quoted in rupees per kilogram, in the Indian market. Both series are drawn from the historical price compilations published by BankBazaar.com [9], [10], which state explicitly that the tabulated figures represent average annual prices. Gold data are available in the compiled series from 1964, but the analysis is restricted to 1981 onwards so that both series cover an identical window and are directly comparable. The final dataset consists of 46 annual observations per metal from 1981 to 2026, yielding 45 year-on-year return observations for each. The 2026 observation is a partial-year figure recorded as at the date of compilation and is treated as such throughout.

B. Analytical Tools

The following measures were computed for each metal.

1) *Compound Annual Growth Rate (CAGR):* computed as CAGR = [(Pn / P0)^(1/n) − 1] × 100, where P0 and Pn denote the price in the base and terminal years and n is the number of years. The CAGR is the appropriate summary of long-run performance because, unlike the arithmetic mean, it accounts for compounding and is unaffected by the sequence of returns.
2) *Annual return:* Rt = [(Pt − Pt−1) / Pt−1] × 100, computed for each year from 1982 to 2026.
3) *Risk measures:* standard deviation of annual returns as the measure of total volatility; coefficient of variation (CV = σ / μ) as the measure of risk borne per unit of return; and maximum drawdown, defined as the largest percentage decline from a prior annual-average peak, as the measure of downside exposure. Downside deviation, computed on negative return observations only, was also calculated.
4) *Gold–silver ratio (GSR):* computed on a per-gram equivalent basis as GSR = (gold price per 10 g ÷ 10) ÷ (silver price per kg ÷ 1,000), representing the number of grams of silver exchangeable for one gram of gold.

5) *Statistical tests:* Welch's independent-samples t-test and the paired t-test were applied to test H01; the variance-ratio F-test and Levene's test were applied to test H02; and Pearson's product-moment correlation with a supporting Spearman rank correlation, together with ordinary least squares regression of silver returns on gold returns, were applied to test H03. Normality was assessed using the Shapiro–Wilk and Jarque–Bera tests. Statistical significance is evaluated at the five per cent level.

All computations were performed using Python 3 with the NumPy, Pandas and SciPy libraries, and results were cross-verified through independent recomputation.

C. Period of Study

The study covers forty-six years from 1981 to 2026. For sub-period analysis the window is partitioned into five phases: 1981–1990 (the pre-liberalisation decade), 1991–2000 (liberalisation and the disinflationary global environment), 2001–2010 (the commodity supercycle and the global financial crisis), 2011–2020 (the correction phase followed by the pandemic shock) and 2021–2026 (the post-pandemic inflationary and geopolitical phase).

V. RESULTS AND DISCUSSION

A. Long-Run Price Trend and Wealth Creation

Table I presents the summary of long-run growth. Gold rose from ₹1,670 per ten grams in 1981 to ₹1,57,000 in 2026, a multiple of 94.01 times and a cumulative appreciation of 9,301.20 per cent. Silver rose from ₹2,715 per kilogram to ₹2,40,000, a multiple of 88.40 times and a cumulative appreciation of 8,739.78 per cent. In compound terms, gold delivered a CAGR of 10.62 per cent against 10.47 per cent for silver, a gap of only fifteen basis points across forty-five years.

TABLE I LONG-RUN GROWTH PERFORMANCE OF GOLD AND SILVER IN INDIA, 1981–2026

Particulars	Gold (₹/10 g)	Silver (₹/kg)	Diff.
Price in 1981	1,670	2,715	—
Price in 2026	1,57,000	2,40,000	—
Growth multiple	94.01×	88.40×	+5.61×
Cumulative return (%)	9,301.20	8,739.78	+561.42
CAGR 1981–2026 (%)	10.62	10.47	+0.15
CAGR 1981–2025 (%)	9.84	10.94	−1.10
₹1,00,000 grew to	₹94.01 lakh	₹88.40 lakh	₹5.61 lakh

Source: Computed by the author from data in [9], [10].

A hypothetical investment of ₹1,00,000 made in 1981 and held without intervention would have grown to approximately ₹94.01 lakh in gold and ₹88.40 lakh in silver. The terminal difference of about ₹5.61 lakh, while not trivial in absolute rupee terms, amounts to only six per cent of the gold outcome — a remarkably small divergence given the very different paths the two series followed to arrive there.

The row reporting CAGR to 2025 warrants comment. Measured to 2025 rather than 2026, silver's compound growth of 10.94 per cent exceeds gold's 9.84 per cent. The reversal arises because the 2026 observation is a partial-year figure in which gold has advanced sharply while silver has retreated from its 2025 level. This sensitivity of the ranking to a single terminal observation is itself a central finding: over long horizons the two metals produce broadly similar compound growth, and which one appears superior depends materially on the endpoints selected. Any claim of the form 'metal X outperforms metal Y' that does not disclose its endpoints should therefore be treated with caution.

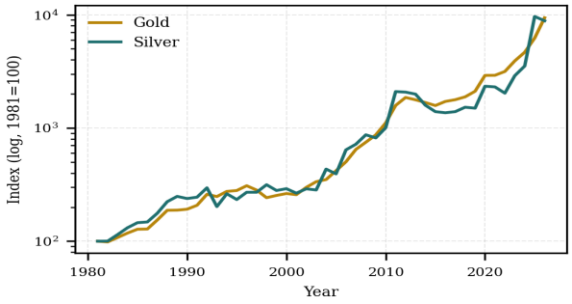

Fig. 1. Indexed price trends of gold and silver in India, 1981–2026 (log scale, 1981 = 100).

Figure 1 plots both series on a logarithmic scale so that equal vertical distances represent equal proportional changes. The two paths track each other closely in aggregate but diverge substantially in the intervening decades.

B. Return Performance

Table II reports descriptive statistics for the 45 annual return observations from 1982 to 2026.

TABLE II DESCRIPTIVE STATISTICS OF ANNUAL RETURNS, 1982–2026 (N = 45)

Statistic	Gold	Silver
Mean return (%)	11.44	14.15
Median return (%)	9.42	3.74
Geometric mean (%)	10.62	10.47
Standard deviation (%)	13.89	34.53
Coefficient of variation	1.21	2.44
Minimum return (%)	−14.39 (1998)	−31.73 (1993)
Maximum return (%)	51.15 (2026)	173.77 (2025)
Skewness	0.751	2.832
Excess kurtosis	0.612	10.542
Positive return years	37 of 45	27 of 45
Negative return years	8 of 45	18 of 45
Success rate (%)	82.22	60.00

Source: Computed by the author. Geometric mean is the annually compounded rate implied by the return series.

The divergence between the mean and the median return for silver is the single most revealing statistic in the table. Silver's arithmetic mean of 14.15 per cent comfortably exceeds gold's 11.44 per cent, which on a superficial reading would favour silver. Its median return, however, is only 3.74 per cent against gold's 9.42 per cent. The mean is pulled upward by a small number of extraordinary years — 173.77 per cent in 2025, 108.77 per cent in 2011, 63.04 per cent in 2006, 56.24 per cent in 2020 and 52.96 per cent in 2004 — while the typical year for silver is unremarkable. A skewness coefficient of 2.832 and excess kurtosis of 10.542 confirm a distribution that is heavily right-skewed and extremely fat-tailed. Gold, with skewness of 0.751 and excess kurtosis of 0.612, approximates normality far more closely; the Shapiro–Wilk test does not reject normality for gold ($W = 0.9645$, $p = 0.181$) but rejects it decisively for silver ($W = 0.7258$, $p < 0.001$).

The practical meaning of this asymmetry is that silver's headline average is not a return an investor can expect to receive. It is an average that materialises only for an investor holding through one of the five or six explosive years in a forty-five-year span. An investor entering and exiting at other times receives the median experience, which is decidedly inferior to gold's. The consistency data reinforce the point: gold produced gains in 37 of 45 years, a success rate of 82.22 per cent, while silver produced gains in 27 of 45, a success rate of 60.00 per cent. Silver's investor faces a losing year twice as often.

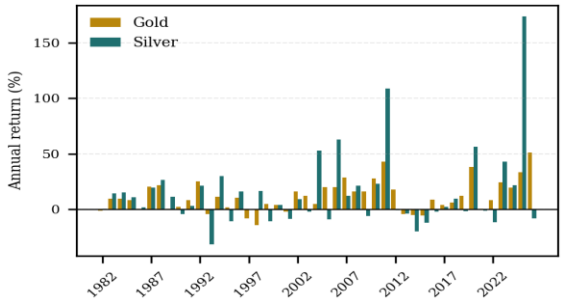

Fig. 2. Year-on-year returns of gold and silver, 1982–2026.

Figure 2 displays year-on-year returns for both metals. The episodic nature of silver's outperformance, concentrated in a handful of towering bars, is visually apparent, as is gold's comparatively regular pattern of moderate positive returns.

C. Risk Analysis

Table III sets out the comparative risk profile. The standard deviation of silver's annual returns, at 34.53 per cent, is 2.49 times that of gold at 13.89 per cent. The coefficient of variation — the risk borne for each unit of return — is 1.21 for gold and 2.44 for silver, meaning that an investor in silver accepts approximately twice as much volatility per percentage point of return. It is notable that the source publication itself observes silver's volatility to be roughly twice that of gold, citing indicative standard deviations of 27

to 28 for silver against 12 for gold [10]; the present computation, based on the full 1981–2026 series, corroborates the direction and approximate magnitude of that observation.

TABLE III COMPARATIVE RISK PROFILE, 1982–2026

Risk Measure	Gold	Silver	S ÷ G
Standard deviation (%)	13.89	34.53	2.49
Coefficient of variation	1.21	2.44	2.02
Downside deviation (%)	4.05	7.89	1.95
Maximum drawdown (%)	−21.61	−34.99	1.62
Year of max. drawdown	1998	2016	—
Return per unit risk (μ/σ)	0.823	0.410	0.50
Excess return per unit risk*	0.391	0.236	0.60

**Computed as (mean return − 6%) ÷ standard deviation, using 6 per cent as an indicative long-run risk-free proxy. Source: Computed by the author.*

The drawdown analysis is particularly informative for the Indian household investor, for whom the relevant risk is not statistical variance but the possibility of needing to liquidate a holding at a loss. Gold's deepest decline from a prior annual-average peak was 21.61 per cent, reached in 1998, and gold stood below a prior peak in eleven of forty-six observations. Silver's deepest decline was 34.99 per cent, reached in 2016 following the collapse of the 2011 peak, and silver stood below a prior peak in twenty-eight of forty-six observations. More significantly, silver's recovery periods were far longer: having peaked at ₹56,900 per kilogram in 2011, silver did not regain that level until 2020, a nine-year period during which an investor who had bought at the top held an underwater position throughout. Gold's longest such episode ran from 1997 to 2002, a shorter and shallower experience.

D. Sub-Period Analysis

Table IV decomposes performance across the five macroeconomic phases identified in Section IV-C.

TABLE IV SUB-PERIOD PERFORMANCE OF GOLD AND SILVER

Period	Gold CAGR (%)	Silver CAGR (%)	Gold SD (%)	Silver SD (%)
1981–1990	7.49	10.12	8.54	9.86
1991–2000	2.69	1.94	11.71	19.36
2001–2010	17.60	15.91	7.41	25.34
2011–2020	7.03	1.22	14.03	21.70
2021–2026	26.37	30.85	16.19	76.18

Source: Computed by the author. SD refers to the standard deviation of annual returns within the sub-period.

Three observations follow. First, gold outperformed silver in three of the five phases, and its periods of underperformance were modest in magnitude while silver's were severe. In 2011–2020 gold compounded at 7.03 per cent against silver's 1.22 per cent, a gap of nearly six percentage points annually sustained across a full decade. Second, the 1991–2000 decade was poor for both metals, with gold compounding at 2.69 per cent and silver at 1.94 per cent, both well below Indian consumer price inflation over that period. This is a necessary corrective to the popular belief that precious metals invariably preserve purchasing power; over a ten-year horizon they demonstrably may not. Third, and most striking, gold's standard deviation was lower than silver's in every single sub-period without exception. Silver's risk premium is not a feature of any particular regime; it is a structural characteristic of the asset.

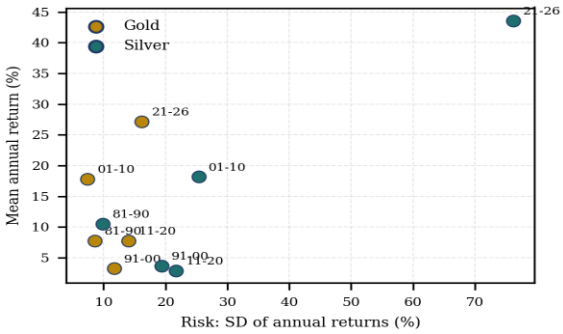

Fig. 4. Risk–return positioning of gold and silver by sub-period.

Figure 4 plots each sub-period in mean-return versus standard-deviation space. Gold's observations cluster to the left, indicating consistently lower risk; silver's

2021–2026 observation lies far to the right, with a standard deviation of 76.18 per cent.

E. Co-Movement between the Two Metals

Pearson's product-moment correlation between the annual returns of the two metals over 1982–2026 is 0.535, significant at the one per cent level ($p = 0.00015$), with a coefficient of determination of 0.2867. The Spearman rank correlation of 0.552 ($p = 0.00009$) confirms that the association is not an artefact of the extreme observations in silver's distribution. Ordinary least squares regression of silver returns on gold returns yields

$$RS = -1.066 + 1.331\,RG, \quad R^2 = 0.2867$$

with a standard error on the slope coefficient of 0.320 ($t = 4.158$, $p < 0.001$). The slope coefficient of 1.331 is silver's beta with respect to gold: for every one percentage point of gold return, silver moves 1.331 percentage points in the same direction on average. This amplification effect gives silver its reputation as the aggressive precious metal. The R^2 of 0.2867 is equally important. It indicates that gold movements explain only 28.67 per cent of the variation in silver returns; the remaining 71.33 per cent is driven by silver-specific factors — principally industrial demand, mine supply and inventory conditions — that have no counterpart in the gold market. This is the empirical signature of the dual monetary-industrial character described in [7], and explains why the causal relationship documented in [5] was found to be frequency-dependent rather than uniform.

The moderate correlation of 0.535 also carries a portfolio implication. Because the two metals are positively but imperfectly correlated, holding both provides some diversification benefit relative to holding either alone. The benefit is, however, limited: at a correlation above 0.5 the two assets are close enough that a precious-metals allocation split between them is not meaningfully more diversified than a concentrated gold position, and the addition of silver raises portfolio volatility considerably more than it lowers it.

F. The Gold–Silver Ratio

The gold–silver ratio expresses how many grams of silver one gram of gold will purchase, and is widely used by practitioners as a relative-value indicator. Table V summarises its behaviour across the study period.

TABLE V BEHAVIOUR OF THE GOLD–SILVER RATIO, 1981–2026

Statistic	Value	Remark
Mean	62.75	Long-run central tendency
Standard deviation	12.40	Moderate dispersion
Minimum	39.65 (2025)	Silver dearest vs gold
First quartile	53.67	Silver relatively dear
Median	60.99	Close to the mean
Third quartile	72.14	Silver relatively cheap
Maximum	95.59 (2022)	Silver cheapest vs gold
Value in 1981	61.51	Near long-run mean
Value in 2026	65.42	Near long-run mean

Source: Computed by the author from data in [9], [10].

The ratio exhibits clear mean-reverting behaviour around a long-run central value of approximately 63, with excursions to 95.59 in 2022 and to 39.65 in 2025. That the ratio began the period at 61.51 and ended it at 65.42, having traversed the full range in between, is itself evidence of mean reversion and explains why the two metals produced nearly identical compound growth across the full window despite radically different intermediate paths. The practical inference is that the ratio may hold tactical value: readings substantially above the third quartile have historically preceded periods of silver outperformance, and readings below the first quartile have preceded periods of gold outperformance. The 2022 reading of 95.59, the highest in the series, was followed by silver returns of 42.65 per cent in 2023 and 173.77 per cent in 2025; the 2025 reading of 39.65, the lowest in the series, was followed by a silver decline of 8.40 per cent alongside a gold advance of 51.15 per cent in 2026. This pattern is suggestive rather than conclusive, and formal testing of a ratio-based switching rule lies beyond the scope of the present study.

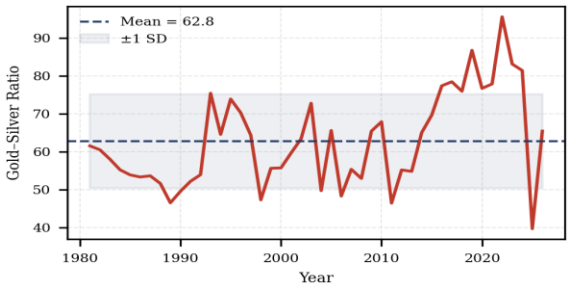

Fig. 3. Gold–silver ratio in India, 1981–2026, with long-run mean and ±1 SD band.

G. Hypothesis Testing

Table VI presents the results of the formal tests of the three stated hypotheses.

TABLE VI RESULTS OF HYPOTHESIS TESTING

Hyp.	Test Applied	Statistic	p-value	Decision
H01	Welch t-test	t = −0.490	0.626	Not rejected
H01	Paired t-test	t = −0.618	0.540	Not rejected
H02	Variance-ratio F	F = 6.179	<0.001	Rejected (1%)
H02	Levene's test	W = 4.422	0.038	Rejected (5%)
H03	Pearson corr.	r = 0.535	0.00015	Rejected (1%)
H03	Spearman corr.	ρ = 0.552	0.00009	Rejected (1%)

Source: Computed by the author using SciPy. Degrees of freedom for the F-test are (44, 44).

The first null hypothesis, that mean annual returns do not differ significantly between the two metals, cannot be rejected. Both the Welch test ($t = -0.490$, $p = 0.626$) and the paired test ($t = -0.618$, $p = 0.540$) return p-values far above conventional thresholds. Although silver's arithmetic mean exceeds gold's by 2.71 percentage points, the dispersion of silver's returns is so wide that this difference is statistically indistinguishable from zero. The second null hypothesis, that return variances do not differ, is rejected decisively: the variance ratio of 6.179 is significant beyond the one per cent level, and Levene's test — which does not assume normality and is therefore the more appropriate test given silver's non-normal distribution — confirms the result at the five per cent level ($W = 4.422$, $p = 0.038$). The third null hypothesis, that no relationship exists between the returns of the two metals, is rejected at the one per cent level under both parametric and non-parametric tests. Taken together, these results yield the study's principal conclusion in compact form: the two metals delivered statistically equivalent returns while exposing the investor to significantly unequal risk. Where two assets offer the same expected return but one carries substantially higher variance, the mean–variance framework unambiguously favours the lower-variance asset.

H. Robustness

Because the 2025 silver observation represents an extreme value, the entire analysis was re-estimated excluding both 2025 and 2026. Over the restricted window 1982–2024 ($n = 43$), gold's mean annual return is 10.00 per cent with a standard deviation of 12.29 per cent, while silver's mean is 10.97 per cent with a standard deviation of 24.89 per cent. The coefficients of variation are 1.23 and 2.27 respectively, the variance ratio remains substantial at 4.102, the correlation strengthens to 0.662 ($p < 0.001$), and the difference in means remains statistically insignificant ($t = -0.227$, $p = 0.821$). The core conclusions are therefore not artefacts of the terminal observations, and gold's advantage in consistency and risk containment holds across specifications.

VI. MAJOR FINDINGS

1) Gold recorded a compound annual growth rate of 10.62 per cent over 1981–2026 against silver's 10.47 per cent, converting an investment of ₹1,00,000 into ₹94.01 lakh and ₹88.40 lakh respectively. Over the full horizon the two metals were near-equivalent wealth creators.
2) The difference in mean annual returns is not statistically significant (Welch $t = -0.490$, $p = 0.626$). Silver's higher arithmetic mean of 14.15 per cent against gold's 11.44 per cent is not distinguishable from zero once its dispersion is accounted for.
3) The difference in return variance is highly significant ($F = 6.179$, $p < 0.001$). Silver's standard deviation of 34.53 per cent is 2.49 times gold's 13.89 per cent, and gold's standard deviation was lower in every one of the five sub-periods examined.

4) Gold delivered positive returns in 37 of 45 years (82.22 per cent) against silver's 27 of 45 (60.00 per cent). Silver's median annual return of 3.74 per cent is less than half gold's 9.42 per cent, indicating that silver's superior mean is driven by a small number of exceptional years rather than by typical performance.
5) Silver's return distribution is severely non-normal, with skewness of 2.832 and excess kurtosis of 10.542; the Shapiro–Wilk test rejects normality at $p < 0.001$. Gold's distribution approximates normality ($W = 0.9645$, $p = 0.181$).
6) Gold's maximum drawdown of −21.61 per cent is substantially shallower than silver's −34.99 per cent, and gold stood below a prior peak in eleven of forty-six observations against silver's twenty-eight. Silver's post-2011 recovery required nine years.
7) The two metals are moderately and positively correlated ($r = 0.535$, $p < 0.001$), with silver exhibiting a beta of 1.331 relative to gold. Gold movements explain only 28.67 per cent of the variation in silver returns, confirming the influence of silver-specific industrial factors.
8) The gold–silver ratio is mean-reverting around a long-run value of 62.75, ranging from 39.65 in 2025 to 95.59 in 2022. Extreme readings have historically preceded reversals in relative performance.
9) The decade 1991–2000 produced compound growth of only 2.69 per cent for gold and 1.94 per cent for silver, both below prevailing Indian inflation, demonstrating that precious metals do not guarantee purchasing power preservation over every ten-year horizon.
10) All principal findings survive the exclusion of the extreme 2025 and 2026 observations, confirming robustness.

VII. CONCLUSION AND IMPLICATIONS

This study set out to determine, on the basis of forty-six years of Indian price data, whether gold or silver constitutes the superior investment asset. The answer that emerges is that the question is incorrectly posed if superiority is understood in terms of return alone. On the return dimension the two metals are, over the long run, near-identical: a difference of fifteen basis points in compound annual growth across forty-five years is economically negligible and statistically insignificant. Superiority resides entirely in the risk dimension, and there the verdict is unambiguous. Gold achieved the same long-run outcome as silver while subjecting the investor to less than half the volatility, a shallower maximum drawdown, a shorter recovery period and a materially higher probability of ending any given year in profit.

The mechanism underlying this asymmetry is the dual demand structure of the two metals. Gold's demand base — jewellery, investment and official reserves — is comparatively stable and countercyclical in its investment component, which is precisely why gold's correlation with equity indices turns negative during crises, as demonstrated for the Indian market in [8]. Silver's demand base includes a large procyclical industrial component, so that silver is simultaneously exposed to monetary drivers, which push its price up during crises, and to industrial drivers, which push its price down. The result is that silver amplifies gold's movements in both directions without offering compensating reliability, consistent with the weaker and less consistent inflation response documented in [7].

Several implications follow. For the retail investor and the ordinary Indian household, gold is the appropriate core precious-metal holding. Its consistency, shallower drawdowns and shorter recovery periods align with the typical household's need to be able to liquidate at short notice without crystallising a large loss. Silver may be included as a satellite position sized to a small fraction of the precious-metal allocation, and should be entered with an explicit multi-year horizon and an understanding that several consecutive losing years are a normal feature of its behaviour rather than an aberration. For the tactically inclined investor, the mean-reverting gold–silver ratio offers a rules-based framework: accumulate silver when the ratio exceeds its third quartile of approximately 72 and rotate towards gold when it falls below its first quartile of approximately 54.

For financial advisers and educators, the most important practical message concerns the gap between silver's mean and median return. Retail marketing of silver frequently cites average returns without disclosing the distribution from which they arise. A client presented with silver's 14.15 per cent average is entitled to know that the typical year delivers 3.74 per cent and that four years in ten deliver a loss.

Communicating the median alongside the mean, and the drawdown alongside the return, would materially improve the quality of retail investment decisions in this asset class.

For policymakers, the finding that gold has compounded at above ten per cent in nominal rupee terms for over four decades helps explain the persistence of household gold accumulation despite successive attempts to channel savings into financial instruments. Schemes seeking to mobilise idle household gold are unlikely to succeed on appeals to financial rationality alone, since the asset in question has been a rational holding on its own terms. The greater opportunity may lie in improving the accessibility, transparency and cost-efficiency of paper and digital forms of both metals, so that the demonstrated investment merit of gold — and the demonstrated risk of silver — can be accessed without the fabrication charges, purity uncertainty and storage costs attaching to physical holdings.

VIII. LIMITATIONS AND SCOPE FOR FURTHER RESEARCH

The study is subject to several limitations conditioning the interpretation of its results. First, the analysis uses average annual observations, which conceal intra-year volatility and therefore understate the true short-horizon risk of both metals; monthly or daily data would yield higher volatility estimates and permit the application of conditional heteroskedasticity models. Second, the price series is drawn from a secondary aggregator; although the source states that the figures are average annual prices, the very large single-year movement recorded for silver in 2025 is of a magnitude without precedent in the series, and corroboration against Multi Commodity Exchange or India Bullion and Jewellers Association records is advisable before the figure is relied upon for policy purposes. Third, all returns are nominal; deflating by the consumer price index would permit direct assessment of real wealth preservation and formal testing of the inflation-hedging hypothesis. Fourth, the analysis is confined to price appreciation and excludes transaction costs, making charges, storage costs, insurance and capital gains taxation, all of which materially affect the realised return on physical holdings. Fifth, no comparison is made with alternative asset classes such as equity, debt or real estate, which limits the portfolio-level conclusions that can be drawn.

Several extensions suggest themselves. A study using monthly data with GARCH-family models would permit direct estimation of volatility clustering, leverage effects and volatility spillovers between the two metals. Inflation-adjusted analysis using the CPI-IW or the current CPI series would test the purchasing-power hypothesis rigorously in the Indian context. A multi-asset portfolio optimisation incorporating gold, silver, the Nifty 50 and government securities would establish the efficient allocation to each metal across risk-tolerance levels. Formal backtesting of a gold–silver ratio switching strategy, incorporating realistic transaction costs, would test the tactical inference advanced in Section V-F. Finally, a primary survey of Indian household investors examining the divergence between perceived and actual risk in silver investment would complement the secondary analysis presented here and connect it to the behavioural literature.

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APPENDIX

TABLE VII ANNUAL PRICE, RETURN AND RATIO DATA, 1981–2026

Year	Gold (₹/10 g)	Silver (₹/kg)	Gold Ret. (%)	Silver Ret. (%)	GSR
1981	1,670	2,715	—	—	61.51
1982	1,645	2,720	-1.50	0.18	60.48
1983	1,800	3,105	9.42	14.15	57.97
1984	1,970	3,570	9.44	14.98	55.18
1985	2,130	3,955	8.12	10.78	53.86
1986	2,140	4,015	0.47	1.52	53.30
1987	2,570	4,794	20.09	19.40	53.61
1988	3,130	6,066	21.79	26.53	51.60
1989	3,140	6,755	0.32	11.36	46.48
1990	3,200	6,463	1.91	-4.32	49.51
1991	3,466	6,646	8.31	2.83	52.15
1992	4,334	8,040	25.04	20.98	53.91
1993	4,140	5,489	-4.48	-31.73	75.42
1994	4,598	7,124	11.06	29.79	64.54
1995	4,680	6,335	1.78	-11.08	73.88
1996	5,160	7,346	10.26	15.96	70.24
1997	4,725	7,345	-8.43	-0.01	64.33
1998	4,045	8,560	-14.39	16.54	47.25
1999	4,234	7,615	4.67	-11.04	55.60
2004	5,850	11,770	4.46	52.96	49.70
2005	7,000	10,675	19.66	-9.30	65.57
2006	8,400	17,405	20.00	63.04	48.26
2007	10,800	19,520	28.57	12.15	55.33
2008	12,500	23,625	15.74	21.03	52.91
2009	14,500	22,165	16.00	-6.18	65.42
2010	18,500	27,255	27.59	22.96	67.88
2011	26,400	56,900	42.70	108.77	46.40
2012	31,050	56,290	17.61	-1.07	55.16
2013	29,600	54,030	-4.67	-4.01	54.78
2014	28,006.50	43,070	-5.38	-20.29	65.03
2015	26,343.50	37,825	-5.94	-12.18	69.65
2016	28,623.50	36,990	8.65	-2.21	77.38
2017	29,667.50	37,825	3.65	2.26	78.43
2018	31,438	41,400	5.97	9.45	75.94
2019	35,220	40,600	12.03	-1.93	86.75
2020	48,651	63,435	38.13	56.24	76.69
2021	48,720	62,572	0.14	-1.36	77.86
2022	52,670	55,100	8.11	-11.94	95.59

2000	4,400	7,900	3.92	3.74	55.70
2001	4,300	7,215	-2.27	-8.67	59.60
2002	4,990	7,875	16.05	9.15	63.37
2003	5,600	7,695	12.22	-2.29	72.77
2023	65,330	78,600	24.04	42.65	83.12
2024	77,913	95,700	19.26	21.76	81.41
2025	1,03,870	2,62,000	33.32	173.77	39.65
2026	1,57,000	2,40,000	51.15	-8.40	65.42

Note: GSR = gold–silver ratio on a per-gram equivalent basis. The 2026 figures are partial-year observations recorded as at the date of compilation. Source: Compiled and computed by the author from [9] and [10].