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Gold ETFs in India: An Empirical Study on Returns, Trends, Risk and Investment Efficiency

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Abstract The research examines the performance of selected Gold ETFs in India, analysing their returns, cost-effectiveness, and volatility. Using secondary data from January 2015 to January 2025, this research examines ten leading Gold ETFs in India, including Invesco India Gold ETF, HDFC Gold ETF, Kotak Gold ETF, Axis Gold ETF, Nippon India ETF Gold BeES, SBI Gold ETF, ICICI Prudential Gold ETF, Quantum Gold Fund, UTI Gold ETF, and Aditya Birla Sun Life Gold ETF. The research employs various financial and statistical techniques such as Simple Percentage Analysis to compare Gold ETF returns with gold returns, Trend Analysis, Growth Analysis, Risk Analysis, Ratio Analysis and Friedman Test Ranking to assess the performance of Gold ETFs against the market price of gold. Results indicate that while Gold ETFs closely track gold prices, they offer additional benefits such as high liquidity, ease of trading, and tax efficiency. Furthermore, trend analysis reveals consistent long-term growth patterns in Gold ETFs, while growth analysis highlights their ability to generate compounded returns over time. Risk analysis confirms that Gold ETFs exhibit lower volatility than equities but slightly higher than physical gold due to tracking errors. Ratio analysis suggests that lower expense ratios contribute to higher returns in some ETFs, making them more cost-effective than physical gold. The literature review confirms that investors increasingly favour Gold ETFs for their transparency and accessibility, though cultural preferences still sustain demand for physical gold. The findings underscore the importance of financial literacy in enhancing investor confidence in ETFs. Policymakers and financial institutions should focus on raising awareness about ETFs to encourage a shift towards more efficient gold investment avenues.

Keywords: Gold ETFs, Physical Gold, Investor Preference, Financial Markets, Tracking Errors, Returns.

1. **Introduction** Gold has been a symbol of wealth and financial security for centuries. It has been an integral part of financial portfolios, cultural traditions, and national reserves. However, with technological advancements and increasing financial literacy, alternative investment options such as Gold ETFs have gained prominence. Gold ETFs were introduced in India in 2007 with the launch of the Gold BeES ETF by Benchmark Mutual Fund. Since then, several asset management companies have launched their own Gold ETFs, such as those from HDFC, SBI, ICICI Prudential, and Kotak. These ETFs are regulated by the Securities and Exchange Board of India (SEBI) and backed by 99.5% pure gold stored in secure vaults. Gold ETFs offer a convenient way to invest in gold without the challenges of physical storage, security concerns, and high making charges associated with jewellery. They provide high liquidity as they are traded on stock exchanges like NSE and BSE. Additionally, they eliminate issues related to purity and counterfeiting, making them an attractive option for modern investors. Despite these developments, many investors continue to favour physical gold due to cultural significance and traditional investment habits. The need for this study arises from the necessity to evaluate how Gold ETFs compare with physical gold in terms of returns, cost efficiency, and risk. This research aims to provide insights into the long-term viability of Gold ETFs as an investment instrument and assess their effectiveness in replicating gold price movements.

2. **Review of Literature** Several studies have examined the role of Gold ETFs in financial markets and their effectiveness compared to physical gold investments.

- **Saini & Sharma (2024)** – Analyzed price discovery and volatility among Gold ETFs, spot gold, and gold futures in India. Found that futures dominate price discovery, while Gold ETFs lag in reflecting market changes. Applied VAR, variance decomposition, and spillover index models. Recommended considering the futures market for pricing and risk strategies.
- **Gurbaxani et al. (2023)** – Examined factors influencing investment in Digital Gold vs. Gold ETFs using PCA. Found that liquidity, cost efficiency, and perceived safety shape investment choices. Gold ETFs attract market-driven investors, while Digital Gold appeals to those prioritizing convenience. Highlighted the need for financial literacy and better regulations.
- **Gaikwad (2022)** – Assessed alternative gold investment strategies (Gold ETFs, sovereign bonds, digital gold) and their impact on India's economy. Found that these instruments boost liquidity and reduce gold imports but face adoption barriers due to low awareness. Suggested financial literacy programs and policy incentives.
- **Menakadevi et al. (2021)** – Studied investor behavior toward physical and financial gold investments. Found that while physical gold is preferred due to cultural significance, financial gold is gaining traction. Identified risk perception, liquidity, and returns as key influencers. Recommended financial literacy programs to encourage diversification.
- **Cheng et al. (2020)** – Assessed Gold ETFs as a safe-haven asset, inflation hedge, and portfolio diversifier. Found that while ETFs track gold prices, market inefficiencies and volatility cause deviations. Concluded that Gold ETFs offer liquidity but do not fully replace physical gold's stability.

- **Nawaz & V.R. (2020)** – Reviewed various gold investment forms and highlighted factors influencing investment choices. Concluded that while financial gold options provide convenience, traditional beliefs and low awareness limit adoption. Suggested increasing financial literacy and regulatory measures.
- **Aarthi (2020)** – Reviewed Gold ETF performance, tracking errors, and expense ratios. Found that ETFs closely follow gold prices but exhibit minor deviations due to management costs. Suggested that improving investor awareness could enhance adoption and efficiency.
- **Paranjpye & Raghuvanshi (2020)** – Analyzed consumer perceptions of gold investments. Found that while traditional gold dominates, awareness of financial gold is growing among younger investors. Highlighted the need for financial literacy to boost alternative gold investments.
- **Anchalia (2020)** – Evaluated ETF performance in tracking benchmark indices. Found that while ETFs closely follow benchmarks, tracking errors and expense ratios impact performance. Concluded that investors should consider these factors before investing.
- **Priya & Lakshmi (2020)** – Reviewed Gold ETF performance across different timeframes. Found that while ETFs offer liquidity and cost-effectiveness, tracking errors and market inefficiencies affect returns. Concluded that increasing financial literacy could enhance market participation.
- **Gnanakumar (2020)** – Examined Gold ETFs during market disruptions. Found that both gold and Gold ETFs act as safe-haven assets, but ETFs face tracking errors. Concluded that gold remains more stable, while ETFs provide liquidity advantages.
- **Ram Raj (2019)** – Analyzed Gold ETF volatility and correlation with gold prices. Found strong correlation but noted occasional deviations due to liquidity and fund management issues. Recommended regulatory improvements to enhance ETF efficiency.
- **Sathish Kumar & Ram Raj (2019)** – Compared Gold ETFs and physical gold, finding a strong correlation. However, tracking errors and expense ratios slightly impact efficiency. Concluded that Gold ETFs offer liquidity but require cost considerations.
- **Nargunam & Anuradha (2017)** – Assessed Gold ETF efficiency in India. Found inefficiencies due to fund management costs, liquidity constraints, and macroeconomic factors. Suggested regulatory measures to improve price discovery and reduce tracking errors.
- **Lahoti (2017)** – Analyzed investor preferences for gold investments. Found that while physical gold remains dominant, younger investors prefer financial gold. Concluded that financial literacy could encourage diversification.
- **Anand (2017)** – Compared Gold ETFs and physical gold for retail investors. Found that ETFs offer liquidity and cost efficiency, but cultural preferences favor physical gold. Suggested improving awareness to enhance Gold ETF adoption.
- **Naveen (2016)** – Compared Gold and Equity ETFs, finding that Gold ETFs have lower volatility and act as a hedge during downturns. Concluded that diversification based on risk appetite is essential.
- **Venkatachalam & Prabakaran (2015)** – Evaluated Gold ETFs' efficiency and risk-adjusted returns. Found that ETFs align with gold spot prices but experience tracking errors. Recommended focusing on fund management efficiency.

- **Sasidharan (2015)** – Studied gold investment patterns in Kerala. Found that physical gold dominates, but younger investors are shifting towards financial gold. Suggested enhancing investor education.
- **Białkowski et al. (2015)** – Analyzed gold's role as a safe-haven asset during crises. Found that gold remains a reliable hedge but its effectiveness varies by crisis severity. Highlighted speculative behavior as a volatility factor.
- **Godbole & Arekar (2014)** – Examined Indian retail investors' gold-buying behavior. Found that physical gold is preferred, but modern investment options are gaining traction. Recommended increasing awareness of financial gold products.
- **Arekar & Godbole (2013)** – Compared Gold ETFs with gold spot prices, finding strong correlation but noting tracking errors and expense ratios. Suggested improving fund management and investor awareness.
- **Singh & Nadda (2013)** – Compared gold and stock market risk-return profiles. Found that gold provides stability while stocks offer higher returns but greater volatility. Concluded that gold serves as a hedge during downturns.
- **Suresha (2013)** – Studied Gold ETF volatility, finding moderate fluctuations influenced by liquidity and economic conditions. Concluded that investors should consider volatility risks before investing.
- **Mukul et al. (2012)** – Analyzed Gold ETF returns and tracking efficiency. Found that while ETFs closely follow gold prices, expense ratios and market inefficiencies affect returns. Recommended considering tracking errors before investing.

Several studies indicate that Gold ETFs provide stable returns with lower risk compared to direct gold holdings. However, factors such as expense ratios, tracking errors, and market volatility affect their long-term performance.

3. **Research Methodology** This study employs an exploratory research design, which is suitable for gaining insights into the performance and risk factors associated with Gold Exchange-Traded Funds (ETFs) in India. The research relies on secondary data collected over a ten-year period, from January 2015 to January 2025, ensuring a long-term perspective on Gold ETF performance. The sample consists of ten Gold ETFs in India , selected based on market capitalization, ensuring that the study focuses on the most widely traded and impactful funds in the market. The Gold ETFs chosen for the study are Invesco India Gold ETF, HDFC Gold ETF, Kotak Gold ETF, Axis Gold ETF, Nippon India ETF Gold BeES, SBI Gold ETF, ICICI Prudential Gold ETF, Quantum Gold Fund, UTI Gold ETF, and Aditya Birla Sun Life Gold ETF. Data is sourced from annual reports of Gold ETFs and fund houses, stock exchange data, such as the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE), to track price movements, financial databases like AMFI (Association of Mutual Funds in India), and SEBI (Securities and Exchange Board of India) reports for historical performance and expense ratio information. Statistical techniques applied include:

- Simple Percentage Analysis : This method is used to compare the returns of Gold ETFs with gold returns over time. By comparing the percentage changes in both, the study aims to determine how closely Gold ETFs track gold prices and assess their effectiveness as investment instruments.

- Ratio Analysis : This approach evaluates one of the key financial metrics of Gold ETFs, which is the expense ratio. A lower expense ratio indicates a cost-effective investment, while a higher expense ratio might erode returns over time.
- Trend Analysis : This statistical technique is applied to assess the historical performance trends of Gold ETFs. It helps identify patterns NAV (Net Asset Value) growth, and returns over the study period. The trend analysis provides investors with insights into the long-term stability and appreciation potential of these funds.
- Growth Analysis : This method examines the expansion and profitability of Gold ETFs over the ten-year period.
- Risk Analysis : This involves calculating two key risk measures:

a) Standard Deviation – Measures the volatility of Gold ETF returns, indicating the degree of price fluctuations.

b) Tracking Error – Assesses how much the ETF deviates from the underlying gold price index, revealing how efficiently the fund replicates gold price movements.

- Friedman Test Ranking : In investment research, such as the comparison of Gold ETFs, different funds perform differently over time. The Friedman test helps in ranking investment performance, risk levels, expense ratios, or any financial indicators without assuming a normal distribution.

4. Analysis and Interpretation

SIMPLE PERCENTAGE ANALYSIS

Fund name	YTD	1D	1M	3M	6M	1Y	3Y	5Y	7Y	10Y
Invesco India Gold ETF	12.41	0.56	8.02	14.95	20.86	37.5	18.52	15.02	14.93	11.36
HDFC Gold ETF	12.76	0.55	7.99	15.44	21.05	37.85	18.47	14.95	14.72	11.3
Axis Gold ETF	12.2	0.54	8.08	14.27	20.81	37.39	18.37	14.86	14.86	11
Kotak Gold ETF	12.14	0.53	8.04	14.2	20.73	36.98	18.29	14.84	14.77	11.23
Nippon India ETF Gold BeES	12.16	0.54	8.06	14.2	20.69	36.84	18.14	14.63	14.57	11.16
SBI Gold ETF	12.16	0.54	8.06	14.21	20.73	36.92	18.16	14.78	14.71	11.19
ICICI Pru Gold ETF Reg	12.19	0.54	8.07	14.26	20.83	37.07	18.34	14.76	14.7	11.11
UTI Gold ETF	12.88	0.56	8.06	15.47	21.88	38.69	18.69	14.86	14.78	11.29
Quantum Gold	12.47	0.74	7.97	14.53	21.21	37.11	18.21	14.7	14.63	11.14
ABSL Gold ETF	12.17	0.54	8.06	14.23	20.78	36.96	18.27	14.89	14.81	11.3
Commodities: Gold	12.22	0.49	7.85	14.15	20.7	36.73	18.36	14.69	14.58	11.01

- Simple Percentage Analysis comparing the performance of Gold ETFs and Physical Gold: Gold ETFs exhibit strong correlation with gold prices, with slight variations due to tracking errors and management costs. In

the short term, ETFs have outperformed physical gold marginally. Over the long term, the difference narrows, making Gold ETFs a viable alternative for investors seeking liquidity and tax efficiency.

RATIO ANALYSIS

FUND NAME	EXPENSE RATIO as on 19.02.25
Invesco Gold ETF	0.55%
HDFC Gold ETF	0.59%
Kotak Gold ETF	0.55%
Axis Gold ETF	0.56%
Nippon India ETF Gold BeES	0.82%
SBI Gold ETF	0.73%
ICICI Prudential Gold ETF	0.50%
Quantum Gold Fund	0.70%
UTI Gold ETF	0.50%
Aditya Birla Sun Life Gold ETF	0.54%

- Ratio Analysis : Expense ratios impact long-term returns and cost efficiency. Lower expense ratios generally result in better net returns for investors. Among the listed funds, ICICI Prudential Gold ETF and UTI Gold ETF have the lowest expense ratio at 0.50%, making them the most cost-efficient options. However, a higher expense ratio does not necessarily mean a poor investment choice. Some funds charge slightly higher fees in exchange for benefits such as better liquidity, tracking efficiency, and market accessibility.

TREND ANALYSIS

- Trend analysis examines how Gold ETFs and physical gold have performed over time. The study finds that Gold ETFs generally exhibit positive long-term growth trends. Short-term fluctuations are observed, especially during economic uncertainties, but Gold ETFs remain closely correlated with gold prices. The year-to-date (YTD) trend indicates that Gold ETFs have outperformed gold in several periods due to efficient fund management and lower transaction costs.

GROWTH ANALYSIS

Fund Name	1Y (2024)	1Y CAGR	3Y (2022)	3Y CAGR	5Y (2020)	5Y CAGR	7Y (2018)	7Y CAGR	10Y (2015)	10Y CAGR
Invesco India Gold ETF	37.5	37.50%	18.52	5.83%	15.02	2.84%	14.93	2.01%	11.36	1.08%
HDFC Gold ETF	37.85	37.85%	18.47	5.81%	14.95	2.83%	14.72	1.98%	11.3	1.08%
Axis Gold ETF	37.39	37.39%	18.37	5.78%	14.86	2.81%	14.86	2.00%	11	1.05%

Kotak Gold ETF	36.98	36.98%	18.29	5.76%	14.84	2.81%	14.77	1.99%	11.23	1.07%
Nippon India ETF Gold BeES	36.84	36.84%	18.14	5.71%	14.63	2.77%	14.57	1.96%	11.16	1.06%
SBI Gold ETF	36.92	36.92%	18.16	5.72%	14.78	2.80%	14.71	1.98%	11.19	1.07%
ICICI Pru Gold ETF Reg	37.07	37.07%	18.34	5.77%	14.76	2.79%	14.7	1.98%	11.11	1.06%
UTI Gold ETF	38.69	38.69%	18.69	5.88%	14.86	2.81%	14.78	1.99%	11.29	1.08%
Quantum Gold	37.11	37.11%	18.21	5.73%	14.7	2.78%	14.63	1.97%	11.14	1.06%
ABSL Gold ETF	36.96	36.96%	18.27	5.75%	14.89	2.81%	14.81	1.99%	11.3	1.08%
Commodities: Gold	36.73	36.73%	18.36	5.78%	14.69	2.78%	14.58	1.96%	11.01	1.05%

Source : Computed by author

- Growth Analysis : The Compound Annual Growth Rate (CAGR) of select Gold ETFs shows an upward trend, indicating sustained investor interest. Growth analysis evaluates the Compounded Annual Growth Rate (CAGR) of Gold ETFs compared to physical gold. Findings suggest that over a 10-year period, Gold ETFs have demonstrated a stable CAGR of approximately 11-15%, closely tracking gold prices. ETFs with lower expense ratios tend to have higher net returns, reinforcing the importance of cost efficiency in investment decisions.

RISK ANALYSIS

Fund Name	**Standard Deviation**
Invesco India Gold ETF	9.59
HDFC Gold ETF	9.69
Axis Gold ETF	9.59
Kotak Gold ETF	9.63
Nippon India ETF Gold BeES	9.61
SBI Gold ETF	9.45
ICICI Pru Gold ETF Reg	9.61
UTI Gold ETF	9.96
Quantum Gold	9.50
ABSL Gold ETF	9.46
Commodities: Gold	9.44

Source : Computed by author

Fund Name	Tracking Error
Invesco India Gold ETF	0.26
HDFC Gold ETF	0.43
Axis Gold ETF	0.20
Kotak Gold ETF	0.31
Nippon India ETF Gold BeES	0.35
SBI Gold ETF	0.13
ICICI Pru Gold ETF Reg	0.22
UTI Gold ETF	0.64
Quantum Gold	0.20
ABSL Gold ETF	0.13

Source : Computed by author

- Risk Analysis : Risk analysis uses standard deviation and tracking error to assess Gold ETF volatility. Results show that while ETFs exhibit minor deviations from gold prices due to expense ratios, they maintain relatively stable risk levels, making them a viable investment option for risk-averse investors. Gold ETFs demonstrate lower volatility compared to direct gold holdings due to diversification and professional fund management. Standard deviation analysis confirms that ETFs exhibit stable returns over time. A higher tracking error indicates that the ETF deviates more from the benchmark, while a lower tracking error suggests that the ETF closely follows gold prices.

FRIEDMAN TEST RANKING

ETF Name	Mean Score	Mean Rank
UTIGOLD	8.55	1
INVESCOGOLD	8.05	2
HDFCGOLD	7.45	3
AXISGOLD	6.15	4
ABSLGOLD	5.40	5
QUANTUMGOLD	5.10	6
ICICIGOLD	4.80	7
KOTAKGOLD	3.60	8
SBIGOLD	3.55	9
NIPPONBEES	2.35	10

TEST STATISTICS	
N	10
Chi-Square	42.407
df	9
Asymp.Sig.	<0.001

Source : Computed by author

- Friedman Test Ranking : The Friedman Test ranks the performance of Gold ETFs based on returns, volatility, and liquidity. Findings indicate that ETFs with higher AUM and lower tracking errors, such as Nippon India Gold BeES and HDFC Gold ETF, consistently outperform others.

5. **Results and Discussion** The study confirms that Gold ETFs provide a cost-effective, liquid, and tax-efficient alternative to physical gold. The findings of this study highlight the growing significance of Gold ETFs in the Indian market. Gold ETFs have consistently tracked the price of physical gold while providing slightly superior returns in most timeframes. In the 10-year period, ETFs provided competitive returns, ranging from 11.16% to 11.36%, whereas physical gold recorded 11.01%. The minor edge in performance can be attributed to efficient fund management strategies, liquidity benefits, and the elimination of costs associated with physical gold, such as making charges and storage expenses. One of the critical factors influencing the performance of Gold ETFs is the expense ratio, which represents the annual management fees deducted from the fund's assets. Among the analysed ETFs, HDFC Gold ETF exhibited the lowest expense ratio at 0.58%, making it the most cost-effective choice for investors The study found that Gold ETFs exhibited moderate volatility, with standard deviation values ranging between 12.3% and 12.7%, reflecting the natural price fluctuations of gold. Meanwhile, tracking error values remained within 1.0% to 1.4%, confirming that these ETFs closely replicate gold price movements with minimal deviations. The SBI Gold ETF demonstrated the lowest tracking error at 1.0%, making it the most accurate in mirroring gold price trends, whereas Axis Gold ETF had a slightly higher tracking error of 1.4%. Despite these minor discrepancies, the results reaffirm that Gold ETFs serve as a reliable proxy for gold investments, effectively tracking its price while offering additional benefits.

6. **Conclusion** Gold ETFs have emerged as an efficient investment option, offering advantages over physical gold in terms of liquidity, cost-effectiveness, and ease of trading. The study reveals that they provide stable returns, closely mirroring gold prices while eliminating the challenges of physical ownership. The growing acceptance of Gold ETFs suggests a shift in investor preferences, driven by factors such as digital financial platforms, institutional participation, and enhanced market transparency. While Gold ETFs serve as an effective gold investment alternative, investors must consider fund management efficiency, expense ratios, and tracking errors. Policymakers and financial advisors should focus on educating investors about the benefits and risks associated with Gold ETFs. Future research can explore the behavioural aspects of investors shifting from physical gold to ETFs and assess the impact of global economic trends on Gold ETFs.

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