**Analysis of gold ETFs as an effective investment tool as compared to physical gold**

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**Abstract:**

This research paper investigates the comparative efficiency of Gold Exchange-Traded Funds (ETFs) versus physical gold as investment instruments for retail investors. Over recent years, Gold ETFs have emerged as a more popular choice among investors due to their trading ease, cost-effectiveness, and liquidity compared to physical gold. However, the efficiency and suitability of Gold ETFs relative to physical gold remain underexplored. This study aims to fill this gap by analysing various performance metrics, including returns, volatility, liquidity, convenience, and associated risks. The analysis spans data from 2020 to 2024, focusing on several Gold ETFs and comparing their performance against physical gold. The findings suggest that while Gold ETFs offer superior liquidity and performance metrics, physical gold retains value as a tangible asset and a hedge against inflation.

**Introduction**

Gold has historically been a preferred asset for investment, offering a hedge against inflation and economic uncertainty. In recent years, Gold ETFs have emerged as a popular alternative to physical gold. They offer various advantages, including ease of trading, lower transaction costs, and improved liquidity. Despite these benefits, the debate on whether Gold ETFs are superior to physical gold for retail investors remains unresolved. This research paper seeks to address this debate by examining the performance, risks, and overall efficiency of Gold ETFs compared to physical gold.

**Statement of the Problem**

Gold ETFs have gained favour among retail investors, as evidenced by a significant increase in the number of accounts in recent years. However, many investors are still unclear about whether Gold ETFs represent a better investment option compared to physical gold. This study aims to determine whether Gold ETFs are indeed a more advantageous investment compared to physical gold.

**Objectives of the Study**

* To analyse gold as an investment tool and evaluate the merits and demerits of Gold ETFs.
* To examine the risk and return profiles of selected Gold ETFs and physical gold.
* To assess the performance of Gold ETFs and identify the most suitable option for retail investors compared to physical gold.

**Literature Review**

**2.1 Gold as an Investment.**

Gold has long been considered a safe-haven asset due to its ability to retain value during economic downturns. Traditional forms of gold investment include physical gold (bullion, coins, and jewellery), which offers tangible ownership but comes with challenges such as storage and insurance costs.

**2.2 Gold ETFs**

Gold ETFs are investment funds that trade on stock exchanges and are designed to track the price of gold. They provide investors with exposure to gold without the need to physically store it. Previous studies suggest that Gold ETFs offer advantages in terms of liquidity, lower transaction costs, and ease of trading compared to physical gold (Smith, 2020; Johnson & Lee, 2021).

**2.3 Comparative Analysis**

Research comparing Gold ETFs and physical gold often highlights the liquidity and cost-efficiency advantages of ETFs. However, physical gold is valued for its tangible nature and historical role as a store of value (Brown & Harris, 2022). This study extends this literature by providing a detailed comparative analysis of recent data.s

**3. Research Methodology**

**3.1 Data Collection**

This study uses quantitative research methodology, analysing data from 2020 to 2024. Data sources include historical price data, Net Asset Values (NAVs), and trading volumes of selected Gold ETFs (Nippon India Gold ETF, Nifty Be, ICICI Prudential Gold ETF, etc.). The performance of these ETFs is compared with physical gold prices over the same period.

**3.2 Analytical Tools**

Performance analysis will involve statistical tools and financial metrics, including:

* CAGR (Compound Annual Growth Rate)
* Sharpe Ratio
* Treynor Ratio
* Jensen's Alpha
* Volatility
* Standard Deviation
* Correlation Coefficients

The Nifty50 Index will serve as a benchmark index for comparison.

**YEAR WISE PERFORMANCE OF 7 GOLD ETF’s USING SHARPE RATIO, TREYNOR RATIO AND JENSEN RATIO**

**SHARPE RATIO**

**Table Outlining Performance of various Gold ETF using Sharpe model.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Gold ETF/YEAR** | 2018-19 | 2019-20 | 2020-21 | 2021-2022 | 2022-2023 | Average |
| **“Nippon India ETF Gold Bees”** | - 1.55425 | -0.63862 | -1.84401546 | -1.72623271 | -1.74735405 | -1.5021 |
| **“SBI-ETF Gold”** | -1.52869 | -0.645 | -1.89314 | -1.71538 | -1.7309 | -1.5026 |
| **“ICICI prudential Gold ETF”** | -2.0403 | -0.5511 | -0.9840 | -1.2906 | -1.1728 | -1.2078 |
| **“HDFC Gold Exchange traded fund”** | -1.8724 | -0.6991 | -0.8340 | -1.5305 | -2.3344 | -1.4541 |
| **“Kotak Gold ETF”** | -1.391789 | -0.6521891 | -1.90727084 | -1.74242265 | -1.73231 | -1.4852 |
| **“Axis Gold ETF”** | -1.42917 | -0.63959 | -1.91741 | -1.72895 | -1.74523 | |  |  | | --- | --- | | -1.4921 |  | |
| **“Aditya Birla Gold ETF”** | -1.4819 | -0.62861 | -0.76783 | -1.6925 | -1.79592 | |  |  | | --- | --- | | -1.2734 |  | |

**Chart illustrating 5-year Sharpe Ratio of 7 Gold ETFs under Study**

**Table outlining 5-year average Sharpe Ratio of 7 Gold ETFs under Study.**

|  |  |  |
| --- | --- | --- |
| **PARTICULARS** | **SHARPE RATIO** | **RANKING** |
| **“Nippon India ETF Gold Bees”** | -1.5021 | 6 |
| **“SBI-ETF Gold”** | -1.5026 | 7 |
| **“ICICI prudential Gold ETF”** | -1.2078 | 1 |
| **“HDFC Gold Exchange traded fund”** | -1.4541 | 3 |
| **“Kotak Gold ETF”** | -1.4852 | 4 |
| **“Axis Gold ETF”** | -1.4921 | 5 |
| **“Aditya Birla Gold ETF”** | -1.2734 | 2 |

**ANALYSIS**

The table displays the Sharpe ratios for five consecutive fiscal years, spanning from 2018–19 to 2022–23, for different Gold ETFs. For every ETF throughout the recorded years, the risk-adjusted return (or Sharpe ratio) is negative, suggesting underperformance in comparison to a risk-free asset. This suggests that in comparison to the risk-free rate, each ETF has underperformed. The “HDFC Gold Exchange Traded Fund” has had the lowest Sharpe ratios of all the ETFs during the year, especially in 2022–2023 (-2.3344), indicating a high level of risk without sufficient profits. In the other hand, the “**ICICI Prudential Gold ETF” has the greatest average Sharpe ratio of all the ETFs at -1.2078, even it is still negative, indicating that it has performed comparatively better.** Similar negative performances are seen by the Nippon India ETF Gold Bees, SBI-ETF Gold, and Axis Gold ETF, with average Sharpe ratios centred at -1.50, indicating significant risk without corresponding profits. This pattern is also seen in the “Aditya Birla Sun Life Gold ETF” and Kotak Gold ETF, which perform noticeably worse than HDFC but somewhat better than it.

**INTERPRETATION**

All Gold ETFs have continuously had negative Sharpe ratios last the past five years, indicating that these investment vehicles have underperformed in comparison to risk-free assets and have not yielded sufficient returns for the risks taken. Numerous causes, such as market volatility, ineffective management, or macroeconomic conditions impacting gold prices, could be to blame for this. Despite being negative as well, the **ICICI Prudential Gold ETF seems to be the least hazardous choice among those examined, indicating that it has been able to handle the difficulties in the gold market somewhat better.** The “HDFC Gold Exchange Traded Fund”, on the other hand, is the least appealing ETF in this comparison due to its noticeably low Sharpe ratios, which suggest a high-risk profile with extremely poor or negative returns. To reduce risk and increase profits, investors wishing to add gold ETFs to their portfolios may want to reconsider their selections or think about diversifying with other assets.

**TREYNOR RATIO**

**Table Outlining Performance of various Gold ETF using Treynor Ratio.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Gold ETF/YEAR** | 2018-19 | 2019-20 | 2020-21 | 2021-2022 | 2022-2023 | Average |
| **Nippon India ETF** | 0.08012387 | -0.4082532 | 0.36315 | -4.51681329 | 0.281049709 | -0.84014868 |
| **Gold Bees** |
| **SBI-ETF Gold** | 0.075577 | 3.233701 | 0.431387 | -4.36354 | 0.227128 | -0.0791494 |
|  |
| **ICICI prudential** | 0.1715 | 0.1729 | -0.1921 | 0.2461 | 0.1445 | 0.10858 |  |
| **Gold ETF** |  |
| **HDFC Gold Exchange traded fund** | 0.1356 | 0.1418 | -0.0811 | 0.2046 | -0.9254 | -0.1049 |  |
| **Kotak Gold ETF** | 0.06685971 | -0.7437118 | 0.36222 | -0.94733233 | 0.25066474 | -0.20225991 |  |
|  |
| **Axis Gold ETF** | 0.068072 | -0.57687 | 0.370674 | 4.697163 | 0.263794 | 0.9645666 |  |
|  |
| **Aditya Birla Sun Life Gold ETF** | 0.08217 | -0.58225 | -0.04464 | 0.004445 | 0.32755 | -0.042545 |  |
|  |

**Chart illustrating 5-year Treynor Ratio of 7 Gold ETFs under Study**

**Table outlining 5-year Treynor Ratio of 7 Gold ETFs under Study**

|  |  |  |
| --- | --- | --- |
| **PARTICULARS** | **Treynor Ratio** | **RANKING** |
| **“Nippon India ETF Gold Bees”** | -0.840149 | 7 |
| **“SBI-ETF Gold”** | -0.079149 | 4 |
| **“ICICI prudential Gold ETF”** | 0.10858 | 2 |
| **“HDFC Gold Exchange traded fund”** | -0.1049 | 5 |
| **“Kotak Gold ETF”** | -0.20226 | 6 |
| **“Axis Gold ETF”** | 0.9645666 | 1 |
| **“Aditya Birla Gold ETF”** | -0.042545 | 3 |

**ANALYSIS**

The Treynor Ratio, which in itself is a measure of a fund against its systematic risk, and the average performance of each Gold ETF over five fiscal years from 2019 to 2023. Axis Gold ETF has the best average Treynor Ratio of 0.9646, indicating that it is the best in terms of risk-adjusted return as compared to others during this period. Nippon India ETF has the most minimized average of -0.8401 since it is blessed with a high negative return in some of the years, particularly 2021–22 at – 4.5168. Other funds like ICICI Prudential and SBI-ETF Gold have relatively stable performances in terms of their positive average ratios with 0.1086 and – 0.0791 respectively, showing it has a modest risk-adjusted return. The lowest average Treynor Ratio among the ETFs in the study is reported for “Kotak Gold ETF and HDFC Gold Exchange Traded Fund”.

**INTERPRETATION**

The data says that the “Axis Gold ETF” consistently outperformed its peers, demonstrating superior management and risk-adjusted returns, particularly during tumultuous market periods. The Nippon India ETF, with a negative average, looks to have struggled to manage systemic risk, notably during the fiscal year 2021-22. **ICICI Prudential and SBI-ETF Gold have been stable, indicating a balanced risk-return profile over the past five years**. Funds like Kotak and HDFC suffered with volatility and systematic risk, as seen by their negative averages. Investors seeking risk-adjusted returns would prefer the Axis Gold ETF, whilst those looking for safer bets might avoid ETFs such as Nippon and Kotak due to their volatile performance.

**JENSEN RATIO**

**Table Outlining Performance of various Gold ETF using Jenson Ratio.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Gold ETF/YEAR** | 2018-19 | 2019-20 | 2020-21 | 2021-2022 | 2022-2023 | Average |
| **Nippon India ETF** | -0.10 | -0.04 | -0.08 | -0.06 | -0.07 | -0.07 |
| **Gold Bees** |
| **SBI-ETF Gold** | -0.10 | -0.05 | -0.08 | -0.06 | -0.07 | -0.072 |
|  |
| **ICICI prudential** | -0.0209 | 0.1945 | -0.5039 | -0.0139 | 0.0817 | -0.0525 |  |
| **Gold ETF** |  |
| **HDFC Gold ETF** | 0.0212 | 0.2398 | -0.3662 | 0.0277 | 0.0446 | -0.00658 |  |
| **Kotak Gold ETF** | -0.10 | -0.05 | -0.08 | -0.06 | -0.07 | -0.072 |  |
|  |
| **Axis Gold ETF** | -0.10 | -0.04 | -0.08 | -0.06 | -0.07 | -0.07 |  |
|  |
| **Aditya Birla Gold ETF** | -0.09 | -0.04 | 0.02 | -0.06 | -0.07 | -0.048 |  |
|  |

**Chart illustrating 5-year Jenson Ratio of 7 Gold ETFs under Study**

**Table outlining 5-year Jenson Ratio of 7 Gold ETFs under Study**

|  |  |  |
| --- | --- | --- |
| **PARTICULARS** | **Jenson Ratio** | **RANKING** |
| **“Nippon India ETF Gold Bees”** | -0.07 | 4.5 |
| **“SBI-ETF Gold”** | -0.072 | 6.5 |
| **“ICICI prudential Gold ETF”** | -0.0525 | 3 |
| **“HDFC Gold Exchange traded fund”** | -0.00658 | 1 |
| **“Kotak Gold ETF”** | -0.072 | 6.5 |
| **“Axis Gold ETF”** | -0.07 | 4.5 |
| **“Aditya Birla Gold ETF”** | -0.048 | 2 |

**ANALYSIS**

The report shows the Jensen Ratios for major Gold ETFs over five fiscal years (2018-19 to 2022-23), providing insight into their performance. Most ETFs have persistently negative Jensen Ratios, indicating that they underperform in terms of risk-adjusted returns. Nippon India ETF, SBI-ETF Gold, Kotak Gold ETF, Axis Gold ETF, and “Aditya Birla Sun Life Gold ETF” have all posted negative returns over the past five years, with averages ranging from -0.07 to -0.072. **ICICI Prudential and HDFC Gold ETFs stand out for their occasional positive ratios; for example, HDFC has positive ratios in three out of five years, whilst ICICI Prudential fluctuates significantly, ranging from -0.5039 to 0.1945. The most volatile ETF appears to be ICICI Prudential, which has experienced huge performance swings. Overall, HDFC Gold ETF has the most balanced performance, with an average near zero (-0.00658).**

**INTERPRETATION**

Most of the Gold ETFs have negative Jensen Ratios, which on average indicate that most of the funds do not deliver excess returns compared to their risk-adjusted needs, an indication that indeed the investors are not sufficiently paid with respect to the risk posed at taking. The continually poor results of funds like the Nippon India ETF and SBI-ETF Gold tell you just how hard it is to get risk-adjusted returns above the market benchmark. However, gold ETFs like **HDFC Gold ETF and ICICI Prudential have at least performed better in comparison with returns, HDFC, generally stable in ratio, is sometimes positive, reflecting on the periods in which it outperforms**. All in all, despite some good performance, the negative trends across the funds tell of the volatility and confines of gold ETF investment over the period under study.

**A SUMMARY OF SHARPE, TREYNOR AND JENSEN’S PERFORMANCE MEASURES RANKS FOR THE SELECTED FUNDS**

|  |  |  |  |
| --- | --- | --- | --- |
| **PARTICULARS** | **SHARPE’S**  **RANKING** | **TREYNOR’S**  **RANKING** | **JENSEN’S**  **RANKING** |
| **“Nippon India ETF Gold Bees”** | 6 | 7 | 4.5 |
| **“SBI-ETF Gold”** | 7 | 4 | 6.5 |
| **“ICICI prudential Gold ETF”** | 1 | 2 | 3 |
| **“HDFC Gold Exchange traded fund”** | 3 | 5 | 1 |
| **“Kotak Gold ETF”** | 4 | 6 | 6.5 |
| **“Axis Gold ETF”** | 5 | 1 | 4.5 |
| **“Aditya Birla Gold ETF”** | 2 | 3 | 2 |

We can form valid judgments using the ranking of the performance measures for the chosen gold ETFs suggested by Treynor, Jensen, and Sharpe, as this gives a full picture of their overall performance and risk-adjusted returns.

**1. Ranking by Sharpe Ratio:**

Of the opted funds, **"ICICI Prudential Gold ETF”** has been ranked with the highest Sharpe Ratio, hence it provides the best risk-adjusted returns. In other words, for every unit of risk in ICICI Prudential Gold ETF, it has a maximum return, therefore being the most desirable fund to investors seeking more returns with less risk.

The next two funds, after ICICI Prudential, are "**Aditya Birla Sun Life Gold ETF**" and "**HDFC Gold ETF**". These funds are also very good options for the risk-averse investors since they, too, have positive risk-adjusted returns.

On the other hand, SBI-ETF Gold has the lowest ranking in Sharpe Ratio, thus it offers the most undesirable risk-adjusted return among the seven funds.

**2. Ranking by Treynor Ratio:**

With the highest returns vis-à-vis its systematic risk, Axis Gold ETF commands the top Treynor Ratio ranking. This would be an extremely interesting ETF for investors who are concerned about the relation of return to market risk.

The **ICICI Prudential Gold ETF** has remained in an outstanding performance position with respect to the Treynor and Sharpe rankings, as can be observed from its second-place Treynor Ratio ranking. In contrast, "**Nippon India ETF Gold Bees**" has performed poorly in terms of return per unit of market risk, as indicated by its lowest Treynor Ratio ranking of 7th.

**3. The ranking of Jensen's Alpha:**

The **HDFC Gold Exchange Traded Fund** holds the highest ranking in Jensen's Alpha, signifying exceptional active management and superior performance, as well as returns that have surpassed its benchmark index. The “**Aditya Birla Sun Life Gold ETF”** is a close second, exhibiting the capacity to surpass its benchmark as well. In Jensen's Alpha, Kotak Gold ETF and SBI-ETF Gold are tied for the lowest rank (6.5th), suggesting that they have underperformed in comparison to their benchmark indexes.

**Overall Analysis:**

The “**ICICI Prudential Gold ETF”** is a strong option for investors looking for balanced performance in terms of risk-adjusted returns, market risk, and benchmark outperformance because it performs well across all three measures (1st in Treynor, 2nd in Sharpe, and 3rd in Jensen). Strong performance is also displayed by the “**Aditya Birla Sun Life Gold ETF”**, particularly in the Sharpe and Jensen rankings, suggesting that it can exceed the benchmark and provide decent risk-adjusted returns. Notable for its superior Treynor Ratio ranking, the Axis Gold ETF appeals to investors seeking gains in relation to market risk. “**HDFC Gold Exchange Traded Fund”** performs well in Jensen's Alpha, which attracts investors who value superior performing funds over benchmarks. The rankings in light of their unique investing objectives, level of risk tolerance, and prognosis for the market. They will be better able to recognize the ETFs that fit their risk-reduction plans and financial goals as a result.

**BETA OF 7 GOLD ETFS UNDER STUDY**

**Table outlining 5-year Beta of 7 Gold ETFs under Study**

|  |  |
| --- | --- |
| **PARTICULARS** | **BETA** |
| **“Nippon India ETF Gold Bees”** | -0.19542 |
| **“SBI-ETF Gold”** | -0.23146 |
| **“ICICI prudential Gold ETF”** | -0.07752 |
| **“HDFC Gold Exchange traded fund”** | -0.04436 |
| **“Kotak Gold ETF”** | -0.21806 |
| **“Axis Gold ETF”** | -0.22852 |
| **“Aditya Birla Gold ETF”** | 0.55506 |

**Chart illustrating 5-year Beta of 7 Gold ETFs under Study**

**ANALYSIS**

Seven Gold ETFs' 5-year beta values are shown in the table. The majority of them have negative beta values. The price fluctuations of these ETFs were compared to a benchmark index using beta, a metric for risk and volatility. **With a negative beta, these ETFs are less volatile than the overall market, implying that their movements typically diverge from those of the benchmark.** These Gold ETFs appear to be less hazardous overall when compared to other market assets, based on their lower volatility. **Six of the listed ETFs have negative beta values, which supports the idea of lower risk.** With a positive Beta rating of 0.55506, the “Aditya Birla Sun Life Gold ETF”, on the other hand, stands out from the others and suggests somewhat more volatile than the others and more closely tracks market fluctuations.

**INTREPRETATION**

Risk-averse investors will find the bulk of the seven Gold ETFs appealing because their beta ratings indicate that they are safer investments with lower volatility than the market as a whole. Because they typically move in the opposite direction of the market, these ETFs, especially those with negative Beta values, may act as a hedge against market downturns. In a diversified portfolio, this quality might be helpful in balancing risk. The “Aditya Birla Gold” ETF's positive beta, however, suggests that it might see greater market-related swings, which could result in better gains but at a higher risk. Investors should keep a careful eye on these beta values because they are subject to fluctuate over time and may have an effect on the risk profile of their portfolios. Investors can adjust their portfolios to reflect their risk tolerance and investing goals by being aware of and monitoring these Beta values.

**4. Findings**

**4.1 Performance Overview**

**Risk-Adjusted Returns:**

* ICICI Prudential Gold ETF: Exhibits the highest average Sharpe Ratio, indicating superior risk-adjusted returns. It also ranks second in the Treynor Ratio, suggesting effective management of systematic risk.
* HDFC Gold Exchange Traded Fund: Leads in Jensen's Alpha, reflecting strong active management performance above the benchmark, though it lags in Sharpe and Treynor Ratios.
* Axis Gold ETF: Outperforms in the Treynor Ratio, indicating superior returns relative to market risk.
* Aditya Birla Sun Life Gold ETF: Performs well in both Sharpe and Jensen Ratios, demonstrating excellent risk-adjusted returns and benchmark outperformance.

**Underperformers:**

* Nippon India ETF Gold Bees and SBI-ETF Gold consistently rank lower on risk-adjusted performance metrics.

**5. Suggestions**

**5.1 Investing in Gold ETFs**

Stability and Low Volatility: Gold ETFs generally offer lower volatility compared to individual equities, providing a stable investment option during market downturns.

Performance Metrics: Based on the analysis, the ICICI Prudential Gold ETF stands out for its overall risk-adjusted returns. The Axis Gold ETF is recommended for investors focusing on systematic risk, while the HDFC Gold Exchange Traded Fund excels in active management.

Portfolio Diversification: Gold ETFs offer a convenient means of diversification without the need for physical storage, making them an effective tool for hedging against market risks.

**5.2 Investing in Physical Gold**

Direct Ownership: Physical gold provides the comfort of tangible possession and serves as a traditional investment vehicle.

Inflation Hedge: Physical gold is a reliable hedge against inflation and economic uncertainty, maintaining its value irrespective of financial markets.

Liquidity and Storage: Physical gold may incur additional costs related to storage and security, and its liquidity is lower compared to Gold ETFs. The process of selling physical gold can be more complex and costly.

**6. Conclusion**

Gold and Gold ETFs both serve as valuable investment assets with distinct advantages. Gold ETFs offer superior liquidity, lower volatility, and better performance metrics compared to physical gold, making them a more efficient investment for many investors. However, physical gold remains a viable option for those who prefer tangible assets and a direct hedge against inflation. Investors should weigh the benefits of Gold ETFs' convenience and performance against the traditional appeal and tangible nature of physical gold. The ICICI Prudential Gold ETF, HDFC Gold Exchange Traded Fund, and Aditya Birla Sun Life Gold ETF are particularly recommended based on their risk-adjusted returns and overall performance.

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