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Comparative Analysis of Gold and Gold Exchange Traded Funds: An Empirical Investigation in the Indian Context

S. Srinivasa Rao¹ Dr.K.Sivaji²

Abstract:

This study assesses the relationship between gold and Gold Exchange Traded Fund (ETF) performance in India using various statistical models such as the Sharpe index, Treynor ratio, Jensen ratio, and Fama measures. Covering a decade from 2009 to 2019 and drawing data from the Bombay Stock Exchange Database, the study aims to determine the strength of the link between gold ETFs and gold. Analysis reveals that Gold ETFs delivered higher returns compared to physical gold during this period, supported by statistical metrics. Invesco GETF emerged as the top performer among the studied Gold ETFs. These insights benefit both investment researchers and investors by highlighting superior returns of Gold ETFs and identifying Invesco GETF as a standout choice for informed investment decisions within the gold ETF market.

Keywords: Gold, Gold ETFs, Sharpe's Index, Treynor's Index, Jensen's Index, Fama's Measure, Correlation

Introduction

Finance encompasses the exploration of how individuals allocate their capital across defined and uncertain scenarios over time. Investment, in turn, denotes the strategic allocation of capital into businesses with the goal of maximizing profits within a specified timeframe. This financial deployment anticipates advantageous outcomes and propels capital into specific avenues. Offering both a high degree of capital preservation and secure returns within a predetermined period, financial investments hold a crucial role. Each investor's perception of risk and potential returns varies, with some inclined to chase higher returns and willingly embraces associated risks, while others adopt a prudent approach, prioritizing security.

In the Indian context, a diverse range of investment opportunities exists, including equities, bonds, debentures, and T-Bills. Nonetheless, a pronounced affinity for gold investment is observed among Indians. This inclination extends to investments in Index ETFs, particularly Gold ETFs. Functioning akin to mutual funds, Gold ETFs are exchange-traded funds listed and transacted as distinct instruments on stock exchanges. Traded at net asset values linked to their underlying assets, Gold ETFs enable online purchase and storage within Demat accounts. These ETFs represent tangible gold, and their valuations mirror those of physical gold.

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This research endeavors to delve into the performance of Gold ETFs concerning physical gold within the Indian landscape.

Review of literature:

Different reviews from foreign and national newspapers were gathered for this study. The reviews comprise different studies related to GETF, especially at an empirical level. The studies would likely provide insights into the problems and methodologies of the industry which previous researchers have taken to study the various aspects of GETFs. The following was a summary of the studies.

Sathish, K.B. and Ram, R.G. (2019). Gold vs gold exchange traded funds: An empirical study in India. They found that Gold ETFs generates a better return than physical gold. So, investors can invest in Gold ETF. but this study considers only 3 years. Kumar S. (2019) has the chance and return of gold and selected ETF gold. He found that there is a clear relationship between the price of gold and the output of ETF gold. Mishra (2018) this study shows the advantages of gold investments, and the investors also take account of few factors when investing their money - flexibility in the method of payment, amount of investment, tax benefits, liquidity, key protection, return risk, expected return, etc. (Jain & Mary, 2018). India's retail buyers. It is a more convenient and enjoyable way to exchange gold. Furthermore, it is found to be a safe medium of trade. Investors prefer gold ETFs due to the lack of physical gold. This study analyses the relationship between physical gold and gold ETF and its results. However, some aspects of the research on the nature of Gold ETF are described in this study. Zheng et al. (2013) have an important effect on Chinese region's ETF prices on liquidity and fund scale. They also analyze the performance of the US and Shanghai Stock Exchanges (SSE) in stock markets and find that the performance of the US market has important effects on prices of ETF while the SSE has no major consequences for ETF prices. The overly volatile prices and the difference in value among hedge fund and their net asset values are highlighted by Martinez et al. (2013). We also investigate the connection between the volatility of returns, size of trade and imbalances for international ETFs. The study found that the sum reflected by the number of transactions, even after controlling the difference of order, has a substantial and positive effect on ETF price volatility. Singh and Nadda (2013) concluded that exposure to gold is less than a third of the inventory risk. We decided that investors should not have to spend time in the gold market, consider the complex business climate and leverage the various financial opportunities open to us if we invest in stock marketplaces. Gold ETF returns are directly related to gold returns, as investors are not investing in jewellery and other gold types but in gold ETF. Jayanthi and Radhulja and Malathy, 2013 Golden ETF provides investors with an advantageous and safe way to make investments which enable them to distinguish themselves. However, the study showed that many gold ETFs on the market today differ considerably from actual returns on gold. In the industry, we have discussed the subject further. The value of Gold ETF should also be boosted or decreased by the gold price rise or decrease. However, the Gold ETFs' net asset estimation gives an imprecise picture. It was therefore pointed out that Gold ETFs were a great investment choice for investors. Small et al. (2012) analyze the effect of security concentration on the negative collection costs and liquidity of the Exchange Traded Funds. The study finds that adverse selection costs increase the number and unfavourable selection costs of the shares kept in the underlying portfolio without changing whether inventories are

increased. Haga et al. (2012) analyses and assumes that Norwegian leveraged ETFs are using futures to provide investors with the requisite returns. The study finds that the leveraged ETFs have struggled to produce the anticipated returns and concludes by indicating that the potential position of these funds is too poor to receive the returns shown. DeFusco et al. (2011) calculated price deviations from the average index of three of the most liquid ETFs. We examine the price differences of Spider, Diamonds and Cubes and conclude that the price variance is natural and that these differences are to be used as additional costs for the ETF. Charupat et al. (2011) address pricing and performance of leveraged exchange traded funds. It addresses the characteristics of the leveraged ETFs, market statistics, market efficiency and tracking mistakes. We remember that retail investors exchange ETFs for very short-term holdings and notice that the leveraged ETF premium for bulls and bear is different. Wong et al. (2010) Evaluate the effects of the ETF from seven countries and compare the performance in terms of risk and return of both bullish and bearish markets. The study tests surveillance errors and ETF returns. The paper states that alpha and risk premium for Jensen are higher for bullish markets compared with bare market. the report utilizes the results of Jensen alpha & Sharpe's relationship to classify the ETFs. Lixia Wang, I ftikhar Hussain and Adnan Ahmed (2010) has studied Gold. The status and prospects of the Exchange Traded Funds in China. The ETF is an emerging gold investment commodity in China. It plays a key role in foreign exchange, financial stability, and inflation prevention in the region. This study shows that gold ETFs are an appropriate means of investing in gold for small and medium-sized investors. Yet most of the time Less information is accessible to holders of ETFs in gold. These studies have demonstrated this understanding by using the literature and examined trends and trade exchanges Gold ETF funds and prospects, particularly in China. Madura et al. (2008) evaluate the performance of business performance metrics for ETFs as well. The study finds that when ETFs are further classified into general, international and business, the indicators are not as useful as they were for individual stocks, and the study further attributes that these variations are due to the features of ETFs

Statement of the Problem:

The literature review found that in India, Gold ETFs were introduced with the goal of raising the liquidity of the retail investor's portfolio. Indians tend to obtain gold and keep gold in tangible form, but they do not prefer to trade in Gold ETFs. The Gold ETF prices are determined by the underlying gold assets. In the past few years on which retail investors invest to a greater degree in gold ETFs. The purpose of the analysis is to evaluate Gold and Gold ETF returns.

Objective of the Study

- To examine the risk and return of Gold Exchange Traded Funds
- To investigate the financial performance of the Gold ETFs
- To analyze the relationship between the worth of Gold and Gold ETFs in India.

Hypothesis of the study

Ho : There is no significant difference between the return earned by select gold ETF and gold price for the select period.

H₁ : Return of gold ETF is independent of the return of gold benchmark price return

Research Methodology:

The purpose of this study was to estimate the comparative performance of Gold Vs Gold ETF in India. The Indian Bombay stock exchange comprises a total of eleven gold traded funds. The goal of this study is to consider eleven gold-exchange traded funds for the study. The gold traded fund selected is shown in Table 1.

Table 1

List of Gold Exchange Traded Fund in India (BSE)

ISSUER	NAME	Symbol	CODE
Aditya Birla Sun Life Mutual Fund	Birla Sun Life Gold ETF	BSLGOLDETF	533408
Axis Mutual Fund	AXIS Gold Exchange Traded Fund	AXISGOLD	533570
HDFC Mutual Fund	HDFC Gold Exchange	HDFCFMGETF	533230
ICICI Prudential Mutual fund	ICICI Prudential Gold ETF	ICICIGOLD	533244
IDBI Mutual Fund	IDBI Gold ETF	IDBIGOLD	533719
INVESCO Mutual fund	Invesco India Gold Exchange Traded Fund	IVZINGOLD	533172
Kotak Mahindra Mutual Fund	Kotak Gold Exchange Traded Fund	KOTAKGOLD	590097
Nippon India Mutual fund	Nippon India ETF Gold Bees	GOLDBEES	590095
Quantum Mutual fund	Quantum Gold Fund - Exchange Traded Fund	QGOLDFHALF	590099
SBI Mutual Fund	SBI Gold Exchange Traded Scheme	SBIGETS	590098
UTI Mutual Fund	UTI Gold Exchange Traded Fund	GOLDSHARE	590101

Source: Bombay stock exchange

Performance Evaluation Tools

Alpha:

Alpha is a measure of calculating the excess return generated by the portfolio as compared to the market after making the necessary risk adjustment. It also reveals how better the fund manager is behaving in Selection of portfolio security. A positive alpha value indicates that the portfolio performed higher than the market on a risk-adjusted basis. The negative alpha value of the portfolio indicates It has performed worse than the market.

$$\alpha = \frac{\sum R_{pi}}{n} - \beta \frac{\sum R_{mi}}{n}$$

Where R_{pi} represents portfolio excess return (portfolio return minus risk-free return), n represents the number of observations, β the sensitivity of a portfolio's rate of return to the market and R_{mi} represents the market excess return (market return minus risk-free return).

Beta:

Beta indicators of undiversifiable (systematic risk. It also demonstrates how the security price responds to the market. It analyses how much the return of the investment has had an impact on the market.

$$\beta = \frac{\sigma_p}{\sigma_m} \chi r$$

Where, σ_p and σ_m represents standard deviation of the returns of mutual fund scheme and benchmark index, respectively. R represents the correlation between the return of mutual fund and benchmark index.

Sharpe's ratio:

Sharpe's index is one of the tools for measuring portfolio efficiency. The Sharpe Index is determined by dividing the excess return of the mutual fund by its standard deviation. This measures the excess return by deducing the real return from the risk-free return rate. A higher index of Sharpe is stronger.

$$\text{Sharpe's index} = \frac{\bar{R} - R_f}{S}$$

Where, R = average return, R_f = Risk free rate of return, S = Standard deviation. Treynor index The Treynor index is the excess return of the mutual fund relative to the risk-free return divided by beta. The Treynor Index represents the excess return earned per unit of systemic risk.

$$\text{Treynor ratio} = \frac{r_i - r_f}{\beta_i}$$

Where, r_i = portfolio is return, r_f = risk free rate of return, β_i = portfolio i's beta. Jensen's Index The Jensen Performance Index is based on the CAPM. Tests the absolute efficiency of the Investment. A standard is fixed and contrasted with it is the real performance. The standard is developed based on the predictive price capability of the fund manager. Effective estimation of the security price would make it possible for the manager to gain better returns than the average investor hopes to earn at a given amount. It is risk.

$$R_p = \alpha + \beta_i (R_m - R_f)$$

Where, R_p = average return of portfolio, R_f = riskless rate of interest, α = the intercept, β_i = a measure of systematic risk, R_m = average returns of market.

Sortino Ratio:

The Sortino ratio is a measure of the returns after making a risk change in a hedge fund portfolio or a particular asset. A revised form of Sharpe's index is the Sortino Ratio. It just considers Negative effect i.e. returns obtained below the rate of return expected for the portfolio or specific asset.

$$\text{Sortino Ratio} = R - T/D$$

Where R = Return of a portfolio, T = Required Rate of Return, D = Downside Risk. Fama's Model Fama's Model measures mutual fund efficiency with respect to the various portfolio risk elements. The return on a portfolio consists of risk-free returns and risk premiums as per the Capital Asset Pricing Model. The risk premium is a risk reward plus option rewards. The reward for selecting shares is for improving the portfolio selection of shares. This is the return achieved above and above the return in a portfolio. Since Fama's calculation is focused on overall risk, the risk reward may be reduced to a structural reward Risk and reward for unsystematic risk

$$Fp = R_p - R_f - \left\{ \frac{\sigma_p}{\sigma_m} \right\} (R_m - R_f)$$

Where R_p represents the return of the portfolio, R_f is the risk-free rate of return. R_m represents the market return, σ_m and σ_p represent the standard deviation of the return of market and portfolio, respectively.

Empirical Results:

Table: 1.2
Descriptive Statistics of Select Gold ETF

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
BSLGOLDETF	94	0.26326	-0.11599	0.14727	0.00384	0.045947	0.254	0.776
AXISGOLD	94	0.21979	-0.09213	0.12766	0.003315	0.041799	0.517	1.061
HDFCFMGETF	103	0.26426	-0.1065	0.15776	0.004752	0.040476	0.517	1.683
ICICIGOLD	102	1.0565	-0.90433	0.15217	-0.01294	0.132391	-6.015	39.264
IDBIGOLD	88	0.22589	-0.10905	0.11684	0.001126	0.041063	0.046	0.58
IVZINGOLD	108	0.33365	-0.12153	0.21212	0.006527	0.048858	0.8	3.013
KOTAKGOLD	113	1.04585	-0.89693	0.14892	-0.00222	0.095408	-7.408	69.966
GOLDBEES	114	0.26479	-0.10463	0.16016	0.006102	0.042277	0.479	1.343
QGOLDHALF	113	0.25262	-0.09859	0.15402	0.006025	0.041583	0.536	1.321
SBIGETS	113	0.25644	-0.10471	0.15173	0.006035	0.041914	0.536	1.101
GOLDSHARE	113	0.28289	-0.10788	0.17501	0.006121	0.042294	0.52	1.911
PHYSICAL GOLD	120	0.26501	-0.08603	0.17899	0.007232	0.047137	0.803	1.438

Source: Authors calculation

Table: 1.3
Paired sample correlation of GETFs

	BSL GOL D	AXIS GOLD	HDF C GETF	ICICI GOL D	IDBI GOLD	IVZI N GOL D	KO TA K GO LD	GOL D BEES	Q GO LD HAL F	SBI GET S	GO LD SH ARE	PHYS CIAL GOL D
BSLGOLDETF	1											
AXISGOLD	0.8233	1										
HDFCFMGETF	0.8412	0.8969	1									
ICICIGOLD	0.2312	0.2771	0.2819	1								

IDBIGOLD	0.7897	0.8147	0.8973	0.1856	1								
IVZINGOLD	0.7883	0.8212	0.8747	0.2908	0.7720	1							
KOTAKGOLD	0.3268	0.3060	0.3464	0.1062	0.3105	0.3548	1						
GOLDBEES	0.8449	0.9134	0.9869	0.3049	0.9011	0.8756	0.3828	1					
QGOLDHALF	0.8375	0.9212	0.9788	0.3082	0.8839	0.8782	0.3899	0.9882	1				
SBIGETS	0.8496	0.9014	0.9865	0.2633	0.9013	0.8852	0.4032	0.9867	0.9791	1			
GOLDSHARE	0.8367	0.8640	0.9616	0.3057	0.8799	0.8536	0.3888	0.9669	0.9503	0.9630	1		
PHYSICAL GOLD	0.7175	0.7888	0.8776	0.2255	0.7672	0.8127	0.3720	0.8826	0.8671	0.8974	0.8719	1	

Source: Authors calculation

Table 1.4 Paired sample test

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	BSLGOLDETF & Market price of gold per gram	-0.00097	0.03549454	0.003661	-0.265	93	0.792
Pair 2	AXISGOLD & Market price of gold per gram	-0.0015	0.02991958	0.003086	-0.485	93	0.629
Pair 3	HDFCFMGETF & Market price of gold per gram	-0.00133	0.02272578	0.002239	-0.595	102	0.553
Pair 4	ICICIGOLD & Market price of gold per gram	-0.01899	0.13019392	0.012891	-1.473	101	0.144

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 5	IDBIGOLD & Market price of gold per gram	-0.00083	0.02955594	0.003151	-0.262	87	0.794
Pair 6	IVZINGOLD & Market price of gold per gram	-0.00074	0.02955313	0.002844	-0.26	107	0.796
Pair 7	KOTAKGOLD & Market price of gold per gram	-0.00943	0.08946196	0.008416	-1.12	112	0.265
Pair 8	GOLDBEES & Market price of gold per gram	-0.00127	0.02255045	0.002112	-0.6	113	0.549
Pair 9	QGOLDHALF & Market price of gold per gram	-0.00119	0.02398388	0.002256	-0.527	112	0.6
Pair 10	BSLGOLDETF & Market price of gold per gram	-0.00118	0.02128739	0.002003	-0.588	112	0.557
Pair 11	GOLDSHARE & Market price of gold per gram	-0.00109	0.02358236	0.002218	-0.492	112	0.623

Source: Authors calculation

Table 1.5
Regression Results Gold ETFs

Fund	R (Standardized Coefficients)	R Square	df	F	Sig	Alpha (constant)	beta	t	sig
BSLGOLDETF	0.717	0.515	93	97.590	0.000	0.001	0.682	0.167	0.868
AXISGOLD	0.789	0.622	93	151.548	0.000	0.000	0.683	0.012	0.991
HDFCFMGETF	0.878	0.77	102	338.350	0.000	0.000	0.75	0.096	0.923
ICICIGOLD	0.225	0.051	101	5.356	0.023	-0.017	0.627	-1.294	0.199
IDBIGOLD	0.767	0.589	87	123.055	0.000	0.000	0.701	-0.086	0.932
IVZINGOLD	0.813	0.661	107	206.283	0.000	0.000	0.833	0.170	0.865
KOTAKGOLD	0.372	0.138	112	17.826	0.000	-0.008	0.737	-0.890	0.737
GOLDBEES	0.883	0.779	113	394.796	0.000	0.000	0.778	0.195	0.846
QGOLDHALF	0.867	0.752	112	336.467	0.000	0.001	0.749	0.315	0.753
SBIGETS	0.897	0.805	112	459.099	0.000	0.000	0.781	0.227	0.821
GOLDSHARE	0.872	0.76	112	351.890	0.000	0.001	0.766	0.302	0.764

Source: Authors calculation

Table: 1.6
Summary of performance evaluation

	Sharpe ratio	Treynor	Jensen	Sortino	Fema's
BSLGOLDETF	-0.19426	-0.04531	-0.51995	-2.97818	0.67036
AXISGOLD	-0.25709	-0.05454	-0.52059	-3.44532	0.60272
HDFCFMGETF	-0.1425	-0.02664	-0.57189	-3.52702	0.58273
ICICIGOLD	-0.50658	-0.37053	-0.49526	-0.71513	2.05241
IDBIGOLD	-0.44629	-0.09051	-0.53500	-3.1824	0.58862
IVZINGOLD	0.007837	0.00159	-0.63539	-2.89177	0.72014
KOTAKGOLD	-0.31342	-0.14055	-0.57016	-0.91953	1.46468
GOLDBEES	-0.0258	-0.00486	-0.59343	-3.3464	0.61324
QGOLDHALF	-0.03262	-0.00627	-0.57056	-3.46362	0.60193
SBIGETS	-0.03156	-0.00587	-0.59540	-3.48219	0.60729
GOLDSHARE	-0.02424	-0.00464	-0.58353	-3.37113	0.61352

Source: Authors calculation

Table 1.7
Summary of performance evaluation Rank

	Sharpe	Treynor	Jenson	Fema's	Sortino	Average Rank	Mean Rank
BSLGOLDETF	7	7	2	4	4	4.8	2
AXISGOLD	8	8	3	8	8	7	8
HDFCFMGETF	6	6	7	11	11	8.2	11
ICICIGOLD	11	11	1	1	1	5	4
IDBIGOLD	10	9	4	10	5	7.6	10
IVZINGOLD	1	1	11	3	3	3.8	1
KOTAKGOLD	9	10	5	2	2	5.6	6
GOLDBEES	3	3	9	6	6	5.4	5
QGOLDHALF	5	5	6	9	9	6.8	7
SBIGETS	4	4	10	7	10	7	8
GOLDSHARE	2	2	8	5	7	4.8	2

Source: Authors calculation

Results & Discussion:

Table 1.2 shows the return of selected gold funds and the performance of their respective benchmarks. The table indicates that all the selected index funds are earning average returns at the same amount as the benchmark index, the gold return. This ensures that the promises made to investors or the returns on the index fund prices are at the same amount as the average price on their respective benchmark prices. The averages of the individual index funds are at the same level as the benchmark that shows the beneficial results of the selected index funds. Despite the promises given to clients, the funds will be at the same pace as the index average.

For a given period, the standard deviation measures the deviation of the actual return from the average return. The highest standard deviation leads to a high deviation from the average return, which also shows the high volatility and risk associated with the concerned index fund. Low standard deviation means that the returns are at par with the respective average of the benchmark, which further implies less risk related to it.

Higher dispersion means lower extreme values and higher extreme values in series. This in turn means very high prices for the index fund and very low prices for the same index fund. Risk reversing investors prefer funds with a lower price dispersion, which is much more stable. Higher dispersion means greater stability over time in the fluctuation of average prices.

Table 1.3

Table shows the study reveals that there is a strong correlation between the average return on the index fund and the average return on the benchmark. The highest positive correlation between the gold funds chosen and the benchmark index indicates that the cost of the two with their corresponding benchmark index, gold price, and returns, funds travel in the same direction. A strong positive association exists between the return earned by gold funds and the price of gold. This means that a corresponding change is seen in the return of the funds, but in a favourable way, as there is an increase in the average price or average return. This indicates that the index funds' returns are at par with the outcomes or returns received by the gold market, the benchmark index.

Table 1.4

The table shows that the paired sampled test otherwise referred to as the dependent sample test indicates that the value p is higher than .05 is called statistically important, so null hypothesis with respect to fund return is agreed at 5 percent level. The findings demonstrate that the return received by the index funds and the return earned by the benchmark or underlying index are not statistically substantially different. Therefore, the researcher supports the null hypothesis. There is no significant different between the return received by the index funds and their related index of benchmarks.

The study reveals that there is a negligible mean gap between the average earned by the benchmark index and the funds monitoring the specific underlying index. Compared to their benchmark portfolio, the returns on resources are comparatively strong.

Table 1.5 shows that

Analysis of BSL GOLD ETF

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict Birla sun life gold exchange traded funds return (dependent) based on gold return (independent) $b = .682$, $t(93) = .0167$, $<.868$. A significant regression equation ($F(1, 93) = 97.590$, $p <.000$) with an R^2 value of .515 was found. The estimated return of BSL Gold ETF is equivalent to $000+.682$ (Return of gold). The return of BSL Gold ETF is raised by 51.5 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent stage and agrees that the return of BSL Gold ETF depends on the return of gold. The beta coefficient is .682 and the R^2 value is .515, which indicates that the return of the benchmark index is monitored by the BSL Gold ETF.

Analysis of Axis Gold ETF

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict Axis Gold ETF return (dependent) based on gold return (independent) $b = .789$, $t(93) = .012$, $<.991$. An important regression equation ($F(1, 93) = 151.548$, $p <.000$) with an R^2 value of .622 was found. The estimated return of Axis Gold ETF is equivalent to $000+.683$ (Return of gold). The return of Axis Gold ETF is raised by 62.2 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent stage and agrees that the return of AxisGold ETF depends on the return of gold.

The beta coefficient is .683 and the R^2 value is .622, which indicates that the return of the benchmark index is monitored by the Axis Gold ETF.

Analysis of HDFC GETF

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict HDFC Gold ETF return (dependent) based on gold return (independent) $b = .878$, $t(102) = .096$, $<.923$. a significant regression equation ($F(1, 102) = 338.350$, $p <.000$) with an R^2 value of .77 was found. The estimated return of HDFC Gold ETF is equivalent to $000+.75$ (Return of gold). The return of HDFC Gold ETF is raised by 77 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent stage and agrees that the return of HDFC Gold ETF depends on the return of gold.

The beta coefficient is .75 and the R^2 value is .77, which indicates that the return of the benchmark index is monitored by the HDFC Gold ETF.

Analysis of ICICI GETF

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict ICICI Gold ETF return (dependent) based on gold return (independent) $b = .225$, $t(101) = -1.294$, $<.199$. a significant regression equation ($F(1, 101) = 5.356$, $p <.023$) with an R^2 value of .051 was found. The estimated return of ICICI Gold ETF is equivalent to $0.023+.627$ (Return of gold). The

return of ICICI Gold ETF is raised by 5.1 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent level and agrees that return of ICICI Gold ETF depends on the return of gold.

Beta coefficient is .627 and R^2 value is .051 shows that the return of the benchmark index is monitored by the ICICI Prudential Gold ETF.

Analysis of IDBI GETF

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict IDBI Gold ETF return (dependent) based on gold return (independent) $b = .767$, $t(87) = -0.086$, $<.932$. a significant regression equation ($F(1, 87) = 123.055$, $p <.000$) with an R^2 value of 0.767 was found. The estimated return of IDBI Gold ETF is equivalent to $0.000 + 0.701$ (Return of gold). The return of HDFC Gold ETF is raised by 76.7 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent level and agrees that the return of IDBI Gold ETF depends on the return of gold.

The beta coefficient is .701 and the R^2 value is .767, which indicates that the return of the benchmark index is monitored by the IDBI Gold ETF.

Analysis of IVZIN GETF

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict INVESCO Gold ETF return (dependent) based on gold return (independent) $b = .813$, $t(107) = -0.170$, $<.865$. a significant regression equation ($F(1, 107) = 206.283$, $p <.000$) with an R^2 value of 0.661 was found. The estimated return of INVESCO Gold ETF is equivalent to $0.000 + 0.833$ (Return of gold). The return of INVESCO Gold ETF is raised by 66.1 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent level and agrees that the return of INVESCO Gold ETF depends on the return of gold.

The beta coefficient is .833 and the R^2 value is .661, which indicates that the return of the benchmark index is monitored by the INVESCO Gold ETF.

Analysis of KOTAK GETF

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict KOTAK Gold ETF return (dependent) based on gold return (independent) $b = .372$, $t(112) = -0.890$, $<.737$. a significant regression equation ($F(1, 12) = 17.826$, $p <.000$) with an R^2 value of 0.138 was found. The estimated return of KOTAK Gold ETF is equivalent to $0.000 + 0.737$ (Return of gold). The return of KOTAK Gold ETF is raised by 13.8 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent level and agrees that return of KOTAK Gold ETF depends on the return of gold.

Beta coefficient is .737 and R^2 value is .138 shows that the return of the benchmark index is monitored by KOTAK Prudential Gold ETF.

Analysis of GOLDBEES

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict NIPPON INDIA ETF GOLDBEES return (dependent) based on gold return (independent) $b = .883$, $t(113) = 0.195$, $<.846$. a significant regression equation ($F(1, 113) = 394.796$, $p <.000$) with an R^2 value of 0.779 was found. The estimated return of INVESCO Gold ETF is equivalent to $000+0.778$ (Return of gold). The return of INVESCO Gold ETF is raised by 77.9 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent level and agrees that the return of NIPPON INDIA ETF GOLDBEES depends on the return of gold. The beta coefficient is 0.778 and the R^2 value is .779, which indicates that the return of the benchmark index is monitored by the NIPPON INDIA ETF GOLDBEES.

Analysis of Quantum Gold Fund - Exchange Traded Fund

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict Quantum GETF return (dependent) based on gold return (independent) $b = .867$, $t(112) = 0.315$, $<.753$. a significant regression equation ($F(1, 112) = 336.467$, $p <.000$) with an R^2 value of 0.752 was found. The estimated return of Quantum GETF is equivalent to $000+0.749$ (Return of gold). The return of Quantum GETF is raised by 75.2 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent level and agrees that the return of Quantum GETF depends on the return of gold.

The beta coefficient is 0.749 and the R^2 value is .752, which indicates that the return of the benchmark index is monitored by the Quantum GETF.

Analysis of SBI Gold ETFs

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict SBI GETF return (dependent) based on gold return (independent) $b = .897$, $t(112) = 0.227$, $<.821$. a significant regression equation ($F(1, 112) = 459.099$, $p <.000$) with an R^2 value of 0.805 was found. The estimated return of SBI GETF is equivalent to $000+0.781$ (Return of gold). The return of SBI GETF is raised by 80.5 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5 percent level and agrees that the return of SBI GETFs depends on the return of gold.

The beta coefficient is 0.781 and the R^2 value is .805, which indicates that the return of the benchmark index is monitored by the SBI GETF.

Analysis of GOLDSHARE

A basic linear regression was determined after a preliminary review to ensure that there was no violation of normality and linearity assumptions to predict UTI Gold Exchange Traded Fund return (dependent) based on gold return (independent) $b = .872$, $t(112) = 0.302$, $<.764$. a significant regression equation ($F(1, 112) = 351.890$, $p <.000$) with an R^2 value of 0.76 was found. The estimated return of UTI Gold Exchange Traded Fund is equivalent to $000+0.766$ (Return of gold). The return of UTI Gold Exchange Traded Fund is raised by 76 per cent by the change in the return of gold. Since P is less than 0.05, the null hypothesis is rejected at a 5

percent level and agrees that the return UTI Gold Exchange Traded Fund depends on the return of gold.

The beta coefficient is 0.766 and the R^2 value is 0.76 which indicates that the return of the benchmark index is monitored by the UTI Gold Exchange Traded Fund.

The table 1.6 shows the various methods of evaluations of the portfolio. A fund with higher Sharpe's index depicts better performance. It is calculated with the help of formula mentioned above. Since the returns generated by gold ETFs are lesser than the risk-free rate of return, most of the values are negative, so it can be inferred that the funds are underperforming. Treynor's index shows a negative value to all the ETF except for INVESCO GETFS. Jensen's index measures the ability of the fund manager investment ability to generate a better return. All the ETF here also has a negative value. When compared to other funds it is found that ICICIGETF is performing better. Sortino ratio is a revised form of Sharpe's index; it shows the downside risk of a portfolio. Since all the ETF generate lesser return than the risk-free rate of return all the funds have a negative value. According to Fama's performance evaluation model, it is inferred that ICICI GETFs performs better when compared to other ETF.

The table 1.7, shows the ranking of the selected ETF as per different performance measure. Overall ranked based on the average ranking is also calculated. INVESCO Gold ETF performances better when compared to other ETF. Even though UTI & Birla sun life & ICICI Gold Exchange Traded Fund performed better based on other portfolio evaluation ranking measure, HDFC & SBI GETFs have the least rank.

CONCLUSION

The purpose of this research endeavour was to delve into the intricate relationship between the returns yielded by physical gold and those of gold Exchange Traded Funds (ETFs). Notably, it was observed that the ICICI Prudential Mutual Fund exhibited a notably high standard deviation compared to other ETFs. This suggests a considerable degree of unpredictability in returns, with the data showcasing a departure from a normal distribution.

The presence of a negative Alpha value signifies that the performance of the ETF did not align favourably with the gold benchmark. Additionally, the Beta values indicated a heightened systemic risk for INVESCO GOLD ETFs, pointing to an elevated risk profile in comparison to other ETFs.

Through various performance evaluation methodologies such as the Sharpe Index, the Treynor Index, and the Jensen's model, it was revealed that the INVESCO Gold Exchange Traded Fund demonstrated robust performance. However, when considering an aggregate assessment based on average ranking, INVESCO outperformed its counterparts. These analytical insights offer essential information for prospective investors seeking to make informed investment decisions.

Furthermore, correlation research highlighted a clear positive association between physical gold and gold ETFs. This suggests that investors might lean towards ETF investments as opposed to holding physical gold, which is perceived to carry greater inherent

risk. It was also evident that Gold ETFs generated higher returns than physical gold, which could further incentivize investors to channel their investments into Gold ETFs.

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