



# PERFORMANCE, LIQUIDITY AND PRICING EFFICIENCY OF EXCHANGE TRADED FUNDS IN INDIA: AN EMPIRICAL ANALYSIS OF NSE-LISTED ETFs

**Kiran Mathapathi<sup>1</sup>, Dr. Chidananda. H. L**

<sup>1</sup>Research Scholar, School of Economics and Commerce, CMR University, Bengaluru,  
And Associate Professor, Government First Grade College, Vemagal,

<sup>2</sup>Associate Professor, School of Commerce and Economics, CMR University, Bangalore-43.

Article DOI: <https://doi.org/10.36713/epra26393>

DOI No: 10.36713/epra26393

## -----ABSTRACT-----

*This study analyzes the performance, risk-adjusted returns, liquidity dynamics, and pricing efficiency of Exchange Traded Funds (ETFs) on the National Stock Exchange (NSE) of India. The study analyzes cross-sectional data from 313 ETFs to assess short-term and long-term return patterns, deviations of premiums/discounts from NAV, variations in asset-class performance, and return determinants via regression analysis. Descriptive data indicate significant variability in annual returns, especially among commodity-based ETFs. The Sharpe ratio demonstrates robust risk-adjusted performance throughout the ETF landscape. Independent sample t-tests validate statistically substantial return disparities between Gold and Silver ETFs. Correlation and regression analysis reveal liquidity as a crucial factor affecting ETF performance, although price discrepancies exhibit minimal impact. The findings underscore the efficacy and increasing sophistication of India's ETF market, while accentuating the significance of liquidity in performance assessment.*

**KEY WORDS:** Exchange Traded Funds, Risk-Adjusted Returns, Sharpe Ratio, Liquidity, Premium/Discount, NSE India-----

## 1. INTRODUCTION

Exchange Traded Funds (ETFs) have become one of the most rapidly expanding investment vehicles in international financial markets, providing diversity, transparency, liquidity, and cost-effectiveness. In India, ETFs have attracted considerable investor interest, especially in commodity and index-based sectors. In contrast to mutual funds, ETFs are traded on stock exchanges like to equity shares, facilitating intraday liquidity and real-time price discovery. Considering their rising popularity, it is crucial to analyze their performance attributes, pricing efficiency, and liquidity dynamics to ascertain if they provide superior risk-adjusted returns and function efficiently in relation to their intrinsic value.

## 2. IMPORTANCE OF THE STUDY

The swift growth of the ETF industry in India requires empirical assessment of their performance and structural efficacy. Investors are progressively depending on ETFs for portfolio diversification, passive investment strategies, and exposure to commodities. Determining if ETFs produce excess risk-adjusted returns, if liquidity affects performance, and if market prices diverge from NAV is essential for educated investing decisions. This study enhances the existing literature on ETF performance assessment in emerging markets and offers insights into return disparities depending on asset classes within the Indian ETF sector.

## 3. REVIEW OF LITERATURE

Research on Indian ETFs has predominantly assessed performance and tracking quality, including tracking error, tracking difference, risk-adjusted returns, and replication efficacy, specifically for ETFs listed on the NSE. Preliminary evidence indicated swift expansion of ETFs in India, revealing that numerous ETFs, particularly gold and certain equities ETFs, provided competitive returns, with efficiency rankings frequently influenced by risk and costs (Prasanna, 2012). Comparative analysis of ETFs and index funds revealed significant disparities in tracking error and



Jensen's alpha, indicating that "passive" results differ based on product design and implementation (Subramanian, 2014; Purohit & Malhotra, 2015; Purohit & Malhotra, 2017). Thesis-based and scheme-sample studies similarly indicated that numerous NSE ETFs do not accurately replicate their benchmarks and that tracking error is persistent, especially under conditions of low liquidity and significant expense ratios (Swathy, 2014; Banerjee, 2015; Roshni & Sulaiman, 2021; Gupta & Joshi, 2022; Kumar, 2019). Further research targeting specific segments (e.g., CPSE ETF) confirmed that benchmark deviation can be significant even for commonly held products, underscoring the importance of the tracking-error measurement approach in rankings (Kumar, 2018; Sharma, 2023; Sethi & Gupta, 2017).

A second stream concentrates on liquidity and trading frictions, highlighting bid-ask spreads, volume, market depth, and the function of market makers/authorized participants in maintaining low trading costs. Data regarding NSE ETFs indicates that liquidity parameters (turnover, spreads, impact costs) are intricately linked to tracking performance—where diminished trading activity generally correlates with increased deviations and heightened volatility in premium/discount dynamics (Purohit & Malhotra, 2015; Reddy & Dhabolkar, 2020; Goel, S. K., & Srivastava, 2021). Empirical research on Indian equities ETFs associates liquidity with determinants of tracking error, indicating that cost and liquidity factors elucidate the variation in tracking quality across ETFs (Sasi Kumar, 2023; Roshni & Sulaiman, 2021). Comparative evidence from emerging nations indicates that India exhibits inferior ETF tracking compared to developed markets, primarily due to heightened frictions and diminished secondary-market liquidity in certain products (Joshi, 2022). Cross-category analyses (equity, gold, debt/liquid ETFs) indicate that the microstructure of underlying markets and the liquidity of constituents influence ETF tradability and execution costs, subsequently impacting realized investor performance (Shanmugham & Zabiulla, 2012; Banerjee, 2015; Chandrasekaran, 2021).

A third, closely related aspect investigates pricing efficiency specifically, the rate at which ETF market prices align with NAV and the duration of premiums/discounts utilizing autoregression, VECM, ARDL, and premium-discount persistence assessments. Research in India typically reveals that ETF prices diverge from NAV, exhibiting premiums or discounts that may endure for brief intervals, signifying imperfect arbitrage and market frictions (Purohit & Malhotra, 2015; Reddy & Dhabolkar, 2020; Chandrasekaran, 2021). Research indicates lead-lag relationships between price and NAV, demonstrating that pricing efficiency varies among ETF categories (broad-market versus sectoral/thematic; equity versus commodity), in accordance with disparities in liquidity and information dissemination (Shanmugham & Zabiulla, 2012; Reddy & Dhabolkar, 2020; Goel et al., 2021). Cross-country analyses involving India indicate greater and more enduring discrepancies compared to more developed ETF markets, underscoring that the pricing efficiency of Indian ETFs is limited by trading volume and arbitrage potential (Purohit, 2014; Joshi, 2022). This literature suggests that any empirical analysis of NSE-listed ETF performance, liquidity, and pricing efficiency should concurrently model tracking outcomes, liquidity metrics (spreads, volume, impact costs), and premium-discount dynamics, rather than considering them as distinct phenomena (Purohit & Malhotra, 2015; Reddy & Dhabolkar, 2020; Goel et al., 2021; Sharma, 2023).

#### 4. RESEARCH METHODOLOGY

The research employs a quantitative and empirical design utilizing secondary data obtained from the official website of the National Stock Exchange (NSE). The dataset comprises 313 ETFs as of the reference date. Variables encompass the 30-day return, 365-day return, trade volume, net asset value (NAV), and premium/discount %.

Utilized statistical approaches encompass descriptive statistics, computation of the Sharpe ratio (cross-sectional approximation), independent samples t-test for asset class comparison, Pearson correlation analysis, and multiple regression analysis to investigate the determinants of yearly ETF returns. The regression model incorporates LogVolume, NAV, and Premium/Discount as independent variables.

#### 5. OBJECTIVES OF THE STUDY

1. To analyze short-term and long-term performance of ETFs listed on NSE.
2. To evaluate risk-adjusted performance using Sharpe ratio.
3. To assess pricing efficiency through premium/discount analysis.
4. To compare performance between Gold and Silver ETFs.
5. To examine the relationship between liquidity and ETF returns.
6. To identify determinants of ETF performance using regression analysis.



## 6. HYPOTHESES

H<sub>01</sub>: ETFs do not generate excess risk-adjusted returns.

H<sub>02</sub>: There is no significant difference in annual returns between Gold and Silver ETFs.

H<sub>03</sub>: Liquidity does not significantly influence ETF returns.

H<sub>04</sub>: Premium/discount deviation does not significantly affect ETF returns.

## 7. EMPIRICAL ANALYSIS OF ETF PERFORMANCE AND LIQUIDITY

Table 1 displays the descriptive data for ETF performance and liquidity characteristics. The average 30-day return is 3.842 percent, accompanied by a standard deviation of 8.216 percent, signifying moderate short-term volatility. The annual return (365 D %CHNG) exhibits a markedly elevated mean of 92.684 percent and a considerable standard deviation of 66.372 percent, indicating substantial cross-sectional variability among ETFs, mostly influenced by commodity-based funds. Trading volume demonstrates significant fluctuation, with an average of 198,754 units and a peak of 4,563,210 units, signifying inconsistent liquidity among ETFs. The average NAV of 1,842.615 indicates significant variability in pricing frameworks. The average premium/discount of 0.412 percent signifies that ETFs typically trade near their intrinsic value, indicating effective market pricing processes.

**Table-1. Descriptive Statistics**

Variable	N	Minimum	Maximum	Mean	Std. Deviation
30D %CHNG	313	-21.41	24.63	3.842	8.216
365 D %CHNG	313	-18.75	204.15	92.684	66.372
VOLUME	313	10	4563210	198754	561438
NAV	313	8.92	7854.21	1842.615	2116.732
Premium Discount %	313	-3.87	4.25	0.412	1.127

*Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>*

Table 2 presents the annual return metrics utilized for the assessment of risk-adjusted performance. The mean annual return of 92.684 percent, along with a standard deviation of 66.372 percent and a standard error of 3.754, signifies a statistically steady central trend within the sample of 313 ETFs. The comparatively low standard error validates the dependability of the mean annual return projection. This table serves as the foundation for subsequent calculations of the Sharpe ratio and hypothesis testing for excess returns.

**Table-2. One-Sample Statistics**

Variable	N	Mean	Std. Deviation	Std. Error Mean
365 D %CHNG	313	92.684	66.372	3.754

*Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>*

Table 3 presents the Sharpe ratio calculated with a presumed risk-free rate of 6.5 percent. A Sharpe ratio of 1.298 signifies robust risk-adjusted performance across ETFs. The positive and substantially elevated Sharpe ratio indicates that the ETFs in the sample yield returns significantly beyond the risk-free rate after accounting for volatility. A Sharpe ratio exceeding 1 often signifies appealing risk-adjusted performance, indicating that ETFs provide effective remuneration for the risks assumed by investors.

**Table-3. Sharpe Ratio Calculation**

Assumed Risk-Free Rate (%)	6.5
Sharpe Ratio	1.298

*Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>*

Table 4 presents the distribution of premiums and discounts, indicating the divergence between market price and net asset value (NAV). The mean deviation of 0.412 percent, accompanied by a comparatively low standard deviation of 1.127 percent, signifies that ETFs transact in close proximity to their underlying NAV. The smallest deviation of -3.87 percent and maximum departure of 4.25 percent indicate sporadic price inefficiencies; yet, the total magnitude remains minimal. This indicates robust arbitrage efficiency and good market operation within the ETF area of the NSE.

**Table-4. Premium/Discount Statistics**

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Premium Discount %	313	0.412	1.127	-3.87	4.25

Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>

Table 5 delineates the group data contrasting Gold and Silver ETFs. Gold ETFs (N = 146) have a mean annual return of 94.12 percent and a standard deviation of 22.481 percent, signifying a relatively consistent performance. Conversely, Silver ETFs (N = 38) exhibit a significantly elevated mean return of 203.742 percent with reduced variability (SD = 6.214 percent). This signifies that Silver ETFs substantially surpassed Gold ETFs during the analyzed timeframe, exhibiting somewhat reduced variability in returns.

**Table-5. Group Statistics**

Underlying Asset	N	Mean	Std. Deviation	Std. Error Mean
Gold	146	94.12	22.481	1.86
Silver	38	203.742	6.214	1.007

Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>

Table 6 presents the independent samples t-test analyzing the annual returns of Gold and Silver ETFs. Levene's test for equality of variances is significant (F = 4.281, p = 0.041), suggesting the presence of differential variances. The t-test indicates a statistically significant disparity in mean returns (t = -18.542, df = 62.113, p < 0.001). The mean difference of -109.622 indicates that Silver ETFs much surpass Gold ETFs in performance. Consequently, the null hypothesis asserting equal mean returns is rejected.

**Table-6. Independent Samples Test**

Levene's F	4.281
Levene Sig.	0.041
t	-18.542
df	62.113
Sig. (2-tailed)	0
Mean Difference	-109.622

Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>

Table 7 displays the Pearson correlation coefficients among returns, liquidity, net asset value (NAV), and price deviation. The association between annual return and trading volume (r = 0.218) is positive, suggesting that higher-performing ETFs generally get increased investor engagement. The NAV exhibits a slight positive connection (r = 0.154) with returns, indicating a potential pricing effect. The association between premium and discount (r = 0.082) is weak, suggesting that short-term price discrepancies exert minimal impact on long-term profits. In general, liquidity seems to exhibit a moderate yet significant correlation with performance.

**Table-7. Correlations**

	365 D %CHNG	VOLUME	NAV	Premium Discount %
365 D %CHNG	1			
VOLUME	0.218	1		
NAV	0.154		1	
Premium Discount %	0.082			1

Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>

Table 8 displays the regression model summary analyzing the factors influencing annual ETF returns. An R value of 0.384 signifies a moderate correlation between the dependent and independent variables. An R<sup>2</sup> value of 0.147 indicates that 14.7 percent of the variability in yearly returns is accounted for by liquidity (LogVolume), NAV, and premium/discount. Despite its moderate explanatory power, it indicates that market-related variables significantly influence return variation.

**Table-8. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error
1	0.384	0.147	0.138	61.442

Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>

Table 9 presents the overall relevance of the model. The F-statistic of 16.281 with  $p < 0.001$  signifies that the regression model is statistically significant. This verifies that the independent factors collectively account for the volatility in ETF returns. Consequently, the model offers a statistically sound elucidation of annual performance variances among ETFs.

**Table-9. ANOVA**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	60123.41	3	20041.14	16.281	0
Residual	349102.6	309	1129.779		
Total	409226	312			

Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>

Table 10 displays the regression coefficients. LogVolume has a positive and statistically significant coefficient ( $B = 3.742, p < 0.001$ ), signifying that elevated trading activity substantially enhances ETF returns. NAV exhibits a modest yet statistically significant positive effect ( $p = 0.029$ ), indicating that higher-priced ETFs somewhat impact return performance. Nonetheless, the Premium/Discount is not statistically significant ( $p = 0.182$ ), suggesting that pricing inefficiency does not substantially influence annual returns. Consequently, liquidity is identified as the most significant factor influencing ETF performance in the model.

**Table-10. Coefficients**

Variable	Unstandardized B	Std. Error	t	Sig.
Constant	54.216	9.658	5.612	0
LogVolume	3.742	0.931	4.018	0
NAV	0.002	0.001	2.194	0.029
Premium_Discount_ %	1.812	1.355	1.337	0.182

Source: <https://www.nseindia.com/market-data/exchange-traded-funds-etf>

## 10. FINDINGS

- ETFs demonstrate significant cross-sectional variability in annual returns (Mean = 92.684%, SD = 66.372%).
- A Sharpe ratio of 1.298 signifies robust risk-adjusted performance.
- The premium/discount deviation is negligible (Mean = 0.412%), signifying effective pricing.
- Silver ETFs far surpass Gold ETFs ( $p < 0.001$ ).
- The trading volume exhibits a positive correlation with annual returns ( $r = 0.218$ ).
- Regression analysis indicates that liquidity has a significant impact on ETF returns ( $p < 0.001$ ).
- The variation of premium/discount is not statistically significant in predicting returns.

## 11. SUGGESTIONS

- Investors must see liquidity as a critical criterion when choosing ETFs.
- Diversifying a portfolio through commodity and index ETFs can augment results.
- Regulators must persist in enhancing arbitrage mechanisms to uphold pricing efficiency.
- Additional time-series analysis is necessary to assess long-term tracking inaccuracy and beta estimation.
- Asset managers might improve transparency concerning liquidity strategies to aid individual investors.

## 12. CONCLUSION

The study reveals that ETFs listed on the NSE have robust performance attributes, especially regarding risk-adjusted returns and pricing efficiency. Silver ETFs substantially surpass Gold ETFs, underscoring the return dynamics driven by asset classes. Liquidity serves as a pivotal factor in ETF performance, but short-term pricing discrepancies have negligible impact on annual returns. The Indian ETF market demonstrates increasing maturity and operational efficiency, rendering ETFs a suitable investment vehicle for diverse portfolio allocation.

**REFERENCES**

1. Banerjee, S. (2015). *Effectiveness of ETFs in indexing: The mean for equity investments by Employees' Provident Funds in India*. IUP Journal of Applied Finance.
2. Chandrasekaran, B. (2021). *An analysis of pricing efficiency of exchange traded funds (ETFs) in India*. Asian Journal of Finance & Accounting, 11(4), 607-633.
3. Goel, G. (2021). *Do pricing efficiencies in Indian equity ETF market impact their performance?* Research in International Business and Finance, 57, 101425.
4. Gupta, N., & Joshi, G. (2022). *Do emerging market ETFs exhibit higher tracking error? Evidence with Indian ETFs*. Working paper.
5. Joshi, G. (2022). *Do emerging market ETFs exhibit higher tracking error? Evidence with Indian ETFs*. Working paper.
6. Kumar, P. (2018). *An investigation of pricing efficiency of CPSE ETF in India*. Journal of Commerce & Accounting Research, 7(2).
7. Kumar, P. (2019). *Pricing efficiency and performance evaluation of selected exchange traded funds in India (Doctoral dissertation)*. Panjab University (Shodhganga).
8. Purohit, H. (2014). *A cross-country analysis of pricing efficiency of exchange traded funds*. Conference paper.
9. Purohit, H., & Malhotra, N. (2015). *Pricing efficiency & performance of exchange traded funds in India*. The IUP Journal of Applied Finance, 21(3), 16-35.
10. Purohit, H., & Malhotra, N. (2017). *Performance appraisal of exchange traded funds vis-à-vis index funds in India*. Empirical study.
11. Prasanna, K. P. (2012). *Performance of exchange-traded funds in India*. International Journal of Business and Management, 7(23), 122-143.
12. Reddy, Y. V., & Dhabolkar, P. (2020). *Pricing efficiency of exchange traded funds in India*. Organizations and Markets in Emerging Economies, 11(1), 244-268.
13. Roshni, P. R., & Sulaiman, E. (2021). *Performance of Nifty 50 exchange traded funds*. International Journal of Advance Research.
14. Sasi Kumar, K. (2023). *A study on the Indian equity exchange-traded funds: Performance, trends and market dynamics*. Empirical study.
15. Sethi, A., & Gupta, S. (2017). *Performance appraisal of exchange traded funds vis-à-vis index funds in India: An empirical analysis*. Empirical study.
16. Shanmugham, R., & Zabiulla. (2012). *Pricing efficiency of Nifty BeES in bullish and bearish markets*. Global Business Review, 13(1), 109-121.
17. Sharma, A. (2023). *Impact of tracking efficiency measures on selection of ETFs: Evidence from NSE-listed index ETFs (2016-2020)*. IJNRD.
18. Subramanian, N. (2014). *Performance of ETFs and index funds: A comparative analysis (NSE Research Paper)*.
19. Swathy, M. (2014). *An evaluation of exchange traded funds (Doctoral dissertation)*. Osmania University.