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AN EMPIRICAL ANALYSIS ON PRICING EFFICIENCY OF EXCHANGE TRADED FUNDS IN INDIA

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ABSTRACT
This paper investigates the pricing efficiency of the five selected Equity Exchange Traded Funds (ETFs) listed on National Stock Exchange of India [NSE]. We examine the deviations of price from net asset value (NAV), or premiums and discounts, and the persistence of premiums and discounts on the following day, by applying regression analysis on five year period data from 1/3/2010 to 28/2/2015. We find strong relationship between the trading price and NAV, four out of five ETFs were trading at their NAV during the study period. Also, the premiums and discounts do not persist over time since the beta coefficients related to one day lag of premiums/discounts are very low or negligible. Therefore, we conclude that the ETF market is efficient and deserves credit from international investors seeking exposure to an emerging stock market.

KEYWORDS: Pricing Efficiency, Exchange Traded Funds (ETFs), premiums/discounts, National Stock Exchange of India [NSE].

INTRODUCTION

ETFs are mutual fund schemes that are listed and traded like a stock on the exchange. An ETF is a hybrid financial product, bearing the twin features of a stock and a mutual fund. Like a stock it can be traded on a stock exchange, and like a mutual fund it behaves like a diversified portfolio. In many ways it is an index fund, with a few different features that put it in a separate class. One of the special features of exchange traded funds (ETFs) is their pricing. Unlike most mutual funds, which can be purchased or redeemed only at an end-of-day closing price, ETFs can be traded on stock exchanges all day long—much like stocks. ETFs are priced continuously during normal trading hours, investor can get a price at which to buy or sell the fund when the market is open.

Relation between NAV and Market Price

ETFs are seen as a hybrid between stocks and mutual funds, and thus feature pricing characteristics similar to both investment types. Like mutual funds, ETFs have a Net Asset Value (NAV). The NAVs of both mutual funds and ETFs are calculated at the end of each trading day, at market close. NAVs for both mutual funds and ETFs represent the real value of the underlying securities. The NAV is calculated by taking the total assets, deducting the liabilities, and dividing by the total number of shares outstanding. However, that's where the similarities between the funds end. A mutual fund's NAV is the price that is paid to buy or sell the fund, minus any commissions. No matter when an investor purchases the mutual fund unit, the end-of-day NAV is the price that is paid. In contrast, as soon as an ETF begins trading, its market price and NAV may diverge.

Therefore, the market price—or the price an investor pays to buy the ETF, or gets when the ETF is sold—may not necessarily equal the ETF's NAV. Instead, the ETF's market price is determined by changes in the value of the underlying securities, the forces of supply and demand and the opportunity for arbitrage (which is explained below). If two investors purchase the same ETF on the same day, they may end up paying different prices due to market fluctuations.

Trading at a Discount or Premium

Like stocks, ETFs have a bid price—the highest price any buyer is willing to pay for the ETF—and an ask price, the lowest price any seller is willing to accept for an ETF. The difference between the current bid and ask prices is known as the bid ask spread, or spread. Because of liquidity of underlying securities, market volatility and other factors, investors may purchase shares at a premium or discount to their NAV. When demand for fund shares exceeds supply, the market price at which an index ETF trades may be higher than its underlying net asset value—the price is at a premium to NAV. For example, if the NAV of a fund is $20, and the fund is selling for $20.20 on an exchange, the fund is said to be at a 1% premium to NAV. When there are more fund sellers than buyers, the market price may be at a discount to NAV—that is, its market price is lower than its NAV. For example, if the NAV of a fund is $20, and the fund is selling for $19.80 on an exchange, the fund is said to be at a 1% discount to NAV. Market forces and the desire to make a transaction usually help keep the bid/ask close to the NAV.

Arbitrage Keeps the Price Right

Arbitrage opportunity serves to keep ETF market prices aligned with the value of their underlying securities. Every time the ETF market price and the net asset value of the underlying securities start to diverge significantly there is an opportunity for arbitrage. Seeing an opportunity for profit from the price difference, authorized participants, which include specialists and market makers, may either create or redeem ETF shares. For example, if the price of the underlying stocks is below the price of the ETF, the authorized participant will buy the underlying securities and convert them to shares in the ETF (while selling the ETF in

the open market). If the underlying stocks are priced above the ETF, the reverse will occur. Due to the arbitrage opportunity and the fact that ETFs can be continuously created and redeemed, the ETF market price and its NAV are usually closely aligned.

REVIEW OF LITERATURE

Engle and Sarkar (2002) examine the premiums and discounts of both domestic and international ETFs. They report smaller premiums and1 discounts for the domestic ETFs compared to international ETFs. This evidence suggests that domestic ETFs are priced more efficiently than international ETFs.

Cheng and Cheng (2002) look into the daily premiums and discounts of the four ETFs in Hong Kong and find 0.59%, 0.27%, and 0.10% premiums, on average, for the Tracker Fund of Hong Kong,iShares MSCI China Tracker, and iShares MSCI Taiwan, respectively. They report -0.14% discount, on average, for iShares MSCI Korea. In addition, they provide evidence that the TraHK offers statistically significant premiums even in down and high volatility markets. They conclude that Hong Kong investors consider the TraHK a valuable investment.

Hughen (2003) investigates the impact of the changes in arbitrage mechanism on the premiums and discounts of the iShares Malaysia Fund. This international ETF has larger premiums and discounts over the period that arbitrage is suspended. The result shows how critical the arbitrage mechanism is for the pricing of ETFs.

Thirumalai (2003) analyzes the pricing efficiency of passive and active ETFs with and without an arbitrage mechanism and trading on the Deutsche Börse. The author finds larger standard deviation of price deviations from NAV for active ETFs but positive and statistically significant mean price deviations for passive ETFs. Although the mean price deviations for active ETFs are not statistically significant, they are more volatile.

Jares and Lavin (2004) provide empirical evidence that the prices of Japan and Hong Kong iShares deviate from the values of underlying indices. They find -0.34% and -0.21% discounts, on average, for Japan and Hong Kong iShares over the time period they analyzed. They also document a positive relationship between the returns and lagged deviations, indicating profitable trading strategies.

Gallagher and Segara (2004) study the tracking performance of the Australian ETFs. They compare the tracking error volatility of equity index funds with that of ETFs and conclude that ETFs mimic the underlying indices closely. Further, they document smaller dollar and percentage differences between net asset values and trade prices. Those differences do not persist over time and disappear within a day. This result implies that the market for ETFs in Australia is efficient.

Harper et al. (2005) compare the performance of international ETFs and closed-end country funds. They consider mean returns and risk-adjusted returns as proxies for performance and report higher mean returns and higher Sharpe ratios for international ETFs. These results indicate that investing in international ETFs rather than closed-end country funds may be a better strategy for international investors.

Lin et al. (2006) investigate the pricing efficiency of the first ETF, the Taiwan Top 50 Tracker Fund (TTT), in Taiwan. The TTT tracks the performance of the Taiwan 50 Index consisting of top 50 companies by their size. The authors show that the index levels of TAIEX, the Taiwan stock market index, and Taiwan 50 index exhibit a close relationship. Also, they move almost identically and are highly correlated. On the other hand, the average dollar and percentage differences between the trade price of TTT and the underlying NAV are 0.018 and 0.041, respectively. However, they are not statistically significant. Additionally, the average dollar and percentage mispricing of TTT are 0.176 and 0.383, respectively. They are statistically significant but economically insignificant after considering the costs related to arbitrage. The authors conclude that the TTT is price efficient.

Delcoure and Zhong (2007) explore the pricing efficiency of iShares and report statistically significant premiums. However, the positive deviations of prices from NAVs are transitory. Thus, their results provide empirical evidence inconsistent with the noise trader argument of previous research.

Mustafa Mesut Kayali (2007) investigates the pricing efficiency of the Dow Jones Istanbul 20 (DJIST), the first exchange traded fund in Turkey trading on the Istanbul Stock Exchange and following the performance of the Dow Jones Turkey Titans 20 Index since January 14,2005. Examines the deviations of price from net asset value (NAV), or premiums and discounts, over the first year of DJISTs trading. It is found that close pricing relationship exists between the two price series and document smaller deviations of price from NAV. That is, the DJIST trades at a smaller discount on average. Although this discount is statistically significant, it does not seem to be significant economically. Also, the premiums and discounts do not persist over time and disappear within two days.

RESEARCH OBJECTIVES

1. To perform an empirical analysis on “Net Asset Value” tracking of “ETF Trading Prices”.
2. To study the persistence of premiums / discounts over a one day time lag.

RESEARCH METHODOLOGY

Data: For this study the Daily Trading Values and Net Asset Values of ETFs listed on National Stock Exchange of India [NSE] were collected for a period of five years from [1/3/2010 to 28/2/2015]. Data had been collected from Goldman Sachs Mutual Fund India website. The ETFs were selected for the study on the basis of their inception; Benchmark/Goldman Sachs AMC was the first Fund House to launch an ETF named “NIFTYBEES” on NSE India. Five Equity ETFs listed on NSE belonging to Benchmark/Goldman Sachs AMC, forms the sample for this study. The details of the sample are given below in Table-1.

Table-1 Sample ETFs listed on National Stock Exchange of India

Scheme Name	Symbol	Investment Objectives	Launched	Issuer	Benchmark Index
Goldman Sachs S&P CNX Nifty Shariah Index Exchange Traded Scheme	SHARIABEES	To provide returns that, before expenses, closely correspond to the total returns of the securities as represented by the CNX Nifty Shariah Index by investing in securities which are constituents of CNX Nifty Shariah Index in the same proportion as in the Index.	Jan 2009	Goldman Sachs Mutual Fund	CNX SHARIAH NIFTY INDEX
Goldman Sachs PSU Bank Exchange Traded Scheme	PSUBNKBEES	To provide returns that, before expenses, closely correspond to the total returns of the securities as represented by the CNX PSU Bank Index	Oct 2007	Goldman Sachs Mutual Fund	CNX PSU BANK INDEX
Goldman Sachs Banking Index Exchange Traded Scheme	BANKBEES	To provide returns that, before expenses, closely correspond to the total returns of securities as represented by CNX Bank Index.	May 2004	Goldman Sachs Mutual Fund	CNX BANK INDEX
Goldman Sachs Nifty Junior Exchange Traded Scheme	JUNIORBEES	To provide returns that, before expenses, closely correspond to the returns of securities as represented by the CNX Nifty Junior Index.	Feb 2003	Goldman Sachs Mutual Fund	CNX NIFTY JUNIOR INDEX
Goldman Sachs Nifty Exchange Traded Scheme	NIFTYBEES	To provide investment returns that, before expenses, closely correspond to the total returns of securities as represented by the CNX Nifty Index.	Jan 2002	Goldman Sachs Mutual Fund	CNX NIFTY INDEX

Hypothesis-I

H_0: Trading Price of ETF is independent of its Net Asset Value.

H_A: Trading Price of ETF is not independent of its Net Asset Value.

$TP\text{-}ETF_i = \alpha_i + \beta_i\ NAV\text{-}ETF_i$ ---------- Regression (1)

where

$TP\text{-}ETF_t$ = Trading Price of ETF

$NAV\text{-}ETF_t$ = Net Asset Value of ETF

H_0: $\beta_i = 0$ and H_A: $\beta_i \neq 0$

Hypothesis-II:

H_0: Premium / Discount on day (t) is independent of premium / discount on day (t-1).

H_A: Premium / Discount on day (t) is not independent of premium / discount on day (t-1).

$PREM/DISC_t = \alpha_i + \beta_i\ PREM/DISC_{t-1}$ ----- Regression (2)

where

$PREM/DISC_t$ = Premium or Discount on Day t

$PREM/DISC_{t-1}$ = Premium or Discount on Day t-1

H_0: $\beta_i = 0$ and H_A: $\beta_i \neq 0$

METHODOLOGY

Closing trading prices and net asset values on a daily basis for a five year period were applied as inputs for Regression (1), if the regression coefficient beta- $\boldsymbol{\beta_i}$ lies "above 1" it implies that the ETF is trading at a premium, if it lies "below 1" it trades at a discount whereas if it is "equal to 1" it is priced perfectly tracking its net asset value also meeting its trading characteristic.

To test the persistence of premiums or discounts over a one day time lag Regression (2) is applied if the regression coefficient beta- $\boldsymbol{\beta_i}$ is "near to 0" it implies that due to arbitrage mechanism the premiums or discounts vanish on the same day whereas if it is "near to 1" it implies that market is imperfect and the premiums or discounts do not disappear for few days after they had occurred.

ANALYSIS AND INTERPRETATION

Table-2 Regression Results Trading Prices and Net Asset Values

NO.	ETF	$TP\text{-}ETF_i = \alpha_i + \beta_i\ NAV\text{-}ETF_i$			
		α_i	β_i	R^2	t-stat
1	NIFTYBEES	-5.61	**1**	0.95	155.9
2	JUNIORBEES	-0.96	**1**	0.99	288.05
3	BANKBEES	-4.04	**1**	0.97	199.06
4	PSUBANKBEES	-1.89	**1**	0.89	96.74
5	SHARIAHBEES	-0.88	**0.99**	0.8	63.52

From the above regression **Table-2** we observe that out of the five selected Equity ETFs "NIFTYBEES", "JUNIORBEES", "BANKBEES" amd "PSUBANKBEES" are exactly trading at their NAVs whereas "SHARIAHBEES" is trading at a very negligible discount to its NAV. If the Beta (β_i) is equal to 1 it implies that the ETF is trading at its NAV, if it is greater than 1 it is trading at premium whereas if it is less than 1 it implies that it is trading at a discount to its NAV. t-stats are high leading to the rejection of the null hypothesis, and proving that there is a relation between trading prices and net asset values of ETFs.. R^2 near to 1 implying that regression analysis is best suited to test the relation between the above variables.

Table-3 Regression Results One Day Lag Premiums / Discounts

NO.	ETF	$PREM/DISC_t = \alpha_i + \beta_i\ PREM/DISC_{t-1}$			
		α_i	β_i	R^2	t-stat
1	NIFTYBEES	-1.62	**0.01**	0	0.36
2	JUNIOR BEES	-0.37	**0.06**	0	2.13
3	BANKBEES	-1.22	**0.03**	0	0.9
4	PSUBANKBEES	-0.68	**0.05**	0	1.79
5	SHARIAHBEES	-1.46	**0.06**	0	2.22

In order to investigate whether the premiums and discounts persist over time or not, we conduct a regression analysis of the premium/discount at the close of day t on its one day lagged premium / discount. That is, we define the premium / discount on day t as the dependent variable and its lagged counterpart as the independent variable. The insignificant coefficient of the lagged premium / discount would suggest that the premiums and discounts do not persist over time and disappear in one day. The results of the regression analysis are provided in **Table-3** our focus is on the coefficient of the independent variable Beta(β_i) , which is less than 0.10 for all the five ETFs and statistically significant near to zero with a low t-values. This finding supports the idea that the deviations of price from the net asset value slightly persist in the following day and the deviation is negligible implying that the pricing mechanism and arbitrage mechanism are working efficiently.

CONCLUSION

If ETF either trades at a premium or discount arbitraging occurs whereby the authorized participant's swap the basket of stocks with the ETF units, the arbitrage continues until the trading price matches the net asset value of the ETF. Arbitrage opportunity serves to keep ETF market prices aligned with the value of their underlying securities. Every time the ETF market price and the net asset value of the underlying securities start to diverge significantly there is an opportunity for arbitrage. Seeing an opportunity for profit from the price difference, authorized participants, which include specialists and market makers, may either create or redeem ETF shares. For example, if the price of the underlying stocks is below the price of the ETF, the authorized participant will buy the underlying securities and convert them to shares in the ETF (while selling the ETF in the open market). If the underlying stocks are priced above the ETF, the reverse will occur. Due to the arbitrage opportunity and the fact that ETFs can be continuously created and redeemed, the ETF market price and its NAV are usually closely aligned.

We observe that Equity ETFs listed on NSE are trading at their Net Asset Values proving their pricing efficiency; we also observe that the premiums and discounts do not persist on the following day proving that markets are perfect and arbitraging is aligning the trading price with its net asset value. So investors can consider NSE ETFs for investment in passive investment avenues and Goldman Sachs previously Benchmark Funds is one of the best ETFs provider in India, it provides diversified ETF "NIFTYBEES", sect oral ETF "BANKBEES" and thematic ETF "SHARIAHBEES" tracking varied indices.

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