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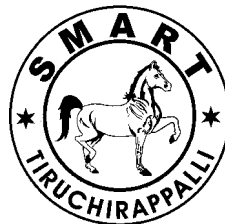
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A STUDY ON THE RELATIONSHIP BETWEEN PRICE AND NET ASSET VALUE OF THE EXCHANGE TRADED FUNDS IN INDIA

Dharani Munusamy

*Assistant Professor, Department of Finance, ICFAI Business School,
ICFAI University, Hyderabad-501203, India.*

E-Mail: mdharani85@gmail.com

Vijayakumar Narayanamurthy

Assistant Professor (SG), PSG Institute of Management, Coimbatore-14

E-Mail: nvkvijay@gmail.com

and

Muruganandam Sivanmalaiappan

*Assistant Professor, PG Department of Commerce, SDM College (Autonomous)
Ujire, Mangalore, Karnataka-574 240*

E-Mail: achieveranand@gmail.com

Abstract

The study examines the causal relationship between daily price return and Net Asset Value (NAV) of the Exchange Traded Funds (ETF), from the listing date of each ETF to December 2013. The study employed Augmented Dickey Fuller (ADF) Unit Root Test for Price and NAV and Granger Causality Test. The study found that the daily time series of the Price and NAV of the selected ETFs were stationary in the first difference and the causality test revealed the existence of bidirectional relationship between them.

Key words: Exchange Traded Fund, Net Asset Value, Unit Root and Causality.

JEL : C58, C87, G11

1. Introduction

Over a decade, Exchange Traded Funds (ETFs) have become popular in India. ETFs are a group of securities, that are traded in recognized stock exchanges, throughout the trading days like stocks. This also tracks the performance of the underlying assets or the indices. The retail investors would buy ETFs in

the secondary market and institutional investors would buy them in both fund houses and secondary markets. The ETF, as a financial product, was first introduced in the American Stock Exchanges, during 1993. The most popularly traded ETFs in the world are the QQQs (Cubes), based on the Nasdaq-100 Index, SPDRs (Spiders) based on the S&P 500 Index,

iSHARES based on MSCI Indices and TRAHK (Tracks) based on the Hang Seng Index.

In India, Nifty BeES was the first ETF, introduced by the Benchmark Mutual Funds Limited, during 2002. At present, there are more than 30 equity based ETFs, available for trading at NSE and 75 traded at BSE, for the benefit of potential investors. The only debt based ETF traded at NSE is the Liquid Benchmark Exchange Traded Scheme (Liquid BeES). All the ETFs traded in India are open ended funds and yield return before expenses and they closely correspond to the total returns of the tracking index, subject to tracking errors.

The ETFs have been traded in the stock exchanges over a decade and they have grown tremendously, in terms of trading volumes. However, the research on this specific subject is scarce and it has not been researched extensively in India. Therefore, to begin with, this study tries to capture the existence of a relationship between ETFs price returns and their NAV in the Indian context. Specifically, this study considers only equity based ETFs that are traded with NSE.

The chapter scheme of this study is organized as follows: Section One covers introduction. Sections Two and Three deal with the statement of the problem and need for the study. The Fourth Section reviews the earlier studies on Exchange Traded Funds. Sections Five and Six address the objectives, hypotheses, data and methodology of the study. The Section Seven discusses the empirical results. The study presents the findings, scope for future research and limitations in Eighth and Ninth Sections respectively.

2. Review of Literature

Internationally, adequate empirical research is available, to investigate the performance, pricing ability and volatility characteristics of the ETFs in the developed and emerging economies. This section reviews the

studies relating to ETFs that are available on emerging markets and developed markets.

Rompotis (2002) examined the premium or discount of the Exchange Traded Funds, by using daily price and Net Asset Value, for selected American ETFs, during March 2001 to July 2002 and found that ETFs traded at premium, with regard to their net asset value and also compared the risk and return of the Exchange Traded Funds with Index funds, from April 2001 to November 2002. The study employed the regression analysis for the sample ETFs and found the ETFs and Index funds to be performing similarly. **Gallagher and Segara (2004)** examined the performance and trading behavior of exchange-traded funds in Australia, from January 2002 to December 2003. The study evidenced the close tracking of the index based ETFs and their respective benchmarks. **Lin and Chou (2006)** observed the tracking error and premium/discount of Taiwan's first Exchange Traded Fund. The study observed the dividends and management expenses, primarily by determining the tracking error and the volatility. **Kuo and Mateus (2006)** investigated the performance and persistence of twenty selected iShares, MSCI country-specific, exchange-traded funds, in comparison with S&P 500 index, from July 2001 to June 2006. The study employed the risk-adjusted performance measures of Sharpe, Treynor and Sortino ratios and found the ETFs beating the U.S. market index and evidenced the performance persistence of ETFs. **Kayali (2007)** analysed the pricing efficiency of Dow Jones Istanbul ETFs during 2005 and found that most of the ETFs were traded at discount in Turkey. **Rompotis (2009)** investigated the cost-performance of ETFs, from 2002 to 2006, for Barclay's iShares and found the expenses influencing the size of iShares, which reflected the existence of strong economies of scale while the impact of turnover on performance seemed to be positive. **Aber, Li and Can (2009)** investigated the price volatility and tracking

ability of iShares ETFs. The study compared the premium and discount position, daily return, and tracking error of ETFs, with conventional mutual funds, benchmarking the same index. The study revealed that most of the ETFs were traded at a premium, with high daily price fluctuations. Further, they appeared to co-move with their benchmarks, by differing slightly in their tracking ability. **Merici et al. (2010)** examined the performances of selected sectoral index funds of U.S. stock market, during 2007 to 2009, by considering the study period during a bear market period. The study used portfolio performance measures of Sharpe and Treynor and observed the strong performance of healthcare and consumer sector index funds. Moreover, the financial and construction sector index funds performed badly during the study period. **Shina and Soydemir (2010)** estimated the tracking errors and relative performance, using Jensen's alpha, risk adjusted returns model, for the selected twenty six ETFs. The study found that the tracking errors varied significantly from zero and recorded persistence. Further, the study examined factors causing the underperformance and evidenced that the change in exchange rate predominantly acted as a source of tracking errors. **Agapova (2011)** compared aggregate fund flows into conventional open-ended index funds with those into ETFs, for various underlying indexes. The study reported that conventional funds and ETFs were substitutes, but not perfect substitutes for one another. Evidence suggested that the coexistence of both instruments could be explained by a clientele effect that segregated the two vehicles into different market niches. **Krause and Tse (2013)** examined the volatility and return spillovers in Canadian and U.S. industry ETFs. The study found that price discovery flowed consistently from the U.S. to Canada for these securities while volatility spillovers were largely bi-directional. Information was impounded more rapidly into returns, through trading in U.S securities and the combination of

negative U.S. return spillovers and asymmetric volatility created bi-directional volatility feedback effects. The results are relevant to market participants and Canadian market regulators since Canadian circuit-breakers are tied to U.S. market conditions.

The present study intends to examine the relationship between price changes and NAV changes of the ETFs in India.

3. Statement of the Problem

All the ETFs are open ended funds and yield return before expenses and they closely correspond to the total returns of the tracking index, subject to tracking errors. Two values are quoted in the market for ETFs. First one is a price of the ETFs and next is the NAV of the Funds. The prices of the ETFs are determined by the supply and demand in the market whereas NAVs of the ETFs are calculated by the Fund House itself. The difference between price and NAV of the funds is called the tracking errors. The tracking errors are determined by the price and NAV relations over the period of time. Therefore, the study tries to examine the relationship between Price and Net Asset Value (NAV) of the exchange traded funds in India.

4. Need for the Study

Numerous studies have tested the performance of the ETFs in international stock markets but they have not focused on its relationship with benchmarks. **Rompotis (2002a, 2002b, 2009)** and **Merici et al. (2010)** examined the premium or discount, risk and return and performance of the Exchange Traded Funds in the US. **Gallagher and Segara (2004)** analysed the performance and trading behavior of exchange-traded funds in Australia. **Lin & Chou (2006)** and **Shina & Soydemir (2010)** observed the tracking error and premium/discount of Taiwan's first Exchange Traded Fund. **Kuo and Mateus (2006)** investigated the performance and persistence of twenty selected iShares. **Kayali (2007)**

analysed the pricing efficiency of Dow Jones Istanbul ETFs. **Aber, Li and Can (2009)** investigated the price volatility and tracking ability of iShares ETFs. Majority of these studies were carried out for matured stock markets and an intensive research on ETFs is limited in India. Therefore, this study intends to examine the relationship between price changes and NAV changes of the ETFs in India.

5. Objectives of the Study

The primary objective of the study was to examine the existence of directional relationship between the price and the NAV of the exchange traded funds in Indian stock market during the study period. Therefore, the study investigated the causal relationship between the price and the NAV of the exchange traded funds in India, by employing Granger Causality Test, during the study period.

6. Data and Methodology

The present study analysed the relationship between the price and the NAV of the exchange traded funds in India. In order to test the objectives, the researchers formed suitable hypotheses and tested the same in the study.

6.1. Hypothesis of the Study

The study tested the following null hypotheses against the alternative hypothesis.

H_0 = There is no causal relationship between the price and the NAV of the ETFs in India.

H_1 = There is casual relationship between the price and the NAV of the ETFs in India.

6.2. Sample Selection

The study considered the select sample of ETFs in India, on the basis of data availability. Sample of selected ETFs included Nifty BeES, Junior Nifty BeES, Bank BeES, PSUBNBEEES, S&P CNX Nifty UTI Notional Depository Receipts Scheme (SUNDER), and

KOTAKPSUBK. The details of select ETFs are furnished in the **Table-1**.

6.3. Sources of Data

The variables in this study were closing price and the Net Asset Value (NAV) of the select sample ETFs. The NAV was extracted from the Benchmark mutual funds- website (www.benchmarkfunds.com), UTI mutual funds-website (www.utimf.com) and the Association of Indian Mutual Funds (AMFIINDIA) -website (www.amfiindia.com). The closing prices of sample ETFs were collected from the National Stock Exchange (India) Limited (NSE).

6.4. Period of the Study

The study employed secondary time series data set, pertaining to closing price and Net Asset Value (NAV) of select ETFs, listed in the ETFs segment of NSE, from its inception to 31st December 2013.

6.5. Tools used for the Study

In general, the empirical work, based on time series data, should be stationary (no unit root) at level (**Gujarati, 2003**). However, that may not be true and they can be non stationary or integrated in order 1 (**Engle and Granger, 1987**). Employing a non stationary time series, in a regression analysis, would result spuriously (**Granger and Newbold, 1974**). Therefore, this study tested for stationarity of the collected time series data set, before the estimations. In this study, to test for presence of a unit root in the data series, the study applied the Augmented Dickey-Fuller (ADF) Test.

Augmented Dickey- Fuller (ADF) Unit Root Test

Dickey and Fuller (1979) developed a test as Augmented Dickey Fuller Test (ADF) in which error terms of a series e_t are correlated. This test augments a random walk, with drift around a stochastic trend, by adding the lagged values of a dependent variable.

$$\Delta NAV_t = \delta NAV_{t-1} + \sum_{i=1}^k \lambda_j \Delta NAV_{t-i} + e_t$$

$$\Delta NAV_t = \alpha + \delta NAV_{t-1} + \sum_{i=1}^k \lambda_j \Delta NAV_{t-i} + e_t$$

$$\Delta NAV_t = \alpha + \beta T + \delta NAV_{t-1} + \sum_{i=1}^k \lambda_j \Delta NAV_{t-i} + e_t$$

Where e_t is a pure white noise error term, α , β and λ are parameters, t is the time or trend variables, δ represents drift and “ $NAV_{t-1} = (NAV_{t-1} - NAV_{t-2})$ ”, “ $NAV_{t-2} = (NAV_{t-2} - NAV_{t-3})$ ”, etc. the null hypothesis is that $\delta = 0$, that there is a unit root, the NAV of the Exchange Traded Funds are stationary. The alternative hypothesis is that δ is less than zero and the Net Asset Value of the Exchange Traded Funds is non stationary. The same methodology is employed for testing stationary of closing price of Exchange Traded Funds. After the unit root test, the study employed Granger Causality Test to examine the relationship between change in closing price and NAV of ETFs.

Granger Causality Test

Granger (1969) causality test, in general, states that if past values of ETF prices are able to forecast the future value of their NAVs, then Price of the ETFs is said to Granger cause their NAVs. Conversely, if past NAVs statistically assist to predict the price of the ETFs, then it can be concluded that NAV Granger causes price of the ETFs. The study tests the null hypothesis that there is no causal relationship between the price and the NAV of ETFs in India. The test is based on the following regressions:

$$price_t = \beta_0 + \sum_{i=1}^M \beta_k price_{t-k} + \sum_{i=1}^N \alpha_l NAV_{t-l} + u_t$$

$$NAV_t = \gamma_0 + \sum_{i=1}^M \delta_k price_{t-k} + \sum_{i=1}^N \gamma_l NAV_{t-l} + v_t$$

Where, $Price_t$ and NAV_t are the two variables under the study, u_t and v_t are mutually uncorrelated error terms, t denotes the time period and ‘ k ’ and ‘ l ’ are the number of lagged terms. The null hypothesis $\alpha_l = 0$ for all l 's and $\delta_k = 0$ for all k 's versus the alternative hypothesis that $\alpha_l \neq 0$ and $\delta_k \neq 0$ for at least some l 's and k 's. If the coefficient α_l 's are statistically significant, but δ_k 's are not, then the NAV causes Price. In the reverse case, Price causes NAV. But if both α_l and δ_k are significant, then causality exists in both ways.

7. Empirical Results

The results of ADF test, to test the existence of unit roots in the series of selected ETF prices and their NAVs, are presented in the **Table-2 and 3** respectively. The Tables reveal the results of t-statistics of regression-based ADF model. The calculated values of the t-statistics of ADF, test for the price and NVA of the ETFs, at the five-percent significance level, were insignificant. The results evidenced the presence of a unit root in the levels of price and NAV of the ETFs i.e., the null hypothesis cannot be rejected. The result of t-statistics of ADF test, in first difference, were highly significant at one percent level. It indicates that the null hypothesis of a unit root, in first difference, is rejected for the ETFs. This study implies that the series were stationary in the first differences. Therefore, the unit root analysis implies that the stock index series were individually integrated at order one, $I(1)$. The analysis of the results that both the selected series in the study, seemed to be insignificant at level and highly significant at first difference, confirmed the stationarity of both the series at first difference. The study took first difference for both price series and NAV series of selected ETFs and directly used them to estimate the causality test. Specifically, to test the null hypothesis that there is no causal relationship between the price and the NAV of the ETFs in India, the study employed Granger Causality Test

and the same result is presented in **Table-4**.

The results of the Granger Causality Test between difference ETF prices and its NAVs rejected the null hypothesis of the test that differences in prices did not cause the NAVs and recorded the existence of the bidirectional causal relationship between Price and NAV variables of selected ETFs under the study. In other words, the ETF prices were caused by its NAVs and in turn, NAVs were caused by ETF prices. Further, the study result indicated that the information flow between ETF prices and its NAVs seemed to be symmetric and perfectly synchronized. This result also provides direction for the investors, to trade freely in this market and construct the optimal portfolio, to ensure definite returns on their investments.

8. Summaries of Findings and Conclusion

The study established the relationship between Price and NAV changes of the Exchange Traded Funds, from the inception of each ETF to December 2013. The required daily closing prices and the NAV of select ETFs, were extracted from the NSE website and respective benchmark ETF fund houses and AMFI websites for the study period. The study employed Augmented Dickey Fuller (ADF) Unit Root Test to test the existence of stationarity of the variables and obtained stationarity at first difference level. Then, the Granger Causality Test was estimated to substantiate the study objective of finding relationships between Prices and NAVs of select ETFs and found the existence of bi-directional relationship between them.

9. Limitations and Scope for Future Study

The study of this subject can be further extended, by analyzing the tracking error of the ETFs, the performance of the ETFs, pricing efficiency of the ETFs and the relationship between returns, volatility and trading volume of the ETFs.

The present study suffered from certain limitation. First, the present study considered only an equity based Exchange Traded Funds. Second, the researchers investigated only NSE listed ETFs for the analysis. Finally, the study examined a selected Indian ETFs. The researchers did not consider the foreign ETFs in the present study.

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Table-1: Details of the Sample ETFs in India during the Study Period

ETFs Name	Launch Date	Listing Date*	Face Value	Mini amount	Tracking Index
Nifty BeES	12-12-2001	1-08-2002	Rs.10	Rs.10000	Nifty
Junior Nifty BeES	06-02-2003	6-03-2003	Rs.1.25	Rs.10000	Junior Nifty
Bank BeES	25-05-2004	4.06.2004	Rs.10	Rs.10000	Bank Nifty
UTI SUNDER	07-07-2003	16-07-2003	Rs.100	Rs.5000	Nifty
Kotak Bank ETF	27-10-2007	16-11-2007	Rs.10	Rs.10000	Nifty
PSU Bank BeES	24-10-2007	01-11-2007	Rs.10	Rs. 10000000	PSU Bank Nifty

Source: www.nseindia.com, www.amfindia.com

* From listing date to 31st December 2013, data are collected for each ETF

Table -2: The Results of Augmented Dickey-Fuller Test Statistics for ETF Prices during the Study Period

Funds Name	Level			First Difference		
	Constant	C & Trend	None	Constant	C & Trend	None
Nifty BeES	-0.701	-2.16799	0.94139	-41.091*	-41.084*	-41.05*
Junior Nifty BeES	-2.799	-2.79786	-1.7183	-39.264*	-39.254*	-39.27*
Bank BeES	-1.763	-2.02892	0.49370	-28.197*	-28.184*	-28.17*
UTI SUNDER	-1.373	-1.9727	0.7322	-21.906*	-21.901*	-21.85*
Kotak BeES	-1.114	-1.4375	-0.0945	-24.855*	-24.962*	-24.88*
PSU Bank BeES	-1.2242	-1.3845	-0.0737	-20.043*	-20.110*	-20.06*

Source: Computed by the Researcher.

Note: critical value of 1%, 5% and 10% level value is -3.449, -2.869 and -2.571 respectively.

Asterisk (*), (**) and (***) denotes statistically significant at 1%, 5% and 10% level respectively.

Table-3: The Results of Augmented Dickey-Fuller Test Statistic for Net Asset Value of ETFs during the Study Period

Funds Name	Level			First Difference		
	Constant	C & Trend	None	Constant	C & Trend	None
Nifty BeES	-0.6775	-2.1396	0.9658	-43.301*	-43.293*	-43.26*
Junior Nifty BeES	-2.6748	-2.6840	-1.673	-37.247*	-37.237*	-37.25*
Bank BeES	-1.8957	-2.2122	0.3993	-29.748*	-29.734*	-29.73*
UTI SUNDER	-1.0574	-1.7980	1.0434	-30.987*	-30.973*	-30.93*
Kotak BeES	-1.2283	-1.5217	-0.116	-19.285*	-19.376*	-19.30*
PSU Bank BeES	-1.2372	-1.4075	-0.094	-20.301*	-20.368*	-20.31*

Source: Computed by the Researcher.

Note: critical value of 1%, 5% and 10% level value is -3.449, -2.869 and -2.571 respectively.

Asterisk (*), (**) and (***) denotes statistically significant at 1%, 5% and 10% level respectively

Table -4: The Results of Pair-wise Granger Causality Tests between Price and NAV of the Selected ETFs during the Study Period

Funds Name	Null Hypothesis	Obs	F-Stat	P-value
Nifty BeES	NAV does not Granger Cause PRICE	1973	48.063*	4.2E-21
	PRICE does not Granger Cause NAV		7.381*	0.0006
Junior Nifty BeES	NAV does not Granger Cause PRICE	1485	2.350*	0.0124
	PRICE does not Granger Cause NAV		1086*	0.000
Bank BeES	NAV does not Granger Cause PRICE	1027	3.974**	0.01908
	PRICE does not Granger Cause NAV		176.96*	1.0E-66
UTI SUNDER	NAV does not Granger Cause PRICE	1086	64.947*	1.3E-38
	PRICE does not Granger Cause NAV		2.7589**	0.04114
Kotak BeES	NAV does not Granger Cause PRICE	481	178.82*	1.2E-58
	PRICE does not Granger Cause NAV		3.4925**	0.03121
PSU Bank BeES	NAV does not Granger Cause PRICE	515	104.58*	8.7E-39
	PRICE does not Granger Cause NAV		3.5453**	0.0295

Source: Computed by the Researcher.

Note: Asterisk (*), (**) and (***) denotes statistically significant at 1%, 5% and 10% level respectively.