

An Analysis of Relationship between NAV of select ETFs and Market Price in India

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Abstract

This study examined the relationship between market price and NAV of select Exchange Traded Funds (ETF). The study employed ADF Unit Root Test for establishment of casual relationship between market price and NAV of ETFs traded in NSE. The study revealed that the daily closing price and NAV of the selected ETFs are stationary in first difference and causality test indicate bidirectional relationship between market price and NAV.

Key words: Exchange Traded Fund, Net asset value, Unit root test, Granger Causality.

Introduction

ETFs are a combination of securities which are traded in the stock exchanges as a single stock. They naturally track performance of underlying index. ETFs were first introduced in USA during 1993 in the American Stock Exchange. In this study, we consider only select Equity based NSE traded ETFs for establishment of relationship between NAV and closing prices of ETFs in stock market. In the table below, we have shown the list of equity ETFs listed and traded on NSE along with issuer name, symbol, underlying index, and the year of launch. These are in simpler terms investment products that combine the flexibility of stock investment and the simplicity of equity mutual funds. Equity ETFs are passive investment instruments that invest in securities in same proportion as in the underlying index. The greatest benefit of ETFs is that they have a very low expense ratio in comparison to MFs.

Table 1 : List of Equity ETFs traded in NSE

Issuer AMC Name	Name of ETF	Symbols	Underlying	Year of Launch
Edelweiss	Edelweiss NIFTY ETF	NIFTYEES	NIFTY Index	2015
ICICI Prudential	ICICI Pru NIFTY ETF	INIFTY	NIFTY Index	2013
Kotak	Kotak NIFTY ETF	KOTAKNIFTY	NIFTY Index	2010
Motilal Oswal	MOST Shares M50	M50	NIFTY Index	2010
Quantum	Quantum Index Fund - Growth	QNIFTY	NIFTY Index	2008
Religare	Religare Invesco NIFTY ETF	RELGRNIFTY	NIFTY Index	2011
SBI	SBI ETF NIFTY	SETFNIFTY	NIFTY Index	2015
UTI	UTI NIFTY ETF	UTINIFTETF	NIFTY Index	2015
Birla Sun Life	Birla Sun Life NIFTY ETF	BSLNIFTY	NIFTY Index	2011
ICICI Pru	ICICI Pru CNX 100 ETF	ICNX100	NIFTY 100 Index	2013
Kotak	Kotak Banking ETF	KOTAKBKETF	NIFTY Bank	2014
SBI	SBI ETF Banking	SETFBANK	NIFTY Bank	2015
Motilal Oswal	MOST Shares M100	M100	NIFTY Midcap 100	2011
SBI	SBI ETF NIFTY Junior	SETFNIFJR	NIFTY Junior 50	2015
Kotak	Kotak PSU Bank ETF	KOTAKPSUBK	NIFTY PSU BANK	2007
ICICI Prudential	ICICI SENSEX Prudential Exchange Traded Fund	ISENSEX	BSE Sensex	2003
UTI	UTI Sensex ETF	UTISENETF	BSE Sensex	2015
Reliance Nippon Life	Reliance ETF NIFTY BeES	NIFTYBEES	NIFTY Index	2001
Reliance Nippon Life	Reliance ETF NIFTY 100	RELCNX100	NIFTY 100 Index	2013
Reliance Nippon Life	Reliance ETF Bank BeES	BANKBEES	NIFTY Bank	2004
Reliance Nippon Life	CPSE ETF	CPSEETF	NIFTY CPSE Index	2014

Reliance Nippon Life	Reliance ETF Infra BeES	INFRABEES	NIFTY Infrastructure	2010
Reliance Nippon Life	Reliance ETF Junior BeES	JUNIORBEES	NIFTY Junior 50	2003
Reliance Nippon Life	Reliance PSU Bank BeES	PSUBNKBEES	NIFTY PSU BANK	2007
ICICI Prudential	BHARAT 22 ETF	BHARATIWIN	BSE BHARAT 22 index	2017

Review of Literature

Some of the literature reviews related to ETFs and their trade carried out in emerging and developed markets are mentioned below :

The existing literatures analysed the risk and return and pricing efficiency of the ETFs (see: Rompotis, 2002; 2009; Kuo and Mateus, 2006; and Lin and Chou, 2006). Meric et al. (2010) compared the performances index funds and Exchange traded funds in US. Shina and Soydemirb (2010) estimated the tracking errors of the ETFs.. In India context, Dharani and Natarajan (2011) examined performance and arbitrage opportunity of the equity based ETFs in India.

Rompotis (2002) examined the discount or premium of the ETF closing prices and NAV for a sample of 30 American ETFs during one year period from 2001 to 2002. His observation was that ETFs are traded at a premium in stock markets in comparison to NAV.

Gallagher and Segara (2004) examined trading characteristics and performance of ETFs in Australia during 2003. They found that index-oriented ETFs closely track their respective benchmarks, while they are not tracking the overseas markets and other relative off- market index managed funds in the same degree.

Aber, Li and Can (2009) investigated the tracking ability and price volatility of four iShares ETFs. They used three measures: daily return of closing prices, tracking error and discount and premium position are compared with popular index MFs tracking the same index. Their observation was ETFs are usually traded at a premium to their NAVs and also approximately co-move with their benchmarks, but differ a little in their tracking ability.

Shina and Soydemirb (2010) estimated the tracking errors from 26 ETFs applying three different methods and test their relative performance using Jensen's alpha, risk adjusted returns model. Their observation was that tracking errors significantly deviate from zero and exhibit persistence.

Thus, the above mentioned have focused on risk and return, volatility, pricing efficiency and tracking error of the

Exchange Traded Funds. However, the present study exclusively focuses on the relationship between Closing price and NAV of the Equity oriented ETFs in India.

Research Objective

- To study performance of select ETFs traded in NSE for a period of 5 years from beginning of 2014 to end of 2018
- To establish casual relationship between NAV of selected ETFs with the market price for the same period
- To study the pricing efficiency of ETFs

Data and Methodology

The study uses secondary data pertaining to selected ETF prices and ETF NAV from 1st January 2014 to 31st December 2018, i.e. for a period of 5 years. We have considered here select six equity based ETFs that are traded in National Stock Exchange of India (NSE) such as Nifty BeES, Junior Nifty BeES, Bank BeES, PSU Bank BeES, UTI NIFTY and KOTAK Bank ETF. The daily ETF prices are collected from ETFs segment from NSE website (www.nseindia.com). The NAVs of select ETFs are collected from benchmark mutual funds website (www.benchmarkfunds.com).

First, we test for stationarity of the data before estimation. This stationary test or unit root test in the econometric literature includes Augmented Dickey-Fuller (ADF) test which was conducted to examine the stationarity of the select variables.

Augmented Dickey- Fuller (ADF) Unit Root Test

Error terms e_t are correlated in Augmented Dickey Fuller (ADF) test. This test augments stochastic trend by adding lagged value of the dependent variables.

The null hypothesis is that $\alpha = 0$, that there is a unit root i.e. NAV of the ETFs are stationary. The alternative hypothesis is that if $\alpha < 0$, then the NAV of the ETFs are non stationary. This too again applied for testing stationarity of Closing price of ETFs.

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

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

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



Granger Casualty Test

We employed, Granger (1969) casualty to find the casual relationship between NAV of ETFs and change in market price. Then purpose of this test is to find out if past prices of ETFs significantly forecasts the future value of NAV of ETFs then Price of the ETFs is said to Granger cause NAV of the ETFs. Alternately, if past values of NAV of the ETFs statistically improve the prediction of Price of the ETFs, then we conclude NAV of ETFs Granger causes market price. The equations applicable for the test are as shown below :

$$price_t = \beta_0 + \sum_{i=1}^M \beta_k price_{t-k} + \sum_{i=1}^N \alpha_i NAV_{t-i} + u_t$$
$$NAV_t = y_0 + \sum_{i=1}^M \delta_k price_{t-k} + \sum_{i=1}^N y_i NAV_{t-i} + v_t$$

Since the closing prices and NAV's of the ETFs are stationary at first difference, the study adopted the first difference stationary equation (6) and (7). Since, the first condition of Granger causality test is that the series should be stationary at level. If the series is stationary at level, then we may follow the equation.

number (4) and (5).

$$\Delta price_t = \beta_0 + \sum_{i=1}^M \beta_k \Delta price_{t-k} + \sum_{i=1}^N \alpha_i \Delta NAV_{t-i} + u_t$$
$$\Delta NAV_t = y_0 + \sum_{i=1}^M \delta_k \Delta price_{t-k} + \sum_{i=1}^N y_i \Delta NAV_{t-i} + v_t$$

Data Interpretation and Findings

Table 2A: Descriptive Statistics for Closing Price and NAV of ETFs

Parameters	Nifty BeES		Nifty Junior BeES		Bank BeES		PSU Bank BeES		Kotak PSU BeES		UTI SUNDER	
	Price	NAV	Price	NAV	Price	NAV	Price	NAV	Price	NAV	Price	NAV
Mean	285.23	285.53	83.82	85.30	600.20	600.42	245.43	245.09	248.30	248.75	328.76	338.93
Median	270.50	270.24	69.19	69.40	582.00	585.16	241.20	241.44	246.00	246.72	333.02	337.53
S.D.	146.27	146.35	60.70	63.42	188.63	187.46	59.70	59.87	61.57	61.58	132.63	140.74
Kurtosis	-1.09	-1.09	6.92	6.61	-0.64	-0.68	-1.19	-1.19	-1.10	-1.14	-1.22	-1.18
Skewness	0.35	0.35	2.55	2.53	0.38	0.35	0.15	0.15	0.19	0.17	0.12	0.17
Range	541.82	542.67	342.15	340.99	663.82	651.08	229.97	233.00	245.26	238.65	493.39	534.17
Minimum	93.75	93.04	27.10	26.87	226.28	219.80	135.00	132.14	135.24	131.51	110.11	111.18
Maximum	635.27	635.72	369.25	367.86	1090.10	1070.88	364.97	365.16	380.50	370.16	603.50	645.35
Count	1975	1975	1494	1494	1020	1020	517	517	483	483	1089	1089

Table 2B: Descriptive Statistics for Return of Price and NAV of ETFs

Parameters	Nifty BeES		Nifty Junior BeES		Bank BeES		PSU Bank BeES		Kotak PSU BeES		UTI SUNDER	
	Price	NAV	Price	NAV	Price	NAV	Price	NAV	Price	NAV	Price	NAV
Mean	0.08	0.08	-0.02	-0.02	0.13	0.13	0.03	0.03	0.02	0.02	-0.13	-0.14
Median	0.15	0.15	0.27	0.33	0.22	0.19	0.01	0.00	0.00	-0.02	-0.02	-0.26
S. D.	1.75	1.85	6.59	6.42	2.80	5.81	2.98	3.03	3.70	3.14	4.26	2.25
Kurtosis	6.33	10.50	1035.25	1154.09	2.58	82.10	4.01	10.12	6.30	9.89	3.84	6.45
Skewness	-0.43	-0.15	-29.40	-31.88	0.12	-0.18	0.25	0.99	-0.21	1.01	0.10	0.49
Range	26.25	29.55	270.36	249.53	32.63	151.72	30.91	32.06	30.11	30.57	30.01	29.01
Minimum	-12.59	-13.25	-232.40	-232.41	-14.66	-77.43	-12.67	-12.46	-21.88	-12.67	-17.86	-16.03
Maximum	13.65	16.30	17.96	17.11	17.97	74.29	18.23	25.60	17.23	25.90	21.15	12.98
Count	1974	1974	1493	1493	1020	1020	516	516	482	482	1088	1088

Table 3A: Observation for Augmented Dickey-Fuller test for ETF Prices

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

Table 3B: Observation for Augmented Dickey-Fuller test for ETF NAVs

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

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

Table 4: Pairwise Granger Causality Tests between NAV of ETFs and Market Price

The basic characteristics selected ETFs in India for the study is presented in Table- 2A and Table-2B respectively in the name of descriptive statistics. Table-2A presents the descriptive statistics of selected ETF prices and their NAV. Table-2B presents the descriptive statistics of ETF price returns and their NAV returns. The descriptive statistics reveals that the mean, standard deviation and other descriptive measures across the selected ETFs are also similar (except skewness, kurtosis) during the study period. On the other hand, skewness and kurtosis shows that the price and NAV series of selected ETFs are not normally distributed during the study period.

We test the stationarity of the two variables price and NAV data series of the selected ETFs using ADF test. The results of ADF test is presented in Table- 3A and 3B respectively for Price and NAV data series. The test result reveals that both the variables Price and NAV seem to be insignificant at level. However, it is highly significant at first difference. It infers that both the series are stationary at first difference. Therefore, we first difference both Price series and NAV series of selected ETFs and directly use this variables series to estimate the causal relationship between them. Specifically, we employ Granger causality test (1964) and the same result is presented in Table 4. The result of Granger causality test between differenced ETF prices and its NAVs rejects the null hypothesis that differenced ETF prices does not Granger cause the ETF NAV's and reveals that both differenced Price and NAV variables of ETFs granger causes each other. This result exhibits the existence of bi-directional relationship between the variables for all the selected ETFs under the study that is ETF prices are caused by its NAV and in turn NAVs are caused by ETF prices.

This result infers that the information flow between ETF prices and its NAVs seems to symmetric

and perfectly synchronized. This result also provides direction to the investors to trade freely in this market for effective portfolio diversification and earn certain returns. We found no significant variations between ETF prices and ETF NAVs in their behaviour. The implication is that the information flow between ETF prices and ETF NAVs is stable and ensures the stable return on the investments within market.

Conclusion

This study established the relationship between Price and NAV changes of the Exchange Traded Funds from beginning of 2014 till December 2018. The daily closing price and NAV of the selected Exchange Traded Funds are extracted from the NSE website and concern bench mark ETF fund houses and AMFI websites respectively for the study period. We employed Augmented Dickey Fuller (ADF) Unit Root Test to test for stationarity of variables and obtained stationarity at first difference level. Then we estimated Granger Causality test to substantiate study objective of finding relationship between prices and NAVs of ETFs and found the existence of bi-directional relationship between them.

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

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