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AN INVESTIGATION OF PRICING EFFICIENCY OF CPSE ETF IN INDIA

Pardeep Kumar*

Abstract *The study empirically examines the pricing efficiency of CPSE ETF in India, listed on National Stock Exchange (NSE). The study covers a period of three years i.e. from 1st April, 2014 to 31st March, 2017. For the purpose of analysis the study employs different statistical tools. Simple linear regression is used to test the relationship between NAV of ETF and price of ETF. Further rupee difference and percentage difference is calculated to find out the price deviation i.e. premium/discount. Descriptive statistics were also used for the purpose of analysis. The regression result suggests a very close relationship between the NAV of CPSE ETF and its market price. During the study period, on average CPSE ETF was traded at discount. But the discount was economically insignificant and does not provide arbitrage opportunity to the market participant. It was concluded that market for CPSE ETF is price efficient.*

Keywords: *Exchange Traded Funds, Regression, Pricing Efficiency, Premium/Discount*

INTRODUCTION

In recent years, Exchange Traded Funds (ETFs) have become popular investment vehicles. An ETF is a hybrid financial product-a mix of a stock and mutual fund. Like a stock it can be traded on a stock exchange at intraday value and like a mutual fund it has a NAV and comprises a well diversified portfolio. ETFs provide several benefits i.e. intraday trading, high tax efficiency, low expense ratio and high level of transparency. All these features distinguish them from conventional mutual funds and other index related products. ETFs follow a passive investing, where investor try to track a benchmark market index, in contrast to active management that seeks to outperform the market. ETFs have registering steady growth in India, with the investment community opting for safe investment option. Realising the popularity of ETFs, Government launched Central Public Sector Enterprise Exchange Traded Fund (CPSE ETF) in March 2014 which has its underlying benchmark index Nifty CPSE. The CPSE ETF is a passive investment fund that is created to help the Centre in its disinvestment program of divesting stake in selected government companies through ETFs. CPSE ETF is fast becoming a popular avenue for investment by both, retail and institutional investors. The CPSE ETF is made up of equity investment in 10of India's largest public sector companies. The biggest of these are ONGC, REC, Coal India, Container Corp, Oil India, Power Finance Gail, BEL, EIL, and Indian Oil.

REGULATORY STRUCTURE OF ETFS IN INDIA

Following are the major participants in ETF market:

1. Stock Exchange: A stock exchange's first task upon entering the ETF business is to define admission to trading conditions and trading rules in conjunction with market authorities and regulators (Deville, 2008). Its second task is to provide information. Stock exchanges disseminate classical intraday and daily data on market activity such as trades and quotes, trading volume and so on. More importantly, exchanges compute and disclose indicative NAVs on a frequent basis.

2. Sponsors and Trustees: Sponsors and trustees issue ETFs and manage the fund's holdings so as to replicate their underlying index or benchmark as closely as possible.

3. Authorised Participant (APs) and Market Makers: An Authorized Participant is typically a large investor, an institution, or an exchange specialist. They are able to turn baskets of equity securities, comprising the underlying index, into blocks of new exchange-traded index funds. Conversely, Authorized Participants redeem blocks of exchange-traded fund shares, and convert them into shares of the securities comprising the underlying index the fund is tracking.

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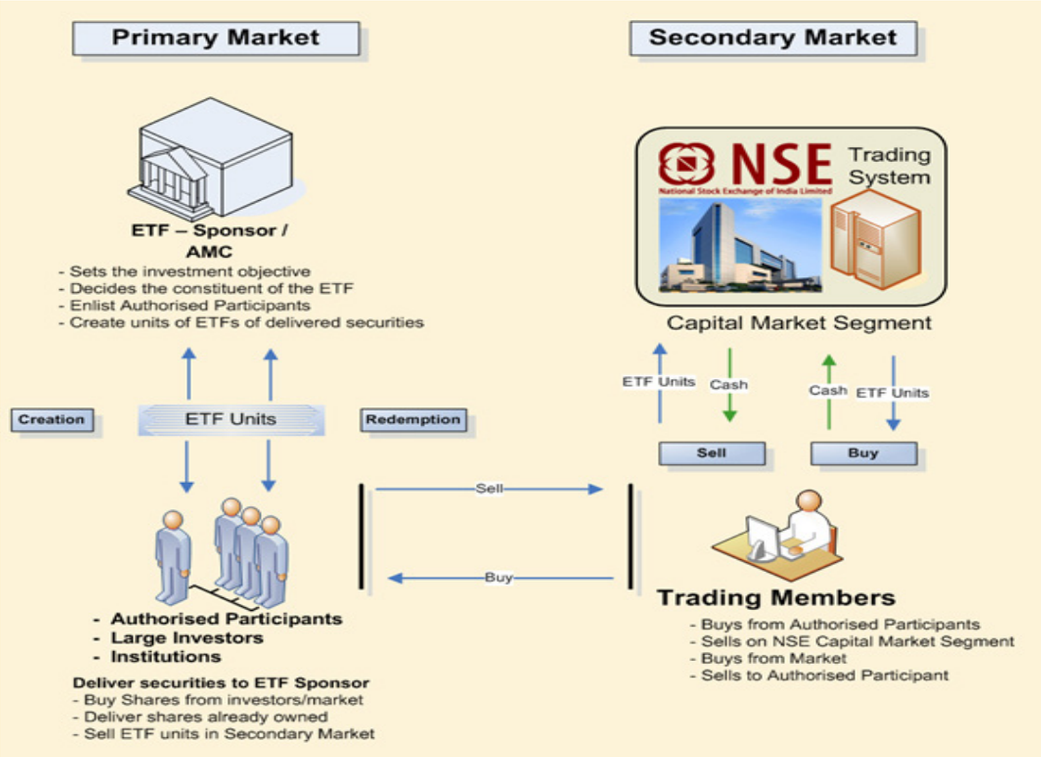

4. Retail and Institutional Investors on the Secondary Market: Most ETF trading occurs in the secondary market. Depending on the market and the ETF, the secondary market may be dominated either by institutional investors and APs or by retail investors.

PREMIUM/DISCOUNT, ARBITRAGE AND PRICING EFFICIENCY

The unique feature of the ETF is that it has both, a market price and NAV. It can be bought and sold in the secondary market at market determined price. The market price or intraday value depends upon the demand and supply of ETFs in secondary market. ETF price is market determined and NAV, Like Mutual Funds, is adjusted at the end of trading day. So these two values may deviate from each other and ETFs may be traded at premium or discount. That is if ETFs market price exceeds its NAV, it is traded at premium and if ETF price is less than NAV, it is traded at discount. 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. 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. If these deviations (premium/discount) are significant and sufficient to cover the arbitrage cost, the market participant can indulge in arbitrage and align the market price of ETFs with their NAVs. Arbitrage is the practice of taking advantage of a price differential between two or more markets. An arbitrage opportunity is inherent in the ETF structure because the ETF's intraday market price fluctuates during the trading day. Authorized Participants can arbitrage this difference (and make a profit) because they can trade directly with the ETF at NAV as well as on the market. The expected result of the arbitrage activity is that the market value of the ETF moves back in line with the ETF's NAV per share and investors are able to buy ETF shares on an exchange at a price that is close to the ETF's NAV per share. Market for ETF is price efficient if market price of ETF is close to its NAV.

LITERATURE REVIEW

The empirical studies suggest pricing efficiency in ETFs market. Most of the study observed small and insignificant premium/discount which was ephemeral as a result of efficient arbitrage execution by market participants. Charteris (2014) examined pricing efficiency of South African ETFs using Johansen's cointegration technique and profile persistence test. The study found that ETFs prices were in long run equilibrium with its NAVs and any short term deviation was corrected by arbitrage mechanism. Kayali (2007) studied the Turky's first ETF, Dow Jones Istanbul 20 (DJIST) and observed that DJIST traded at significant discount but not persistent. The deviation lasted only for two days thus suggested an efficient market. Lin, Chan, & Hsu (2006)

observed almost identical changes in prices of Taiwanese ETF, TTT and its NAV. The study also observed that TTT was traded at premium for most of trading days but premium was insignificant. Ackert and Tian (2000) studied the pricing efficiency of SPDRs and found an insignificant deviation (discount). But MidCap SPDRs was traded at economical significant discount because of existence of arbitrage cost. Rompotis (2009) has the same finding about German ETFs i.e. premium or discount was not significant and lack of persistency. Swathy (2004) studied the pricing efficiency of ETFs listed on Indian National Stock Exchange. The result was in support of earlier study. The study observed that out of five, four ETFs were traded close to its NAV and any deviation disappeared next day because of efficient arbitrage execution.

Although most of the study concluded that the market for ETFs is price efficient and any deviation is priced away by an efficient arbitrage mechanism. But there are fewer studies which suggested that the premium or discount was not only significant but also persistent. Jares and Lavin (2004) examined the pricing efficiency of Japan and Hong Kong iShare and observed that the deviation was not only significant but also frequent. Engle and Sarkar (2002) investigated the pricing efficiency of domestic and country ETFs and found that the premium or discount was more significant and persistent for country ETFs than domestic ETFs.

The review of literature shows that there are many international researches testing the pricing efficiency of ETFs market. But as, Indian ETFs market is still in its primitive phase, there are very few empirical researches on Indian ETFs. Further CPSE ETF is a new entrant in Indian ETFs family. So this is the first study which examines the pricing efficiency of CPSE ETF in India. This study is an attempt to fill the research gap and contributes to the literature examining pricing efficiency of ETF in India.

OBJECTIVES OF THE STUDY AND HYPOTHESES

The unique "in kind" creation/redemption process suggests the ETFs should be price efficient i.e. the price of ETFs should be close to its NAVs. If there exist any deviation, that is priced away by efficient arbitrage mechanism. So the objective of the study is to examine the pricing efficiency of CPSE ETF in India i.e. to investigate whether CPSE ETF traded at significant premium or discount to its NAV and to find whether any mispricing provides profitable arbitrage opportunity to market participant. Further, t-value is used to test the hypotheses that the rupee difference is zero and the percentage difference equals zero. An economically insignificant mispricing suggest that CPSE ETF has pricing efficiency.

METHODOLOGY

To examine the pricing efficiency of CPSE ETF and existence of arbitrage opportunity, the study employ following simple linear Regression: $NAV_{ETF} = \alpha + \beta * P_{ETF}$. Wherein, NAV_{ETF} = Net Assets Value of CPSE ETF, P_{ETF} = Market Price of CPSE ETF, α = intercept and β = slop coefficient. The linear regression model captures the relationship between NAV of CPSE ETF and its market price. The equation defines the daily closing NAV of the CPSE ETF as the dependent variable and daily closing price of CPSE ETF as independent variable.

The study further uses Rupee difference and percentage difference to examine the pricing efficiency of CPSE ETF. The rupee difference is defined as: $RP_{dif} = (P_{ETF} - NAV_{ETF})$ and percentages difference as: % dif = $[(P_{ETF} - NAV_{ETF})/P_{ETF}]*100$. A positive rupee and percentage difference suggests that CPSE ETF traded at premium and a negative value represents a discount. Autoregression model can also be applied if the deviation is found to be significant. In addition to above, descriptive statistics have also been used to examine the pricing efficiency of ETF.

DATA AND SOURCES

The study is secondary in nature. The study covers the period from 1-April-2014 to 31-March-2017 i.e. for 3 years and includes 732 numbers of observations. (CPSE ETF was launched in March, 2014). The required data related to the price of CPSE ETF and NAV is collected from the official website of National Stock Exchange (NSE) and Association of Mutual Funds of India (AMFI).

EMPIRICAL FINDINGS

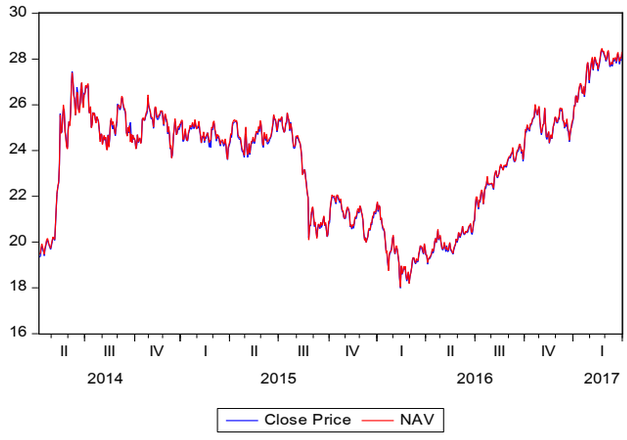

Fig. 1: Movement of CPSE ETF Price and NAV

Fig. 1 shows the movements of CPSE ETF price and NAV from 1st –April- 2014 to 31st –March-2017. The figure shows almost identical movements in the price of CPSE ETF and its NAV. Table 1 also shows a very close value of their mean, maximum and minimum. On 12 February, 2016, both registered their lows (Price 17.99, NAV 18.03) and simultaneously, both recorded their peak on 22 February, 2017 (Price 28.39, NAV 28.46).

Table 1: Descriptive Statistics: CPSE ETF Price and NAV

Close_price	NAV	
Mean	23.50355	23.54981
Median	24.38000	24.44500
Maximum	28.39000	28.46000
Minimum	17.99000	18.03000
Std. Dev.	2.528841	2.531591

Sample period: 1st April, 2014 to 31st March, 2017.
Both recorded low on 12th February, 2016.
Both recorded High on 22nd February, 2017.

Table 2: Regression Analysis of NAV and Price of CPSE ETF

Coefficient	**t-value**	
α (Constant)	0.027823	1.290933
β (P_{ETF})	1.000784	1097.647**
R^2	0.999394	

The regression model: $NAV_{ETF} = \alpha + \beta * P_{ETF}$.
**Significant at the 1 % level.

Table 2 shows the result of simple linear regression which defines NAV of CPSE ETF as dependent variable (NAV_{ETF}) and daily closing price of as independent variable (P_{ETF}). The coefficient of P_{ETF} (1.000784) shows that the changes in the price of CPSE ETF and its NAV is almost identical. Further the correlation between NAV_{ETF} and P_{ETF} is 0.99969 (i.e. square root of R^2). So the regression result exhibits a close relationship between NAV and market price of CPSE ETF.

The study further examines the pricing efficiency of CPSE ETF. For this purpose rupee deviation (P_{ETF} - NAV_{ETF}) and percentage deviation $\{[(P_{ETF} - NAV_{ETF})/P_{ETF}]*100\}$ have been calculated. A positive deviation means CPSE ETF traded at premium and a negative value implies discount. Figure 2.1 & 2.2 exhibits the rupee difference and percentage difference of CPSE ETF from 1st April, 2014 to 31st March, 2017. The graph shows that there is no continuous pattern of premium or discount in CPSE ETF. But both graphs show that negative deviations are more than the positive one and most of time CPSE ETF traded at discount. Further most of the deviation are scattered around horizontal axis implying small premium/discount. Moreover, it also illustrates that around 89 % of the deviations are within the range of ± INR 0.1 and about 99 % of the deviation are within the range of ± 0.2.

Table 2.1 & 2.2 exhibits the summery statistics and distribution of rupee difference and percentage difference respectively. The average rupee difference and percentage difference are INR -0.046257 and -0.198203 respectively i.e. on average, the CPSE ETF sells at discount. The highest recorded discount is INR -0.33 and -1.323176 % as compared to highest premium of INR 0.86 and 3.408641 %. Out of total 732 trading days, the CPSE ETF traded at discount for 608 (83.03%) trading days and at premium only for 106 (14.48%) trading days. For remaining 18 (2.46%) trading days CPSE ETF traded at par with its NAV. The t-value is used to test the hypotheses that the rupee difference and the percentages difference equals zero. Although, CPSE ETF traded at a discount most of the trading days, t-test suggests an insignificant discount level. The arbitrage process requires that the observed deviations (premium/discount) should be economically significant and exceed transaction cost (Lin, Chan, & Hsu, 2006). So it can be concluded that, on average CPSE ETF is traded at insignificant discount and does not provide any arbitrage opportunity to market participant. Thus, the analysis suggests pricing efficiency of CPSE ETF in India.

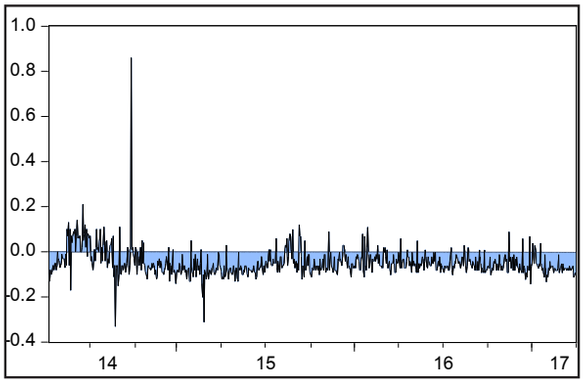

Fig. 2: Ruppe Deviation

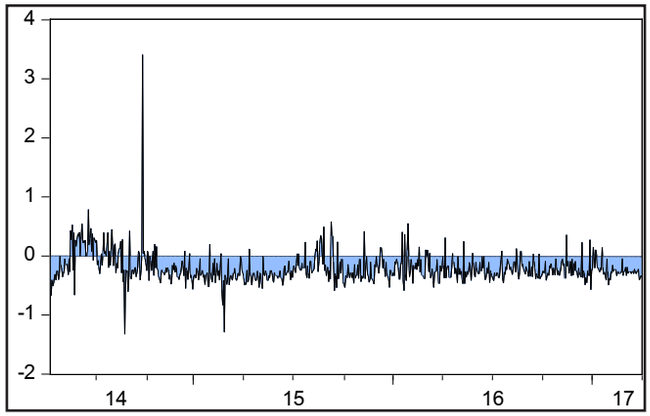

Fig. 3: Ruppe Deviation

Table 3: Descriptive Statistics of Rupee Difference and % Difference

Rupee difference		% difference	
Average	-0.046257	Average	-0.198203
Median	-0.060000	Median	-0.249510
Maximum	0.860000	Maximum	3.408641
Minimum	-0.330000	Minimum	-1.323176
Std. dev.	0.062328	Std. Dev.	0.258048
t-value	0.349750811		

Study period from 1st April, 2014 to 31st March, 2017. Total 732 trading days.

Rupee difference is calculated as = (P_{ETF} –NAV_{ETF}) and

% difference is calculated as = [(P_{ETF}- NAV_{ETF})/P_{ETF}]

Table 4: Frequency Distribution of Rupee Difference and % Difference

Rupee difference	No.	%	% difference	No.	%
-0.3 & less	2	0.27	-0.8 & less	3	0.14
-0.3 to -0.2	1	0.14	-0.8 to -0.6	4	0.55
-0.2 to -0.1	60	8.20	-0.6 to -0.4	74	10.11
-0.1 to 0	545	74.45	-0.4 to -0.2	376	51.37
0	18	2.46	-0.2 to 0	151	20.63
0 to 0.1	90	12.30	0	18	2.46
0.1 to 0.2	14	1.91	0 to 0.2	55	7.51
0.2 to 0.3	1	0.14	0.2 to 0.4	37	5.05
0.3 & above	1	0.14	0.4 & above	14	1.91

The study supports the findings of the earlier studies which suggested pricing efficiency in ETFs market. Most of the earlier studies observed small and insignificant premium/discount which disappeared in one or two days as a result of efficient arbitrage execution by market participants (Kayali 2007, Rompotis 2009, Charteris 2014). Lin, chan & Hsu (2006) found that Taiwanese ETF, TTT was traded at economically insignificant premium and most of deviations were within the range ± TWD 0.3. This study observed insignificant discount which was within the range of ±INR 0.2. The result of the study does not support some of the studies which argued that premium/discount persistence and inefficiency in ETFs market (Ackert & Tian 2000, Jares and Lavin 2004, Engle & Sarkar 2006).

SUMMERY AND CONCLUSIONS

Central Public Sector Enterprise Exchange Traded Fund (CPSE ETF) was introduced by Government in March 2014 to replicate the performance of its underlying index Nifty CPSE. The objective of the study is to examine the pricing efficiency of CPSE ETF in India over a period of three year i.e from 1st April, 2014 to 31st March, 2017. The study uses regression analysis to measure the relationship between CPSE ETF price and its NAV. The coefficient of P_{ETF} shows that the changes in CPSE ETF prices and its NAV were almost identical. The study further uses descriptive statistics, rupee deviation and percentage deviation to capture the pricing efficiency of CPSE ETF. The result suggests that, 83% of the time CPSE ETF was traded at discount. However, the discount was not significant as 89 % of the deviations were within the range of ± INR0.1. The findings support the earlier study conducted by (Kayali 2007, Rompotis 2009, Charteris 2014, Lin, chan & Hsu 2006). Further, market participant can earn arbitrage profit when the mispricing is economically significant and also covers the arbitrage cost (Lin, chan & Hsu 2006). On average CPSE ETF was traded at -0.19820 % discount. Thus CPSE ETF does not provide arbitrage opportunity to market participant and it can be concluded that the market for CPSE ETF is price efficient.

REFERENCES

Deville, L. (2008). Exchange traded funds: History, trading and research. *Handbook of Financial Engineering,* 1-37, *Springer.* Retrieved from http://halshs.archives-ouvertes.fr/halshs-00162223

Charteris, A. (2014). Does the law of one pricing hold for South African exchange traded funds? *Mediterranean Journal of Social Sciences*, *5*(3), 183-189.

Kayali, & Mesut, M. (2007). Pricing efficiency of exchange traded funds in Turkey: Early evidence from the Dow Jones Istanbul 20. *International Research Journal of Finance and Economics, 10*(7), 14-23.

Lin, C., Chan, S., & Hsu, H. (2006). Pricing efficiency of exchange traded funds in Taiwan. *Journal of Asset*

Management, *7*(1), 60-68. doi:10.1057/palgrave.jam.2240202

Ackert, L. F., & Tian, Y. S. (2000). Arbitrage and valuation in the market for standard and poor's depositary receipts. *Financial Management*, *29*(3), 71. doi:10.2307/3666230

Rompotis, G. G. (2009). Active vs. Passive Management: New Evidence from Exchange Traded Funds. *SSRN Electronic Journal*. doi:10.2139/ssrn.1337708

Garg, S. (2014). The performance and trading characteristics of exchange traded funds in India: An empirical study. *The International Journal of Business & Management*, *2*(4), 70-78.

Jares, T. E., & Lavin, A. M. (2004). Japan and Hong Kong Exchange Traded Funds (ETFs): Discount, returns, and trading strategies. *Journal of Financial Services Research*, *25*(1), 57-69.

Engle, R., & Sarkar, D. (2006). Premium-discount and exchange traded funds. *The Journal of Derivatives*, 27-45.