Performance of Exchange-Traded Funds in India

P. Krishna Prasanna¹

¹Department of Management Studies, Indian Institute of Technology, Madras, India

Correspondence: P. Krishna Prasanna, Department of Management Studies, Indian Institute of Technology, Madras, 600036, Chennai, India. Tel: 91-442-257-4571. E-mail: pkp@iitm.ac.in

Received: October17, 2012	Accepted: November 5, 2012	Online Published: November 15, 2012
doi:10.5539/ijbm.v7n23p122	URL: http://dx.doi.org/10.5539/ijbm	v7n23p122

Abstract

The concept of Exchange-Traded Funds (ETFs) is very popular in foreign countries, but in India, it is still in the initial growth phase. This research paper examines the characteristics and growth pattern of all the 82 exchange traded schemes floated and traded on Indian Stock markets, and evaluates their performance using Data Envelopment Analysis (DEA). On an average, ETFs grew at 37% annually during the period 2006 -2011in India. These funds consistently outperformed the market index and generated higher returns. ETFs generated excess returns of 3% p.a. as against CNX NIFTY, which is the Indian equity market bench mark. Gold ETFs provided 13% excess returns as compared to the returns on the equity market and attracted large investments in the post financial crisis years. Data Envelopment Analysis ranked domestic and overseas fund of funds as efficient funds, which were floated by foreign Asset Management Companies (AMCs) and the AMCs with Joint Ventures in India. Among the foreign AMCs, Franklin Templeton was found to offer the most efficient fund. These efficient funds are found to have higher Sharpe ratios, indicating that the DEA ranking is in broad consensus with the evaluation done using Sharpe ratios. However large funds were not found to be efficient funds. This infers that the fund size does not indicate superior performance.

Keywords: exchange-traded funds, data envelopment analysis, market index

1. Introduction

Exchange-Traded Funds (ETFs) were first introduced in USA in 1993. About 60% of trading volumes on the American Stock Exchange are reported to be from ETFs. As per the ETF landscape report released by BlackRock Inc. (a US-based AMC), ETFs have grown by 33.2%, compounded annually in the past 10 years, and 26.1% in the past five years, globally.

ETFs are referred to as passive schemes that fund managers resort to, to avoid risk and offer low-cost options to the investors. These funds rely on an arbitrage mechanism to maintain the prices at which they trade, in line with the net asset values of their underlying portfolios.

As Exchange-Traded Funds started growing in India since 2006, the investment industry required performance analysis of this newly available financial asset. Moreover, fund selection also requires investors to analyze returns, volatility and performance of the available funds. The purpose of this paper is to empirically assess the investment performance of Exchange-Traded Funds in India. The paper uses monthly returns of ETFs over the period 2006-20011 to analyze 82 ETFs that were floated and traded on the Indian Stock Market across various themes. The paper investigates the relationship between fund size and performance and provides useful insights for the fund managers and investors.

Performance of ETFs has been examined on the basis of their returns and risk characteristics. Performance measures include average annual returns and excess returns measured by alpha values; risks measured by standard deviation and risk-adjusted returns measured by the Sharpe ratio. Data Envelopment Analysis (DEA) with three inputs and two out variables was used to analyze ETF performance and generate relative efficiency ranking among the peer group of funds.

On an average in India, ETFs grew at 37% annually during 2006 -2011. These funds also generated excess returns of 3% p.a. as against CNX NIFTY, the Indian equity market's bench mark. Gold ETFs provided 13% excess returns as compared to the returns on the equity market and attracted large investments in the post financial crisis years. Data Envelopment Analysis ranked domestic and overseas fund of funds as efficient funds. These efficient funds were floated by foreign Asset Management Companies (AMCs) and the AMCs with joint

ventures in India. In India, as on 31st May 2011, there are 25 large funds which represent the most recent gold funds as well as overseas fund of funds. The efficient funds were not found to be the large funds; however, they offered higher returns and have higher Sharpe ratios.

This paper, being the first research work on ETFs in India, not only contributes to academic literature but also provides insights to investment professionals about an economy that is gaining significant prominence as an emerging economy in the global investment landscape.

2. Exchange Traded Funds in India

While the concept of ETFs is very much popular in foreign countries, in the Indian markets it is still in the initial growth phase. According to the Association of Mutual Funds of India (AMFI) data, the Indian mutual fund (MF) industry has been holding Rs. 6.75 trillion worth of assets over the past decade. On an average, during 2006-2011, Indian ETFs comprised of only 1.4% of the total industry assets. In comparison, in the US, ETFs comprise about 9% of the MF industry. This trend often raises the query among the investors as to whether or not Exchange-Traded Funds (ETFs) will be able to perform well in India.

In 2001, Benchmark was the first company to launch the first ETF in India - Nifty BeES, which was listed on the NSE for trade. In 2007, Benchmark also launched the first Gold Exchange-Traded Fund. Figure 1 presents a comparison of the growth in the total assets of the Indian MF industry and the growth of ETFs in India. The growth rate in ETFs was found to be higher than the industry growth rate during 2006 - 07. However, ETFs did not continue to grow at that pace in the post financial crisis period. Figure 2 presents the percentage of ETF assets with respect to the total assets of the Indian MF industry. While in 2006-07, the share of ETFs in the total industry was about 3%, it fell subsequently and the average is around 1.4%.



Figure 1. Comparative analysis of ETFs vs total funds



Figure 2. ETFs% in the total Indian mutual fund industry

AMFI categorizes ETFs in India into 4 categories: i) Fund of funds oversees (FOF Overseas); ii) Fund of funds domestic (FOF Domestic); iii) Gold ETFs; iv) Other ETFs. The fund of funds schemes invest in a collection of mutual funds on the basis of an underlying theme. The most popular themes referred by AMCs in India are aggressive, conservative and moderate growth plans. The overseas fund of funds schemes collect money from domestic investors and invest it in global mutual funds as per some underlying theme. In India, the existing overseas fund of funds invests in themes such as agriculture, mining and emerging markets. Retail investors account for 94% of the folios for overseas fund of funds. It is expected that they would deliver super-normal returns. Gold ETFs invest in underlying gold markets. Other funds comprise of index funds in India, the underlying being popular and widely traded indices such as BSE Senses, CNX NIFTY or Bank NIFTY.

In this context this research paper investigates the performance of various categories of ETFs in India and addresses the following specific research objectives:

- To assess the growth rates and returns across the different categories of ETFs floated in India during the period 2005-2011.
- To examine whether ETFs provide excess returns to investors compared to CNX NIFTY, the equity market benchmark in India.
- To evaluate and rank various categories of Exchange-Traded funds to further explore:
- Which categories of the funds (FOF/FOFO/GF/OF) are found efficient?
- Which AMCs were floating the efficient ETFs in India?
- o Does a higher Sharpe ratio indicate superior and consistence performance of a mutual fund?
- o Do fund size and resultant higher growth rates indicate efficiency of the fund?

3. Review of Literature

3.1 ETFs' Performance Across Countries

The existing evidence in the literature on performance of ETFs is mixed. While there were many papers reporting negative performance of ETFs, there were others that presented strong positive evidence about the performance of ETFs.

Adjei Frederick (2009) found no significant difference between the performances of the ETFs and the S&P 500 index. He found weak evidence of performance persistence on both the half-yearly and the yearly horizons. Johnson (2009) reported the existence of tracking errors between foreign ETFs and the underlying home index returns. Blitz David *et al.* (2010) investigated the performance of index mutual funds and the ETFs that are listed in Europe. They found that European index funds and ETFs underperform their benchmarks by 50 to 150 basis points per annum. William (2009) found the existence of tracking errors between foreign ETFs and the underlying home index in US.

Blitz David and Huij (2011) evaluated the performance of ETFs that provide passive exposure to global emerging markets (GEM) equities and found that GEM ETFs exhibit higher tracking error. Houweling (2011) found that treasury ETFs were able to track their benchmark but investment grade corporate bond ETFs and high yield corporate bond ETFs underperform their benchmarks. Charupat & Miu (2011) analyzed the performance of leverage ETFs, and concluded that price deviations are small among leverage ETFs and that price volatility is more, as a result of rebalancing, at the end of the day.

Patrick (2011) found that in Hong Kong the magnitude of tracking errors is negatively related to the size but positively related to the expense ratio of the ETFs. He further commented that replicating the performance of underlying securities involves more risk, since they have a higher tracking error than in the US and Australia.

Chang and Krueger (2012) investigated the performance of Exchange-Traded Funds and Closed-End Funds over the 2002 to 2011 period. They studied investment results such as returns, risks and risk-adjusted returns and found that though ETFs have significantly lower expenses, their performance is statistically worse than those of close-ended funds.

On the contrary, there was equal evidence of positive performance of ETFs. Ching-Chung *et.al.* (2005) indicated that the Taiwanese ETF and, the Taiwan Top 50 Tracker Fund (TTT) are price efficient and trading on them produces almost identical returns to the Taiwan stock market. Joel *et al.* (2006) compared the risk and return performances of ETFs available for foreign markets and closed-end country funds. They found higher mean returns and Sharpe ratios for ETFs, and concluded that a passive investment strategy through ETFs is observed to be superior to an active investment strategy using closely held country funds.

Huang and Guedj (2009) investigated as to whether an Exchange-Traded Fund (ETF) is a more efficient indexing vehicle than an Open-Ended Mutual Fund (OEF). They noted that ETFs are better suited for narrower and less liquid underlying indexes, and also for investors with long investment horizons. Jack *et al.* (2009) indicated that the US ETFs are more likely to trade at a premium than at a discount, with comparatively large daily price fluctuations. Gerasimos (2011) found that ETFs trade at a premium from their Net Asset Value (NAV) and the pattern of their returns can be predicted.

Meric *et al.* (2009) reported that from October 9, 2007 to March 9, 2009, the U.S. stock market experienced the worst bear market and lost about 56% of its value during this period. They compared the performances of 38 sector index funds using the Sharpe and Treynor portfolio performance measures and found that the healthcare and consumer staples sector index funds had the best performance and the financials and home construction sector index funds had the worst performance in the October 9, 2007-March 9, 2009 bear market run.

Wong and Shum (2010) examined the performances of 15 worldwide ETFs across bearish and bullish markets over the period 1999 to 2007. They observed that ETFs always provide higher returns in a bullish market than in a bearish market. They noted from the Sharpe ratios that ETF returns are not positive and proportional to the market volatility.

Yuexiang *et al.* (2010) investigated the pricing efficiency of the Shanghai 50 ETF (SSE 50 ETF), the first Exchange-Traded Fund (ETF) in China. They demonstrated that ETF market prices and their Net Asset Values are co-integrated and there is a unidirectional causality from price to NAV. They also found that the fund's prices did not closely follow the NAV during the second half of 2007, when the Chinese stock market experienced substantial volatility, reflecting sudden increased market risks as well as potential arbitrage opportunities during financial turbulences. Gerasimos (2011) found that the performance of ETFs is predictable and the return superiority is persistent in the short term level.

This mixed evidence about performance of ETFs across developed as well as emerging economies warrants and motivated the present research about the performance of ETFs in India.

3.2 Mutual Fund Performance through Data Envelopment Analysis

Apart from traditional measures such as the Sharpe ratio and Treynor's ratio, Data Envelopment Analysis (DEA) is found suitable to assess and rank the funds in mutual fund literature. Sedzro and Sardano (2000) observed that DEA provides a good ranking procedure when compared with the Sharpe and Treynor ratios. Anderson *et al.* (2004) used basic DEA to investigate 257 Australian real estate mutual funds over the 1997-2001 period. Greg (2006) assessed the relative efficiencies and inefficiencies of 25 of the largest US stocks, bonds and balanced funds using DEA. Ioannis (2011) evaluated the performance of natural resources ETFs using DEA and ranked the ETFs based on 3 input and 3 output variables.

3.3 Mutual Fund Performance in India

There are many research papers on the Indian mutual fund (MF) industry. Sivakumar *et al.* (2010) observed that private players were able to mobilize greater resources in the Indian MF industry than public institutions. Jaspal Singh (2004) evaluated the performance of various mutual funds and found that ICICI prudential floated and managed by a private AMC is the best performer in India. Madhumita *et al.* (2008) evaluated the performance of mutual funds on the basis of rate of returns as well as risk-adjusted methods, and found that the majority of equity funds outperformed the benchmark index. Most of these studies evaluated the growth and performance of equity funds, but there is no paper on Exchange-Traded Funds in India. Hence, the focus of this paper is to investigate the growth and performance of ETFs in India.

4. Data and Model

In India, the first ETF was launched in the year 2001. However, the MF industry in general and the ETFs in particular started growing rapidly only since 2006. Between January 2006 and December 2011, 82 ETF schemes were floated by 22 Asset Management Companies (AMCs). The data for 60 months from April 2006-April 2011 about the categories of AMCs, the monthly net asset values, and the total assets under management of all the 82 schemes were collected from the Association of Mutual Funds in India (AMFI) website.

Through time series data, the growth trend of the total assets under management of ETFs was identified. Monthly returns have been computed from Net Asset Values. Returns were compared across various categories of ETFs to analyze the performance of each category. Further, ETF returns were regressed against the returns of the CNX NIFTY Index (Equity index of 50 stocks maintained by the National Stock Exchange as Proxy for market) to estimate the excess returns (alpha values) that the ETFs provide to investors on and above the market returns. It is expected that ETFs would have high risk-adjusted returns and higher Sharpe ratios. Accordingly, the Sharpe ratio of each individual ETF has been calculated by dividing the excess ETF returns over the risk free rate with the standard deviation of ETF returns.

Further, DEA has been used to appraise and rank all ETFs in a risk- return frame work without reference to the market index. This method is considered appropriate because different ETFs target different benchmarks for their schemes. DEA assesses the relative efficiencies of peer group funds (ETFs) based on linear programming and optimization techniques using multiple input and output variables.

4.1 Data Envelopment Analysis

Data Envelopment Analysis is a non-parametric method based on linear programming. DEA analysis ranks the funds based on output-input ratio. Three input and two output variables were selected and used as per the Greg (2006) model. Three input oriented models of DEA - basic, cross and super efficiency models were used to appraise and rank the ETFs. Optimization software MAX DEA has been used to run these models and generate efficiency scores across ETFs.

4.1.1 Basic Efficiency Model

Input variables proxy the risk metrics and output variables reflect the return parameters. The Basic Efficiency Model is referred as a constant to the scale model. The objective of this optimization model is to maximize the ratio of output to input variables.

Basic Efficiency:

$$h_{o}^{*} = \frac{\max \sum_{r=1}^{s} u_{r} Y_{ro}}{\sum_{i=1}^{m} v_{i} x_{io}}$$
(1)

$$h_{kj} = \frac{\sum_{r=1}^{n} Y_{rj} u_r}{\sum_{i=1}^{m} x_{ij} v_i} \le 1j = 1, 2, 3.....n$$
(2)

i=1,2,3...n m-Input Variables r=1,2...s-Output Variables j=1,2...n-mutual funds V_r -Weight of input i u_r -Weight of output r.

4.1.2 Cross Efficiency Model

This model facilitates peer group evaluation. It computes the efficiency score of each ETF by taking the average of the individual efficiency scores obtained by using optimum weights of all other funds in the group based on the Basic DEA model.

Cross Efficiency:

$$h_{kj} = \frac{\sum_{r=1}^{s} Y_{rj} u_{rk}}{\sum_{i=1}^{m} x_{ij} v_{ik}} \le 1 j, k = 1, 2, 3 \dots n$$
(3)

 h_{kj} -score of mutual fund j cross evaluated by mutual fund k

4.1.3 Super Efficiency Model

This model is very similar to the basic model except that the objective function is allowed to exceed the value 1. In other words, the fund for which the efficiency score is being evaluated is not included in the constraint equations of the linear model.

Super Efficiency:

$$h_{o}^{*} = \frac{\max \sum_{r=1}^{s} u_{r} Y_{ro}}{\sum_{i=1}^{m} v_{i} x_{io}}$$
(4)

Subject to

$$\frac{\sum_{r=1}^{s} Y_{rj} u_{rk}}{\sum_{i=1}^{m} x_{ij} v_{ik}} \le 1j = 1, 2, 3, \dots, n, j \ne 0$$
(5)

X_{ij}-Input Y_{rj}-Output V_i-weight of input i u_r-weight of output r

i=1,2...m-Input variables r=1,2...s-Output variables j=1,2...n- mutual funds

4.2 Input Variables

Three input variables and two output variables have been used to estimate the relative efficiencies of ETFs in India.

4.2.1 Standard Deviation

Standard Deviation is a measure of the volatility of the returns that the mutual fund produces. A high volatility implies high probability of unexpected gain/loss. This is the most accepted and widely used measure of financial risk, and is computed taking deviation from the mean value of all monthly returns.

4.2.2 Maximum Drawdown

Maximum Drawdown is a measure of the capability of the fund to rebound from a trough. It is calculated as the largest percentage drop from peak to trough before attaining a new peak during the investigation period. This is considered as an input variable since the period of study covered the world financial crisis phase when the Net Asset Values (NAVs) of almost all the funds fell. This input variable captures the ability of ETFs to rebound and perform better. For example if the NAV fell from its highest value of Rs.20 to Rs.10 before reaching a new peak of Rs.21, the computed value of drawdown will be 50%.

4.2.3 Monthly Downside Deviation

Monthly Downside Deviation is a measure of the volatility of the downside performance of a mutual fund. It is calculated by finding the average negative returns during the investigation period and measuring the deviation of the negative returns around this mean. A small Downside Deviation indicates lesser probability and risk of large negative returns.

4.3 Output Variables

4.3.1 Profitable month's percentage

Profitable month's percentage measures the percentage of months with positive returns in the investigation period on the total number of months. This variable captures the persistence of positive performance.

4.3.2. Compounded Monthly return

It measures the long term returns generated by the ETF, and is calculated by taking the nth root of the total return, where n is the number of periods being considered. This is computed as follows:

(((Net asset value in April 2011)/ (Net asset value in April 2006)) $^{1/60-1}$ (6)

This variable does not capture the interval monthly returns during the entire period. This indicates that the return an investor would get if he holds the fund for long term (5 years from April 2006-2011).

5. Empirical Results

5.1 ETFs-Origin and Growth in India

The growth in Indian ETFs was predominant during 2006-07 (Figure 3). The global financial crisis halted the trend during 2008-2009.



Figure 3. Total assets under management across all ETFS

Figure 4 to Figure 7 presents the growth pattern in fund size, and Figure 8 presents the comparative pattern. Gold Funds first started in 2007 and have grown continuously over the 5 year period. During the financial crisis investors found gold to be an alternative performing asset class. The investment level was sustained in fund of fund overseas during the crisis period. The total investments did not fall. The fund of funds domestic as well as other funds based on Indian indices fell substantially during the crisis period. The other ETFs which are mostly index funds are yet to begin attracting additional funds after the halt.



Figure 4. Monthwise AUM distribution-Gold ETFs



Figure 5. Monthwise AUM distribution-FoF overseas figure



Figure 6. Monthwise AUM distribution-FoF domestic



Figure 7. Monthwise AUM distribution-Other ETFs



Figure 8. Comparative Analysis of ETFs based on monthly AUMs

Table 1 presents the compounded growth rates for all the categories of ETFs in India for the period 2006-2010. On an average, ETFs grew at 37% compounded annually as against reported global growth rate of 26% during this period (Black Rock report).

As already observed, the growth rate across all ETFs was very high during 2006-07. The total investments in the subsequent years fell due to the crash of the financial markets across the globe. On the whole, the domestic fund of funds had a negative compounded growth rate over the five year study period, whereas, overseas fund of funds grew @ 80%, and Gold ETFs grew by 94%. As for the other ETFs, though they fell drastically during the crisis time, they still generated the highest average compounded growth rate over the 5 year period.

S No	Trino	Veer	Total AUM (RS.in	Year on Year Growth	CAGR
5.INO	Туре	rear	Lakhs)	rate	(2006-2011)
1.	FOF-Domestic	1-Apr-07	139486.62	N/A	
		1-Apr-08	218812.94	56.87%	
		1-Apr-09	144460.46	-33.98%	90%
		1-Apr-10	70629.80	-51.11%	
		1-Apr-11	133341.34	88.79%	
2.	FOF-Overseas	1-Apr-07	N/A	N/A	
		1-Apr-08	48738.62	N/A	
		1-Apr-09	270076.13	454.00%	52.20%
		1-Apr-10	255134.67	-6.00%	
		1-Apr-11	282772.39	11.00%	
3.	Gold ETF	1-Apr-07	N/A	N/A	
		1-Apr-08	22640.42	N/A	
		1-Apr-09	47978.21	112.00%	64.20%
		1-Apr-10	70187.81	46.00%	
		1-Apr-11	165089.10	135.00%	
4.	Other ETF	1-Apr-07	2489.93	N/A	
		1-Apr-08	433983.93	17330.00%	113.00%
		1-Apr-09	267741.10	-38.00%	

Table 1. Growth rates and returns across the different types of 82 ETFs in India

		1-Apr-10	62391.50	-77.00%	
		1-Apr-11	108510.53	74.00%	
5.	Total ETF	1-Apr-07	141976.55	N/A	
		1-Apr-08	724175.91	410.07%	
		1-Apr-09	730255.90	0.84%	37.00%
		1-Apr-10	458343.78	-37.24%	
		1-Apr-11	689713.36	50.48%	

Table 2 presents various categories of asset management companies (AMCs) and their asset composition. Across the various players, foreign AMCs floated the maximum number of ETFs and are holding the highest value of investments. Foreign AMCs own 55% of the total ETF assets, Indian Joint Ventures own 24% and private Indian AMCs own 15% of the assets.

Table 2. Asset under management by various categories of asset management companies as on 31st December, 2011

S.No	Category	No. of AMCs	No of ETFs	Total AUMs (Rupees in lakhs)	% Share in total investments
1	Bank Joint Venture-Predominantly Indian	1	1	15548.25	1.74%
2	Bank Sponsored	1	1	75.35	0.01%
3	Private Foreign	5	26	496706.4	55.48%
4	Private Indian	8	17	130256.1	14.55%
5	Private Joint Venture-Predominantly Foreign	3	14	37135.52	4.15%
6	Private Joint Venture-Predominantly Indian	4	23	215519.3	24.07%
	Total	22	82	895240.92	100.00%



Figure 9. Category-wise distribution based on AUM

4.2 ETFs Performance

4.2.1 Comparative Analysis of Returns

Table 3 presents the average monthly returns across the schemes and across the years. ETFs floated upon Indian stock market indices and categorized as other ETFs, provided higher returns both in the period of boom as well as during the recovery phase. This was despite the fact that the total AUM dipped drastically since 2008 in these funds. Overseas Fund of funds also gave equally higher returns to the investors across the years. All ETFs had negative returns during the year 2008-09 on account of the global financial crisis.

Year	FOF-domestic	FOF-overseas	Gold ETF	Other ETF	Average Return	Nifty Return
Apr 06 - Mar 07	0.46%	0.93%		0.96%	0.78%	0.44%
Apr 07 - Mar 08	1.04%	1.32%	2.15%	1.67%	1.55%	1.38%
Apr 08 - Mar 09	-1.10%	-2.90%	-1.69%	-2.53%	-2.06%	-4.52%
Apr 09- Mar 10	2.60%	3.04%	-0.78%	5.79%	2.66%	4.17%
Apr 10 - Mar 11	0.68%	1.56%	0.12%	1.25%	0.90%	0.30%

Table 3. Average monthly returns of 82 ETFs in India

Table 4 provides the comparative descriptive statistics. All categories of ETFs outperformed the market benchmark. The average monthly return on ETFs during the five year study period of 2006-11 is more than twice the return upon equity market index. The standard deviation which measures volatility is less than half of the market index. This infers that ETF investors take less than half of the market risk to earn a return that is twice that of market return.

	FoF Domestic	FoF Overseas	Gold ETF	Other ETFs	Average Return	Nifty Return
Maximum	11.75%	12.04%	11.75%	31.02%	11.66%	21.92%
Minimum	-9.50%	-22.84%	-14.85%	-22.35%	-16.87%	-35.89%
Average	0.72%	0.78%	1.69%	0.91%	0.79%	0.36%
Standard deviation	3.59%	5.55%	5.27%	8.60%	3.88%	9.04%

Table 4. Descriptive statistics of monthly returns of 82 ETFS during April 2006-April 2011

4.2.2 ETF's Performance: Excess Returns

Single index model based on the classical Capital Asset Pricing has been used to compute alpha and beta. Using CNX NIFTY as the market index, Jensen's alpha was computed for various categories of ETF via the regression of the excess return of the index against the excess return of the ETF as follows:

$$R_{et}-R_{f} = \alpha + \beta (R_{it}-R_{f}) + \varepsilon_{t}$$
(7)

where R_{et} and R_{it} are the monthly return for the ETF and equity market index NIFTY at time t, R_f is the risk-free rate proxy and ε_t is an error term. α represents Jensen's alpha (1968), which is the intercept of the regression in the excess risk-adjusted return above that of the market index and β is the slope of the regression.

The regression results and beta estimates provide insights into the level of the ETFs' dependency upon the market performance. The alpha values reflect the excess returns the funds were able to provide on and above the market benchmark. Except in the case of gold ETFs where the underlying asset is gold and not equity market index, in all

the other cases the beta coefficients are statistically significant, leading to the inference that their performance depends upon market performance. ETFs floated on Indian indices (categorized as other ETFs) had the highest betas whereas domestic and overseas fund of funds had moderate but statistically significant betas. R square of 79% between the average ETFs returns and the market returns further indicates their performance dependence on the market performance. The alpha values were positive though not statistically significant, indicating positive excess returns even during the crisis times. These values indicate excess monthly returns generated by ETFs; they have been compounded over a period of 12 months and the computed annualized average excess return is presented in Table 5. Gold ETFs provided highest excess returns of 13% p.a. On an average, ETFs provided 3% excess return over the market benchmark during the 5 year period of 2006-2011. Excess annual return of 12% on ETFs floated on Indian indices and referred as other ETFs was found to be statistically significant.

S. No.	Fund	Jenson Alpha	Beta Coefficient	R Square	Compounded annualexcess returns	Sharpe Ratio
1	Gold	0.0103	0.0159	0.0008	13.08%	0.6754
2	Other ETFs	0.0098**	0.8635***	0.8674	12.41%	0.3655
3	Fund of Funds: Overseas	0.0027	0.4911***	0.6409	3.28%	0.0729
4	Fund of Funds: Domestic	0.0018	0.3796***	0.9142	2.18%	0.0596
5	Average	0.0025	0.3838***	0.7983	3.04%	0.1177

Table 5. Regression estimates

*90% significance level, **95% significance level, ***99% significance level

4.2.3 Performance Ranking across ETFs using the Data Envelopment Analysis (DEA) Model

Data Envelopment Analysis ranks the funds having higher output to input ratio as efficient funds. Input variables describe the risk characters while output variables represent return characters. Standard Deviation, maximum Drawdown and monthly Downside Deviation were the input variables, and profitable month's percentage and compounded monthly returns were included as output variables. The basic efficiency scores have been computed for all 35 ETFs that were launched by various categories of AMCs in India by the end of December 2006. Three input variables and three output variables were included for generating basic efficiency scores. For all these ETFs super efficiency and cross efficiency scores have been estimated and reported in Table 6. Further, Sharpe ratios have also been computed (Table 6), for which, the yield on 10 years' Government bonds have been considered as risk free rate. The Sharpe ratio was computed from the following formula.

Sharpe ratios were small for some funds as they had low average monthly returns for many months due to negative returns during the years 2008 and 2009.

Table 6. Efficiency scores of all 35 ETFs floated till December 2006 based on their performance between Jan 2007-May 2011

Fund Name	Annualize d Return	Sharp e Ratio	Basic efficien cy	Super efficien cy	Mean Cross Efficie ncy	AMC Category
FT India Life Stage Fund of Funds - The 50s Plus Flo (G)	10.4775	0.4707	1.0000	1.2999	1.0062	Pvt.(F)
Birla Sun Life Asset Allocation Fund-Conservative Plan-(D)	9.1481	0.1991	1.0000	1.0000	0.8985	Pvt. JV(I)
Birla Sun Life Asset Allocation Fund-Conservative Plan-(G)	9.1481	0.1991	1.0000	1.0000	0.8985	Pvt. JV(I)
Principal Global Opportunities Fund-(D)	9.0972	0.0486	1.0000	1.0000	0.3110	Pvt. JV(F)
Principal Global Opportunities Fund-(G)	9.0972	0.0486	1.0000	1.0000	0.3110	Pvt. JV(F)
FT India Life Stage Fund Of Funds-The 50+S Plan (G)	11.5144	0.4308	0.7667	0.7667	0.6922	
ICICI Prudential Cautious Plan	11.4135	0.4303	0.7458	0.7458	0.6578	
ICICI Prudential Cautious Plan-Dividend Option	11.4135	0.4303	0.7458	0.7458	0.6578	
FT India Life Stage Fund Of Funds-The 40s Plan (G)	14.4639	0.5555	0.7126	0.7126	0.6106	
Nifty Benchmark Exchange Traded Scheme-Nifty BeES	12.9217	0.1611	0.7073	0.7073	0.2671	
ICICI Prudential Very Aggressive Plan	10.8613	0.1166	0.7024	0.7024	0.2674	
ICICI Prudential Very Aggressive Plan-Dividend Option	10.8613	0.1166	0.7024	0.7024	0.2674	
FT India Dynamic PE Ratio Fund of Funds-Growth	5.0000	0.6830	0.6565	0.6565	0.5610	
FT India Life Stage Fund Of Funds-The 30s Plan (G)	15.5873	0.5256	0.5932	0.5932	0.5086	
FT INDIA Life Stage Fund Of Funds-The 30S Plan (D)	15.5873	0.5256	0.5932	0.5932	0.4905	
FT India Life Stage Fund Of Funds-The 40s Plan (D)	11.6658	0.3078	0.5427	0.5427	0.4347	
FT India Life Stage Fund Of Funds-The 20s Plan (D)	20.2414	0.5880	0.5244	0.5244	0.4296	
FT India Life Stage Fund Of Funds-The 20s Plan (G)	20.2414	0.5880	0.5244	0.5244	0.4437	
FT India Dynamic PE Ratio Fund of Funds-Dividend	13.7957	0.3356	0.4627	0.4627	0.3878	
ING OptiMix Asset Allocator Multi-Manager FoF Scheme - (G)	10.3555	0.1220	0.4453	0.4453	0.3316	
Birla Sun Life Asset Allocation Fund-Moderate Plan-(D)	11.4790	0.2215	0.4251	0.4251	0.3647	
Birla Sun Life Asset Allocation Fund-Moderate Plan-(G)	11.4790	0.2215	0.4251	0.4251	0.3647	
ING OptiMix Asset Allocator Multi-Manager FoF Scheme -(D)	8.2772	0.0174	0.4081	0.4081	0.2527	

Banking Index Benchmark Exchange Traded	24 0328	0 3806	0 3/153	0 3/153	0 2894
Scheme (Bank BeES)	24.0328	0.3890	0.5455	0.5455	0.2094
Birla Sun Life Asset Allocation	12 8270	0 2255	0 3///	0 3///	0 30/9
Fund-Aggressive Plan-(D)	12.0270	0.2255	0.5444	0.3444	0.5049
Birla Sun Life Asset Allocation	12 8270	0 2255	0 3444	0 3444	0 3040
Fund-Aggressive Plan-(G)	12.8270	0.2233	0.5444	0.5444	0.3049
ICICI Prudential Moderate Plan	9.6502	0.1178	0.3408	0.3408	0.2865
ICICI Prudential Moderate Plan-Dividend	0.6502	0 1178	0.3408	0.3408	0 2865
Option	9.0302	0.1178	0.5408	0.5408	0.2805
ICICI Prudential Aggressive Plan	10.8958	0.1490	0.2829	0.2829	0.2327
ICICI Prudential Aggressive Plan-Dividend	10 2052	0.1400	0 2820	0 2820	0 2227
Option	10.8938	0.1490	0.2829	0.2829	0.2327
Nifty Junior Benchmark Exchange Traded	10 4076	0 2045	0 2572	0 2572	0.2217
Scheme (Junior BeES)	19.4970	0.2943	0.2372	0.2372	0.2217
UTI Sunder	14.3286	0.2098	0.2433	0.2433	0.2109
Kotak Equity-FOF-Growth	12.7146	0.1641	0.2257	0.2257	0.1958
Kotak Equity-FOF-Dividend	12.0294	0.1407	0.2136	0.2136	0.1849
Sensex ICICI Prudential Exchange Traded	12 2570	0 1 4 5 4	0 2122	0 2122	0 1999
Fund	12.2370	0.1454	0.2132	0.2132	0.1888

The scheme names are abbreviated as follows: D indicates Dividend payout option; G indicates Growth Plans; FoF indicates Fund of funds.

Fund Type is abbreviated as follows: Pvt.(F) indicates foreign private Asset Management Companies(AMC); Pvt.(I) indicates private Indian AMC; Pvt. JV(I) indicates Private Joint Ventures-Predominantly Indian; Pvt. JV(F) indicates Private Joint Ventures-Predominantly Foreign.

The basic efficiency score of 1 indicates that the fund is efficient. Higher cross efficiency across basic efficient funds indicates their superior performance across peer funds. Super efficiency further ranks efficient funds. It is observed that the model ranked 5 funds to be efficient across 35 funds over the period of 52 months from 1st Jan 2007 to April 2011.Out of these funds the first 3 funds were domestic fund of funds and the other two were overseas fund of funds. These five funds were floated by 3 AMCs. A popular foreign AMC, Franklin Templeton floated the first best fund. This fund has been found to be efficient by all the three basic, super and cross efficiency models. Birla Sun life a Joint Venture, where the Indian partner has a predominant share floated the next two best funds. These funds were found to be superior by basic and super efficiency models but did not get an efficiency score equal or higher than one in the cross efficiency model. The last two funds were floated by Principal Global opportunities which was also a Joint Venture but with the predominant share held by a foreign partner. The best funds were neither the funds with higher Sharpe ratios nor the funds with highest returns. This infers that funds providing higher returns are not considered as efficient funds. The average annualized return across the funds was 11% and the ETFs that were found efficient had a return of 9-10%. Though Sharpe ratios are widely used to rank the fund's performance, the inclusion of other parameters in this optimization model to provide for consistent performance ranked the funds differently. The Maximum Drawdown and monthly Downside Deviation are the two additional input variables that were key variables, particularly during the crisis time to filter efficient funds from peer group. ETFs were also found to have lower Sharpe ratios as they had negative returns in two out of these 4 years time. The correlation between the basic efficiency scores the Sharpe ratios was very low as is presented in Table 9.

In India, 67 ETFs were floated up to end of the December 2008. With the twin objectives of increasing sample size and also to avoid the crisis years to find efficient funds in normal market conditions, DEA optimization model was employed to rank all these 67 funds on the same 3 input and 2 output variables. The performance of these funds has been analyzed for a period of 29 months - from 1st Jan 2009 to 31st May 2011.

Table 7 presents the efficiency scores of all 67 ETFs. The funds which were found efficient in the previous

analysis were found to be efficient here also. Out of the 67 ETFs, 9 funds were found to be efficient having a basic efficiency score of above one. Four funds floated by Franklin Templeton were found efficient by the basic model. All were domestic fund of funds. One more domestic fund floated by ING optimix, a foreign AMC and two domestic funds floated by Birla Sun life an AMC that is an Indian Joint Venture were also found to be efficient. Another foreign AMC, HSBC, has floated two efficient overseas funds of funds. The correlation between the efficiency scores and Sharpe ratios improved (Table 9). The efficient funds were found to have higher Sharpe ratios. Further, the Pearson's correlation coefficient between the Sharpe ratios and estimated efficiency scores was found statistically significant at .01 level, indicating that the DEA ranking is broadly in consensus with the evaluation by Sharpe ratios.

Table 7. Efficiency scores of all 67 ETFs floated till December 2008 based on their performance for period Jan 2009-May 2011

Fund Name	Annualiz ed Returns	Sharp e Ratio	Basic Efficiency	Super Efficiency	Mean Cross Efficiency	AMC Category
FT India Life Stage Fund of Funds-The 50s Plus Flo (G)	20.59	0.8674	1.0000	1.3232	0.9931	Pvt.(F)
Ft India Life Stage Fund Of Funds-The 40s Plan (G)	23.30	1.2174	1.0000	1.0706	0.8413	Pvt.(F)
Ft India Life Stage Fund Of Funds - The 30s Plan (G)	26.60	1.2445	1.0000	1.0079	0.8195	Pvt.(F)
ING Optimix Income Growth Multi- FoF-30% Equity Plan Option A (D)	36.46	0.9349	1.0000	1.0003	0.7392	Pvt.JV(F)
Birla Sun Life Asset Allocation Fund-Conservative Plan(D)	12.76	0.8125	1.0000	1.0000	0.8612	Pvt.JV(I)
HSBC Emerging Markets Fund (D)	29.85	2.6172	1.0000	1.0000	0.7899	Pvt.(F)
HSBC Emerging Markets Fund (G)	29.85	2.6172	1.0000	1.0000	0.7899	Pvt.(F)
Ft India Life Stage Fund Of Funds - The 30s Plan (D)	18.95	1.1608	1.0000	1.0000	0.3398	Pvt.JV(I)
Birla Sun Life Asset Allocation Fund-Conservative Plan (G)	12.76	0.8125	1.0000	1.0000	0.3398	
ING Optimix Income Growth Multi-Manager FoF 30% Equity Plan Option A -(G)	38.02	0.9835	0.9998	0.9998	0.7391	
Ft India Life Stage Fund Of Funds - The 20s Plan (G)	36.76	1.2662	0.9467	0.9467	0.3048	
Ft India Life Stage Fund Of Funds - The 20s Plan (D)	27.57	1.2537	0.9467	0.9467	0.1641	
ICICI Prudential Moderate Plan	33.73	1.1048	0.9418	0.9418	0.7587	
ICICI Prudential Moderate Plan (D)	33.73	1.1048	0.9418	0.9418	0.7587	
Ft India Life Stage Fund Of Funds - The 50+S Plan (G)	12.81	0.9287	0.8704	0.8704	0.7469	
FT India Dynamic PE Ratio Fund of Funds(G)	28.83	1.1625	0.8695	0.8695	0.6680	
ICICI Prudential Aggressive Plan	15.59	1.2554	0.8587	0.8587	0.6886	
ICICI Prudential Aggressive Plan (D)	15.59	1.2554	0.8587	0.8587	0.6886	
Birla Sun Life Asset Allocation Fund-Aggressive Plan(D)	34.64	1.1366	0.8494	0.8494	0.6742	
Birla Sun Life Asset Allocation Fund-Aggressive Plan-(G)	34.64	1.1366	0.8494	0.8494	0.6742	
ING OptiMix 5 Star Multi-Manager FoF Scheme (D)	19.00	1.2767	0.8341	0.8341	0.6509	

ING OptiMix 5 Star Multi-Manager FoF Scheme (G)	19.00	1.2754	0.8338	0.8338	0.6506	
Birla Sun Life Asset Allocation Fund-Moderate Plan(D)	25.00	1.0452	0.8322	0.8322	0.3386	
Birla Sun Life Asset Allocation Fund-Moderate Plan(G)	25.00	1.0452	0.8322	0.8322	0.6831	
Nifty Junior Benchmark Exchange Traded Scheme (Junior BeES)	35.44	1.3108	0.8301	0.8301	0.6267	
FT India Life Stage Fund of Funds The 50s Plus Flo (D)	33.60	1.1494	0.8193	0.8193	0.5268	
ICICI Prudential Cautious Plan	22.39	1.1133	0.7971	0.7971	0.7370	
ICICI Prudential Cautious Plan (D)	22.39	1.1133	0.7971	0.7971	0.7370	
Kotak Equity-FOF (G)	39.01	0.9254	0.7427	0.7427	0.5609	
ICICI Prudential Very Aggressive Plan	28.76	0.8144	0.7179	0.7179	0.5857	
ICICI Prudential Very Aggressive Plan (D)	30.26	0.8257	0.7179	0.7179	0.5857	
Kotak Equity-FOF (D)	53.73	0.9266	0.7095	0.7095	0.5305	
Sundaram Global Advantage Fund (G)	37.95	1.3390	0.7019	0.7019	0.5477	
Sundaram Global Advantage Fund (D)	37.95	0.9436	0.7019	0.7019	0.5477	
ING Latin America Equity Fund(G)	39.19	1.1979	0.6766	0.6766	0.5288	
ING Latin America Equity Fund (D)	39.18	1.1991	0.6762	0.6762	0.5288	
ING OptiMix Global Commodities Fund(G)	11.22	0.5067	0.6756	0.6756	0.4734	
ING OptiMix Global Commodities Fund(D)	11.22	0.5067	0.6745	0.6745	0.4719	
Ft India Life Stage Fund Of Funds - The 40s Plan (D)	11.29	0.2254	0.6733	0.6733	0.4561	
Principal Global Opportunities Fund(D)	51.37	0.8977	0.6714	0.6714	0.5213	
Principal Global Opportunities Fund(G)	20.49	0.7862	0.6714	0.6714	0.5213	
Sensex ICICI Prudential Exchange Traded Fund	35.37	1.0102	0.5903	0.5903	0.4649	
Kotak Sensex ETF	58.38	1.0236	0.5794	0.5794	0.4593	
Gold Benchmark Exchange Traded Scheme (Gold BeES)	33.60	1.0752	0.5740	0.5740	0.4412	
UTI Sunder	35.37	1.0298	0.5733	0.5733	0.4654	
Reliance Gold Exchange Traded Fund(D)	35.36	1.0616	0.5711	0.5711	0.4380	
Quantum Gold Fund (an ETF)	57.87	0.9972	0.5678	0.5678	0.4377	
Nifty Benchmark Exchange Traded Scheme- Nifty BeES	35.44	0.9757	0.5468	0.5468	0.4442	
Quantum Index Fund	20.45	0.7902	0.5444	0.5444	0.4430	
Reliance Banking Exchange Traded Fund(D)	37.77	0.9141	0.5016	0.5016	0.4070	
Dws Global Thematic Offshore Fund (D)	19.87	0.6173	0.4898	0.4898	0.7660	
Dws Global Thematic Offshore Fund(G)	19.87	0.6173	0.4898	0.4898	0.8612	
Banking Index Benchmark Exchange Traded Scheme (Bank BeES)	56.92	0.9771	0.4804	0.4804	0.3899	
Kotak PSU Bank ETF	37.03	0.8995	0.4543	0.4543	0.3688	
Ft India Life Stage Fund Of Funds-The 50+S Plan (D)	16.38	1.0396	0.4537	0.4537	0.3975	

PSU Bank Benchmark Exchange Traded Scheme (PSU Bank BeES)	37.02	0.8994	0.4395	0.4395	0.3579	
ING Global Real Estate Fund - Retail Plan (D)	38.94	0.5691	0.4236	0.4236	0.2722	
ING Global Real Estate Fund - Retail Plan (G)	38.93	0.5663	0.4221	0.4221	0.2714	
DSP BlackRock World Gold Fund-Regular Plan(G)	29.62	0.7895	0.4203	0.4203	0.7479	
AIG World Gold Fund(G)	36.97	0.8123	0.4170	0.4170	0.3261	
ING Global Real Estate Fund-Institutional Plan (D)	26.79	0.5786	0.3906	0.3906	0.2646	
ING Global Real Estate Fund-Institutional Plan (G)	26.75	0.6105	0.3898	0.3898	0.2715	
FT India Dynamic PE Ratio Fund of Funds(D)	19.22	0.4724	0.3806	0.3806	0.6680	
AIG World Gold Fund(D)	31.05	0.6615	0.3542	0.3542	0.2753	
ING OptiMix Asset Allocator Multi-Manager FoF Scheme (G)	32.38	0.2821	0.2740	0.2740	0.2311	
ING OptiMix Asset Allocator Multi-Manager FoF Scheme (D)	32.35	0.2821	0.2740	0.2740	0.2311	
DSP BlackRock World Gold Fund-Regular Plan (D)	19.52	0.2931	0.2402	0.2402	0.7070	

The scheme names are abbreviated as follows: D indicates Dividend payout option; G indicates Growth Plans; FoF indicates Fund of funds.

Fund Type is abbreviated as follows: Pvt.(F) indicates foreign private Asset Management Companies(AMC) ; Pvt.(I) indicates private Indian AMC; Pvt. JV(I) indicates Private Joint Ventures-Predominantly Indian; Pvt. JV(F) indicates Private Joint Ventures-Predominantly Foreign.

The top 25 large ETFs based on total assets under management were selected and ranked to examine the relationship between fund size and efficiency. Table 8 presents the efficient scores of the top 25 large ETFs as on 1st April 2011. The data used was the 12 months performance of these 25 funds. The most recent funds were the funds with the highest investment inflows. The efficiency scores indicate that the largest funds are not the most efficient funds. Funds found efficient across these 25 ETFs are the funds that provided highest returns and have higher Sharpe ratios. This infers that larger fund size does not indicate superior performance.

T 11 0	T () C	F 11 1	1 1	,	cc ·
Lable X	Largest 25	Funds based	l on assets lindei	· management.	efficiency scores
1 uoie 0.	Eurgest 25	i unus ousee	i on assets anael	infunugement.	cifferency scores

E. IN.	Annualized	Sharp e	Basic	Super	Mean Cross	AUM (Rs in	AMC
r unu maine	Return	Ratio	Efficiency	Efficiency	Efficiency	lakhs)	Category
HDFC Gold Exchange Traded Fund	24.9424	1.4452	1	1.0276	97.059	27801.45	Pvt.(I)
DWS Global Agribusiness Fund-Regular Plan(G)	30.7096	1.7706	1	1	98.1746	14616.26	Pvt. JV(I)
DWS Global Agribusiness Fund-Regular Plan(D)	30.7096	1.7706	1	1	98.1746	9612.347	Pvt. JV(I)
ICICI Prudential Gold ETF	24.4944	1.4009	0.9936	0.9936	96.0004	8075.208	

JPMorgan JF							
Greater							
China Equity	17.1910	0.6381	0.9761	0.9761	79.2511	7533.463	
Off-shore							
Fund							
ING OptiMix							
Global	25.4623	0.9485	0.9665	0.9665	80.2355	11319.25	
Commodifies							
Fund(G)							
ING OptiMix							
G3lobal	25.4942	0.9504	0.9664	0.9664	80.1811	21362.61	
Commodities							
Fund (D)							
Axis Gold	18.4110	0.8560	0.9619	0.9619	86.6206	13945.73	
	22 (714	0.0102	0.0446	0.0446	00.0251	11021.07	
SBI gold ETF	22.6/14	0.9193	0.9446	0.9446	80.9351	11021.97	
DSP Black							
ROCK WORLd	28.9387	0.7531	0.8194	0.8194	62.6949	16532.72	
Energy Fund							
(U) DSD Plack							
Dor Black							
Energy Fund	24.2434	0.6749	0.8194	0.8194	62.6949	12226.44	
(D)							
(D) Fidelity							
Global Real							
Assets	24.8460	0.9656	0.7187	0.7187	63.0618	91849.78	
Fund(G)							
Fidelity							
Global Real							
Assets	24.8460	0.9656	0.7187	0.7187	63.0618	57249.46	
Fund(D)							
UTI Sunder							
ETF	15.5761	0.2397	0.7035	0.7035	51.0618	34421.57	
Reliance	25 (927	0 7704	0 (521	0 (521	55.0265	01007.04	
Gold ETF(D)	25.6827	0.7784	0.6531	0.6531	55.9365	21807.84	
Sundaram							
Global	8 600 2	0.0221	0 5176	0.5176	27 7701	10961 66	
Advantage	8.0092	0.0321	0.3170	0.3170	57.7701	10801.00	
Fund (G)							
Sundaram							
Global	8 3780	0.0144	0.5176	0.5176	37 7699	7551 553	
Advantage	8.5780	0.0144	0.5170	0.5170	51.1077	7551.555	
Fund (D)							
DSP							
BlackRock							
World	13.4831	0.3230	0.4989	0.4989	40.7422	6045.717	
Mining Fund							
(G)							
DSP Black							
Rock World	20.0207	0 7 7 2 1	0.402.4	0.402.4		10051 50	
Gold Fund	28.9387	0.7531	0.4834	0.4834	37.3661	13251.69	
(G)							

Nifty Junior							
Benchmark	18 0005	0 2610	0 4770	0.4770	25 8220	8606.01	
ETF (Junior	18.9005	0.2019	0.4779	0.4779	55.6529	8000.91	
BeES)							
Shariah BeES	31.8524	0.7915	0.4435	0.4435	32.8026	226980.7	
Reliance							
Banking	41.9321	0.6868	0.37	0.37	29.1178	5479.576	
ETFund-(D)							
Kotak Sensex	17 6504	0 2842	0 222	0 222	27 2671	21207.14	
ETF	17.0394	0.2843	0.332	0.332	27.2071	51297.14	
PSU Bank							
Benchmark	20 1548	0.2551	0 2046	0.2046	22 8601	21285 17	
ET (PSU	20.1346	0.2331	0.3040	0.3040	25.8001	21203.17	
Bank BeES)							
Kotak PSU	19 0216	0 2267	0 2005	0 2005	22 2460	4850.07	
Bank ETF	10.9310	0.2207	0.2995	0.2993	25.2409	4039.07	

Note: 25 large funds as on 1st April 2010 were evaluated based on the performance of 12 months between April 2010 and March 2011

Table 9.	Pearson'	s correlation	between	sharp	ratios a	and bas	sic effi	ciency	scores
								2	

Model	Period of Study	Correlation coefficient	significance at the 0.01 level (2-tailed)	
1	2007-11	0.1728	0.321	35
2	2009-11	0.608**	0.000	67
3	2010-11	0.736**	0.000	25

*90% significance level, **95% significance level, ***99% significance level

5. Conclusion

This research paper evaluates the performance of all the 82 Exchange-Traded schemes floated and traded on the Indian Stock markets. The compounded growth rates across the years 2006-2011 and trend analysis reveals that the overseas fund of funds as well as the Gold funds were able to impress the investors and were able to mobilize greater resources. On an average, the ETFs grew at a compounded annual growth rate of 37% during 2006-11. It has been found that foreign AMCs were holding 55 % of assets across the ETFs, followed by Indian Joint Ventures and Private AMCs. ETFs have consistently outperformed the market index and have generated higher returns. The volatility of their returns was also found to be lesser than that of the returns of the bench mark index NIFTY in equity market. On an average, the ETFs were able to generate 3% annualized excess returns over the market returns.

Assets under management reflect the investment flows and the resources mobilized by the fund. Investors would like to chase performance and invest in superior performing funds. The funds floated on the Indian equity market indices (categorized as other ETFs) grew substantially during the boom period of 2006-07. Overseas funds and Gold funds grew substantially during and after 2008, the post global financial crisis period. In addition to the contemporary economic conditions, these investment flows indicate investors' risk appetite, interest in the sector and their expectations about the performance of the fund.

Data Envelopment Analysis was used with three input and two output variables to capture the multidimensional nature of risk and return parameters. The funds found efficient by this model were not the funds giving highest return. However, the efficiency scores have a statistically significant correlation with the Sharpe ratios that were used widely to rank mutual funds. DEA ranking is not only based on excess returns to risk to return ratio as in case of Sharpe ratio, it is also more comprehensive as it includes multiple input and output variables and provides better fund evaluation.

DEA ranked the funds floated by foreign AMCs and AMCs with Joint Ventures as relatively efficient funds. Among the foreign AMCs, Franklin Templeton funds were found to be the efficient fund across all the years. Domestic funds were found to be efficient in not just the analysis of the 35 funds for 53 months but also in the analysis of the 67 funds for the 29 post financial crisis months beginning January 2009. The analysis of 25 large funds for the most recent 12 months period (April2010-11) identified overseas fund of fund and Gold ETF as superior funds. These efficient funds were also found to be giving highest returns and having higher Sharpe ratios. However, large funds holding maximum assets were found to be neither efficient nor did they provide the highest returns.

The growth and success of the fund industry requires the investors to choose superior funds rationally and requires the managers to deploy these funds efficiently to improve fund performance. Data Envelopment Analysis is an improved evaluation technique incorporating multiple parameters for the assessment of mutual funds.

Acknowledgement

The author acknowledges the research support received from the following intern students:

- Kishore Kumar, R., Undergraduate student in Department of Metallurgical and Materials Engineering, IIT Madras.
- Nitin, G., Undergraduate student in Department of Ocean Engineering, IIT Madras.

References

- Adjei, F. (2009). Diversification, Performance, and Performance Persistence in Exchange-Traded Funds, International Review of Applied Financial Issues and Economics, 1(1).
- Anderson, R. I., Brockman C. M., Giannakos, C., & McLeod, R. W. (2004). A Non-Parametric Examination of Real Estate Mutual Fund Efficiency. *International Journal of Business and Economics*, 3(3), 225-38.
- Blitz, D., & Huij, J. (2011). Evaluating the Performance of Global Emerging Markets Equity Exchange-Traded Funds.
- Blitz, D., Huij , J., & Swinkels, L. (2009). The Performance of European Index Funds and Exchange-Traded Funds. http://dx.doi.org/10.2139/ssrn.1438484
- Chang, C. E., & Krueger, T. M. (2012). The Case for Country-specific Closed-end Funds Instead of Exchange-traded Funds. *International Business Research*, 5(5). http://dx.doi.org/10.5539/ibr.v5n5p3
- Charupat, N., & Miu, P. (2011). The pricing and performance of leveraged exchange-traded funds. *Journal of Banking & Finance*, 35(4), 966-977. http://dx.doi.org/10.1016/j.jbankfin.2010.09.012
- Ching-Chung, L., Shih-Ju, C., & Hsinan, H. (2005). Pricing efficiency of exchange traded funds in Taiwan. *Journal of Asset Management*, 7(1), 60–68.
- Gerasimos, G., & Rompotis. (2011) Does premium impact Exchange-Traded Funds' returns? *Journal of Asset Management*, 11, 298–308.
- Gerasimos, G., & Rompotis.(2011). Predictable patterns in ETFs' return and tracking error. *Studies in Economics and Finance*, 28(1).
- Greg, N., & Gregoriou (2006). Optimization of Largest US Mutual Funds using Data Envelopment Analysis. Journal of Asset Management, 6(6), 445-55. http://dx.doi.org/10.1057/palgrave.jam.2240194
- Houweling, P. (2012). On the Performance of Fixed Income Exchange Traded Funds. *The Journal of Index Investing*, *3*(1), 39-44. http://dx.doi.org/10.3905/jii.2012.3.1.039
- Huang, H., Jennifer, C., & Gued, L. (2009). Are ETFs Replacing Index Mutual Funds? AFA 2009 San Francisco Meetings Paper. http://dx.doi.org/10.2139/ssrn.1108728
- Ioannis, E., & Tsolas. (2011). Natural Resources Exchange Traded Funds: Performance Appraisal using DEA Modeling. Journal of Centrum Cathedra, 4(2), 250-259.
- Jack, W., Aber, Dan, L., & Luc, C. (2009). Price volatility and tracking ability of ETFs. Journal of Asset Management, 10, 210-221. http://dx.doi.org/10.1057/jam.2009.13
- Jaspal, S. (2004). Growth, Performance and Prospects of Mutual Funds in India. *Finance India*, 18(4), 1755-1760.
- Joel, T., Harper, A., Jeff, M., & Oliver, S. (2006). Performance comparison between exchange-traded funds and closed-end country funds. *International Financial Markets, Institution and Money*, 16(2), 104–122. http://dx.doi.org/10.1016/j.intfin.2004.12.006

- Johnson, & William, F. (2009). Tracking errors of exchange traded funds. *Journal of Asset Management*, 10(4), 253–262. http://dx.doi.org/10.1057/jam.2009.10
- Madhumita Chakraborty, P., Jain, K., & Vinay, K. (2008). Mutual funds performance: An evaluation of select growth funds in India. *South Asian Journal of Management*, 80(4), 80-92.
- Meric, I., McCall Charles, W., & Meric, G. (2009). Performance of exchange-traded sector index funds in the October 9, 2007-March 9, 2009 bear market ,Rowan University Journal of Finance and Accountancy.
- Patrick Kuok-Kun Chu. (2011). Study on the tracking errors and their determinants: evidence from Hong Kong exchange traded funds. *Applied Financial Economics*, 21(5), 309–315. http://dx.doi.org/10.1080/09603107.2010.530215
- Sedzro, K. T., & Sardano, D. (2000). Mutual Fund Performance Evaluation Using Data Envelopment Analysis. In S. B. Dahiya (ed.) The current state of business disciplines, Spellbound Publications, Rohtak, India, 1125-44.
- Sivakumar, K. P., Rajmohan, S., Sezhiyan, D. M., & Narasimhulu, S. (2010). Performance Evaluation of Mutual Fund Industry in India. *Vidwat: The Indian Journal of Management*, *3*(1), 26-32.
- William, F., & Johnson. (2009). Tracking errors of exchange traded funds. *Journal of Asset Management*, 10, 253–262. http://dx.doi.org/10.1057/jam.2009.10
- Wong Karen, H. Y., & Shum Wai, C. (2010). Exchange-traded funds in bullish and bearish markets. *Applied Economics Letters*, 17, 1615–1624. http://dx.doi.org/10.1080/13504850903085035
- Yuexiang, J., & Feng, G., & Tianjian, L. (2010). Pricing Efficiency of China's Exchange-Traded Fund Market. *Chinese Economy*, 43(5), 32-49. http://dx.doi.org/10.2753/CES1097-1475430503

Annexure

Table 10. AUM details

S.No.	Month	Total	ETF	ETF/Total
1	Apr-06	12502774.95	141976.55	1.14%
2	May-06	13870447.37	141026.72	1.02%
3	Jun-06	15099569.01	134929.03	0.89%
4	Jul-06	15549869.21	149466.34	0.96%
5	Aug-06	29856274.62	323712.44	1.08%
6	Sep-06	30368553.96	538691.04	1.77%
7	Oct-06	30734844	770483.15	2.51%
8	Nov-06	32573585.23	1111196.55	3.41%
9	Dec-06	33446861.78	1043521.56	3.12%
10	Jan-07	33712307.52	893654.36	2.65%
11	Feb-07	35537786.74	768438	2.16%
12	Mar-07	35573949.09	642874.27	1.81%
13	Apr-07	35550860.97	724175.91	2.04%
14	May-07	38480021.42	916822.24	2.38%
15	Jun-07	42494747.22	993482.51	2.34%
16	Jul-07	46356771.03	987023.26	2.13%
17	Aug-07	47047102.57	818719.77	1.74%
18	Sep-07	48023497.99	996808.23	2.08%
19	Oct-07	53139165.72	1226942.06	2.31%
20	Nov-07	54738634.33	1156278.74	2.11%
21	Dec-07	54928107.55	1172331.34	2.13%
22	Jan-08	57298531.39	1022451.02	1.78%
23	Feb-08	56759005.05	941200.34	1.66%
24	Mar-08	53103545.62	773642.69	1.46%
25	Apr-08	56949424.11	730255.9	1.28%
26	May-08	60014118.48	736472.62	1.23%

27	Jun-08	56446946.54	726858.58	1.29%
28	Jul-08	52913188.33	752628.22	1.42%
29	Aug-08	54367876.33	825510.23	1.52%
30	Sep-08	52722480.99	811390.82	1.54%
31	Oct-08	42993021.15	685196.73	1.59%
32	Nov-08	40011658.62	596388.8	1.49%
33	Dec-08	41925417.89	578588.52	1.38%
34	Jan-09	45906617.12	553505.31	1.21%
35	Feb-09	49912176.12	521084.48	1.04%
36	Mar-09	49150471.75	480916.19	0.98%
37	Apr-09	54949233.39	458343.78	0.83%
38	May-09	63756988.84	492179.26	0.77%
39	Jun-09	66948445.12	503385.31	0.75%
40	Jul-09	68863177.49	499701.26	0.73%
41	Aug-09	74873346.89	523805.03	0.70%
42	Sep-09	74285215.58	575902.86	0.78%
43	Oct-09	76282366.23	476006.69	0.62%
44	Nov-09	80808613.21	511659.39	0.63%
45	Dec-09	79520999.52	630163.69	0.79%
46	Jan-10	76235438.09	635823.8	0.83%
47	Feb-10	78254591.46	669059.59	0.85%
48	Mar-10	74859247.78	677956.26	0.91%
49	Apr-10	77048071.12	689713.36	0.90%
50	May-10	80501879.98	731515.17	0.91%
51	Jun-10	67739904.67	737149.26	1.09%
52	Jul-10	66720624.85	732314.61	1.10%
53	Aug-10	68932471.39	766021.94	1.11%
54	Sep-10	71526379.45	837314.66	1.17%
55	Oct-10	67806744.31	971248.56	1.43%
56	Nov-10	67806744.31	971248.56	1.43%
57	Dec-10	67806744.31	971248.56	1.43%