Mid-Cap Value ETFs: Performance Analysis & Maximizing the Coefficient of Determination

Kriti Awasthi*
Dr. A K Varma**

*Research Scholar
School of Management Studies
Punjabi University, Patiala

**Director/Principal
Continental group of Institutes, Jalvehra
Distt. FGS (Punjab)

Abstract

Since 1993, Exchange traded funds (ETFs) have grown exponentially in assets management offering unique advantages to traditional indexing methods of mutual funds, futures, and owned portfolios. By encapsulating the performance of broad-based market indexes in tradable baskets of securities, ETFs provide individual investors a flexible and low-cost alternative to index mutual funds. The research study investigates the performance of Mid-Cap Value ETFs relative to market and S&P 400 index. For the purpose of evaluation four moments i.e. mean, variance or standard deviation, skewness, and kurtosis have been examined and thereafter the Yearly as well as overall five yearly Sharpe and Treynor ratios of the Mid-Cap Value ETFs, S&P 500 index and S&P 400 index have been compared. Regression analysis was also done to study the relationship of Mid-Cap Value ETFs with the S&P 500 index and S&P 400 index and also to calculate the coefficient of determination.

Keywords:

Mid-Cap, ETFs, Performance etc.

Introduction

Mutual funds (MFs) have a long history within the financial sector, with the concept dating back to the 1920's and the industry has experienced success in the past decade. Despite the popularity of MFs, the industry has in recent years been subject to criticism. An alternative to MF investing is Exchange Traded Products (ETPs). ETPs are one of the most successful financial innovations in the last 20 years. Exchange Traded Funds (ETFs) is a very popular subgroup of Exchange Traded Products and Exchange Traded Funds account for the majority of the invested capital in ETPs (Blackrock, 2011b). Since the creation of the first ETF in 1993, the SPDR S&P 500 ETF (Carrel, 2008), the global market for ETFs has grown rapidly. To spur interest among investors the first ETFs were passively managed and tracked well-known equity or fixed income indices. Today different types of ETPs provide exposure to a wide array of regions and sectors, as well as a broad selection of asset classes.

Exchange Traded Funds

An Exchange Traded Fund is a hybrid financial product, a cross between a stock and a mutual fund. Like a stock, it can be traded on a stock exchange, and like a mutual fund it behaves like a diversified portfolio. In many ways it is an index fund, with a few subtleties that put it in a separate league. Unlike an open-ended index fund, where an investor purchases units from the fund itself and to redeem them sells the units back to the fund and thereby expanding or shrinking its corpus on each entry or exit from the fund, in an ETF, it is listed on

an exchange ensuring that the entry or exit of investors has no effect on the fund corpus.

As per the New York Stock Exchange (NYSE): "An ETF is an investment product that allows an investor to buy and sell shares in a single security that represents a fractional ownership of a portfolio of securities. Legally, ETFs are open-ended investment companies or unit investment trusts that are registered under the Investment Company Act of 1940." ETFs are baskets of securities that are traded, like individual stocks, on an exchange. Unlike regular open-end mutual funds, ETFs can be bought and sold throughout the trading day like any stock. Most ETFs charge lower annual expenses than index mutual funds. However, as with stocks, one must pay a brokerage to buy and sell ETF units, which can be a significant drawback for those who trade frequently or invest regular sums of money.

Features of Exchange Traded Funds

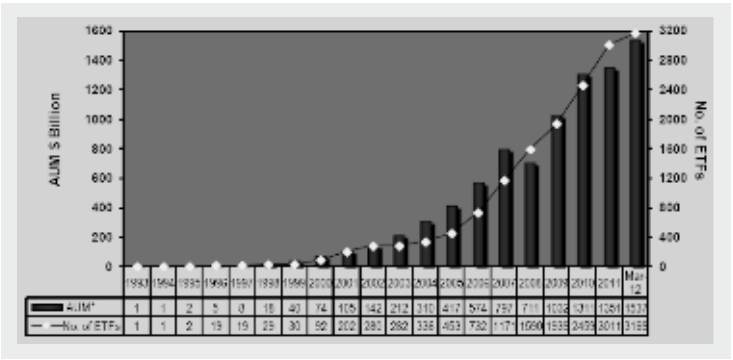
ETFs provide Tradability, transparency and Cash Equitisation. It also helps in Cash Flow Management, exposure diversification and in tracking the error. ETFs tied to a sector or industry may be used to gain exposure to new and important sectors. Such strategies may also be used to reduce overweight or increase an underweight sector. ETFs are generally priced as a percentage of the value of their underlying index. The denomination is such that the investor can easily follow the tracking accuracy to the index. Given that the market share price is determined by the forces of supply and demand, not the underlying net asset value, investors may purchase shares at a premium or discount to their net asset value.

Growth of Exchange Traded Funds in International Market

The first ETF was introduced in Canada in 1989 as the Toronto Index Participation Fund (TIP 35). In 1993, an ETF was introduced in the U.S. by State Street, the Standard and Poor's 500 Depository Receipts (SPDR) that tracks the broad market index S&P 500. The Hong Kong Tracker Fund was the first ETF in Asia, introduced in 1999, and the first ETF in Europe was Euro STOXX 50 launched in 2001.

International Growth of ETFs

Figure 1 Growth of International ETFs

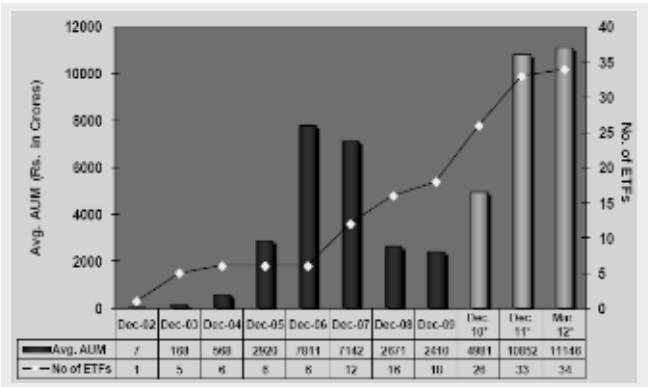


At the end of March 2012, there were 3169 ETFs listed in the stock exchanges around the world as shown in figure 1.The ETF market has grown from $66 billion in 2000 to 1586.5 billion at the end of March 2012.

Growth of Exchange Traded Funds in India

The first ETF in India, "Nifty BeEs (Nifty Benchmark Exchange Traded Scheme) based on S&P CNX Nifty was launched in January 2002 by Benchmark Mutual Fund. It may be bought and sold like any other stock on NSE. Its symbol on NSE is "NIFTYBEES".

Figure 2 Growth of Domestic ETFs



2. The domestic market for ETFs has grown rapidly.

Brief Review of Literature

Academic literature has shown substantial interest regarding the behaviour and performance of traditional mutual funds. Such interest has now started to spread to ETFs. The academic literature provides a description of the pricing, performance, trading, taxation, and effects of Spiders in comparison to other investment instruments (Ackert and Tian, 2000, Poterba and Shoven 2002 and Boney et al. 2006). Elton et al. (2002) compare the performance of the Spider to the performance of the largest index mutual fund tracking the S&P500 Index and the Vanguard S&P 500 Index Fund. The authors argue that the relative performance of the Spiders versus the Vanguard S&P500 Index Fund is mainly due to the fact that Spiders keep the cash in a non interest bearing account while the process of creating/deleting shares take place.

Boney et al. (2006) found that the Spider has a significantly negative effect on the flow of funds into indexed mutual funds. Turning to liquidations in the hedge fund industry, Getmansky, Lo, and Mei (2004) use a sample of liquidated hedge funds and found that attrition rates differ significantly across investment styles. The study made by Baquero et al. (2005) develops an empirical model for hedge fund liquidation. The estimation of the model indicates that historical performance is an important factor in explaining fund liquidation, where performance in the more distant past is of less importance.

Romero and Rodriguez (2010) study a sample of index ETFs and index mutual funds issued by the same mutual fund family. The authors evaluate the fund flows to each investment product and get to the conclusion that both investment vehicles are complements. Guedj and Huang (2008) and Madura and Ngo (2008) gave a model that identifies the characteristics of ETFs affecting its future performance. The factors that are significantly related to stock prices are size (market capitalization), ETF liquidity (measured by the ETF stock trading volume) and momentum (measured through the prices and returns).

Methodology

For the research purpose, the following eight ETFs were used and compared it with the S&P 400 and S&P 500 index starting from December 2006 to December 2011.

1. iShares Russell Midcap Value Index Fund (IWS)
2. iShares S&P MidCap 400 Value Index Fund(IJJ)
3. PowerShares Fundamental Pure Mid Value Portfolio (PXMV)
4. iShares Morningstar Mid Value Index Fund (JKI)
5. WisdomTree MidCap Dividend Fund (DON)
6. Vanguard Mid-Cap Value ETF (VOE)
7. Rydex MidCap 400 Pure Value ETF (RFV)
8. WisdomTree International MidCap Dividend Fund (DIM)

The study used four moments i.e. Mean, Standard deviation, Kurtosis and Skewness to study the return characteristics of the ETFs and market. Kurtosis characterized the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicated a relatively peaked distribution. Negative kurtosis indicated a relatively flat distribution. Skewness characterized the degree of asymmetry of a distribution around its mean. Positive skewness indicated a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicated a distribution with an asymmetric tail extending toward more negative values. Thereafter, Sharpe Ratio and Treynor Ratio were calculated to analyze the performance of ETFs relative to the S&P 400 and S&P 500.

The Sharpe Ratio, or Sharpe Index, measures the mean excess return per unit of risk in an investment asset or a trading strategy. The Sharpe Ratio is defined as:

$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R - R_f]}{\sqrt{Var[R - R_f]}}$$

where R is the asset return, Rf is the return on a benchmark asset, such as the risk free rate of return, $E[R - Rf]$ is the expected value of the excess of the asset return over the benchmark return, and σ is the standard deviation of the excess return (Sharpe 1994). The Sharpe Ratio is used to characterize how well the return of an asset compensates the investor for the risk taken. When comparing two assets each with the expected return $E[R]$ against the same benchmark with return Rf, the asset with the higher Sharpe Ratio gives more return for the same risk.

Treynor ratio, also known as reward to volatility ratio, or Treynor's measure a risk-adjusted measure of return based on systematic risk. It is similar to the Sharpe ratio, with the difference being that the Treynor ratio uses beta as the measurement of volatility.

Treynor's ratio is calculated as:

$$T = \frac{r_i - r_f}{\beta_i}$$

where:

T - Treynor ratio,

r_i - return,

r_f - risk free rate

β_i - Beta

The beta for the ETFs was calculated by using the S&P 500 as an independent variable.

Regression analysis was also used to determine the relationship of S&P 500 and S&P 400 index with each of the eight Mid-Cap Value ETFs. For maximising the coefficient of determination firstly S&P 500 and S&P 400 was individually regressed with each of the eight Mid-Cap Value ETFs i.e. taking Mid-Cap Value ETFs as dependent variable and S&P 500 index & S&P 400 as independent variables. Then, both S&P 500 index & S&P 400 were regressed with each of the eight Mid-Cap Value ETFs i.e. taking Mid-Cap Value ETFs as dependent variable and S&P 500 index & S&P 400 as independent variables.

Analysis

The exhibit I reflected the yearly returns for all Mid-Cap Value ETFs, S&P 500 and S&P 400 index for last five years. It was seen that six out of eight Mid-Cap Value ETFs were giving negative returns with highest being given by DIM i.e. 4.6% and all were giving lower returns than that of S&P 400 and only one ETF had higher returns than S&P 500 index in 2007. However in the year 2008 when recessionary conditions were prevalent in the US economy, all the eight Mid-Cap Value ETFs gave higher negative returns than S&P 500 and S&P 400 index. It was also seen that all the ETFs recovered more quickly in 2009 as compared to S&P 500 and S&P 400 index with IWS recovered the maximum i.e. from -81% to +29% while market recovered the minimum. After 2009 due to economic slowdown in US the returns again started decreasing and became negative in 2011. In 2011 the only DON was giving the positive returns of 2.7 % when the other ETFs and market were giving negative returns. It was also found that yearly average returns for most of ETFs was negative and was lower as compared to S&P 500 index having just 0.25% and all ETFs had lower returns than that of S&P 400 index.

Exhibit II indicated that mean monthly returns of most of the ETFs with a maximum value of 0.22% was higher than that of S&P 500 index having a value of just -0.05% and lower than that of S&P 400 having value of 0.36%. The standard deviation values implied that the volatility of returns in most of the ETFs with IWS having the maximum value of 10% was higher as compared with that of S&P 500 and S&P 400 index which showed that ETFs were more risky as compared to market. The positive kurtosis values of ETFs, S&P 500 index and S&P 400 index suggested that distribution curves for the five year mean returns was more leptokurtic (which means that more values were close to the mean returns). The negative Skewness values of all ETFs, S&P 400 index and S&P 500 index suggested that distribution curves of returns were negatively skewed which indicated that the tail on the left side of the probability density function is longer than the right side and the bulk of the values (possibly including the median) lie to the right of the mean.

Exhibits III and IV reflected that all the Value ETFs were having negative and lower Sharpe and Treynor ratios than the S&P 500 and S&P 400 index in 2007. Due to the economic slowdown in the year 2008 the Sharpe Ratio for S&P 500 was -2.18 in the year 2008 and the Sharpe's ratio for ETFs varied between -2.2 to -1.8 which showed that six ETFs outperformed the market in 2008 but only one was able to beat S&P 400 index, whereas in Exhibit IV the Treynor's Ratio for S&P 500 was -0.41 and it varied from -0.69 to -0.36 for all the eight ETFs. The treynor ratio moved in tandem with the Sharpe ratio in most of the ETFs and showed that six ETFs outperformed the market in 2008.

With the markets recovering in the subsequent years, S&P 500 saw the Sharpe's ratio rising to 1.2 from -2.18 in the previous year and the negative Sharpe's ratio started turning positive ranging from 0.78 to 1.8 and the Treynor ratio from 0.19 to 0.38 for all ETFs in the year 2009 and the recovery for four ETFs was higher which indicated that half of the ETFs outperform the market and only two ETFs outperformed the S&P 400 index in 2009.

For the year 2010, the Sharpe ratio for all the ETFs varied from 0.31 to 0.89 whereas the Treynor ratio varied from 0.06 to 0.18 which indicated that the five ETFs outperformed the market but none was able to beat the S&P 400 index. Similarly, in the year 2011 the Sharpe ratio for the ETFs varied from -0.22 to -0.09 and the Treynor ratio from -0.14 to 0.02 but the Sharpe and Treynor ratio was highest for DON which indicated that only DON outperformed the market.

Exhibits V and VI showed the five yearly Sharpe and Treynor Ratios for all ETFs, S&P 400 index and S&P 500 index. The five yearly sharpe ratio for all ETFs ranging from -0.62 to -0.12 indicated that four out of eight ETFs was higher than that of S&P 500 but none was having higher Sharpe ratio than that of S&P 400 index having a value of -0.01 which showed that four ETFs outperformed the market in last five years. Similarly the Treynor ratio was in tandem with the Sharpe ratio and indicated that four ETFs outperformed the market in last five years.

It was seen in the Exhibit VII that S&P 400 index and S&P 500 index were used as independent variables for regression analysis taking each of the Mid-Cap Value ETFs as dependent variables. The regression yielded the maximum coefficient of determination of 0.99 for the IJJ ETF which showed that when both S&P 400 index and S&P 500 index were used as independent variables to estimate the movement of IJJ, then 99% of variation was captured by these two indexes, rest 1% was explained by exogenous factors. However when IJJ ETF was regressed with only S&P 500 index then the coefficient of determination was just 0.90. So it can be said that the coefficient of determination increased when IJJ ETF was regressed with both S&P 400 index and market index. Similarly for other ETFs the Coefficient of determination was maximized when regressed with S&P 400 index and S&P 500 index together as compared to when regressed individually with S&P 400 index and S&P 500 index. Also t-statistic showed that these indexes were individually statistically significant variables for estimating ETFs returns. Exhibit VII also showed that the correlation coefficient was higher with a maximum value of 0.99 when both S&P 400 index and S&P 500 together were regressed with each of the ETFs as compared to that when each of the ETFs was regressed with S&P 400 index and S&P 500 index individually with a minimum value of just 0.44. The average COD increased from 0.72 to 0.95 and average R from 0.83 to 0.98 when regressed with S&P 400 index and S&P 500 index together as compared to when regressed individually with S&P 400 index and S&P 500 index.

Conclusion

The research study investigated the performance of Mid-Cap Value ETFs relative to market and S&P 400 index. The results implied that the Mid-Cap Value ETFs yearly returns were higher than that of market in only two years during last five years. It was also seen that Mid-Cap Value ETFs had higher volatility in returns than S&P 500 index and S&P 400 index. This was especially seen during the time period of recession when the ETFs showed more negative returns as compared to that of S&P 500 index and S&P 400 index but the rebound by the ETFs was impressive i.e. returns earned by most of the ETFs were better than that of S&P 500 index. The study also depicted that most of the Mid-Cap Value ETFs had lower five year average returns than that of the market index. The yearly Sharpe and Treynor ratios indicated that the most of the ETFs outperformed the S&P 400 index and S&P 500 index in three years during last five years. The Five yearly Sharpe and Treynor ratios also indicated four out of eight ETFs was higher than that of

S&P 500 but none was having higher than that of S&P 400 index. The results also implied that the coefficient of determination could be maximized by using S&P 500 index and S&P 400 Index together as independent variables in regression with each ETF instead when indexes were used individually. It was also found that the ETFs were highly correlated with the S&P 500 and S&P 400 index during the last five years.

YEAR	IWS	IJJ	VOE	DON	DIM	JKI	RFV	PXMV	S&P 500	S&P 400
2007	-3.7%	0.4%	-6.3%	-8.5%	4.6%	-8.4%	-5.8%	-1.1%	3.5%	6.7%
2008	-81.3%	-41.2%	-44.1%	-40.3%	-51.0%	-42.5%	-49.3%	-42.8%	-38.5%	-37.3%
2009	29.9%	31.1%	35.6%	27.5%	29.9%	31.9%	55.5%	22.9%	23.5%	35.0%
2010	21.8%	20.5%	19.5%	18.0%	7.8%	17.1%	21.0%	13.6%	12.8%	24.9%
2011	-3.6%	-4.4%	-2.5%	2.7%	-17.0%	-4.8%	-6.9%	-2.3%	0.0%	-3.1%
AVG	-7.4%	1.3%	0.4%	-0.1%	-5.1%	-1.3%	2.9%	-2.0%	0.3%	5.2%

Exhibit I: Yearly returns comparison of eight ETFs, S&P 400 and S&P 500 index

	IWS	IJJ	VOE	DON	DIM	JKI	RFV	PXMV	S&P 400	S&P 500
Mean	-0.011	0.001	0.001	0.001	-0.004	-0.001	0.002	-0.001	0.004	-0.001
Standard Deviation	0.109	0.066	0.065	0.068	0.070	0.068	0.087	0.068	0.065	0.055
Kurtosis	22.643	1.388	1.410	1.612	1.129	1.096	2.601	2.554	1.234	0.504
Skewness	-3.901	-0.528	-0.462	-0.567	-0.551	-0.299	-0.037	-0.775	-0.560	-0.514
Range	0.843	0.379	0.387	0.402	0.369	0.396	0.576	0.408	0.366	0.277
Minimum	-0.673	-0.222	-0.222	-0.225	-0.242	-0.206	-0.281	-0.256	-0.218	-0.169
Maximum	0.170	0.157	0.165	0.177	0.127	0.190	0.295	0.152	0.148	0.108
Sum	-0.637	0.099	0.037	0.053	-0.242	-0.037	0.137	-0.042	0.218	-0.030

Exhibit II: Descriptive Statistics of monthly returns of eight ETFs, S&P 400 and S&P 500 index

year	iws	ijj	voe	don	dim	jki	rfv	pxmv	S&P 400	S&P 500
2007	-0.232	-0.207	-0.502	-0.578	-0.022	-0.575	-0.361	-0.263	0.070	-0.084
2008	-2.218	-1.935	-2.074	-1.836	-2.223	-1.932	-1.726	-1.939	-1.773	-2.185
2009	0.786	1.363	1.565	1.167	1.232	1.354	1.833	0.967	1.542	1.234
2010	0.574	0.899	0.857	0.763	0.318	0.725	0.693	0.575	1.096	0.673
2011	-0.094	-0.193	-0.112	0.115	-0.701	-0.206	-0.229	-0.099	-0.181	0.000

Exhibit III: Yearly Sharpe Ratio comparison of eight ETFs, S&P 400 index and S&P 500

year	iws	ijj	voe	don	dim	jki	rfv	pxmv	S&P 400	S&P 500
2007	-0.073	-0.041	-0.098	-0.117	-0.004	-0.114	-0.076	-0.053	0.016	-0.016
2008	-0.695	-0.382	-0.406	-0.371	-0.454	-0.384	-0.365	-0.391	-0.401	-0.413
2009	0.246	0.269	0.306	0.236	0.252	0.269	0.388	0.195	0.349	0.233
2010	0.180	0.178	0.168	0.154	0.065	0.144	0.147	0.116	0.248	0.127
2011	-0.030	-0.038	-0.022	0.023	-0.143	-0.041	-0.048	-0.020	-0.041	0.000

Exhibit IV: Yearly Treynor Ratio comparison of eight ETFs, S&P 400 index and S&P 500

Symbols	Sharpe ratio	Treynor ratio
iwp	-0.422	-0.118
ijk	0.108	0.021
vot	-0.022	-0.005
rfg	0.283	0.058
jkh	0.007	0.001
mdyg	0.081	0.016
fvl	-0.219	-0.048
S&P 500	-0.229	-0.043
S&P 400	-0.007	-0.002

Exhibit V: Five yearly Sharpe & Treynor Ratios of eight ETFs, S&P 400 and S&P 500 index

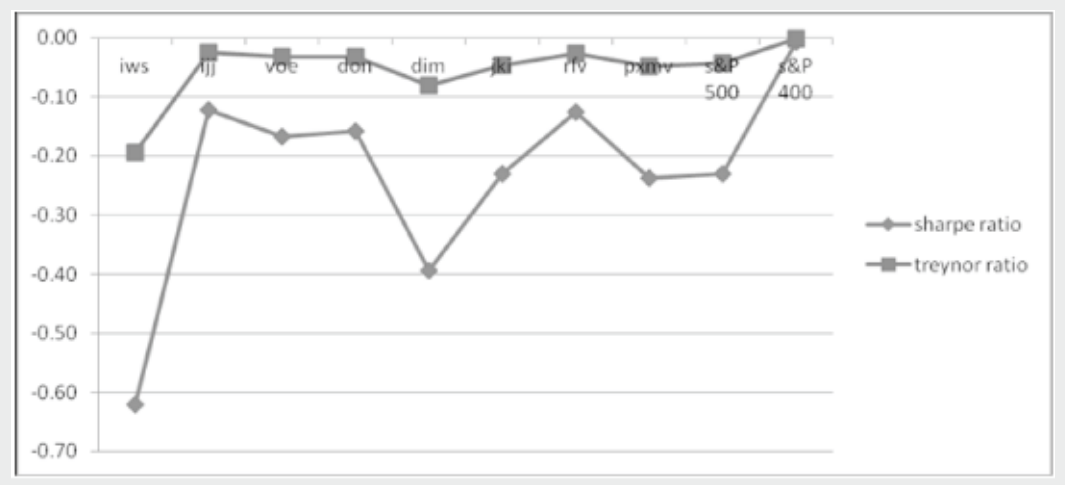


Exhibit VI: Five yearly Sharpe & Treynor Ratios Comparison of eight ETFs, S&P 400 and S&P 500 index

REGRESSION WITH S&P 400	pxmv	rfv	jki	dim	don	voe	ijj	iws	AVERAGE
COD	0.68	0.89	0.80	0.49	0.86	0.89	0.93	0.20	0.72
R	0.83	0.94	0.89	0.70	0.93	0.94	0.97	0.44	0.83
REGRESSION WITH S&P 500	pxmv	rfv	jki	dim	don	voe	ijj	iws	AVERAGE
COD	0.97	0.85	0.93	0.90	0.91	0.91	0.90	0.66	0.88
R	0.98	0.92	0.96	0.95	0.96	0.95	0.95	0.81	0.94
REGRESSION WITH S&P 400 and S&P 500	pxmv	rfv	jki	dim	don	voe	ijj	iws	AVERAGE
COD	0.97	0.94	0.94	0.96	0.96	0.96	0.99	0.91	0.95
R	0.98	0.97	0.97	0.98	0.98	0.98	0.99	0.96	0.98

Exhibit VII: Regression of eight ETFs with S&P 400 and S&P 500 index

References

Ackert L.F. and Tian, Y.S. (2000), "Arbitrage and Valuation in the Market for Standard and Poor's Depositary Receipts", *Financial Management*, Vol. 29 (3), pp. 71-87.

Baquero, G; Ter Horst, J. and Verbeek, M. (2005), "Survival, Look-Ahead Bias, and Persistence in Hedge Fund Performance", *Journal of Financial and Quantitative Analysis*, Vol. 40 (3), pp. 493-517.

Boney, V; Doran, J.S. and Peterson, D.R. (2007), "The Effect of the Spider Exchange Traded Fund on the Cash Flow of Funds of S&P Index Mutual Funds",. *Institutional Investors Guide to ETFs*, Vol. 41 (10), pp. 61-74.

Dellva, W. L. (2001), "Exchange-Traded Funds Not for Everyone", *Journal of Financial Planning*, pp.110-124.

Demaine, J. (2002), "Exchange traded funds for the sophisticated investor", *Derivatives use, Trading and Regulation*, Vol.7 (4), pp. 354-361.

Elton, E.J.; Gruber, M. J.; Comer, G. and Li, K. (2002), "Spiders: Where are the bugs?" *Journal of Business*, Vol. 75 (3), pp. 234-242

Gardner, R. and Welch, J. (2005), "Increasing After-Tax Return with Exchange-Traded Funds", *Journal of Financial Planning*, pp. 30-35.

Gastineau, G.L. (2004), "The Benchmark Index ETF Performance Problem", *The Journal of Portfolio Management*, pp. 96-103.

Getmansky, M.; Lo, A.W. and Mei, S. X. (2004), "Sifting Through the Wreckage: Lessons from Recent Hedge-Fund Liquidations. Journal of Investment Management", Vol. 2(4), pp. 6-38.

Getmansky, M. (2008), "The Life Cycle of Hedge Funds: Fund Flows, Size and Performance". Working paper.

Guedj, I. and Huang, J. (2008), "Are ETFs Replacing Index Mutual Funds?" Working paper.

Kostovetsky, L. (2003), "Index Mutual Funds and Exchange-Traded Funds", *The Journal of Portfolio Management*, pp. 80-92.

Madura, J. and Ngo, T. (2008), "Pricing behavior of exchange-traded funds", *Journal of Economics and Finance*, Vol. 32, pp. 1–23.

Mussavian, M. Hirsch, J. (2002), "European Exchange-Traded Funds: An Overview", *The Journal of Alternative Investments*, pp. 63-77.

Poterba, J.M. and Shoven, J.B. (2002), "Exchange-Traded Funds: A New Investment Option for Taxable Investors", *The American Economic Review*, Vol. 92 (2), pp.422-427.

Romero-Perez, H. and Rodriguez, J. (2010), "A look at side by side management: evidence from ETF and mutual funds. University of Puerto Rico" Working Paper.