Measuring the Relative Performance of ETFs

by

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Abstract

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This paper measures the relative performance of ETFs in the US market. The historical data on four ETFs and four Mutual Funds are collected through 2011 to 2013. To examine the relative performance of ETFs compared to the Mutual Funds, this paper employs the methodology of Jensen's Alpha and Tracking Error. According to the regression, Jensen's Alphas of the ETFs and Mutual Funds are very close, while the Tracking Error of the ETFs is larger than that of the Mutual Funds. The results of the empirical study show that ETFs do not outperform the Mutual Funds. However, ETFs have several advantages over the Mutual Funds, such as on the aspect of management cost.

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Chapter 1 Introduction

1.1 Purpose of Study

Exchange Traded Funds (ETFs) have become a popular and fast-growing fund in recent financial market because of their fee structure, tax efficiency and increased level of transparency. ETFs allow investors to obtain exposure to various indices and market sectors through a cash investment. Due to the relative low risk of ETFs, many investors prefer ETFs. This paper will focus on the relative performance evaluation of ETFs. Comparing to the Mutual Funds, the ETFs are relatively new. Meanwhile, ETFs combine the features of traditional mutual funds and provide investors with a new channel for financial market and a new instrument for investments.

The market portfolio concept has a long history. Hassine and Roncalli (2013) mentioned that performance evaluation should base on the value at risk framework using the tracking error volatility, performance difference and liquidity spread. Nonetheless, the debate in lots of academic research concerns the compare between Mutual Funds and Exchange Traded Funds. Therefore, the purpose of this paper is to measure the relative performance of the ETF compare to the mutual fund under the U.S market.

1.2 **Background of ETFs**

As one of the most popular exchange trading tools, ETFs only have 20 years history. ETFs are first introduced in 1993. More specifically, the well-known “SPDRs”,

which were invested in the 500 shares of the Standard and Poor's 500 Index, are the first ETF to be traded in the U.S. market. ETFs reached the European continent (XTRA board in Germany) at the beginning of the new century. The ETFs will begin to challenge the dominance of the open-ended mutual funds.

In 1999, the ETFs market experienced a flourishing which effectively increased the awareness of ETFs. At the beginning of that period, 4% of the Nasdaq trading volume was accounted as ETFs, then the number doubled in 2000. During the period 2001 to 2005, the numbers still kept a high level. The market value of ETFs in the U.S. market has surged to 882 billion with more than 900 funds (ETFDB, 2012).

In 2009, there were almost 1000 funds in the ETFs market, until nowadays, there are over $ 1 trillion assets in the market. In the recent couple of years, ETFs has become the most active tool in the trading market. The use of ETFs has also been widened from a single sector of stock exchanges into commodity, bonds, futures and other asset classes.

1.3 EFTs vs. MFs

From the prospective of comparing ETFs and Mutual Funds, it is obvious that Mutual Funds have a much longer history. However, it doesn't mean that Mutual Funds are better than ETFs. Although ETFs have only 20 years of history, it has already been one of the most popular trading instruments. The table below will

mainly focus on the advantages of ETFs.

Table 1: the ETFs compare to Mutual Funds

	ETFs	Open-Ended Mutual Funds
Tax Efficiency	No capital gains generated while ETF shareholders redeem shares, no taxes need to be paid	When Mutual Funds shareholders redeem their shares, there will be capital gains occurs, they will have to pay tax
Transaction Costs	A range of 0%-0.74% for ETF transaction fee, with an average of 0.41%. A range of 0.09%-0.99% for ETF index transaction fee. Low transaction costs	An average transaction fee of 1.47%, 0.61% for money market. Charges early withdrawal fee with a range of 1.5% to 2%. Front load can charge as high as 5.75%. Much higher transaction costs
Transparency	Disclose every trading day	Disclose every quarter
Flexibility	ETF can be traded throughout the day and will be reported every 15 seconds. Apply to other trading strategies, such as buy on margin, short, options and exchanges.	NAV of Mutual Funds will be reported only at the end of the trading day. Cannot be shorted, no exist of mature fund options, and can't be traded on exchanges
Minimum	One share can be purchased in ETF	Mutual Funds will have limits for investors to purchase

1.4 Outline of the Paper

Chapter 1 briefly introduces the purpose of this paper, the history of ETFs and compared ETFs with Mutual Funds. Chapter 2 includes literature reviews of previous studies relevance to this paper, what has been done and what should be improved. Chapter 3 is the methodology and data employed in this paper. Meanwhile, the data will be represented in that part. Chapter 4 is the analysis of the results. Conclusions and suggestions will be proposed in Chapter 5.

Chapter 2 literature review

2.1 logic of ETF

ETFs are open-end funds, meaning that they allow investors to purchases the fund and redeem their fund. For this reason, investors have more liquidity by investing in ETFs .when they think the market is bullish and increase their funds value or they can redeem their fund if the market looks bearish. Similar to the valuation of MFs and Unit Investment Trusts, ETFs can be purchased at the end of each trading day for its net-asset value (NAV). Additionally, ETFs enjoy the tradability of closed-end funds, which trade throughout the day at prices that may differ from their NAVs. Generally, ETFs are most commonly compared to open-ended mutual funds because of certain similarities they share and the growing competition.

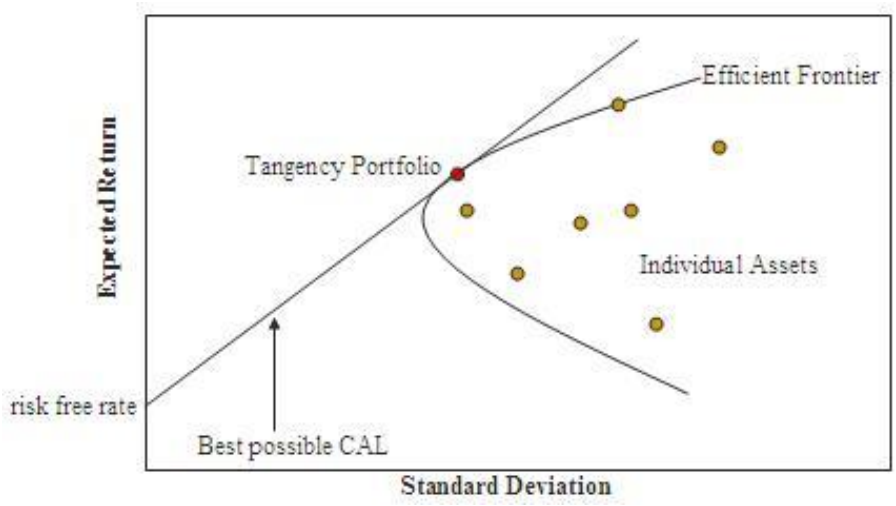
When it comes to the liquidity issue, ETFs' liquidity has two main sources. Firstly, for those funds that are authorized participants should be redeem in cash or shares from those fund. Another liquidity source is from the market. Like close-end funds, ETFs can be traded in the secondary markets and the trading methodology is the same as that of a normal stock. Therefore, investors could trade shares in secondary market with the share price fluctuating around NAV. When the share price of ETF is higher than the NAV, invested of redeeming the shares of ETF from the investment companies, investors are allowed to liquidate their shares in the secondary market. There exists an arbitrage opportunity for trading strategy and liquidity for the ETF.

Therefore, so the features of open-end fund and close-end fund are the two sources which will determine the value of ETFs

Another issue is whether ETFS challenging the dominance of mutual funds, Bansal, & Somani, (2002) pointed out ETFs are not expected to beat mutual funds in terms of net assets in the near future; however, retail and institutional investors are confirming that ETFs will be one of the fastest-growing investment products of the future. A research report suggest that ETFs are a threat to mutual funds because advisors, both strategic-asset allocators and tactical-assets allocators are increasing using ETFs as part of investor' portfolios.

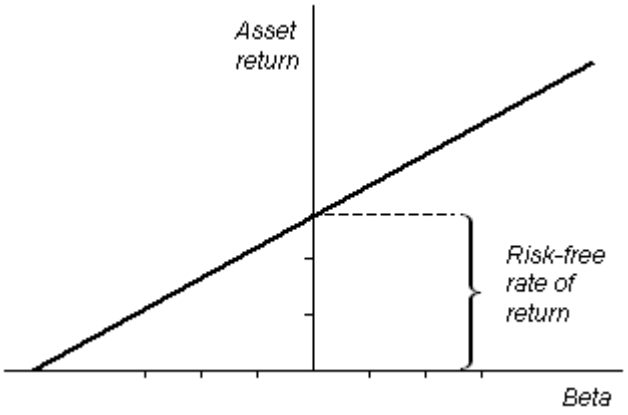
2.2 Traditional models of measuring the performance of ETF

The traditional way to evaluate ETF performance is to focus on the association between the risk and excess rate of return in the market. Before the 1950s Markowitz formalized his portfolio theory, investors had already have the knowledge that diversification of portfolio could reduce the risk and retain the same return. Modern portfolio theory (MPT) assumes the investors are risk-averse. It is the first theory provides a framework of portfolio evaluation methodology that can construct an "efficient frontier" portfolio to maximize the expected return based on a given level of market risk. (Figure 1)



Markowitz, H.M. "Portfolio selection". *The journal of finance: 77-91*(march 1952)

Based on Markowitz earlier work, Sharpe (1964) proposed the Capital Asset Pricing Model (CAPM) for pricing risky security. One assumption is added in this model is that there is borrowing and lending at a risk-free rate. The risks for the asset have two components: a risk-free rate (such as a US treasury bill) and systematic risk ("beta"), the CAPM model is now a straightforward line and indicate the simple way to evaluate the return on the asset. (figure2)



ROLL, R. (1977): "A Critique of the Asset Pricing Theory's Test*," journal of financial economics*, 4,129-176

Although portfolio theory and the CAPM are key theories in finance, however, there are still some limitations; for example, the returns may not be best represented by a normally-distributed random variable in all cases. Building on the CAPM model, Treynor (1965) developed the model to evaluate the performance of funds. It is appropriate only when funds are well-diversified and focus on systematic risk (β). Sharp (1966) issued the sharp performance index assume that the fund is not well-diversified and exposed to total risk (σ).Jensen (1968) pointed jensen's α performance index that help to predict the risk-adjusted return of the asset identified. The Jensen measure is based on the CAPM. In order to evaluate the statistical significant value of alpha, the t-statistic of the regression should be calculated in the first place, which means using the estimated value of alpha divided by its standard deviation. And the result will provide by the results of the regression. If a t-statistic is greater than two indicates, then the probability of obtaining a normally distributed alpha values is sternly less than 5% and if by any chance that alpha value is normally distributed, then is result may obtain through luck, not through skill. This paper is using Jensen's measure to evaluate the relative performance of ETFs and mutual funds.

2.3 fund managers' performance

To evaluate funds' performance, fund managers need to qualified two basic abilities which are fund selectivity and market timing. Selectivity requires fund managers to pick mispriced securities. Market timing ability reflects the ability of a fund manager to move in and out of the equity market.

Fama (1972) stated that fund managers' forecasting skills can be divided into two parts; the first part tests managers' ability to predict the change of a stock relative to the index. The second part tests if the manager can long or short stock at the right time. Treynor and Black (1973) have shown that as portfolio managers, they are able to separate security analysis and market timing actions effectively. Grant (1977) explained how market timing will have effects on empirical tests which are focused on micro forecasting skills. Merton (1981) put forward a model to compare the performance of the stock market and bond market, but he did not get into detail about measuring the abnormal return Based on the research, Bhattacharya and Pfleiderer (1983) corrected the error in the work of Jensen (1972) which is using simple regression technique for the accurate measurement of selection and timing ability. Moreover, in order to track the S&P 500 index, Frino and Gallagher (2001) investigated index funds performance and applied a single market model regression for the index funds return on the return of benchmark._

2.4 Recent studies on ETF VS M.F.

In the recent literature, a number of articles study issues concerning the performance, risk, tracking error and expenses of ETFs and index funds traded in the U.S. market .Dellva (2001) described the increasingly popular exchange-traded funds—ETFs, for short—as alternatives to traditional mutual funds. ETFs are index-based equity instruments that represent ownership in either a fund or a unit investment trust and give investors the opportunity to buy and sell shares of an entire stock portfolio as a single security. In comparing index mutual funds and ETFs, each investment offers some attractive characteristics that may appeal to stock and mutual fund investors. ETFs and HOLDRS provide significant trading flexibility. Bansal and Somani (2002) provided the research of the challenge of ETFs to the mutual funds. ETFs have much more advantages for the investors and become an effective tool for the investors. Using baskets of stocks, they support diversification and a cost-effective alternative to equity mutual funds. ETF's not only offer low turnover and tax efficiency similar to an index mutual fund, but also allow constant trading during the day.

One important characteristic of ETFs that distinguished them form their mutual fund counterparts is their tax characteristic. Poterba and Shoven (2002) compare the pre-tax and after-tax returns on the SPDR trust and the Vanguard Index 5000 fund. Results suggest that between 1994 and 2000, the before-and after tax return on the SPDR trust and this mutual fund were very similar .Both the after-tax and the pre-tax

return on the fund were slightly greater than those on the ETF. These findings suggest that ETFs offer taxable investors a method of holding broad baskets of stocks that deliver returns comparable to those of low-cost index funds. Bernstein (2004) compares the tax efficiency of ETFs, open-end mutual funds, and closed-end mutual funds and concludes that it is difficult to make a generalization about the tax efficiency of the various types of funds.

In the context of the competition between ETFs and mutual funds, Boney *et al*. (2006) report that SPDRs has a negative impact on the flow of funds allocated in indexed mutual funds. In other words there have been assets which abandoned traditional index funds in favor of the ETF. Agapova (2009) also uses fund flows into conventional index funds and ETFs in order to examine implications of substitutability of these two similar investments vehicles - finding that these products are substitutes, but not perfect ones.

2.5 Objectives

According to the prior researches, the importance and attractiveness of ETFs are widely confirmed in the modern financial market during the recent years. Not only in the US and some developed European countries, the ETFs also grow rapidly in the developing countries such as China, India, South Korea and Brazil. Thus, the ETFs have been an important part of the global investment instruments. Most of the prior literatures on the ETFs mainly focus on the performance evaluation and the features

of ETFs itself. Little researches are found that study the relative performance evaluation of ETFs and Mutual Funds. Therefore, the main objectives of this paper are to evaluate the relative performance of the ETFs and Mutual Funds based on the sample in the US during the period 2011-2013 with the methodology of Jensen's Alpha and Tracking Error.

Chapter 3 Methodology

3.1 Regression Analysis

In this section, in order to exam the relative performance between ETF and mutual funds, we follow the approach of Jensen's α that measure the abnormal return.

$$R_{ETF} - R_f = J_{\alpha ETF} + (R_{MKT} - R_f)\beta_{ETF} + \varepsilon_{ETF} \text{ ---------- (1)}$$

$$R_{MF} - R_f = J_{\alpha MF} + (R_{MKT} - R_f)\beta_{MF} + \varepsilon_{MF} \text{ ---------- (2)}$$

Where: R_{ETF} indicates that the raw return of the ETF

Rf indicates the risk free rate

R_{MKT} represents the return on the S&P 500

β_{ETF} estimate for the systematic risk an ETF is exposed to.

$J_{\sigma ETF}$ coefficient estimates the return the examined its ETF counterparts could achieve above the return of the SPX

ε_{ETF} is the error term for ETF that can't explained by this model

R_{MF} indicates that the raw return of the Mutual Funds

β_{MF} estimates for the systematic risk an MF is exposed to.

$J_{\sigma MF}$ coefficient estimates the return the examined its MF counterparts could achieve above the return of the SPX

ε_{MF} is the error term for the mutual fund that can't explained by this model

J_{α} is an unadjusted for risk and measure of performance relative to that of the S&P 500. If the $J_{\sigma ETF} > J_{\sigma MF}$, ETF outperforms the MF. If the $J_{\sigma ETF} = J_{\sigma MF}$, ETF performs as well as the MF. However, If the $J_{\sigma ETF} < J_{\sigma MF}$, ETF underperforms the MF.

Additionally, when we consider the adjusted-risk measure of performance, assume the funds are well diversified,

3.2 Track Error

To examine the relative performance of the Exchange Trading Fund to the Mutual Fund, another major methodology employed in this paper is tracking error. Tracking error refers to the deviation of an index fund's performance from its corresponding index (Milonas and Rompotis, 2010). The tracking error method is very popular in the formal literatues in evaluating the performance of ETFs. In this study, the relative performance of ETFs to the MFs would be calculated by using four mutual funds and four ETFs under the same benchmark (S&P 500) based on the US market.

In this study, we will employ three alternative methods for estimating tracking error as described in the paper of Milonas and Rompotis (2010). The first method, $TE_{1,p}$ computes tracking error the standard deviation of return differences between ETFs and their indexes. The estimation equation is presented as following:

$$TE_{1,P} = \sqrt{\frac{1}{n-1}} \sum_{T=1}^{n} (e_{pt} - \bar{e}_p)^2 \quad \text{---------- (3)}$$

Where: e_{pt} is the difference of returns on the day t and $\bar{e}_p$ is the average return`s difference over n days

The second method, $TE_{2,p}$ defines the tracking error as the average of absolute differences between ETFs and their indexes. The absolute differences are needed

because both positive and negative differences exist, which would affect the calculation and final results.

The third method, $TE_{3,p}$ estimates the tracking error as the standard error of the performance regression, which derives from a semi variance analysis of the return differences between ETFs and indexes. For each ETF this paper identifies the observations concerning negative excess returns which means for the observations equal to zero or positive will be both discarded. Then in this paper, all the squared negative excess returns will be summed up and divided this sum by the number of observations with negative excess returns subtract one. Semi variance analysis (SVA) is represented by the following equation:

$$SVA = \frac{\sum X_{ETF} < X_{MKT} (X_{ETF} - X_{MKT})^2}{n-1} \quad \text{--------- (4)}$$

Where: X_{ETF} shows the return of ETF X_{MKT} represents the return of the market and n is the number of negative excess returns. If $TE_{3,p}$ is higher than $TE_{1,P}$

We will infer that the first method underestimates the actual tracking error of ETF.

3.4 data sources

The sample data of our study include four ETFs and four mutual funds. Among ETFs, RANGER EQUITY BEAR ETF (HDGE), DIREXION DAILY S&P 500 BULL 3X SHARES (SPXL), PROSHARES ULTRA S&P 500 (SSO) and

PROSHARES ULTRAPRO S&P 500 (UPRO) were chosen as sample data. On the other side, PROFUNDS BANKS ULTRASECTOR INV (BKPIX), HODGES (HDPMX), PRIMECAP ODYSSEY AGGRESSIVE GROWTH (POAGX) and PROFUNDS ULTRABULL INV (ULPIX) were chosen as mutual fund samples. These eight funds are all in the US market and under the same benchmark (S&P 500), and they are all top performance in their fields. The reason for using US market as an example in this paper is because the US market is more develop than markets in other countries. We will use the most recent data to approve the results, so we choose approximately two years period daily trading data from August 2011 to August 2013 in our analysis. Data was found on the website of Bloomberg (www.bloomberg.com).

Chapter 4 Result Analysis

4.1 Data Overview

According to the table 1below, there are around 2012 observations in the ETF data pool. In the table, use ETF as selected funds, use ETFPC to represent the percentage change in different period, use MPC as the market percentage change, and use RF to represent the risk free rate. The average excess return of the ETF and the market are all positive, and they both have high volatility. This information show that ETFs and the market performed very well. This test is based on $\beta_{ETF,}$ the coefficient of the$(R_{MKT} - R_f)\beta_{ETF}$, so in the regression model, the function $(R_{MKT} - R_f)\beta_{ETF}$ is the key variable.

Table 1: ETF Data Summary

Variable	Obs	Mean	Std. Dev.	Min	Max
ETF	2012	2.5	1.118312	1	4
etfpc	2008	.1566742	2.581832	-13.19067	14.05029
mpc	2008	.0864822	1.046487	-4.459236	4.62915
rf	2012	2.07293	.4217171	1.657	2.578

From the table 2 below, there are nearly 2012 data in the MF data pool. In the table, use MF as mutual funds, use MFPC to represent the percentage change during the period, use MPC as the market percentage change, and use RF to represent the risk free rate. The table results show that the market and MF have positive excess return, and they both have a very high volatility, which tells that both MF and the market are doing well. The test is based on β_{MF} the coefficient of$\left(R_{MKT} - R_f\right)\beta_{MF}$, so in the regression model, $\left(R_{MKT} - R_f\right)\beta_{MF}$ is taken as the key variable.

Table 2: MF Data Summary

```
. sum  MF mfpc mpc rf

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
          MF |       2012         2.5    1.118312         1          4
        mfpc |       2008   .1564776     2.01376  -9.176471   10.88235
         mpc |       2008   .0864822    1.046487  -4.459236    4.62915
          rf |       2012    2.07293    .4217171      1.657      2.578

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```

4.2 Regression Result

This paper mainly employs two regression methods: Fixed Effects Regression and Random-Effects GLS Regression. The Fixed Effects Regression method is a linear regression model that measures both independent and dependent variables for multiple times, and then analyzes the data. Using the Fixed Effects Regression method helps us have a good control of all the stable characteristics and data. The Random Effects Regression method assumes all individual studies use different method effects, and they have distributions with certain mean and variability.

The following results report the estimates of the single-index regression analysis employed for explaining the performance of the selected ETFs and Mutual Funds. In particular, presented in the results are the alpha and beta estimates of the model, along with their t-statistics, the R-square, and the number of daily observations available for ETFs and MFs. This paper points out that in the case of alphas, t-tests shows the difference of estimates from zero whereas the relevant t-tests on beta estimates evaluate the difference of coefficients from unity.

(1) ETF Fixed Effects Regression

According to the results of Fixed Effects Regression,

$$(2)\ R_{ETF}-R_f=-1.792542+(R_{MKT}-R_f)\ 0.1293613$$

The result shows that $J_{\sigma ETF}$ is -1.792542 and β_{ETF} is 0.1293613.The t value for the coefficient of Rmr is 41.57, which is statistically significant at the 5% level. The t value of the coefficient is -42.01, which is large enough to show that the result is significant at the 5% level. Therefore, the results show that the $J_{\sigma ETF}$ for the sample for ETFs is -1.79542.

Table 2: ETF fixed effect regression

```
Fixed-effects (within) regression               Number of obs      =      2008
Group variable: name                            Number of groups   =         4

R-sq:  within  = 0.4632                         Obs per group: min =       502
       between = 0.2304                                        avg =     502.0
       overall = 0.4614                                        max =       502

                                                F(1,2003)          =   1728.33
corr(u_i, Xb)  = 0.0000                         Prob > F           =    0.0000
```

etfr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Rmr	.1293613	.0031117	41.57	0.000	.1232589	.1354637
_cons	-1.792542	.0426713	-42.01	0.000	-1.876226	-1.708857
sigma_u	.18698444					
sigma_e	1.9075168					
rho	.00951746	(fraction of variance due to u_i)				

F test that all u_i=0: F(3, 2003) = 4.82 Prob > F = 0.0024

(3) ETF Random Effects GLS Regression

According to ETF Random Effects GLS Regression

$$R_{ETF} - R_f = -1.792542 + (R_{MKT} - R_f)0.1293613$$

The result shows that $J_{\partial ETF}$ is -1.792542 and β_{ETF} is 0.1293613. The z value for the coefficient of Rmr is 41.57 which indicate the result is significant at the 5% level. The z value of the coefficient is -19.16 which also shows that the result is significant at the 5% level. Therefore, the results show that the $J_{\partial ETF}$ for ETF sample is -1.792542.

Table 3: ETF Random Effects Regression

```
Random-effects GLS regression                   Number of obs      =      2008
Group variable: name                            Number of groups   =         4

R-sq:  within  = 0.0000                         Obs per group: min =       502
       between = 0.0000                                        avg =     502.0
       overall = 0.4614                                        max =       502

                                                Wald chi2(1)       =   1728.33
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

etfr	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Rmr	.1293613	.0031117	41.57	0.000	.1232626	.13546
_cons	-1.792542	.0935392	-19.16	0.000	-1.975875	-1.609208
sigma_u	.16647802					
sigma_e	1.9075168					
rho	.0075593	(fraction of variance due to u_i)				

(4) MF Fixed Effects Regression

According to MF Fixed Effects Regression,

$$R_{MF} - R_f = -1.793664 + (R_{MKT} - R_f)0.128389.$$

We can tell from the result that $J_{\partial MF}$ is -1.793664 and β_{MF} is 0.128389. The t value for coefficient of Rmr is 74.77 which are significant at the 5% level. The t value of the coefficient is -76.18, this number is also significant at the 5% level. Therefore, the results show that the $J_{\partial MF}$ for MF sample is -1.793664.

Table 4: MF fixed effect regression

```
Fixed-effects (within) regression               Number of obs      =      2008
Group variable: name                            Number of groups   =         4

R-sq:  within  = 0.7362                         Obs per group: min =       502
       between = 0.6659                                        avg =     502.0
       overall = 0.7360                                        max =       502

                                                F(1,2003)          =   5591.19
corr(u_i, Xb)  = -0.0000                        Prob > F           =    0.0000
```

Rmf	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Rm	.128389	.001717	74.77	0.000	.1250217	.1317564
_cons	-1.793664	.0235462	-76.18	0.000	-1.839842	-1.747486
sigma_u	.04257068					
sigma_e	1.0525756					
rho	.00163307	(fraction of variance due to u_i)				

F test that all u_i=0: F(3, 2003) = 0.82 Prob > F = 0.4821

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(5) MF Random Effects Regression

According to MF Random Effects Regression,

$$R_{MF} - R_f = -1.793664 + (R_{MKT} - R_f)0.128389.$$

The result shows that $J_{\partial MF}$ is -1.793664 and β_{MF} is 0.128389. z value for coefficient of Rmr is 74.78, which is significant at the 5% level. The z value of the coefficient is -76.19, also a significant result at the 5% level. Therefore, the results show that the $J_{\partial MF}$ for MF sample is -1.793664.

Table 5: MF random effects regression

Random-effects GLS regression — Number of obs = 2008
Group variable: **name** — Number of groups = 4

R-sq: within = 0.0000
between = 0.0000
overall = 0.7360

Obs per group: min = 502
avg = 502.0
max = 502

Wald chi2(1) = 5592.68
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

Rmf	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Rm	.128389	.0017168	74.78	0.000	.1250242	.1317539
_cons	-1.793664	.0235431	-76.19	0.000	-1.839808	-1.747521
sigma_u	0					
sigma_e	1.0525756					
rho	0	(fraction of variance due to u_i)				

4.3 Tracking Error Result

The major consideration for this paper is the deviation between the performance of MF and ETF, where the deviation means “tracking error”. People have showed great interest in the literature of MF and ETF. In order to report the underperformance and outperformance to statistics, the first thing was used in this paper was to calculate the relevant performance of the mutual funds and ETF by minus the daily return of the S&P 500. Then based on the methodology described in Milonas and Rompotis (2010), the tracking error can be estimated. In particular, $TE_{1,P}$ is the first method which computes the tracking error as the difference of the standard deviation of return between the ETF and the mutual funds. $TE_{2,P}$ is the second method to compute the tracking error by calculating the absolute value of the difference between the returns of mutual funds and the ETF and then take the average of the value. The reason why that so many researchers consider about the absolute value of performance deviation is because that both positive and negative value of the difference will reflect the declination of the performance between the mutual funds and the ETF. At the last, $TE_{3,P}$ is the third method that the tracking error estimation is made by using the standard error of performance regression.

According to the results in Table 6, the $TE_{1,p}$, $TE_{2,p}$, and $TE_{3,p}$ of the average ETF is equal to 0.88%, 0.79%, and 1.33%, The corresponding estimates of the mutual funds are 0.33%, 0.031%, and 0.93%, By comparing the results of the ETFs and mutual funds, we infer that, on average, the former is a less efficient tracker than the latter.

Table 6: Tracking Error

Symbol	TE1 (%)	TE2 (%)	TE3 (%)	avg.
HDGE US ETF	0.0127	0.0113	0.0179	0.013967
SPXL US ETF	0.0102	0.0091	0.0144	0.011233
SSO US ETF	0.0025	0.0025	0.0071	0.004033
UPRO US ETF	0.0099	0.0088	0.014	0.0109
avg.	0.008825	0.007925	0.01335	0.010033
BKPIX US EQUITY	0.0079	0.0076	0.0125	0.009333
HDPMX US EQUITY	0.0011	0.001	0.00502	0.002373
POAGE US EQUITY	0.0016	0.0015	0.0087	0.003933
ULPIX US EQUIRY	0.0025	0.0022	0.011	0.005233
avg.	0.003275	0.003075	0.009305	0.005218

Chapter 5 Conclusion and Suggestions

The main conclusion of these articles is that ETFs do not outperform their mutual funds counterparts but the result is much closed. However, there is a well-established cost advantage of ETFs over the managed mutual funds and, in most of the cases, over the corresponding index funds when management costs and purchase and redemption fees are taken into account. However, investors in ETFs are shouldered with brokerage commissions whereas mutual fund investors are not charged with such expenses. With respect to tracking error the result shows that the ETF is a more efficient tracker when the relevant performance of the funds against the performance of the benchmark is taken into account.

Overall, the results of our research support the findings that have already been provided by the literature via the examination of the developed U.S. ETF and mutual fund market. Other evaluation method can be undertaken to make a future on the characteristics of funds.

Reference

Bansal, V. K., & Somani, A. (2002). Exchange traded funds: Challenge to traditional mutual funds. *Review of Business, 23*(3), 40. Retrieved from http://search.proquest.com/docview/220927213?accountid=13908

Black, Fischer, Michael C. Jensen and Myron Scholes. 1972. "The Capital Asset Pricing Model: Some Empirical Tests," in *Studies in the Theory of Capital Markets*. Michae C. Jensen, Ed. New York: Praeger, pp. 79–121.

Boney, V. (2007). Mutual and exchange traded funds: Market effects and the impact of investor sentiment. (Order No. 3282572, The Florida State University). ProQuest Dissertations and Theses, , 107-n/a. Retrieved from http://search.proquest.com/docview/304869332?accountid=13908. (304869332).

Buetow, G. W., & Henderson, B. J. (2012). An empirical analysis of exchange-traded funds. Journal of Portfolio Management, 38(4), 112-127,12. Retrieved from http://search.proquest.com/docview/1033047189?accountid=13908

Coggins, F., Beaulieu, M., & Gendron, M. (2006). *Mutual fund daily conditional performance: Selectivity and timing measurements*. Rochester: doi:http://dx.doi.org/10.2139/ssrn.820344

DeFusco, R. A., Ivanov, S. I., & Karels, G. V. (2011). The exchange traded funds' pricing deviation: Analysis and forecasts. Journal of Economics and Finance, 35(2), 181-197. Retrieved from http://search.proquest.com/docview/897118906?accountid=13908

Doran, J. S., Boney, V., & Peterson, D. R. (2006). *The effect of the spider exchange traded fund on the cash flow of funds of S&P index mutual funds*. Rochester: doi:http://dx.doi.org/10.2139/ssrn.879777

G, W. K., Cheng, L. T. W., & Chan, K. C. (1998). International mutual fund selectivity and market timing during up and down market conditions. *The Financial Review, 33*(2), 127-144. Retrieved from http://search.proquest.com/docview/208178642?accountid=13908

Hassine, M., & Roncalli, T. (2013). *Measuring performance of exchange traded funds*. Rochester: Retrieved from http://search.proquest.com/docview/1313268920?accountid=13908

Market Timing, Selectivity, and Mutual Fund Performance: An Empirical Investigation by Cheng-Few Lee and Shafiqur Rahman *The Journal of Business* , Vol. 63, No. 2 (Apr., 1990), pp. 261-278

Maxey, D. (2009, Jul 06). Investing in funds: A quarterly analysis --- exchange-traded funds: A more active role --- mutual funds, beware: ETFs increasingly are moving beyond indexes. *Wall Street Journal*. Retrieved from http://search.proquest.com/docview/399124223?accountid=13908

Middleton, K. L., & Prather, L. J. (2003). Timing and selectivity of managed portfolios. *Corporate Finance Review, 8*(2), 28-33. Retrieved from http://search.proquest.com/docview/198762945?accountid=13908

Nguyen, V. T. (2005). Three essays on the microstructure of exchange traded funds. (Order No. 3246037, The University of Mississippi). ProQuest Dissertations and

Theses, , 153-153 p. Retrieved from http://search.proquest.com/docview/305446531?accountid=13908. (305446531).

Maxey, D. (2010, Feb 08). Going from mutual fund to an ETF. *Wall Street Journal.* Retrieved from http://search.proquest.com/docview/399130031?accountid=13908

Romero-Perez, H. (2010). Essays on exchange-traded funds. (Order No. 3412082, University of Puerto Rico, Rio Piedras (Puerto Rico)). ProQuest Dissertations and Theses, , 86-n/a. Retrieved from http://search.proquest.com/docview/726036806?accountid=13908. (726036806).

Rompotis, G. G. (2012). The german exchange traded funds. IUP Journal of Applied Finance, 18(4), 62-82. Retrieved from http://search.proquest.com/docview/1240576068?accountid=13908

Prasanna, P. K. (2012). Performance of exchange-traded funds in india. International Journal of Business and Management, 7(23), 122-143. Retrieved from http://search.proquest.com/docview/1327700231?accountid=13908

Sanchez, B., & Wei, P. (2010). The liquidity of exchange traded funds. International Review of Applied Financial Issues and Economics, 2(4), 621-646. Retrieved from http://search.proquest.com/docview/859539516?accountid=13908