

THE RELATIVE PERFORMANCE OF EQUITY INDEX ETFs AND EQUITY INDEX MUTUAL FUNDS

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PERFORMANCE OF ACTIVELY MANAGED EQUITY ETFs

ABSTRACT

Empirical evidence relating to the performance of ETFs is mixed. The mainstream findings are that equity-index ETFs underperform both their benchmark index and equity-index-mutual funds. It is generally reported that ETFs have lower tracking errors, lower expense ratios, and higher brokerage commissions than mutual funds. Previous studies also suggest that the ETF industry has undergone significant changes since 2000, concerning ETF costs and the elimination of the primary causes of ETF underperformance.

The purpose of this study is to reexamine the performance of equity-index ETFs using a relatively larger sample and a longer study period. I find that, during the 2001 to March 2012 period, equity-index ETFs outperformed both equity-index-mutual funds and the S&P 500 index. I used two measures of investment performance—one that assumes a perfectly diversified portfolio and another that does not involve such assumption. The two measures of investment performance provide similar signals.

Moreover, I find that equity-index ETFs have lower expense ratios, lower portfolio turnover, and smaller portfolio holdings compared with equity-index-mutual funds. Also, equity-index ETFs invest 35% of their portfolios in the top-ten stocks they held, compared with 19% for equity-index-mutual funds—all of which suggest that, on average, ETFs are less diversified than equity-index-mutual funds.

Keywords: ETFs, Index Funds, Investment Performance, Portfolio Turnover, Expense Ratios, Investment Company Act

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I. INTRODUCTION

Exchange traded fund (ETF) is an investment company similar to a mutual fund and closed-end fund in the sense that its shares represent a share of a pool of underlying assets such as stocks, bonds, or commodities. The three types of funds are regulated by the SEC under the Investment Company Act of 1940. ETFs however have received SEC's "exemptive relief" from various provisions of the Investment Company Act, "that would not otherwise allow the ETF structure," according to the 2012 ICI Fact Book.

ETFs are structured either as open-end investment companies (mutual funds), unit investment companies (UITs), commodity funds, or sector funds.² Those ETFs that primarily invest in futures contracts, commodities, and currencies are not registered with the SEC and are not regulated under the Investment Company Act of 1940. ETFs that invest in commodities are regulated by the SEC under the Securities Act of 1933, and ETFs that invest in commodity futures or currency futures are regulated by the CFTC.

II. SIMILARITIES BETWEEN INDEX ETFs AND INDEX MUTUAL FUNDS

Until 2008, ETFs were set up similar to index mutual funds that tracked specific market index and therefore permitted ETF investors to speculate in, or hedge exposure to, different economic sectors, domestic or international markets, or to engage in different investment styles. These index ETFs, like index mutual funds, have low portfolio turnover and low operating expenses.

Since 2008, however, the SEC has granted "exemptive relief" to ETF sponsors to offer actively managed ETFs that do not track a specific index. Unlike index mutual funds which are purchased or redeemed by investors at their net assets value (NAV), which is calculated at the end of the day, ETFs trade continuously throughout the day at a price which is close to its intraday indicative value (IIV), i.e. the market value of its underlying assets. Also, ETFs are purchased through a broker and thus investors must incur brokerage commissions, bid-ask spreads, and annual expense ratios when they buy or sell ETF shares.

Aber et al. (2009) observe that index-based ETFs can be considered as competitors and as potential substitutes for conventional index mutual funds. However, the expense ratios of ETFs are generally lower than those of index mutual funds because ETFs do not provide shareholder services and transfer agency services. Moreover, according to Kostovetsky (2003), the goal of ETFs and index mutual funds is essentially the same: to provide investors with a way to own a well-diversified indexed portfolio by using economies of scale to buy large quantities of stock at low cost.³

² See the 2012 ICI Fact Book, page 53, for a list of sectors and assets related to commodity and sector ETFs.

³ Prior to 2008, all ETFs were index based and tracked specific equity indexes.

According to Kostovetsky (2003), there are three major differences between an ETF and an index mutual fund: management fees, shareholder transaction costs, and taxation costs. ETFs have lower management fees, higher shareholder transaction costs, and lower taxation costs. ETFs also have smaller tracking errors than index mutual funds. According to Kostovetsky, the goal of ETFs and index funds is essentially the same, but that ETFs provide shareholders with convenience of buying or selling ETFs shares throughout the day, whereas mutual fund shares can be bought or redeemed only at the end of the trading day. Also, ETFs can be bought on margin, can be sold short, and are exempt from the sell-short uptick rule. An investor can place a stop, stop-loss, and limit orders on ETF shares.

Kostovetsky (2003) documents that ETFs are important for large investors. He shows that investors with more than \$59,635 to invest should choose ETFs over index funds, and that as the initial investment grows, ETFs become far superior to index funds. Index funds, on the other hand, are superior to ETFs for small investors, especially for short-term horizons. Moreover, Svetina (2010) shows that only 17% of all ETFs directly compete with index mutual funds. Svetina (2010) finds that the creation of new competing ETFs reduces flows for incumbent index funds and reduces market share of incumbent ETFs in the same investment style.

Elton, et al. (2002) observe that the major difference between index mutual funds and SPDRs is that SPDRs can be purchased and sold throughout the day and that investors favor this immediacy. They also observe that in most of the second generation EFTs, their principal disadvantages related to the inability of EFTs to earn income on dividends and capital gains, and inability to earn income on security lending have already been eliminated. Moreover, as observed by Gastineau (2001), ETFs have lower operating costs than conventional mutual funds for reasons connected with the elimination of the transfer agency function. Those that value intraday trading of EFT shares in addition to the lower EFT expense ratio would prefer EFTs over conventional funds.⁴

III. SIMILARITIES BETWEEN ETFs AND CEFs

An index ETF is like a CEF, but whereas indexed ETFs are passively managed to replicate their specific indexes, CEFs are actively managed. Also, shares of ETFs are created and redeemed at close to their NAV, but shares of CEFs often trade at discount or premium relative to their NAV. Both ETFs and CEFs are regulated by the SEC under the Investment Company Act (1940), and both trade throughout the day similar to shares of publically traded companies. ETFs can be considered as potential substitutes for CEFs, as regards their trading characteristics, according to Barnhart and Rosenstein (2010). Barnhart and Rosenstein find that CEF discount to NAV widens upon the introduction of a similar ETF, and that the average discount on a similar domestic

⁴ The first U.S. index EFT was launched in 1993 by State Street Global Advisors, and the first U.S. actively managed EFT was launched in 2008.

equity, domestic bond, and international equity CEFs widens according to the degree of relatedness or substitutability of the ETF for the CEF. Moreover, they also find that a CEF loses desirability whenever a substitute ETF becomes available.

Ruan, et al. (2012) find that ETFs are generally more actively traded, have lower tracking errors, and have lower transaction costs and risk than CEFs. Index ETFs can focus on major market indexes, countries, sectors, regions, or investment styles (Reilly and Norton, 2006). And whereas a share of ETF trades at close to its NAV, the market price of a CEF often deviates from its NAV. Moreover, ETFs are more tax efficient than CEFs because ETF investors have control over capital gains taxes, and because ETFs have lower operating expenses. However, according to Gastineau (2004), the proponents of index funds say that expense ratios and tax efficiency do not matter anymore because the decline in the stock market since 2000 has eliminated capital gains overhang in most index mutual funds.

IV. GROWTH OF THE ETF INDUSTRY

Since the first U.S. ETF was launched in 1993, ETFs have grown rapidly in total assets, number, and variety. Today, there are actively managed ETFs, as well as indexed ETFs that track specific indexes representing various markets, countries, or sectors. There are ETFs that hold stocks, bonds, derivative instruments (such as futures contracts, forward contracts, and swaps), or commodities (such as gold and silver) depending on the specific investment objective of the ETF.

ETFs are popular with both retail and institutional investors and their popularity has been rapidly increasing since 1993. Bradley and Litan (2011 and 2012) observe that ETFs have grown so fast in number and variety that they now account for approximately 50% of all trading in the U.S. equity markets as at the end of 2011. The total net assets of ETFs were \$7 billion in 1997, according to Reilly and Norton (2006). This figure increased to \$301 billion in 2005 and \$1.5 trillion in 2011, according to the 2012 ICI Fact Book. As at the end of 2011, there were 1134 U.S. ETFs.

V. CREATION AND REDEMPTION OF ETF SHARES

The creation of an ETF begins when the sponsor selects an investment objective as well as a specific index, if the ETF is designed to track an index.⁵ The ETF either holds all of the securities in the index or select a sample of representative securities. The Sponsor of an actively managed ETF trades securities regularly, generally on a weekly or monthly basis. Since ETFs are required to publish information about their portfolio holdings, the ETF publishes a “creation basket” each business day. This creation basket is a list of names and quantities of the securities and other assets, and is either a replicate or a sample of the ETF’s portfolio.

In the primary market, ETF shares are created by “authorized participants,” which are typically institutional investors who deposit the creation basket and/or cash with the sponsor. In return, they receive a “creation unit” which generally consists of

⁵ The discussion in this section is based on the 2012 ICI Fact Book, pages 46 to 47.

25,000 to 200,000 ETF shares. The authorized participant may keep or sell the ETF shares in the secondary market. The ETF shares are listed on the exchanges and trade like the shares of publically traded companies. Small investors typically buy ETF shares in the secondary market. A creation unit is deleted when an authorized participant returns the specified number of shares in the published creation unit to the sponsor. In return the authorized participant receives the “redemption basket,” which consists of securities and/or other assets contained within the ETF portfolio. The redemption basket typically mirrors the creation basket.

According to Kostovetsky (2003), the advantage of the creation/redemption process is that an ETF does not need to pay to obtain constituent shares. It gets constituent shares without liquidity cost. And that the advantage to the ETF investor is that one can obtain a large number of ETF shares without moving its price in the secondary market. Moreover, this creation and redemption in-kind provide arbitrage opportunities to both the retail and institutional investors that prevent the ETF shares from diverging from the NAV of constituent securities. Elton, et al. (2002) find that the tracking errors of SPDRs are small and short lived. And, according to Kostovetsky, fund transaction costs are nearly nonexistent because of the creation and redemption in-kind, although there is some cash drag. Depository Trust Clearing Corporation oversees the settlement of ETF trades.

VI. ARE ETFS A POTENTIAL DANGER TO ECONOMIC RECOVERY?⁶

According to Bradley and Litan (2011), ETFs began as a constructive financial innovation but have grown so fast in number and variety that they now account for about 50% of all trading in the U.S. equity markets. In the process, ETFs have distorted the role of equity markets in capital formation, and pose systematic risks from potential settlement failures. Bradley and Litan opined that U.S. equity markets are broken and that both professional and amateur investors believe that these new derivative instruments “have turned the market into a casino on steroids.” Bradley and Litan show that fewer and fewer U.S. companies now elect to trade on U.S. stock markets such that the number of exchange-traded stocks has dropped 30%, from 6,200 to 4,300 in the past 12 years.

Moreover, according to Bradley and Litan (2011), ETFs may now be undermining the fundamental role of equity markets in ensuring the efficient allocation of capital, and that individual stocks now behave as if they are derivatives of ETFs – instead of the other way round. ETFs decrease diversification effects, with stocks and sectors worldwide moving together. They suggest that investors should worry about the “disconnect” between ETF size, liquidity, and market-price disruptions in stocks, bonds, commodities, “and everything.” According to Bradley and Litan (2012), the proliferation of ETFs also poses unquantifiable but very real systematic risks of the kind

⁶ The discussion in this section is based on Bradley and Litan (2011 and 2012).

that manifested during the “flash crash” of May 6, 2010, and that other flash crashes, potentially much more severe, are a virtual certainty.

Relatedly, Ludwig and Nadig (2011) show that, in times of high volatility, the use of ETFs has increased and that ETFs make up about 10% of the number of actual trades across all U.S. exchanges. And as stocks have been on a sharp correction, the number has approached 20%.

VII. THE INVESTMENT PERFORMANCE OF ETFS

Empirical findings on the investment performance of ETFs are mixed. Svetina (2010) finds that, on average, ETFs outperform their benchmark indexes on net return basis and that only 17% of all ETFs directly compete with index funds. Small, et al. (2012), however, find that ETFs earn returns that are very similar to those of their underlying portfolio of securities. Elton et al. (2002), on the other hand, find that SPDRs underperform the S&P 500 index and “low-cost index funds,” mostly because of management fees, their inability to earn investment income on dividends and capital gains, and their inability to earn income on security lending. However, Elton, et al. opined that these principal disadvantages have already been eliminated in the second generation of ETFs. Similarly, Gastineau (2004) suggests that indexed ETFs underperform large index funds that track the same index. Relatedly, Prather, et al. (2009), argue that the expense ratios of index funds do not include trading costs, and that the true costs of investing in SPDRs cannot be directly compared to those of an index funds.

The purpose of the present study is to reexamine the performance of ETFs and index mutual funds using a relatively longer study period and a larger, more representative, sample of ETFs and index funds. Moreover, I study, (1) the effects of recent changes made regarding ETF costs, as suggested by Fuhr (2001), and the elimination of the principal causes of ETF underperformance as suggested by Elton, et al. (2002), and (2) the elimination of Capital gains overhang in most of index funds since 2000, according to Gastineau (2004). I investigate the effects of these events on the relative performance of ETFs and index mutual funds.

VIII. DATA

The data consist of ETFs and index mutual funds obtained from the Morningstar Principia database. I extracted those ETFs that had invested at least 50% of their portfolio in U.S. stocks, and that had invested no more than 15% of their portfolio in bonds or non-U.S. stocks. All of the funds in the sample track a specific equity index, and are distinct portfolios. This means that multiple versions of the same

fund have been discarded for the purpose of this study. Also, master feeder funds and funds of funds are not included in the sample. The final sample consists of 337 exchange traded funds and 468 index mutual funds, and the study period is January 2001 to March 2012. Monthly returns for the funds and for the S&P 500 index were obtained from the Principia.⁷ Corresponding returns on the 91-day Treasury bills were obtained from the federal reserve bank of St. Louis.⁸

As shown in Table 1, the average size of ETFs is \$1.6 billion, and that of index funds is \$1.8 billion. And as indicated by the percentage of U.S. Stocks (D-Stocks) of 103.743% for ETFs and 96.775% for the mutual funds, the two groups of funds are essentially domestic-equity funds. The percentage of U.S. stocks in the funds' portfolios range from 300.64% for "Direxion Daily Small Cap Bull 3X Shares" to 85.65% for the "First Trust ISE-Revere Natural Gas Indx." Index mutual funds held 760 stocks on average, compared with 349 stocks held by the average ETF, suggesting that the mutual funds are more diversified than the ETFs, on average.

Moreover, as shown in Table 1, index mutual funds had an average portfolio turnover of 76.630% compared with 38.487% for the ETFs—indicating that a greater percentage of an index fund's holdings changed, on average, than that of an ETF. These numbers suggest a holding period of 31.2 months for the ETF and 15.7 months for the index fund. According to Morningstar, Inc., a turnover ratio of 20% to 30% would indicate a buy-and-hold strategy. The combination of TopTen, Holdings, and portfolio turnover (TO) indicates that index funds are much more diversified, are more actively managed, and have a higher expense ratio (ExRatio), on average. Aber et al. (2009) similarly finds that ETFs have a lower expense ratio than index mutual funds. Brokerage commissions are not included in expense ratios. If brokerage commissions were included in the reported expense ratios, the average index mutual fund's expense ratio would rise even higher relative to that of an average ETF. Similarly, Gastineau (2001, 2004), Kostovetsky (2003), and Aber et al. (2009) all find that ETFs have lower operating costs than mutual funds. Kostovetsky (2003) finds that ETFs have lower management fee and lower fund transactions costs, but that they have higher brokerage commissions than index mutual funds.

⁷ Although the "best fit index" varies among individual funds, I used the S&P 500 index as the performance benchmark for both the ETFs and index mutual funds.

⁸ www.stlouisfed.org/. Monthly yields are derived from the quarterly yields.

Table 1
Sample Characteristics of ETFs and Index Funds
(January 2001 to March 2012)

Variable	ETFs	N	Index Funds	N
Net Assets (\$M)	1636.570	337	1790.990	427
D-Stocks (%)	103.743	337	96.775	468
F-Stocks (%)	1.120	337	1.409	468
Bonds (%)	0.038	337	0.007	468
Holdings	349	337	760.000	468
TopTen (%)	34.592	337	19.401	468
ExRatio (%)	0.432	337	0.700	468
Turnover (%)	38.487	335	76.630	468

Note:

Note: N is the number of non-missing data points; Bonds is the percentage of the fund's portfolio invested in bonds; D-Stocks is the percentage of the fund's portfolio invested in domestic common stocks; F-Stocks is the percentage of the portfolio invested in non-U.S. stocks; Holdings is the number of stocks held by the fund; and TopTen is the percentage of the fund's portfolio invested in the top-ten stocks it held. ExRatio and Turnover refer to the fund's expense ratio and portfolio turnover, respectively. Net Assets are in millions of dollars. Cash and other securities held by the fund are not included in this table.

IX. METHODOLOGY

I use the following model to measure the risk-adjusted performance of fund companies:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad [1]$$

where, R_{it} is the excess return on fund i , in month t , i.e. the fund's return in excess of corresponding monthly yield on 91-day-Treasury bills; R_{mt} is the excess return on the S&P 500 index in month t ; and ε_{it} is the residual return on fund i , in month t . Fund i 's risk-adjusted performance is measured by Jensen's alpha, α_i . I measure the

risk-adjusted performance again using the Sharpe Information Ratio as suggested by Reilly and Norton (2006) and Goodwin (1998). According to Reilly and Norton (2006), the Sharpe Information Ratio, S_p , is a more general measure of portfolio performance than the traditional Sharpe measure.

If “ D_t ” is the differential return between the portfolio and the benchmark ($R_{pt}-R_{mt}$) in period t , then:

$$S_p = \frac{\bar{D}}{\sigma_D}, \quad [2]$$

where, \bar{D} is the arithmetic average of the monthly differential returns, i.e. $\bar{D} = \frac{1}{n} \sum_{t=1}^n D_t$;

σ_D is the standard deviation of the differential returns; and n is the number of monthly returns. For the test of null hypothesis--that the differentials are zero, on average--the t-statistic is:

$$t = \frac{\bar{D}}{\sigma_D \sqrt{n}}. \quad [3]$$

The t-statistic has a t distribution with $n-1$ degrees of freedom.

As with Jensen's alpha, the Sharpe Information Ratio indicates portfolio performance relative to the benchmark index and lends itself to statistical tests of significance. However, unlike the Jensen's alpha, the Sharpe Information Ratio adjusts for total risk, rather than just systematic risk, and this is crucial to performance measurement because previous studies have shown that mutual fund portfolios, on average, contain significant idiosyncratic risks. Reilly and Norton (2006) and Goodwin (1998) argue that the Sharpe Information Ratio is a more general measure of portfolio performance than the traditional Sharpe measure.

X. THE RESULTS

As shown in Table 2, ETFs have larger tracking errors and larger volatility of tracking errors than mutual funds, contrary to Kostovetsky (2003). The mean tracking error for the average ETF is 0.126% per month compared with 0.102% for the average index mutual fund. As regards the risk-adjusted-investment performance, both groups have a significantly positive performance during the 2001 to 2012 period. However ETFs have outperformed the Index mutual funds during that period and were more

volatile than index funds, as indicated by the Jensen's alphas and the portfolio betas, respectively. Moreover, the Sharpe information ratio, S_p , indicates that ETFs have outperformed both the index funds and the S&P index during the study period. The measured information ratio is 0.021 for the average ETF, and -0.287 for the average index mutual fund. Further, only 5% of the ETFs had a significantly negative information ratio, compared with 32% of the index mutual funds.

Table 2
Estimated Measures of Investment Performance
(January 2001 to March 2012)

Variable	Exchange Traded Funds		Index Mutual Funds	
	N	Mean	N	Mean
Tracking Error	336	0.126	468	0.102
Std.	336	3.478	468	1.455
S_p :	336	0.021	468	-0.287
(% positive)		8.930		15.600
(% Negative)		5.060		32.260
Jensen's α_p		0.174*		0.131*
β_p		1.146		1.076

Note:

Tracking Error is calculated for each fund, each month, as the return on the fund portfolio minus the return on the S&P 500 index. Std. refers to the standard deviation of the monthly tracking error. The Sharpe Information Ratio is calculated using Equation [2] and averaged across the fund groups. "% positive" and "% negative" refer to the number of Information Ratios, that are either significantly positive or negative, as a percent of the number of estimated Information Ratios in that group. Jensen's alpha and portfolio beta are estimated for each fund using Equation [1], and then averaged across each of the two fund groups.

*Significant at the 1% level.

Overall, Equity index ETFs are less diversified than index mutual funds and have lower expense ratios and lower portfolio turnover. Also, on average, equity-index ETFs have outperformed equity index mutual funds during the 2001 to 2012 period. It appears that the changes made since year 2000, regarding ETF expenses (Fuhr, 2001) and other "principal causes of ETF underperformance" (Elton, et al., 2002; Gastineau, 2004) have significantly boosted the investment performance of the average ETF.

XI. SUMMARY AND CONCLUSIONS

Empirical evidence relating to the performance of ETFs is mixed. The mainstream findings are that equity-index ETFs underperform both their benchmark index and equity-index-mutual funds. It is generally reported that ETFs have lower tracking errors, lower expense ratios, and higher brokerage commissions than mutual funds. Previous studies also suggest that the ETF industry has undergone significant changes since 2000, concerning ETF costs and the elimination of the primary causes of ETF underperformance.

The purpose of this study is to reexamine the performance of equity-index ETFs using a relatively larger sample and a longer study period. I find that, during the 2001 to March 2012 period, equity-index ETFs outperformed both equity-index-mutual funds and the S&P 500 index. I used two measures of investment performance—one that assumes a perfectly diversified portfolio and another that does not involve such assumption. The two measures of investment performance provide similar signals. I find that only 5% of ETFs have a negative and statistically significant Sharpe Information Ratio, compared with 32% of the equity index mutual funds. I also find that equity index ETFs have larger and more volatile tracking errors.

Moreover, I find that equity-index ETFs have lower expense ratios, lower portfolio turnover, and smaller portfolio holdings compared with equity-index-mutual funds. Also, equity-index ETFs invest 35% of their portfolios in the top-ten stocks they held, compared with 19% for equity-index-mutual funds—all of which suggest that, on average, ETFs are less diversified than equity-index-mutual funds.

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