Exchange-Traded Funds: A New Investment Option for Taxable Investors

By James M. Poterba and John B. Shoven*

Exchange-traded funds (ETF's) are a rapidly growing class of financial products. ETF's are typically organized as unit trusts. They were introduced in 1993, and by the end of 2001, they held $79 billion in assets—2.4 percent of the total assets in equity mutual funds. The share of equity mutual-fund assets held through ETF's doubled in 2000 and rose by nearly 50 percent in 2001. With several years of continued growth at this pace, the assets held through ETF's will rival the assets held in equity index funds.

Exchange-traded funds are of interest to public-finance researchers concerned with taxation and portfolio behavior for two reasons. First, they represent financial innovations that are sometimes described as prototypes for the future evolution of the mutual-fund industry. It is therefore important to understand their tax treatment and their after-tax returns. Second, ETF's are often promoted as being more "tax efficient" than traditional equity mutual funds. By reducing the tax burden on investments in corporate stocks, relative to investments in such stocks held through equity mutual funds, ETF's may therefore move closer to the consumption-tax treatment of corporate capital income.

In this brief paper, we compare the pretax and after-tax return on the largest exchange-traded fund, the SPDR trust, which holds the securities in the S&P 500, with the returns on the largest equity index fund, the Vanguard Index 500 fund. This fund tracks the same index as the SPDR trust. We extend the ETF return calculations of Edwin J. Elton et al. (2002) by focusing on a longer sample period and by comparing ETF returns with those on index funds.

Mutual funds are subject to specialized tax rules. In particular, they must pass through realized capital gains to their shareholders. Joel Dickson and Shoven (1995) and Dickson et al. (2000) emphasize that this raises the tax burden on mutual-fund investors relative to the tax burden on investors who buy and hold a portfolio of securities. When a fund manager sells appreciated shares, buy-and-hold investors in an equity mutual fund may become liable for taxes on the fund's realized capital gains. Exchange-traded funds are technically mutual funds, so they are governed by the same tax rules, but they have used a technique known as "redemption in kind" to reduce substantially or even eliminate their distributions of realized capital gains. This accounts for their historical tax advantage relative to many traditional equity mutual funds.

I. The Mechanics of Exchange-Traded Funds

ETF's are traded securities. Gary Gastineau (2001, 2002) provides a very detailed history of ETF's and describes the current operation of these products. The first ETF's were traded on the American Stock Exchange, although ETF's are now traded on the New York Stock Exchange as well. Each ETF share is a claim on a trust that holds a specified pool of assets. The SPDR trust, for example, holds the stocks in the S&P 500. ETF shares are created when an authorized financial institution deposits a portfolio of securities with the trustee and receives ETF shares in return. These ETF shares can be sold to other investors. The market for ETF shares operates like the market for shares of a common stock. Investors can buy or sell ETF shares at any point during the day. ETF share prices may diverge from the underlying net asset value (NAV) of the securities held in the trust, although such divergence is restricted by the capacity of authorized financial institutions to

* Poterba: Department of Economics, Massachusetts Institute of Technology, Cambridge, MA 02142, and NBER; Shoven: Department of Economics, Stanford University, Stanford, CA 94305, and NBER. We are grateful to Yingcong Lan for excellent research assistance, and to Daniel Bergstresser, Rob Engle, Burton Malkiel, and especially Joel Dickson and John Rea for many helpful discussions. The Hoover Institution, the National Science Foundation, and the Finance Program of the Stanford Institute for Economic Policy Research provided us with research support.

create and redeem ETF shares. If the ETF share price rises too far above the NAV for the underlying assets, the creating institutions will buy the associated securities, deposit them in the trust, and create new ETF shares. If the ETF share price falls below the NAV of the underlying assets, institutions will purchase ETF shares and redeem them for the underlying securities.

ETF shares must be purchased through brokerage firms, which entails commission costs. They can be purchased on margin and sold short. These features, as well as the opportunity to trade ETF shares throughout the day, distinguish ETF's from traditional equity mutual funds. Mutual funds can only be bought or sold at their end-of-day net asset value. In many cases they can be purchased without any commission, directly from the fund complex. Mutual-fund shares cannot be sold short or bought on margin. These differences suggest that ETF's and mutual-fund shares may be appropriate for different types of investors: ETF's for investors who demand short-term liquidity and who buy in large lots, equity mutual funds for investors who make many small purchases or sales and who place less value on liquidity.

The foregoing differences notwithstanding, ETF's are similar to mutual funds in many ways. Both have operating expenses that reduce investor returns. Most ETF's to date have been designed to track a specified market index, so they are similar to equity index funds. Both ETF's and index funds may experience some "tracking error" in matching the pretax return on the index. ETF and mutual funds can differ in their expense ratios, in their tracking error, and because of the bid-ask spread on the ETF, in the relationship between their purchase price and the net asset value of the underlying index securities. On an after-tax basis, differences in capital-gain realizations between ETF's and equity index funds may also lead to differences in returns.

Table 1 presents information on the growth of ETF's, equity index funds, and all equity mutual funds during the last decade. The first column shows that between 1993, when ETF's were first introduced, and 2000, the assets held by equity mutual funds rose roughly fivefold. Over the same period, the assets of domestic index funds rose by a factor of 15. Index funds represented 3 percent of the assets in equity mutual funds in 1993, compared with nearly 9 percent in 2000. The growth in ETF's is even more dramatic. ETF's had virtually no assets in 1993, but by year-end 2000, they accounted for 1.7 percent of equity mutual-fund assets. This share had grown to 2.3 percent by November 2001.

ETF assets are highly concentrated. Table 2 shows that at the end of 2001, eight ETF's had at least $1.5 billion in assets. The two largest funds, the SPDR trust (ticker symbol SPY) and the NASDAQ 100 trust (ticker symbol QQQ),

TABLE 1—ASSETS IN EQUITY MUTUAL FUNDS AND EXCHANGE-TRADED FUNDS, 1993–2001

Year	Equity mutual funds	Domestic equity index funds	Exchange-traded funds
1993	740.7	22.6	0.46
1994	852.8	26.0	0.42
1995	1,249.1	47.0	1.05
1996	1,726.1	83.5	2.40
1997	2,368.0	147.9	6.70
1998	2,978.2	233.1	15.56
1999	4,041.9	344.0	33.86
2000	3,962.3	339.3	65.59
2001	3,418.2	317.5	83.00

Source: Authors' tabulations based on data from the Investment Company Institute (2001a, b). All entries correspond to December of the indicated calendar year; 2001 data are for November. Table entries report billions of dollars.

TABLE 2—EXCHANGE-TRADED FUNDS WITH MORE THAN $1.5 BILLION IN ASSETS, 31 DECEMBER 2001

Fund name	Assets ($ billion)	Launch date	Expense ratio (percent)
SPDR Trust (SPY)	30.4	29 Jan 1993	0.12
NASDAQ-100 Trust (QQQ)	21.8	9 Mar 1999	0.18
S&P Midcap 400 Trust (MDY)	4.8	4 May 1995	0.25
iShares S&P 500 Index Fund (IVV)	3.6	15 May 2000	0.09
DOW Diamond Series Trust I (DIA)	3.0	27 Jan 1998	0.12
iShares Russell 2000 Index Fund	2.1	22 May 2000	0.20
HOLDRS Biotech (BBH)	1.6	22 Nov 1999	†
iShares Russell 3000 Index Fund	1.5	22 May 2000	0.20

Source: Wall Street Journal, 7 January 2002, p. R17.
† Minimum expense ratio of eight cents per share.

accounted for more than $51 billion in ETF assets, or nearly three-quarters of the total. Table 2 also shows that the expense ratios charged on the largest funds vary from nine basis points (iShares S&P 500) to 28 basis points (SPDR Technology). In general, the expense ratios on ETF's that invest in specific industries or in indexes that include non-U.S. stocks are higher than the expense ratios for ETF's that hold only domestic securities. The expense ratios for most of the large ETF's, however, are substantially below the expense ratios for equity mutual funds, even those for index funds. Data compiled by the Investment Company Institute (pers. comm.) suggest that, in 1998, the asset-weighted average expense ratio for domestic equity index funds was 24 basis points (0.24 percent) per year.

II. Comparing Returns on ETF's and Index Funds

To illustrate the differences in the before-tax and the after-tax returns on ETF's and traditional equity mutual funds, consider a taxable investor who faces a tax rate of τ_d on dividend income and τ_{cg} on realized long-term capital gains. Assume that all realized gains are long term. For investors who do not liquidate their holdings, the pretax return (R) on both ETFs and mutual funds consists of three components: $R = d + g + u$. In this expression, d denotes dividend income, g denotes realized capital gains distributed by the ETF or the fund, and u denotes unrealized capital gains. All three of these return components are measured as percentages of the beginning-of-period value of the fund or the ETF. For the fund this would be measured using NAV, while for the ETF, the initial value could be measured using either NAV or the market price of ETF shares.

Table 3 presents information on the return to holding an S&P 500 portfolio by holding the SPDR exchange-traded fund and by holding the retail Vanguard Index 500 fund. The table also shows the returns on the index itself. We consider the retail version of the Vanguard index fund, which has higher expenses than the institutional fund for clients with large portfolios.

We calculate returns on the SPDR trust in two ways. The first measures annual undistributed capital gains as the difference between the net asset value of the SPDR trust at the beginning and at the end of the year. The second measures undistributed capital gains as the difference between the closing prices for the shares in the SPDR trust over the same period. The NAV and closing price can differ for the ETF.

TABLE 3—CALENDAR-YEAR RETURNS ON THE VANGUARD S&P 500 INDEX FUNDS, ETF'S, AND THE S&P 500 INDEX

Year	Total return	Dividend yield[b]	Distributed capital gains[b]
Exchange-Traded Fund (SPY):[a]			
1994	1.16 (0.67)	2.64	0.00
1995	37.22 (38.10)	2.85	0.02
1996	22.70 (22.54)	2.26	0.20
1997	33.06 (33.48)	1.87	0.00
1998	28.35 (28.69)	1.46	0.00
1999	20.86 (20.39)	1.17	0.00
2000	−9.15 (−9.73)	1.03	0.00
Average:	19.17 (19.16)	1.90	0.00
Vanguard Index 500 Fund:			
1994	1.18	2.67	0.46
1995	37.45	2.84	0.30
1996	22.88	2.22	0.43
1997	33.19	1.90	0.85
1998	28.62	1.48	0.47
1999	21.07	1.24	0.87
2000	−9.06	0.96	0.00
Average:	19.33	1.90	0.48
S&P 500 Index:			
1994	1.32	2.83	−1.54[c]
1995	37.58	3.00	34.11[c]
1996	22.96	2.42	20.26[c]
1997	33.36	2.09	31.01[c]
1998	28.58	1.67	26.67[c]
1999	21.04	1.36	19.53[c]
2000	−9.10	1.11	−10.14[c]
Average:	19.39	2.07	17.13[c]

Sources: Data underlying calculations for the SPDR return at NAV and for the S&P 500 Index are drawn from the *S&P Monthly Review.* SPDR closing-price returns are computed from CRSP data. Data on the Vanguard Index 500 fund were collected from various fund reports to shareholders.

[a] For SPY, total returns are calculated in two ways. The first return entry for each year calculates undistributed capital gains as the difference between the SPY's net assset value at the beginning and end of the year. The second return entry, shown in parentheses, calculates undistributed capital gains as the difference between the SPY's closing price at the beginning and end of the year.

[b] Reported as percentages of beginning-of-year price.

[c] Capital gains on the S&P 500 Index are total (not distributed) capital gains.

Table 3 shows that, on average, the total pretax return for a SPDR trust investor was 16 or 17 basis points, depending on our measure of undistributed capital gains, below the return on the Vanguard Index 500. This fund in turn had an average return that was 6 basis points lower than the return on the S&P 500 Index. The return differential between the index fund and the index is *smaller* than the index fund's expense ratio. This indicates that the Vanguard Index 500 fund outperformed the index during our sample period. The superior performance of the index fund may be due to various trading strategies with positive average returns, such as purchasing shares in companies that are being added to the S&P 500 when their addition is announced, rather than when the addition actually takes place.

The 22- or 23-basis-point shortfall between the average return on the SPDR trust and the return on the S&P 500 Index is explained by two primary factors. First, the expense ratio for the SPDR exchange-traded fund averaged 17 basis points over the seven-year period we consider. Second, when an ETF receives dividend payments, they are held in a non-interest-bearing cash account until the end of each quarter, at which point they are distributed to investors. Elton et al. (2002) observe that, in a rising market like that experienced during much of our sample period, the delay in reinvesting dividends will cause the return on the ETF to fall below that on the market index or on index funds that reinvest dividends immediately.

The calculations in Table 3 suggest that the average return on the SPDR trust has been close to the average return on the S&P 500 index, and that it has been within 20 basis points of the average pretax return on the lowest-cost retail index fund. The average ETF return would be closer to the average return on all index funds, since other retail index funds have higher expense ratios than the Vanguard Index 500. The disparity between the ETF return and the index-fund return would be larger if we considered an institutional index fund, such as Vanguard Admiral S&P 500 Index, which charges an expense ratio of 12 rather than 18 basis points.

Table 3 shows that, while the average return on the SPDR trust tracks the average S&P 500 return, there are nontrivial year-to-year differences. The difference between the closing price and the NAV on ETF's can generate differences between the ETF return calculated using closing prices and the return on the index fund or the S&P 500 index. In 1999, for example, there was nearly a 60-basis-point difference between the ETF return calculated using closing prices and that calculated using the net asset value at the beginning and end of the year.

TABLE 4—AFTER-TAX RETURNS FOR TAXABLE INVESTORS IN SPY AND VANGUARD INDEX 500, 1994–2000

	Percentage return		
Return measure	SPY (ETF)	Vanguard Index 500	Difference
Before-tax	17.982	18.197	0.215
After-tax with 39.6-percent ordinary-income tax rate	14.993	15.165	0.172
After-tax with 28-percent ordinary-income tax rate	15.227	15.406	0.179

III. Taxes and Transactions Costs

The current-year after-tax return for a buy-and-hold investor in either an ETF or an index fund is $R_{at} = (1 - \tau_d)d + (1 - \tau_{cg})g + u$. Daniel Bergstresser and Poterba (2002) note that unrealized gains in fact face a tax burden that in present discounted value is some fraction of the current statutory tax rate. Assuming a zero tax rate on undistributed gains probably overstates the effective after-tax return differences between the SPDR trust and the Vanguard Index 500.

The average capital-gain distribution on the SPDR trust, as a percentage of the beginning-of-year trust value, was 3 basis points per year over the 1993–2000 period. For the Vanguard Index 500 fund, the average capital gain distribution was 48 basis points. For a taxable investor facing a 20-percent marginal tax rate on realized capital gains, the after-tax return on the index fund would be reduced, relative to that on the SPDR, by roughly 9 basis points.

Table 4 shows the before-tax and the after-tax geometric mean return on both the SPDR and the Vanguard Index 500 fund over the 1994–2000 period. Before tax, the return on the Vanguard Index 500 is 21.5 basis points higher than the return on the ETF. This value is

different from the value in Table 3, which focuses on the arithmetic mean return. For an investor facing an income tax rate of 39.6 percent on dividend income, and 20 percent on long-term capital-gain realizations, the after-tax return on the Vanguard Index 500 is 17.2 basis points higher than that on the SPDR trust. If the investor faces a lower marginal tax rate, 28 percent on ordinary income, then the return differential is 17.9 basis points in favor of the Vanguard Index 500 fund. These modest differences suggest that the higher tax burden associated with the greater capital-gain distributions on the Index 500 fund, relative to the SPDR ETF, do not reduce the after-tax return by enough to outweigh the pretax return advantage of the index fund. The capital-gain distributions of the Vanguard Index 500 fund are very low by comparison to other equity mutual funds, and even by comparison to other index funds. If we compared the SPDR with other index funds, the after-tax return benefits of low capital-gain distributions would be magnified.

The calculations in Table 4 do not include all of the potential costs that an investor might face in purchasing an exchange-traded fund. Investors must pay commission charges to a broker when they buy or sell ETF's. In addition, the bid–ask spread on ETF's raises the round-trip transaction cost. For the 1994–2000 period, the average difference between the bid and ask prices for the SPDR trust, as a percentage of the midpoint of the price range for each day, was 0.096 percent (9.6 basis points). This spread would essentially represent a one-time charge associated with trading in ETF's. Commission charges should be viewed in the same way: a one-time cost that reduces the return on the ETF investment.

We have not tried to calculate the effect of these transaction costs on the internal rate of return on the SPDR trust relative to that on the Vanguard Index 500. If an investor were holding the SPDR trust for only a single year, then the return would be reduced by the average bid–ask spread, or by another 9.6 basis points. Commission costs would further reduce the return, but the magnitude of this effect would depend on the size of the ETF purchase. Over longer holding periods, the transaction cost associated with the bid–ask spread has a more muted effect on the internal rate of return.

IV. In-Kind Redemptions and After-Tax Returns

The SPDR trust has distributed fewer capital gains than the Vanguard Index 500 over our sample period. The difference in capital-gain realization rates between ETF's and equity mutual funds has more generally been a key component of the marketing claim that ETF's are "tax efficient" relative to mutual funds. The experience of the SPDR trust is not representative of all ETF's; many ETF's have distributed capital gains in recent years. However, the way ETF shares are created and redeemed provides ETF's with a means to lower their capital-gain realizations relative to some traditional equity mutual funds.

When arbitrageurs redeem ETF shares from the trust, the trustee has the option of distributing the underlying securities that comprise the index, rather than cash, to the arbitraguer. This is known as "redemption in kind," and it is a strategy that is available to all investment companies operating under the terms of the Investment Company Act of 1940. Traditional equity mutual funds can also utilize redemption in kind, although they have historically used this option relatively infrequently. The greater use of this strategy by the ETF's reflects in part their greater frequency of large trades, as arbitrageurs create and redeem trust shares.

Redemption in kind offers the trustee the opportunity to reduce the value of unrealized capital gains held within the ETF trust. When the trustee distributes securities, he can choose to distribute securities with substantial embedded capital gains. When an arbitrageur redeems $100,000 of ETF shares for $100,500 of underlying stock, the capital gain for the arbitrageur is $500. This is true even if the ETF distributes a basket of securities with a current market value of $100,500, but a basis to the ETF of $50,000. When the ETF distributes these securities with a basis below the market price, however, it eliminates the potential capital-gains tax liability that ETF investors might face if these shares were sold by the trustee. Thus, redemption in kind provides a way around the problem of embedded capital gains in open-end equity mutual funds. By distributing low-basis stock, the ETF reduces the likelihood that it will at some point need to sell low-basis stock and

then distribute realized capital gains to its investors.

Redemption in kind is a powerful means of reducing embedded capital gains. As of 30 September 2000, for example, the SPDR trust held net assets of $24.29 billion, capital loss carryforwards of $0.52 billion, and unrealized capital losses of $1.06 billion. Despite the fact that the trust grew through a period of substantial market appreciation, it apparently succeeded in distributing its low-basis securities and in retaining higher-basis holdings.

Redemption in kind is not the only factor leading to differences in capital-gain realizations between the SPDR trust and the Vanguard Index 500. Because the SPDR trust was created in 1993, while the Vanguard Index 500 began trading in the 1970's, the distribution of purchase bases for the securities in the SPDR trust is different from that in the Vanguard fund. Such historical differences can lead to differences in realized gains and after-tax returns.

V. Further Issues

In future work, we hope to explore many issues associated with exchange-traded funds. We hope to move beyond our analysis of the SPDR trust to consider the performance of other exchange-traded funds. In October 2001, there were 96 exchange-traded funds, compared with 79 one year earlier. Many of the new funds have specific investment objectives, such as holding stocks in a given sector or nation, and they also have substantially higher expense ratios than the SPDR trust. The mutual funds that these ETF's compete with are also likely to have substantially higher expenses than the Vanguard Index 500 fund.

We also hope to study the attraction of ETF's and traditional open-end equity mutual funds for taxable investors with assets in both a taxable and a tax-deferred account. The low rate of taxable distributions on ETF's, and their liquidity, may make them more attractive for equity investments outside tax-deferred accounts than for investments in IRAs or 401(k) accounts. The attributes of traditional equity mutual funds may make them more attractive for retirement-account investors.

Finally, we plan to consider how ETF's feature in the expanding mix of products offered by the mutual-fund industry. ETF's may be part of an emerging trend toward segmentation of the mutual-fund marketplace, with investors who wish to trade frequently segregated into different products than low-turnover investors. The former group may eventually hold funds with substantial expense ratios that cover the account management fees associated with high-turnover investors, while low-turnover, or high-account-value, investors may be able to invest through funds with much lower costs. ETF's may attract investors who value the ability to trade frequently, thus reducing the turnover rate for the investors who continue to invest in traditional open-end equity funds.

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