

# The Benchmark Index ETF Performance Problem

*A simple solution.*

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Performance comparisons of conventional indexed mutual funds and indexed exchange-traded funds or ETFs are problematical. Most comparisons have focused on the tax-efficiency of the ETF structure, while ignoring the apparently higher operating efficiency of conventional index funds.

Our purpose is to help investors understand why the pre-tax performance of benchmark index ETFs has generally lagged the performance of large conventional mutual funds that use the same index.

## THE PERFORMANCE PROBLEM

Conventional indexed mutual funds and benchmark index ETFs are competing products. They are excellent substitutes for one another for many purposes. Largely at the initiative of ETF proponents, most comparisons have focused on expense ratios and on the relatively greater tax-efficiency of the ETFs. Conventional fund proponents have countered with arguments that the expense and tax differences are not really material, and that the decline in the stock market since early 2000 has largely eliminated any capital gains overhang in most funds.

To put this latter point in perspective, the Investment Company Institute estimates that \$99 billion in capital gains distributions went to taxable mutual fund accounts in the year 2000. These distributions declined to \$5 billion for 2002. Vanguard's S&P 500 Index Fund had modest embedded capital losses at the end of 2002 (*see Exhibit 1*).

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## EXHIBIT 1

### Embedded Capital Gains and Losses in the Vanguard 500 Index Fund

	<u>12/31/02</u>	<u>Percent of Net Assets</u>
<b>Net Assets</b>	\$68,145,498	100%
<b>Net Unrealized Gains (Losses)</b>	\$2,420,867	3.6%
<b>Net Realized Gains (Losses)</b>	(\$4,292,867)	(6.3%)
<b>S&amp;P 500 Close on 12/31/02</b>	879.82	

Source: Vanguard.

The extent of the decline in stock prices since early in 2000 means it may take a few years before the capital gains distribution issue is widely discussed again—but investors cannot dismiss the issue of tax-efficiency, because it is of great long-term importance.

In the near term, however, investors should be looking carefully at the relative pre-tax performance of conventional index funds and index ETFs. The significance of this comparison is highlighted in Mazzilli and Kittsley [2003].<sup>1</sup> They correctly point out that tracking error for most ETFs has been modest and, while generally negative, the average negative tracking error has been lower than most funds' expense ratios. Their research demonstrates that the typical index ETF has improved very slightly on the performance of its benchmark index, making modest inroads into the fund's expense ratio. Since index ETF expense ratios are generally as low as or lower than conventional mutual fund expense ratios, the implicit conclusion is that the funds are performing well.

While the conclusion that ETF performance is good is justified for some of the ETFs based on less widely used indexes, it is decidedly not justified for ETFs based on some of the most popular benchmark indexes—the Russell 2000 index for small-cap stocks and Standard & Poor's 500 index for large-cap stocks. As we will see, for these two popular indexes, ETFs have underperformed their most comparable conventional mutual fund competitors.

We think we understand the reason behind relative performance weakness in the popular benchmark index ETFs. Somewhat paradoxically, it appears to be due partly to a lack of aggressiveness on the part of ETF fund managers. Simple determination by ETF managers not to let this underperformance continue could largely solve the problem, but a modest structural change to make the index ETF portfolio management process more comparable to the process used by the best conventional index

mutual funds will make improved performance routine for all but the most timid ETF index fund managers.

## MAGNITUDE OF THE PROBLEM

For reasons partly spelled out in Sauter [2002, 2003], Vanguard has changed the benchmark indexes for most of its domestic equity index funds. A case in point is the Vanguard SmallCap Index Fund, which has recently abandoned the Russell 2000 for a new index, the MSCI® US SmallCap 1750 Index.

Exhibit 2 compares the performance of the Vanguard SmallCap Index Fund, the iShares Russell 2000 Fund, and the Russell 2000 index itself for the years 2001 and 2002. There are several reasons to look behind this exhibit and behind Vanguard's decision to change indexes. The results have implications for index and fund performance.

For the ten years ending in 2001, the Vanguard SmallCap Index Fund beat its Russell 2000 benchmark index by an average of 76 basis points or 0.76% per year. As Exhibit 2 shows, the Vanguard SmallCap Index Fund outperformance in 2001 and 2002 was slightly below this long-term average, with fund outperformance of the index at 61 bp (0.61%) and 46 bp (0.46%) in the two years, respectively (all comparisons pre-tax). The other significant data in Exhibit 2 show that the iShares Russell 2000 ETF (which uses the same Russell 2000 benchmark index that the Vanguard small-cap fund used as its portfolio template before 2003) *underperformed* the benchmark in its first two full calendar years of operation.

We have noted elsewhere that there are substantial transaction costs embedded in benchmark indexes that result from publication of scheduled index changes before the funds are able to transact; increasing activity and price movement in stocks added to or removed from the benchmark indexes; and embedding high transaction costs in the index performance itself (see Gastineau [2002]). We estimate that the embedded index change transaction costs in the Russell 2000 have averaged about 200–300 bp annually.

The outperformance that Vanguard achieved came largely from recapturing part of these embedded transaction costs. It did this by making annual reconstitution transactions at a time other than the market close on the last trading day of June when Russell index rebalancing is formally implemented.

In an explanation of the change to the new MSCI 1750 Index, Sauter [2003] specifically disavows any claim that the MSCI indexes will have higher returns. He does

## EXHIBIT 2

### Fund Performance and Tracking Error for Two Russell 2000 Funds

	2001		2002	
	Performance	Tracking Error	Performance	Tracking Error
Vanguard Small Cap Investor Shares	+3.10%	+0.61%	-20.02%	+0.46%
Russell 2000 Index	+2.49%	—	-20.48%	—
iShares Russell 2000 ETF	+1.96%	<u>-0.53%</u>	-20.52%	<u>-0.04%</u>
<b>Vanguard Outperformance of iShares</b>		<u>+1.14%</u>		<u>+0.50%</u>

Source: Fund reports.

note, however, that as a result of certain features of the MSCI index construction, “funds tracking such an index should lose a slightly smaller portion of their gross returns to taxes and transaction costs” (p. 2).

While the fund’s benchmark index has changed, we would expect Vanguard and various fund analysts to continue to compare the performance of the Vanguard SmallCap Index Fund to the Russell 2000 index as well as to its new benchmark. Analysts will compare the performance of the two indexes and the performance of the iShares Russell 2000 ETF to both its own template/benchmark and the new MSCI index. They will also compare the performance of the Vanguard and several iShares small-cap funds, which, after all, cover comparable stock universes.

We would expect the new MSCI SmallCap Index to outperform the Russell 2000 index approximately two years out of three because of lower embedded transaction costs. Even if the new MSCI index becomes as popular as the Russell 2000, it should have somewhat lower embedded transaction costs because it is designed to reduce such transaction costs. Consequently, the Vanguard portfolio manager responsible for the SmallCap Index Fund will probably find it harder to outperform the MSCI index but, on average, easier to beat the Russell 2000 index.<sup>1</sup>

(We suggest a partial rehabilitation plan for the iShares Russell 2000 ETF later when we discuss a change in ETF operating procedures.)

Exhibit 3 compares the pre-tax performance of the S&P 500 SPDR with the Vanguard 500 Index Fund and the S&P 500 index return year by year from 1994, the first full year of SPDR operations, through year-end 2002. While the difference is far less dramatic than the Russell 2000 comparison in Exhibit 2, once again the conventional fund has outperformed the ETF. Interestingly enough, although it is not illustrated in this exhibit, the greater tax-efficiency of the ETF has led to smaller capital gains distributions. Nonetheless, under reasonable tax rate assumptions, the cumulative after-tax return for the Vanguard fund would still be slightly better than the after-tax return on the SPDRs.

### WHAT IS GOING ON HERE?

In fairness to ETF portfolio managers, we believe a structural weakness in current ETFs is part of the explanation of why these two ETFs have underperformed comparable Vanguard funds tracking the same indexes. A simple change in portfolio management policy will permit the ETFs to perform in line with conventional funds using the same index on a pre-tax basis and presumably outperform them on an after-tax basis in the long term.

A modest structural change in ETF operating policy will let ETF portfolio managers operate like conventional index fund managers who time their trades to recapture some of the transaction costs embedded in the benchmark index modification process. The structural

## EXHIBIT 3

### Annual Pre-Tax Returns on S&P 500

Fund:	SPDRs	iShares 500	Vanguard 500	S&P 500 Index
Symbol:	SPY	IVV	VFINX	SPX
Year				
1994	0.47%		1.22%	<b>1.32%</b>
1995	<b>38.03</b>		37.42	37.52
1996	22.56		22.88	<b>22.95</b>
1997	<b>33.50</b>		32.87	33.35
1998	29.10		<b>29.61</b>	28.57
1999	20.39		<b>21.04</b>	<b>21.04</b>
2000	-9.73		<b>-9.06</b>	-9.10
2001	-11.98	-11.95%	-12.09	<b>-11.88</b>
2002	-21.57	<b>-21.48</b>	-22.15	-22.09
Cumulative Return Compounded Monthly 1994-2002	+119.52%	N/A	+120.69%	<b>+121.88%</b>

Source: Bloomberg.

Bolded return is the best return of the group for that period.

All returns compounded monthly.

problem that the ETF portfolio management process can overcome (but for the most part has not) is somewhat esoteric, and we beg your indulgence as we attempt to explain it in the simplest terms possible.

While this particular structural feature of ETFs tends to discourage aggressive portfolio management, we believe that issuers and advisors to ETFs can overcome a largely psychological obstacle and meet their responsibility to turn in the best performance possible, just as effective managers of conventional index funds do. To level the playing field completely, a modification of the rules under which ETFs operate will eliminate the remaining structural basis for underperformance.

### WHY INDEX ETFs HAVE BEEN UNDERPERFORMING

Everything about ETFs seems to reflect the in-kind fund share creation and redemption process. As most observers of the dramatic growth of exchange-traded funds know, new ETF shares are created and current ETF shares are extinguished through processes called *creation* and *redemption*. As Exhibit 4 illustrates, these are straightforward processes when they are stripped of some minor embellishments.

Each day, every equity benchmark index ETF will

post its creation and redemption baskets with the National Securities Clearing Corporation (NSCC) for publication over electronic market data networks. The creation and redemption baskets are usually identical or nearly identical. They consist of portfolio securities held by the ETF in a very close match to the weights accorded those securities in the index.

While some benchmark index ETFs do not hold all the securities in their index, and some indexes or portfolios need to be modified to assure the fund's tax treatment as a regulated investment company, we assume for simplicity that the creation and redemption baskets are identical and that each basket is a very, very close replication of the components and the weightings called for by the index. Under these circumstances, if an authorized participant (usually the exchange specialist or some other market maker in the fund's shares) needs to create additional ETF shares because of investor demand or needs to redeem current ETF shares because the authorized participant has accumulated an excessive inventory of shares in the ETF, either a creation basket of securities with a cash-balancing amount will be exchanged for shares of the fund, or shares of the fund will be turned in and the authorized participant will receive a basket of securities and a cash-balancing amount.<sup>2</sup>

The back-and-forth exchange of fund shares for

portfolio securities is as straightforward as the arrows in Exhibit 4.

Most ETFs impose a service charge that covers the fund's administrative costs of handling the creation or redemption of as many creation or redemption baskets as an authorized participant may wish to handle on any given day. The fund itself usually incurs no transaction or other variable costs associated with either creations or redemptions, so the shareholders in the fund are insulated from transaction costs associated with an increase or reduction in the size of the fund.

Creation and redemption take place without unusual attention or complication on most days because most indexes change their composition only infrequently. When an index change does occur, however, *the portfolio manager has to decide when and how the fund portfolio will be adjusted to reflect the change in the index.* The portfolio manager's handling of the index change has important implications for fund performance.

We begin by assuming that the index provider announced after the close of the market yesterday that the index would change through: 1) the addition of a new stock; 2) the deletion of the stock of a company acquired by a foreign company not eligible for membership in this benchmark index; and 3) a reweighting of the other stocks in the index because the entering and leaving index components are not the same size. The index changes will be effective as of the close of trading one week from last night.

The easy way for the ETF manager to make this adjustment would be to post new creation/redemption baskets on the morning of the day the index change

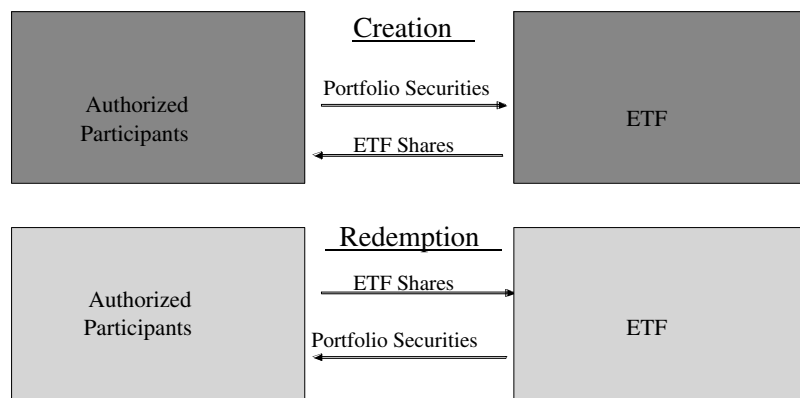
becomes effective. These baskets would reflect what the portfolio will look like *after* all changes necessary in the composition of the portfolio have been implemented. The security added to the index will be part of both the creation and redemption baskets. The security dropped from the portfolio will be removed from both baskets, and all the positions in the baskets will be reflected at their weight *after* adjustments to be made at the market close on that date.

While this description parallels the kind of changes Standard & Poor's makes in its indexes, a similar process affecting many more stocks at one time occurs in connection with the annual rebalancing of the Russell indexes, and in some form reflects the index modification, rebalancing, and reconstitution policies of all index providers. During the trading day when the index changes at the close, the ETF portfolio manager modifies the portfolio that the fund held at the beginning of the day to match the creation/redemption baskets—and the revised index.

There may be some modest transaction expenses associated with bookkeeping entries or trading commissions, but there need be no measurable market impact if market-on-close orders are used. Also, commissions can usually be avoided if a market-on-close order is used.

This process should replicate the index performance very closely, and the ETF should track the index very closely before fund expenses. After fund expenses, the tracking error will be approximately equal to the fund's expense ratio. Because any creations or redemptions taking place on the date the index change occurs will be implemented with baskets that reflect the index change, the only task for the portfolio manager is to mod-

## EXHIBIT 4 Creation and Redemption Simplified



*Everything priced consistent with net asset value each day.*

ify the fund portfolio (as it was carried by the fund on the previous evening and at today's opening) for the changes that will go into effect at today's close. This is more or less what most ETF managers have been doing. It is *not* what aggressive managers of conventional index mutual funds do.

Blume and Edelen [2002] note that, at least through the period ending December 31, 2000, changing an index fund portfolio as soon as possible after an announced index change consistently improved the performance of S&P 500 funds to the extent that the strategy could be considered "almost a case of stochastic dominance" (p. 2). By this they mean that an S&P 500 mutual fund or ETF implementing index changes as soon as possible after the index change announcement would offset or more than offset its operating expenses by saving some of the transaction costs embedded in the index modification process.

Many index fund managers use more sophisticated techniques than trading as soon as possible after the index change announcement. In fact, there is a substantial cottage industry—to the extent anything on Wall Street can be described in such terms—that tries to anticipate upcoming changes in indexes and to help managers time index modification trades to improve the performance of index fund portfolios, often to the point of beating the index after expenses. Such techniques are easy to adopt and are successfully used by conventional index fund managers whose funds sell shares for cash and redeem shares for cash.

An ETF portfolio manager's life can be a little more complicated. The ETF manager posts creation and redemption baskets each day, and authorized participants (APs) have until a few seconds before 4:00 p.m. each day to notify the fund's distributor (which, in turn, will notify the portfolio manager) that an AP will create or redeem that day.

Because inventory management by authorized participants is a more significant motivation for creation and redemption than arbitrage factors, a large ETF will often face both creations and redemptions (from different authorized participants) on the same day. The portfolio manager could modify the posted creation and redemption baskets the morning after the index provider's announcement of the index change and trade immediately, but that policy may commit the fund to a specific index change trade.

Although the historical performance advantages of such a strategy are documented by Blume and Edelen [2002], changing the creation and redemption baskets early suggests to other market participants that the portfolio manager is committed to making index-updating trades

early rather than wait for the official implementation date of the index change or even longer. Changing the basket reveals trading plans, with a probable cost to the fund's shareholders. If the portfolio manager does not modify the posted creation and redemption baskets to reflect the index change and modifies the fund portfolio some time between the announcement date and the record date for the index change, creations and redemptions based on baskets that reflect the old index or the new index but not the actual portfolio could lead to additional trading to get the portfolio to match the index on the effective date.

To understand how early (or delayed) implementation of index changes can cause additional trading, assume the portfolio manager decides to make the changes on the day after the announcement of the index change without changing the creation and redemption baskets. If there were no creations or redemptions on that day, the portfolio would be changed exactly as desired. The next day's creation/redemption baskets would reflect the post-adjustment index structure, and no further adjustment transactions would be necessary.

If, on the other hand, the fund experienced either creation or redemption activity (or both in different amounts), and the entire portfolio had been modified to update it for the upcoming index changes, some combination of too many or too few shares of the stocks being added, dropped, or reweighted would be in the portfolio.

To put this prospect of unbalanced trades into perspective, it is not unusual for 3% to 5% of the assets of a large index ETF and an even greater fraction of the assets of a smaller fund to enter or leave in creations or redemptions on any given day. Creation and/or redemption activity could, then, lead on the next day to modest corrective trading in the stocks affected by the index change to make the portfolio accurately reflect the index.<sup>3</sup>

The evidence is strong that trading *at most times other than the official moment of index adjustment* should improve investors' results with most popular indexes. Many ETF managers are simply reluctant to depart from slavish replication of index changes.

Until now, few of them have been criticized for this passivity. Some of their colleagues who manage conventional benchmark index funds have shown no such reluctance. The greater aggressiveness of conventional managers is almost certainly due in part to the fact that their "creations" and "redemptions" are made for cash, and there is no need to reverse directions on a transaction between the announcement of an index change and its implementation. The more settled regulatory and procedural

status of conventional index funds also provides comfort to the conventional index fund portfolio managers that they will not face much criticism if a particular effort to beat the index misfires.

This description may actually underemphasize the constraints some ETF portfolio managers feel in dealing with the exemptive orders granted by the SEC to permit their firms to issue ETFs. We would note, however, that the exemptive orders and the prospectus language for all the ETFs that we have examined clearly provide for flexibility in the timing of index modification transactions.

## A BETTER LONG-TERM SOLUTION

While there is little justification for not attempting to pick the low-hanging fruit associated with trading away from the official moment of an index change, there is a relatively simple mechanism that can eliminate any need to repurchase or resell securities that the portfolio manager has previously sold or purchased in pursuit of index outperformance. The problem arises only because the ETF portfolio manager does not know what creations or redemptions will happen until the end of the trading day. The problem can be solved simply by requiring authorized participants to commit to creating or redeeming by 2:30 p.m. on any day they wish to create or redeem.

This will give the portfolio manager adequate information as to the number of shares that need to be traded in the portfolio to implement any pending index changes that day. There will be no repurchasing of positions sold prematurely and no subsequent sales of positions acquired as part of the creation baskets that were not dealt with on the day the portfolio manager decided to implement the index change.

Both conventional funds and ETFs are theoretically bound by the provisions of SEC Rule 22c-1, which provides, among other things, that they:

cannot sell, redeem or repurchase [their shares] except at a price based on the current net asset value of [their shares] next computed after receipt of a tender of [their shares] for redemption or of an order to purchase or sell [their shares].

As more mature products, the conventional index funds—Vanguard probably more effectively than most—have erected barriers to late-arriving orders when late orders might disrupt the fund's trading plans for the day.

ETFs must be permitted to protect their shareholders in a similar way.

Unlike most actively managed funds, Vanguard protects its *index fund* shareholders by a process that, in effect, gives Vanguard's portfolio managers the functional equivalent of early notice of money coming into or leaving the funds. It is worth a few lines to explain how a shareholder protection system like Vanguard's might work.

Institutional investors can buy or sell a stock at the market close or *better* for no net commission, as long as the broker has some time to try to execute the trade at a better price than the close. To get its orders in early enough to give brokers the necessary time to work them before the close, Vanguard relies on a number of policies to thwart efforts to make last-minute transactions in its equity index funds.

For example, it will not accept an interfund transfer instruction after 2:30 p.m. on any trading day. While Vanguard theoretically accepts wire purchase instructions until 4:00 p.m., it reserves the right to refuse wire orders that might disrupt fund operations. And while Vanguard nominally accepts mail orders until the market close, there is obviously a fair amount of flexibility as to when it stops opening the mail.<sup>4</sup>

ETFs have not yet succeeded in obtaining protection for their ongoing shareholders from this effect of Rule 22c-1 by requiring earlier notice so that they know what creation or redemption baskets they will face on a given day in time to adjust their trading plans accordingly. Meanwhile, the provisions that Vanguard and other index funds have built into their prospectuses provide effective insulation from the disruptive effect of late-arriving orders, and these conventional index funds do not face material impediments to aggressive efforts to improve upon the index return at low risk.

When ETFs achieve the same shareholder protection, there will be no excuse for ETF performance that does not match conventional index fund performance on the new level playing field.

## ENDNOTES

<sup>1</sup>Through the middle of 2003, the iShares Russell 2000 Fund had maintained close tracking of its benchmark (before expenses), and the Vanguard SmallCap Index Fund absorbed the transaction costs of switching to its new benchmark.

<sup>2</sup>The cash-balancing amount can be negative, i.e., cash can be received by a creator or paid by a redeemer, but that is unimportant for this discussion.

<sup>3</sup>The cost of these adjustments should not be a deterrent. We estimate the cost of reversing such trades at under 5 basis points per year in most index ETFs. The basis for this estimate is available from the author.

<sup>4</sup>Mail orders to buy or sell fund shares go to post office boxes, so it is actually a matter of picking up the mail.

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