

NBER WORKING PAPER SERIES

TAX EXTERNALITIES OF EQUITY MUTUAL FUNDS

Joel M. Dickson
John B. Shoven
Clemens Sialm

Working Paper 7669
<http://www.nber.org/papers/w7669>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2000

The views expressed herein are those of the authors and are not necessarily those of the National Bureau of Economic Research.

© 2000 by Joel M. Dickson, John B. Shoven and Clemens Sialm. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Tax Externalities of Equity Mutual Funds
Joel M. Dickson, John B. Shoven, and Clemens Sialm
NBER Working Paper No. 7669
April 2000
JEL No. G23, H23

ABSTRACT

Investors holding mutual funds in taxable accounts face a classic externality. The after-tax return of their investment depends on the behavior of others. In particular, redemptions may force the mutual fund to sell some of its equity positions in order to pay off the liquidating investors. As a result, it may be forced to distribute taxable capital gains to its shareholders. On the other hand, new investors convey a positive externality upon existing investors by diluting the unrealized capital gain position of the fund. This paper's simulations show that these externalities are important determinants of the after-tax performance of equity mutual funds.

John B. Shoven
NBER
30 Alta Road
Stanford, CA 94305
Phone: 650-326-7160
Fax: 650-328-4163
shoven@leland.stanford.edu

Joel Dickson
The Vanguard Group
PO Box 2600
Valley Forge, PA 19482

Clemens Sialm
Stanford University
Dept of Economics
Stanford, Ca 94305-6072

Introduction

Mutual funds have played an increasingly important role in meeting the financial goals of U.S. investors over the last several decades. As shown in Table 1, the growth of equity mutual fund assets has been remarkable. According to the Investment Company Institute (ICI)—the mutual fund trade association—total assets of equity mutual funds have increased from \$40 billion at year-end 1980 to \$2,503 billion at year-end 1998¹, representing a compound annual growth rate of 25.8% over the period. Overall, the mutual fund industry has benefited from a broader shift away from households investing directly in equities to indirect ownership of equities. This trend is documented in detail by Poterba and Samwick (1995).

Table 1 Equity Mutual Fund Assets

Year	Equity Mutual Fund Assets (\$ billions)		
	Total	Held Outside Employer Plans, IRAs	% Outside Employer Plans and IRAs
1980	\$ 40.0	\$ 33.9	84.8%
1985	\$ 113.5	\$ 77.3	68.1%
1990	\$ 228.3	\$ 131.0	57.4%
1995	\$ 1,080.7	\$ 575.0	53.2%
1998	\$ 2,503.3	\$ 1,339.5	53.5%

Source: ICI calculations

The mutual fund industry benefited greatly from the introduction and growth of new retirement accumulation vehicles (e.g., 401(k) plans, Individual Retirement Accounts). However, a majority of mutual fund assets are still held outside tax-qualified vehicles. A lot of attention has recently been devoted to the tax efficiency of mutual fund investments. Dickson and Shoven (1994, 1995) argue that mutual funds have not generally considered the tax implication of their trading activity and suggest ways in which portfolio managers could improve after-tax returns for their

shareholders. More recently, Bergstresser and Poterba (1999) consider how different portfolio characteristics affect after-tax returns and mutual fund cash flows. The topic of mutual fund tax efficiency has also received attention from legislators, as evidenced by the introduction of H.R. 1089 (“The Mutual Fund Tax Awareness Act of 1999”), which would direct the Securities and Exchange Commission to improve disclosure of after-tax returns for mutual funds.

While a lot of research has focused on the persistence of mutual fund performance (see, for example Carhart (1997)), there has been somewhat less discussion about the mutual fund structure as an investment vehicle. This paper considers how the tax situation of investors is affected by the mutual fund structure through the actions of other shareholders. We also discuss choices made by the mutual fund managers that can affect—positively or negatively—the after-tax returns realized by their shareholders. The difference between the after-tax performance of mutual funds and directly held investments center mainly on how mutual fund cash flows can impact returns over time.

Although mutual funds were established as pass-through vehicles, there are tax differences between funds and individually managed accounts. In particular, there are three significant differences that could impact the relative attractiveness of a mutual fund investment. First, Subchapter M of the Internal Revenue Code—originally enacted in 1936 to provide for the tax treatment of pass-through entities, including mutual funds—does not include a provision to pass-through the character of short-term capital gains for tax purposes.² Thus, while mutual funds report short-term capital gain distributions to their shareholders, these distributions are treated as ordinary income dividends and not as short-term capital gains.³ This difference matters only if a

taxpayer has realized losses that would not otherwise be offset by gains. In other words, the tax liability of a mutual fund shareholder could be greater if short-term losses were offset by long-term gains that could otherwise have been offset by short-term gains from the mutual fund.

Second, mutual funds can not distribute net realized losses. Instead, funds can use loss carry-forwards for up to eight years following the year of the loss. The net effect of this treatment is to accelerate the tax liability of mutual fund shareholders versus individually managed accounts, where net losses can be declared in the year they occur and used to offset other gains or up to \$3,000 of taxable income.⁴

These two negatives are offset by a significant benefit for mutual fund shareholders: the pass-through of the fund's expenses. Mutual funds distribute net investment income to shareholders, which is income received by the fund less charged expenses. Take for example, a mutual fund whose underlying portfolio of securities generates a 2 percent gross dividend yield. If the fund's expense ratio—e.g., investment advisory, custody, distribution, shareholder servicing expenses—is 1 percent, then the net income distribution to shareholders would be 1 percent. If the expense ratio were 0.5 percent, then the dividend would be 1.5 percent. Effectively, fund expenses are fully deductible for all taxpayers because they lower the taxable income received by shareholders. Generally, investment fees assessed in a non-registered investment vehicle (e.g., individually managed and trust accounts) are an itemized deduction that can be used only to the extent they exceed 2 percent of adjusted gross income.

Mutual fund shareholders are taxed through two different mechanisms. Each year, a fund passes-through its income and capital gains realizations in the form of distributions made to the fund's

shareholders. These distributions result from the actions of the portfolio manager and affect all shareholders in the fund because each shareholder receives their pro-rata share of the distribution (as of the distribution's record date). Although the portfolio manager's trading activity leads to the fund's distributions, the trading activity could have been initiated by the portfolio manager or imposed on the portfolio manager as a result of shareholder activity (net cash flow). It is this latter case that distinguishes the mutual fund or other commingled vehicles from "separate" accounts.⁵ As such, a mutual fund investment is subject to a classic externality because the actions of other existing and potential investors can affect the taxable distributions to all shareholders.

This paper explores the positive and negative externalities resulting from mutual fund cash flows and how these externalities can be affected by the management and accounting practices of the fund. Mutual fund redemptions are generally viewed as a negative relative to an individually managed account because redemptions can force capital gains to be realized and distributed to shareholders, accelerating their tax liability. Another argument is that negative cash flows can make otherwise tax-efficient funds unstable (Warther 1996). An implicit assumption in these arguments is that mutual funds use average cost accounting.⁶ In fact, mutual funds have significant flexibility in choosing how they account for security sales, and we will show how the choice of accounting technique can either exacerbate or reduce the magnitude of the mutual fund tax externality.

We also consider the other side of the cash flow argument; namely, that positive cash flows benefit mutual fund shareholders versus an investment vehicle with no ongoing cash flow (i.e., a

separate account).⁷ The positive externality associated with mutual fund cash flows has not been generally discussed and can represent a significant benefit to investors in mutual funds. Such cash flow dilutes the unrealized capital gains position of the fund and generally makes tax-sensitive accounting techniques more powerful in reducing the overall tax burden of the investment. We will also show that these benefits can increase over time relative to a portfolio without cash flows.

In addition to the tax imposed on mutual fund distributions, mutual fund shareholders also may face an additional tax liability upon the sale of such assets to the extent the market value upon sale is greater or less than their accumulated cost basis (which is the sum of the value of all purchases, including reinvested distributions). Obviously, these two forms of shareholder taxation are not mutually exclusive and represent a difference in the timing of tax payments. Postponing the realization of capital gains decreases the present value of the tax liability and allows individuals to take advantage of the lower long-run capital gains tax rates. Timing differences (i.e., the deferral or acceleration of tax liabilities) resulting from different mutual fund characteristics is an important focus of our analysis.

The rest of the paper is organized around investigating the externalities associated with mutual fund investments. The next section briefly describes the positive and negative externalities associated with mutual fund management and how management practices can affect these relationships. The third section is the bulk of the paper and presents a simulation methodology that allows us to investigate the magnitude of the externalities. This section looks at how certain tax-management techniques can affect after-tax returns in both a separate account and a mutual

fund environment. In addition, we consider the effects of accounting techniques and “closing” funds on the after-tax returns for shareholders. The final section presents a brief conclusion and issues for policymakers to consider in helping investors understand alternative investment vehicles.

Mutual Fund Tax Externality

The differences between mutual funds and separately managed accounts and the effect of tax externalities can be illustrated with a simple example. Assume that a mutual fund currently has three taxable shareholders whose initial purchases were completed at different times and were used to buy the same equity security (XYZ Company).¹⁰ There are no other transactions in the fund. Table 2 gives the investment position of the fund and each of its shareholders:

Table 2 Illustration of Tax-Externality

Time	Shareholder Action	Fund Action	Total Fund Position
1	Investor A purchases \$100 of fund shares	Fund buys \$100 of XYZ stock at \$100/share	1 share of XYZ stock; Market value = \$100; Cost basis = \$100
2	Investor B purchases \$125 of fund shares	Fund buys \$125 of XYZ stock at \$125/share	2 shares of XYZ stock; Market value = \$250; Cost basis = \$225
3	Investor C purchases \$150 of fund shares	Fund buys \$150 of XYZ stock at \$150/share	3 shares of XYZ stock; Market value = \$450; Cost basis = \$375

Now assume that investor A redeems her entire investment in the next period, with XYZ stock trading at \$140 per share. If another shareholder invests at the same time, then investor A can be paid with the cash received from the new shareholders without requiring any securities transactions at the fund level. However, if the redemption is the only shareholder transaction, then the fund must sell some of its holdings to raise the cash to pay the redeeming shareholder. However, the gain or loss realized (and then distributed to the remaining shareholders) would depend on the accounting treatment used. For example, selling the XYZ shares purchased with investor A's initial investment—which would also correspond to FIFO accounting—would result in a \$40 gain that must be distributed to the remaining shareholders.¹¹ However, the existence of other shareholders has presented a way to mitigate this potential externality. In particular, if the fund sells the shares purchased at \$150 that resulted from investor C's investment, then the fund would realize a \$10 loss that would result in no current taxable capital gain distribution to the remaining shareholders and could be used to offset future capital gain realizations. It is important to stress that these differences affect the timing of the remaining shareholders' tax liabilities as opposed to the elimination of any tax liability. When investors B and C ultimately sell their shares, they will owe taxes based on the capital gains realized upon redemption.¹² No matter which tax treatment is used by the fund, investor A still pays tax based on the difference between the market value of the redemption (\$140) and her cost basis (\$100).

Construction of Mutual Funds

More generally, consider a portfolio of (equity) securities. Its market value (MV) and cost basis (CB) can be represented by the following relationships:

$$MV_t = \sum_{i=1}^n p_{it} S_{it} = \sum_{i=1}^n p_{it} \sum_{j=1}^t s_{ij} \quad (1)$$

$$CB_t = \sum_{i=1}^n \sum_{j=1}^t p_{ij} s_{ij} \quad (2)$$

where p_{ij} is the price of security i at time j , and S_{it} is the total number of shares of security i held at time t . S_{it} equals the sum of the holdings of the shares s_{ij} , which were initially purchased at time j . (Note the relationships are a portfolio snapshot at time t . Net security positions, s_{ij} , may differ at times t and $t+1$ to the extent there are sales or purchases of the fund's securities.) Also, the difference between the portfolio's value and its cost basis—or the net unrealized gain (UG)—is:

$$UG_t = \sum_{i=1}^n \sum_{j=1}^t (p_{it} - p_{ij}) s_{ij} \quad (3)$$

The net unrealized gain of the portfolio is a combination of positions at a loss and those at a gain (both across securities and within an individual security's tax lots). It is important to recognize that the amount of gain or loss recognized from a partial sale of the portfolio's assets can not be determined without further assumptions. Instead, the UG_t relationship represents the net amount of gain or loss recognized if the portfolio were to be completely liquidated at time t .

Equation (3) demonstrates that the dispersion in unrealized gain liabilities and, hence, in capital gain realizations is an important determinate in the ability to control the capital gain realizations

through accounting procedures. In particular, the larger the standard deviation of $(p_{it} - p_{ij})$ conditional on $s_{ij} > 0$, the more ability the manager has to minimize or maximize tax realizations. In this context, a separate account with minimal cash flow will have very little ability to control gain realizations. On the other hand, a mutual fund with positive cash flow over time and that tends to buy small amounts of each security at different points in time will tend to have much more flexibility.

The fund has four sources of cash flows. First, the stocks held in the mutual fund pay dividends d_t at time t . Second, the fund pays expenses of x_t to its fund managers. Third, the fund is required to distribute annually the received dividends net of expenses and the realized capital gains to its shareholders, if they are positive. Realized capital losses are carried forward and subtracted from future realized capital gains. The total fund distributions are denoted by fd_t . The investors in the fund must pay taxes on those distributions. Dividends and short-term capital gains (i.e., gains of assets held for one year or less) are taxed at the marginal income tax rate on ordinary income and long-term capital gains (i.e., gains of assets held for more than one year) are taxed at the lower capital gains tax rate. Fourth, investors buy or redeem shares of the mutual fund. Those exogenous cash flows are denoted by c_t . Additional flows result from the re-investments of distributions by the fund's shareholders. The proportion α of the dividend distributions and the proportion β of the capital gains distributions are automatically re-invested. Total cash flows must be absorbed by net asset sales. The total cash flows at time t are given by:

$$cf_t = d_t - x_t - (fd_t^D + fd_t^{SCG} + fd_t^{LCG}) + (c_t + \alpha fd_t^D + \beta (fd_t^{SCG} + fd_t^{LCG})) \quad (4)$$

The rest of the paper investigates how portfolio management decisions, accounting procedures, and shareholder cash flow can affect the recognition of capital gains or losses in the fund.

No Cash Flows

A separate account of directly held securities may have little or no ongoing cash flows after the initial investment in the portfolio. Although dividends—to the extent they are reinvested—may provide some positive cash flow, the new positions resulting from reinvested dividends would likely be relatively small compared with the initial investments. These portfolios would not be subject to the tax externality described in the introduction because the account owners decide when to sell the assets, and the associated tax liability does not depend on the activity of any other shareholders (though discretionary portfolio management decisions could impact the account owners).

There is a tradeoff for control over the portfolio's tax liability, however. With no new cash flows, the portfolio's net unrealized gain will increase if security prices rise over time. This has the potential to accelerate the tax liability for a shareholder in certain cases. For example, if positions are sold to maintain the portfolio's security weightings over time (e.g., to maintain diversification of the portfolio's assets), then gains may be realized instead of being able to direct cash flow to rebalance the portfolio. Also, if a forced realization of capital gains occurs (e.g., merger and acquisition activity among the portfolio's holdings), the portfolio may have a higher ratio of market value to cost basis than a mutual fund that has had positive cash flows.

Net Cash Flows

A mutual fund or other commingled investment vehicle is subject to the cash flow patterns of both existing and new shareholders. Cash flows affect security transaction activity within the fund. As such, actions of other shareholders can cause positive or negative effects for all other shareholders.

First, consider the case of positive cash flow. Assuming the fund is in a net unrealized gain position, the existence of positive cash flow dilutes the overall capital gain position of the fund because the market value and cost basis of any new investment are equal, whereas the portfolio's market value exceeds its basis. An equivalent way of stating this relationship is that the new securities come in, in aggregate, at a cost higher than the average cost basis of the portfolio. This dilution is positive for the existing shareholders from a number of perspectives. First, it spreads any capital gain realizations across a larger shareholder base (i.e., the per-share value of any distribution is reduced). Second, it provides a means to offset negative cash flows that might otherwise require a liquidation of some equity positions. Finally, and most importantly, the addition of new cost lots at different prices through security purchases increases the power of the fund's accounting techniques to mitigate any future redemption activity by allowing for greater choice among tax lots. Overall, cash flows can represent a positive externality.

What about negative net cash flows? Unambiguously, if securities are sold at their average cost, then the portfolio will realize capital gains to the extent the portfolio's basis is less than its market value. However, the portfolio does not have to realize gains or losses at their average costs. The decisions of the fund's adviser—specifically, the accounting technique chosen—can

mitigate the potential tax externality. That said, continuous redemptions can cause an accelerated tax liability over time even in a tax-efficient portfolio if share prices generally rise and the fund's accounting techniques eliminate much of the gross unrealized loss in the portfolio.

A number of studies have investigated the relationships affecting net cash flows (Barclay, Pearson, and Weisbach, 1998; Sirri and Tufano, 1998; Bergstresser and Poterba, 1999). However, many of these relationships have been performance-based, which can often be fleeting. On the other hand, to the extent cash flows are positively correlated with equity market movements, it could imply that the tax-efficient accounting techniques described below are even more powerful because the portfolio would be buying when prices are rising and selling when prices are falling (and possibly realizing losses).

The academic studies suggest that unrealized capital gains may be a factor in future net cash flow patterns and that managers might consciously control the “tax overhang” in order to remain attractive for future shareholders (Barclay, Pearson, and Weisbach, 1998). However, a tax efficient investor would probably prefer a buy-and-hold portfolio with a lower level of net cash flows than one in which that tax liability were accelerated in order to supposedly attract a high level of new cash. In other words, such a strategy significantly reduces the benefit of a positive cash flow. Another approach would be to advertise the fund, if this were successful in generating new cash flow over time. Most directly, the cash flow relationship can be affected by a decision to limit new cash to the fund—e.g., closing the fund to new investors. Closing a fund is often done for investment reasons in order to maintain the fund's character and investment process. However, there is a potentially significant negative to such an approach: it makes negative cash

flows and their associated externalities more likely. We investigate closing a fund in our simulations in the following section.

Accounting Techniques

Mutual funds are subject to the same rules as other owners of equity securities when accounting for security sales; namely, specific identification of the tax lots sold.¹³ Currently, mutual funds are not required to disclose how they account for security sales in any prospectus or shareholder report. As demonstrated in the next section, this information could be useful to shareholders because different accounting techniques can have a material impact on the after-tax performance of mutual fund investments.

It is also interesting to note that tax-efficient accounting techniques benefit all current fund investors. That is, accounting for security sales in different ways does not affect the fund's pre-tax return—the objective of a fund's tax-deferred shareholders—but can improve the fund's after-tax return—the objective of those shareholders holding the fund outside of a tax-qualified vehicle. Within this context, certain regulatory practices could affect the ability to use accounting techniques to affect the after-tax return for shareholders. In particular, a proposal in President Clinton's fiscal year 1998 budget proposal would have required all security sales to use average cost accounting. Although this proposal was not included in the final budget for that year, the simulations in the next section suggest that such a move could accelerate the tax liability for shareholders in funds that currently use more tax-friendly accounting.

Although a survey of accounting techniques among mutual funds is not available, we will consider a range of potential accounting techniques: first-in first-out (FIFO), last-in first-out (LIFO), average cost, and tax-sensitive accounting. Average cost identifies for sale the security position that is closest to the average cost of the overall position in the security, or equivalently sells a fixed fraction of all the lots purchased at different points in time. First-in, first-out is simply identifying for sale the oldest lot for each position. FIFO is usually a tax-inefficient strategy to the extent security prices rise over time. Last-in, first-out is selling the most recently purchased lot of each position. The last technique we consider is tax-sensitive accounting, which is often referred to as highest-in, first-out (HIFO) accounting. HIFO accounting identifies the highest cost lot in each security for sale.¹⁴ These techniques and their ability to affect relative after-tax performance are investigated in the next section.

The ability to use accounting techniques to affect after-tax performance depends on the management and structure of the investment vehicle. In particular, accounting techniques are more powerful when there is a greater dispersion of cost lots for each security. Accounting procedures can mitigate the potential negative effects of redeeming investors on the other shareholders. On the other hand, a separate account with a large initial investment relative to its overall portfolio does not have as much ability to leverage accounting techniques because the fund's holdings would be much more concentrated at specific points in time (i.e., HIFO, LIFO, FIFO, and average cost are close to equivalent because there is minimal dispersion of cost lots). Similarly, active management techniques—where securities may be bought or sold in short time frames—may be less able to use accounting techniques than passively managed vehicles—where small slices of many securities tend to be transacted. However, for those portfolios with more

concentrated buying and selling, the ability to effect trading strategies (e.g., harvesting losses) can have a relatively greater impact on after-tax returns. We investigate these inter-dependent relationships in the next section.

Simulations of Mutual Funds

In order to look at how tax-management policies can affect after-tax returns and the importance of externalities between shareholders, we constructed a simulator to isolate different factors that can affect after-tax returns, some of which (like the choice of accounting technique) are under the control of investment managers. These simulations attempt to quantify the magnitude of the effects discussed in the previous sections and how choices by mutual fund managers can mitigate or exacerbate the externalities between shareholders.

We report results for simulated portfolios that invest in the fifty largest companies (in terms of market capitalization) in 1983 and track the returns of these portfolios over the next 15 years.¹⁵ We calculate returns using the actual monthly returns of the component stocks minus an expense charge of five basis points per month. We assume that ninety percent of the fund distributions of dividends and capital-gains are automatically reinvested in the mutual fund.¹⁶ The after-tax returns are computed for an investor facing a 39.6 percent marginal income tax rate on dividends and realized short-term capital gain distributions and a 20.0 percent marginal tax rate on realized long-term capital gain distributions. These are the current rates for someone in the top federal

income tax bracket. We apply these rates to the entire 1984-98 period.¹⁷ Further, we ignore state and local income taxes. A detailed description of the data set is contained in the Appendix. First, we evaluate four different accounting policies: (1) always using the average cost basis for determining capital gains and losses, (2) using FIFO (using the cost basis of the oldest lots of a particular stock), (3) using LIFO (using the cost of the most recently acquired lots)¹⁹, and (4) using HIFO (using the cost of the most expensive lots). The cost basis of the remaining shares of a particular security also depends on the choice of accounting technique. If HIFO is used, for instance, the cost basis of the remaining shares will be lower (i.e., the unrealized capital gain position of the fund will be greater) than if one of the other techniques is chosen. By choosing accounting technique, the fund determines the timing of taxes of its shareholders.

Second, we evaluate portfolios that follow active and passive investment strategies. In our simulations, passively managed funds track either an equally- or a value-weighted index of the fifty companies in our dataset. Our actively managed funds are assumed to hold thirty of the fifty securities at all points in time. The thirty stocks are held in value-weighted proportions. Each month, the actively managed funds completely divest themselves of two of their thirty positions and bring in two randomly selected companies from the twenty that have been outside the fund.²⁰ The portfolio is rebalanced so that the new holdings are proportional to the market capitalizations of the members. The fact that the new entrants are randomly chosen probably reflects our bias towards the efficient market hypothesis.

We examine three alternative rules for choosing which two securities to kick out of the mutual fund each month. One rule is to drop the two firms that have the largest gains relative to their

cost bases. A second rule is exactly the opposite – to sell the two firms that have the lowest price relative to cost basis. This is a relatively tax efficient strategy, although it is not the tax minimizing strategy which would keep track of the difference between short and long-term gains and losses and which would make the number of stocks liquidated dependent on the cost basis. The third rule chooses the two stocks to be deleted each month randomly. Under this regime, the actively managed funds are true noise traders, exchanging randomly chosen positions for equally randomly chosen replacements.

It is important to note that the three different security selection processes of our active fund simulations will result in different portfolios and, hence, different pre-tax returns. A portfolio that sells two stocks with the greatest appreciation will obviously sell different stocks in a given month than an otherwise similar portfolio that sells the two stocks with the least amount of appreciation. Hence, the constituents and portfolio weights of the portfolios will differ over time. This is different from our index-fund simulations, where the differences among the portfolios—accounting technique and cash-flow patterns—do not affect pre-tax returns among the simulated portfolios.

Third, we also consider the impact of net mutual fund sales on the after tax returns that the fund offers its long-term shareholders. The first net sales regime applies to a fund that has a trend of net sales equal to one percent of assets per month. The second regime, roughly corresponding to a fund that is closed to new purchases (or at least to some classes of potential buyers), is for a fund with a trend rate of net sales of minus one percent of assets per month. That is, on average it experiences net redemptions.

Passive Management

Equally-Weighted Fund

The results in Table 3 detail the simulation of an equally-weighted index fund that holds all fifty stocks. That is, two percent of the fund's assets are invested in each of the fifty securities. The maintenance of the two-percent weights implies a monthly rebalancing of the portfolio—selling stocks whose relative price has risen and buying additional shares in those whose relative price has fallen. Table 3 displays the before and after-tax average monthly returns for the entire period 1984-98 for an equally-weighted index fund experiencing deterministic net sales. It is important to note that the after-tax returns in Table 3 represent buy-and-hold returns that tend to overstate the actual differences for investors that will ultimately sell their holdings because of the timing differences of gains realizations among the different simulations considered. We show results for investors who liquidate their investment at the end of the horizon later in the discussion.

Table 3 Average Monthly Returns for Passively Managed Funds with Equal Weights and Deterministic Sales, 1984-98

A. Average Before-Tax Monthly Returns

Net Sales/Assets	Average Cost	FIFO	LIFO	HIFO
-1%	1.5000	1.5000	1.5000	1.5000
0	1.5000	1.5000	1.5000	1.5000
+1%	1.5000	1.5000	1.5000	1.5000

B. Average After-Tax Monthly Returns

Net Sales/Assets	Average Cost	FIFO	LIFO	HIFO
-1%	1.2347	1.2220	1.2630	1.2821
0	1.2894	1.2731	1.3183	1.3503
+1%	1.3296	1.3137	1.3475	1.3830

Panel A simply reminds us that the before-tax return is exactly the same for the different accounting techniques and different patterns of net sales of the fund because portfolio constituents and their weights are unaffected by the choice of accounting technique or cash flow. This means that an investor holding the fund in a tax-qualified pension account (such as an IRA or 401(k) account) would be indifferent to the arguments of this sub-section.

On the other hand, Panel B confirms our intuition and previous discussion. Namely, that accounting techniques and net cash flow can have important affects on after-tax returns. In other words, a taxable investor who was in one of these funds for the entire period 1984-98 would care a lot about which cell in the panel his fund has chosen for him. Our separate account simulation where there is no ongoing cash flow (other than dividends received and the assumed ten percent of dividend and capital gains distributions that are not reinvested) shows a difference of 7.72 basis points per month in after-tax returns between a fund that uses HIFO accounting and one that uses FIFO. Perhaps more realistically, the difference between HIFO and average cost

accounting is 6.09 basis points per month or 73 basis points per year. Over long holding periods, such as ten or fifteen years, an annual 73 basis points differential can be very significant.

The externality effects of cash flows are demonstrated in the relative returns of a growing fund versus a shrinking fund. The individual buy-and-hold investor in the fund with 1 percent net sales per month experiences a much higher after-tax return—10.09 basis points per month when the funds use FIFO accounting—than the investor in the shrinking fund. This is a difference of slightly more than 121 basis points per year—an enormous amount considering that the two funds hold exactly the same securities with the same weights and use the same accounting techniques. This difference is due to the externality between existing shareholders and new shareholders that we discussed in the previous section of the paper. The fund with a steady supply of new shareholders is continuously buying new lots of the fifty securities and can accomplish the monthly rebalancing (to retain the two-percent weights) with far less tax consequence than the fund experiencing steady net redemptions. The interaction between these effects shows even greater dispersions in after-tax returns. For example, the difference between owning a tax-sensitive FIFO index fund experiencing net new sales every month and an average-cost basis index fund experiencing net redemptions is 14.83 basis points per month or more than 1.78 percent per year.

Table 4 looks at whether the magnitude of these externalities may change as the portfolios age. Our simulated passively managed funds begin in 1984 with newly acquired positions in all fifty stocks. Initially, there is not much advantage to one accounting technique over the other because all of the original lots carry the same cost basis. The advantage of FIFO and LIFO over FIFO

and average cost accounting grows as the number of lots of purchases to choose amongst for partial liquidations grows. To examine this effect, we calculate the difference accounting choices and net sales makes for the years 1994-98 for our funds begun in 1984. The average monthly before-tax return for the sample of fifty equally weighted stocks was 1.7981 percent for the 1994-98 period. This is certainly a much better than average period of time for large capitalization stocks such as those in our sample. The average after-tax returns for 1994-98 are shown in Table 4.

Table 4 Average After-Tax Monthly Returns for Passively Managed Funds with Equal Weights and Deterministic Sales, 1994-98

Net Sales/Assets	Average Cost	FIFO	HIFO
-1%	1.5158	1.4949	1.5641
0	1.5846	1.5564	1.6583
+1%	1.6335	1.6052	1.6958

The gain from the relatively tax efficient HIFO policy is larger than before. For example, with zero exogenous net sales, the difference between HIFO and FIFO is 10.19 basis points per month and the difference between HIFO and average cost accounting is 7.37 basis points per month. The difference between the after-tax performance of growing and shrinking funds is also wider for the five years 1994-98 than it is for the entire time period 1984-98. Now, comparing the HIFO results for one percent net sales with the HIFO results with minus one percent net sales, the growing fund offers its high-tax shareholders a 13.17 basis points a month advantage. This is more than thirty percent greater than the difference over the entire fifteen-year period, a difference that we already thought was enormous. For the five years 1994-98, the difference in after-tax return for a HIFO index fund experiencing one percent per month net sales and an

average cost index fund experiencing one percent net redemptions is 18.00 basis points per month or 2.16 percent per year.

These results—and the results of the other simulations reported below—must be tempered somewhat by the fact that equity returns were very strong over the period of our simulations. In a generally rising equity market, accounting differences have the potential to add more value on an after-tax basis because HIFO accounting would tend to realize a small gain or loss on a relatively recent security purchase (to the extent cash flow allowed for security purchases). FIFO accounting, on the other hand, would realize old securities at a much larger gain (on average). In a declining equity market, accounting and net cash flow differences would likely have a somewhat smaller effect because there would be more losses to realize throughout the portfolio, resulting in a generally lower tax liability.

Value-Weighted Fund

The assumption that the passive funds hold their positions with equal weights causes them to realize gains and losses in the process of monthly rebalancing. If the fund held positions with value or market capitalization weights, rebalancing would be greatly reduced. With value weights, rebalancing is necessary only if the companies in the index issue or repurchase shares or if the composition of the largest fifty companies changes due to mergers and acquisitions. Besides, it could be argued that market capitalization weights are more consistent with the indexing philosophy. We have examined the effect of the same accounting and net sales assumptions for the case with value weights. The results are shown in Table 5. For the record,

the average monthly before-tax return on value-weighted portfolios is 1.4972 percent for 1984-98 and 2.0275 percent for 1994-98.

Table 5 Average After-Tax Monthly Returns for Passively Managed Funds with Market Capitalization Weights and Deterministic Sales

A. 1984-1998

Net Sales/Assets	Average Cost	FIFO	HIFO
-1%	1.3122	1.3070	1.3190
0	1.3895	1.3863	1.4015
+1%	1.4044	1.4017	1.4091

B. 1994-1998

Net Sales/Assets	Average Cost	FIFO	HIFO
-1%	1.8390	1.8313	1.8424
0	1.9487	1.9432	1.9655
+1%	1.9666	1.9618	1.9729

The results confirm our intuition: the accounting technique is much less important with value weights because much less rebalancing is necessary.²¹ The choice of accounting technique is most important when a portion of a position is being sold. Here that happens to a much smaller extent than with equal weights because value weights automatically adjust to market movements. Hence, portfolio sales are largely dictated by changes to the index being tracked (which are minimal in our data set) and negative cash flow. This explains the convergence of the results in Table 5 when cash flow is non-negative. In these cases, there is very little selling of the index's underlying securities; hence, their after-tax returns are nearly identical. However, it is important to note that the externality imposed by the presence or absence of new investors is still present and is essentially undiminished. The difference between HIFO accounting with 1 percent new sales and 1 percent new redemptions is 9.01 basis points per month over the entire 1984-98 period and is 13.05 percent per month for the 1994-98 period.

Liquidation Tax

The calculations in Tables 3, 4, and 5 are for funds operating on an ongoing basis. Individual investors who joined the fund at inception could have experienced the returns shown in these tables. If they do not sell their mutual fund holdings until they pass through an estate, the gains from tax deferral could translate into permanent gains. The estate or heir could sell the mutual fund shares at net asset value and owe no taxes on the difference between NAV and the cost basis of the mutual fund shares (or the cost basis of the underlying shares in the fund for that matter). However, it is true that the funds using HIFO accounting are carrying their portfolio positions at significantly lower cost bases than funds using average cost accounting or FIFO.

By looking at cases where the investment is liquidated at the end of the time period, we can get a better sense of the value of the timing differences. Table 6 shows after-tax return figures for investors in the funds from the beginning in 1984 whose investment was liquidated at the end of 1998. The average before-tax return is still 1.5000 percent per month, just as it was in Table 3.

Table 6 Average After-Tax Monthly Returns (1984-98) for Passively Managed Funds with Equal Weights, Deterministic Sales, and Liquidation in 1998

Net Sales/Assets	Average Cost	FIFO	HIFO
-1%	1.1884	1.1883	1.2012
0	1.2478	1.2416	1.2815
+1%	1.2922	1.2842	1.3283

Although the magnitude of the differences are somewhat reduced relative to the results reported in Table 3, the advantage of tax-efficient accounting (i.e., HIFO) instead of average cost accounting remain substantial. For instance, with zero exogenous net sales, the difference between HIFO and average cost accounting is 3.37 basis points per month over the fifteen year

period. Even ignoring compounding, that means that after fifteen years the FIFO fund will leave its holders with more than six percent more after-tax wealth than the average cost accounting fund. More strikingly, the externality between early shareholders and new shareholders is still present in undiminished form. Even if a fund is going to be liquidated at the end of fifteen years, taxable holders are far better off being in a fund that grows until the end rather than one that steadily loses shareholders. Of course, the value of tax deferral increases with time, and the fifteen-year horizon analyzed in these simulations is probably much longer than the typical investor's holding period. Thus, the cash flow and accounting differences discussed here would be much less important to an investor who plans to buy and sell their investments relatively frequently.

Randomness of Fund Sales

Funds don't experience the steady exogenous supply of new buyers that we have been examining. The next question we look at is the cost of random ebbs and flows that funds actually experience. To do this, we examine the after-tax average returns of both equally weighted and market capitalization-weighted index funds experiencing fluctuating net sales. We superimpose a standard deviation of 4.5 percent per month on the underlying trend of net sales and a serial autocorrelation of 0.25. These values correspond with the data on observed monthly net sales for a sample of roughly 800 equity mutual funds over the period 1992-99. This simulation is repeated 100 times and the following tables report the average after-tax returns. The results for both fluctuating net sales and deterministic net sales are shown in Table 7.

As we saw before, the value-weighted index fund needs to do very little rebalancing in our simulations, so the gains from tax-efficient accounting techniques are minimal with deterministic cash flows. However, Panel B indicates that fluctuating cash flows make the choice of accounting technique very important. The reason is that “ebbs” force the funds to sell off some of their positions and this is just the circumstance where accounting techniques matter. When an index fund sells positions, it sells small slices of each of its holdings. Because our simulated funds would then engage in 50 partial redemptions, the choice of accounting technique makes a significant difference in the amount of taxable gains realized.

Table 7 Average After-Tax Monthly Returns (1984-98) for Passively Managed Funds; Deterministic vs. Fluctuating Net Sales

A. Equally Weighted Portfolios

Net Sales/Assets	Average Cost	FIFO	HIFO
+1% Deterministic	1.3296	1.3137	1.3830
+1%, 4.5% SD	1.3075	1.2918	1.3688
Difference	.0221	.0219	.0142

B. Market Capitalization Weighted Portfolios

Net Sales/Assets	Average Cost	FIFO	HIFO
+1% Deterministic	1.4044	1.4017	1.4091
+1%, 4.5% SD	1.3499	1.3272	1.3997
Difference	.0545	.0745	.0094

Panel B indicates that mere fluctuations in net redemptions alone reduce the average monthly after-tax rate of return by 5.45 basis points a month if the value-weighted fund uses average cost accounting. On the other hand, HIFO accounting reduces the impact of net sales fluctuations by more than eighty percent. The HIFO fund with fluctuating net sales has an average after-tax return that is less than one-half basis point per month below the average cost accounting firm without fluctuating sales. Perhaps more importantly, the HIFO fund has a five basis points a

month advantage over the average cost fund in an environment of fluctuating net sales. These same patterns are apparent for the equally weighted index funds of Panel A, although the magnitudes differ.

The basic lesson that we take from Table 7 is that the externality of fluctuating sales on existing shareholders can be significantly and in some cases greatly reduced by mutual fund managers if they adopt the appropriate accounting policies. Under FIFO the ebbs and flows of other shareholders has only a very slight impact on the buy and hold fund participants. The same cannot be said for average cost or FIFO accounting.

Active Management

We now turn to our stylized versions of actively managed funds.²² Table 8 shows after-tax returns for the three different strategies of choosing which two of the 30 stocks to eliminate from the portfolio each month. Panel A is for a fund experiencing a trend rate of net sales of 1 percent (with a standard deviation of 4.5 percent per month and a coefficient of serial correlation of 0.25). Panel B is for a fund with no net sales (e.g., an individually managed account). Panel C shows the same asset strategies for funds that are experiencing trend net redemptions of one percent per month.

Table 8 Average After-Tax Monthly Returns (1984-98) for Actively Managed Funds with Market Capitalization Weights

A. One Percent Trend Growth

Investment Policy	Average Cost	FIFO	HIFO
Sell Winners	1.1391	1.1540	1.1585
Random Sells	1.2480	1.2446	1.2621
Sell Losers	1.3470	1.3343	1.4268

B. Separate Account (zero percent growth)

Investment Policy	Average Cost	FIFO	HIFO
Sell Winners	1.1248	1.1272	1.1302
Random Sells	1.2269	1.2246	1.2380
Sell Losers	1.3458	1.3196	1.4353

C. Negative One Percent Trend Growth

Investment Policy	Average Cost	FIFO	HIFO
Sell Winners	1.0961	1.1000	1.1103
Random Sells	1.1837	1.1824	1.1923
Sell Losers	1.2486	1.2317	1.3282

The choice of accounting technique continues to play a significant role, with the difference between HIFO and average cost accounting varying between two and eight basis points per month. The difference in investment policy is even larger. For instance, in Panel A, the difference in average after tax return of discarding losers and discarding winners is almost 27 basis points per month.²³ This is despite the fact that the before-tax return is slightly (three basis points) higher for the discarding winners strategy than the discarding losers one.²⁴ The overall difference between choosing a growing fund which is discarding losers and using HIFO and an alternative actively managed fund that sells winners, uses average cost accounting and is experiencing trend net redemptions is 33.07 basis points per month or 4.0 percent per year. This is an enormous difference for two funds experiencing the same market returns and choosing from

the same universe (large cap stocks) of securities. Almost all of the advantage of one fund over the other is due in some way to the management of the fund.

It is interesting that the mutual fund that uses FIFO and a policy of discarding losers in Panel A. of Table 8 has a higher after-tax return than the FIFO value-weighted index fund in Panel B of Table 7. To make the cases comparable, one wants to look at the case of fluctuating net sales. This certainly indicates that a tax-sensitive actively managed fund can outperform a tax-sensitive index fund, although a number of our assumptions affect this result. There are no bid-ask spreads in our model and we charge the same expenses to both index and actively managed funds. On the other hand, we have a particularly rigid actively managed strategy. A real-world tax-sensitive actively managed fund would not mechanically replace two positions each month. They would opportunistically replace positions with large losses as they occur.

Liquidation Tax

For completeness, we also examine the cases where actively managed funds are liquidated at the end of our fifteen-year period in order to quantify the timing element of capital gains deferral and ultimate realization. The results are shown in Table 9.

Table 9 Average After-Tax Monthly Returns (1984-98) for Actively Managed Funds with Market Capitalization Weights; Liquidated in 1998

A. One Percent Trend Growth

Investment Policy	Average Cost	FIFO	HIFO
Sell Winners	1.1260	1.1403	1.1433
Random Sells	1.2162	1.2141	1.2275
Sell Losers	1.2968	1.2920	1.3595

B. Negative One Percent Trend Growth

Investment Policy	Average Cost	FIFO	HIFO
Sell Winners	1.0838	1.0881	1.0960
Random Sells	1.1380	1.1382	1.1436
Sell Losers	1.2015	1.2054	1.2402

While the advantage of the investment strategy of selling the biggest losing positions in the fund each month is reduced by between three and eight basis points a month, it still is the strategy with the highest after-tax monthly return. In fact, the differences across investment strategy are still extremely large and the differences across accounting policies are significant. The fund with the best combination of policies (HIFO, selling losers, and a positive trend of net sales) beats the fund with the worst combination (average cost accounting, selling winners, and a negative trend of net sales) by an after-tax margin of 27.57 basis points per month. Considering that all of these funds are choosing from the same fifty stocks over the same time frame and they all are being liquidated at the end of the period, this difference in monthly after-tax returns has to be considered enormous.

Closing the Fund

The next issue we examine is the impact on long-term holders of closing an actively managed fund to new investors or to certain classes of new investors. Mutual funds, particularly large

mutual funds such as Vanguard Windsor and Fidelity Magellan, have taken this action. The stated reason is usually that the managers of the fund cannot find productive investments in which to place additional funds. The fund may also be concerned about establishing such large positions as to lose liquidity.²⁵ The question that we are concerned with is the externality effect on the long-term holders.

Are the long-term holders harmed by the absence of new buyers of the fund? We assess this issue by reexamining the performance of our actively managed simulated funds. We compare the funds in two different scenarios. In the first scenario, the fund is left open to new buyers for the entire fifteen years of our model. The net sales are random with a positive trend of one-percent of assets per month and the same 4.5 percent per month standard deviation previously assumed. Under the second scenario, the fund is open for the first ten years with the same sales experience, but it is then closed over 1994-98. The closed fund has negative net sales. These are generated from a trend of negative one-percent of assets per month and a standard deviation of 4.5 percent a month. The resulting net sales distributions are truncated so that net sales are always nonpositive when the fund is closed to new investors.²⁶ The average redemptions are approximately two percent per month under these assumptions.

Table 10 demonstrates that closing the fund to new investors likely has a large negative impact on the taxable holders of the fund. In all cases, the impact is significant, but it is the largest for funds that otherwise were following tax efficient practices. The funds that systematically divest themselves of their largest losers cost their taxable shareholders between 18 and 25 basis points per month in after-tax return by closing the fund. The relatively tax-efficient investment policy

of selling losers still offers the highest after-tax rates of return, but its effectiveness is greatly diminished by the closure of the fund to new investors. The most tax efficient strategy of all remains the combination FIFO and selling losers. The fact that its after-tax return in Table 3.14 is slightly below that of the FIFO fund with the same investment policy is a result that the before tax returns are not identical across the cells of these tables. While it is still true that FIFO is the best of the accounting policies, its advantage is also significantly diminished by closure of the fund.

Table 10 Average After-Tax Monthly Returns (1994-98) for Actively Managed Funds with Market Cap Weights;

A. One Percent Trend Growth; Open to New Investors

Investment Policy	Average Cost	FIFO	HIFO
Sell Winners	1.6875	1.6664	1.6706
Random Sells	1.7384	1.7334	1.7547
Sell Losers	1.8901	1.9146	1.9635

B. Minus One Percent Trend Growth; Closed to New Investors

Investment Policy	Average Cost	FIFO	HIFO
Sell Winners	1.6050	1.5687	1.5542
Random Sells	1.6017	1.5998	1.6049
Sell Losers	1.6695	1.7332	1.7179

Conclusions

Our overall conclusion is that the tax-induced externalities between mutual fund shareholders are extremely large and important and that they can be influenced by management policies. The costs of random fluctuations in net sales on the after-tax performance of the fund are greatly

diminished by choosing FIFO, for instance. The advantage of a fund with positive net sales relative to one with net redemptions is also extremely large. Net sales are presumably somewhat under the control of management. The extreme action of management closing the fund to new buyers is found to have a devastating impact on the ability to pursue tax efficient strategies. Finally, the active investment policy of selling losing positions relative to selling off winners offers much better after tax returns.

We find that there is nothing inherently inconsistent with tax-efficient actively managed portfolios. Active management techniques (e.g. selling losers vs. selling winners) appear to have a greater impact on after-tax returns than the choice of accounting technique. Both are very important, however. In other words, large-capitalization index funds can generally generate good tax efficiency by simply choosing a tax-efficient accounting technique, whereas the tax efficiency of actively managed funds requires both a tax-motivated investment strategy (such as selling losing positions) and the appropriate tax-efficient accounting policy. With an aggressive combination of tax-efficient policies, the actively managed funds we simulated could have provided greater tax efficiency than similarly constructed indexed funds that only use tax-sensitive accounting.

Given the sensitivity of after-tax returns to the accounting policies implemented by mutual fund managers, it appears that fund investors could benefit from better information about how their funds account for security sales. Today, no disclosure is required to detail how security positions are accounted for upon sale. Certainly our simulations indicate that this information would be of

value to taxable mutual fund investors and can impact after-tax returns by as much as eight basis points per month among otherwise identical funds based on our simulations.

One significant area for future research would include a practical look at policies that mutual funds can implement to reduce the externalities identified in this paper. Many tax-managed funds currently assess asset-based redemption fees that are paid to the fund to compensate shareholders for the actions of short-term investors whose redemptions could force capital gain realizations on other shareholders. Although redemption fees may be a good way to internalize the externality, the optimal structure of these fees would be an interesting extension. Another approach to these issues might be the use of cash reserves as an “insurance policy” against having to sell stocks and realize gains when faced with negative cash flow. Of course, there is a potential trade-off in holding cash in generally rising equity markets (i.e., lowers the pre-tax return), and borrowing cash (i.e., leverage) faces many regulatory hurdles within the mutual fund context.

We find that the tax externalities facing mutual fund investors are important considerations in choosing between mutual funds and direct investments. We have demonstrated that the existence of positive net cash flow can provide a significant benefit to existing mutual fund shareholders, and that any negative externalities resulting from mutual fund redemptions can be mitigated by the management practices of the fund. Although separate accounts arguably provide greater direct control over an individual’s own tax situation, we have shown that a tax-sensitive mutual fund can meet or exceed the after-tax returns of an individually managed account. Further research into the mutual fund versus separate account debate may be useful because it seems that

this subject has not received the attention that it deserves in both the academic and popular literature on portfolio choice.



Appendix: Data

Our source of the return and distribution data of the stocks used in the mutual fund simulations is the Center for Research in Security Prices (CRSP). CRSP maintains a comprehensive collection of standard and derived security data available for the NYSE, AMEX, and Nasdaq Stock Market. The mutual fund simulations use the returns, the distributions, and the market capitalizations of the fifty largest companies in December 1983 in terms of market capitalization. We used the CRSP data set to identify those fifty companies. The returns and dividends were derived using CRSP's holding period returns with and without dividends over the period from January 1984 to December 1998.

Table A lists some summary statistics of the companies in our dataset. Seven of the 50 companies were delisted from the three stock exchanges. If a company was merged into another company, we followed the stock of the acquirer after the merger. If a company was bought out for cash, we replaced it with the largest market capitalization company that is not already in the dataset after taking into account taxable cash-distributions. Standard Oil of Ohio merged with BP in June 1987 after paying a small cash-distribution to its shareholders. Shell, Marubeni, Getty Oil, Gulf Oil, Reynolds R J Industries, Texas Oil an Gas, and Superior Oil were all bought out for cash and were replaced by TDK Corp., Westinghouse Electric, Halliburton, Smithkline Beckman, Xerox, Intel, and American International Group, respectively. Superior Oil never enters our dataset because it was already bought out in October 1984. The monthly return of an equally-weighted index of the 50 companies had a mean of 1.50 percent and a standard deviation of 4.12 percent. The corresponding summary statistics for a value-weighted index were 1.50

percent and 4.11 percent. The means and standard deviations of the two indices correspond closely to the performance of the Standard & Poor's 500 Index. Of the 43 companies that were in our dataset for 15 years, Pfizer had the highest monthly return of 2.37 percent and Tenneco had the lowest return of 0.63 percent. Motorola's returns had the highest monthly standard deviation of 9.75 percent, whereas Exxon's returns had a standard deviation of only 4.42 percent.

Table 11: Companies in Dataset

Rank	Company Name (in Dec. 1983)	Ticker	In Dataset	Mkt.Cap. in Mio.	Mean Return 28-Dec-83 per Month	Std. Dev. per Month
1	INTERNATIONAL BUSINESS MACHS COR	IBM	Jan-84-Dec-98	74,508	1.16%	7.67%
2	AMERICAN TELEPHONE & TELEG CO	T	Jan-84-Dec-98	59,392	1.60%	6.90%
3	EXXON CORP	XON	Jan-84-Dec-98	31,623	1.65%	4.42%
4	GENERAL ELECTRIC CO	GE	Jan-84-Dec-98	26,653	1.90%	6.15%
5	GENERAL MOTORS CORP	GM	Jan-84-Dec-98	23,419	1.11%	7.58%
6	STANDARD OIL CO IND	SN	Jan-84-Dec-98	14,829	1.35%	4.91%
7	SCHLUMBERGER LTD	SLB	Jan-84-Dec-98	14,481	0.85%	7.79%
8	CANON INC	CANNY	Jan-84-Dec-98	13,746	1.16%	7.94%
9	SEARS ROEBUCK & CO	S	Jan-84-Dec-98	13,163	1.26%	7.93%
10	EASTMAN KODAK CO	EK	Jan-84-Dec-98	12,614	1.07%	6.45%
11	DU PONT E I DE NEMOURS & CO	DD	Jan-84-Dec-98	12,421	1.54%	6.61%
12	SHELL OIL CO	SUO	Jan-84-May-85	12,365	2.99%	9.28%
13	ROYAL DUTCH PETROLEUM CO	RD	Jan-84-Dec-98	12,062	1.77%	5.64%
14	STANDARD OIL CO CALIFONIA	CHV	Jan-84-Dec-98	11,846	1.43%	5.83%
15	MOBIL CORP	MOB	Jan-84-Dec-98	11,696	1.57%	5.50%
16	HEWLETT PACKARD CO	HWP	Jan-84-Dec-98	10,802	1.56%	9.45%

17 ATLANTIC RICHFIELD CO	ARC	Jan-84-Dec-98	10,802	1.24%	6.42%
18 MINNESOTA MINING & MFG CO	MMM	Jan-84-Dec-98	9,672	1.15%	5.62%
19 PROCTER & GAMBLE CO	PG	Jan-84-Dec-98	9,469	1.84%	6.14%
20 MARUBENI CORP	MARTY	Jan-84-Apr-84	9,422	9.97%	17.35%
21 TEXACO INC	TX	Jan-84-Dec-98	9,292	1.30%	5.95%
22 SHELL TRANSPORT & TRADING	SC	Jan-84-Dec-98	9,046	1.70%	6.30%
23 PHILIP MORRIS INC	MO	Jan-84-Dec-98	8,968	2.22%	7.31%
24 G T E CORP	GTE	Jan-84-Dec-98	8,341	1.43%	5.16%
25 JOHNSON & JOHNSON	JNJ	Jan-84-Dec-98	7,821	1.96%	6.67%
26 GETTY OIL CO	GET	Jan-84-Jan-84	7,765	24.59%	
27 AMERICAN HOME PRODUCTS CO	AHP	Jan-84-Dec-98	7,735	1.73%	5.92%
28 COCA COLA CO	KO	Jan-84-Dec-98	7,295	2.29%	6.22%
29 GULF OIL CORP	GO	Jan-84-May-84	7,130	14.12%	13.21%
30 FORD MOTOR CO	F	Jan-84-Dec-98	7,127	2.11%	7.82%
31 AMERICAN EXPRESS CO	AXP	Jan-84-Dec-98	6,961	1.69%	8.27%
32 REYNOLDS R J INDUSTRIES INC	RJR	Jan-84-Apr-89	6,881	3.16%	10.04%
33 MERCK & CO INC	MRK	Jan-84-Dec-98	6,683	2.31%	6.61%
34 DOW CHEMICAL CO	DOW	Jan-84-Dec-98	6,536	1.38%	6.97%
35 HONDA MOTOR LTD	HMC	Jan-84-Dec-98	6,287	1.48%	8.50%
36 I T T CORP	ITT	Jan-84-Dec-98	6,160	1.33%	6.64%
37 UNION PACIFIC CORP	UNP	Jan-84-Dec-98	5,824	1.01%	6.68%
38 BELL CANADA ENTERPRISES	BCE	Jan-84-Dec-98	5,806	1.19%	5.25%
39 BRISTOL MYERS CO	BMY	Jan-84-Dec-98	5,760	1.87%	5.66%
40 TENNECO INC	TEN	Jan-84-Dec-98	5,714	0.63%	6.85%
41 PFIZER INC	PFE	Jan-84-Dec-98	5,705	2.37%	7.56%
42 UNOCAL CORP	UCL	Jan-84-Dec-98	5,493	1.12%	8.00%
43 ABBOTT LABS	ABT	Jan-84-Dec-98	5,480	1.97%	6.21%
44 WAL MART STORES INC	WMT	Jan-84-Dec-98	5,439	2.30%	7.63%
45 STANDARD OIL CO OF OH	SOH	Jan-84-May-87	5,396	1.93%	6.84%
46 MOTOROLA INC	MOT	Jan-84-Dec-98	5,366	1.51%	9.75%
47 PHILLIPS PETROLEUM CO	P	Jan-84-Dec-98	5,286	1.08%	7.75%

48 ROCKWELL INTERNATIONAL CORP	ROK	Jan-84-Dec-98	5,098	1.18%	7.11%
49 SUN INC	SUN	Jan-84-Dec-98	5,081	0.91%	7.22%
50 TEXAS OIL & GAS CORP	TXO	Jan-84-Jan-86	5,010	-1.75%	7.83%
51 T D K CORP	TDK	Feb-84-Dec-98	4,955	1.17%	9.25%
52 WESTINGHOUSE ELECTRIC CORP	WX	May-84-Dec-98	4,792	1.23%	8.72%
53 HALLIBURTON COMPANY	HAL	Jun-84-Dec-98	4,778	1.00%	9.47%
54 SMITHKLINE BECKMAN CORP	SKB	Jun-85-Jun-89	4,706	1.69%	8.20%
55 XEROX CORP	XRX	Jun-86-Dec-98	4,698	1.82%	8.09%
56 INTEL CORP	INTC	May-89-Dec-98	4,691	3.62%	10.68%
57 SUPERIOR OIL CO	SOC		4,676		
58 AMERICAN INTERNATIONAL GROUP INC	AIGR	Jul-89-Dec-98	4,665	2.02%	6.40%
BRITISH PETROLEUM PLC	BP	Jun-87-Dec-98	637	1.32%	6.42%
Equally-Weighted Fund		Jan-84-Dec-98		1.50%	4.12%
Value-Weighted Fund		Jan-84-Dec-98		1.50%	4.11%
Standard & Poor's 500 Index		Jan 84-Dec-98		1.48%	4.33%

References

Barclay Michael J., Neil D. Pearson, and Michael S. Weisbach . “Open-end Mutual Funds and Capital-Gains Taxes,” *Journal of Financial Economics* (1998) 49:1, 4-43.

Berstresser, Daniel and Poterba, James. “Do After-Tax Returns Affect Mutual Fund Inflows?” Massachusetts Institute of Technology. Mimeo, 1999.

Carhart, Mark M.. “On Persistence in Mutual Fund Performance,” *Journal of Finance* 52 (1997): 57-82.

Dickson, Joel M.. “Mutual Fund Economics and Performance: The Effects of Shareholder-Level Taxation.” Stanford University. Unpublished Ph.D. dissertation, 1994.

Dickson, Joel M. and John B. Shoven. “A Stock Index Mutual Fund Without Net Capital Gains Realizations”, NBER Working Paper No. 4717. Cambridge, MA: National Bureau of Economic Research, 1994.

Dickson, Joel M. and John B. Shoven . “Taxation and Mutual Funds: An Investor Perspective.” In *Tax Policy and the Economy*, vol. 9, edited by James M. Poterba. Cambridge, MA: The M.I.T. Press, 1995.

Poterba, James and Andrew Samwick . “Stock Ownership Patterns, Stock Market Fluctuations, and Consumption,” *Brookings Papers on Economic Activity*, 2 (1995):295-372.

Sirri, Erik and Peter Tufano. “Costly Search and Mutual Fund Flows,” *Journal of Finance* 53 (1998): 1589-1622.

Warther, Vincent A. “Are Tax-Minimizing Mutual Funds Stable? Mutual Fund Flows and Capital Gains Overhangs.” University of Michigan Business School. Mimeo, 1996.

Endnotes

* The authors would like to thank Olivia Lau of Stanford for superb assistance with this research. We also have benefited from discussions, information and ideas from Harold Evensky, Fred Grauer, Keith Lawson, Davide Lombardo, Jim Poterba, John Rea, Douglas Shackelford, an anonymous referee and conference participants at the NBER's "The Economic Effects of Taxation." Research support from the Smith-Richardson Foundation and the NBER are gratefully acknowledged. The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of The Vanguard Group Inc., its affiliates, or its Board of Directors.

¹ The figures exclude equities held in variable annuities, which would add about \$475 billion to the total as of year-end 1998.

² Legislation permitting the pass through treatment of long-term capital gains through a mutual fund was enacted in 1942. The legislative history provides no indication as to why short-term gains also were not provided with this pass through treatment. This omission appears to have been more of an oversight than a conscious effort to treat short-term gains differently for mutual funds.

³ Although short-term gains are combined with ordinary dividends for tax purposes, short-term gains do not qualify for the dividends-received deduction available to corporate investors.

⁴ This argument assumes that capital gain tax rates remain constant. If capital gains taxes were to increase significantly, this relationship could reverse because losses could be used to offset a higher potential future tax liability.

⁵ This paper will use the terms "separate account" or "individually managed account" interchangeably to refer to a portfolio of securities managed for one investor. These accounts are not subject to the tax rules of Subchapter M of the Internal Revenue Code and are exempt from registration under the Investment Company Act of 1940.

⁶ Although mutual funds cannot explicitly use the "average cost" basis methods that are available to mutual fund shareholders in determining realized gain or loss, a fund could mimic average cost accounting by identifying upon sale those tax lots closest to the security's average cost.

⁷ Our discussion and simulations consider a separate account to have an initial investment but no ongoing cash flow (except dividends from the underlying investments). This is, of course, quite stylized because separate accounts will

generally have some cash flow—positive or negative—over the investment horizon. However, we do not consider these situations because it does not represent an externality as in the mutual fund context.

⁸ Although mutual funds cannot explicitly use the “average cost” basis methods that are available to mutual fund shareholders in determining realized gain or loss, a fund could mimic average cost accounting by identifying upon sale those tax lots closest to the security’s average cost.

⁹ Our discussion and simulations consider a separate account to have an initial investment but no ongoing cash flow (except dividends from the underlying investments). This is, of course, quite stylized because separate accounts will generally have some cash flow—positive or negative—over the investment horizon. However, we do not consider these situations because it does not represent an externality as in the mutual fund context.

¹⁰ Technically, a mutual fund that owned just one security would fail certain diversification tests that must be met in order to qualify as a mutual fund. The example given is obviously for illustration only.

¹¹ The distribution of the realized gains (to the extent they are not reinvested in additional fund shares) would also be a negative cash flow event that could force further realizations. This is described in more detail in Dickson (1994) and Warther (1996).

¹² Any deferred tax liability could be eliminated to the extent such shares pass through an estate (i.e., stepped-up basis) or used for certain charitable contributions.

¹³ As mentioned in footnote 6, mutual fund shareholders—but not mutual funds themselves—are allowed to use “average cost basis” methods, which are not forms of specific identification. For both mutual funds and their shareholders, FIFO is the default method for determining gain or loss.

¹⁴ Tax-efficient accounting is more general than FIFO accounting. For example, it might be preferable to realize a larger dollar amount of long-term gains than a smaller amount of short-term gains because of their differences in marginal tax rates. Also, a fund with capital loss carry-forwards that will soon expire might want to switch accounting techniques to realize a lot of gain.

¹⁵ We used the CRSP data set to determine the identity of these fifty companies and to track their monthly returns and distributions from 1984 through 1998. If a company was merged into another company, we followed the stock of the acquirer. If a company was bought out for cash, we replaced it with the largest market capitalization company (in December 1983) that was not already in the data set.

¹⁶ The expense ratio and reinvestment percentage assumptions are made to approximately real-life portfolios.

However, the results reported in this section are not sensitive to these assumptions.

¹⁷ We computed as well the returns with actual tax-rates over the period between 1984 and 1998 for high- and medium-income individuals. We did not summarize the results with actual tax rates because they are very similar to the results reported in this section.

¹⁸ We computed as well the returns with actual tax-rates over the period between 1984 and 1998 for high- and medium-income individuals. We did not summarize the results with actual tax rates because they are very similar to the results reported in this section.

¹⁹ We present the results for LIFO in just the first simulations. Generally, the results are similar—but slightly less tax efficient—to the FIFO case in the generally rising equity market over the simulation period. Also, LIFO is not a widely used method among mutual funds because of the significant wash-sale restrictions that are encountered in a daily cash flow environment.

²⁰ This corresponds to an annual turnover rate of approximately 80%.

²¹ It should be noted, however, that our “index” funds have even less turnover than most index funds tied to a particular market benchmark (e.g., S&P 500). As shown in the data appendix, there was very little change to the portfolio’s underlying holdings over the time period examined. As the rate of change in an index fund’s constituents changes, accounting techniques would become more important.

²² As in the simulations of index funds with fluctuating net cash flow, we report the average results of 100 simulations.

²³ In the “selling winners” scenario, the portfolio manager sells the two positions with the highest ratios of market value to cost basis. Similarly, the “selling losers” case looks at selling the two positions with the lowest ratios of market value to cost basis (which may or may not result in realized losses).

²⁴ As discussed above in the description of these simulations, the security selection process (i.e., selling “winners”, selling “losers”, or random sales) results in different portfolios because the securities sold from the portfolio differ under the three scenarios. Unlike the simulations of index funds where all of the portfolios hold the same stocks in the same weights, our actively managed funds simulated here will have different pre-tax returns.

²⁵ One suggestion that is often made is to split a fund into two without closing it. However, that approach does not work if the fund faces liquidity constraints. While smaller funds have greater liquidity, one must consider liquidity

issues across all funds that a manager advises. As such, a fund that is split still represents one large pool of assets managed by the adviser and does not enhance liquidity.

²⁶ This is a very extreme and somewhat unrealistic form of a fund closing. Usually, a fund is closed to new investors and remains open for existing investors (sometimes with annual purchase limits). The example shown, though, is consistent with the goal of closing the fund; namely, to ensure that positive cash flow is significantly reduced or reversed, so that it does not alter the fund's investment approach or flexibility.