

Tax Externalities of Equity Mutual Funds

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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, the mutual fund may be forced to distribute realized capital gains to its shareholders. The taxes of investors staying with the fund are accelerated by the actions of those leaving the fund. On the other hand, new investors convey a positive externality upon existing investors by diluting the unrealized capital gain position of the fund. The simulations presented in this paper show that these externalities are important determinants of the after-tax performance of equity mutual funds. Mutual fund managers can significantly influence the magnitude of these externalities by choosing tax-efficient accounting techniques and investment policies.

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1. 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 1.1, 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 1.1 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 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.

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

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 on IRS Form 1099-DIV—the tax form documenting taxable mutual fund distributions. In other words, short-term capital gain distributions from mutual funds are reported on Schedule B (Interest and Ordinary Dividends) of IRS Form 1040 instead of Schedule D (Capital Gains and Losses). 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.³

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% gross dividend yield. If the fund's expense ratio—e.g., investment advisory, custody, distribution, shareholder servicing expenses—is 1%, then the net income distribution to shareholders would be 1%. If the expense ratio were 0.5%, then the dividend would be 1.5%. 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% 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"

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 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.

accounts.⁴ 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.

In addition, 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. If during the investment horizon, fewer taxable distributions were received, then the tax liability due upon liquidation would almost always be greater relative to an investment with the same pre-tax return (assuming such return is positive) which distributed more taxable capital gains throughout the investment horizon.

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 cash flows 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.⁵ 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).⁶ 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.

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

⁴ 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.

⁵ Although mutual funds cannot expressly 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.

⁶ 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.

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.

2. Mutual Fund Tax Externality

The differences between mutual funds and separately managed accounts and how mutual funds can exacerbate or mitigate any potential negative tax events 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).⁷ There are no other transactions in the fund. The following table gives the investment position of the fund and each of its shareholders:

Table 2.1 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.⁸ 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

⁷ 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.

⁸ 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).

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. 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).

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

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

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

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:

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

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 cannot 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 (1) 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 fund 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 cashflows must be absorbed by net asset sales. The total cash flows at time t are given by:

$$cf_t = d_t - x_t - (fd_t^D + fd_t^{SCG} + fd_t^{LCG}) + (c_t + \alpha fd_t^D + \beta (fd_t^{SCG} + fd_t^{LCG})) \quad (2)$$

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 as security prices rise over time (assuming they do). 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). Secondly, 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).

Other than performance, are there other ways that mutual funds could generate positive cash flows, thereby benefiting existing investors? 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.⁹ 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.

⁹ As mentioned in footnote 5, 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.

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 be effected using 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.¹⁰ 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.

¹⁰ Tax-efficient accounting is more general than HIFO 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.

3. Simulations of Mutual Funds

We have constructed a mutual fund simulator to help evaluate the importance of the externalities between shareholders and the effect of accounting and other policies of mutual fund managers. By assumption, the simulated mutual funds only keep track of the equities of the companies which were amongst the fifty largest (in terms of market capitalization) in 1983. 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 is not already in the data set. A detailed description of the data set is contained in Appendix 1.

The mutual fund returns are based on the actual monthly returns of the component stocks minus an expense charge of five basis points per month. We have used this expense ratio for all of our simulations, although we recognize that this is a high charge for a passively managed index fund and a low charge relative to the expenses of most actively managed funds. We assume that ninety percent of the fund distributions of dividends and capital-gains are automatically re-invested in the mutual fund. 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.¹¹ Further, we ignore state and local income taxes.

3.1 Description of Simulations

This section discusses the effects of different mutual fund policies on after-tax returns for a buy-and-hold mutual fund investor. First, mutual funds choose the accounting technique they use to determine the cost basis of shares that they sell. 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)¹², 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 than if one of the other techniques is chosen. By choosing accounting technique, the fund determines the timing of taxes of its shareholders.

Second, mutual funds follow either an active or a passive (index) investment strategy. Passively managed funds track either an equally- or a value-weighted index of the fifty companies in our dataset. 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

¹¹ 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.

¹² We present the results for LIFO in just the first simulations. Generally, the results are similar—but slightly less tax efficient—to the HIFO 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.

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. 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.

Third, we also look at the impact of the pace 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.

3.2 Passive Management

Equally-Weighted Fund

The first results are shown in Table 3.1 and refer to a passively managed index fund holding all fifty stocks with equal weights. 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 3.1 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.

Table 3.1 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. 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 indicates that 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. First, if the fund is experiencing neither net sales nor net redemptions (other than the assumed ten percent of dividend and capital gains distributions that are not reinvested), then the difference in after-tax returns between a fund that uses HIFO accounting and one which uses FIFO accounting is 7.72 basis points per month. Perhaps more realistically, the difference between HIFO and average cost accounting is 6.09 basis points per month or 73 basis points per year. This difference is larger than the assumed expenses of the fund. Over long holding periods, such as ten or fifteen years, this 73 basis points per year differential can be very significant.

Second, the individual investor in the growing fund (with 1 percent net sales per month) experiences a much higher after-tax return than the investor in the shrinking fund. Comparing the HIFO result with +1% net sales to the one with -1% net sales shows a difference of 10.09 basis points per month. 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 difference between owning a tax-sensitive HIFO 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.

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 HIFO 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 3.2.

Table 3.2 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 +1% net sales with the HIFO results with -1% 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.

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 Tables 3.3 and 3.4. 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 3.3 Average After-Tax Monthly Returns for Passively Managed Funds with Market Capitalization Weights and Deterministic Sales, 1984-98

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

Table 3.4 Average After-Tax Monthly Returns for Passively Managed Funds with Market Capitalization Weights and Deterministic Sales, 1994-98

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.¹³ 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. 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 sales 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 3.1 and 3.2 (and for 3.3 and 3.4) 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. There always is a question as to whether the deferral can be continued indefinitely and how investors would fare if the fund liquidated its positions at some point in the future. To examine this we have calculated the fifteen-year history of an equally weighted fund (as in Table 3.1) that liquidates and distributes all proceeds at the end of 1998. The figures in Table 3.5 refer to investors who were in the funds from the beginning in 1984. The average before-tax return is still 1.5000 percent per month, just as it was in Table 3.1.

¹³ 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.

Table 3.5 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

The gains from using HIFO instead of average cost accounting are significantly reduced relative to the comparable Table 3.1, but they still are 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 HIFO 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.

Randomness of Fund Sales

Of course, funds don't experience the kind of steady exogenous supply of new buyers that we have been examining. The next question we look at is what 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 Tables 3.6 and 3.7.

Table 3.6 Average After-Tax Monthly Returns (1984-98) for Passively Managed Funds with Equal Weights; Deterministic vs. Fluctuating Net Sales

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

Table 3.7 Average After-Tax Monthly Returns (1984-98) for Passively Managed Funds with Market Capitalization Weights; Deterministic vs. Fluctuating Net Sales

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

As we saw before, the value-weighted index fund needs to do very little rebalancing, so the gains from tax-efficient accounting techniques are minimal with deterministic cash flows. However, 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. Table 3.7 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 Table 3.6, although the magnitudes differ.

The basic lesson that we take from Tables 3.6 and 3.7 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 HIFO 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 accounting.

3.3 Active Management

We now turn to some stylized versions of actively managed funds. The funds select randomly thirty of the fifty stocks at the beginning of the investment period. Each month, they completely divest of two of their positions and bring in two randomly selected companies from the twenty that have been outside the fund. The portfolio is rebalanced so that the holdings are proportional to the market capitalizations of the members. The simulations are again repeated 100 times and the following tables report the average after-tax returns over those simulations. Tables 3.8 and 3.9 show after-tax returns for the three different strategies of choosing which stocks to eliminate from the portfolio each month. Table 3.8 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). Table 3.9 is for a fund with no net sales (e.g., an individually managed account). Table 3.10 shows the same asset strategies for funds that are experiencing trend net redemptions of one percent per month. These funds may have restricted access to some classes of investors, thus creating this net withdrawal situation.

Table 3.8 Average After-Tax Monthly Returns (1984-98) for Actively Managed Funds with Market Capitalization Weights; 1% 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
Difference: Losers-Winners	.2079	.1803	.2683

Table 3.9 Average After-Tax Monthly Returns (1984-98) for Actively Managed Funds with Market Capitalization Weights; Separate Account (0% cash flow)

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
Difference: Losers-Winners	.2210	.1924	.3051

Table 3.10 Average After-Tax Monthly Returns (1984-98) for Actively Managed Funds with Market Capitalization Weights; -1% 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
Difference: Losers-Winners	.1525	.1317	.2179

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 Table 3.8, the difference in average after tax return of discarding losers and discarding winners is almost 27 basis points per month.¹⁴ 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.¹⁵ The overall difference between choosing a growing fund which is discarding losers and using HIFO and an

¹⁴ 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).

¹⁵ In the case of our actively managed funds, different accounting techniques and cash flow patterns can result in different securities being sold under the various scenarios. In other words, because the new purchases and monthly re-balancing can affect the ratio of market value to cost basis for each security, the portfolios—and hence, their pre-tax returns—will differ because of differences in the securities being sold each month.

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 HIFO and a policy of discarding losers in Table 3.8 has a higher after-tax return than the HIFO value-weighted index fund in Table 3.7. To make the cases comparable, one wants to look at the case of fluctuating net sales in Table 3.7. 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. Further, a fund interested in optimizing tax efficiency might choose a different universe of stocks than we have here. Tax minimization is easiest with stocks that have high price volatility. We have not constructed our sample of fifty stocks with this in mind.

Liquidation Tax

For completeness, we have examined the cases where actively managed funds are liquidated at the end of our fifteen-year period. The results are shown in Tables 3.11 and 3.12.

Table 3.11 Average After-Tax Monthly Returns (1984-98) for Actively Managed Funds with Market Capitalization Weights; 1% Trend Growth; Liquidated in 1998

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
Difference: Losers-Winners	.1708	.1517	.2162

Table 3.12 Average After-Tax Monthly Returns (1984-98) for Actively Managed Funds with Market Capitalization Weights; -1% Trend Growth; Liquidated in 1998

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
Difference: Losers-Winners	.1177	.1173	.1442

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. 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.¹⁶ The average redemptions are approximately two percent per month under these assumptions.

Table 3.13 Average After-Tax Monthly Returns (1994-98) for Actively Managed Funds with Market Cap Weights; 1% 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

¹⁶ 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.

Table 3.14 Average After-Tax Monthly Returns (1994-98) for Actively Managed Funds with Market Cap Weights; -1% 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

Tables 3.13 and 3.14 contain the results. The first thing to note is that closing the fund to new investors 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 HIFO 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 HIFO is the best of the accounting policies, its advantage is also significantly diminished by closure of the fund.

4. 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 HIFO, 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.

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 A: Companies in Dataset

Rank	Company Name (in Dec. 1983)	Ticker	In Dataset	Mkt.Cap. in Mio. 28-Dec-83	Mean Return 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	BMJ	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	XRJ	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%

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