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Chapter Author: Joel M. Dickson, John B. Shoven

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TAXATION AND MUTUAL FUNDS: AN INVESTOR PERSPECTIVE

Joel M. Dickson

Board of Governors, Federal Reserve System

John B. Shoven

Stanford University and NBER

EXECUTIVE SUMMARY

Shareholder level taxes are taken into account in determining the performance of growth and growth and income mutual funds over the 1963–1992 period. We rank a sample of funds on a before- and after-tax basis for investors in different income classes facing various investment horizons. The differences between the relative rankings of funds on a before- and after-tax basis are dramatic, especially for middle- and high-income investors. For instance, one fund that ranks in the 19th percentile on a pretax basis ranks in the 63rd percentile for an upper-income, taxable investor. We also present an analysis of the extra taxes that shareholders bear because of the failure of mutual funds to manage their realized capital gains in such a way as to permit a substantial deferral of taxes.

This research was undertaken while Dickson was a doctoral candidate in the Department of Economics at Stanford University. The research presented and opinions expressed are solely those of the authors and do not necessarily reflect those of the Board of Governors, the Federal Reserve Banks, or other members of its staff. The authors would like to thank Victor Fuchs, John Andrew McQuown, James Poterba, Charles Schwab, William Sharpe, Mark Wolfson, and seminar participants at Stanford University, UCSD, and NBER for helpful comments and discussions. Financial support was provided by Charles Schwab & Company.

While it is not possible to determine precisely this magnitude, the extra taxes almost certainly amounted to more than \$1 billion in 1993.

1. INTRODUCTION

American households invest vast sums of money in U.S. equity markets through mutual funds. According to the Federal Reserve's *Flow of Funds Accounts*, investors purchased an additional \$67.1 billion in corporate equity via mutual funds in 1992 alone. By the end of 1992, individual assets in equity mutual funds totalled \$466.4 billion versus \$181.7 billion just five years prior. The result has been a huge demand for information about the performance of mutual funds in all types of media. Magazines such as *Consumer Reports*, *Forbes*, *Fortune*, *Business Week*, and *Money Magazine* frequently feature mutual fund performance rankings. Newspapers and public television cover these matters, and a small industry has developed providing newsletters and tabulated data regarding mutual funds.

Are the media and the funds themselves providing the most relevant performance information for most investors? Our answer is "no." This negative response results because tax considerations matter a great deal for most mutual fund investors, while many published performance measures and rankings ignore taxes.¹ As Table 1 suggests, a significant portion of the total assets of growth and growth and income funds are subject to shareholder level taxation. As of December 31, 1992, at least 58.6 percent of the total assets of growth and growth and income funds were subject to shareholder level taxes. In this paper we document that taxes not only affect the level of returns of equity mutual funds for taxable investors, but also that taxes dramatically affect the relative rankings of the funds.

A mutual fund's returns can be described in at least three ways. First, there is the return on the fund's underlying portfolio. Second, the gross-of-tax return is the return on the fund's portfolio after fees, loads, and bid/ask spread losses due to a fund's turnover are taken into account. This gross-of-tax return (usually without load adjustments) is the return reported by the funds themselves and used by academics and the popular press to determine mutual fund rankings. The third measure, and the

¹ Prior to 1993, only *Fortune* magazine regularly published after-tax returns. In general, mutual fund returns are ranked over relatively short horizons—one, three, or five years. A fund's sensitivity to the taxes of its shareholders, however, can not be easily determined over such a short horizon, since variations in pretax returns among equity mutual funds may mask the beneficial or detrimental tax management of a fund's advisor. This paper considers much longer investment horizons (10 years at a minimum) when a fund's "tax sensitivity" can be discerned with more confidence.

TABLE 1.
Mutual Fund Asset Composition of Growth and Growth and Income Funds, Year-end 1992 (millions of dollars)

Growth and growth and income funds	
Total net assets	301,496.3
IRA assets	61,729.0
Self-employed retirement plan assets	10,193.1
Other retirement plans (est.)	23,633.3
Other nontaxable institutions (est.)	29,398.9
 Taxable assets	 176,542.0 (58.6%)

Source: Investment Company Institute (1993).

Fiduciaries, Corporations, Retirement Plans, and Other Institutions are included in the category "Institutional Assets," which is not available by investment objective. At the end of 1992, institutional assets represented 31.73 percent of the total assets of equity, bond, and income funds. The estimate of institutional assets, therefore, is taken to be 31.73 percent of the total net assets within each classification. The estimates for retirement plans and other institutions (assumed to be tax exempt) represent each component's share in the institutional assets category.

one we argue is the relevant statistic for investors subject to shareholder level taxation, is the net-of-tax return. The net-of-tax return equals the gross return minus the amount of taxes that the shareholder must pay on dividend and realized capital gains distributions.

Many people need both pretax and posttax performance information. Consider an equity investor who is accumulating money in a tax-sheltered 401(k) pension plan and also investing after-tax income in an equity mutual fund outside the pension system. It matters a great deal which fund is used in each case, but the published information gives little, if any, guidance as to which funds have been most appropriate under each scenario. This paper provides a substantial amount of information that should be valuable to investors with both taxable and tax deferred mutual fund accounts.

Since the seminal work of Treynor (1965), Sharpe (1966), and Jensen (1968, 1969, 1972), there have been hundreds of academic papers on mutual fund performance and evaluation. One class of these papers (e.g., Kon and Jen, 1978, 1979; Lehmann and Modest, 1987; Grinblatt and Titman, 1993) compares and contrasts the myriad ways to evaluate performance relative to some benchmark. The other class of papers on this topic (e.g., Chang and Lewellen, 1984; Henriksson, 1984; Ippolito, 1989) focuses more on the opportunity cost of mutual fund investing. Topics in the second class include whether mutual funds are able to "outperform" the market through timing and selection ability and

whether mutual funds offer superior returns to the market as a whole in order to offset their expenses, fees, and load charges. In the context of academic research, only Horowitz (1965), who focuses on the internal rate of return of alternative mutual fund investments, and Jeffrey and Arnott (1993), who focus on the relationship between turnover and net-of-tax performance, adjust mutual fund returns for the effects of personal taxes.

Instead of focusing solely on the pretax performance of mutual funds prevalent in both academic studies and the popular press, we will consider three different performance measures. The pretax return is relevant for those individual investors who enjoy tax-deferred status on their asset accumulations (e.g., IRA accounts). For individuals subject to shareholder level taxation, we compute posttax returns by adjusting the pretax return for any required tax payments. Posttax returns are calculated for individuals in three different tax brackets. We also calculate liquidation values for each of the three tax rates. The liquidation value is the amount that an individual would receive by selling all of her mutual fund shares and subtracting the required tax payments for previously unrealized capital gains.

The remainder of the paper proceeds as follows: Section 2 describes the data used in our analysis. Section 3 presents our basic methodology. Section 4 demonstrates how startling mutual fund performance changes can be when shareholder taxes are considered. Section 5 discusses risk-adjusting the mutual fund returns. Section 6 looks at the aggregate tax saving that might be possible if mutual funds distributed less realized capital gains and allowed shareholders to defer taxes. Section 7 examines the contention that a fund's turnover rate is related to its posttax performance, while Section 8 concludes and summarizes.

2. DATA

We compiled a data set of mutual funds using the following criteria. As of October 31, 1992, the fund must have been classified as a Growth or Growth and Income fund in the Morningstar Mutual Funds data base. Since the tax effects we wish to consider should compound over a long time horizon, we required the fund to have been in existence for at least 10 years. Each fund meeting these criteria was ranked on total net assets with the largest 150 funds chosen.² Our largest fund is Fidelity Magellan

² There is certainly a selection bias induced by choosing, *ex post*, the 150 largest funds. Since our focus is how taxes change the relative rankings of mutual funds and not on quantifying the return of a representative fund over a particular horizon, this bias should not affect our basic conclusions.

with \$20.55 billion in total assets. The 150th fund, Eaton Vance Stock, had total assets of \$86.91 million as of October 31, 1992.³ As of December 31, 1992, these funds had combined total net assets of \$209,104.1 million, or 69.4 percent of the total reported in Table 1.

Investment Company Data Institute (ICDI) maintains a data base of mutual fund disbursements dating back approximately 30 years. For each fund in our sample, we obtained from ICDI month-end net asset values (NAV), dividend and realized capital gains payments per share, "ex" dates for the dividend and capital gains distributions, reinvestment prices for the distributions, and split dates and ratios.⁴ NAVs are net of expenses and fees but not adjusted for any load charges. The data cover the entire history of the mutual fund or the 30-year span 1963–1992 for those funds in existence for more than 30 years.⁵ Sixty-two of the 147 funds had data for the entire 30-year period, and 126 funds had been operating for at least 20 years.

The data from ICDI combine short-term and long-term realized capital gains distributions in the reported capital gains distribution amounts. Under the United States Tax Code, however, short-term realized capital gains are taxed as ordinary income and do not qualify for the preferential tax treatment historically afforded long-term realized capital gains. The ICDI data, then, overstate the posttax return of those funds that distribute short-term capital gains.

The capital gains distributions reported by ICDI are checked against both Moody's *Annual Dividend Record* and Standard and Poor's *Annual Dividend Record*. Both the Moody and Standard and Poor's publications report the short-term and long-term realized capital gains distributions by mutual funds. If either issue reports short-term capital gains, then the capital gains distribution reported by ICDI is adjusted to reflect the respective short-term and long-term realized capital gains components.⁶

³ Three funds had to be deleted from our original list. In November 1992, the Shearson Appreciation Portfolio Fund was merged into the Shearson Appreciation Fund. Data acquisition problems led to the deletion of the General Electric S&S Program Fund. Finally, Lexington Corporate Leaders is set up as a unit investment trust whose distributions include nontaxable return of capital. Since our data do not break down the taxable and nontaxable portions of their payments to shareholders, we deleted Lexington Corporate Leaders from our list of funds. Our total sample, therefore, consists of 147 growth and income funds.

⁴ We are indebted to Bill Crawford, Sr. of ICDI for making this data available to us.

⁵ ICDI data for four funds are available only quarterly from January 1963 through September 1967 and are not included in our analysis over that time period.

⁶ Prior to the late 1970s, short-term capital gains breakouts in the Moody's and Standard and Poor's publications are more limited, a fact that could result in some short-term gains still being treated as long-term gains in the data.

3. RETURN CALCULATIONS

We define the monthly total return as the percentage change in value at the end of the current month of one mutual fund share purchased at the end of the previous month. Returns are calculated on both a pretax and a posttax basis. Intuitively, the pretax measure reinvests the entire distribution while the posttax measure reinvests only the after-tax payment. In notational terms:

$$R_t = \frac{(\text{shares}_t * NAV_t - NAV_{t-1})}{NAV_{t-1}}, \quad (1)$$

where

$$\text{pretax: } \text{shares}_t = 1 + \sum_{i=1}^{n_{dt}} \frac{Divs_{it}}{PD_{it}} + \sum_{j=1}^{n_{ct}} \frac{KGains_{jt}}{PKG_{jt}}$$

$$\text{posttax: } \text{shares}_t = 1 + \sum_{i=1}^{n_{dt}} \frac{(1 - \tau_{dt})Divs_{it}}{PD_{it}} + \sum_{j=1}^{n_{ct}} \frac{(1 - \tau_{ct})KGains_{jt}}{PKG_{jt}}.$$

Returns are adjusted for splits as necessary. NAV_t is the fund's net asset value at the end of month t . $Divs$ and $KGains$ are the dividend and realized capital gains payments per share that are reinvested at prices PD and PKG , respectively. There are n_{dt} dividend distributions and n_{ct} capital gains distributions in a given month. Dividends are taxed at the marginal rate on ordinary income, τ_{dt} , and realized capital gains are taxed at τ_{ct} . A provision of the tax code is that long-term realized capital gains distributed by mutual funds are taxable as long-term gains, even though, at the time of the distribution, an individual might not have held her mutual fund shares for the time normally required for an investment to qualify for the preferential long-term rate.

Since our data report "ex"-dates instead of actual payment dates, our methodology assumes that a distribution's "ex"-date and payment date fall within the same month. For the long horizons we consider in this paper such an assumption should not adversely affect accumulations. In addition, the tax code currently states that any distribution announced in October, November, or December is treated as income in that calendar year even if the payment is not disbursed until January of the following calendar year. The tax code, therefore, treats any payment with a December "ex"-date, when many distributions are made, as payable in December.

There are two additional assumptions embedded in equation (1). First, all distributions are taxed immediately. Second, for multiple distributions on different days within the month, we assume that the fund has already gone "ex." In other words, the new shares received from re-investing one payment have no claim on any further distributions made within the same month.

Posttax returns are computed for investors in three different tax brackets. Using the Internal Revenue Service's *Statistics of Income*, we calculate the median adjusted gross income (AGI) for each year between 1963 and 1989. Median AGI is assumed to grow at the rate of the consumer price index from 1990 to 1992. These calculations lead to a value of \$21,314 for median AGI in 1992. We define a "low-tax" individual as having taxable income equal to the median AGI less the standard deduction for married persons and three exemptions. We feel that such an individual probably represents the low end of the mutual fund marketplace. A "middle-tax" and "high-tax" individual are similarly defined using three times median AGI and 10 times median AGI, respectively. Investors are assumed to retain their tax status (low, middle, high) throughout the analysis.⁷

Table 2 presents the annual marginal tax rates for ordinary income and long-term realized capital gains based on the taxable income of each of our three individuals. These rates are compiled from Pechman (1987) and various issues of IRS Publication No. 17. Throughout most of this period, the first \$200 of dividend income could be excluded from taxation for married persons filing jointly. We assume that any dividends paid by the mutual funds in our analysis are not subject to the dividend exclusion.

Prior to the 1986 tax reform, an individual was allowed to exclude 60 percent of his realized long-term capital gains (50 percent prior to November 1978) from the ordinary income tax, and the marginal tax rate on gains was limited to a maximum of 25 percent for most investors. During the 1970s, however, gains in excess of \$50,000 were subject to an additional tax on the excluded portion of the gain, resulting in a higher marginal rate that varied with the amount of the realized gain (see Minarik, 1981). We assume that realized capital gains for each of our individuals total less than \$50,000 annually over this period. Beginning in 1987, realized long-term capital gains are taxed at the maximum of the ordinary income rate or 28 percent.⁸

⁷ We consider only federal tax rates. Returns can differ even more when state and local taxes are taken into account.

⁸ The reader should note that our posttax return calculations discount realized capital gains distributions by the full marginal tax rate on long-term gains. This implicitly assumes that the taxpayer either does not realize capital losses on other assets or uses losses to offset realized gains from investments other than the mutual fund.

TABLE 2.
Marginal Tax Rates for Three Investor Types

Year	Low tax rate		Middle tax rate		High tax rate	
	Income	K Gains	Income	K Gains	Income	K Gains
1963	20	10	26	13	59	25
1964	17.5	8.75	27	13.5	53.5	25
1965	16	8	25	12.5	50	25
1966	17	8.5	25	12.5	50	25
1967	17	8.5	25	12.5	53	25
1968	18.275	9.1375	26.875	13.4375	56.975	25
1969	18.7	9.35	30.8	15.4	58.3	25
1970	19.475	9.7375	28.7	14.35	56.375	25
1971	17	8.5	28	14	55	25
1972	19	9.5	28	14	55	25
1973	19	9.5	28	14	58	25
1974	19	9.5	32	16	58	25
1975	19	9.5	32	16	58	25
1976	19	9.5	32	16	60	25
1977	19	9.5	36	18	60	25
1978	19	^a	36	^a	62	^a

1979	18	7.2	37	14.8	64	25
1980	18	7.2	43	17.2	64	25
1981	17.775	7.11	42.4625	16.985	63.2	25
1982	16	6.4	39	15.6	50	20
1983	15	6	35	14	50	20
1984	16	6.4	33	13.2	49	19.6
1985	16	6.4	33	13.2	49	19.6
1986	16	6.4	33	13.2	49	19.6
1987	15	15	28	28	38.5	28
1988	15	15	28	28	33	28
1989	15	15	28	28	33	28
1990	15	15	28	28	33	28
1991	15	15	28	28	31	28
1992	15	15	28	28	31	28

Source: Pechman (1987) and Internal Revenue Service, Statistics of Income (SOI), various years.

^a The marginal tax rate on long-term capital gain realizations in 1978 is the lesser of 50 percent of the income rate or 25 percent for realizations made from January through October. For November and December capital gains realizations, the marginal rate is the lesser of 40 percent of the income rate or 25 percent.

Taxable income for the low-tax-rate individual is computed as the median adjusted gross income (AGI) (computed from SOI) less the standard deduction for married couples and less three exemptions. Taxable incomes for the middle- and high-tax-rate individuals are comparably calculated using three times median AGI and 10 times median AGI, respectively. Median AGI for 1990-1992 is held constant (in real terms) at the 1989 level.

4. RESULTS

We generate mutual fund returns under three different scenarios. The pretax return is relevant for investors whose assets are in tax deferred accounts (e.g., IRAs and Keoghs). The posttax return is most relevant for those taxable investors with long holding periods or who plan to pass their assets through their estate.⁹ The liquidation value is the amount of money an investor would receive if he were to liquidate his mutual fund position at the end of the holding period. This value best describes the opportunities for those investors divesting assets at the end of the period for a specified purpose (e.g., tuition payments, down-payment for a house, purchasing a yacht). The liquidation value for a \$1 initial investment is calculated by the following formula:

$$L_T = \prod_{t=1}^T (1 + R_t) - \tau_{cT} \left(\prod_{t=1}^T (1 + R_t) - \text{basis}_T \right);$$

$$\text{basis}_T = 1 + \frac{1}{NAV_0} \left(\sum_{i=1}^{n_{dt}} (1 - \tau_{dt}) \text{Divs}_{it} + \sum_{j=1}^{n_{ct}} (1 - \tau_{ct}) \text{KGains}_{jt} \right) \quad (2)$$

$$+ \frac{1}{NAV_0} \sum_{t=2}^T \left[\left(\prod_{k=1}^{t-1} \text{shares}_k \right) \left(\sum_{i=1}^{n_{dt}} (1 - \tau_{dt}) \text{Divs}_{it} + \sum_{j=1}^{n_{ct}} (1 - \tau_{ct}) \text{KGains}_{jt} \right) \right].$$

R_t and shares_k are the monthly posttax return and shares calculated from equation (1), and NAV_0 is the share price of the fund at the beginning of the holding period. The number of shares are adjusted for splits as necessary. equation (2) shows that the end-of-period liquidation value, L_T , is simply the accumulation of the posttax returns less the amount of taxes that must be paid at the time of sale on previously unrealized capital gains.¹⁰

Table 3 presents our results for the 30-year period 1963–1992. This table shows the end-of-period value of a \$1 investment made at the beginning of the holding period. The top half of the table shows that the median result for the 62 mutual funds with 30-year returns was that \$1 in 1963 would have grown to a pretax \$21.89 by the end of 1992. Over this period, investing \$1 in the S&P 500 index would have resulted in

⁹ Because of the step-up in basis at the time of death, any unrealized capital gains would not be taxed if an heir were to immediately liquidate a decedent's holdings.

¹⁰ As shown in equation (2), the liquidation value would be greater than the posttax value if the accumulated basis is greater than the posttax value of the mutual fund at the time of liquidation. Implicitly this assumes full loss offsets.

TABLE 3.
Mutual Fund Returns, 1963–1992 (nominal value of \$1 investment)

Method	Regime	Number of funds = 62 (Pretax S&P 500 = 22.13)				Std Dev
		TBills	Min	Median	Max	
Pretax	N/A	6.91	8.45	21.89	76.03	12.99
Posttax values	Low tax	4.97	7.06	16.51	61.02	10.01
	Mid tax	3.69	5.97	12.75	50.14	8.05
	High tax	2.53	4.63	9.82	40.26	6.41
Liquidation values	Low tax	4.97	6.59	16.04	55.56	9.24
	Mid tax	3.69	5.29	12.04	41.49	6.77
	High tax	2.53	4.46	8.93	33.17	5.34

Table 3 reports the value of a \$1 initial investment at the end of the 30-year period concluding in 1992. TBills is the terminal value of a T-Bill investment, while all of the other columns refer to results obtained with the sample of 62 mutual funds with 30-year returns described in the text. Posttax values are computed for hypothetical investors facing three different sets of tax rates (low, mid, high) and assume that the investment is not sold at the end of 1992. The liquidation values assume that the mutual fund investment is sold at the end of 1992 and any remaining capital gains (or losses) are taxed according to the tax rates at the end of 1992.

\$22.13. The numbers for the median posttax numbers are \$16.51, \$12.75 and \$9.82 for the low, middle, and high income investors respectively. The median liquidation values are \$16.04, \$12.04, and \$8.93 for taxable holders in our three different tax circumstances.¹¹ The differences in actual return over the 30-year period to a taxable investor are immediately evident. The high-tax investor who reinvests only after-tax distributions has an accumulated wealth per dollar invested on the order of 45 percent of the amount published by the funds in their prospectuses and promotional material.

Table 3 also reports the value of a \$1 investment in Treasury Bills (T-Bills) (the risk-free investment in our analysis) over the relevant period.¹² Notice that over the 30-year period, even the worst performer in our mutual fund sample did better than T-Bills. For tax-free investors, the last place fund outdistanced T-Bills by 22 percent, the median fund produced 217 percent more, and the best fund resulted in 11 times as much wealth per dollar invested as T-Bills.¹³ The return multiples rela-

¹¹ Table 3 presents results for the median fund within each category. Because of differences in the pretax and posttax rankings, the median fund is not the same mutual fund under each case.

¹² S&P 500 and T-Bill returns are taken from Ibbotson (1993).

¹³ Because of the selection bias in our data set, it is quite likely that the worst growth or growth and income mutual fund investment over this period involved an investment in a fund that was not included in our data.

tive to T-Bills are larger for taxable investors since T-Bills are more heavily taxed than equity mutual funds, at least at the federal level. This is because T-Bill interest is taxed at full ordinary rates (as are dividends), while realized capital gains have usually been taxed at lower rates (See Table 2).¹⁴ Even if a high-tax-rate individual had the misfortune of investing in the worst of our funds, she would have 84 percent more money accumulated (77 percent if she were to liquidate her position) between 1963 and 1992 than if she had invested and accumulated with T-Bills. The median and best performing funds generate 3.9 and 15.9 times more wealth (3.5 and 13.1 times as much wealth upon liquidation) for the high-tax investor than T-Bills.

Figure 1 illustrates the degree to which the pre- and posttax rankings of our funds differ (for a high-tax investor) over the 30-year horizon.¹⁵ To facilitate comparisons across different horizons where the number of funds change, we report the rankings in terms of percentiles. The worst fund has a percentile rank of zero, and the best fund ranks at the 100 ($1 - 1/n$) percentile, where n is the number of funds ranked.¹⁶ Figure 1 plots a fund's after-tax percentile ranking versus its pretax percentile ranking. If tax considerations did not change the relative performance of these mutual funds, then the rankings would be unchanged, and all funds would show up on the 45-degree line shown in Figure 1. One glance at the figure indicates that shareholder level taxes cause considerable changes in the relative ranking of funds. Obviously, funds appearing above the 45-degree line have a higher after-tax ranking than before-tax ranking and vice versa.

Table 4 presents summary statistics on the ranking differences shown in Figure 1. The movement of an average fund in our sample is plus or minus 9.8 percentile points. The maximum change in relative position was Franklin Growth, which improved its rank by an enormous 43.6 points going from the 19.4 percentile on a pretax basis to the 63.0 percent-

¹⁴ The monthly post-tax return on T-Bills is $R_t = (1 - \tau_{dt}) \text{TBill}_t$, where TBill_t is the nominal, pretax T-Bill return in month t .

¹⁵ A previous version of this paper entitled "Ranking Mutual Funds on an After-Tax Basis" (National Bureau of Economic Research Working Paper No. 4393), provides an appendix detailing the individual performance of the funds pictured in Figure 1.

¹⁶ We also considered another performance measure based on a fund's return relative to the median return. Fund X, for example, might have a pretax value 20 percent greater than the median pretax value, while its posttax value might be 10 percent above the median posttax value. We would then say Fund X lost 10 percentage points relative to the median. This median performance measure, unlike the percentile rankings, might be able to distinguish large relative movements if funds' returns are tightly bunched. In the text we report the percentile differences. Results for the median measure are available from the authors upon request.

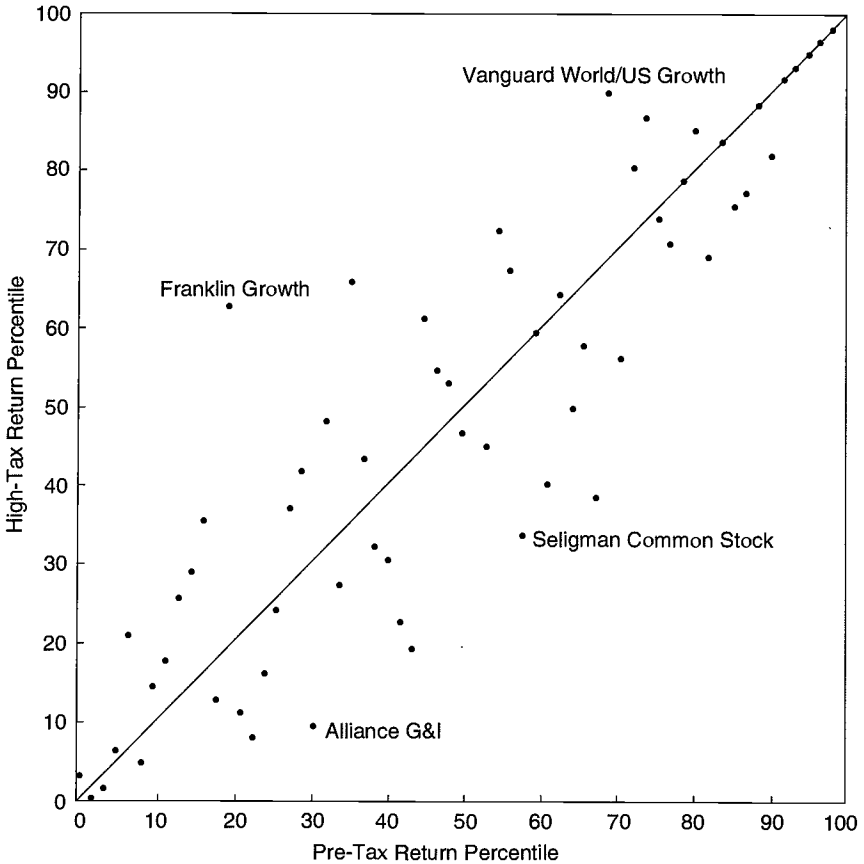


FIGURE 1. *Pretax versus high-tax percentile ranks—30-year period (1963–1992).*

tile for a high-tax investor.¹⁷ For a high-tax investor, Franklin Growth returned an average of 8.27 percent each year over the 1963–1992 period. In contrast, the fund that performed at the 19.4 percentile on a posttax basis (National Stock) yielded its investors a 6.95-percent after-tax annual return. Franklin Growth's percentile ranking movement, therefore, represented an additional return of 132 basis points per year (after tax)

¹⁷ Using the median measure discussed in footnote 14, Franklin Growth gained 37.8 percentage points relative to the median over the 1963–1992 period. Franklin Growth performed 27.9% below the median on a pretax basis but 9.9 percent higher than the median for a high-tax investor.

TABLE 4.
Percentile Differences of Rankings over a 30-Year Period (1963–1992)
Number of Funds = 62(absolute deviations)

Comparison	Tax regime	Max(-)	Med	Max(+)	Mean
Posttax	Low	9.7	1.6	12.9	3.1
vs.	Mid	19.4	4.8	25.8	6.2
pretax	High	29.0	8.1	43.6	9.8
Liquidation	Low	8.1	1.6	8.1	2.4
vs.	Mid	12.9	4.8	14.5	4.9
pretax	High	29.0	8.1	25.8	8.6
Liquidation	Low	6.5	1.6	4.8	1.8
vs.	Mid	16.1	1.6	9.7	3.1
posttax	High	17.7	1.6	9.7	2.9

Max(-) reports the percentile point reduction for the fund with the largest relative ranking decrease. Med is the median absolute value difference among the sample of funds. Max(+) gives the percentile point increase for the fund with the largest relative ranking increase. Mean is the average absolute percentile change within the sample.

over the 1963–1992 horizon. Overall, our interpretation of Figure 1 and Table 4 is that the pretax rankings, which are the rankings usually provided to investors, are inappropriate for providing necessary performance information to taxable investors.

As shown in Table 4, the difference between the pretax and the posttax rankings of funds over the 30-year horizon is still considerable for intermediate-tax-rate investors. The average absolute value percentile change between pre- and posttax rankings is 6.2 points for our middle-tax-rate investor, with the maximum change still being Franklin Growth, which gained 25.8 percentiles. The additional return for our midtax investor in this case represented a 111-basis-point increase per year in after-tax return over the amount the investor would have received if Franklin Growth's pretax and midtax percentile ranking remained constant. As one would expect, the difference between the pre- and posttax rankings is not terribly great for our low-tax-rate investor where the average percentile change (in absolute value) drops to 3.1 points.

The liquidation value rankings for the 1963–1992 period are much closer to the posttax rankings than the pretax rankings as shown in Figure 2 for high-tax investors.¹⁸ Figure 2 contains two panels. The left panel plots a fund's liquidation value ranking versus pretax ranking, whereas the right panel plots a fund's liquidation ranking versus posttax ranking. The mean absolute value change between liquidation value and

¹⁸ Previous versions of this paper contain similar graphs for midtax and low-tax individuals.

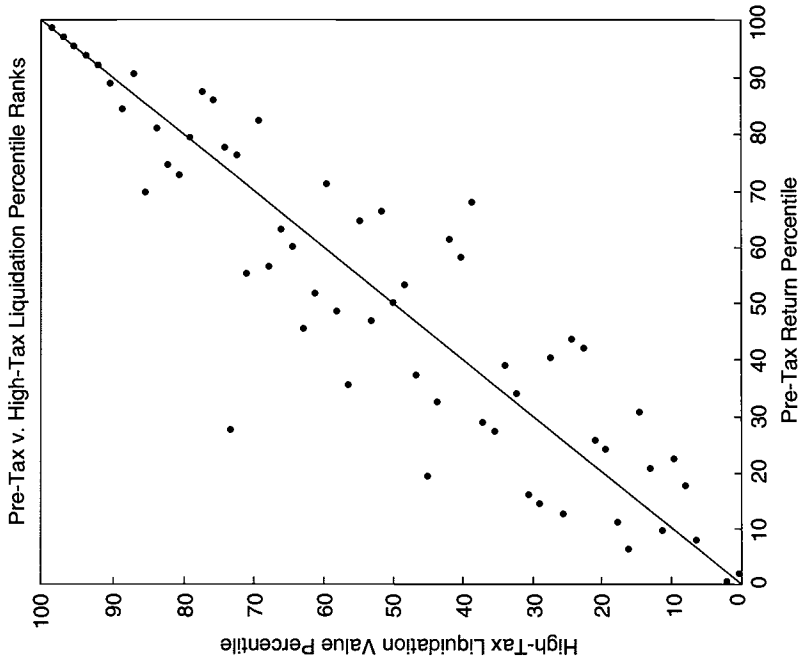
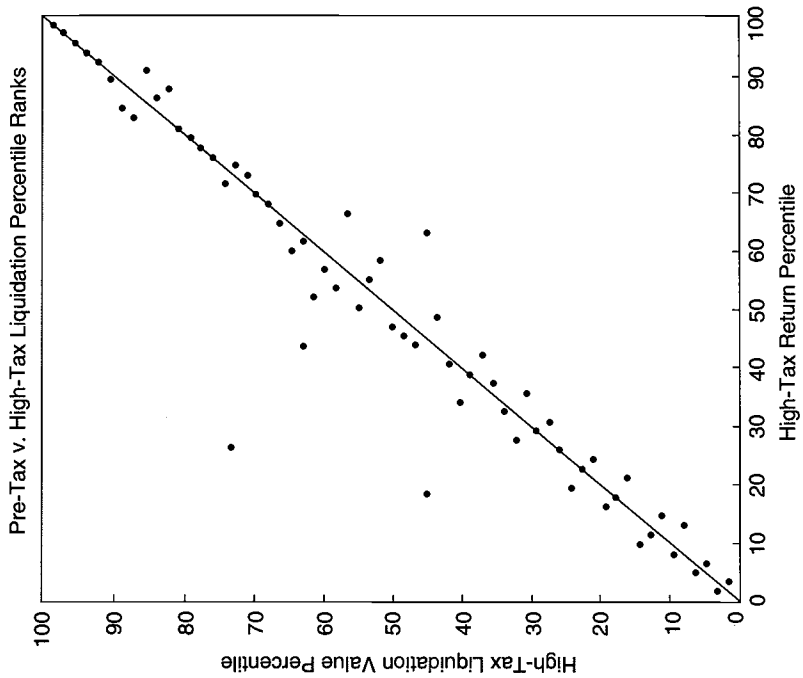


FIGURE 2. Rank comparisons with high-tax liquidation values—30-year period (1963–1992).

pretax return rankings reported in Table 4 is 8.6 points for the high-tax investor, 4.9 points for the midtax people, and only 2.4 percentile points for the low-tax investor. The average absolute value change in position between the liquidation ranking and the posttax ranking was roughly three percentiles for both the high- and middle-tax-rate investors but only 1.8 points for the low-tax asset holder.

These results show that the differences between the various after-tax rankings and the published pretax rankings are large over a 30-year horizon, particularly for middle- and high-income investors. A natural question that arises is whether it takes a 30-year period for these tax differences to become important. To provide the answer, we separately calculated mutual fund performance rankings for the three 10-year subperiods within our 30-year data set.

Our conclusion is that the ranking differences are still considerable for 10-year intervals. For example, the average absolute value change in rank for high-tax investors between the posttax and pretax rankings was roughly five percentile points for the first two 10-year periods and 8.7 points (7.1 and 3.7 points for midtax and low-tax investors, respectively) for the most recent 1983–1992 period. The performance rank changes over the most recent decade, in fact, are not that much smaller than for the entire 30-year period. Once again we see that the effect of shareholder taxation is quite important for the midtax investor but much less significant for the low-tax household. Figure 3 plots the posttax return rank for high-tax investors against the pretax return rank for the 1983–1992 period.¹⁹ The largest increase in rank between the two concepts was 35.4 percentile points (Fidelity Value), which moved from the 17.0 percentile (pretax) to the 52.4 percentile (high-tax). Fidelity Value earned 10.94 percent per year for a high-tax investor, whereas if it would have remained in the 17th percentile, the fund would have earned only 9.08 percent annually. The biggest downward movement was Putnam Growth & Income (A), which fell a total of 37.4 percentile points, a movement that represented a 247-basis-point decrease relative to the after-tax return Putnam would have posted had it maintained its pretax return percentile.

The case of Vanguard's Index 500 Fund illustrates how a tax conscious fund could improve its relative performance. The Index 500 Fund follows the passive strategy of investing in the component stocks of the Standard and Poor's 500 (S&P 500) index in the same value-weighted proportions as the index. This fund realizes capital gains for three main

¹⁹ A detailed list of the 147 mutual funds with computed pretax and posttax returns is available from the authors.

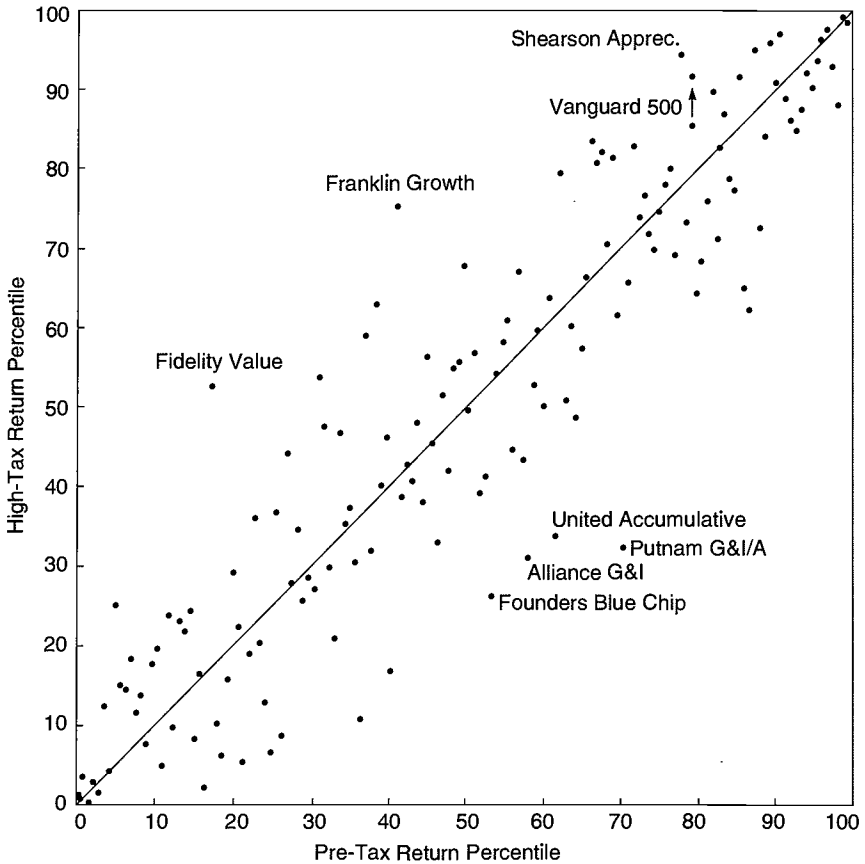


FIGURE 3. *Pretax versus high-tax percentile ranks—10-year subperiod (1983–1992).*

reasons: constituent changes in the S&P 500, share repurchases of the 500 firms, and net redemptions by the fund's shareholders. The relatively passive investment approach of the Index 500 Fund resulted in the posttax return ranking 6.1 percentiles higher than the pretax return (85.0 percentile posttax versus 78.9 percentile pretax) for the high-tax investor over the 1983–1992 period. As depicted in Figure 3, if the Vanguard 500 portfolio could have deferred all of its realized capital gains (without sacrificing any pretax return), it would have ended up at the 91.8 percentile for the high-tax investor. Dickson and Shoven (1994) show that managing such a fund to defer all capital gains realizations is feasible. While Dickson and Shoven (1994) are able to replicate the pretax return

of the Index 500 within a few basis points, the after-tax return to high-income investors is increased by as much as 97 basis points per year relative to the Index 500. This result is solely from the deferral of all realized capital gains that Dickson and Shoven (1994) show could be easily attained through the use of simple accounting and trading strategies over the sample period.²⁰

Mutual fund rankings change dramatically not only for taxable versus nontaxable investors but also for high-tax versus low-tax investors. Table 5 clearly shows there is a considerable difference in the standings of the various funds in our sample for the two different types of investors. The average absolute movement between low-tax and high-tax percentile ranking is 7.2 points (6.6 points upon liquidation) over the 1963–1992 period. The relative movements are still considerable over each of the three 10-year subperiods. In the 1983–1992 period, for example, the average movement is plus or minus 5.4 points (4.3 points upon liquidation). This table suggests that it is not merely sufficient to choose one tax rate to measure after-tax returns. Individual taxable investors, instead, should be able to determine relative rankings based on their own marginal rates.

5. RISK-ADJUSTED RETURNS

All of the above rankings consider only the average return over the 10- and 30-year horizons and do not take risk into account. We recognize that investors are risk averse and, in general, would be willing to trade some expected return for increased safety. Since our focus is on the relative rankings when shareholder taxation is taken into account, any risk-adjusting measure we use must allow for straightforward comparison on both a pre- and posttax basis.

The usual starting point when one risk adjusts mutual fund returns is the method first employed by Jensen (1968). Jensen uses the capital asset pricing model (CAPM) as a benchmark to determine whether or not a mutual fund manager is able to engage in successful stock selection and market timing activities. The assumptions underlying the CAPM approach are that the investor holds the market portfolio, is only interested in the riskiness of the entire portfolio, and, therefore, needs to ascertain the contribution of each asset to the riskiness of the total portfolio. One problem with this approach is that many mutual fund investors are not

²⁰ As Dickson and Shoven (1994) show, a tax conscious fund that tracks the S&P 500 is not an index fund in the usual sense, since it has to deviate slightly from the true portfolio weights in order to offset realized capital gains with capital losses while adhering to the wash-sale restrictions.

TABLE 5.
High-Tax versus Low-Tax Percentile Differences over a 30-Year Period and 10-Year Subperiods
(absolute deviations)

		30-year horizon (1963-1992) Number of funds = 62			
	Max(-)	Median	Max(+)	Mean	
Posttax return	21.0	6.5	30.6	7.2	
Liquidation return	24.2	6.5	19.4	6.6	

10-year subperiods													
		Subperiod 1 (1963-1972) Number of funds = 62				Subperiod 2 (1973-1982) Number of funds = 126				Subperiod 3 (1983-1992) Number of funds = 147			
	Max(-)	Med	Max(+)	Mean	Max(-)	Med	Max(+)	Mean	Max(-)	Med	Max(+)	Mean	
Posttax return	12.9	3.2	9.7	3.4	11.1	3.2	11.9	3.7	23.1	4.1	20.4	5.4	
Liquidation return	6.5	1.6	8.1	2.2	11.9	2.4	11.9	3.0	26.5	3.4	15.0	4.3	

Max(-) reports the percentile point reduction for the fund with the largest relative ranking decrease. Med is the median absolute value difference among the sample of funds. Max(+) gives the percentile point increase for the fund with the largest relative ranking increase. Mean is the average absolute percentile change within the sample.

nearly this diversified. For many mutual fund investors, their entire equity portfolio is a particular diversified mutual fund, and the riskiness of their portfolio is given by the variance (or standard deviation) of that fund's returns.

A second problem for our analysis is that the usual CAPM model of riskiness does not take shareholder level taxation into account. In order to adjust posttax mutual fund returns for risk, we would need to make some statement about the realized capital gains of the market portfolio. This calls for some knowledge of the effective tax rate on accrued gains, and we do not think it is straightforward to make such a calculation.

One possibility might be to use one of our funds, the Vanguard Index 500, as a measure of the before-tax and after-tax market returns. Since the investment strategy of the Index 500 is to track the S&P 500 (the benchmark portfolio in many empirical CAPM studies), its performance is an obvious candidate for a market portfolio. Two potential difficulties, however, come to mind. First, consider a fund that, at all times, holds the same stocks and makes the same trades as the benchmark portfolio. On a pretax basis, the familiar CAPM β will equal unity (and α will equal zero), as expected. On an after-tax basis, though, the estimates of α and β will differ from zero and one respectively if the sole difference between this fund and the benchmark fund is the months in which distributions are made.²¹

Another possible risk-adjusting method would be to use the consumption CAPM (CCAPM). The argument for such an approach is that the riskiness individuals are really concerned about should be the variability of their total wealth including such assets as human capital, Social Security wealth (and other government programs such as welfare and unemployment insurance), and housing. The principal advantages of the CCAPM are that, with this broad definition of wealth, almost everyone is somewhat well diversified, and, consumption, by definition, is an after-income tax concept. As with the market portfolio CAPM, however, the CCAPM does not allow for easy comparisons since the after-tax consumption portfolio would also have to be used as the pretax benchmark in order to consider changes in relative performance. In addition, the CCAPM has not fared well in most empirical tests of the model's implications.

Because of the difficulties noted above, the risk measure we decide to employ is Sharpe's (1966) reward-to-variability measure (a.k.a. Sharpe

²¹ This result rings true for any mutual fund relative to the benchmark. If the fund under consideration makes taxable distributions in different months than the benchmark fund, then the estimates of α and β will depend on the distribution months in addition to actual differences in stock selection, market timing ability, or "risk" of the fund.

ratio), which is simply the ratio of the average monthly excess return of the mutual fund to the standard deviation of its monthly excess returns. This measure is admittedly crude. Implicitly, it assumes that the mutual fund is the whole portfolio of the investor or, at least, that its riskiness is assessed separately from that of other assets. While this sounds extreme, it may not be further from the truth than the assumptions of the standard CAPM involving the level of diversification in the investor's portfolio. The main advantage of the Sharpe ratio, however, is that it can easily be calculated on a posttax basis as well as on a pretax basis, allowing relative comparisons to be made.

The results of the Sharpe ratio are depicted in Figure 4. The top half of the figure plots pretax average excess return against pretax standard deviation, whereas the bottom half plots both concepts for an upper-income, taxable investor. The importance of adjusting returns for risk can be seen by the considerable horizontal spread in the funds in both panels. (Their monthly standard deviations range from roughly 3.5 percent to 7.5 percent.) We implicitly assume that investors have the opportunity to invest in T-Bills (and also to borrow at that rate).

The optimal fund for all investors is the one with the largest ratio of average excess return to standard deviation. If you consider running a line from each point in Figure 4 to the origin, the highest ranked fund will be the one whose corresponding line has the steepest slope. Every high-tax investor, regardless of their degree of risk aversion, should choose this fund (Mutual Shares) in preference to all others.²² The line through the fund represents the opportunities that investors have by choosing different combinations of this fund and T-Bills.

Figure 4 shows that our earlier story that taxes dramatically affect relative rankings is still true when the rankings are risk adjusted. The largest improvement in ranking due to tax considerations is Franklin Growth. The top half of the figure shows that roughly 80 percent of the funds offered a better opportunity set (when combined with T-Bills) than does Franklin Growth. However, the bottom half of the figure shows that only about 35 percent of the funds offered a better after-tax opportunity set than Franklin Growth. Tax considerations caused it to "pass" more than half of the funds that ranked higher on a pretax basis.

The amount by which the risk-adjusted rankings vary from tax effects are very similar to the non-risk-adjusted returns. For the 30-year horizon, the average absolute value change in the high-tax, risk-adjusted rankings was 9.2 percentiles compared to 9.8 percentiles shown in Table 4 for the non-risk-adjusted case. In the 10-year subperiod from 1983 to

²² We are, of course, using ex post returns and make no claim about future performance.

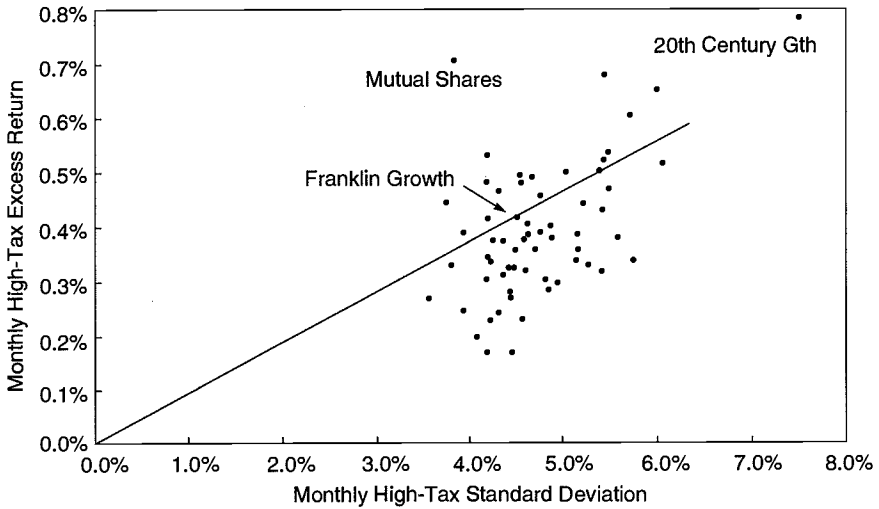
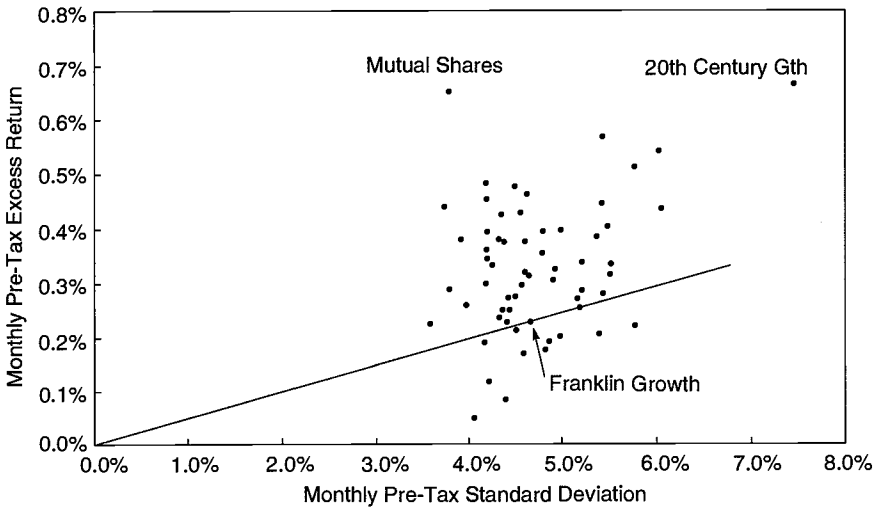


FIGURE 4. High-tax versus pretax risk adjusted returns—30-year period (1963–1992).

1992, the average change was 7.7 percentiles for the reward-to-variability ratios versus 8.7 percentiles for the average returns. The differences between midtax and low-tax ranking movements are even smaller between the risk-adjusted and non-risk-adjusted cases.

6. THE POSSIBLE AGGREGATE TAX SAVING

A natural question to ask is how much money could investors save in taxes if mutual funds became more conscious of shareholder level taxes and adopted strategies to defer the net realization of capital gains? Of course, it must be recognized from the outset that the flip side of shareholder tax saving is a loss of revenue to the Treasury Department. Estimating the aggregate amount of the possible tax saving is difficult in the extreme, and we can only hope to arrive at the approximate order of magnitude.

The first step in making the calculation is to examine the amount of capital gains distributed by mutual funds. Table 6 displays the dollar amount of net realized capital gains distributions of equity, bond, and income funds from 1970 to 1993. It should be emphasized that this is a much broader universe of funds than the sample of large growth and growth and income funds discussed in all of the other analyses of this paper. Nonetheless, the vast bulk of the net realized capital gains in the larger set of funds result from net realized appreciation on common stock positions and could conceivably be eliminated or deferred if the managers of the mutual funds were so inclined. The Potential Gross Tax Saving column of Table 6 results from a multiplication of the Net Realized Capital Gains figures by the estimated fraction of equity mutual fund assets held by taxable shareholders (58.6 percent) as of the end of 1992 and then by the marginal personal income tax rates for realized capital gains for our middle-income investors from Table 2. These numbers bound from above the amount of money that investors might save. In fact, the saving would certainly be less for several reasons.

If mutual funds permit their shareholders to defer capital gains by managing the portfolio in such a way that capital gains distributions are not required, then shareholders will have larger realized capital gains when they liquidate or exchange their mutual fund shares. By and large, the shareholders would be postponing taxes, not eliminating them. Table 7 provides some information about how long people remain in a given mutual fund. A survey of those who fully or partially redeemed their shares in 1991–1992 indicated the distribution of tenures with the fund as shown in Table 7.²³ The median person in the sample had been

²³ It should be noted that there is a selection bias problem with this data source. The sample is taken from those who sell their shares, whereas we would like to have information about how much longer a person who currently owns a fund (and who is able to defer capital gains because of the policies of the mutual fund manager) will continue to own it. It must be acknowledged that the information in Table 7 is only suggestive, but it is not exactly appropriate to the problem at hand.

TABLE 6.
Distributions to Mutual Fund Shareholders and Gross Potential Tax Saving: Equity, Bond, and Income Funds (millions of dollars)

Year	Dividends	Net realized capital gain	Potential gross tax saving
1970	1,414.1	922.1	77.5
1971	1,330.7	775.5	63.6
1972	1,286.6	1,402.6	115.1
1973	1,300.2	943.3	77.4
1974	1,563.2	484.3	45.4
1975	1,449.1	219.2	20.6
1976	1,580.0	470.9	44.2
1977	1,789.7	634.8	67.0
1978	2,116.0	710.6	75.0
1979	2,451.4	929.0	80.6
1980	2,669.0	1,774.2	178.8
1981	3,143.0	2,697.2	268.5
1982	3,832.9	2,350.1	214.8
1983	4,981.0	4,391.6	360.3
1984	7,238.4	6,019.2	465.6
1985	12,864.2	4,984.6	385.6
1986	22,273.4	17,463.8	1,350.9
1987	31,823.7	22,975.6	3,769.8
1988	31,078.3	6,345.3	1,041.1
1989	34,096.1	14,802.8	2,428.8
1990	32,917.7	8,054.6	1,321.6
1991	35,322.2	14,116.1	2,316.2
1992	59,177.0	22,335.6	3,664.8
1993	73,302.4	36,105.3	5,942.2

Source: First two columns, 1994 *Mutual Fund Fact Book*, p. 112; third column, authors' computations.

TABLE 7.
Tenure in Fund From Which Shares Were Redeemed, 1991-1992

Tenure	Full redemptions (percent)	Partial redemptions (percent)
2 Years or less	24	23
3-4 Years	20	18
5-6 Years	23	17
7-9 Years	19	20
10+ Years	14	22

Source: 1993 *Mutual Fund Fact Book*, p. 85.

with the fund for five years. Fifty-four percent of the sellers were fully liquidating their positions, whereas 46 percent were only selling part of their holdings. It is difficult to know whether people would be significantly less inclined to sell their holdings or switch between funds if that would trigger a large and taxable realization of previously accrued capital gains. Certainly, given the current practice of most funds of realizing gains quickly after they accrue, tax considerations have not been a major consideration in determining the behavior summarized in Table 7. If the turnover of mutual fund shares remained approximately what is shown in Table 7, the Treasury would still collect, at least in present-value terms, taxes on most of the capital gains realized within mutual funds. Five years of deferral would save the investor in present value terms a maximum of 25 percent of the bill, meaning that the investors' gains and the Treasury's loss would only be roughly one-fourth the potential gross magnitudes shown in Table 6. There are even additional complications, of course.

If mutual funds allowed their investors the opportunity to defer capital gains by refraining from annual net realized capital gains distributions, the shareholders would then have some discretion about the tax year in which to realize the gains. A household whose income fluctuated sufficiently would have the opportunity to realize the gain when their marginal tax rate was lower (15 percent rather than 28 percent, e.g.). Some investors would be able to postpone the realization until retirement, which often involves lower marginal tax rates. Finally, due to the step up of cost bases at death, there is some probability that a deferral of capital gains taxes will result in the effective elimination of the taxation of the gains. It is considerations such as these that make impossible a precise estimate of the magnitude of the tax advantage of mutual funds permitting the deferral of capital gains.²⁴

Our guess is that investors could gain between one-quarter and one-half of the potential gross tax saving shown in Table 6. These savings would be available annually and in 1993 would have been between \$1.5 and \$3 billion. This would be the impact of allowing mutual fund shareholders to benefit from the same tax strategies that people who hold stocks directly have employed for decades. No government regulations need to be changed, simply the behavior of the money managers who are, after all, paid handsomely for acting in the best interests of their shareholders.

It is interesting to note that the level of awareness of shareholder level

²⁴ In the analysis of Section 4 we assumed that investors' incomes were relatively constant (i.e., high-income investors always had high incomes, etc.). Widely fluctuating incomes (and therefore widely fluctuating marginal income tax rates) would have complicated the previous analysis of the changes in pre- and posttax percentile rankings as well.

taxes seems to be increasing in the mutual fund industry. Charles Schwab introduced the Schwab 1000, the first fund that we are aware of that explicitly managed realized capital gains in April 1991. The firm now offers three index funds with this feature (the Schwab 1000, the Schwab Small-Cap Index Fund, and the Schwab International Index Fund). Recently, Vanguard has introduced its Tax-Managed Portfolios, which include a growth and income fund, a capital appreciation fund, and a "balanced" portfolio. It will be interesting to see the market receptivity to these tax sensitive offerings.

7. AFTER-TAX RETURNS AND TURNOVER

We have shown that shareholder level taxation can dramatically change the relative rankings of mutual funds. An important issue for taxable investors deciding between the plethora of funds available is whether a fund's future relative posttax performance movements might be inferred from its investment policies. Our basic intuition is that the amount a fund "turns over" its portfolio should be related to the amount of its taxable distributions to shareholders. Many of our funds churn their portfolios significantly over a single year (100 percent is not uncommon), possibly realizing capital gains as they accrue and, thus, subjecting their shareholders to tax liabilities. Those funds that do not turnover their portfolios and more closely adhere to a buy-and-hold strategy, the argument continues, realize less of their accrued gains, allowing their investors to defer capital gains taxes into the future.

The relationship between turnover and mutual fund performance has been discussed by a couple of authors. Ippolito (1989) presents evidence of no relationship between turnover and pretax performance net of fees and expenses. In other words, Ippolito finds that funds with high turnover rates earn sufficiently greater risk-adjusted returns to offset the costs (other than taxes) associated with increased turnover. Jeffrey and Arnott (1993) consider the relationship between turnover and after-tax returns. Assuming a 35-percent marginal tax rate for realized capital gains over the 1982–1991 period, they report a statistically significant correlation coefficient of approximately 0.4 between a fund's average turnover and the amount of taxes due from its capital gains distributions.

Jeffrey and Arnott (1993) conclude that taxable investors should consider funds with relatively passive investment strategies (i.e., low turnover) to avoid large tax liabilities. A conclusion that high turnover funds may be unwise for shareholders subject to taxation, however, does not immediately follow. Consider a mutual fund with a high turnover rate that is successful at stock selection and market timing activities. A higher

pretax return (if one assumes a dividend yield commensurate with other funds) implies there are more capital gains to realize. Hence, this fund will most likely impose a larger capital gains tax burden on its shareholders relative to other funds. However, if its pretax return is sufficiently large, taxable investors may still want to invest in this fund even if the shareholders will have to pay large amounts of realized capital gains taxes.

To consider the effect of turnover on after-tax performance, we computed average annual turnover rates for each of our funds over the 10-year period 1983–1992 from Morningstar. Consistent with our intuition, the fund with the lowest average turnover (Franklin Growth—3.2 percent) jumped from the 40.8 pretax percentile to the 75.5 percentile for a high-tax investor over the 1983–1992 period. The fund with the highest average turnover (Fidelity Value—296 percent), however, also dramatically improved its posttax performance, jumping 35.4 percentiles (the largest increase over this period).

Table 8 reports sample correlation coefficients between average turnover rates and the ratio of posttax value (liquidation) to pretax value.²⁵ The numbers in parentheses are *P* values under the null hypothesis of zero correlation between after-tax performance and average turnover. The *P* value represents the minimum level of statistical significance at which we would reject the null hypothesis. We use ratios of posttax to pretax measures instead of rank changes since the best performing funds typically outdistance other funds by large amounts, and their rankings may not change even if their posttax to pretax ratios are lower than those of most other funds. If our intuition is correct, we would expect negative correlations between turnover rates and the posttax to pretax performance ratios. Table 8 shows that the intuition is basically correct. All of the computed correlations are negative, and most correlations are significant at the 5% level. Overall, for high-tax investors over this period, the correlation between average turnover and the ratio of high-tax to pretax value was -0.20 (*P* value = 0.015).²⁶ These results suggest that turnover can be an indicator of a fund's relative posttax performance.

Table 8 is certainly not a formal test of the relationship between turn-

²⁵ Because of the problems associated with risk-adjusting after-tax returns discussed in the previous section, we do not consider the relationship between turnover and risk-adjusted performance. This analysis is consistent with Jeffrey and Arnott (1993).

²⁶ The corresponding table in previous versions of this paper showed that, in general, turnover was not strongly correlated with posttax performance. Those earlier calculations were undertaken before we had broken out the short-term versus long-term capital gains. The fact that the turnover correlations are significant when short-term capital gains are explicitly accounted for strengthens our argument that many managers sacrifice their shareholders' after-tax returns not only by realizing capital gains but also by realizing relatively more tax disadvantaged short-term capital gains instead of long-term capital gains.

TABLE 8.
*Turnover Correlations over a 10-Year Subperiod (1983–1992) (p-values
in parentheses)*

		Growth 96	Growth and income 51	Overall 147
Number of funds				
Average turnover (%)		84.83	65.99	78.29
Posttax value over Pretax value	Low	-0.16 (0.130)	-0.33 (0.018)	-0.17 (0.045)
	Mid	-0.16 (0.110)	-0.34 (0.015)	-0.17 (0.037)
	High	-0.20 (0.057)	-0.39 (0.005)	-0.20 (0.015)
Posttax Liquidation over Pretax Value	Low	-0.25 (0.015)	-0.20 (0.165)	-0.20 (0.013)
	Mid	-0.25 (0.012)	-0.18 (0.194)	-0.20 (0.014)
	High	-0.29 (0.003)	-0.33 (0.019)	-0.25 (0.003)

Average turnover is the annual average of turnover percentages reported by Morningstar. Turnover data for 1992 were not yet available, and a nine-year average was computed for 27 of the funds in our sample.

The numbers in the table refer to the correlation across the sample of funds between a fund's average turnover and its ratio of posttax value (liquidation) to pretax value over the 10-year sample period. The numbers in parentheses represent *P* values under the null hypothesis of zero correlation.

over and relative posttax performance. In fact, funds with higher turnover rates may still be good investments for the tax conscious investor. This point is illustrated by the example of Vanguard's Index 500 Fund discussed earlier. If this fund were able to defer all capital gains disbursements to its shareholders, it would have performed even better on an after-tax basis. Deferring capital gains relative to the S&P 500 index, however, necessarily implies that the fund would turn over its portfolio at a greater rate (7 percentage points per year in Dickson and Shoven, 1994).

8. CONCLUSION

Mutual funds seem to pay very little attention to shareholder level taxes. Funds publish long-term performance statistics that ignore taxes, and the financial press ranks them on these pretax measures. Most funds realize large fractions of their accrued capital gains each year. This type of investment policy eliminates an investor's opportunity to defer taxes

on accrued capital gains and adversely affects after-tax returns to a fund's shareholders.

We have calculated both pre- and posttax mutual fund returns for individuals in different tax brackets over various investment horizons. While it is not surprising that taxes lower the accumulations that one can achieve with mutual fund investments over all holding periods, our calculations show that the relative rankings of funds on a posttax basis (and on our liquidation basis) differ quite dramatically from the published pretax rankings. That is, taxable investors cannot easily and reliably determine which of two funds would have offered them a better after-tax return with the publicly available information. While we feel that more work is necessary to account satisfactorily for risk, this consideration does not dampen our main conclusion that after-tax performance rankings are very different from pretax performance rankings.

Our analysis of the aggregate impact of the failure of mutual funds to tax manage their portfolios indicates that the consequence is that the present value of investors' tax bills is raised considerably. In 1993, when mutual funds distributed \$36 billion in net realized capital gains, taxpayers probably paid more than \$1 billion in extra (present value) taxes over and above what would have been required with tax sensitive management of the funds.

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