An Empirical Examination of Tax Factors and Mutual Funds' Stock Sales Decisions

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1. Introduction

Main question: Influence of capital gains taxes on mutual fund managers' decisions to sell stocks.

- Do mutual funds and tax-exempt institutions differ in their propensity to sell individual stocks according to the institutions'
  - tax status,
  - differences in capital gains triggered per dollar of stock sold,
  - the time remaining until the tax year-end, and
  - the year-to-date net realized gain.

Data:

- mutual funds' end-of-quarter positions in specific securities from 1988 to 1992
- similar data for tax-exempt pension funds, colleges and foundations.

2. What is your prior?

2.1 It looks important

- Dickson and Shoven (1993): after-tax proceeds to a taxable mutual fund investor over a ten-year period are as much as 55% less than the pretax proceeds implied by the raw returns
- regulatory interest

2.2 But, there are impediments

- compensated on assets under management; performance rewards are on before-tax returns
- taxable and non-taxable money are commingled (no clienteles)
- distribution accounting
  - growing funds have low gains realizations
  - overhang aversion
- other economic factors
  - liquidity needs
  - improve diversification
  - trade on private information
  - manager's "strategy"
- behavioral biases

3. Prior research

3.1 Market-wide

- studies of stock price movements and trading volume (e.g., Seida and Wempe (2000))

3.2 Individuals

- Feldstein and Yitzhaki (1978) and Feldstein, Slemrod and Yitzhaki (1980), who study the effect of capital gains taxation on the turnover in individuals' stock portfolios.
- Poterba (1987) and Seyhun and Skinner (1994) examine the capital gains and losses reported in samples of individual tax returns.
- Odean (1998) examines broker records and finds behavioral biases.

3.3 Institutions

- Collins, Geisler, and Shackelford (1997) find that insurance companies realize more capital gains when tax rates are lower, regulatory constraints are more binding, and accounting earnings are lower.
- Gibson, Safieddine, and Titman (2000) find that in aggregate, mutual funds sell significantly more loser stock (defined as the 20% of stocks with poorest returns over the prior twelve months) late in the fiscal year.
- Barclay Pearson and Weisbach (1998) infer from aggregate portfolio cash flows and net asset value changes that fund managers seek a target overhang for the fund.

4. Findings

- the likelihood of sale of a stock is related to the gain (or loss) realized on sale.
- responses to tax factors vary over institution type and time until the end of the fiscal year.
- responses are consistent, which is necessary for tax clienteles.
- some evidence that YTDG affects gain realizations.
- differences remain after controlling for past returns and earnings

5. Four primary questions:

(1) Do stock sales depend upon the capital gain triggered?

(2) Does the sensitivity of trading decisions to the gain or loss realized on sale of a security vary over the course of the year?

(3) Is the response of mutual funds to tax factors consistent from year to year?

(4) Is the likelihood of sale of a stock influenced by the cumulative capital gains realized by the fund in the year to date?

6. Setting

- high (28%), holding-period independent, stable capital gains tax rate
- estimate the basis of each security held by each institution to capture the idiosyncratic tax effect of different purchase prices for each stock held by an institution
- Growth vs. balanced and income vs. colleges, foundations and pensions.
- Defer gains; recognize losses.
  - The tax benefit is large and the non-tax costs are small when a gain (loss) realization is deferred (accelerated) from the last day (first day) of one fiscal year to the first day (last day) of the next (previous) one.

7. Data and tax rules

7.1 Taxation of mutual funds

- Regulated investment companies
- 216 growth funds, 105 income and balanced funds, 13 colleges or foundations, and 20 pensions.
  - about $\frac{1}{3}$ of 1991 Directory of Mutual Funds universe.
- Average quarterly price for 3,120 stocks.
- 25,116 distinct quarter-stock combinations and 258,366 observations.
- HIFO or average cost?

Table 1
Summary of sale and no sale events by HIFO layer.

Number of		*Sale Into Layer*					
Layers	*No Sale*	1	2	3	4	≥ 5	*Total*
1	85,108	30,257					115,365
2	45,330	6,217	7,891				59,438
3	24,174	3,180	1,498	2,267			31,119
4	14,932	2,048	916	484	742		19,122
≥ 5	24,848	4,473	1,712	1,048	569	672	33,322
Total	194,392	46,175	12,017	3,799	1,311	672	258,366

Table 2
Descriptive statistics.

	N	*Mean*	*Std. Dev.*	*Percentile* 25th	*Median*	75th
Panel A: Portfolio characteristics						
Number of positions[a]						
Growth	2,242	60	72	30	41	67
Balanced and income	1,144	50	30	29	46	63
Colleges, foundations, and pensions	339	198	254	40	67	294
Net gain realized in year as a fraction of portfolio value[b]						
Growth	556	.0575	.0964	.0113	.0431	.0914
Balanced and income	286	.0438	.0865	.0080	.0298	.0593
Colleges, foundations and pensions	84	.0255	.0381	.0039	.0191	.0421
Net unrealized gain as a fraction of portfolio value[c]						
Growth	556	.1615	.1533	.0567	.1746	.2705
Balanced and income	286	.0882	.1391	.0218	.1027	.1709
Colleges, foundations and pensions	84	.1893	.1476	.1133	.2084	.2862

Table 2, continued
Descriptive statistics.

	N	*Mean*	*Std. Dev.*	*Percentile* 25th	*Median*	75th
Panel A: Portfolio characteristics						
Unrealized gain as a fraction of portfolio value[d]						
Growth	556	.2289	.1073	.1435	.2213	.3001
Balanced and income	286	.1608	.0872	.1010	.1534	.2127
Colleges, foundations and pensions	84	.2522	.0858	.1835	.2533	.3200
Unrealized loss in year as a fraction of portfolio value[e]						
Growth	556	-.0674	.0663	-.0892	-.0444	-.0216
Balanced and income	286	-.0726	.0706	-.0971	-.0490	-.0273
Colleges, foundations and pensions	84	-.0629	.0803	−.0747	−.0410	−.0260

Table 2, continued
Descriptive statistics.

	N	*Mean*	*Std. Dev.*	*Percentile* 25th	*Median*	75th
Panel B: Regression variables						
SALE—Fraction of stock position sold[f]						
Growth	134,340	.1643	.3384	.0000	.0000	.0693
Balanced and income	57,070	.1541	.3328	.0000	.0000	.0000
Colleges, foundations and pensions	66,956	.0365	.1439	.0000	.0000	.0000
GAIN—Gain realized if entire position sold, as a fraction of portfolio value[g]						
Growth	134,340	.00299	.00914	-.00026	.00076	.00409
Balanced and income	57,070	.00218	.00819	-.00039	.00098	.00388
Colleges, foundations and pensions	66,956	.00100	.00657	-.00002	.00006	.00066
TURN—Portfolio turnover[h]						
Growth	2,242	.1185	.1212	.0305	.0811	.1705
Balanced and income	1,144	.1175	.1388	.0240	.0710	.1602
Colleges, foundations and pensions	339	.0241	.0281	.0044	.0174	.0327

Table 2, continued
Descriptive statistics.

	N	*Mean*	*Std. Dev.*	*Percentile* 25th	*Median*	75th
Panel B: Regression variables						
AB0—Contemporaneous excess stock return[i]	25,116	.0105	.2528	-.1162	-.0116	.1008
UE0—Contemporaneous unexpected earnings[j]	25,116	.0013	.1684	-.0070	.0010	.0058

Table 3
Pearson correlation coefficients of regressors. $N = 258{,}366$

(p-values appear beneath coefficients)

	GAIN	TURN	AB0	AB1	AB2	$UE0$	$UE1$	$UE2$
SALE	-0.0466	0.3845	-0.0140	0.0147	0.0138	-0.0080	-0.0049	0.0016
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0124	0.4293
GAIN		0.0064	0.1927	0.1133	0.0820	0.0362	0.0166	0.0279
		0.0012	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
TURN			0.0545	0.0666	0.0434	0.0050	0.0093	0.0114
			0.0001	0.0001	0.0001	0.0106	0.0001	0.0001
AB0				-0.0164	-0.0144	0.1062	0.0410	0.0343
				0.0001	0.0001	0.0001	0.0001	0.0001
AB1					-0.0176	0.0833	0.1229	0.0133
					0.0001	0.0001	0.0001	0.0001
AB2						0.0374	0.0415	-0.0163
						0.0001	0.0001	0.0001
UE0							0.1443	0.0605
							0.0001	0.0001
UE1								0.0710
								0.0001

8. Regression

8.1 Variables

- SALE=0, 77%; = (0, 1), 14%; = 1, 9% ⇒ tobit.
- GAIN if all sold, as a fraction fo market value

8.2 Tobit equation

$$
\begin{aligned}
SALE_{ist} = \sum_{j=1}^{3} \Big(& \delta_{1,j}\beta_{1,j} GAIN_{ist} + \delta_{2j}\beta_{2j} GAIN_{ist} \\
& + \delta_{3j}\beta_{3j} GAIN_{ist} + \delta_{4j}\beta_{4j} GAIN_{ist} \Big) \\
& + \gamma_1 TURN_{it} \\
& + \gamma_2 AB0_{st} + \gamma_3 AB1_{st} + \gamma_4 AB2_{st} \\
& + \gamma_4 UE0_{st} + \gamma_5 UE1_{st} + \gamma_6 UE2_{st} \\
& + \tilde{\epsilon}_{ist},
\end{aligned}
$$

Table 4
Tobit regression of stock sales on GAIN and control variables.

	Variable	*Quarter*	*Predicted sign*	*Coefficient*	*p-value*
Growth funds					
	GAIN	1	-	-6.0499	0.0001
	GAIN	2	-	-7.9832	0.0001
	GAIN	3	-	-8.2659	0.0001
	GAIN	4	-	-4.1720	0.0001
Balanced and income funds					
	GAIN	1	?	3.3256	0.0195
	GAIN	2	?	-0.7504	0.6716
	GAIN	3	?	-1.2316	0.4794
	GAIN	4	?	-0.8334	0.5996
Colleges, foundations, and pensions					
	GAIN	1	0	3.4653	0.0579
	GAIN	2	0	-0.1892	0.9240
	GAIN	3	0	2.0914	0.2509
	GAIN	4	0	1.0261	0.4840

Table 4 continued
Tobit regression of stock sales on GAIN and control variables.

	Variable	*Quarter*	*Predicted sign*	*Coefficient*	*p-value*
Control variables	TURN		+	4.6910	0.0001
	AB0		-	-0.1401	0.0001
	AB1		-	-0.0642	0.0011
	AB2		-	0.0174	0.1178
	UE0		-	-0.1549	0.0037
	UE1		-	-0.0945	0.0523
	UE2		-	-0.0085	0.8651
Number of observations: 258,366					

Observations for each stock position held by every institution over twelve quarters are pooled in a single regression. The dependent variable, SALE, is the fraction of the institution's position sold in the quarter. It ranges between 0 and 1. The first explanatory variable, GAIN, is an estimate of the gain that would be realized for tax purposes if the stock were sold, scaled by the market value of the portfolio. A separate coefficient on the GAIN variable is estimated for each institution type and calendar quarter. Each GAIN variable is non-zero only for observations from the corresponding quarter and institution class.

9. A big deal?

- If selling the stock would trigger a gain equal to 1% of the portfolio's value, the expected value of SALE is .1434. If, on the other hand, selling the stock would trigger a loss of 1% of the portfolio's value, the expected value of SALE is .1760, or about 23% more.
- An excess return of −50% in the quarter (AB0) implies the expected value of SALE is .1734, while an excess return of 50% implies the expected value of SALE is .1457, all else equal.
- Unexpected earnings of −50% implies the expected value of SALE is .1749, while unexpected earnings of 50% implies SALE is .1457.
- An unrealized gain or loss on a given security equal to 1% of the market value of the portfolio has a similar effect on SALE as an excess return over one quarter (or unexpected earnings) of about 50% in magnitude.

Table 5
Tobit regression of stock sales on GAIN and control variables:
1991 and 1992 observations partitioned on response to GAIN in 1990.

		Low		*Middle*		*High*	
Variable	*Quarter*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Growth funds							
GAIN	1	-17.5781	0.0001	-7.0041	0.0002	-3.1093	0.0804
GAIN	2	-10.9622	0.0001	-3.6426	0.0498	-4.2086	0.0253
GAIN	3	-19.2266	0.0001	-8.5774	0.0001	-2.6887	0.1156
GAIN	4	-9.9132	0.0001	0.4604	0.7814	0.9745	0.5353
Balanced and income funds							
GAIN	1	-6.2668	0.0856	1.4313	0.6157	10.7816	0.0056
GAIN	2	-13.0513	0.0027	-1.6013	0.5651	7.1735	0.0668
GAIN	3	-20.5765	0.0001	-1.3770	0.6507	10.7173	0.0087
GAIN	4	-16.8165	0.0001	2.4100	0.3559	7.8650	0.0428
Colleges, foundations and pensions							
GAIN	1	-3.1739	0.1839	8.3053	0.0409	43.4383	0.0001
GAIN	2	-2.3903	0.3931	3.0385	0.5422	22.4560	0.0027
GAIN	3	-1.1579	0.7383	3.4610	0.4550	26.3114	0.0002
GAIN	4	-3.2948	0.1788	13.6752	0.0010	24.6273	0.0001

Table 5
Tobit regression of stock sales on GAIN and control variables:
1991 and 1992 observations partitioned on response to GAIN in 1990.

		Low		*Middle*		*High*	
Variable	*Quarter*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Control variables							
TURN		4.7766	0.0001				
AB0		-0.1395	0.0001				
AB1		-0.0473	0.0348				
AB2		-0.0319	0.1536				
UE0		-0.1181	0.0488				
UE1		-0.0969	0.0838				
UE2		-0.0087	0.8833				
Number of observations:		165,984					

The dependent variable is SALE. The GAIN, TURN, AB, and UE variables are defined in table 2.

Table 6
Tobit regression of stock sales on GAIN, YTDG, GAINxYTDG,
and control variables for quarter 3.

		Growth		*Balanced and Income*		*Colleges, Foundations, and Pensions*	
Variable	*Quarter*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
GAIN	3	-5.3369	0.0001	1.2613	0.5279	2.0301	0.2972
YTDG	3	1.3501	0.0001	0.2976	0.4149	11.8278	0.0001
GAINxYTDG	3	-58.6478	0.0003	-41.2389	0.0052	57.4558	0.1963
TURN		4.8995	0.0001				
AB0		-0.2049	0.0001				
AB1		0.0319	0.3795				
AB2		-0.1473	0.0003				
UE0		-0.0700	0.5972				
UE1		0.0074	0.9585				
UE2		0.0803	0.2480				

Number of observations: 65,356

10. Conclusions

- There are significant relationships between unrealized gains and losses and stock sales by growth mutual funds.
- The findings are consistent with the existence of identifiable tax clienteles within the mutual fund industry.
- Effect of unrealized gains on growth funds' stock sale decisions varies somewhat over the fiscal year. Strongest in the third calendar quarter.
- Interaction of YTDG and GAIN in the third calendar quarter.