



American Finance Association

Tax-Induced Trading: The Effect of the 1986 Tax Reform Act on Stock Market Activity

Author(s): Paul J. Bolster, Lawrence B. Lindsey, Andrew Mitrusi

Source: *The Journal of Finance*, Vol. 44, No. 2 (Jun., 1989), pp. 327-344

Published by: Blackwell Publishing for the American Finance Association

Stable URL: <http://www.jstor.org/stable/2328593>

Accessed: 26/11/2009 07:26

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/action/showPublisher?publisherCode=black>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



Blackwell Publishing and American Finance Association are collaborating with JSTOR to digitize, preserve and extend access to *The Journal of Finance*.

<http://www.jstor.org>

Tax-Induced Trading: The Effect of the 1986 Tax Reform Act on Stock Market Activity

PAUL J. BOLSTER, LAWRENCE B. LINDSEY, and ANDREW MITRUSI*

ABSTRACT

The end of favorable tax treatment for long-term capital gains caused investors to reassess traditional tax-induced trading strategies. This study compares trading behavior in December 1986 and January 1987 with previous years. Our results indicate that these tax code changes had a powerful effect on trading behavior. Relative trading volume was considerably higher in December 1986 for long-term winners but not significantly lower for long-term losers. Results also indicate altered trading patterns based on short-term gains in December 1986 and for long-term winners in January 1987.

THE MOST SWEEPING REVISION of the United States tax code in many years became law in September 1986. One key aspect of that law was the elimination of the favorable tax treatment of long-term capital gains. Under prior law, capital gains on assets held at least six months were generally¹ taxed at only forty percent of the rate applied to ordinary income. Under the new tax law, assets sold after December 31, 1986 are to be taxed, with a few exceptions,² at the same rate at which ordinary income is taxed. This change represented the largest capital gains tax rate increase in at least half a century.

The purpose of this study is to assess the short-run investor reaction to this change in the tax treatment of capital gains. The nearly four-month lag between the passage of the legislation and the effective date of the tax rate change gave investors ample opportunity to assess the law's consequences for their portfolios and adjust their behavior accordingly. Since investors are seeking to maximize the risk-adjusted after-tax return on their portfolio, this record increase in capital gains tax rates is likely to induce significant changes in investment strategy.

The extreme sensitivity of capital gains realizations to the capital gains tax rate by holders of common stock has been frequently demonstrated. A permanent, or long-term and recurring, investor response is evidenced by the findings of

* Bolster is from the College of Business Administration, Northeastern University. Lindsey is from the Department of Economics, Harvard University and is a Faculty Research Fellow at the National Bureau of Economic Research (NBER). Mitrusi is a Staff Economist at NBER. The authors wish to thank NBER for computational support. Partial support for Prof. Bolster was provided by a grant from the Research and Scholarship Development Fund at Northeastern University. We also wish to thank Marc Bremer and participants in the NBER Summer Institute seminar on Corporate Finance and Taxation for their helpful comments.

¹ Taxpaying investors with substantial capital gains income were often required to pay the Alternative Minimum Tax. This tax, levied at a rate of twenty percent, was applied to ordinary income as well as capital gains income.

² For calendar year 1987, the maximum capital gains tax rate was set at twenty-eight percent, although some taxpayers faced tax rates on ordinary income as high as 38.5 percent. Beginning in 1988, the distinction between these rates was eliminated.

Feldstein and Yitzhaki (1978), Feldstein, Slemrod, and Yitzhaki (1980), and Minarik (1981). The possibility of transitory, or short-term, investor response to tax changes in addition to the permanent effect has been established by Auten and Clotfelter (1979), Lindsey (1986), and the U.S. Treasury (1985).

Considerable study has focused on tax-induced trading at year end. Constantinides (1984) and others have argued that the optimal trading strategy for an investor is to realize losses by selling these assets prior to year end and to hold winners into the new tax year. Thus, reductions in tax liability could be claimed now, and new liabilities associated with winners could be postponed. Prior to 1986, this tax-induced trading strategy was even more lucrative for investors holding short-term winners and losers. Empirical investigations of this trading behavior are provided by Dyl (1977), Reinganum (1983), Givoly and Ovadia (1983), Lakonishok and Smidt (1986), and Slemrod (1986a,b). Although this evidence implies a significant amount of tax-induced trading by investors, Stiglitz (1983) presents alternative tax avoidance strategies which allow investors to avoid taxes altogether, and Poterba (1986) shows that most investors do not make use of tax-minimizing trading techniques anyway. These studies, to the extent that they address tax-induced year-end trading, are examinations of the permanent, albeit periodic, response to a stable capital gains tax structure.

Our study differs from earlier work on this subject in three important respects. First, earlier studies focused on investor behavior during periods of relatively stable capital gains tax rates. In contrast, this paper looks at the effects of a sharp discontinuity in the capital gains tax rate. Second, because of the stability of the capital gains tax rate, these earlier studies focused on a recurring distortion of normal investor behavior induced by a combination of the tax rate and the end of the tax year. This paper examines both the recurring, permanent effect and one which is unique to investor behavior in late 1986, the transitory effect. Finally, earlier studies made no distinction between stocks which had appreciated relatively recently and stocks which had appreciated over a long period of time. Given the period studied, no distinction was necessary. However, the tax changes in 1986 had an effect on stocks the appreciation (or depreciation) of which had been recent different from the effect on those stocks the price change of which was primarily a long-term phenomenon. We therefore introduce this added dimension to the analysis. With these three exceptions, this paper follows the analytic methodology developed by other authors.

The remainder of the paper is organized as follows. A model of investor behavior incorporating the change in capital gains taxation is developed in Section I. This section also contains a formal statement of the hypotheses. A description of data and methodology is provided in Section II. Empirical results are shown in Section III. A brief concluding section follows.

I. Why 1986 Is Different

The existing work on the effect of capital gains taxes on investor strategy has focused on behavior during periods of relatively constant capital gains tax regimes. The Tax Reform Act of 1986 offers the possibility of testing investor

sensitivity to a dramatic change in tax regime. To facilitate the analysis of this effect, we follow previous studies by assuming no transactions costs and a constant capital gains tax rate. Assets are assumed to be equally risky; hence, investors' decisions are based solely on after-tax expected returns. These returns are limited to capital appreciation. Tax arbitrage strategies based on derivative securities are not considered. The investor's basis, or price at purchase, is normalized to unity and

- R_0 = accumulated return to date on the existing asset,
- R_1 = expected future return on the existing asset,
- R_2 = expected future return on an alternative asset,
- c_0 = old capital gains tax rate,
- c_1 = new capital gains tax rate.

With a constant capital gains tax rate, a decision by an investor to sell an existing asset and buy an alternative asset requires that

$$(1 - c_0)(1 + R_0)(1 + R_1) + c_0 \leq (1 + (1 - c_0)R_0)(1 + (1 - c_0)R_2). \quad (1)$$

The total after-tax return for holding the current asset is expressed on the left, and the total after-tax return for switching assets is on the right. The key advantage to holding the existing asset is that no tax is paid currently. The entire accumulated value in the investor's current position is allowed to grow at rate R_1 . When the asset is finally sold, the entire return, $(1 + R_0)(1 + R_1) - 1$, is taxed at rate c_0 . (The c_0 term on the left side of equation (1) is to compensate for taxing the whole value of the asset, including the initial purchase price of unity, in the rest of the left-hand term.) On the other hand, selling and switching assets involves a current tax liability equal to $c_0 R_0$, which diminishes the value of the stockholder's position to be invested in the new asset. The rate of return on the new asset, R_2 , must therefore exceed the future rate of return on the existing asset to make a sale profitable. This extra return is expressed in equation (2):

$$R_1 \leq (1 - (c_0 R_0 / (1 + R_0))) R_2. \quad (2)$$

As long as the accumulated return in the existing asset, R_0 , is positive, then R_2 must exceed R_1 . The ratio of the return on the new asset to the return on the existing asset is a function of the capital gains tax liability owed as a share of the before-tax proceeds from the sale of the existing asset. Thus, the higher the capital gains tax rate, the greater the incentive to hold the existing asset. This effect is permanent and actually grows over time with R_0 as long as the existing asset is appreciating. For expository purposes, we will term this the permanent lock-in effect.

In December 1986, the investment calculus was complicated by the forthcoming increase in the capital gains tax rate. If the investor held the current asset, he or she would be subject to capital gains tax at the higher rate not only on his or her future return, but on the return already accumulated in the asset as well. On the other hand, sale of the asset would allow taxation of the existing return at a

lower rate. The new choice faced by the investor is given by equation (3) in the same context as that presented in equation (1):

$$(1 - c_1)(1 + R_0)(1 + R_1) + c_1 \leq (1 + (1 - c_0)R_0)(1 + (1 - c_1)R_2). \quad (3)$$

The key difference between the investor's choice in equation (1) and the choice given by equation (3) is that the total return on the existing asset will be taxed at c_1 if the asset is held. On the other hand, the existing return, R_0 , is taxed at the lower rate of c_0 if the asset is sold now and the proceeds reinvested. Note that the permanent lock-in effect still remains as the investor is left with a smaller portfolio value if he or she sells and pays the capital gains tax. However, the advantage of selling before the capital gains tax rises creates a separate effect, which runs in the opposite direction. This is clearly indicated by equation (4):

$$R_1 \leq (1 - (c_0R_0/(1 + R_0)))R_2 + ((c_1 - c_0)/(1 - c_1)(1 + R_0))R_0. \quad (4)$$

The first term on the right-hand side of equation (4) shows the permanent lock-in effect. It is identical to the right-hand side of equation (2). However, the temporary effect of a change in tax rates induces a second, transitory effect into the calculus. This is given by the second term in equation (4). This represents the tax savings (in terms of expected future return) by realizing the existing gains on the asset at the old law's lower tax rate. Since $c_1 > c_0$, if R_0 is positive, indicating that a gain has accumulated in the asset, then a positive incentive to sell is created. This positive incentive to sell helps to lower the value of R_2 needed to make selling more profitable than holding the existing asset. The actual decision to sell will depend on the relative values of the permanent lock-in effect and the transitory incentive to sell before the rate increases.

As a sidelight, the investor might choose to sell and then buy back his or her existing assets. In this case, the investor may expect that his or her current asset yields as high a return as any alternative asset, $R_1 = R_2$, but may still choose to sell because the existing return on the asset will be taxed at a substantially lower tax rate. Equation (5) illustrates the condition under which this may be true:

$$R_1 \leq (c_1 - c_0)/c_0(1 - c_1). \quad (5)$$

In prior Decembers, the permanent lock-in effect causes trading volume for long-term winners to be abnormally low. Tax-motivated trading in December 1986 should exhibit a different pattern from tax-motivated selling in earlier years. There is an increased incentive to sell to realize the existing gain on the asset at the low 1986 capital gains tax rate, c_0 , rather than at the impending rate, c_1 . However, as equation (4) demonstrates, it is by no means clear that this will produce a net incentive to sell in December, only a reduced incentive to hold. Thus, trading volume should not be as low as in previous years. This yields our first hypothesis:

HYPOTHESIS 1: *In December 1986, the drop in trading volume for long-term winners will be less severe than in previous Decembers.*

Conversely, the tax treatment of stocks which have declined over a long period of time should exhibit lower volume in December 1986 relative to previous

Decembers. This can be seen by contrasting equations (2) and (4) under the assumption that R_0 is negative. Under old law (equation (2)), there is a clear-cut incentive to sell a loser even if the expected return on the new asset, R_2 , is less than that on the existing asset, R_1 .³

Under the new tax law, this permanent incentive to sell remains. However, it should be noted that, under the old law, the tax rate on long-term losses was fifty percent of the ordinary rate, versus forty percent on winners. Thus, the effect on winners and losers need not be symmetric. We would also expect that there would be less effect of the law change on losers than on winners as the change in tax rates is less. Offsetting this permanent effect, the transitory effect from the tax change would cause the investor to be less likely to sell his or her losers since, R_0 being negative, they would be worth more next year at a tax rate of c_1 than this year at a tax rate of c_0 . As in the case of winners, it is not clear whether the permanent or transitory effects dominate.

HYPOTHESIS 2: In December 1986, the rise in trading volume for long-term losers will be less than in previous Decembers.

The situation for short-term capital gains is quite different. The old tax law only afforded lower capital gains tax rates to assets held at least six months. The tax rate on short-term capital gains was generally the same as the tax rate on ordinary income. Thus, in the case of short-term winners, there used to be two reasons not to sell during December. The first was the advantage to holding indicated by the permanent lock-in effect and the resulting deferral of taxes. The second reason was that the short-term asset would soon become a long-term asset, thus at least halving the effective tax rate. In the context of equation (2), the likelihood that a profitable switch sale can be made is greatly enhanced if the capital gains tax rate, c_0 , is halved.

The converse was true for short-term losers. Selling a short-term asset produced the greatest tax saving. Holding the asset entailed two costs: deferral of the tax benefits from selling a loser and the possible deferral of the asset until it became a long-term loss with a tax value only half that of a short-term loss.

Thus, the incentive to sell short-term losses and hold short-term winners was even stronger than the case for stocks held long term. Analysis of abnormal volume based on short-run price performance would therefore indicate an even stronger tax effect than would be indicated by longer term considerations. Short-term performance would only reinforce any tax motivations which investors possessed for stocks with similar longer term performance.

The Tax Reform Act of 1986 created ambiguity in this situation for trading during December 1986. Two offsetting effects resulted from the tax changes. First, the tax rate on short-term capital gains was scheduled to be reduced beginning on January 1, 1987. This would increase the incentives to hold stocks which had appreciated and to sell stocks which had declined over the short term. Second, the distinction between the short-term and the long-term capital gains tax rates was eliminated. This would remove one of the motives for holding winners and selling losers which existed in prior years.

³ Of course, if the investor feels this way, he or she can sell and then repurchase the same security thirty days later.

Although it is uncertain, *a priori*, which of these effects is stronger, an analysis of effective tax rates indicates that the second effect may dominate the first. Average marginal tax rates for 1986 and 1987 were generated using the National Bureau of Economic Research TAXSIM model.⁴ Limiting the analysis to taxpayers who reported receiving dividend income, the average marginal tax rate faced by investors on short-term gains was 21.0 percent and fell to 20.6 percent in 1987. Thus, the incentive to sell losers and hold winners in order to take advantage of a change in the short-term capital gains rate is relatively small. By contrast, the incentive to hold winners and sell losers before they were converted from short-term assets into long-term assets was considerably weakened. The long-term capital gains tax rate for these dividend recipients averaged only 9.4 percent under the old tax law but would rise to 19.3 percent under the new tax law. Thus, the incentive to hold a winner in anticipation of converting a short-term gain into a long-term gain was reduced from 11.6 percentage points under the old tax law to 1.3 percentage points under the new tax law.

On average, therefore, investors saw little increase in one motivation for holding a short-term winner and a considerable decrease in another incentive for holding a short-term winner. We would, therefore, expect a decrease in the normal pattern of holding short-term winners while selling short-term losers. Thus, the clear pattern of holding short-term winners and selling short-term losers should be weakened by these tax rate changes. This leads us to propose a third hypothesis:

HYPOTHESIS 3: The pre-1986 pattern of holding short-term winners and selling short-term losers at year end should be significantly weakened in 1986.

Finally, we consider the implications of these hypotheses for the likely volume pattern for January 1987. Effective on the first of that month, all capital gains were taxed at the new, higher rate of the new law. This produces two changes from the prior analysis of tax effects. First, the transitory effect, expressed by the second term in equation (4), disappears. Second, the magnitude of the permanent effect changes as the permanent tax rate rises from c_0 to c_1 .

These tax changes have strong implications for abnormal volume in January 1987. The presence of the transitory effect in December 1986 accelerated the sale of long-term winners which might have otherwise been sold during early 1987. Thus, the return to normal in January would imply a reduction in trading volume relative to other years. In addition, the rise in the capital gains tax rate in 1987 enhances the permanent lock-in effect of the tax system. This would also cause a reduction in trading volume. These two effects work in the same direction, causing us to propose a fourth hypothesis:

HYPOTHESIS 4: In January 1987, the decline in trading volume for long-term winners will be greater than in previous Januaries.

⁴ The National Bureau of Economic Research TAXSIM model is a computerized representation of the U.S. tax code which relies on highly disaggregated data provided by the Internal Revenue Service. The economists responsible for creating TAXSIM include Daniel Feenberg, Martin Feldstein, Lawrence Lindsey, and Andrew Mitrusi.

II. Methodology and Data

Tests of these hypotheses require measurement of the return, or gain, on various stocks for both a long-term and a short-term holding period, as well as the trading volume for these stocks during that holding period. Our objective is to group stocks into various portfolios by ranking their return and then comparing the year-end activity of the various portfolios to see if our hypotheses are supported.

We establish a short-term holding period of five months and a long-term holding period of twenty-three months terminating at the end of November for each year in the study.⁵ The short-term and long-term returns, *STR* and *LTR*, for the shares of firm *j* are

$$STR_j = (Price_{j,t-5}/Price_{j,t}),$$

$$LTR_j = (Price_{j,t-23}/Price_{j,t}),$$

where $Price_{j,t}$ is the November closing price for firm *j* in the year in question. This construction closely follows the measures of capital gains used by Lakonishok and Smidt (1986), allows the use of monthly prices, and isolates the effect of December trading.

Abnormal volume is assessed for every month under study using a methodology established by Dyl (1977). This requires a three-step procedure. First, a vector of firm-specific relative volume measures is established for a period of forty-eight consecutive months for each firm:

$$RVOL_{j,t} = VOL_{j,t} / \frac{1}{12} \sum_{t=12}^{t-1} VOL_{j,i}.$$

$VOL_{j,t}$ represents actual trading volume for firm *j* during month *t*. Thus, $RVOL$ represents the volume of shares traded during a particular month relative to the average monthly volume during the preceding twelve months. $RVOL_{m,t}$, or the relative trading volume for the entire market, is also established for each month:

$$RVOL_{m,t} = \frac{1}{n_t} \sum_{i=1}^{n_t} RVOL_{i,t},$$

where n_t is the number of firms for which $RVOL$ can be computed during month *t*.

The second step is the creation of the expected, or “normal”, volume of trading. This is done by estimating an OLS model of the form:

$$R\hat{VOL}_{j,t} = \hat{a}_j + \hat{b}_j(RVOL_{m,t}).$$

Estimates of a_j and b_j are derived using thirty-six months of relative volume

⁵ We also computed capital gains measures for holding periods of eleven and seventeen months. One problem with the eleven-month measure was that it was classified as short term during part of our period of analysis and long term in the remainder. Results derived from the seventeen-month measure are consistent with those derived using the twenty-three month (*LTR*) measure.

data for the firm and the market. These estimates are then used to estimate relative volume for the subsequent twelve-month period. The third step in the procedure, the measurement of abnormal volume, $AVOL_{j,t}$, is produced by subtraction:

$$AVOL_{j,t} = RVOL_{j,t} - R\hat{VOL}_{j,t}.$$

An abnormal volume measure of 0.10 indicates that volume is ten percent above its expected level, while a measure of -0.20 indicates that it is twenty percent below its expected level.

Once the vector of abnormal volume measures has been determined for a number of firms, the various capital gains measures are used to rank and partition the sample. This allows the examination of unusual trading behavior for securities with different performance records.

Monthly volume and price data are obtained from the PDE version of Compustat. $RVOL$ measures are derived for all firms listed on the NYSE or the AMEX using trading volume data for the period January 1976 through January 1987. Since the previous year's monthly volume data are needed to construct the $RVOL$ series for the current year, and three previous years of $RVOL$ data are needed to construct abnormal volume measures, the final sample includes abnormal volume for the years 1980–1986 for those firms with complete $RVOL$ data for any period of four consecutive calendar years. The resulting sample of firms varies from a high of 1578 in 1986 to a low of 1272 in 1980. Table I provides additional descriptive data for the sample.

The central concern of this study is to determine the transitory effects of the change in capital gains tax laws that occurred in 1986. To facilitate this analysis,

Table I
Number of Sample Firms, Returns, and
December Abnormal Trading Volume by Year
for the Period 1980–1986

Data were obtained from Compustat. Abnormal volume ($AVOL$) represents the difference between actual volume and volume predicted by a time series process. Short-term and long-term returns measure capital gains over a five-month period and a twenty-three-month period ending on the last trading day of November. The sample for a particular year includes all NYSE and AMEX firms with complete monthly trading volume and price data for the four preceding years. These data are obtained from the PDE version of Compustat.

	Mean Abnormal Volume	Median Abnormal Volume	Mean Short-Term Return	Mean Long-Term Return	Number of Firms
1980	0.0419	-0.0777	0.2680	0.8448	1292
1981	0.0992	-0.0198	-0.0842	0.6370	1319
1982	0.1456	-0.0614	0.3558	0.2821	1358
1983	0.0595	-0.0737	-0.0232	0.7189	1406
1984	0.0736	-0.0573	0.0216	0.2311	1456
1985	0.1009	-0.0821	0.0389	0.1437	1521
1986	0.1556	0.0214	-0.0593	0.4006	1578

Table II
December Abnormal Volume Means for Pooled Data
(1980–1985) on 7909 Firms and 1986 Data
on 1578 Firms

Firms are ranked by long-term capital gains and divided into groups using quintile ranges for the 1986 sample. Data were obtained from Compustat. Each group of three numbers in the abnormal volume (AVOL) column represents, from top to bottom, mean AVOL for the quintile, *t*-value, and number of observations. AVOL is the difference between actual volume and volume predicted by a time series process. Long-term return measures capital gains over a twenty-three-month period ending on the last trading day in November. *F*-values are provided to test for differences in mean AVOL for the pooled sample and the 1986 sample.

Long-Term Return Quintile	Pooled Data		1986		Difference	
	Abnormal Volume	Long-Term Return	Abnormal Volume	Long-Term Return	Abnormal Volume	<i>F</i> -Value
Low 1	0.2431 (12.16)** 1761	−0.3505	0.2587 (5.40)** 315	−0.4012	0.0156	0.09
2	0.1193 (3.87)** 2017	0.0442	0.1334 (2.91)** 317	0.0422	0.0141	0.03
3	0.0130 (0.80) 1691	0.3441	0.0973 (2.41)* 314	0.3524	0.0843	4.13*
4	−0.0139 (−0.57) 940	0.6269	0.0984 (3.20)** 317	0.6342	0.1123	6.13**
High 5	−0.0933 (−5.15)** 1500	1.6198	0.0248 (0.64) 315	1.3760	0.1181	7.41**

* Significant at the 0.05 level.

** Significant at the 0.01 level.

abnormal volume data for December during the years 1980–1985, a period of relatively stable tax laws, are pooled. This provides a large sample of December trading behavior to which December 1986 can be compared.

III. Results

A. Long-Term Performance and Trading Volume

The relationship between long-term capital gains and abnormal trading volume is summarized in Tables II–V. Mean abnormal volume data for the pooled data (1980–1985) and for 1986 are presented for each long-term capital gain quintile. To control for differences in the distribution of capital gains performance measures (*LTR* and *STR*) between the pooled sample and the 1986 sample, the long-term capital gain, or *LTR* (and later, the short-term capital gain, or *STR*) quintile ranges for the 1986 sample are used to classify the pooled data into five groups. Because the pooled data are matched to 1986 return levels, the five groups contain unequal numbers of firms. For expositional ease they are referred

Table III

January Abnormal Volume Means for Pooled Data (1981–1986) on 7875 Firms and 1987 Data on 1577 Firms

Firms are ranked by long-term capital gains as of December of the previous year and divided into groups using quintile ranges for the 1987 sample. Data were obtained from Compustat. Each group of three numbers in the abnormal volume (AVOL) column represents, from top to bottom, mean AVOL for the quintile, *t*-value, and number of observations. AVOL is the difference between actual volume and volume predicted by a time series process. Long-term return measures capital gain over a twenty-three-month period ending on the last trading day in November of the previous year. *F*-values are provided to test for differences in mean AVOL for the pooled sample and the 1987 sample.

Long-Term Return Quintile	Pooled Data		1987		Difference	
	Abnormal Volume	Long-Term Return	Abnormal Volume	Long-Term Return	Abnormal Volume	<i>F</i> -Value
Low 1	0.0230	-0.3454	-0.1561	-0.4012	-0.1791	0.89
	(0.29)		(-3.13)**			
	1732		315			
2	0.0260	0.0440	-0.1804	0.0430	-0.2064	3.64
	(0.62)		(-4.05)**			
	2015		316			
3	-0.2150	0.3440	-0.1831	0.3524	-0.1616	8.15**
	(-0.94)		(-4.17)**			
	1689		314			
4	-0.0946	0.6269	-0.2155	0.6342	-0.1209	5.83*
	(-3.66)**		(-5.48)**			
	939		317			
High 5	-0.1413	1.6198	-0.2665	1.3760	-0.1252	7.15**
	(-7.22)**		(-6.34)**			
	1500		315			

* Significant at the 0.05 level.

** Significant at the 0.01 level.

to as quintiles in the ensuing discussion. Below each entry in Tables II and III, the *t*-value and the number of firms in the quintile are displayed. This *t*-value assesses the hypothesis that the abnormal trading volume, or *AVOL*, mean for the quintile is significantly different from zero.

First, consider the pooled data in isolation. The pattern of means for the pooled data confirms the conventional, pre-1986 strategy of selling losers, creating positive abnormal trading volume, and holding winners, creating negative abnormal trading volume. The means are ordered monotonically in the expected direction. This confirms earlier findings of various authors regarding tax effects and year-end selling decisions.

The 1986 data, considered in isolation, illustrate a similar monotonic pattern, albeit with a minor “flattening” in the series between quintiles 3 and 4. However, all 1986 quintile means are positive, suggesting that December trading volume was abnormally high across our entire sample of stocks. This indicates that the transitory effect to realize capital gains before the tax rate increased overwhelmed the permanent lock-in effect. In the context of equation (4), the second term dominated the first term. The only caveat to this observation is the lack of statistical significance for the *AVOL* value in the very highest quintile. Thus, in

Table IV
December Abnormal Volume Medians for Pooled Data
(1980–1985) on 7909 Firms and 1986 Data
on 1578 Firms

Firms are ranked by long-term capital gains and divided into groups using quintile ranges for the 1986 sample. Data were obtained from Compustat. Each pair of entries in the abnormal volume (AVOL) columns represents the median AVOL within that quintile followed by the number of observations. AVOL is the difference between actual volume and volume predicted by a time series process. Long-term return measures capital gains over a twenty-three-month period ending on the last trading day in November. *Z*-values are the test statistic from the Wilcoxon two-sample nonparametric test of population differences in two independent samples. See Winkler and Hays (1975) for a more detailed description.

Long-Term Return Quintile	Pooled Data		1986		Difference	
	Abnormal Volume	Long-Term Return	Abnormal Volume	Long-Term Return	Abnormal Volume	<i>Z</i> -Value
Low 1	0.0932 1761	−0.3094	0.0496 315	−0.3527	−0.0436	−0.48
2	−0.0348 2017	0.0461	−0.0373 317	0.0369	−0.0025	0.32
3	−0.1175 1691	0.3407	−0.0354 314	0.3558	0.0821	2.66*
4	−0.1423 940	0.6190	0.0466 317	0.6237	0.1889	5.20**
High 5	−0.1869 1500	1.3204	−0.0375 315	1.1258	0.1494	5.11**

* Significant at the 0.05 level.

** Significant at the 0.01 level.

absolute terms, December 1986 represented a significant departure from previous Decembers. However, the traditional incentive to sell losers and hold winners is still evidenced in relative terms (i.e., abnormal volume is more positive for losers than for winners).

The crux of our analysis, the direct test of our hypotheses concerning investor behavior and long-term capital gains, is summarized in the final two columns in Tables II and III. Mean abnormal volume increased in 1986 for each of the five long-term capital gain groups as compared with firms exhibiting similar performance during the period from 1980 to 1985. Furthermore, as evidenced by the *F*-values, this increase in mean abnormal trading volume is significant at the five percent level for quintile 3 and at the one percent level for firms exhibiting even better performance in quintiles 4 and 5.

The pattern of differences provides strong evidence that investors did indeed sell their long-term winners to lock in a favorable tax liability at the lower long-term rate rather than postpone this liability into an epoch of significantly higher tax rates.

The hypothesized incentive to hold long-term losers into 1987 in order to enhance the value of such losses is not evidenced by our results, however. We are not certain why this is the case. There is one plausible explanation for this phenomenon given by the tax rules. Tax-motivated selling in December offers the investor two possible advantages. First, if the investor has a net capital gains

Table V
January Abnormal Volume Medians for Pooled Data
(1981–1986) on 7875 Firms and 1987 Data
on 1577 Firms

Firms are ranked by long-term capital gains as of December of the previous year and divided into groups using quintile ranges for the 1987 sample. Data were obtained from Compustat. Each pair of entries in the abnormal volume (AVOL) columns represents the median AVOL within that quintile followed by the number of observations. AVOL is the difference between actual volume and volume predicted by a time series process. Long-term return measures capital gains over a twenty-three-month period ending on the last trading day in November of the previous year. Z-values are the test statistic from the Wilcoxon two-sample nonparametric test of population differences in two independent samples. See Winkler and Hays (1975) for a more detailed description.

Long-Term Return Quintile	Pooled Data		1987		Difference	
	Abnormal Volume	Long-Term Return	Abnormal Volume	Long-Term Return	Abnormal Volume	Z-Value
Low 1	−0.2156	−0.3070	−0.3589	−0.3527	−0.1433	−2.95**
	1732		315			
2	−0.1614	0.0461	−0.3040	0.0369	−0.1426	−4.38**
	2015		316			
3	−0.1732	0.3407	−0.2420	0.3558	−0.0688	−3.15**
	1689		314			
4	−0.2009	0.6190	−0.2852	0.6237	0.0843	−2.65**
	940		317			
High 5	−0.2408	1.3204	−0.2475	1.1258	−0.0067	−1.63
	1500		315			

* Significant at the 0.05 level.

** Significant at the 0.01 level.

position, the capital losses offset these gains and effectively reduce tax liability by the long-term capital gains tax rate. This motivation would produce behavior which supports our hypothesis. However, a second motivation occurs if the investor has a net capital loss position in the current year. Capital losses are only deductible against other income up to \$3000, a comparatively small figure. Any excess is carried over into subsequent tax years. Thus, many capital losses realized in 1986 might actually produce tax savings valued at 1987 tax rates. This would tend to maintain the tax motivations for selling losers in 1986. As this carry forward provision is not symmetric with respect to winners, there is a clear reason why our “winner” hypothesis should exhibit the expected pattern while the “loser” hypothesis does not.

Quintile medians are reported in Tables IV and V. It is worth noting that quintile 1 is completely populated by long-term losers, while quintiles 3–5 are completely populated by long-term winners. Quintile 2 contains a mix of winners and losers, with the mean and median *LTR* values positive for pooled and 1986 data. Thus, quintile medians indicate that there was abnormally heavy trading volume for stocks which had declined in price and abnormally low volume for stocks which had appreciated both in the pre-1986 period and in 1986 with the exception of quintile 4.

The trend across medians progresses monotonically for the pooled data. This

reiterates investors' propensity to sell losers and to hold winners prior to 1986. In 1986, the trend is not monotonic. If anything, the pattern of abnormal trading volume medians for 1986 quintiles is relatively flat, ranging from 0.0496 for the lowest capital gain quintile to -0.0375 for the highest capital gain quintile.

Differences in abnormal trading volume quintiles are also reported in Tables IV and V. In this instance, quintile 1 exhibits a shift in its median that is in accordance with our expectation that investors will hold long-term losers more tightly than in previous years. The statistical significance of the shifts in quintile medians is assessed using the Wilcoxon two-sample test.⁶ This nonparametric technique for comparison of two sample medians provides a test statistic which is normally distributed. The resulting Z-values are reported in the far right column. This shift appears insignificant for the forty percent of firms producing the poorest capital gains performance during the periods of comparison. However, median abnormal trading volume increased significantly for the remaining sixty percent of the firms in each sample.

The data for January 1987 are also reported in Tables II–V and tend to confirm our expectations regarding the effect of the tax law change. Most striking is the substantial decline in trading volume between the pooled data for the earlier years and January 1987. The data are reported in the same quintile groups as the December 1986 data, with the top three quintiles solely populated by stocks which had appreciated in value. In January 1987, all quintile groups had statistically significant abnormally low trading volumes. The volume for the pooled data is much more ambiguous, with three of the quintiles exhibiting volume not significantly different from its normal level.

The decline in trading volume between the earlier years and January 1987 is particularly significant. Typically, relative trading volume in January 1987 was fifteen percent lower than in other Januaries. In the top three quintiles, the decline in the abnormal volume measures is statistically significant in the case of all three mean volume and median volume measures. The decline in volume in the bottom quintile of performers is ambiguous, with the median value indicating a statistically significant decline but the mean value indicating no statistically significant difference.

These data support the hypothesis that tax effects were important in December 1986. The abnormally high volume of December was followed by abnormally low volume in January. Had the high volume in December been due to some seasonal excitement which was unrelated to year-end behavior, it is unlikely that such a pattern would have emerged. Furthermore, the switch from abnormally high volume in December to abnormally low volume in January conforms with our hypothesis regarding the effect of the end of the transitory selling phenomenon and the rise in the permanent marginal tax rate on capital gains.

B. Short-Term Effects and Trading Volume

Trading motives concerning the disposition of short-term gains and losses were also changed by the Tax Reform Act of 1986. As explained earlier, prior to 1986 the incentives for investors to hold winners and sell losers were unambiguous, regardless of whether the assets were held for a long-term period or a short-term

⁶ A more detailed description of this procedure can be found in Winkler and Hays (1975).

Table VI

**December Abnormal Means for Pooled Data (1980–1985)
on 7909 Firms and 1986 Data on 1578 Firms Ranked
Independently by Long-Term and Short-Term
Capital Gains and Classified Using Quintile
Ranges for the 1986 Sample**

Data were obtained from Compustat. Each group of three numbers within each cell represents, from top to bottom, the mean abnormal volume (AVOL), *t*-value, and number of observations. AVOL is the difference between actual volume and volume predicted by a time series process. Short-term and long-term returns measure capital gains over a five-month period and a twenty-three-month period ending on the last trading day in November. Marginals contain AVOL means for quintiles formed using one of the return measures.

Quintile	Long-Term Return					Short-Term Return Marginals
	Low 1	2	3	4	High 5	
Short-Term Return	Pooled Data (1980–1985)					
Low 1	0.4617 (12.60)** 515	0.1424 (2.32)* 187	0.0321 (0.72) 109	−0.0441 (−0.77) 55	−0.1154 (−2.10)* 81	0.2705 (10.59)** 947
2	0.3214 (7.43)** 361	0.2068 (3.71)** 259	0.0023 (0.05) 141	−0.0319 (−0.46) 64	−0.1810 (−3.89)** 113	0.1572 (6.21)** 938
3	0.1822 (3.68)** 277	0.2141 (1.79) 415	−0.0199 (−0.41) 226	−0.1140 (−2.10)* 90	−0.0657 (−0.81) 134	0.1014 (2.14)* 1142
4	0.0902 (1.41) 202	0.1339 (2.45)** 488	−0.0346 (−1.22) 363	−0.0921 (−1.88) 152	−0.1075 (−2.55)* 203	0.0250 (1.05) 1408
High 5	0.0135 (0.36) 406	0.0092 (0.33) 668	0.0413 (1.63) 852	0.0271 (0.78) 579	−0.0821 (−3.55)** 969	−0.0049 (−0.39) 3474
Long-Term Return Marginals	0.2431 (12.16)** 1761	0.1193 (3.87)** 2017	0.0130 (0.80) 1691	−0.0139 (−0.57) 940	−0.0933 (−5.15)** 1500	
Short-Term Return	1986					
Low 1	0.3647 (4.60)** 156	0.1178 (1.28) 68	0.0186 (0.12) 34	−0.0982 (−0.95) 25	−0.1191 (−1.23) 32	0.1882 (3.80)** 315
2	0.2021 (2.19)* 56	0.1019 (1.24) 79	−0.0273 (−0.40) 65	0.2023 (2.13)* 51	0.0051 (0.08) 65	0.0894 (2.46)* 316
3	0.1039 (1.23) 57	0.1822 (1.59) 69	0.2720 (2.43)* 75	0.0903 (1.58) 62	0.0782 (1.08) 53	0.1539 (3.59)** 316
4	0.1671 (0.90) 20	0.1507 (1.27) 63	0.0363 (0.55) 70	0.1125 (2.08) 98	−0.0321 (−0.27) 65	0.0769 (1.83) 316
High 5	0.1543 (1.31) 26	0.1095 (1.10) 38	0.1295 (1.97) 70	0.0827 (1.37) 81	0.0921 (1.31) 100	0.1043 (3.04)** 315
Long-Term Return Marginals	0.2587 (5.40)** 315	0.1334 (2.91)** 317	0.0973 (2.41)* 314	0.0984 (3.20)** 317	0.0248 (0.64) 315	

* Significant at the 0.05 level.

** Significant at the 0.01 level.

Table VII
December Abnormal Medians for Pooled Data (1980–1985) on 7909 Firms and 1986 Data on 1578 Firms
Ranked Independently by Long-Term and Short-Term
Capital Gains and Classified Using Quintile Ranges
for the 1986 Sample

Data were obtained from Compustat. Each pair of numbers in each cell represents the median abnormal volume (AVOL) and the number of observations for that cell. AVOL is the difference between actual volume and volume predicted by a time series process. Short-term and long-term returns measure capital gains over a five-month period and a twenty-three-month period ending on the last trading day in November.

Quintile	Long-Term Return				
	Low 1	2	3	4	High 5
Short-Term Return	Pooled Data (1980–1985)				
Low 1	0.3073 515	0.0289 187	−0.0132 109	−0.0744 55	−0.1960 81
2	0.1456 361	0.0487 259	−0.0894 141	−0.1164 64	−0.2143 113
3	0.0502 277	−0.0046 415	−0.1341 226	−0.1874 90	−0.1860 134
4	−0.0663 202	−0.0505 488	−0.1472 363	−0.1750 152	−0.2219 203
High 5	−0.0893 406	−0.0900 668	−0.1044 852	−0.1338 579	−0.1821 969
Short-Term Return	1986				
Low 1	0.1313 156	−0.0177 68	−0.2365 34	−0.1247 25	−0.2461 32
2	0.0504 56	0.0113 79	−0.1277 65	0.0604 51	−0.0770 65
3	−0.0465 57	−0.0050 69	0.0682 75	0.0600 62	0.0155 53
4	−0.0665 20	−0.0584 63	−0.0362 70	0.0574 98	−0.0295 65
High 5	−0.1421 26	−0.0920 38	0.0115 70	0.0832 81	0.0019 100

period. In the case of short-term assets, two objectives entered the investors' calculus, and the effect of the tax reform depended upon which effect dominated the investor's decision.

In order to examine this hypothesis, we must first control for the long-term motivations created by the tax law. As a result, we decompose our data to present short-term results which control for long-term portfolio performance. Tables VI and VII contain abnormal trading volume means and medians, respectively, for firms that have been ranked into quintiles twice, once by *STR* and again by *LTR*. By combining these quintile rankings, twenty-five cells are formed. Since the rankings are done independently, the sample size will vary from cell to cell. To maintain comparability of data, cell ranges for short-term and long-term price

changes derived from the 1986 sample are used to classify the pooled data. This facilitates comparison of data between the pooled and 1986 samples as firms with comparable performance records are exhibited in both matrices and effectively reduces the pooled sample from 8352 to 7909 observations. The reduction of 443 observations represents *STR*, *LTR* pairs that "fall off the edge" of the 1986 cell grid.

The upper left corner cell of the pooled data section of Table VI contains information concerning firms that were among the lowest twenty percent of short-term performers and the lowest twenty percent of long-term performers. Five hundred fifteen firms met this dubious distinction. Regardless of the holding period, investors had motives to sell such securities during this period, and they did, as evidenced by the large abnormal trading volume mean of 0.4617. This implies that trading volume for these firms was forty-six percent higher than expected during December.

Examining the *AVOL* means for the pooled sample in cells across the uppermost row, two observations can be made. First, the number of qualifying firms dwindles predictably. Relatively few firms can claim membership among the top twenty percent of performers over the last twenty-three months and the bottom twenty percent of performers over the last five months! Second, the mean *AVOL* decreases monotonically as we move from left to right. Even among the poorest short-term performers, investors are more likely to hold securities which have provided superior long-term gains. Although not strictly monotonic, this trend is apparent for each row in the pooled sample matrix. Hence, within any group of stocks exhibiting similar short-term gains, the propensity to hold (sell) increases as long-term performance improves (deteriorates).

Parallel observations can be made by examining pooled sample cell means within a given column. If we restrict our attention to the worst twenty percent of long-term performers (*LTR* quintile 1), as short-term performance improves, mean *AVOL* decreases. However, this phenomenon is not repeated for other *LTR* quintiles. Pooled sample results for firms grouped by short-term capital gains and without regard to long-term performance, the *STR* marginals, display a clear pattern suggesting that investors are more likely to hold short-term winners and sell short-term losers regardless of long-term performance. This reinforces our earlier observation that, under the old tax law, investors should exhibit a pattern of holding winners and selling losers using either long-term or short-term performance measures.

The *AVOL* means for the twenty-five 1986 cells are displayed in the lower panel of Table VI. Other than the topmost row (*STR* quintile 1), behavior induced by long-term performance is difficult to characterize. Examination of *AVOL* means for any column suggests no distinct investor reaction to varying short-term performance measures. The *AVOL* means derived from grouping stocks solely by short-term capital gains (*STR* marginals) follow no clear pattern either. Thus, the strongly monotonic relationship displayed by the *STR* marginals for the pooled sample broke down in December 1986. This clearly indicates that the nature of investor trading incentives arising from short-term security performance in previous years was significantly altered.

For completeness, Table VII contains *AVOL* medians for the twenty-five cells for pooled data and 1986 data. These data generally reinforce observations made from examination of the cell means in Table VI.

IV. Conclusions

Much of our work reinforces findings by earlier authors that tax effects are evident in December trading under the prior law. However, we hypothesized that changes in this pattern are likely during December 1986 as a result of changes in the tax law that would take effect as of January 1, 1987. By and large, these hypotheses are substantiated by the data.

First, it is clear that there is reduced holding of long-term winners in 1986. Normally these winners exhibit abnormally low trading volumes. However, in 1986, this pattern is eliminated, even reversed. This is very much in accord with expectations. Second, contrary to expectations, the opposite result did not occur for long-term losers. Little change in the pattern of trading of long-term losers is indicated. Third, the usual reinforcing pattern of short-term and long-term effects is eliminated in December 1986. The evidence indicates that the usual patterns evidenced by portfolios partitioned by both short- and long-term gains disappeared in 1986. Finally, the performance of stock market volume in January 1987 supports our conclusion that tax-induced effects are significant. The switch from abnormally high volume in December to abnormally low volume in January indicates a stronger-than-usual year-end behavior. Furthermore, the abnormally low volume in January conforms to our expectations regarding the permanent effect of the tax law change.

REFERENCES

- Auten, G. and C. Clotfelter, 1979, *Permanent vs. Transitory Effects and the Realization of Capital Gains*, U.S. Treasury, Office of Tax Analysis (U.S. Government Printing Office, Washington, D.C.).
- Constantinides, George M., 1984, Optimal stock trading with personal taxes: Implications for prices and the abnormal January returns, *Journal of Financial Economics* 13, 65–89.
- Dyl, Edward A., 1977, Capital gains taxation and the year-end stock market behavior, *Journal of Finance* 32, 165–175.
- Feldstein, Martin S. and Shlomo Yitzhaki, 1978, The effect of the capital gains tax on the selling and switching of common stock, *Journal of Public Economics* 9, 17–36.
- , Joel Slemrod, and Shlomo Yitzhaki, 1980, The effects of taxation on the selling of corporate stock and the realization of capital gains, *Quarterly Journal of Economics* 94, 777–791.
- Givoly, Dan and Arie Ovadia, 1983, Year-end tax-induced sales and stock market seasonality, *Journal of Finance* 38, 171–185.
- Lakonishok, Josef and Seymour Smidt, 1986, Volume for winners and losers: Taxation and other motives for stock trading, *Journal of Finance* 41, 951–974.
- Lindsey, Lawrence, 1986, Capital gains: Rates, realizations and revenues, National Bureau of Economic Research Working Paper No. 1893.
- Minarik, J., 1981, Capital gains, in Henry Aaron and Joseph Pechman, eds.: *How Taxes Affect Economic Behavior* (Brookings Institution, Washington, D.C.).
- Poterba, James M., 1986, How burdensome are capital gains taxes?, MIT Working Paper No. 410.
- Reinganum, Marc R., 1983, The anomalous behavior of small firms in January: Empirical tests for tax-loss selling effects, *Journal of Financial Economics* 12, 89–104.

- Slemrod, Joel, 1986a, The effect of capital gains taxation on year-end stock market behavior, *National Tax Journal* 39, 69–77.
- , 1986b, Stock transaction volume and the 1978 capital gains tax reduction, *Public Finance Quarterly* 14, 3–16.
- Stiglitz, Joseph E., 1983, Some aspects of the taxation of capital gains, *Journal of Public Economics* 21, 257–294.
- U.S. Treasury, Office of Tax Analysis, 1985, *Report to Congress on the Capital Gains Tax Reductions of 1978* (U.S. Government Printing Office, Washington, D.C.).
- Winkler, Robert L. and William L. Hays, 1975, *Statistics: Probability, Inference, and Decision*, 2nd ed. (Holt, Rinehart and Winston, New York).