

NBER WORKING PAPER SERIES

TAX INDUCED TRADING: THE EFFECT OF THE
1986 TAX REFORM ACT ON STOCK MARKET ACTIVITY

Paul J. Bolster

Lawrence B. Lindsey

and

Andrew W. Mitrusi

Working Paper No. 2659

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 1988

Bolster is an Assistant Professor of Finance at Northeastern University. Lindsey is an Associate Professor of Economics at Harvard University and a Faculty Research Fellow at the National Bureau of Economic Research. Mitrusi is a Staff Researcher at the NBER. The authors wish to thank NBER for computational support. Partial support for Professor Bolster was provided by a grant from the Research and Scholarship Development Fund at Northeastern University. We also wish to thank Marc Bremer for his helpful comments. This research is part of NBER's research program in Taxation. Any opinions expressed are those of the authors not those of the National Bureau of Economic Research.

NBER Working Paper #2659
July 1988

TAX INDUCED TRADING: THE EFFECT OF THE
1986 TAX REFORM ACT ON STOCK MARKET ACTIVITY

ABSTRACT

The abolition of the favorable tax treatment of long term capital gains forced investors to reassess traditional year-end trading strategies used to manage tax liabilities. This study compares with year-end trading behavior in previous years with that observed at the end of 1986. Traditional strategies involve selling both short and long term losers and holding short and long term winners. Our results affirm previous findings concerning tax induced trading at year end. However, for 1986, we find that the anticipated tax code changes had a powerful effect on trading behavior. Compared to previous years, relative trading volume was considerably higher in December of 1986 for long term winners and lower for long term losers. Additional results indicate that traditional patterns of trading induced by short term capital gains and losses were also altered substantially in 1986.

Paul J. Bolster
Department of Finance and Economics
Northeastern University
Boston, MA 02115

Lawrence B. Lindsey
National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138

Andrew W. Mitrusi
National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138

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

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 40 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 exceptions², 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 4-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.

This paper differs from earlier work on this subject in three important respects. First, earlier studies focussed 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 focussed 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 two effects: one recurring, which we deem the "permanent" effect, and one which is unique to investor behavior in late 1986, which we deem 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 a different effect on stocks whose appreciation (or depreciation) had been recent than on those stocks whose price change 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. Section II provides a summary of previous work concerning tax effects and security trading. A model of taxpayer behavior incorporating the change in capital gains taxation is developed in Section III. This section also contains a formal statement of the hypotheses. A description of data and methodology is provided in Section IV. Empirical results are shown in Section V. A brief concluding section follows.

I. Related Studies

The sensitivity of capital gains realizations to the capital gains tax rate by holders of common stock has been frequently demonstrated. Feldstein and Yitzhaki [5] found the sale and repurchase of corporate stock is quite sensitive to the tax rate. In a later study with Slemrod [4], they reported that high income taxpayers reduced the ratio of their long term gains to dividends by 0.497 for every one percentage point increase in the capital gains tax rate. Minarik [9] reestimated this data using a different functional form and weighted least squares, and found a significant, though substantially lower degree of responsiveness. On the other hand, a report by the Department of Treasury [14] found the overall responsiveness of capital gains realizations to be nearly as great as that found by Feldstein, Slemrod, and Yitzhaki. The Treasury report also found that common stock was the most elastic with respect to the tax rate of all of the types of assets considered.

Unlike the present paper, these studies examined only the long term responsiveness of taxpayers to tax changes. Cross section data was used which, in theory, represents taxpayer behavior after adjustment to a given tax regime. Auten and Clotfelter [1] and Lindsey [8] disaggregated taxpayer response into permanent and transitory components. However, both studies looked at aggregate capital gains realizations and did not report transitory behavior specifically for common stock. Similarly, the Department of Treasury study considered

transitory behavior for aggregate realizations, but not for common stock sales.

Our consideration of short term investor response to capital gains tax changes uses an analytic technique developed to study the year-end tax loss selling phenomenon. Since capital gains are not taxed until the asset is sold, investors have an incentive to realize capital losses before the end of a tax year and hold capital gains until the next tax year. In a regime of constant capital gains tax rates, the savings from such a strategy approximately equals the accrued interest for one year on the resulting tax consequences. This suggests that, in any period of roughly unchanged capital gains taxes, the volume of trading in stocks that had appreciated in value over the year (winners) should recede to an abnormally low level during December as investors postpone realizations. Conversely, stocks that experienced declining value (losers) should experience abnormally high trading volume as year end approaches and investors seek to realize those losses in the current year. Furthermore, the degree of abnormal volume should depend on the amplitude of gains and losses.

Dyl [3] used a random sample of 100 common stocks for the period 1948 to 1970. A relative volume measure was developed based on monthly trading in the particular stock to total monthly trading on the New York Stock Exchange. An expected volume for December was computed for each stock based on the relative volume of that security and actual volume on the NYSE. Dyl defined abnormal volume as the difference between actual

trading volume and expected volume. He measured security performance over an 11 month period from January through November³ and found abnormally low volume for winners and abnormally high volume for losers. The evidence indicated that tax considerations were of great importance. Investors exhibited an enhanced tendency to hold securities which had appreciated during bull markets (when their tax rates were thought to be especially high) and a reduced tendency during bear markets (when their tax rates were thought to be especially low).

Reinganum [11] considered the relationship between tax loss selling and firm size. Instead of focussing on volume, he examined abnormal price movements during January and found that small capitalization firms which had declined substantially during the final 6 months of the previous year had abnormally high returns during the first few trading days of the new year. This January "rebound" was considerably smaller for large capitalization firms. Although tax loss selling was strongly indicated as influencing price behavior during early January, a firm-size effect also was confirmed.

Like Reinganum, Givoly and Ovadia [6] focussed on abnormal return data rather than on abnormal volume. They found that tax induced selling existed for all firms, but was greatest for small firms. Their data indicated that the recovery from tax induced selling was a major contributor to the abnormally high returns enjoyed by small stocks during January. They conclude that by selecting stocks which reached their 24 month lows in December, an investor could achieve an excess return even after

recognition of transactions costs.

Constanides [2] argued that the optimal trading strategy for an investor was to sell any short term loser and reinvest the proceeds in order to reestablish a short term position in the stock.⁴ The reason for this is that both short term losers and short term winners face a tax rate roughly twice that on securities held long term, thus doubling the tax saving from a stock sale which realizes a short term position. Such a strategy not only increases the return to the investor, it also restricts tax trading as an explanation for the abnormally high returns observed in January. Rational investors can profitably change their effective tax years to end in months other than December, thus allowing them to arbitrage away any abnormal January returns. In general this point has been neglected in subsequent literature. However, we expand on Constanides argument regarding the optimal realization of short term losses by applying it to the unique situation which existed in 1986.

Lakonishok and Smidt [7] examine the relationship between abnormal volume and past price movements. Their volume measure is the number of shares traded relative to the total number of shares outstanding for each security, which is coupled with a similar measure for the total market to estimate a normal trading volume. They conclude that there is a distinct December effect which is, at least partly, motivated by tax loss selling. However, they also find that a change in the capital gains holding period is unlikely to affect turnover. They do not present evidence as to whether a change in the capital gains tax rate

would have a similar effect.

Although this evidence implies a significant amount of tax induced trading by investors, the effect of the level of capital gains tax rates on investors is open to question. For example, Stiglitz [13] presents a number of possible tax oriented strategies which might help investors eliminate tax liability. But, Poterba [10] shows that the vast majority of investors do not make use of tax minimizing strategies when it comes to trading.

II. Why 1986 is Different

The existing work on the effect of capital gains taxes on investor strategy has focussed on behavior during periods of relatively constant capital gains tax regimes. The Tax Reform Act of 1986 offered the possibility of testing investor sensitivity to a dramatic change in tax regime. To understand this effect, consider first an investor's decision under the old tax law. 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

A decision by an investor to sell an existing asset and buy an alternative asset requires the condition given by equation 1.

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

The total after tax return for holding the current asset on is expressed on the left, and the total after tax return for switching assets 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_0R_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.

$$R_1 \leq (1-(c_0R_0/(1+R_0))) R_2 \quad (2)$$

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 would be subject to capital gains tax at the higher rate not only on his 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 taxpayer 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 sells and pays the capital gains tax. However, the ad-

vantage 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.

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

The first term on the right hand side of equation 4 shows the permanent lock-in effect, and is almost identical to the right hand side of equation 2. The only change is that the permanent lock-in effect is now calculated at rate c_1 instead of c_0 . This tends to increase the incentives to hold existing assets. The gain on the alternative asset (R_2) must now be larger than before to induce selling, all else equal, as c_1 is greater than c_0 .

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 taxpayer might choose to sell and then

buy back his existing assets. In this case, the taxpayer may expect that his current asset yields as high a return as any alternative asset, $R_1 = R_2$, but may still choose to sell because his 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.

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

Thus, tax motivated trading in December, 1986 should exhibit a different pattern than tax motivated selling in earlier years. In the case of winners, there is an increased incentive to sell them to realize the existing gain on the asset at the low 1986 capital gains tax rate. 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. This yields our first hypothesis:

Hypothesis #1: In December, 1986, there will be less abnormally low volume for long term winners than in other Decembers. However, it is unclear whether the resulting increase in volume will be sufficient to establish abnormally high volume for long term winners.

Conversely, the tax treatment of stocks which have declined over a long period of time should exhibit less abnormally high volume in December, 1986. This can be seen by contrasting equa-

tions 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 .⁵

Under the new tax law, this permanent incentive to sell becomes even greater because the tax rate on long term losses under the new law, c_1 , is greater than under the old law. It should be noted that under the old law, the tax rate on long term losses was 50 percent of the ordinary rate, versus 40 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 taxpayer to be less likely to sell his 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, there will be less abnormally high volume for long term losers than it is in other Decembers. However, it is uncertain whether the reduction in volume will be sufficient to establish abnormally low volume for long term losers.

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. So, 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 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.

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.⁶ Limiting the analysis to taxpayers who reported receiving dividend income, the average marginal tax rate on short term gains was 21.0 percent, and fell to 19.2 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 19.2 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 to 2.8 percentage points.

On average, therefore, investors saw little increase in one

motivation for holding a winner, and a considerable decrease in another incentive for holding a 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 pattern of holding short term winners, and selling short term losers at year end prior to 1986 should be significantly weakened in 1986.

III. 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 established a short term holding period of 5 months and a long term holding period of 23 months terminating at the end of November for each year in the study.⁷ The short term and long term returns, STG and LTG, for the stock in firm j were:

$$\text{STR}_j = (\text{Price}_{j,t-5} / \text{Price}_{j,t})$$

$$\text{LTR}_j = (\text{Price}_{j,t-23} / \text{Price}_{j,t})$$

where $\text{Price}_{j,t}$ 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 [7], 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 [3]. This requires a three step procedure. First, a vector of firm-specific relative volume measures is established for a period of 48 consecutive months for each firm:

$$\text{RVOL}_{j,t} = \text{VOL}_{j,t} / \frac{1}{12} \sum_{i=t-12}^{t-1} \text{VOL}_{j,i}$$

Thus, RVOL represents the volume of shares traded during a particular month relative to the average monthly volume during the preceding 12 months. $\text{RVOL}_{m,t}$, or the relative trading volume for the entire market is also established for each month.

$$\text{RVOL}_{m,t} = \frac{1}{n} \sum_{i=1}^n \text{RVOL}_{i,t}$$

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:

$$\widehat{RVOL}_{j,t} = \widehat{a}_j + \widehat{b}_j (RVOL_{m,t})$$

Estimates of a_j and b_j are derived using 36 months of relative volume data for the firm and the market. These estimates are then used to estimate relative volume for the subsequent 12 month period. The third step in the procedure, the measurement of abnormal volume is produced by subtraction:

$$AVOL_{j,t} = RVOL_{j,t} - \widehat{RVOL}_{j,t}$$

An abnormal volume measure of 0.10 indicates that volume is 10 percent above its expected level, while a measure of -0.20 indicates that it is 20 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 were obtained from the PDE version of Compustat. RVOL measures were derived for all firms listed on the NYSE or the AMEX for the period 1976 through 1986. Since the previous year's monthly volume data is needed to construct the RVOL series for each firm 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 through 1986 for those firms with complete RVOL data for any period of 4 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, abnormal volume data for December during the years 1980 through 1985, a period of relatively stable tax law, are pooled. This provides a large sample of December trading behavior to which December of 1986 can be compared.

IV. Results

A. Long-Term Performance and Trading Volume

The relationship between long-term capital gains and abnormal trading volume is summarized in Tables II and III. Mean abnormal volume data for the pooled data (1980 to 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 LTR (and later, STR) quintile ranges for the 1986 sample were used to classify the pooled data into 5 groups. Because the pooled data were matched to 1986 return levels, the 5 groups contain unequal numbers of firms. For expositional ease they are referred to as quintiles in the ensuing discussion. Below each entry in Table II, the T-value and the

number of firms in the quintile are displayed. This T-value assesses the hypothesis that the 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 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, and the direct test of our hypotheses concerning investor behavior and long-term capital

gains is summarized in the final two columns in Table II. Mean abnormal volume increased in 1986 for each of the 5 long-term capital gain groups as compared with firms exhibiting similar performance during the period from 1980-1985. Furthermore, as evidenced by the F-values, this increase in mean abnormal trading volume is significant at the 5% level for quintile 3, and at the 1% 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 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 Table III. It is worth noting that quintile 1 is completely populated by long-term losers, while quintiles 3 through 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 investors were net sellers of losers and net holders of winners for 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 .0496 for the lowest capital gain quintile to -.0375 for the highest capital gain quintile.

Differences in abnormal trading volume quintiles are also reported in Table III. 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 2-Sample test.⁸ 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 rightmost column. This shift appears insignificant for the 40% of firms producing the poorest capital gains performance during the periods of comparison. However, median abnormal trading volume increased significantly for the remaining 60% of the firms in each sample.

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 taxpayers to hold winners and sell losers were unambiguous, regardless of whether the assets were held for a long term period or a short term 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 IV and V 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 rank-

ings, 25 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 is done to facilitate 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 IV contains information concerning firms that were among the lowest 20% of short-term performers and the lowest 20% of long-term performers. 515 firms met this dubious distinction. Regardless of 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 .4617. This implies that trading volume for these firms was 46% higher than expected during December.

Examining the AVOL means for 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 20% of performers over the last 23 months and the bottom 20% of performers over the last 5 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 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 cell entries within a given column. If we restrict our attention to the worst 20% 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. The STR marginals display a clear pattern suggesting that investors are more likely to hold short-term winners and sell short-term losers irregardless of long-term performance. This reinforces our earlier observation that under the old tax law, short term and long term both should exhibit a pattern of holding winners and selling losers.

The AVOL means for the 25 1986 cells are displayed in the lower panel of Table IV. 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. STR marginal means follow no clear pattern either. This clearly indicates that the identity of investor incentives arising from short-term security performance in previous years is no longer present. Thus, the strongly monotonic relationship displayed by the STR marginals for the pooled sample broke down in December of 1986.

For completeness, Table V contains AVOL medians for the 25 cells for pooled data and 1986 data. This data generally reinforces observations made from examination of the cell means in Table IV.

V. Conclusions

Much of our work reinforces findings by earlier authors that tax effects were evident in December trading under prior law. However, we hypothesized that changes in this pattern were 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 seem to have been substantiated by the data.

First, it is clear that there was reduced holding of long term winners in 1986. Normally these winners exhibited abnormally low trading volume. However, in 1986, this pattern was eliminated, even reversed. This was 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 was indicated. Finally, the usual reinforcing pattern of short term and long term effects was 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.

REFERENCES

1. G. Auten and C. Clotfelter. Permanent vs. Transitory Effects and the Realization of Capital Gains, U.S. Treasury, Office of Tax Analysis, Washington, D.C., U.S. Government Printing Office, 1979.
2. George M. Constanides. "Optimal Stock Trading with Personal Taxes: Implications for Prices and the Abnormal January Returns", Journal of Financial Economics 13 (March 1984), 65-89.
3. Edward A. Dyl. "Capital Gains Taxation and the Year-End Stock Market Behavior", Journal of Finance 32 (March 1977), 165-75.
4. Martin S. Feldstein, Joel Slemrod, and Shlomo Yitzhaki. "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains", Quarterly Journal of Economics 94 (June 1980), 777-91.
5. Martin S. Feldstein and Shlomo Yitzhaki. "The Effect of the Capital Gains Tax on the Selling and Switching of Common Stock", Journal of Public Economics 9 (February 1977), 17-36.
6. Dan Givoly and Arie Ovadia. "Year-End Tax-Induced Sales and Stock Market Seasonality", Journal of Finance 38 (March 1983), 171-85.
7. Josef Lakonishok and Seymour Smidt. "Volume for Winners and Losers: Taxation and Other Motives for Stock Trading", Journal of Finance 41 (September 1986), 951-74.

8. Lawrence Lindsey. "Capital Gains: Rates, Realizations and Revenues, National Bureau of Economic Research, Working Paper No. 1893, April 1986.
9. J. Minarik. "Capital Gains", In How Taxes Affect Economic Behavior, Washington, D.C., Brookings Institution, 1981.
10. James M. Poterba. "How Burdensome are Capital Gains Taxes?" MIT Working Paper No. 410, February 1986.
11. Marc R. Reinganum. "The Anomalous Behavior of Small Firms in January: Empirical Tests for Tax-Loss Selling Effects", Journal of Financial Economics 12 (June 1983), 89-104.
12. Joel Slemrod. "Stock Transaction Volume and the 1978 Capital Gains Tax Reduction", Public Finance Quarterly 10 (January 1986), 3-16.
13. Joseph E. Stiglitz. "Some Aspects of the Taxation of Capital Gains", Journal of Public Economics 21 (July 1983), 257-94.
14. U.S. Treasury, Office of Tax Analysis. Report to Congress on the Capital Gains Tax Reductions of 1978, Washington, D.C., U.S. Government Printing Office, September 1985.
15. Robert L. Winkler and William L. Hays. Statistics: Probability, Inference, and Decision, 2nd ed., New York, Holt, Rinehart and Winston, 1975.

FOOTNOTES

1. Taxpaying investors with substantial capital gains income were often required to pay the Alternative Minimum Tax. This tax, levied at a rate of 20 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 28 percent, although some taxpayers faced tax rates on ordinary income as high as 38.5 percent. Beginning in 1988, the distinction between these caps was removed.
3. This 11 month holding period represents a measure of short term capital gains. During the period under study in Dyl [3], a holding period of at least 12 months was required to qualify for the favorable long term capital gains tax rate.
4. While this strategy is technically an illegal "wash" sale for the purposes of tax avoidance, investors could select securities which are close substitutes or wait 30 days to reestablish their positions.
5. Of course, if the investor feels this way, he can sell and then repurchase the same security 30 days later.
6. 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.

7. We also computed capital gains measures for holding periods of 11 and 17 months. One problem with the 11 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 17 month measure are consistent with those derived using the 23 month (LTR) measure.

8. A more detailed description of this procedure can be found in Winkler and Hays [15].

TABLE I

SAMPLE DATA, 1980-1986
DECEMBER ONLY

	<u>MEAN AVOL</u>	<u>MEDIAN AVOL</u>	<u>MEAN STR</u>	<u>MEAN LTR</u>	<u>FIRMS</u>
1980	0.0419	-0.0777	1.2680	2.1331	1292
1981	0.0992	-0.0198	0.9158	1.7255	1319
1982	0.1456	-0.0614	1.3558	1.5822	1358
1983	0.0595	-0.0737	0.9768	1.7560	1406
1984	0.0736	-0.0573	1.0216	1.5792	1456
1985	0.1009	-0.0821	1.0389	1.5065	1521
1986	0.1556	0.0214	0.9407	1.3567	1578

TABLE II
 ABNORMAL VOLUME MEANS FOR STOCKS RANKED BY
 LONG TERM CAPITAL GAINS^a

QUINTILE	POOLED DATA		1986		DIFFERENCE		
	AVOL	LTR	AVOL	LTR	AVOL	F-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
L T R	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**

^a Each group of three numbers in the AVOL column represents, from top to bottom, mean AVOL for the quintile, T-value, and number of observations. F-Values are provided to test for differences in mean AVOL for the pooled sample and the 1986 sample.

* Significant at .05 level.

** Significant at .01 level.

TABLE III

ABNORMAL VOLUME MEDIANS FOR STOCKS RANKED BY
LONG TERM CAPITAL GAINS^a

QUINTILE	POOLED DATA		1986		DIFFERENCE	
	AVOL	LTR	AVOL	LTR	AVOL	Z-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
L T R 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**

^a Each pair of entries in the AVOL columns represents the median AVOL within that quintile followed by the number of observations. Z-Values represent the test statistic from the Wilcoxon 2-Sample test, a test of population differences in 2 independent samples. See Winkler and Hays [15] for a more detailed description.

* Significant at .05 level.

** Significant at .01 level.

TABLE IV

ABNORMAL VOLUME MEANS FOR OBSERVATIONS RANKED INDEPENDENTLY
BY LONG TERM AND SHORT TERM CAPITAL GAINS^a

POOLED DATA (1980-1985)

QUINTILE	LTR					STR MARGINALS
	LOW 1	2	3	4	HIGH 5	
LOW	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
	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
S	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
T	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	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
LTR 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	

^a Each group of three numbers within each cell represents, from top to bottom, the mean AVOL, T-Value, and number of observations. Marginals represent AVOL means for quintiles as ranked by STR or LTR.

* Significant at .05 level.

** Significant at .01 level.

TABLE IV (Continued)
 ABNORMAL VOLUME MEANS FOR OBSERVATIONS RANKED INDEPENDENTLY
 LONG TERM AND SHORT TERM CAPITAL GAINS^a

		1986					
		LTR					
QUINTILE		LOW 1	2	3	4	HIGH 5	STR MARGINALS
S T R	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
LTR 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		

^a Each group of three numbers within each cell represents, from top to bottom, the mean AVOL, T-Value, and number of observations. Marginals represent AVOL means for quintiles as ranked by STR or LTR.

* Significant at .05 level.

** Significant at .01 level.

TABLE V

ABNORMAL VOLUME MEDIANS FOR OBSERVATIONS RANKED INDEPENDENTLY
BY LONG TERM AND SHORT TERM CAPITAL GAINS^a

POOLED DATA (1980-1985)

<u>QUINTILE</u>		LTR				HIGH 5
		LOW 1	2	3	4	
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
S T R	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

1986

<u>QUINTILE</u>		LTR				HIGH 5
		LOW 1	2	3	4	
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
S T R	3	-.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

^a Each pair of numbers in each cell represents the median AVOL
and the number of observations for that cell.