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# THE SEASONALITY EFFECT REVISITED: SOME REPERCUSSIONS FROM THE TAX REFORM ACT OF 1986\*

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## Introduction

There has been a growing collection of empirical research revealing situations where the Capital Asset Pricing Model (CAPM) appears to not hold. These instances are called stock market anomalies. One of these anomalies is stock return seasonality. Abnormal returns of stocks, adjusted for movements in the market return and level of beta risk, typically are negative in the last trading days of December and rebound to positive abnormal returns in the first trading days of January.

The Tax Reform Act (TRA) of 1986 was the greatest revision in the U.S. tax code in decades. Its main structural change, which affected investors, was the elimination of the preferential treatment of capital gains vis a vis dividend income. Tax induced selling of stocks having performed poorly prior to the end of the calendar year is thought to be a major determinant of the seasonality anomaly. The purpose of this paper is to examine the impact of the TRA on stock returns during the last days of December and the first days of January.

## Previous Research

Much research has focused on the phenomena of year-end stock selling of losers and the burst of stock price advances at the start of the calendar year. Branch (1977) developed a profitable trading rule of purchasing securities that reached a year-end loss in the last week of the year that proved effective because these securities increased in price during January. Dyl (1977) found that stocks with low (high) returns experienced a statistically significant increase (decrease) in trading volume adjusted for market trading volume. Studies focusing on the seasonality pattern of stock returns showing support for this anomaly include Keim (1983), Reinganum (1983), Givoly and Ovadia (1983) and Roll (1983). The explanation for the seasonality anomaly revolves around the tax loss selling induced effect. This has become the commonly accepted paradigm in finance. Jones, Pearce and Wilson (1987) provide evidence that suggests the seasonality effect existed prior to 1913 when federal income taxation was enacted in the United States. However, the ex-

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planation of the cause of the anomaly is questioned, not the existence of the phenomena.

More recently, Bolster, Lindsey and Mitrusi (1989) examined the effects of the TRA on trading volume of stock. Their results support their hypotheses that the TRA tax code changes fundamentally altered investor behavior. The traditional increased volume for stock losers and decreased trading for winners was substantially modified. The end of the preferential tax treatment of capital gains caused investors to re-evaluate their tax-induced trading strategies.

### Hypothesis and Methodology

In the U.S. tax code, capital gains and losses are recognized for tax purposes when realized, occurring when the security is sold. This enables the investor to have control over the timing of recognition. Tax strategies may be implemented to take advantage of this aspect of the law. Stocks with an unrealized loss at the end of the year, in December, may be sold to create a tax deduction. Assuming no anticipated change in investment circumstance, the immediate tax reduction is preferred to a deferred tax deduction because of the time value of money. This will encourage selling in December to take advantage of the tax benefit resulting in a depressing effect on stock returns. On the contrary, for stocks which have an unrealized capital gain for the investor, there is a tax incentive to defer the gain, and of course, the accompanying tax. This causes neither an increase nor decrease price pressure on stocks. The unrealized capital gain or loss is measured from the purchase price of the investor to the current price. The same stock could be a potential sell-off candidate to an investor who has an unrealized capital loss in that stock as opposed to a neutral candidate to an investor who has an unrealized capital gain in that stock. On net, stocks experienced a drop in returns caused by trading on the tax strategies.

The passage of the TRA on October 13, 1986, changed the value of the tax deduction benefit from selling capital loss stocks in December. Previous to the TRA, long-term capital gains were taxed at 40 percent of the individual's top marginal income tax rate bracket. Capital losses reduced the amount of taxable capital gains. The maximum rate that could apply would be 20 percent. Dividend income and short-term capital gains were taxed at the top marginal income tax rate bracket, as much as 50 percent. Subsequently, all realized capital gains and losses were taxed at the same rate as dividend income. For 1987, the highest tax rate bracket for long-term capital gains became 28 percent and for ordinary income and short-term capital gains, 33 percent. For 1988, short- and long-term capital gains and ordinary income, the highest tax bracket, became 33 percent. Thus, the tax incentive to conduct tax-induced trading strategies was substantially reduced.

To illustrate a tax-induced trade, suppose an individual in 1986 has realized short-term capital gains of \$500,000. It is the end of the year (December) and the portfolio includes unrealized losses in stock of \$100,000. Before

any tax-induced trading, the federal income tax liability would be \$250,000. If the person were to sell and realize these capital losses in 1986, an equal amount of capital gains would be shielded from taxation, saving \$50,000 immediately, given the 50 percent effective tax rate applying to short-term capital gains. This contrasts to the same person who in 1988 also earns \$500,000 in capital gains (short or long term). Again, it is the end of the year (December) and the portfolio has \$100,000 of unrealized stock losses. Before any tax-induced trading, the federal income tax liability would be \$165,000. Now, if those stocks are sold to realize their capital losses, taxes will be reduced by \$33,000 immediately, given the 33 percent tax rate applying to capital gains. Thus, the tax incentive to trade after TRA (1986) has diminished. Furthermore, if the individual has expectations of future tax changes based on: 1) a change in individual income which would change the tax bracket; 2) the reinstatement of the capital gains differential (a much discussed topic); or 3) an increasing tax rate being legislated, the incentive to take tax losses is reduced even further.

It is the hypothesis of this study that the seasonality effect observed in the past of negative returns in the closing days of December, followed by positive returns in the opening days of January, will be altered. That is, the seasonality anomaly will undergo change caused by the TRA in support of the tax-induced selling hypothesis of this anomaly.

A sample of 316<sup>1</sup> stocks was randomly selected from the Center for Research in Security Prices (CRSP) tapes from the University of Chicago. A control for dividend yield was enacted by dividing the total sample into three groups based on their dividend yield. The three groupings were: (1) no dividend, (2) dividend yield between 0 percent and 5 percent, and (3) dividend yield greater than 5 percent. This resulted in sub-sample sizes of 96, 110, and 110, respectively.

Daily CRSP returns were collected for 1986, 1987, and 1988. The data was segmented by dividend yields and aggregated to form an equal weighted average portfolio by dividend yield group. Control for fluctuations in capital market returns conditions and the level of market risk for each portfolio was accomplished by calculating abnormal returns for each of the portfolios (Equation 2) using the Capital Asset Pricing Model (CAPM) shown in Equation 1:

$$\tilde{R}_{iE} = \tilde{R}_{fE} + \hat{\beta}_i (\tilde{R}_{mE} - \tilde{R}_{fE}) \quad \text{Equation 1}$$

where the  $\tilde{R}_{mE}$  (return of the market) was proxied using the market-value weighted Standard and Poor's 500 total return stock index, the  $\tilde{R}_{fE}$  (risk-free rate) was proxied using the U.S. Treasury 30 day bill rate for each month and the  $\tilde{R}_{iE}$  (actual average return of the portfolio) was collected from the CRSP tapes.<sup>2</sup> The estimation period was the 1986 calendar year set of trading days.<sup>3</sup> Ordinary least squares regression equations, for the  $\beta_i$ , were estimated using the SPSS software package.<sup>4</sup> The average abnormal return equation is:

$$\widetilde{\text{AAR}}_{iE} = \widetilde{R}_{iE} - [\widetilde{R}_f + \beta_i (\widetilde{R}_{mt} - \widetilde{R}_{fi})] \quad \text{Equation 2}$$

where  $\widetilde{\text{AAR}}_{iE}$  is the average abnormal return for portfolio  $i$ , computed for each of the three portfolios controlling the dividend yield factor.

A Mann-Whitney U test and Wilcoxon signed rank test will be conducted on the three portfolio daily abnormal return patterns for the last 10 trading days and first 10 trading days of the calendar year.<sup>5</sup> The comparison will be: (1) the seasonal pattern of the last 10 trading days of 1986 to the first 10 trading days of 1987, and (2) the seasonal pattern of the last 10 trading days of 1987 to the first 10 trading days of 1988.<sup>6</sup> These two comparisons will show if the seasonality pattern existed in these two years. It is expected that the seasonal pattern will disappear in 1987-88 because of the reduction in the tax advantage of capital gains versus dividend income.

The Mann-Whitney U test and Wilcoxon signed rank test compare to the daily abnormal returns, generated from the Capital Asset Pricing Model, of the December trading days to the abnormal returns of the January trading days. The tax-induced trading hypothesis predicts that the pattern of abnormal returns will be non-random and not normally distributed. Whereas, in the absence of tax-induced trading, the pattern of abnormal returns will be random and normally distributed.

## Results

The regression equation results from the three dividend groups are shown in Table 1. As expected, the dividend yield is inversely related to beta. Also, the F-statistics are extremely significant.

Tables 2 and 3 display the average abnormal returns and cumulative average abnormal return for the 20 trading days surrounding the beginning of the year 1987 and 1988. The seasonality pattern appears to exist for the turn of the year 1987, from Table 2, for all three dividend yield groups. That is, as in past years, the last trading days of December generated negative ab-

Table 1  
Regression Equations

	<u>Intercept</u>	<u>Beta</u>	<u>F-value Significant at Alpha of</u>
No Dividend	-.000053074	.906891	.00001
Low Dividend	-.0000984821	.9441413	.00001
High Dividend	-.000807741	.566207	.00001

Table 2  
Abnormal Returns for Dividend Yield Groups  
December 1986 versus January 1987

	Day	<u>No Dividend</u>		<u>Low Dividend</u>		<u>High Dividend</u>	
		<u>AAR</u>	<u>CAAR</u>	<u>AAR</u>	<u>CAAR</u>	<u>AAR</u>	<u>CAAR</u>
<u>December</u> Trading Days Before the End of 1986	-10	-.0085	-.0335	-.0082	-.0282	-.0042	-.0096
	- 9	-.0039	-.0250	-.0034	-.0200	-.0013	-.0054
	- 8	+.0080	-.0211	+.0090	-.0166	+.0061	-.0041
	- 7	-.0033	-.0291	-.0093	-.0256	-.0009	-.0102
	- 6	-.0096	-.0258	-.0093	-.0228	-.0048	-.0093
	- 5	+.0026	-.0162	+.0034	-.0135	+.0028	-.0045
	- 4	+.0005	-.0188	+.0012	-.0169	+.0014	-.0073
	- 3	-.0088	-.0193	-.0085	-.0181	-.0044	-.0087
	- 2	-.0058	-.0105	-.0054	-.0096	-.0025	-.0043
	- 1	-.0047	-.0047	-.0042	-.0042	-.0018	-.0018
<u>January</u> Trading Days After the Start of 1987	+ 1	+.0161	+.0161	+.0173	+.0173	+.0112	+.0112
	+ 2	+.0218	+.0379	+.0233	+.0406	+.0147	+.0159
	+ 3	+.0020	+.0399	+.0027	+.0433	+.0024	+.0183
	+ 4	+.0088	+.0487	+.0098	+.0531	+.0066	+.0249
	+ 5	+.0062	+.0549	+.0071	+.0602	+.0050	+.0299
	+ 6	+.0046	+.0595	+.0055	+.0657	+.0040	+.0339
	+ 7	+.0054	+.0649	+.0062	+.0719	+.0045	+.0384
	+ 8	-.0016	+.0633	-.0010	+.0709	+.0001	+.0385
	+ 9	+.0079	+.0712	+.0089	+.0798	+.0061	+.0446
	+10	+.0076	+.0788	+.0086	+.0884	+.0059	+.0505

Table 3  
Abnormal Returns for Dividend Yield Group  
December 1987 versus January 1988

	Day	<u>No Dividend</u>		<u>Low Dividend</u>		<u>High Dividend</u>	
		<u>AAR</u>	<u>CAAR</u>	<u>AAR</u>	<u>CAAR</u>	<u>AAR</u>	<u>CAAR</u>
<u>December</u>  Trading Days Before the End of 1987	- 10	-.0147	-.0247	-.0147	+.0017	-.0081	+.0084
	- 9	+.0191	-.0100	+.0205	+.0164	+.0131	+.0165
	- 8	+.0023	-.0291	+.0031	-.0041	+.0026	+.0034
	- 7	-.0006	-.0314	+.0001	-.0072	+.0008	+.0008
	- 6	+.0105	-.0308	+.0115	-.0073	+.0077	+.0000
	- 5	-.0028	-.0413	-.0022	-.0188	-.0006	-.0077
	- 4	-.0219	-.0385	-.0220	-.0166	-.0125	-.0071
	- 3	-.0045	-.0166	-.0040	+.0054	-.0017	+.0054
	- 2	+.0099	-.0121	+.0110	+.0094	+.0073	+.0071
	- 1	-.0022	-.0022	-.0016	-.0016	-.0002	-.0002
<u>January</u>  Trading Day After the Start of 1988	+ 1	+.0303	+.0303	+.0321	+.0321	+.0200	+.0200
	+ 2	+.0073	+.0376	+.0082	+.0403	+.0057	+.0257
	+ 3	-.0013	+.0363	-.0007	+.0396	+.0003	+.0260
	+ 4	+.0054	+.0417	+.0062	+.0458	+.0045	+.0305
	+ 5	-.0636	-.0219	-.0654	-.0196	-.0386	-.0081
	+ 6	+.0130	-.0089	+.0141	-.0055	+.0092	+.0011
	+ 7	-.0098	-.0187	-.0096	-.0151	-.0050	-.0039
	+ 8	-.0008	-.0195	-.0002	-.0153	+.0006	-.0033
	+ 9	-.0020	-.0215	-.0014	-.0167	-.0001	-.0034
	+ 10	+.0205	-.0010	+.0219	+.0052	+.0139	+.0105

normal returns to be followed by positive abnormal returns during the first trading days of January. However, the seasonality pattern appears to vanish, from Table 3, for the turn of the year 1988. The no dividend group has a negative cumulative average abnormal return in both December and January. The low dividend and high dividend groups have positive cumulative average abnormal returns in both December and January.

The Mann-Whitney U and Wilcoxon signed rank test results are given in Table 4 to decide if the seasonal pattern changes from Tables 2 and 3 are statistically significant. The results for the no, low, and high dividend groups are divided into panels A, B, and C, respectively. The alpha level for only the Mann-Whitney U test is reported, as the Wilcoxon signed rank tests were similar. As Table 4 displays, for all three dividend groups, the seasonal pattern did exist at the turn of the year 1987 when capital gains income still retained preferential tax treatment compared to dividend income.<sup>7</sup> However, the traditional seasonal pattern vanishes at the turn of the year 1988 for all three dividend groups.

### Conclusions

This study shows support for previous findings by earlier researchers that tax induced selling of stocks occurs in December and January causing a "seasonality effect." This seasonality effect is hypothesized to vanish at the end of the year 1988 when the preferential treatment of capital gains income, as opposed to dividend income, is eliminated. Controls for dividend yield and beta risk are put in place.

The evidence shows that as predicted the previous stock return anomaly called the seasonality effect disappears. This is but one repercussion of the Tax Reform Act of 1986.

### Endnotes

<sup>1</sup>This study looked at stock returns for the 1986-89 period. Mergers occurring in 1988 reduced the sample size to 271.

$$\tilde{R}_{iE} = \sum \tilde{r}_{iE} / n$$

where  $\tilde{r}_{iE}$  is the actual return of an individual stock comprising the portfolio of  $n$  stocks calculated to an actual average return of the portfolio  $R_{iE}$ .

<sup>3</sup>Estimation periods for 1986-87 and 1986-88 were also collected to estimate regression coefficients, abnormal returns and to conduct statistical tests.

<sup>4</sup>No attempt was made to remove outliers from the distribution of returns except for an 11 day period during the stock market crash of 1987. Of course, this only affects the tests conducted using the 1986-87, and 1986-88 regression equations.



Table 4  
Statistical Test Results

Panel A  
 No Dividend Group

<u>Group Mean Rank</u>	<u>Trading Days</u>					
	30	25	20	15	10	5
December 1986	26.37	19.42	14.95	10.67	6.50	3.20
January 1987	34.63	31.58	26.05	20.33	14.50	7.80
Mann Whitney U Statistic	326	160.5	89	40	10	1
Wilcoxon Signed Rank W Statistic	791	495.5	299	160	65	16
Level of Alpha	.0667	.0032*	.0022*	.002*	.0015*	.0159*
<u>Group Mean Rank</u>						
December 1987	31.13	26.0	20.90	15.87	9.50	4.60
January 1988	29.87	25.0	20.10	15.13	11.50	6.40
Mann Whitney U Statistic	431	300	192	107	40	8
Wilcoxon Signed Rank W Statistic	934	650	418	238	95	23
Level of Alpha	.7788	.8084	.8410	.8381	.4813	.4206

\*Significant at the 5% alpha level.

Table 4  
Statistical Test Results

Panel B  
 Low Dividend Group

Group Mean Rank	<u>Trading Days</u>					
	30	25	20	15	10	5
December 1986	26.08	19.40	14.93	10.67	6.50	3.20
January 1987	34.92	31.60	26.03	20.33	14.50	7.80
Mann Whitney U Statistic	317.5	160	88.5	40	10	1
Wilcoxon Signed Rank W Statistic	782.5	485	298.5	160	65	16
Level of Alpha	.0501	.0031*	.002*	.0020*	.0015*	.0159*

Group Mean Rank

December 1987	31.13	26.0	20.90	16.69	9.50	4.60
January 1988	29.87	25.0	20.10	15.27	11.50	6.40
Mann Whitney U Statistic	431	300	192	109	408	
Wilcoxon Signed Rank W Statistic	934	650	418	238	95	23
Level of Alpha	.7788	.8084	.8410	.6823	.4813	.4206

\*Significant at the 5% alpha level.

Table 4  
Statistical Test Results

Panel C  
 High Dividend Group

Trading Days

<u>Group Mean Rank</u>	30	25	20	15	10	5
December 1986	26.37	19.42	14.95	10.67	6.50	3.20
January 1987	34.63	31.58	26.05	20.33	14.50	7.80
Mann Whitney U Statistic	326	160.5	89	40	10	1
Wilcoxon Signed Rank W Statistic	791	485.5	299	160	65	16
Level of Alpha	.0667	.0032*	.0022*	.002*	.0015*	.0159*

Group Mean Rank

December 1987	31.13	26.0	20.90	16.69	9.50	4.60
January 1988	29.87	25.0	20.10	15.27	11.50	6.40
Mann Whitney U Statistic	431	300	192	109	40	8
Wilcoxon Signed Rank W Statistic	934	650	418	238	95	23
Level of Alpha	.7788	.8084	.8410	.8381	.4813	.4206

\*Significant at the 5% alpha level.

<sup>5</sup>Additional tests are completed on seasonal patterns of 5, 15, 20, 25, and 30 days providing similar results.

<sup>6</sup>The tests are conducted with abnormal returns generated from regression equations using 1986 trading data. Additionally, the same tests are conducted using 1986-87 regression equation data, and 1986-88 regression equation data. Ultimately, the same conclusions are found. Specific test results can be obtained by writing to the authors.

<sup>7</sup>The seasonal pattern for 5, 10, 15, 20, and 25 days was significant at the 5% alpha level for 1987. This significance disappeared in 1988.

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