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## Personal Income Taxes and the January Effect: Small Firm Stock Returns Before the War Revenue Act of 1917: A Note

PAUL SCHULTZ\*

### ABSTRACT

This paper tests the tax explanation of the January effect by examining small firm stock returns before the War Revenue Act of 1917. No evidence of a turn-of-the-year effect is found. This paper also extends previous authors' work on the subject to 1918–29. A January effect is found during that period.

THE LARGE ABNORMAL RETURNS earned by small firm stocks during the first few days of January is attracting considerable attention from financial economists. Specifically, Keim [10] shows that over the entire 1963–79 period the average difference between risk-adjusted returns of small and large firms is about 0.7% *per day* during January. Even more striking is the finding of Keim [9] that over the entire 1931–78 period the relation between daily abnormal returns and size is *always* negative and more pronounced in January than in any other month. Similarly, Ibbotson and Sinquefeld [8] note that the average return on the quintile of NYSE stocks with the lowest market values exceeds the return on the Standard and Poor's Corporate Index for 50 of the 56 Januarys from 1926–81.

There is no accepted theory linking the excess returns of small firms in January with the change of the tax year. Nevertheless, the plausibility of a relation between taxes and stock return seasonality has led Roll [17], Brown et al. [6] Berges, McConnell, and Schlarbaum [2], and Reinganum [16], among others, to investigate personal income taxes as an explanation for the "January effect." This paper uses a different methodology and reaches stronger conclusions than any of the above papers. Specifically, I examine the returns of small firms for the period from 1900 to 1929. Prior to the Revenue Act of 1917, marginal income tax rates for investors were very low (or zero). The major finding of this paper is that there is no evidence that small firms earned abnormal returns in January prior to the 1917 tax act. I also show that a January effect does appear during the years 1918–29. Therefore, I cannot reject a tax explanation for the "January effect."

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The remainder of this paper is organized as follows. Section I provides a brief history of the Federal income tax. Section II discusses the data and explains the methodology used in this paper. Section III presents the results. Finally, Section IV summarizes the empirical results and discusses the conclusions to be drawn from them.

### **I. A Brief History of Federal Income Taxes**

There was no Federal personal income tax from 1900–13. During 1913 Congress passed the Sixteenth Amendment which paved the way for a personal income tax bill later that year. Initially, the income tax rate was 1% after a \$4,000 exemption for married couples and \$3,000 exemption for single tax payers. There was an additional progressive surtax which ranged from 1% on incomes of \$20,000 to 8% on incomes in excess of \$2,000,000. Thus the maximum tax rate in 1913 was only 9%, and that rate was only applied to incomes in excess of \$2,000,000. The Revenue Act of 1916 raised the income tax from 1% to 2%. The surtax was also increased at this time with the maximum surtax at 13%. Thus the maximum marginal tax rate in 1916 was 15%, the 2% income tax plus the 13% surtax.

The Revenue Act of October 1917 raised income tax rates to levels near those of today. This act reduced exemptions for married couples from \$4,000 to \$2,000, and for single individuals from \$3,000 to \$1,000. The 1917 act raised the income tax itself from 2% to 4%. More importantly though, it added an additional progressive surtax onto the surtax already in place. This additional surtax ranged from 1–50%. Thus the maximum marginal tax rate increased to 67%—the 4% income tax plus the 13% surtax, plus the 50% additional surtax. Income taxes were raised again in 1918, particularly in the lower and middle tax brackets. The end of World War I brought a slight reduction in tax rates, but the cost of servicing the war debt kept tax rates slightly above the 1917 rates. Table I displays marginal tax rates for individuals with various incomes over the years 1913–21.

The tax treatment of gains and losses changed several times over the first few years of the Federal income tax. Prior to the 1916 act, gains were recognized at the time of sale and taxed as ordinary income while losses were not deductible.

**Table I**  
**Marginal Tax Rates (in Percent) for Individuals with**  
**Various Incomes under the Different Federal Income**  
**Tax Laws of 1913–21**

| Taxable<br>Income | Act of<br>1913 | Act of<br>1916 | Act of<br>1917 | Act of<br>1918 | Act of<br>1919 |
|-------------------|----------------|----------------|----------------|----------------|----------------|
| \$5,000           | 1              | 2              | 5              | 13             | 9              |
| 10,000            | 1              | 2              | 7              | 16             | 12             |
| 20,000            | 2              | 3              | 12             | 21             | 17             |
| 30,000            | 2              | 3              | 12             | 26             | 22             |
| 50,000            | 3              | 4              | 16             | 36             | 32             |
| 100,000           | 5              | 7              | 31             | 64             | 60             |
| 500,000           | 7              | 12             | 54             | 76             | 72             |
| Maximum Rate      | 9              | 15             | 67             | 77             | 73             |

The 1916 act allowed investors to deduct losses on stock transactions up to the amount of gains recorded during that year (specialists and brokers could deduct all losses). The 1918 Revenue Act (which became law early in 1919) allowed for full deduction of losses even if they exceeded capital gains. No distinction was made between long- and short-term capital gains until 1921. At this time, the capital gains tax was changed to 12½% of the gain on securities which had been held for two years or longer. Similarly, the 1924 act restricted the tax rebate on long-term capital losses to 12½% of the loss.

The empirical work presented here tests for evidence of a January effect in the years prior to Federal income tax. I include all the years up to the 1917 Revenue Act in the before-tax category. Although an income tax was in effect each January from 1914–17, marginal tax rates as shown in Table I appear far too small relative to transaction costs to induce tax trading.<sup>1</sup>

There is no theory that specifies when taxes should begin to affect the January returns of small firms. During the 1918–24 period, several changes took place in tax laws that could have provided the necessary conditions for a January effect. Thus 1918 is the earliest year that any tax trading theory would have as a breakpoint. It has been argued that taxes should first affect stock returns in the 1940s. Brown et al. [6] note that few Americans paid income tax prior to World War II. For example, in 1918 only 7.7% of all American citizens were members of a family in which income tax was paid. Our concern, however, is with the marginal tax rates of common stockholders. Leffler [12, p. 92] estimates that only 200,000 investors held *either* listed stocks or bonds before World War I. This compares with over 400,000 Americans who paid income tax in 1916 and 4,000,000 who paid taxes in 1918.

The *Wall Street Journal* provides additional support for the 1917 Revenue Act as the first that affected January stock returns. On the first trading of every year from 1900–29, the *Wall Street Journal* carried a market summary of the previous day's trading. There is no mention of tax trading for the last trading day of any of the years from 1900 to 1916. It is noted that large numbers of cash sales took place on December 31, 1917, but taxes were not specified as a reason for the sales. In contrast, tax trading is mentioned in market summaries for the last day of every year from 1918 on. In particular, the January 1, 1919 *Wall Street Journal* describes market activity on the last day of 1918 as follows:

Cash sales in stocks, of course, were credited to those who wanted to register their losses under the 1918 income tax. Acting in the eleventh hour, many investors made unusual sacrifices. Sales had to be for cash to come within the technical provision of the law. All such sales were designated on the stock tape as "cash" transactions and therefore it was easy to discern the amount of this kind of business. The volume was so large that the street was taken by surprise.

## II. Data and Methodology

CRSP stock return data extends back only as far as 1926, so all return data used here is based on prices taken from the *Wall Street Journal*. Because the data

<sup>1</sup> See Stoll and Whaley [19] or Schultz [18] for a discussion of the costs of trading small firms. Bid-ask spreads tended to be even larger for small firms during the period covered by this paper than they are at present.

used here is gathered by hand, many of the usual methodological techniques used in other papers on the January effect are prohibitively costly to employ.

Portfolios of small firms are formed for each January from 1900 to 1929 and for other periods during each year. The inclusion criteria is that the stocks' bid price be \$5 or less on the day prior to the beginning of the given period.<sup>2</sup> Stocks from all exchanges are eligible for inclusion in the small firm portfolio. The reader should note two things about the inclusion criteria for the small firm portfolio. First, stock price is highly correlated with Keim's [10] size variable (stock price times shares outstanding).<sup>3</sup> Second, the total number of stocks included in the small firm portfolio using this criteria is close to the number that would be produced by Keim's [10] criteria of including 10% of all listed stocks.

The return on the small firm portfolio over a given period is approximated by the average percentage change in the bid price of the stocks in the portfolio over the period. Dividends are not included in the portfolio return.

Changes in the Dow Jones Industrials are used as a proxy for returns on the market portfolio. Note that dividends are thus excluded from this market return. It should also be remembered that the Dow Jones Industrials were a much larger proportion of the stocks on the New York Stock Exchange during 1900–29 than they are today. The chief advantage of that index, though, is that it is available on a daily basis.<sup>4</sup>

Returns are measured for the small firm portfolio and the Dow Jones Industrials for the nine-day period from the second to the last trading day in December through the eighth trading day in January for each year from 1900 to 1929.<sup>5</sup> Keim [9] finds that most of the January effect occurs during the first four days of January and thus the relatively short January periods are chosen to maximize the probability of finding a January effect prior to 1918. The last trading day of the year is included because of Roll's [17] finding of positive abnormal returns for small firms on that day.

Returns are also gathered for the small firm portfolio and the Dow Jones Industrials for two other nine-day periods in each year from 1918–29. In the years 1900–17, returns are gathered for two other nine-day periods during odd numbered years and four other nine-day periods during even numbered years.<sup>6</sup> The non-January periods are not chosen randomly. Instead, they are chosen to include the largest rise and the largest fall in the Dow Jones Industrials each

<sup>2</sup> The *Wall Street Journal* quoted bid and ask prices for listed stocks during the period covered by this study.

<sup>3</sup> Stoll and Whaley [19], for instance, show a strong correlation between stock price and stock price times shares outstanding.

<sup>4</sup> Simulations have been performed that indicate that dividend omission and use of the Dow Jones Industrials as a proxy for the market have no effect on the results in this paper. Those simulations are available from the author.

<sup>5</sup> Some of the *Wall Street Journals* were badly torn or had pages missing due to their age when they were microfilmed. If one day's *Wall Street Journal* was in extremely bad condition, it was sometimes necessary to use an adjacent day. Thus a few of the periods have eight or ten trading days.

<sup>6</sup> The purpose of gathering data for the extra periods was to make up for the fact that a smaller number of firms were available during the early years than during 1918–29. Exclusion of these extra periods has no material effect on the results printed here.

**Table II**

Nine-Day Return on the Small Firm Portfolio  
(Excluding Dividends) Minus the Nine-Day Return  
on the Dow Jones Industrials (Excluding Dividends)  
Computed from the Second to the Last Trading Day  
in December Through the Eighth Trading Day in  
January for Each January from 1900 Through 1917

| Year      | Small Firm Change<br>Minus Dow Jones<br>Change | Number of<br>Stocks in<br>the<br>Portfolio | Proportion of<br>All Listed<br>Stocks in<br>Portfolios <sup>a</sup> |
|-----------|------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------|
| 1899-1900 | 0.0788                                         | 12                                         | 7.5%                                                                |
| 1900-01   | 0.0921                                         | 16                                         | 11.7%                                                               |
| 1901-02   | -0.0315                                        | 16                                         | 9.6%                                                                |
| 1902-03   | 0.0048                                         | 25                                         | 14.1%                                                               |
| 1903-04   | -0.0046                                        | 14                                         | 8.1%                                                                |
| 1904-05   | -0.0419                                        | 12                                         | 7.0%                                                                |
| 1905-06   | -0.0032                                        | 13                                         | 7.0%                                                                |
| 1906-07   | -0.0485                                        | 11                                         | 6.5%                                                                |
| 1907-08   | 0.0681                                         | 30                                         | 17.1%                                                               |
| 1908-09   | -0.0135                                        | 14                                         | 8.3%                                                                |
| 1909-10   | 0.0968                                         | 7                                          | 4.1%                                                                |
| 1910-11   | 0.0242                                         | 19                                         | 10.7%                                                               |
| 1911-12   | 0.0092                                         | 25                                         | 15.1%                                                               |
| 1912-13   | -0.0287                                        | 28                                         | 14.4%                                                               |
| 1913-14   | -0.0263                                        | 43                                         | 15.5%                                                               |
| 1914-15   | -0.0052                                        | 37                                         | 14.1%                                                               |
| 1915-16   | 0.0149                                         | 21                                         | 7.8%                                                                |
| 1916-17   | -0.0244                                        | 11                                         | 5.5%                                                                |
| Mean      | 0.0090                                         |                                            |                                                                     |

<sup>a</sup> Proportion is the number of stocks included in the small firm portfolio divided by the total number of NYSE and Curb listed stocks on the first trading day of the year.

year such that the average change over the entire period is about zero. Periods with large movements in the Dow Index are chosen to minimize the standard error of the slope coefficient in a regression of the small firm returns on the change in the Dow Jones Average.<sup>7</sup> Thus while only about 11% of the trading days from 1900-29 are used in the estimation of parameters, a much greater proportion of the information contained in the data is used.<sup>8</sup>

### III. Results

The most important result of this paper is that no January effect is found in the years prior to 1918. For illustrative purposes, Table II lists the difference between

<sup>7</sup> See, for example, Neter and Wasserman [13] for a discussion about the use of this type of experimental design in economics.

<sup>8</sup> The average nine-day returns on the Dow Jones returns is 0.13% during the entire 1900-29 period. Non-January periods used in parameter estimation are available from the author.

**Table III**  
**Nine-Day Return on the Small Firm Portfolio**  
**(Excluding Dividends) Minus the Nine-Day Return**  
**on the Dow Jones Industrials (Excluding Dividends)**  
**Computed from the Second to the Last Trading Day**  
**in December Through the Eighth Trading Day in**  
**January for Each January from 1963 Through 1980**

| Year    | Small Firm Change<br>Minus Dow Jones<br>Change | Number of<br>Stocks in<br>the<br>Portfolio |
|---------|------------------------------------------------|--------------------------------------------|
| 1962-63 | 0.0698                                         | 12                                         |
| 1963-64 | 0.0664                                         | 16                                         |
| 1964-65 | 0.1023                                         | 16                                         |
| 1965-66 | 0.1168                                         | 25                                         |
| 1966-67 | 0.0841                                         | 12                                         |
| 1967-68 | 0.1408                                         | 12                                         |
| 1968-69 | 0.1914                                         | 6                                          |
| 1969-70 | 0.1874                                         | 30                                         |
| 1970-71 | 0.1635                                         | 14                                         |
| 1971-72 | 0.1803                                         | 7                                          |
| 1972-73 | 0.1198                                         | 19                                         |
| 1973-74 | 0.2297                                         | 25                                         |
| 1974-75 | 0.3814                                         | 27                                         |
| 1975-76 | 0.1070                                         | 44                                         |
| 1976-77 | 0.1221                                         | 37                                         |
| 1977-78 | 0.0916                                         | 21                                         |
| 1978-79 | 0.1032                                         | 11                                         |
| 1979-80 | 0.0322                                         | 14                                         |
| Mean    | 0.1383                                         |                                            |

the return on the small firm portfolio and the Dow Jones Average for each of the January periods from 1900-17. Prior to the recent work on the January effect, a financial economist would have found nothing surprising in Table II. However, Keim [9] finds a negative relationship between firm size and excess returns in every January from 1931-78. In contrast, the return on the Dow Jones Industrials exceeds that of the small firm portfolio in 10 of the 18 Januaries from 1900 to 1917. Similarly, the average of the return difference in Table II, 0.9%, is unremarkable outside the context of Keim's [10] results. He finds an average difference between the abnormal returns for small and large firms of 8% during the first five days of January.

Table III replicates Table II using data from 1963-80. That is, portfolios of randomly selected stocks priced under \$5 were assembled for each of the Januaries from 1963-80. The total number of stocks included in the portfolio each January is equal to the number on the corresponding Januaries of 1900-17. Table III shows the results of applying the methodology used in Table II to a period that Keim [10], Roll [17], and others have shown has a January effect.<sup>9</sup> In contrast to Table II, the small firm portfolio return exceeds the Dow Jones price change in every January from 1963-80. Another striking contrast between the two tables

<sup>9</sup> Returns during this later period are based on closing prices, not bid prices.

Table IV

Nine-Day Return on the Small Firm Portfolio  
(Excluding Dividends) Minus the Nine-Day Return  
on the Dow Jones Industrials (Excluding Dividends)  
Computed from the Second to the Last Trading Day  
in December Through the Eighth Trading Day in  
January for Each January from 1918 Through 1929

| Year    | Small Firm Change<br>Minus Dow Jones<br>Change | Number of<br>Stocks in<br>the<br>Portfolio | Proportion of<br>All Listed<br>Stocks in<br>Portfolio <sup>a</sup> |
|---------|------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------|
| 1917-18 | 0.0187                                         | 19                                         | 6.4%                                                               |
| 1918-19 | 0.0320                                         | 31                                         | 10.1%                                                              |
| 1919-20 | 0.0778                                         | 17                                         | 12.6%                                                              |
| 1920-21 | 0.3026                                         | 45                                         | 11.4%                                                              |
| 1921-22 | 0.0003                                         | 53                                         | 12.4%                                                              |
| 1922-23 | 0.1493                                         | 48                                         | 10.2%                                                              |
| 1923-24 | 0.2623                                         | 65                                         | 10.4%                                                              |
| 1924-25 | 0.0525                                         | 40                                         | 7.0%                                                               |
| 1925-26 | 0.1767                                         | 39                                         | 5.7%                                                               |
| 1926-27 | 0.0724                                         | 31                                         | 4.7%                                                               |
| 1927-28 | 0.2506                                         | 44                                         | 5.7%                                                               |
| 1928-29 | 0.0227                                         | 39                                         | 4.2%                                                               |
| Mean    | 0.1098                                         |                                            |                                                                    |

<sup>a</sup> Proportion is the number of stocks in the small firm portfolio divided by the total number of NYSE and Curb listed stocks on the first trading day of the year.

is that the mean of the difference between small firm and Dow Jones returns in Table III is about 14 times the corresponding difference in Table II.

Table IV replicates Table II using data from 1918-29. The difference between the small firm returns and the Dow Jones return is positive every January during 1918-29 as it is during 1963-80. In contrast, during 1900-17 about half of the differences between small firm returns and Dow Jones returns were positive. The average difference in nine-day returns during 1918-29 is about 11% as compared to 13% during 1963-80 and 0.9% during 1900-17.

The alert reader will notice that the difference between small firm returns and the Dow Jones return is small prior to 1920-21. This could be construed as evidence that the relevant tax change occurred in 1918 or 1921. Also, although Keim [9] found a negative relation between firm size and January returns during every year from 1931 to 1979, the relation was not always statistically significant.

As a test for January effects, the following equation is estimated using all January and non-January data for the three periods 1900-17, 1918-29, and 1963-80.

$$\tilde{R}_{st} = \alpha_0 + \alpha_1 J + \beta \tilde{R}_{mt} + \tilde{\epsilon}_{st} \quad (1)$$

where

$\tilde{R}_{st}$  = the price change of the small firm portfolio

$J = 1$  during January,  $0$  otherwise

$\tilde{R}_{mt}$  = the percentage change in the Dow Jones Industrials.

**Table V**  
**Weighted Least Squares Regression Estimates of the**  
**Equation**

$$\tilde{R}_{st} = \alpha_0 + \alpha_1 J + \beta \tilde{R}_{mt} + \tilde{\varepsilon}_{st}^a$$

|                                     | 1900-17  | 1918-29  | 1963-80  |
|-------------------------------------|----------|----------|----------|
| $\alpha_0$                          | 0.0198   | 0.0087   | -0.0036  |
| SE( $\alpha_0$ )                    | (0.0091) | (0.0145) | (0.0081) |
| $\alpha_1$                          | -0.0176  | 0.1156   | 0.1520   |
| SE( $\alpha_1$ )                    | (0.0182) | (0.0254) | (0.0162) |
| $\beta$                             | 1.34     | 0.90     | 0.82     |
| SE( $\beta$ )                       | (0.1371) | (0.2038) | (0.1358) |
| Number of Portfolio<br>Observations | 72       | 36       | 72       |

<sup>a</sup>Each observation is weighted by the square root of the number of stocks in the portfolio.  $\tilde{R}_{st}$  = Return on the small firm portfolio (excluding dividends).  $J = 1$  in January, 0 otherwise.  $\tilde{R}_{mt}$  = Return on the Dow Jones Industrials (excluding dividends).

The number of firms in the small firm portfolio ranges from 7 to 76. Ordinary least squares estimates of (1), while unbiased, will be inefficient. Thus (1) is estimated using weighted least squares with the square root of the number of securities in the portfolio as the weight.

The regression results are shown in Table V. Again, the important finding of the paper is contained in the estimate of (1) for 1900-17.  $\alpha_1$  is found to be insignificantly different from zero. Thus there is no evidence of a January effect prior to the 1917 Revenue Act.<sup>10</sup>

Equation (1) is also estimated using 1963-80 as a check to see if the methodology and sampling techniques used in this paper are sufficiently powerful to detect a January effect (if one exists) during 1900-17. To do this, every non-January period as well as every January period from the 1900-17 sample is duplicated using data from 1963-80. That is, there are an equal number of periods with rising and falling Dow Jones Averages in each sample and corresponding portfolios in the two samples have an equal number of stocks. Table V shows that the estimate of (1) using modern data does reveal a large and statistically significant January effect. The estimated value of  $\alpha_1$  indicates that after adjustment for market returns stockholders earned an extra 15% return for holding small firm stocks for just the first nine days of January. Thus the methodology and sampling techniques used on the 1900-17 data are sufficient to detect the January effect during 1963-80.

Finally, Equation (1) is estimated for 1918-29, the period from the beginning of the modern income tax to the beginning of the period covered by Keim's [9]

<sup>10</sup> These parameter estimation periods are longer than is customary in financial research. In order to make sure that beta nonstationarity has no effect on the results of this paper, both the 1900-17 and 1918-29 periods were divided in half. A slope coefficient dummy which took a value of zero during the first half of each period and one during the second half of each period was included in Equation (1). This dummy variable was not significant at the 10% level in either 1900-17 or 1918-29.  $\alpha_1$  remained statistically significant at the 1% level for 1918-29 and was not significant at the 10% level for 1900-17.

**Table VI**  
Weighted Least Squares Estimates of the Equation

$$\pi_{st} = \gamma_0 + \gamma_1 J + \gamma_2 \tilde{R}_{mt} + \tilde{\epsilon}_{st}^a$$

|                                  | 1900-17  | 1918-29  | 1963-80  |
|----------------------------------|----------|----------|----------|
| $\gamma_0$                       | 0.2742   | 0.2458   | 0.3397   |
| SE( $\gamma_0$ )                 | (0.0159) | (0.0211) | (0.0240) |
| $\gamma_1$                       | -0.0154  | 0.2621   | 0.4934   |
| SE( $\gamma_1$ )                 | (0.0358) | (0.0432) | (0.0392) |
| $\gamma_2$                       | 2.82     | 2.25     | 2.49     |
| SE( $\gamma_2$ )                 | (0.2281) | (0.2957) | (0.3667) |
| Number of Portfolio Observations | 72       | 36       | 72       |

<sup>a</sup>  $\pi_{st}$  = proportion of the stocks in the small firm portfolio that rise in price rather than stay even or fall.  $J = 1$  in January, 0 otherwise.  $\tilde{R}_{mt}$  = the return on the Dow Jones Industrials (excluding dividends).

study. Again, evidence of a January effect is uncovered. Specifically, the coefficient on the January dummy is found to be significant at the 1% level. The 13% extra return earned for the first nine days in January is similar in magnitude to the modern January effect.

As a second test for a January effect, the following equation is estimated for 1900-17, 1918-29, and 1963-80

$$\pi_{st} = \gamma_0 + \gamma_1 J + \gamma_2 \tilde{R}_{mt} + \tilde{\epsilon}_{st} \quad (2)$$

where

$\pi_{st}$  = the proportion of stocks in the small firm portfolio which rise in price during period  $t$  (rather than stay even or fall)

$J = 1$  during January, 0 otherwise

$\tilde{R}_{mt}$  = the percentage change in the Dow Jones Industrials during period  $t$ .

The advantage of this test is that outliers cannot exert disproportionate influence on the parameter estimates. A problem arises in that the proportion of stocks in the small firm portfolio which rise in price has a binomial distribution. Thus the variance of the proportion is  $\pi_{st}(1 - \pi_{st})/N$ , where  $N$  is the number of stocks in the portfolio. This heteroscedasticity is eliminated by using weighted least squares with weights given by the square root of  $N/(\pi_{st}(1 - \pi_{st}))$ . Estimates of (2) are shown in Table VI.<sup>11</sup>

The primary result of this paper is reaffirmed in Table VI. No evidence of a January effect is seen for the 1900-17 observations. The coefficient on the January dummy is negative and insignificant.

The estimate of (2) for 1963-80 data indicates that the January effect is not just a phenomenon of a few small firm stocks with very large returns. The

<sup>11</sup> The reader may find it surprising that the small firm portfolio beta is estimated to be less than 1 during 1918-29 and 1963-80. They are comparable to Keim's [10] Scholes-Williams estimate of the small firm portfolio beta of 0.92.

A logit model could be estimated but only 2 of the 180 observations lie outside the zero-one range. These 2 are less than 1.05.

estimated coefficients indicate that given a zero change in the Dow Jones Industrials, 75% of small firm stocks should rise in price during January, while 35% should rise in price during other months. Similar results occur when estimating (2) using data for 1918–29. Again there is evidence that, *ceteris paribus*, more small firm stocks rise in price in January than during other parts of the year.

#### IV. Summary and Conclusions

This paper tests for a relation between personal income taxes and the January effect noted by Keim [10], Roll [17], and others. The empirical findings presented here support that hypothesized relation.

The critical finding of this paper is that there is no evidence of a January effect before the 1917 tax act. In contrast to the huge excess returns earned by small firms year after year from 1931 on, the Dow Jones Industrials outperform the small firm portfolio in 10 of the 18 Januarys from 1900–18. The average difference between the return on the small firm portfolio and the Dow Jones Industrials is only 0.9% for the first nine days of January during 1900–17. On the other hand, Keim [10] finds that small firms outperform large firms by about 3% on the first trading day of January alone during 1963–80.

This paper also extends the work of Keim [9] and others back from 1931 to the beginning of modern income taxes in 1917. A January effect is found for the years 1918–29 which is similar in magnitude to the turn-of-the-year effect found in 1963–80.

The empirical support shown here for a tax explanation for the January effect is troubling. We have no accepted theoretical explanation for a link between personal income taxes and the large abnormal returns of small firms in January. While it is easy to show a desire on the part of investors to take tax losses in December, what is needed is an explanation of why small stocks are worth more to investors in January than in December.

Other explanations for this turn-of-the-year effect are more dubious than a tax explanation. For instance, it seems unlikely that the extra returns earned by small firms are compensation for risk. There is little risk involved in buying small firm stocks in December if they always go up in January. Similarly, it is possible that another structural change occurred around 1918 that later led to the January effect. For example, the Federal Reserve System began in 1913. However, in this case we are not only missing a theory linking the structural change with the January effect, we cannot even define the structural change.

The need for further theoretical work on the January effect is obvious. It is hoped that this paper will help point theoreticians to an explanation for this anomaly.

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