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THE ANOMALOUS STOCK MARKET BEHAVIOR OF SMALL FIRMS IN JANUARY

Empirical Tests for Tax-Loss Selling Effects

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Small firms experience large returns in January and exceptionally large returns during the first few trading days of January. The empirical tests indicate that the abnormally high returns witnessed at the very beginning of January appear to be consistent with tax-loss selling. However, tax-loss selling cannot explain the entire January seasonal effect. The small firms least likely to be sold for tax reasons (prior year 'winners') also exhibit large average January returns, although not unusually large returns during the first few days of January.

1. Introduction

Previous empirical research by Banz (1981) and Reinganum (1981) demonstrates that on average firms with small market value of equity experience returns that significantly exceed those of large capitalization companies even after adjusting returns for estimated betas. Reinganum's work indicates that the size effect during the 1960s and 1970s is most dramatic when the sample includes both New York and American Stock Exchange listed companies. For very small capitalization firms, the 'abnormal' returns on an annual basis are on average more than twenty percent. Subsequent studies probe deeper into the data to attempt to explain this phenomenon. Roll (1981) conjectures that the apparent abnormal returns might be attributed to misestimated betas caused by non-trading. Reinganum (1982), however, reports that even Dimson betas could not explain the difference in average returns associated with market capitalization. Furthermore, James and Edmister (1981) find a significant size effect even after directly controlling for trading volume. In fact, within the small firm

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group, the more actively traded stocks experience the greatest 'abnormal' returns.

Other research closely examines the time-series patterns of portfolio returns stratified by market capitalization. Brown, Kleidon and Marsh (1982) analyze the size effect on a yearly basis. They emphasize that the magnitude (and sometimes the sign) of the size effect changes from year to year and argue that these changes are not deviations from a stable mean effect but rather changes in the mean effect itself over time. Yet perhaps the most startling piece of evidence has been discovered by Keim (1983). He analyzes the time-series of differences in small firm versus large firm returns and discovers a strong seasonal pattern. Keim reports that about half of the annual size effect can be attributed to the month of January and that much of the January effect occurs during the first few trading days of the month.

Keim's results seem to suggest an anomaly within an anomaly. Although earlier research by Rozeff and Kinney (1976) detects a January seasonal, Keim's finding indicates that the nature of the seasonal pattern is systematically related to market capitalization. That is, the seasonal reported by Keim is for the returns of small firms compared to those of the large firms. Ignoring transaction costs, this result strongly suggests a market inefficiency. By going long in small firms and short in large firms, one could have earned on average 'abnormal' returns of twelve percent in January. Since this unusual behavior occurs in January, one naturally might suspect that the result is being driven by some tax effect.

This research seeks to test whether the January size effects are associated with tax-loss selling. Evidence consistent with tax-loss selling is reported in at least three other studies. Branch (1977) discovers that 'abnormal' profits can be earned if one buys the stocks of companies whose prices reach yearly lows during the last week of December and sells these stocks in January. Similarly, Roll (1982) reports that a stock's prior year return tends to be negatively related to its subsequent turn-of-the-year return. Dyl (1977) also finds evidence for tax-loss selling in year-end volume patterns. He discovers that stocks with substantial price declines exhibit abnormally high year-end volume whereas firms with price appreciation display abnormally low volume.

The organization of the paper is as follows. In the next section, the data sources are described and the construction of the market value portfolios is explained. In the third section, the tests for tax effects are explained and the empirical evidence is presented. The major findings are summarized in the conclusion.

2. The data

The securities selected for analysis are contained on the December 1980 version of the University of Chicago's Center for Research in Security Prices (CRSP) daily files. The CRSP daily files include all securities that have traded on the New York and American Stock Exchanges since July 1962. The sample of firms analyzed in this study changes yearly. To qualify for inclusion in a given calendar year, a firm need only possess data on price and number of shares outstanding at the end of the previous calendar year. Thus, firms that are analyzed in, say, 1964 are selected at the end of 1963. No survival requirements are imposed on the sample. The number of firms included in the sample at the beginning of any one-year range from around 1500 in the mid-1960s to over 2500 in the mid-1970s.

To test for size effects, portfolios are created based on the year-end stock market capitalizations of the firms in the sample. At the end of each calendar year, the market capitalizations of all firms in the sample are calculated by multiplying the price per share by the number of shares of common stock outstanding. The capitalizations of all firms are ranked and firms are placed in various portfolios depending on their relative position. Firms in the top ten percent of this ranking comprise the large firm portfolio, *MV10*. Firms in the bottom ten percent form the small firm portfolio, *MV1*. The remaining firms are placed into eight intermediate portfolios, *MV9* through *MV2*. In the following calendar year, the daily returns of firms within each portfolio are combined with equal-weights to form the daily return of the portfolio. Each year, the ranking and portfolio formation process is repeated. Thus, market value rankings from 1963 are used to create the 1964 portfolios. Similarly, the rankings from the end of 1964 form the basis for the 1965 portfolio memberships and so on. In this study, market value rankings are performed eighteen times using year end data from 1962 through 1979.

The basic characteristics of the ten portfolios are contained in Reinganum (1982, 1983). Based on portfolios similar to the ones analyzed in this paper, Keim finds the difference between the average returns of the smallest and largest firm portfolios to be about 0.7 percent per day in January, which is significantly larger than the difference in any other month. However, even in January, the differential return performance is not uniform. The greatest disparity in returns occurs during the first few trading days in January. In fact, the average return on the first trading day in January for the smallest firm portfolio exceeds three percent. The next section tests whether the January, and especially the beginning of January, size effects are associated with tax-loss selling.[1]

[1]The January size effects are not sensitive to the month of portfolio formation. While portfolios analyzed in this paper are created with end of December stock market capitalizations, portfolios formed with, say, end of February capitalizations exhibited strong seasonal effects in the following January. However, only portfolios computed with December market capitalizations exhibited unusual return behavior in the following month. That is, small firms at the end of, say, June did not display exceptional returns in July. This evidence is consistent with a tax-loss

3. Tests for tax effects

To test for year-end tax effects a measure of potential tax-loss selling (PTS) is needed to classify securities.[2] An ideal PTS measure probably would take account of the dollar losses in a security relative to a price near the end of the year scaled by an average dollar trading volume figure. In addition, the ideal PTS measure probably should be standardized for institutional holdings. That is, a pension fund is not taxed on either its gains or losses and hence would not be motivated to sell losers because of potential tax benefits.

To compute an ideal PTS measure, the data for price, volume and institutional holdings would be required. Unfortunately, the latter two items are not available to me in computer readable form. Given this data constraint, a measure is constructed using only price data. The idea behind the measure was to calculate the difference between the price of a stock at the end of the year and its maximum price during the period in the previous year which would be classified by the Internal Revenue Service as short-term. During most of the time period analyzed in this study, a gain or loss is considered short-term if the position was closed within six months. Thus, for most of the years, the maximum price is selected from the beginning of July through the second to the last trading day of the calendar year. The tax selling measure is computed by dividing the security's price on the second to the last trading day of the year by the aforementioned maximum price. By construction, the tax selling measure could not exceed a value of 1.0 and could not fall below 0.0. For example, if the price of a security on, say, December 30 equalled 20 and the maximum price during the prior six months was 25, the value of the tax selling measure would be 0.80 (=20/25).

The first tests for tax effects are based on a simple experimental design. Each security is jointly classified by the relative rank of its year-end market capitalization and the relative rank of its tax selling measure. To maintain continuity with previous research, a security could be associated with one of ten market capitalization groups. However, only four tax-loss selling measure categories are created. Given this scheme, a security is placed into one of

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selling effect. Furthermore, this evidence reduces the likelihood that the January effects are caused by data errors.

[2]The potential for a calendar year-end tax effect presumably stems from the fact that short-term capital losses may directly offset ordinary income. For example, consider an individual who plans to liquidate assets for consumption purposes at the end of the year. Such an individual may be better off selling those assets with short-term capital losses than those with gains for at least three reasons. First, the sale of the losers will result in a reduction in current taxes whereas the sale of the winners would require payment of additional taxes. Second, if the winners are held long enough they will be taxed on sale at the much lower capital gains rate. Third, if the short-term losses become long-term, the tax benefits from the sale of the losers is reduced. Thus, tax incentives may exist for individuals to sell their short-term losers. [See Constantinedes (1981) for a good discussion of the impact of personal taxes on capital market equilibrium.]

forty cells. This categorization permits one to test for tax-loss selling effects within each market value portfolio as well as to test for differences in tax-loss selling effects between market value portfolios.

The number of firms within each cell in a given year need not be equal across cells because the market value groups and the tax-loss groups are calculated separately. However, if the tax-loss selling measure and the market capitalization variable are independent, then the number of firms within each cell should be approximately the same. Table 1 presents the number of firms within each cell on a percentage basis averaged across the eighteen years of the study. If the number of firms is uniformly distributed (and if in each year the number of firms in the sample is an exact multiple of forty), then 2.5 percent of the firms should fall within each market value/tax-loss classification. Yet the evidence in table 1 reveals that the distribution of firms is far from a uniform one. Within the smallest market value portfolio, *MV1*, more than sixty percent of the firms are in the bottom quartile of the tax-loss selling measure distribution. That is, about two-thirds of the firms within the smallest market value portfolio experience relatively large price declines during the previous six months (nine months in 1977 and twelve months since 1978). On the other hand, less than one-tenth of the firms within the

Table 1

Distribution of firms by tax-loss selling group and market value portfolio (in percent).[a]

	Tax-loss selling group			
Portfolio	1 ('losers')	2	3	4 ('winners')
MV1	6.21	2.08	1.01	0.72
MV2	4.37	2.84	1.62	1.19
MV3	3.39	2.89	2.16	1.57
MV4	2.74	2.87	2.42	1.97
MV5	2.30	2.82	2.70	2.18
MV6	1.82	2.81	2.80	2.58
MV7	1.44	2.48	2.98	3.10
MV8	1.14	2.29	3.08	3.49
MV9	0.93	2.12	3.19	3.75
MV10	0.68	1.81	3.05	4.44

[a]*MV1* contains firms in the bottom decile of the year-end market capitalization ranking. *MV10* are those firms in the top decile of the ranking. The 'losers' are those firms in the bottom quartile of the tax-loss selling measure distribution. The 'winners' are in the upper quartile of this distribution. The tax-loss measure is computed by dividing the price of a stock on the second to the last day of year by the maximum price during the prior period considered short-term by the IRS. The figures in this table are constructed by averaging the annual distribution numbers over the eighteen years of the sample.

smallest market value portfolio are classified in the upper quartile of the tax-loss selling measure distribution. Thus, within portfolio *MV1* approximately nine times as many firms fall in the bottom quartile of the tax-loss selling distribution as fall in the upper quartile. In other words, firms defined as very 'small' generally do not trade at a year-end price which is near the maximum price during the last six months of the year. The classification of firms within the largest market value group differs greatly from the small firm group. More than forty percent of the large firms are in the upper quartile of the tax-loss distribution, which reflects the fact that they tend to trade at year-end prices near the maximum price during the last six months of the year. On the other hand, less than one-tenth of the large firms suffer relatively large price declines. Clearly, market capitalization and the measure of potential tax-loss selling are not independent.[3] During the eighteen years of this study, the Spearman rank correlation coefficient ranges from 0.12 to 0.54 between these two variables and averages 0.40.

While table 1 indicates that the market capitalization variable is correlated with potential tax-loss selling, not all of the firms classified as 'small' are candidates for tax-loss selling. The dispersion in the potential tax-loss selling measure for firms within each market value portfolio permits one to test for tax effects while holding market capitalization roughly constant.[4] For the data to be consistent with an explanation related to tax-loss selling, the firms in the bottom quartile of the potential tax-loss selling distribution within each market value portfolio ought to exhibit more pronounced returns spikes in January than the firms in the upper quartile of the distribution.

Fig. 1 compares the average daily returns of the firms in the bottom quartile of the tax-loss selling distribution with those in the upper quartile of the distribution for each market value portfolio. For each trading day in January, the daily returns for each portfolio are averaged over the eighteen

[3]Market capitalizations and the tax-loss selling measures may be correlated for at least two reasons. First, portfolio membership is determined by sorting year-end market capitalizations. Holding number of shares outstanding constant, this sorting technique would, ex post, tend to place stocks with the largest price declines over the previous year in the small firm portfolio and stocks with the greatest price appreciation over the previous year in the large firm portfolio. Second, small firms may experience more volatile rates of return than large firms. Hence, one would expect, a priori, the small firm (high variance) group to contain the most candidates for tax-loss selling, because some of the firms in this group will have experienced the most severe price declines on a percentage basis in the previous year. Roll (1982) also argues that the volatility of small firm returns make small firms more likely candidates for tax-loss selling.

[4]Yet the median market capitalizations of two subportfolios within a given market value group will not be exactly equal. In fact, as one might suspect, the 'losers' based on the price declines in the previous year tend to have smaller market capitalizations than the 'winners' within each market value group. For example, for the smallest firm group (*MV1*), the median capitalization for firms in the 'winner' subportfolio exceeds the median capitalization for firms in the 'loser' subportfolio by about $200,000. However, the differences in return behavior between the losers and winners (fig. 1) cannot be attributed primarily to size effects within each market value group. For example, the losers within *MV2* are larger than the winners within *MV1* but have different January return behavior.

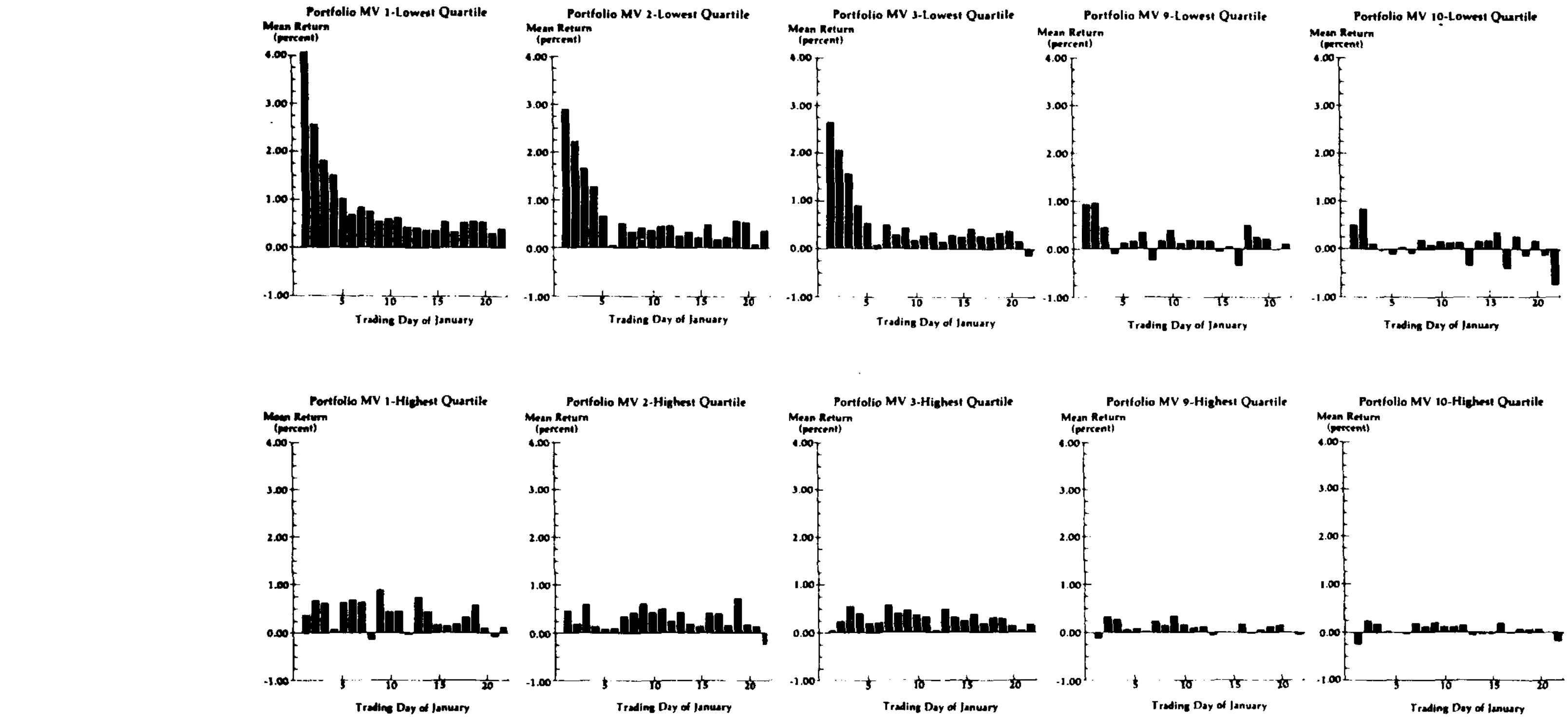

Fig. 1. Average daily returns in January for securities in the upper quartile and bottom quartile of the tax-loss selling distribution by market value portfolio. Each graph displays portfolio returns by trading day in January averaged over the eighteen years of this study (1963–1980). Securities are placed into portfolios based upon their market capitalizations and potential for tax-loss selling. The top row of graphs contains those firms *most* likely to be sold for tax purposes in the previous December. The lower row of graphs contains securities in the highest quartile of the tax-loss selling distribution, i.e., those firms *least* likely to be sold for tax reasons in the previous December. Each column contains securities in the same market value portfolio. *MV1* is the smallest firm portfolio and *MV10* is the largest firm portfolio. Firms in portfolios *MV4* through *MV8* are omitted from the figure. Looking across a row, one observes capitalization effects holding tax-loss selling effects roughly constant. In a given column, one observes tax-loss selling effects holding market capitalization roughly constant.

years of the study. If the data are to be consistent with the tax-loss selling hypothesis, then the firms in the bottom quartile should exhibit the largest average returns on the first few trading days of January. Indeed, the graphs illustrate that during the first couple of days in January firms with the greatest relative price declines (the bottom quartile) experience higher average returns than those firms in the upper quartile. For example, within portfolio *MV1*, on the first trading day in January the firms in the bottom quartile average a daily return of more than 4.0 percent whereas the firms in the upper quartile earn slightly less than 0.4 percent. The superior performance of the firms with the greatest price declines is consistent with the tax-loss selling hypothesis.

For firms in the bottom quartile of the tax-loss selling distribution within *MV1*, the average return of nearly 4.1 percent on the first trading day of the year is exceptionally large. One naturally might wonder whether this average is due to one exceptionally big return during one year. Examination of the data, though, reveals that during the period from 1963 through 1980 this subportfolio within *MV1* never experiences a negative return on the first trading day of the year. On the first trading day of the year, the returns for this subportfolio range from 1.5 percent in 1969 to 11.3 percent in 1975. Thus, the results on the first trading day in January are not generated by one large outlier but rather reflect consistently large one-day returns.

Tests for unusual return behavior near the beginning of the year can also be formulated within the framework of a statistical model. The daily returns of each market value/tax-loss portfolio are regressed on a set of nineteen dummy variables with no intercept term. The first twelve dummy variables represent each month of the year. The last seven dummy variables are used for the first seven trading days in January. The monthly dummy variables are intended to capture the mean portfolio effects exclusive of the first seven trading days in January. The seven daily dummy variables are included to measure any unusual return behavior that is associated with the beginning of a new year above and beyond the regular January return effect. This methodology allows one to test whether the January size effect is attributable solely to the first few days of the new year.

The monthly mean effects and beginning of year effects for firms in the bottom quartile of the tax-loss selling distribution are reported in table 2 by market value portfolio. Although the composition of each portfolio is updated annually, the regression results are calculated based on the pooled sample of daily returns for each market value portfolio using 4514 trading days from 1963 through 1980. For ease of reporting, daily returns are multiplied by 1000. Thus, a 10.0 equals one percent. From table 2 one observes that, during the first two trading days of a new calendar year, firms in the bottom quartile of the distribution generally earn rates of return in excess of those associated with January as a whole and that these average returns are more than two standard errors from zero. The magnitude of the beginning of year effect is greatest for the smallest firms. For example, firms in the bottom quartile of the tax-loss selling distribution within portfolio *MV1* on average earn a return of 3.59 percent on the first trading day of the year in addition to their regular daily return in January. Indeed, for this smallest firm portfolio, the mean effects during the first five trading days in January are all more than two standard errors away from zero. Furthermore, the sum of these effects is about 8.5 percent.

One also observes in table 2 that the day 1 return effects are monotonically related to market capitalization. That is, holding the measure of potential tax-loss roughly constant, the magnitude of the day 1 effect diminishes as market capitalization increases. Apparently a size effect still emerges after attempting to control potential tax-loss selling. Two explanations for this result seem plausible. First, there really is a size or size-related effect above and beyond any tax-loss selling effect. Second, the measure of potential tax-loss selling employed in this paper is deficient and the misspecification in the measure is related systematically to market capitalization. One possible explanation for this association is that non-taxable institutions (e.g., pension funds) may tend to be the marginal investor in large firms but not in small firms. All else constant, this alignment of investors would imply that small firms would more likely experience selling motivated by tax reasons. As explained earlier, the measure of potential tax-loss selling used in this paper does not control for institutional holdings.

Table 2 also presents intriguing information on the mean effects in each of the twelve months exclusive of the effects during the first trading days in January. From this table one observes that the smaller firms experience large average returns in January apart from the first few trading days. For example, the firms in the bottom quartile of the tax-loss selling distribution within portfolio *MV1* earned on average about 0.49 percent per trading day in January. This effect is more than twice as large as any other monthly mean effect for this portfolio. Furthermore, at the 0.05 significance level one would reject the hypothesis that the mean effects within all months are equal. Indeed, for the firms in the four smallest market value portfolios the hypothesis of identical mean returns across months would be rejected. Thus seasonality in returns seems to be present even after controlling for the very large effects on the first few trading days in January. However, with the exception of *MV1*, one could not reject the hypothesis of equal means across months from February through December. One might argue that this generalized January effect also captures a tax related effect, but such an argument becomes almost incredible. Clearly, this line of reasoning would be inconsistent with the standard efficient market hypothesis.

While the evidence in table 2 indicates that market capitalization may still proxy for an unexplained return effect in January, the evidence in table 3

Table 2

Mean month and beginning-of-year effects for the securities in the bottom quartile of the tax selling measure distribution by market value portfolio (tax selling measure computed in the year prior to the holding period.)[a]

	Mean monthly effects											
Portfolio	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
MV1	4.909	2.127	1.013	0.533	0.379	0.561	1.339	1.360	1.376	−0.442	0.100	0.948
	(0.59)	(0.51)	(0.48)	(0.49)	(0.48)	(0.48)	(0.49)	(0.48)	(0.50)	(0.48)	(0.50)	(0.49)
MV2	3.524	0.723	0.771	0.171	−0.134	0.019	1.177	0.837	1.150	−0.921	0.457	1.038
	(0.63)	(0.54)	(0.51)	(0.52)	(0.52)	(0.52)	(0.52)	(0.51)	(0.53)	(0.51)	(0.53)	(0.52)
MV3	2.778	0.254	0.723	0.051	−0.344	0.003	0.702	0.535	0.679	−0.810	0.419	1.061
	(0.64)	(0.56)	(0.52)	(0.53)	(0.53)	(0.53)	(0.53)	(0.52)	(0.54)	(0.52)	(0.55)	(0.53)
MV4	2.248	−0.141	0.966	0.043	−0.241	−0.192	0.620	0.401	0.620	−1.016	0.601	1.135
	(0.67)	(0.58)	(0.54)	(0.55)	(0.55)	(0.55)	(0.55)	(0.54)	(0.56)	(0.54)	(0.57)	(0.55)
MV5	1.970	0.092	0.611	0.200	−0.511	−0.101	−0.383	0.572	0.567	−0.873	0.701	0.633
	(0.69)	(0.60)	(0.56)	(0.58)	(0.57)	(0.57)	(0.57)	(0.56)	(0.58)	(0.56)	(0.59)	(0.57)
MV6	2.107	0.334	0.880	0.108	−0.317	−0.283	0.216	0.811	0.741	−1.064	0.674	0.699
	(0.70)	(0.61)	(0.57)	(0.58)	(0.58)	(0.58)	(0.58)	(0.57)	(0.59)	(0.57)	(0.60)	(0.58)
MV7	2.306	−0.253	0.697	0.030	−0.391	−0.433	0.248	0.762	0.347	−1.275	0.496	1.022
	(0.72)	(0.62)	(0.58)	(0.60)	(0.59)	(0.59)	(0.59)	(0.58)	(0.60)	(0.58)	(0.61)	(0.59)
MV8	1.542	−0.509	0.547	0.410	−0.742	−0.692	−0.046	0.867	0.347	−0.911	0.541	1.064
	(0.76)	(0.66)	(0.62)	(0.63)	(0.63)	(0.63)	(0.63)	(0.62)	(0.64)	(0.62)	(0.65)	(0.63)
MV9	1.145	−0.055	0.022	0.822	−0.778	−0.788	0.104	0.421	0.190	−0.752	0.577	0.498
	(0.76)	(0.66)	(0.62)	(0.63)	(0.62)	(0.62)	(0.63)	(0.61)	(0.64)	(0.61)	(0.65)	(0.63)
MV10	0.388	0.175	1.065	−0.072	−0.817	0.098	0.255	0.599	−0.004	0.169	−0.327	0.836
	(0.85)	(0.74)	(0.69)	(0.71)	(0.70)	(0.70)	(0.71)	(0.69)	(0.71)	(0.69)	(0.72)	(0.70)

Table 2 (continued)

Portfolio	Effects on first trading days in January						
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
MV1	35.854	20.717	13.188	10.154	5.298	1.927	3.414
	(2.33)	(2.33)	(2.33)	(2.33)	(2.33)	(2.33)	(2.33)
MV2	25.484	18.690	13.072	9.227	3.118	−3.083	1.601
	(2.47)	(2.47)	(2.47)	(2.47)	(2.47)	(2.47)	(2.47)
MV3	23.639	17.760	12.877	6.251	2.557	−1.951	2.138
	(2.53)	(2.53)	(2.53)	(2.53)	(2.53)	(2.53)	(2.53)
MV4	19.942	16.309	10.828	6.094	1.473	−1.953	2.494
	(2.63)	(2.63)	(2.63)	(2.63)	(2.63)	(2.63)	(2.63)
MV5	19.170	14.690	9.379	4.100	−0.656	−2.498	1.891
	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)	(2.73)
MV6	14.221	12.063	7.673	1.891	−2.501	−2.214	1.834
	(2.76)	(2.76)	(2.76)	(2.76)	(2.76)	(2.76)	(2.76)
MV7	10.898	8.915	6.873	−0.265	−2.451	−3.209	−0.113
	(2.82)	(2.82)	(2.82)	(2.82)	(2.82)	(2.82)	(2.82)
MV8	10.163	8.933	2.939	−0.330	−5.866	−3.545	−0.028
	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)
MV9	8.063	8.423	3.256	−2.217	0.028	0.429	2.289
	(2.99)	(2.99)	(2.99)	(2.99)	(2.99)	(2.99)	(2.99)
MV10	4.677	8.032	0.700	−0.707	−1.476	−0.036	−1.254
	(3.34)	(3.34)	(3.34)	(3.34)	(3.34)	(3.34)	(3.34)

[a]The mean effects are estimated by regressing daily portfolio returns on dummy variables for each month of the year and for the first seven trading days in January. Mean effects are multiplied by 1000 for reporting purposes. Thus, a 10.0 equals 1.0 percent. Standard errors are reported in parentheses. While the market value portfolios are updated annually, the statistical results are calculated using 4514 trading day returns from 1963 through 1980. Portfolio *MV1* contains the smallest firms within the sample and *MV10* the largest firms. The tax selling measure is computed by dividing the closing price on the second to the last trading day of the calendar year by the prior high for the period considered short-term by the IRS. For example, when a gain became long-term after six months, the denominator of the measure was the highest price between the beginning of July and the second to the last trading day in December.

Table 3

Mean month and beginning-of-year effects for the securities in the highest quartile of the tax selling measure distribution by market value portfolio (tax selling measure computed in the year prior to the holding period).[a]

	Mean monthly effects											
Portfolio	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
MV1	2.938	1.374	1.272	1.965	0.301	0.017	0.053	0.527	1.823	−0.961	0.785	2.445
	(0.78)	(0.68)	(0.63)	(0.65)	(0.64)	(0.64)	(0.65)	(0.63)	(0.65)	(0.63)	(0.66)	(0.64)
MV2	3.366	1.559	0.794	1.457	0.017	0.269	0.501	0.497	1.340	−0.618	0.715	0.586
	(0.57)	(0.50)	(0.46)	(0.48)	(0.47)	(0.47)	(0.47)	(0.46)	(0.48)	(0.46)	(0.49)	(0.47)
MV3	2.843	0.935	0.941	1.378	0.050	0.214	1.121	0.919	0.867	−0.153	1.276	1.386
	(0.54)	(0.47)	(0.44)	(0.45)	(0.44)	(0.44)	(0.45)	(0.44)	(0.45)	(0.44)	(0.46)	(0.45)
MV4	2.191	0.648	0.674	0.815	−0.278	0.195	0.643	0.763	1.014	−0.296	0.781	0.971
	(0.51)	(0.44)	(0.42)	(0.43)	(0.42)	(0.42)	(0.43)	(0.41)	(0.43)	(0.41)	(0.44)	(0.42)
MV5	1.861	0.582	0.484	1.244	−0.039	0.348	1.114	0.614	0.888	−0.148	1.044	1.074
	(0.50)	(0.43)	(0.40)	(0.41)	(0.41)	(0.41)	(0.41)	(0.40)	(0.42)	(0.40)	(0.42)	(0.41)
MV6	2.054	0.432	0.596	0.967	−0.069	0.313	0.965	0.624	0.967	−0.314	1.109	0.876
	(0.50)	(0.43)	(0.40)	(0.41)	(0.41)	(0.41)	(0.41)	(0.40)	(0.42)	(0.40)	(0.42)	(0.41)
MV7	1.377	0.419	0.549	0.731	−0.018	0.200	0.717	0.638	0.846	−0.142	1.209	0.862
	(0.46)	(0.40)	(0.37)	(0.38)	(0.38)	(0.38)	(0.38)	(0.37)	(0.39)	(0.37)	(0.39)	(0.38)
MV8	1.180	0.200	0.307	0.776	−0.166	0.208	0.679	0.637	0.669	−0.069	1.028	0.644
	(0.46)	(0.40)	(0.37)	(0.38)	(0.38)	(0.38)	(0.38)	(0.37)	(0.38)	(0.37)	(0.39)	(0.38)
MV9	0.849	0.002	0.261	0.660	−0.315	0.402	0.586	0.468	0.742	0.243	1.081	0.693
	(0.45)	(0.39)	(0.36)	(0.37)	(0.37)	(0.37)	(0.37)	(0.36)	(0.37)	(0.36)	(0.38)	(0.37)
MV10	0.601	−0.066	0.228	0.666	−0.189	0.283	0.348	0.244	0.264	0.258	0.804	0.689
	(0.46)	(0.40)	(0.37)	(0.38)	(0.38)	(0.38)	(0.38)	(0.37)	(0.39)	(0.37)	(0.39)	(0.38)

Table 3 (continued)

Portfolio	Effects on first trading days in January: Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
MV1	0.802	3.690	3.201	−2.311	3.327	3.832	3.349
	(3.07)	(3.07)	(3.07)	(3.07)	(3.07)	(3.07)	(3.07)
MV2	1.205	−1.460	2.580	−2.049	−2.605	−2.390	0.107
	(2.26)	(2.26)	(2.26)	(2.26)	(2.26)	(2.26)	(2.26)
MV3	−2.331	−0.503	2.653	1.145	−0.866	−0.724	2.826
	(2.13)	(2.13)	(2.13)	(2.13)	(2.13)	(2.13)	(2.13)
MV4	1.979	0.433	4.046	1.146	1.842	−0.085	1.407
	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)	(2.03)
MV5	0.661	0.635	3.021	0.558	−0.752	0.042	2.326
	(1.96)	(1.96)	(1.96)	(1.96)	(1.96)	(1.96)	(1.96)
MV6	−0.358	1.229	3.143	0.160	−0.134	−2.518	2.409
	(1.97)	(1.97)	(1.97)	(1.97)	(1.97)	(1.97)	(1.97)
MV7	−0.840	1.794	2.564	0.626	−0.510	−0.178	1.520
	(1.83)	(1.83)	(1.83)	(1.83)	(1.83)	(1.83)	(1.83)
MV8	−1.510	1.277	1.495	1.195	−0.404	−1.869	1.756
	(1.81)	(1.81)	(1.81)	(1.81)	(1.81)	(1.81)	(1.81)
MV9	−1.996	2.437	1.857	−0.245	−0.029	−0.627	1.481
	(1.76)	(1.76)	(1.76)	(1.76)	(1.76)	(1.76)	(1.76)
MV10	−3.110	1.802	1.099	−0.353	−0.610	−0.867	1.273
	(1.81)	(1.81)	(1.81)	(1.81)	(1.81)	(1.81)	(1.81)

[a]The mean effects are estimated by regressing daily portfolio returns on dummy variables for each month of the year and for the first seven trading days in January. Mean effects are multiplied by 1000 for reporting purposes. Thus, a 10.0 equals 1.0 percent. Standard errors are reported in parentheses. While the market value portfolios are updated annually, the statistical results are calculated using 4515 trading day returns from 1963 through 1980. Portfolio *MV1* contains the smallest firms within the sample and *MV10* the largest firms. The tax selling measure is computed by dividing the closing price on the second to the last trading day of the calendar year by the prior high for the period considered short-term by the IRS. For example, when a gain became long-term after six months, the denominator of the measure was the highest price between the beginning of July and the second to the last trading day in December.

suggests that at least part of the January size effect seems to be associated with tax-loss selling. Table 3 contains the return effects for each month and the first seven trading days in January for firms in the highest quartile of the tax-loss selling distribution by market value portfolio. One observes that very few of the return effects during the first seven trading days in January are more than two standard errors from zero. The point estimates of these day effects tend to be much smaller than the day effects reported in table 2. For example, in contrast to the firms with the greatest price declines in portfolio *MV1*, this subset of *MV1* firms does not exhibit even one statistically significant return effect during the first seven trading days in January. Since only firms in the bottom quartile of the tax-loss selling distribution earn exceptional returns during the first seven trading days of January, one might feel confident in concluding that the very large returns observed at the beginning of January are indeed a tax-loss selling phenomenon.

But the evidence in table 3 also suggests that at least a portion of the unusual behavior of small firms in January is not attributable to potential tax-loss selling. That is, the mean effects in January exclusive of the first few trading days are anomalous even for the firms least likely to experience tax-loss selling. In table 3, the point estimates for January are greater than the point estimates in the other months for each of the first eight market value subportfolios. Based on an F-test, one would reject the hypothesis of identical mean monthly effects for the subportfolios of *MV1* through *MV4* at the 0.05 level. The January effects for small firms seem significant, regardless of whether the firms are subject to tax-loss selling. Thus, while potential tax-loss selling may explain the extraordinary returns witnessed at the beginning of January, potential tax-loss selling does not seem capable of explaining the entire anomolous return behavior of small firms in January.

While the return performance of small firm 'losers' is especially pronounced during the first few trading days in January, one might wonder about the magnitude of the dollar profits generated by a short-term trading strategy designed to exploit these returns. To measure this magnitude roughly, price and volume data for the smallest firms (*MV1*) in the bottom quartile of the tax-loss selling distribution are collected for the last trading day of 1974 and the first five trading days of 1975. These firms are selected because their average return on the first day of January is about 11.3 percent, the largest first day portfolio return in the study. During this period, this portfolio of small firm 'losers' contains 171 securities. On the first day in January, only 108 of these securities actually traded. The average return for these 108 securities on the first day in January is about 13.9 percent. During the first five days of January, only 5 of the 171 securities experience no volume. For computing hypothetical dollar trading profits, the investor is assumed to purchase all the shares that traded during the first five days of

January at the closing price at the end of December.[5] The investor then is assumed to sell off his inventory of shares at the closing prices during the first five days of January. For example, assume that a stock traded 200 and 300 shares on the second and fifth day of January, respectively. If the dollar closing price on December 31 equals 1.00 and the closing prices on the second and fifth day of January are 1.25 and 1.50, then the hypothetical trading profit for the week would be

$$\$200 = 200 \times (\$1.25 - \$1.00) + 300 \times (\$1.50 - \$1.00).$$

For the 171 firms the aggregate trading profits for the first week in January come to $142,525 on an assumed initial investment $518,062, a one-week return of approximately 27% ignoring transaction costs. The purpose of this calculation is not to explain the anomalous return behavior of these small firms during the first few days of January, but rather to point out that the hypothetical dollar profits associated with these abnormal returns do not appear to be large and may vanish after transaction costs.[6]

4. Conclusion

Small firms experience large returns in January and exceptionally large returns during the first few trading days of January. The empirical tests reported in this paper indicate that the abnormally high returns witnessed at the very beginning of January appear to be consistent with tax-loss selling. While these returns may be inconsistent with the efficient market hypothesis, the dollar profits associated with a trading rule designed to exploit this phenomenon seem relatively small. However, tax-loss selling cannot explain the entire January seasonal effect. The small firms least likely to be sold for tax reasons (prior year 'winners') also exhibit large average January returns, although not unusually large returns during the first few days of January.

[5]A trading strategy which began on the second to the last day of December may have produced bigger dollar profits, because, as Roll (1982) reports, average returns on the last trading day in December are also exceptionally large.

[6]If one assumes round-trip commissions for these companies to be about seven percent, then the aggregate trading profits would be reduced to about $106,000. Furthermore, if one assumes that the sale of stock occurred at a price just one eighth of a point less than the closing price, the trading profits after commissions would be reduced to about $36,000. The precipitous drop from $106,000 to $36,000 is due to the fact that the average share price in this group of firms is slightly less than one dollar. A move of an eighth of a point on a dollar stock would be a 12.5% change. [See Stoll and Whaley (1983) for an analysis of transaction costs by capitalization group for NYSE companies.] Based on a trading rule with ten NYSE and ten AMEX companies selected at the end of 1978, Roll (1982) reports that, after transaction costs, there would appear to be no profit for the NYSE issues at the turn-of-the-year but that 'an astute trader with a good floor broker might make a small profit in AMEX issues'.

While tax-loss selling may account for the unusually large returns at the beginning of January, several questions still remain unanswered. First, why do firms exhibit a January seasonal effect even after purging the data of potential tax-loss selling effects? Furthermore, why does this seasonal pattern still seem to be related to market capitalization? Apart from the seasonality issue, why do small firms still apparently earn average returns significantly greater than those of large firms over long periods of time? In addition, given the highly skewed and leptokurtic nature of small firm returns, can any theory conditioned only upon means and a variance–covariance matrix capture the salient features in the pricing of small firms? If not, what equilibrium theory is capable of accurately describing the pricing of these assets? While this paper has provided additional insights into the peculiar behavior of the returns of smaller firms, the anomaly still is not fully understood.

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