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ALL THINGS CONSIDERED, TAXES DRIVE THE JANUARY EFFECT

Honghui Chen
University of Central Florida

Vijay Singal
Virginia Tech

Abstract

The multitude of explanations for the January effect leaves the reader confused about its primary cause(s): is it tax-loss selling, window dressing, information, bid-ask bounce, or a combination of these causes? The confusion arises, in part, because evidence has generally been presented in support of a particular hypothesis though the same evidence may be consistent with another hypothesis. Furthermore, prior work does not adequately control for the bid-ask bounce. In this article we try to disentangle different explanations of the January effect and identify its primary cause. We find that tax-related selling is the most important cause, overshadowing other explanations.

JEL Classifications: G10, G12, G14

I. Introduction

There is considerable evidence of a January effect in U.S. equity markets; that is, some stocks experience large mean returns in January.[1] Keim (1983) and Reinganum (1983) find that the January effect exists primarily for small firms. Roll (1983) argues that because the more volatile stocks are likely to be extreme losers (and winners) and because the final size of the losing stocks will be small, it is not surprising to find that the January effect exists primarily for small firms.

Various explanations are advanced: window dressing, information, tax-loss selling, and bid-ask bounce. Previous studies present evidence in support of each of

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[1]The body of empirical literature relating to seasonalities is large. To conserve space, we cite only one or two papers relating to a single issue. As a result, many important papers are not cited. We apologize for those omissions. Singal (2004) surveys the literature on the January effect.

the explanations but typically without considering the alternate explanations.[2] The problem in interpretation arises from the fact that large January returns for small stocks are simultaneously consistent with window dressing, information release, and tax-loss selling hypotheses. Furthermore, the diminution of January returns in samples without small stocks lends credence to the view that the January effect is a manifestation of market microstructure biases in measurement of stock returns.

We try to disentangle the different explanations by conducting new comprehensive tests to separate one explanation from another. To control for the bid-ask bounce, we use midpoint quotes instead of closing prices in our entire analysis. We find evidence the January effect consistent with the tax-loss selling hypothesis. In particular, stocks with the highest potential for tax-loss selling earn an average return of 5.2% in the first five trading days of January. The December returns are negatively correlated with the potential for tax-loss selling, implying lower returns for stocks subject to tax-loss selling. On the other hand, the January returns are positively correlated with the potential for tax-loss selling. In addition, we find changes in turnover also consistent with tax-loss selling.

We also find that investors tend to postpone sale of winners to January so that payment of taxes is deferred by almost a year. We find support for the tax-gain selling hypothesis: stocks with the lowest potential for tax-loss selling earn an average of 1.8% in the last few trading days of December. The volume traded for these stocks is also large in January, supporting the notion that investors postpone their sales of winners to January. Tax-loss selling in December and tax-gain selling in January are both consistent with the predictions of Constantinides (1984).

The evidence in support of the tax-related selling hypotheses is also consistent with the window dressing hypothesis. However, if institutional investors window dress their portfolios, they must window dress more than once a year. Mutual funds and similar institutions are required to file semiannual reports including lists of holdings with the Securities and Exchange Commission (SEC) and send those reports to the shareholders under the Investment Company Act of 1940. Therefore, we study the behavior of stock returns around semi-annual closing (June–July) when tax-related selling would not contaminate the inferences, but institutions would window dress if they do so at the end of the calendar year. We do not find evidence consistent with the window dressing hypothesis based on either returns or turnover.

Next, we examine the differential information hypothesis (also known as the information release hypothesis). According to this hypothesis, the excess January returns are the effect of significant information releases that occur in the

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[2]Window dressing is supported by Haugen and Lakonishok (1987) and Lakonishok et al. (1991), information by Barry and Brown (1984), tax-loss selling by Poterba and Weisbenner (2001) and Jones, Lee, and Apenbrink (1991), and market microstructure biases by Bharadwaj and Brooks (1992) and Cox and Johnston (1998).

first few days of January. If new information releases cause the January effect, we should find that the turnover in January is larger for small firms than in December. In fact, we find that the January stock turnover is smaller than the December turnover for small firms. As for window dressing, we should also find a midyear effect because of information. However, we find no such effect. Thus, the evidence does not support the differential information hypothesis.

In addition, we check the robustness of our analysis using closing prices and extend our sample to a longer period. The conclusions drawn previously are supported by the robustness checks.

II. Sample Characteristics and Preliminary Results

The initial sample consists of common stocks traded on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and NASDAQ. We exclude American Depositary Receipts (ADRs) and other special stocks from our sample, as is commonly done in other studies. Daily return data are obtained from the Center for Research in Security Prices (CRSP) files. The closing bid-ask quotes are obtained from the NYSE's Trade and Quote (TAQ) database, which is available from January 1993. Accordingly, our study covers 1993 through January 1999; that is, we analyze stock returns for December of each year and the following January. To be included in the sample, a firm must have return data for the whole year and the first five days of January of the following year from CRSP, and closing bid-ask quotes from TAQ.

The first step in the analysis is assessing the potential for tax-loss selling (*PTS*). Typically, *PTS* is measured by using the stock return for a pre-specified number of trading days (or months) leading up to the end of the year, called *PTSret*. Sometimes, researchers consider the drop from the highest price attained during the year as a measure of *PTS,* referred to as *PTSmax*. We rely on a new measure of *PTS* (called *PTSflow*) that considers the daily closing price and daily volume to arrive at a measure of *PTS*. Raw stock return is used in all measures of *PTS* instead of risk-adjusted stock return as the tax credit is based on actual loss and not on risk-adjusted loss. To calculate *PTS,* we first find the price on the reference date defined as the 12th-last trading day in December, usually around December 15. The selection of the 12th-last trading day as the reference date is slightly different from past research. Most researchers exclude the last 6 trading days of the year. Our choice of the reference date balances the need to have a date close to the end of the year while allowing the investors to have enough time to sell. In any case, the choice of the reference date, whether the 12th-last trading day or the 6th-last trading day, does not have a material effect on the results.

PTSflow is measured in equation (1) as the daily dollar flows (closing price times volume) that occur above the reference price divided by the total dollar flows during the estimation period: from January 1 to the reference date, the 12th-last trading day in December:

$$PTSflow = \frac{\sum_t p_t V_t I_t}{\sum_t p_t V_t}, \tag{1}$$

where p_t is the closing price on day t, V_t is the volume on day t, and I_t is an indicator variable set to 1 if $p_t > R$ (the reference price).[3] Though there are some differences among the three *PTS* measures, the results relating to the January effect are similar. Therefore, we report results only with *PTSflow* (simply referred to as *PTS*), except in Table 1, where results with all three measures are reported for comparison.

From Table 1, we find that the number of firms varies by year from 5,365 to 6,311 firms, giving a total of 35,862 firm-years. The first three data columns in Table 1 have the three measures of *PTS.* According to *PTSflow,* the maximum potential for tax-loss selling occurred in 1998 with a value of 0.719. This value implies that 72% of the dollar flows occurred above the reference price (i.e., investors paid more than the current price) whereas the remaining 28% of the flows occurred below the reference price (i.e., investors paid less than the reference price).

Also in Table 1, the reference price changes through the six-year period from an average of \$19.86 in 1993 to \$16.84 in 1998. The mean market capitalization, at the end of the calendar year for each stock, also increases from \$833 million in 1993 to \$1,899 million in 1998. Stock risk is measured by beta and by standard deviation. Estimates of beta are obtained using monthly returns following the methodology in Fama and French (1992). Each stock's monthly returns for at least the previous 24 months (up to a maximum of 60 months) are regressed on the current month's and a lagged month's CRSP value-weighted index returns. The sum of the coefficients of the current and lagged month's returns is our estimate of beta. Standard deviation is estimated using the same monthly return data as for beta estimation. Residual standard deviation is reported for comparison. Residual standard deviation constitutes at least 85% of the total standard deviation, suggesting that systematic risk is only a small part of total risk. Recent evidence is consistent with an increase in the idiosyncratic risk component of total risk (see Campbell et al. 2001). We report returns for the last five trading days of December (excluding the last trading day),[4] the first five trading days of the next January, and the difference between the five-day January and five-day December returns. January is the first

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[3] Trading volume for NYSE and NSADAQ stocks is measured differently. However, we do not believe a bias is introduced because we only use a ratio of volumes.

[4] We exclude the last trading day of the year because it is a much shortened trading session with an abnormally low trading volume.

TABLE 1. Sample Characteristics with Midpoint Quotes, by Year.

PTS Year	*PTSflow*	*PTSret*	*PTSmax*	Ref. Price	Year-End Cap ($ million)	STD (%)	Beta	Res. STD (%)	Dec 5-Day Return (%)	Jan 5-Day Return (%)	Jan Return– Dec Return (%)	No. of Observations
93	0.544	0.227	−0.233	19.80	832.74	15.11	1.58	14.38	1.44***	1.67***	0.23	5,365
	0.553	0.110	−0.181	11.88	81.78	12.97	1.39	12.14	0.20***	0.00	0.00	
94	0.707	−0.053	−0.296	14.76	773.71	14.67	1.65	13.94	0.59***	1.74***	1.15***	5,779
	0.841	−0.083	−0.244	10.75	76.21	12.87	1.46	12.04	0.00	0.00	0.00	
95	0.477	0.337	−0.212	23.38	1,008.51	14.12	1.60	13.66	1.40***	1.07***	−0.34*	5,997
	0.453	0.232	−0.148	12.88	94.32	12.32	1.35	11.84	0.24***	0.00	−0.10***	
96	0.533	0.173	−0.252	18.12	1,173.10	13.85	1.38	13.54	−0.20**	2.87***	3.08***	6,236
	0.565	0.098	−0.188	13.56	106.27	12.13	1.15	11.77	0.00	0.60***	0.59***	
97	0.524	0.212	−0.261	20.12	1,572.81	13.94	1.22	13.58	0.79***	0.14	−0.65***	6,174
	0.530	0.167	−0.208	14.81	137.07	12.29	1.05	11.99	0.69***	−0.88***	−2.04***	
98	0.719	−0.079	−0.379	16.84	1,898.66	15.08	1.19	14.30	2.70***	4.66***	1.95***	6,311
	0.842	−0.163	−0.353	11.00	109.21	13.23	1.06	12.52	0.92***	1.36***	0.46***	
All	0.585	0.134	−0.274	18.83	1,226.80	14.45	1.43	13.89	1.12***	2.05***	0.93***	35,862
	0.659	0.042	−0.222	12.50	99.49	12.64	1.22	12.06	0.13***	0.00	0.00	

Note: The sample consists of all stocks on the New York Stock Exchange (NYSE), American Stock Exchange, and NASDAQ in the Center for Research in Security Prices (CRSP) files that are listed for the entire calendar year and the first five days of the following January, and are available on the NYSE's Trade and Quote (TAQ) database. The reference price is as of the 12th-last trading day of the year. *PTSret* is the return of the stock from beginning of the year until the reference day. *PTSmax* is the percentage drop in the stock price from its maximum attained over the year to the reference price. *PTSflow* is the ratio of dollar volume that occurred above the reference price and the total dollar volume. Market capitalization is as of the end of the year. Dec 5-day return is the buy-and-hold return over the 6th-last trading day through the 2d-last trading day of the year, and the Jan 5-day return is the return over the first five trading days of the next year. Returns are presented using midpoint quotes from TAQ. Beta is estimated by regressing monthly returns on the concurrent and one-month lagged value-weighted CRSP market returns. Standard deviations are estimated over the same monthly returns. In each cell, the first number is the mean and the second number is the median.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.

month of the following year. That is, the five-day return of January 1999 is reported in the row labeled 1998.

Closing Stock Prices and Midpoint Bid-Ask Quotes

Table 2 shows that tax-loss selling in December occurs for stocks that have fallen in value significantly during the year. A decline in value also means that firm size (as measured by equity) has fallen and the stock price has decreased. Referring to Table 2 once again reveals that the mean (median) reference price for stocks with the greatest *PTS* is \$7.71 (\$4.50).

Market microstructure biases are most likely to plague stocks with low prices and low capitalization, exactly the type that meet the criteria for tax-loss selling. Not surprising, researchers suggest that biases introduced by market microstructure might explain the January effect and that transaction costs make it unprofitable to arbitrage. Because trading in small firms is fraught with market microstructure issues, researchers attempt to uncover whether the January effect is truly an anomaly or whether it is caused by biases such as the bid-ask bounce, bid-ask spreads, and transaction costs that make it not possible to arbitrage.[5] (See Singal, 2004, for a detailed analysis of trading strategies to arbitrage the January effect.)

Among microstructure issues, the bid-ask bounce is of particular concern. As documented by Keim (1989), small stocks trade at the bid in late December and trade at the ask in early January. Because the spreads can be large for small stocks, the bid-ask bounce can give the impression of a positive January return when such a return does not really exist. Keim's analysis of bid to bid prices reveals a 50% reduction in returns for the last day of December and first day of January. One way of correcting for the bid-ask bounce is to exclude low-price stocks (tabular results not reported here), a strategy used by Cox and Johnston (1998). If we use a price screen of \$10 in accordance with previous research (see Cox and Johnston 1998; Pritamani and Singal 2001), the trend in returns by *PTS* quartiles and size quintiles in Tables 1 to 3 is preserved but the magnitude of returns is much smaller. However, a price screen ostensibly designed to limit the contribution of market microstructure biases also biases the experiment against finding a January effect because tax-loss selling is primarily a small firm effect. For that reason, we do not pursue this line of inquiry. Instead, we use the midpoint of the bid and ask for computing returns throughout this article except in section III and part of section V. In this way, we try

[5]Ball, Kothari, and Shanken (1995) suggest that low-priced stocks trading within a relatively wide bid-ask interval may explain the effect. Cox and Johnston (1998) find that stocks with prices greater than \$10 do not exhibit positive returns in January. Bharadwaj and Brooks (1992) also find that it is a low-price effect.

TABLE 2. Turn-of-the-Year Returns.

Panel A. Turn-of-the-Year Returns by Potential for Tax-Loss Selling (*PTS*) Quartiles

PTS Quartile	*PTS*	Ref. Price	Year-End Cap ($ million)	STD (%)	Beta	Dec 5-Day Return (%)	Jan 5-Day Return (%)	Jan Return– Dec Return (%)	No. of Observations
1	0.126	32.35	2,641.07	11.220	1.247	1.82***	−0.06	−1.88***	8,963
	0.081	24.00	256.59	9.486	1.087	0.75***	−0.23***	−1.19***	
2	0.460	21.60	1,261.65	13.461	1.440	1.39***	0.77***	−0.62***	8,966
	0.429	16.00	144.63	11.684	1.236	0.52***	0.00	−0.39***	
3	0.779	13.66	731.43	15.504	1.562	1.02***	2.28***	1.26***	8,968
	0.806	9.88	84.31	13.828	1.342	0.00	0.55***	0.32***	
4	0.973	7.71	273.50	17.803	1.471	0.26*	5.21***	4.95***	8,965
	0.987	4.50	35.05	16.185	1.257	0.00	1.78***	2.38***	

Panel B. Turn-of-the-Year Returns by Size Deciles

Size Decile	*PTS*	Ref. Price	Year-End Cap ($ million)	STD (%)	Beta	Dec 5-Day Return (%)	Jan 5-Day Return (%)	Jan Return– Dec Return (%)	No. of Observations
1	0.695	6.62	28.36	18.17	1.44	0.11	3.81***	3.70***	15,836
	0.838	4.50	23.44	16.44	1.22	0.00	0.49***	1.09***	
2	0.588	13.44	100.33	14.31	1.57	1.33***	2.30***	0.97**	3,960
	0.661	11.75	97.57	13.15	1.34	0.00	0.27***	0.00	
3	0.541	16.89	168.30	13.53	1.59	1.90***	1.19***	−0.71***	2,938
	0.573	15.25	164.33	12.17	1.37	0.65***	0.00	−0.64***	
4	0.509	20.70	263.37	12.79	1.54	2.21***	0.43***	−1.78***	2,377
	0.507	18.75	256.23	11.54	1.31	1.02***	−0.20***	−1.54***	
5	0.510	23.18	389.34	12.10	1.54	2.21***	0.20	−2.01***	2,044
	0.516	21.00	381.47	10.95	1.33	1.11***	−0.19**	−1.73***	
6	0.486	26.91	587.5	11.54	1.41	2.39***	−0.36**	−2.75***	1,864
	0.468	24.13	574.00	10.59	1.25	1.48***	−0.61***	−1.94***	
7	0.452	30.13	907.32	10.61	1.31	2.50***	−0.39**	−2.89***	1,796
	0.423	27.75	892.54	9.77	1.18	1.71***	−0.59***	−2.36***	
8	0.457	33.98	1,564.65	9.56	1.24	2.05***	−0.05	−2.10***	1,740
	0.413	30.66	1,500.30	8.64	1.15	1.55***	−0.40***	−1.94***	
9	0.422	40.45	3,252.89	8.80	1.20	1.91***	−0.02	−1.93***	1,723
	0.357	36.00	3,049.46	7.94	1.10	1.45***	−0.26*	−1.57***	
10	0.339	87.05	19,053.51	7.34	1.05	1.31***	0.49***	−0.82***	1,584
	0.222	49.91	9,834.46	6.64	0.98	0.97***	0.15*	−0.75***	
All	0.585	18.83	1,226.80	14.45	1.43	1.12***	2.05***	0.93***	35,862
	0.659	12.50	99.49	12.64	1.22	0.13***	0.00	0.00	

Note: Returns are presented using the midpoint of bid-ask quotes from the New York Stock Exchange's (NYSE) Trade and Quote (TAQ) database. Each year, all of the stocks in the sample are ranked and assigned to *PTS* quartiles according to their *PTS* measures, with *PTS* increasing with the quartile number. Categorization into size deciles is based on each stock's market capitalization at each year-end, and the decile breakpoints are based only on NYSE stocks. Market capitalization is as of the end of the year. Dec 5-day return is the buy-and-hold return over the 6th-last trading day through the 2d-last trading day of the year, and the Jan 5-day return is the return over the first five trading days of the next year. Returns are presented using midpoint quotes from TAQ. Beta is estimated by regressing monthly returns on the concurrent and one-month lagged value-weighted CRSP market returns. Standard deviations are estimated over the same monthly returns. In each cell, the first number is the mean and the second number is the median.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.

to correct for one important source of the market microstructure bias: the bid-ask bounce.

Preliminary Results

From Table 1, it can be seen that the mean five-day return for January is positive for all years, ranging from 0.1% to 4.7%. It is greater than 1.0% for five of six years. Similarly, the mean five-day return for December is positive for all years except 1996, ranging from –0.2% to 2.7%. However, it is greater than 1.0% for only three years. The mean difference between five-day midpoint January and five-day midpoint December returns is positive for all years except for 1995 and 1997. Overall, the five-day January return is 2.1% compared with the five-day December return of 1.1%. The results here seem to suggest that the five-day January returns are positive and large, and are usually larger than the returns during the previous five days in December, suggesting the continued existence of the January effect.

III. The Tax-Loss Selling Hypothesis and Tax-Gain Selling Hypothesis

Constantinides (1984) shows that, with zero transactions costs, investors should optimally sell losers immediately to realize capital losses. Adding transactions costs to this scenario, Constantinides finds that investors will postpone selling until the cost of not selling outweighs the transactions costs. In December, the tax-related cost of not selling will almost certainly outweigh the transactions costs because of tax benefits. Thus, much of the tax-loss selling should occur in December. In January, these losers earn high returns, resulting in the January effect.

There is evidence to support the tax-loss selling hypothesis as a reason for the January effect. Poterba and Weisbenner (2001) examine the effect of changes in capital gains tax rules on the January effect and find that the turn-of-the-year return is positively related to the difference between short-term and long-term capital gain tax rates. Jones, Lee, and Apenbrink (1991) provide further evidence of tax-loss selling by examining the January effect around the introduction of individual taxes in 1917.

In addition to tax-loss selling, Constantinides (1984) suggests that rational investors should realize long-term capital gains to reestablish a short-term status for stocks to garner short-term capital losses in the future, assuming differential tax rates for long-term gains and losses and short-term gains and losses. In his model, all trades (sales and purchases) occur once a year, in December. Thus, according to his model, investors should sell losers in December to realize capital losses and sell winners in December to reestablish a short-term status. However, if we allow trades to occur in every period, it is optimal to realize losses in December and realize gains in January. By waiting a few days, it is possible to defer payment of taxes by almost one year. Thus, rational investors will sell losers in December to realize losses to offset realized gains and sell winners in January to realize capital gains to establish a short-term status. Although Constantinides considers only tax-gain selling of winners, investors may sell winners in January for achieving other objectives of liquidity or portfolio rebalancing necessitated by an appreciation of winners.

The evidence related to tax-gain selling is mixed. Badrinath and Lewellen (1991) find evidence of realization of capital gains in January. On the other hand, Reinganum (1983) and Sias and Starks (1997) find prior-year winners also gain in January, which is contrary to the tax-gain selling hypothesis.

Tests of Tax-Loss Selling and Tax-Gain Selling Hypotheses

Test 1: Results Based on Stock Returns. In the previous section, we observed that the five-day January returns tend to be larger than the five-day December returns. Now we segregate the sample based on the potential for tax-loss selling, as measured by *PTS,* in Panel A of Table 2. The mean *PTS* is 0.126 for the lowest *PTS* quartile and 0.973 for the highest *PTS* quartile.

The five-day January return increases monotonically as we move to higher levels of *PTS,* while the five-day December return falls. The trend in return indicates that high-*PTS* stocks experience a greater amount of selling pressure than do low-*PTS* stocks in December. However, in January the buying pressure is much stronger for the high-*PTS* stocks. The stocks in the highest *PTS* quartile earn 4.95% less in the last five days of December than in the first five days of January, consistent with the tax-loss selling hypothesis.

Stocks in the lowest *PTS* quartile constitute the winner stocks, as most investors purchased them below the reference price. We find that the average return is 1.8% in December and –0.1% in January; that is, these stocks earn 1.9% more in the last five days of December than in the first five days of January. This is consistent with tax-gain selling because winner stocks should do better in December than in January as fewer traders will sell these stocks in December.

The results in Panel B of Table 2 support the previous conclusions: small stocks (in size decile 1) experience significantly higher returns in January than in December (3.7%), whereas large stocks (in size decile 10) gain less in January than in December (–0.8%).

In the foregoing panel results, we did not simultaneously control for *PTS,* risk, price, and size. The regression model in equation (2) allows us to achieve that. The dependent variable is the five-day December return or the five-day January return:

$$R_{it} = \alpha + \beta_1 PTS_{it} + \beta_2 Risk_{it} + \beta_3 Size_{it} + \beta_4 \log(Price_{it}) + \varepsilon_{it}. \qquad (2)$$

TABLE 3. Regression of Turn-of-the-Year Returns.

Intercept	*PTS*	log(*Price*)	*Size*	STD	Adj. R^2	No. of Observations
Panel A. Dependent Variable: December 5-Day Returns (%)						
−0.473	−0.911	0.154	2.318	0.079	0.008	31,477
0.103	0.000	0.061	0.000	0.000		
−0.931	−0.785	0.593		0.081	0.006	31,477
0.001	0.000	0.000		0.000		
−0.040	−1.051		2.638	0.073	0.008	31,477
0.819	0.000		0.000	0.000		
1.942	−1.403				0.002	35,862
0.000	0.000					
Panel B. Dependent Variable: January 5-Day Returns (%)						
2.882	2.844	−1.642	1.368	0.063	0.045	31,477
0.000	0.000	0.000	0.000	0.000		
2.611	2.918	−1.383		0.064	0.045	31,477
0.000	0.000	0.000		0.000		
−1.717	4.326		−2.034	0.126	0.037	31,477
0.000	0.000		0.000	0.000		
−1.349	5.818				0.025	35,862
0.000	0.000					

Note: The following regression is estimated with standard deviation as measure of risk.

$$R_{it} = \alpha + \beta_1 PTS_{it} + \beta_2 Risk_{it} + \beta_3 Size_{it} + \beta_4 \log(Price_{it}) + \varepsilon_{it}.$$

The dependent variable is the five-day midpoint return in December or January. *PTS* is the potential for tax-loss selling. *Risk* is measured as the standard deviation or beta. *Size* is the standardized size percentile ranking of a stock's market capitalization at the end of the year, where the percentage breakpoints are based on New York Stock Exchange (NYSE) stocks. *Price* is the reference price for the stock. In each cell, the first number is the regression coefficient, and the second number is the p-value.

The results are reported in Table 3 for the five-day December and five-day January returns, using standard deviation as the risk measure. The results are similar when beta is used as a measure of risk instead of standard deviation. Size is the standardized percentile size ranking of the firm in the year of its inclusion. More specifically, we assign each stock to a percentile according to its capitalization at the end of the previous December, where the percentile break points are based only on NYSE stocks. We then scale the percentile rankings so that stocks in the smallest percentile take the value of 0 and stocks in the top percentile take a value of 1. The percentiles allow us to construct finer partitions than deciles.[6] Price is the reference price on the 12th-last trading day of the year.

[6]When we use the NYSE, AMEX, and NASDAQ size breakpoints for determining size, the results are more consistent with our conclusions in the paper. However, conservatively and in accordance with prior research related to size, we report results based on NYSE size breakpoints.

Panel A of Table 3 reports the regression results with December return as the dependent variable. The coefficient of *PTS* is negative and significant after controlling for *Price, Size,* and *Risk*. This implies that the higher the *PTS,* the lower is the December return, or that the lower the PTS, the higher is the December return, which is consistent with both tax-loss selling and tax-gain selling. We can see from the table that the coefficient of *PTS* is –0.91. Because the value of *PTS* can range from 0 to 1, the maximum effect of *PTS* on the five-day December return is 0.9%: the return of a firm with *PTS* of 1 will be 0.9% lower than the return of a firm with *PTS* of 0. The coefficient of *Size* (*Price*) is positive and significant, which is consistent with the observation that smaller firms (lower priced stocks) experience smaller returns (more negative returns) than larger firms (higher priced stocks) in December. The coefficient of risk is positive and significant, implying that riskier firms (adjusted for *Size* and *PTS*) earn more in December than do less risky firms. As smaller firms are generally riskier and high-*PTS* firms are riskier, riskier firms might be expected to earn less than less risky firms in December. However, the result indicates that among similar *Size* and similar *PTS* firms, riskier firms earn more. This is consistent with the expectation that riskier firms should earn higher returns in all periods to compensate investors for the greater amount of risk.

Results with the five-day January return as the dependent variable are reported in Panel B of Table 3. Now, the coefficient of *PTS* is positive and significant, implying that firms with high *PTS* earn more than firms with low *PTS* in the first five trading days of January, which is consistent with both of the tax-related selling hypotheses. The difference in return for a stock with *PTS* of 1 and a stock with a *PTS* of 0 is 2.8% over the five-day period. Coefficients on the size variables and risk variable also remain significant and of the expected sign.

In the foregoing analysis, we find large returns earned by high-*PTS* firms in January as compared with the returns earned by low-*PTS* firms. On the other hand, low-*PTS* firms earn significantly more than high-*PTS* firms in December. The results are supported by regression analysis: the returns in both December and January depend on a firm's *PTS*. The results are separately consistent with both the tax-loss selling hypothesis and the tax-gain selling hypothesis.

Test 2: Results Based on Turnover. Tax-related hypotheses have implications for how trading volume will change for the affected stocks. If tax-loss selling drives the January effect, we would expect those stocks to experience abnormally high volume in December. Similarly for tax-gain selling, we would expect low-*PTS* stocks to exhibit high January volume relative to December volume.

Considering the tax-loss selling hypothesis, Dyl (1977) contends that the volume of high-*PTS* stocks should increase abnormally in December, as more investors are interested in selling the losing stocks. He finds that the volume is high in December for stocks with high *PTS* but finds no evidence of abnormal volume in January either for winners or losers. Lakonishok and Smidt (1986) find that turnover is generally higher for past winners than for past losers irrespective of the month but that the difference in turnover between the past winners and past losers is smaller in December than in other months.

Our study of trading volume allows us to shed light not only on the tax-loss selling hypothesis but on other hypotheses as well. Lo and Wang (2000) claim that among the different definitions of volume, dollar turnover is theoretically correct and a better and consistent measure of volume. Therefore, we use share turnover, which is the same ratio as dollar turnover, as a measure of volume (shares traded divided by the number of shares outstanding). Furthermore, we use a market model to evaluate abnormal trading volume. Lo and Wang find that using the market model is an appropriate way of controlling for market-related and firm-specific trading activity. To estimate abnormal turnover, we use the market model in equation (3), where T_t is turnover for period *t,* subscript *i* refers to the individual stock, and subscript *m* refers to the market:

$$T_{it} = \alpha_i + \beta_i T_{mt} + \varepsilon_{it}. \tag{3}$$

Because we require abnormal volumes for five-day periods at the end of December and beginning of January, each period is defined to be a five-trading-day period. The five-day trading period also allows us to abstract from extremely high and extremely low volume days that are likely to skew the parameter estimates. Equation (3) is estimated over 40 five-trading-day periods (200 trading days) before the reference date. The parameters estimated previously are used in equation (4) for computing abnormal turnover (AT_{it}):

$$AT_{it} = T_{it} - \hat{\alpha}_i - \hat{\beta}_i T_{mt}. \tag{4}$$

If all investors hold the market portfolio at all times, the share turnover of any stock will equal the aggregate market turnover, and the turnover of all stocks will be equal. Unfortunately, because turnover varies depending on firm characteristics, such as size, inclusion in a market index, availability of options, and so on, the magnitude of abnormal turnover can vary with each stock depending on its normal turnover. A stock that turns over 0.1% of its outstanding shares daily must be treated differently from a stock that turns over 1% of its outstanding shares daily. Thus, we define an abnormal turnover index (*ATI*), which is the abnormal turnover divided by that stock's average turnover over the previous 40 five-trading-day periods.

Table 4 reports the *ATI* of stocks by *PTS* quartile in December and January, and the difference between the two months. Because of the skewness of *ATI,* we concentrate on results based on the median. For high-*PTS* stocks, the median *ATI* is larger in December (30% above normal) than in January (27.7% below normal), consistent with the tax-loss selling hypothesis and indicating greater interest in trading the losers in December. On the other hand, the *ATI* is larger in January than in December for low-*PTS* stocks, possibly because investors move to sell their

TABLE 4. Turnover at the Turn of the Year.

PTS Quartile	*PTS*	Ref. Price	Year-End Cap ($ million)	STD (%)	Beta	Dec *ATI*	Jan *ATI*	Jan *ATI*– Dec *ATI*	No. of Observations
Panel A. Turnover at Turn of the Year, by *PTS* Quartiles									
1	0.126	34.14	2,559.84	11.27	1.24	0.316***	0.326***	0.011	9,338
	0.080	23.75	242.98	9.49	1.08	−0.132***	−0.077***	0.068***	
2	0.460	36.90	1,245.76	13.50	1.44	0.216***	0.232***	0.016	9,341
	0.429	15.88	138.03	11.68	1.23	−0.128***	−0.197***	−0.027***	
3	0.781	13.47	707.34	15.60	1.55	0.428***	0.084***	−0.345***	9,342
	0.809	9.63	80.61	13.86	1.33	0.005	−0.249***	−0.201***	
4	0.974	7.60	261.97	18.02	1.46	0.894***	0.107***	−0.787***	9,339
	0.988	4.25	33.15	16.37	1.25	0.300***	−0.277***	−0.521***	
Panel B. Turnover at Turn of the Year, by Size Deciles									
1	7.98		42.03	17.48	1.46	0.738***	0.238***	−0.500***	20,958
	5.63		30.95	15.78	1.23	0.084***	−0.292***	−0.307***	
2	18.73		211.02	13.17	1.56	0.241***	0.185***	−0.056	5,464
	16.75		199.13	11.84	1.34	−0.074***	−0.166***	−0.096***	
3	25.06		483.56	11.78	1.47	0.116***	0.132***	0.016	3,989
	22.63		461.71	10.70	1.27	−0.065***	−0.131***	−0.076***	
4	32.70		1,231.86	10.07	1.28	0.036**	0.099***	0.063***	3,599
	29.06		1,126.24	9.10	1.17	−0.086***	−0.094***	0.006	
5	111.37		10,805.59	8.11	1.13	−0.009	0.033***	0.043***	3,350
	42.00		4,750.68	7.21	1.04	−0.078***	−0.060***	0.041***	
All	23.03		1,193.65	14.55	1.42	0.463***	0.187***	−0.276***	37,360
	12.25		94.47	12.67	1.22	−0.009**	−0.199***	−0.153***	

Note: We use the following equation to estimate abnormal turnover (AT_{it}) where T_{it} is period t turnover, subscript i refers to the individual stock, and subscript m refers to the market. The parameters are estimated from a market model formulation of turnover. Because we require abnormal volumes for five-day periods at the end of December and beginning of January, each period is defined to be a five-trading-day period. The five-day-trading period also allows us to abstract from extremely high and extremely low volume days that are likely to skew the parameter estimates. The market model is estimated over 40 five-trading-day periods (200 trading days) before the reference date.

$$AT_{it} = T_{it} - \hat{\alpha}_i - \hat{\beta}_i T_{mt}.$$

Finally, we obtain the abnormal turnover index (ATI_{it}), which is the abnormal turnover divided by that stock's average turnover over the previous 40 five-trading-day periods. Market capitalization is as of the end of the year. Beta is estimated by regressing monthly returns on the concurrent and one-month lagged value-weighted CRSP market returns. Standard deviations are estimated over the same monthly returns. In each cell, the first number is the mean and the second number is the median.

*** Significant at the 1% level.
** Significant at the 5% level.

winners in January. Turnover by size deciles in Panel B of Table 4 yields similar observations. The *ATI* for small size stocks is considerably higher in December than in January (by 30.7%), whereas the reverse is true for large size stocks as suggested by the tax-related selling hypotheses.

TABLE 5. Regression of Turnover at the Turn of the Year.

Intercept	*PTS*	STD	Beta	*Size*	Adj. R^2	No. of Observations
Panel A. Dependent Variable: 5-Day Abnormal Turnover Index in December						
−0.209	0.265	0.042		−0.438	0.006	31,318
0.056	0.017	0.000		0.001		
0.252	0.427		0.115	−0.837	0.003	31,318
0.009	0.000		0.000	0.000		
0.125	0.562				0.000	35,648
0.162	0.000					
Panel B. Dependent Variable: 5-Day Abnormal Turnover Index in January						
0.468	−0.388	0.003		−0.351	0.002	31,318
0.000	0.000	0.130		0.000		
0.531	−0.372		−0.009	−0.387	0.002	31,318
0.000	0.000		0.510	0.000		
0.344	−0.275				0.001	35,648
0.000	0.000					

Note: The following regression is estimated with different measures of risk.

$$Turn_{it} = \alpha + \beta_1 PTS_{it} + \beta_2 Risk_{it} + \beta_3 Size_{it}.$$

The dependent variable is the five-day abnormal turnover index (*ATI*) in December or January, or between the two *ATI*s. *PTS* is the potential for tax-loss selling, and *Risk* is measured as the standard deviation or beta. *Size* is the standardized size percentile ranking of a stock's market capitalization at the end-of-year, where the percentage breakpoints are based on New York Stock Exchange (NYSE) stocks. In each cell, the first number is the regression coefficient, and the second number is the *p*-value.

We estimate the regression model specified in Table 5 to simultaneously control for *PTS, Risk,* and *Size*. In Panel A, with the December *ATI* as the dependent variable, we find that the *ATI* is positively correlated with *PTS*. That is, volume turnover is abnormally higher in December for stocks with high *PTS* and relatively lower for stocks with low *PTS*. Panel B for January reveals the opposite: abnormal volume turnover is higher for low-*PTS* stocks than for high-*PTS* stocks. Based on the coefficients, we can conclude that the abnormal volume turnover in January for stocks with *PTS* of 0 is 39% greater than the abnormal volume turnover for stocks with a *PTS* of 1, which is consistent with both tax-related selling hypotheses.

We find support for tax-related selling of both kinds. Evidence in support of tax-loss selling includes the abnormally high returns (5.2%) in the first five trading days of January for stocks with the greatest *PTS*. On the other hand and consistent with tax-gain selling in January, we find that firms in the lowest *PTS* quartile earn 1.9% more in the last five days of December than in the first five days of January. Differences in volume support similar asymmetric changes for high-*PTS* stocks and low-*PTS* stocks. The regression results also support these conclusions.

IV. The Window Dressing Hypothesis

According to the window dressing hypothesis developed by Haugen and Lakonishok (1987) and Lakonishok et al. (1991), institutional managers are evaluated based on their performance and their investment philosophy. To improve their performance, the institutions buy both risky stocks and small stocks but sell them before the end of the year so that they do not show up in their year-end holdings. At the beginning of the following calendar year (in January), investment managers reverse the process by selling winners, large stocks, and low-risk stocks while replacing them with small and risky stocks that typically include many past losers. A related reason for the trading is portfolio rebalancing. The rebalancing may be motivated by a desire to window dress or for other reasons. However, we consider all of the other reasons under the broad umbrella of window dressing, as the ultimate conclusions are unaffected by whether those reasons are considered separately.

Prior Evidence Supports Window Dressing

Let us reconsider the evidence presented in the previous section to examine whether it is consistent with window dressing. If fund managers window dress, that is, they replace losers with winners in December and replace winners with losers in January, we will observe the exact pattern as shown in Table 2: low-*PTS* stocks outperform high-*PTS* stocks in December, and high-*PTS* stocks outperform low-*PTS* stocks in January. The stock return results presented in Table 3 and the volume results in Tables 4 and 5 are consistent with both the window dressing hypothesis and the tax-related selling hypotheses. Even funds with narrowly defined objectives (such as sector funds) or where the fund manager would like to be invested in a particular industry, window dressing is not difficult.

Distinguishing Between Tax-Related Selling and Window Dressing

As the tax-related selling hypotheses and the window dressing hypothesis have similar predictions about return behavior, it has been difficult to distinguish between the two hypotheses. We attempt to distinguish between the hypotheses by analyzing a different time during the calendar year.

Although tax-related selling occurs only around the turn of the year because that corresponds to the end of tax year for most individual and corporate investors, window dressing would also occur at other times during a calendar year. The Investment Company Act of 1940 requires semi-annual submission of Form N-SAR that provides information about fees and performance to the SEC. In addition, the Investment Company Act of 1940 requires all mutual funds to file semi-annual reports with the SEC and send those reports to shareholders. These reports include "a list showing the amount and values of securities owned on the date of such balance sheet." Though these regulations apply only to investment companies, investors in institutions are also likely to expect periodic information from those institutions. Thus, it is probably not unreasonable to expect dissemination of information to the public semi-annually as of June 30 and December 31. Because no tax-related selling is likely to take place in June or July, a pattern similar to the December-January pattern found in June-July will be due entirely to window dressing.

We consider five-trading-day periods at the end of June and beginning of July. Because tax-related selling is not expected, *PTS* is not calculated for the June-ending period.[7] Neither do we calculate midpoint returns, as these returns will bias against our finding evidence in support of window dressing. The results for June and July are presented in Table 6. Yearwise returns are in Panel A. Overall, the return for the last five trading days of June (0.1%) is similar to the return for the first five trading days of July (0.5%). The five-day July return varies between –2.0% and 2.2%, and the five-day return in June ranges from –2.0% to 1.6%. Thus, there seems to be no pattern in June and July returns.

Analyzing returns by size decile in Panel B of Table 6, we find that the five-day July return is marginally positive (0.5%). The absence of a large and positive return in July means that there is not much evidence of window dressing by institutional managers. The five-day July returns become marginally larger as we move to larger size deciles. Again, higher July returns for larger stocks are not consistent with window dressing that would have predicted lower returns for large stocks in July similar to Panel B of Table 2. There, the five-day January return is a large 4.7% for the smallest size decile but the returns are negative for larger deciles. This same pattern was expected for the June-July period if window-dressing is indeed the cause of the January effect.

Finally, we test for abnormal turnover during the June-July period. We estimate equations (2) and (3) using the past 40 five-trading-day periods ending on the 7th-last trading day in June. The *ATI* is reported in Table 7. The window dressing hypothesis suggests that small size stocks would experience higher volume in June than would large size stocks, and that the large size stocks would experience higher volume in July than would small size stocks. We observe this pattern for December-January. The results in Table 7 suggest that, compared with the change in *ATI* from December to January, change in *ATI* from June to July is much smaller for both large and small stocks, indicating that window dressing is not evident in trading volume.

One criticism of the June-July period is that managers may not undertake riskier strategies around midyear but reserve it to the end of the year. However, for window dressing to explain the January effect, managers must buy small stocks at the beginning of the year; that is, they must begin to take riskier positions early

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[7] We exclude the last trading day in June from our analysis so that the procedure can be compared with earlier year-end analysis. Similarly, we require that a firm be listed from July 1 of the previous year; in the earlier analysis, firms were listed from January 1, giving approximately the same period of listing.

TABLE 6. Returns Around the Mid-Calendar-Year Period (June-July).

Year	Ref. Price	Year-End Cap ($ million)	STD (%)	Beta	June 5-Day Return (%)	July 5-Day Return (%)	July Return– June Return (%)	No. of Observations
Panel A. June-July Returns, by Year								
94	18.33	799.51	15.08	1.58	−1.98	−0.16	1.83	5,707
	11.25	79.57	12.93	1.38	−1.64	0.00	1.56	
95	20.50	741.79	14.58	1.63	−0.23	2.17	2.41	6,123
	12.25	72.04	12.77	1.45	0.00	0.99	1.90	
96	23.16	967.91	14.12	1.61	−1.07	−1.95	−0.88	6,246
	13.75	91.56	12.27	1.35	−0.42	−1.67	−0.74	
97	26.37	1,123.51	13.81	1.38	0.34	0.93	0.59	6,622
	13.88	103.44	12.08	1.15	0.00	0.38	0.58	
98	31.55	1,478.21	13.87	1.20	1.58	0.31	−1.27	6,595
	14.19	122.02	12.12	1.04	0.79	0.00	−0.92	
99	29.19	1,894.88	14.84	1.19	1.51	1.54	0.03	6,322
	11.69	112.81	13.04	1.05	0.45	0.00	−0.23	
All	25.04	1,178.21	14.37	1.43	0.07	0.48	0.41	37,615
	12.88	95.39	12.52	1.22	0.00	0.00	0.01	
Panel B. June-July Returns, by Size Decile								
1	7.21	28.34	18.02	1.44	0.04	0.32	0.28	16,763
	4.88	23.50	16.31	1.21	0.00	0.00	0.00	
2	14.09	99.62	14.34	1.57	−0.19	0.30	0.50	4,277
	12.38	96.58	13.05	1.35	0.00	0.00	0.00	
3	17.59	168.11	13.49	1.58	0.09	0.37	0.28	3,143
	15.63	164.15	12.12	1.36	0.00	0.00	0.01	
4	21.80	265.97	12.69	1.53	0.47	0.34	−0.13	2,575
	19.00	259.71	11.42	1.31	0.00	0.00	0.00	
5	24.30	396.77	11.96	1.51	0.22	0.46	0.24	2,190
	21.72	389.10	10.79	1.31	0.00	0.00	0.59	
6	28.89	611.56	11.42	1.41	0.24	0.30	0.06	1,986
	25.00	598.96	10.41	1.24	0.00	0.00	0.00	
7	31.10	950.60	10.39	1.29	0.03	0.66	0.63	1,800
	27.63	933.12	9.48	1.16	0.00	0.52	0.66	
8	36.63	1,662.49	9.53	1.25	−0.01	1.34	1.35	1,750
	31.84	1,601.71	8.58	1.15	−0.16	1.08	1.28	
9	43.98	3,470.10	8.65	1.18	0.05	1.28	1.23	1,648
	38.13	3,244.05	7.78	1.09	−0.18	1.01	1.16	
10	233.54	20,081.91	7.35	1.05	0.19	1.48	1.29	1,483
	51.50	10,554.16	6.67	0.98	−0.15	1.46	1.33	
All	25.04	1,178.21	14.37	1.43	0.07	0.48	0.41	37,615
	12.88	95.39	12.52	1.22	0.00	0.00	0.01	

Note: This table is similar to Table 1 except that returns are based on closing price and reported for the last five trading days of June (excluding the last day) and the first five trading days of July. In Panel B, the returns are reported by size deciles based on market capitalizations at the end of the year, with the breakpoints of New York Stock Exchange (NYSE) stocks only. In each cell, the first number is the mean and the second number is the median.

TABLE 7. Turnover Behavior at June-July, by Size Quintiles.

Size Quintile	Ref. Price	Year-End Cap ($ million)	STD	Beta	June *ATI*	July *ATI*	July *ATI*– June *ATI*	No. of Observations
1	8.61	42.83	17.28	1.47	0.156	0.093	−0.063	21,040
	6.00	32.09	15.63	1.24	−0.325	−0.374	−0.058	
2	19.48	212.18	13.12	1.56	0.313	0.146	−0.167	5,718
	17.06	199.71	11.79	1.33	−0.148	−0.180	−0.053	
3	26.48	498.92	11.70	1.46	0.083	0.126	0.043	4,176
	23.38	477.65	10.62	1.27	−0.149	−0.145	−0.005	
4	33.82	1,301.53	9.95	1.27	0.130	0.070	−0.060	3,550
	29.25	1,188.50	9.00	1.16	−0.095	−0.114	−0.036	
5	133.76	11,338.29	8.03	1.12	0.028	0.020	−0.008	3,131
	43.44	5,025.25	7.15	1.03	−0.092	−0.099	−0.031	
All	25.04	1,178.21	14.37	1.43	0.159	0.096	−0.062	37,615
	12.88	95.39	12.52	1.22	−0.215	−0.246	−0.046	

Note: We use the following equation to estimate abnormal turnover (AT_{it}) where T_{it} is period t turnover, subscript i refers to the individual stock, and subscript m refers to the market. The parameters are obtained from a market model formulation of turnover. Because we require abnormal volumes for five-day periods at the end of June and beginning of July, each period is defined to be a five-trading-day period. The five-day-trading period also allows us to abstract from extremely high and extremely low volume days that are likely to skew the parameter estimates. The market model is estimated over 40 five-trading-day periods (200 trading days) before the reference date.

$$AT_{it} = T_{it} - \hat{\alpha}_i - \hat{\beta}_i T_{mt}.$$

Finally, we obtain the abnormal turnover index (ATI_{it}), which is the abnormal turnover divided by that stock's average turnover over the previous 40 five-trading-day periods. Market capitalization is as of the end of the year. Beta is estimated by regressing monthly returns on the concurrent and one-month lagged value-weighted CRSP market returns. Standard deviations are estimated over the same monthly returns. In each cell, the first number is the mean and the second number is the median.

in the year. This means that fund managers are likely to engage continually in risk taking and window dressing rather than to concentrate during a particular calendar month. Thus, December-January and June-July are equally opportune for window dressing, implying that the June-July period is not inappropriate for detecting window dressing by fund managers. Moreover, Busse (2001) finds no change in riskiness of mutual funds based on daily returns throughout the year. Overall, there is little, if any, evidence in support of window dressing.

V. The Differential Information Hypothesis

The differential information hypothesis relies on how variation in the quantity of information available for different firms may result in different returns. Barry and Brown (1984) suggest that firms with less information have higher perceived risk than do firms with more information even though the systematic risk of the two firms may be equal. If the return-generating model assumes compensation for beta risk alone, whereas returns also depend on nonsystematic risk, the excess returns for firms with less information will be seen as abnormal returns. Because small firms have less information, the January effect (abnormal return in January) is observed for small firms but not captured by the return-generating model. They test the hypothesis of less information by using the period of listing as a proxy for availability of information and find that the January effect can be partially explained by differential production of information among firms. Merton's (1987) investor recognition hypothesis is another way of looking at the information story. If investors become aware of companies when new information is made public (typically in January), they may be more inclined to buy because of increased awareness, resulting in the observed January returns. These and other versions of the information hypothesis are examined based on returns and volume turnover.

Evidence Related to the Differential Information Hypothesis

Test 1: Results Based on Stock Returns. If the differential information hypothesis is correct, we should observe higher returns for small firms not only in January but also in April, July, and October because the Securities Act of 1933 requires firms to submit accounting information every quarter: usually in January, April, July, and October. However, we do not find higher returns for small stocks in July relative to large size stocks (see Panel B of Table 6).

We reexamine the information hypothesis by using the number of analysts as a proxy for the quantity of information production. Brennan and Subrahmanyam (1995) find that stocks with greater analyst coverage have more information available, which in turn reduces information asymmetry. Accordingly, new information should affect an information-rich stock less than an information-poor stock. However, we find that, after controlling for size, there is no distinct pattern in returns by the number of analysts.[8]

Test 2: Results Based on Turnover. The volume data are not supportive of the information hypothesis either. According to the hypothesis, less trading will occur in small stocks in December as traders wait until January when new information is expected. Nonavailability of information also increases the adverse-selection problem, causing higher spreads and lower volume. Thus, trading volume of small stocks should be higher in January than in December, and higher in July than in June. Panel B of Table 4 shows that small stocks have abnormally high volume in December, significantly larger than the abnormal volume in January. In addition to the preceding results, turnover data for June-July in Table 7 do not show higher volume in July than in June for small stocks. Thus, it is safe to conclude that the information hypothesis is not the primary driver of January effect.

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[8]Results reported in this article but not tabulated are available from the authors.

VI. Robustness Checks

Effect of Price and PTS on Returns

Several authors (see Singal, 2004, for a review) suggest that the January effect is caused by the bid-ask bounce of low-price stocks. One way of minimizing this effect is to delete low-price stocks, as in Cox and Johnston (1998). However, low-price stocks are also small in size. Another way to test whether *PTS* is a significant contributor to returns in addition to price is to regress the return on *Price* and *Risk* as given by equation (5). The residual is then regressed on *PTS* as given by (6). The test is then reversed with price left out of the first regression:

$$R_{it} = \alpha + \beta_2 \log(Price_{it}) + \beta_3 Risk_{it} + \varepsilon_{it} \tag{5}$$

$$\hat{\varepsilon}_{it} = \alpha + \beta_3 PTS_{it} + \eta_{it}. \tag{6}$$

The significance of *PTS* as an explanatory variable remains unaltered whether equation (2) or equation (6) is used. Thus, it is reasonable to conclude that *PTS* is a significant contributor to the January effect. The price, independent of *PTS,* also contributes to the January effect.

Longer Period and Closing Prices

Using bid-ask quotes from TAQ limits our sample to the post-1992 period in the earlier sections of this article. One might wonder whether results from the limited period are representative. To address this concern, we expand our sample to start in 1987. We begin with 1987 so as not to confuse two substantially different tax regimes caused by the Tax Reform Act of 1986. Bhabra, Dhillon, and Ramírez (1999) and Poterba and Weisbenner (2001), among others, highlight the significant changes introduced by the tax code relating to capital gains and distributions by mutual funds.

Extending the sample period to 1987 requires us to use closing prices instead of bid-ask quotes. In this way, we are also able to compare the midpoint results with those obtained using closing prices. The results over the longer 12-year period are similar to the results over the shorter 6-year period. We therefore conclude that the 6-year results with the TAQ data requirement are representative of the 12-year window from 1987 to 1998.

There are two observations with regard to differences between results using closing prices and results using midpoint quotes. First, the returns for the highest *PTS* quartile are 5.2% with midpoint quotes are used and 6.4% with closing prices for comparable periods. Thus, correction for the bid-ask bounce accounts for less than 25% in returns in the highest *PTS* sample. Second, for the lowest *PTS* quartile, the difference between January and December returns is –1.9% when midpoint quotes are used and –2.1% when closing prices are used. The difference is only about 10%. The smaller difference in returns is not surprising because the bid-ask bounce is less likely to affect large firms whose spreads are typically small as a percentage of price. This implies that tax-gain selling in January is less affected by the bid-ask bounce than is tax-loss selling in December. Regression results reveal no material change in the magnitude or significance of the coefficients on *PTS* when compared with the coefficients in Table 3.

VII. Concluding Remarks

We reexamine the January effect to present a more complete study of the various explanations. We consider all of the explanations, one at a time, and find that the evidence is largely consistent with tax-related selling. We do not find much support for the window dressing hypothesis, including portfolio rebalancing, and the information hypothesis. It is reasonable to expect that window dressing should occur more frequently than only in December. We find little evidence of selling small stocks in June or excess returns for small stocks in July. The economically insignificant size of abnormal returns for small stocks in July also suggests that information could not be the primary driver of January returns. Furthermore, the greater turnover in December than in January is also inconsistent with the information hypothesis.

The results are based on midpoint quotes, suggesting that the bid-ask bounce of low-priced stocks should not be a significant contributing factor in our analysis. We conclude that the large returns to winners in December and to losers in January must largely be due to both tax-loss selling and tax-gain selling.

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