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ABSTRACT

This article evaluates the tax-loss-selling hypothesis against the window-dressing hypothesis as explanations for turn-of-the-year anomalies. We examine differences between securities dominated by individual investors versus those dominated by institutional investors and find that the effect is more pervasive in the former. Controlling for capitalization, we find that in early January (late December), stocks with greater individual investor interest outperform (underperform) stocks with greater institutional investor interest. These results hold for both stocks that previously appreciated in value and stocks that previously depreciated in value. The results are most consistent with the tax-loss-selling hypothesis as an explanation for the turn-of-the-year effect.

THE ABNORMAL RETURNS GARNERED by small capitalization stocks around the turn-of-the-year are well documented (e.g., Rozeff and Kinney (1976) and Keim (1983)). Roll (1983) posits that the turn-of-the-year effect may simply result from measurement error associated with the bid-ask spread. Consistent with Roll's hypothesis, Keim (1989) documents that much of the turn-of-the-year effect can be attributed to a tendency for transactions to record at bid prices in late December and closer to ask prices in early January. Similarly, Griffiths and White (1993) find that seller-initiated transactions (at bid prices) dominate just before the tax year-end and that buyer-initiated transactions (at ask prices) dominate in the days following the tax year-end. Although these empirical studies support Roll's conjecture, the *source* of the movement across the bid-ask spread at the turn-of-the-year remains unclear.[1] In this article we examine return differences of portfolios dominated by institutional investors versus portfolios dominated by individual investors to ascertain whether the turn-of-the-year effect can be explained by the systematic trading behavior of

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[1] Keim (1989) and Griffiths and White (1993), however, document that a significant turn-of-the-year effect remains when employing bid-to-bid returns, implying that the entire turn-of-the-year effect cannot be explained by the move across the bid-ask spread alone. Althbugh Clark, McConnell, and Singh (1992) find that there is a seasonal in bid-ask spreads, January returns are not related to the change in the size of the bid-ask spread.

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either investor type. In so doing we are able to differentiate between the two prominent explanations for the observed return behavior around the calendar year-end: the tax-loss-selling hypothesis and the window-dressing hypothesis.

The first explanation, the tax-loss-selling hypothesis, depends on the tax-motivated trading of individual investors.[2] According to this hypothesis, prior to the calendar year-end individual investors sell stocks that have declined in value in order to realize tax losses. Such selling results in a tendency for late December transactions to close at bid prices. Thus, recorded returns over the last few days of December are small or negative. Immediately following the calendar turn, without the investors' desire to realize tax losses, the closing prices move, on average, from the bid toward the midpoint of the spread, resulting in a positive recorded return. Further, the tax-loss-selling hypothesis predicts the resultant "January effect" should differ for stocks depending on their tax-loss selling potential.

Empirical tests of tax-loss-selling have been mixed in terms of support for the hypothesis. Evidence in favor of the hypothesis includes abnormally high trading volume in December (Dyl (1977)) and abnormally high returns in January (Givoly and Ovadia (1983)) for stocks that had price declines the previous year, as well as consistent behavior around the turn of the year in individual investor buy and sell volume (Ritter (1988)) and odd-lot transactions (e.g., Dyl and Maberly (1992), Koogler and Maberly (1994), and Barber (1995)). However, studies have also found that small firm stocks without price declines have abnormally high January returns (Reinganum (1983)) and that the turn-of-the-year effect in Canada existed prior to the introduction of the capital gains tax (Tinic, Baroni-Adesi, and West (1987)). These empirical results suggest that the entire January effect cannot be explained by tax-loss selling.

In contrast, the window-dressing hypothesis suggests that the year-end portfolio rebalancing of institutional rather than individual investors is responsible for the turn-of-the-year anomaly. According to this hypothesis, because institutional investors are evaluated in relation to their peers, just prior to the calendar year-end, they buy winners and sell losers in order to present respectable year-end portfolio holdings. Empirical tests have resulted in mixed support for the window dressing hypothesis. For example, although Athanassakos (1992) concludes Canadian institutional investors exhibit seasonal rebalancing of their portfolios, Griffiths and White (1993) find little support for the hypothesis in their evaluation of Canadian block trades around the turn-of-the-year.[3]

A problem with distinguishing the tax-loss-selling from the window-dressing hypothesis is that they both predict largely the same pattern in security

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[2] See, for example, McEnally (1976), Branch (1977), Dyl (1977), Brown, Keim, Kleidon, and Marsh (1983), Givoly and Ovadia (1983), Constantinides (1984), Chan (1986), Badrinath and Lewellen (1991), Griffiths and White (1993), Koogler and Maberly (1994), and Jones and Lee (1995).

[3] In addition, see Haugen and Lakonishok (1987), Lakonishok and Smidt (1988), Ritter and Chopra (1989), and Lakonishok, Shleifer, Thaler, and Vishny (1991).

returns around the year-end. Thus, differentiating between the two hypotheses requires determining the source of the patterns.[4] Consequently, we examine whether the previously documented tendency for prices to move systematically across the bid-ask spread at the turn-of-the-year can be associated with the activities of individual or institutional investors as suggested by the above hypotheses. Specifically, we examine the roles of individual and institutional investors in year-end activities by empirically investigating two unique sets of data. First, controlling for market capitalization, we compare the return behavior of New York Stock Exchange (NYSE) stocks held primarily by institutional investors versus those held primarily by individual investors. Second, employing a trader-identified transactions data set, we examine differences in the buying and selling behavior of individual and institutional investors during a single turn-of-the-year, December 1990 and January 1991.

Our analyses provide significant insights into the turn-of-the-year effect. First, the turn-of-the-year effect is much stronger for securities dominated by individual investors. Holding capitalization constant, securities dominated by individual investors exhibit substantially lower recorded returns in late December consistent with the hypothesis that these securities are more likely to record prices at the bid in late December. Also consistent with this hypothesis, we find that immediately following the calendar turn, securities dominated by individual investors exhibit substantially larger average returns than do securities dominated by institutional investors. Moreover, we document that these patterns hold for both winner stocks (i.e., those stocks with positive performance during the preceding year) and loser stocks (i.e., those stocks with negative performance during the preceding year). For losers, our results support the hypothesis that tax-loss selling by individual investors is more important than window-dressing by institutional investors in causing the turn-of-the-year effect. For winners, however, the results are less clear. The transactions data results and the return point estimates for the winner portfolios dominated by institutional investors are consistent with the window-dressing hypothesis. However, the relative performance of the winner portfolios dominated by institutional versus individual investors in December and January, although consistent with the window-dressing hypothesis, appears to be driven by the behavior of the individual-investor-dominated portfolios. Moreover, the behavior of the individual-investor-dominated winner stocks is inconsistent with tax-based explanations, i.e., winner portfolios dominated by individual investors retain a significant "January effect" inconsistent with the hypothesis that these investors are reluctant to recognize taxable gains in late December. In sum, regardless of prior performance, our results are consistent with the hypothesis that the trading of individual investors is primarily responsible for the turn-of-the-year effect.

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[4] Other potential explanations for the January anomaly have proven only partially successful. See, for example, Tinic and West (1984) or Ritter and Chopra (1989) for explanations centered on risk changes in January and Seyhun (1988) for information-based explanations.

The balance of the article is organized as follows: in the following section, we describe our data and discuss employing institutional holdings as a proxy for institutional trading. Empirical tests and results concerning institutional-dominated versus individual-dominated portfolios at the turn-of-the-year are presented in Section II. The return differences between institutional-dominated versus individual-dominated portfolios for winner versus loser stocks are examined in Section III. We employ transactions data to examine institutional versus individual trading at the 1990–1991 turn-of-the-year in Section IV. A discussion of the implications and conclusions are presented in the final section.

I. Data

A. Capitalization / Institutional Fraction Portfolios

The initial data for this study consist of the institutional holdings, market equity capitalization, and daily returns for all firms listed on the NYSE. For each year from 1978–1992 (15 years) we obtain the number of shares held by institutional investors from the January issue of Standard and Poor's *Security Owners Stock Guide*. These holdings originate from Vickers Stock Research Corporation.[5]

An issue that arises in evaluating the effects of institutional holdings is the high degree of correlation between firm capitalization and institutional holdings. Consequently, to control for the effects of capitalization, the empirical analysis in this study focuses on the differences between similar-size portfolios with high- versus low-institutional holdings. To construct the portfolios, we first obtain the beginning of the year market equity capitalization (from the Center for Research in Security Prices (CRSP) monthly tapes) for the period 1977–1991. We then form capitalization quintile portfolios and within each capitalization quintile we further sort securities into three equal-member-size portfolios based on the fraction of shares held by institutional investors as of the third quarter of the year.[6]

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[5] In addition to the approximately 1,500 institutional investors that are required to make 13(f) filings (i.e., institutions with at least $100 million in managed equity), Vickers currently monitors more than 3,000 institutions that are not required to file such reports. Over time, the number of institutional investors required to make 13(f) filings as well as the additional number of institutional investors monitored by Vickers has increased. Since it is reasonable to assume that there exists a nontrivial fraction of institutional investors that are not monitored by Vickers, our measures of institutional holdings should be viewed as relative rather than absolute.

[6] Based on our conversations with the SEC and Vickers, institutional holdings published in the January issue of the *Security Owners Stock Guide* reflect third quarter or earlier institutional holdings. Since we desire to sort the portfolios prior to the event (the turn-of-the-year), the "staleness" of this data is to our advantage. To test whether misclassifications due to the lag in the recorded institutional holdings is a problem, we examine the changes in the institutional-fraction portfolios and find that membership is relatively stable over time. On average, less than 2.5 percent of the securities move from either the high- to the low- or the low- to the high-institutional portfolio over the year.

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Table I

Average Institutional Holdings February 1, 1977–January 31, 1992
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Each year, capitalization-sorted New York Stock Exchange (NYSE) stocks are further sorted into three portfolios by the fraction of shares held by institutional investors. The one-third of the total stocks in each capitalization quintile with the highest percentage of institutional ownership is designated as the high institutional portfolio, the one-third with the lowest percentage is designated as the low institutional portfolio, and the middle third is omitted from the analysis. The table shows the mean fraction of shares held by institutional investors as well as the mean natural log of capitalization for the low and high institutional fraction portfolios within each capitalization quintile. In addition, t-tests for differences in mean institutional fractions and differences in mean natural logs of capitalization for securities in the high and low institutional fraction portfolios are presented.

	Institutional Fraction	Ln (Capitalization)
Smallest stocks		
Low	0.0334	17.0767
High	0.3100	17.7709
t-statistic	−57.99***	−20.34***
Quintile 2		
Low	0.0621	18.2993
High	0.4461	18.6717
t-statistic	−78.34***	−15.14***
Quintile 3		
Low	0.0996	19.1887
High	0.5355	19.4827
t-statistic	−95.25***	−11.82***
Quintile 4		
Low	0.1699	20.0897
High	0.6127	20.3978
t-statistic	−73.74***	−12.08***
Largest stocks		
Low	0.2649	21.5741
High	0.6407	21.6293
t-statistic	−62.14***	−1.68*

* indicates statistical significance at the 10% level; ** at 5% level; *** at 1% level.

For each of the fifteen size-institutional-fraction-sorted portfolios we compute average daily returns across the stocks using data from the daily CRSP tapes for each February to January period (inclusive). Portfolio membership is rebalanced annually at January month-end. The sample includes all firms with adequate data (i.e., returns available and listed in the *Security Owners Stock Guide*). The number of firms ranges from a minimum of 1,331 firms in 1986 to a maximum of 1,532 firms in 1991 for a total of 21,233 firm/years.

Table I presents the average institutional fraction for the low- and high-institutional holdings portfolio within each capitalization quintile (we omit the middle institutional holdings portfolio for each capitalization quintile). The t-tests for differences in mean institutional holdings between the low- and high-institutional portfolios show that all differences are statistically significant at the one percent level.

Given the correlation between capitalization and institutional holdings, it may be that further sorting capitalization portfolios by the fraction of institutional holdings is simply a refined size-sort. A test of that hypothesis is also presented in Table I. Comparison of capitalizations reveals that securities in the high-institutional portfolio tend to be larger than securities in the "corresponding-capitalization" low-institutional portfolios. We address this remaining capitalization bias in our empirical tests.

B. Institutional Holdings as a Proxy for Institutional Trading

A limitation of the capitalization-institutional-fraction portfolios is that we rely on differences in average institutional holdings to make inferences regarding marginal pricing effects. For example, although the results presented in Table I suggest that individual investors are the majority owners in the low-institutional portfolios, the results do not necessarily imply that individual investors are, in general, the price-setters (i.e., marginal traders) in the low-institutional portfolios. Schwartz and Shapiro (1992) document that institutional investors tend to have higher turnover rates than individual investors. Thus, if the differences in turnover rates are substantial, prices could be set by institutional investors in portfolios in which they maintain relatively minor fractional ownership. Before proceeding to our analysis of differences in turn-of-the-year effects for institutional versus individual investors, we first assess whether we can employ relative institutional *holdings* as a proxy for relative institutional trading. To do so, we make use of a transactions database that identifies whether traders are individual or institutional investors: the Trades, Orders, Reports, and Quotes (Torq) data set compiled by Joel Hasbrouck and the NYSE.

The Torq data consists of the trading records for 144 NYSE firms (approximately fifteen firms randomly selected from within each capitalization decile) over the November 1990–January 1991 time period. For most trades (excluding specialist trades), an audit trail identifies the buyer(s) and seller(s) as either an institutional or individual investor.

To evaluate whether the differences in average institutional holdings imply differences in the marginal trading of institutional investors, we examine the relative importance of institutional versus individual investors in each Torq firm's volume of price-setting trades. Specifically, we estimate fractional "price-setting" volume as the percentage of buy- or sell-initiated volume attributed to institutional or individual investors. Using a tick test, we define a sell order as price setting if it occurs on a downtick (price is lower than the previous trade price) or zero downtick (price is the same as the previous trade price and the last price change was a downtick). Similarly, we define a buy order as price setting if it occurs on an uptick or zero uptick.[7]

For each firm in the Torq data, we compute the fractional price-setting volume attributed to institutional and individual traders for the entire sample

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[7] See Lee and Ready (1991) for an analysis of tick-test classifications.

Fractional Price-Setting Volume by Capitalization Quintile/Institutional Fraction

Each year, capitalization-sorted New York Stock Exchange (NYSE) stocks are further sorted into three portfolios by the fraction of shares held by institutional investors. The one-third of the total stocks in each capitalization quintile with the highest percentage of institutional ownership is designated as the high institutional portfolio, the one-third with the lowest percentage is designated as the low institutional portfolio, and the middle third is omitted from the analysis. Firms in the Trades, Orders, Reports, and Quotes (Torq) data set are sorted into the appropriate capitalization quintile/institutional fraction portfolio according to their capitalization and institutional holdings. Presented below are the fractions of price-setting volume attributed to institutional, individual, and unidentified traders for each portfolio. Price-setting volume is limited to downtick/zero-downtick sell orders and uptick/zero-uptick buy orders over the Torq data sample period, November 1, 1990 through January 31, 1991.

Size/Institutional Fraction	% Institutional	% Individual	% Unidentified
Smallest/high	0.5173	0.3842	0.0986
Smallest/low	0.4028	0.4853	0.1119
Q2/High	0.7516	0.1412	0.1072
Q2/Low	0.3844	0.5067	0.1089
Q3/High	0.7087	0.1714	0.1199
Q3/Low	0.4212	0.5141	0.0647
Q4/High	0.8097	0.0804	0.1099
Q4/Low	0.6514	0.2333	0.1153
Largest/high	0.7552	0.1196	0.1252
Largest/low	0.7885	0.1098	0.1018

period (November 1, 1990–January 31, 1991). Torq firms are then sorted into the appropriate capitalization quintile-institutional fraction portfolio given their 1990 data. The cross-sectional averages of the fractional price-setting volume are reported in Table II. These averages provide an estimate of the relative importance of institutional versus individual investors in setting prices. In quintile three, for example, individual investors account for 51 percent of the low-institutional portfolio's price-setting volume and 17 percent of the high-institutional portfolio's price-setting volume.

Generally, the evidence in Table II supports the supposition that differences in proportional ownership are associated with differences in fractional trading. As expected, institutional investors appear to be more important in setting the prices for the high-institutional portfolios. That is, the fraction of price-setting volume attributed to institutional investors exceeds the fraction attributed to individual investors for every high-institutional portfolio. In addition, individual investors appear to be more important than institutional investors in setting prices for the three smallest capitalization quintiles' low-institutional portfolios. Further, although institutional investors comprise a larger fraction of price-setting volume than individual investors in capitalization quintile four's low-institutional portfolio, the relative importance of individual investors in relation to institutional investors is greater for the low-institutional

portfolio than the corresponding high-institutional portfolio.[8] Therefore, although differences in institutional and individual investor trading patterns are likely to be strongest for the lower capitalization portfolios, differences may still be evident in the larger capitalization quintiles as well. For the largest quintile, however, the Torq data reveals little evidence of trading differences across the low- and high-institutional portfolios even though there are large differences in ownership.

II. Institutional and Individual Portfolios at the Turn-of-the-Year

We begin the analysis of the behavior of institutional versus individual investors by comparing the returns of the high- and low-institutional portfolios around the turn-of-the-year. If the turn-of-the-year effect is unrelated to institutional holdings, then we should observe little systematic difference between the similar capitalization high- and low-institutional portfolio returns around the turn-of-the-year. Table III presents the mean returns for the high- and low-institutional portfolios within each capitalization-quintile for the last four trading days of December and for the first four trading days of January.[9,10]

In general, Table III documents the usual turn-of-the-year effects—strong positive returns in early January concentrated in smaller stocks. Comparison of the high- and low-institutional portfolios, however, reveal substantial differences in the pre- and postturn periods. First, the difference between the returns across the last four days of December versus the first four days of January is much stronger for the low-institutional portfolios. On average, the mean daily return difference in December and January for the high-institutional portfolios is 0.03 percent versus 0.57 percent for the low-institutional portfolios. Moreover, according to the F-statistics, we can reject (beyond the 5 percent level) the hypothesis that the four-day December returns are equal to the four-day January returns for four of the five low-institutional portfolios, but for *none* of the high-institutional portfolios. In addition, for every capitalization quintile, we can reject the hypothesis (at the 1 percent level or better) that the difference between the high- and the low-institutional portfolio returns is equal in the December and January periods. The implication is that the firms in the low-institutional portfolios are experiencing a larger turn-of-the-year effect than the firms in the high-institutional portfolios.

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[8] We focus on "price-setting volume" under the conjecture that the traders initiating the transactions are setting the prices. We also examine volume of trading and find similar results.

[9] Previous research has shown that the propensity for low-capitalization stocks to garner abnormal returns is concentrated in the few days around the turn-of-the-year, most commonly, the day immediately preceding and the few days immediately following the year-end (see, for example, Keim (1983) or Roll (1983)). Accordingly, our analysis is limited to the eight-day window surrounding the turn-of-the-year. Similar results are obtained when we evaluate the 30-day window around the turn-of-the-year.

[10] All estimates presented in this study are generated from dummy variable ordinary least square regressions. All t- and F-statistics reported in Tables III and IV are based on Newey-West (1987) heteroskedasticity and autocorrelation consistent standard errors.

Table III

**Average Daily Returns (in percent) Around the Turn-of-the-Year:
February 1, 1977–January 31, 1992**

Each year, capitalization-sorted New York Stock Exchange (NYSE) stocks are further sorted into three portfolios by the fraction of shares held by institutional investors. The one-third of the total stocks in each capitalization quintile with the highest percentage of institutional ownership is designated as the high institutional portfolio; the one-third with the lowest percentage is designated as the low institutional portfolio; and the middle third is omitted from the analysis. The mean daily return (t-statistics in parentheses) over the last four (December) and first four (January) trading days of the calendar year are reported for each portfolio. In addition, we report the differences between the high- and low-institutional fraction portfolios for these periods. The F-statistic tests the hypothesis that the mean daily returns do not differ in December and January. All t- and F-statistics are based on the Newey–West (1987) heteroskedasticity and autocorrelation consistent standard errors.

Index	December	January	F
Average high	0.2790	0.3080	0.01
	(2.50)**	(1.74)	
Average low	0.1351	0.7079	8.31***
	(1.62)	(4.22)***	
Difference: high–low	0.1439	−0.4000	50.79***
	(2.59)**	(−8.24)***	
Smallest high	0.3281	0.5876	1.29
	(2.72)***	(3.25)***	
Smallest low	0.3462	1.1334	11.97***
	(2.65)***	(5.26)***	
Difference: high–low	−0.0181	−0.5457	16.08***
	(−0.19)	(−5.03)***	
Quintile 2 High	0.3746	0.3493	0.01
	(2.90)***	(1.86)	
Quintile 2 Low	0.1069	0.7600	8.05***
	(1.12)	(4.26)***	
Difference: high–low	0.2677	−0.4067	24.43***
	(2.53)**	(−6.00)***	
Quintile 3 High	0.3074	0.2542	0.05
	(2.98)***	(1.33)	
Quintile 3 Low	0.0409	0.7441	13.83***
	(0.54)	(4.66)***	
Difference: high–low	0.2665	−0.4899	60.55***
	(4.34)***	(−7.25)***	
Quintile 4 High	0.2282	0.1812	0.04
	(1.89)	(0.97)	
Quintile 4 Low	0.0989	0.5380	4.96**
	(1.41)	(3.12)***	
Difference: high–low	0.1293	−0.3568	29.67***
	(1.79)	−5.47)***	
Largest high	0.1566	0.1677	0.01
	(1.45)	(0.89)	
Largest low	0.0824	0.3679	1.56
	(0.94)	(1.91)	
Difference: high–low	0.0742	−0.2002	10.97***
	(1.33)	(−2.19)**	

** indicates statistically significant at the 5 percent level; *** at the 1 percent level.

If these differences are due to a stronger shift across the bid-ask spread for the low-institutional portfolios, then two results should be apparent. First, in late December, securities in the low-institutional portfolios should exhibit a greater tendency to close at the bid. If such is the case, then the measured returns for the high-institutional portfolios should exceed the measured returns for the low-institutional portfolios in late December. Second, in early January, the low-institutional portfolios should outperform the high-institutional portfolios as the securities in the low-institutional portfolios enter January from a point that is closer to the bid than the ask, on average.

The results presented in Table III are consistent with both of these implications. First, the t-statistics for the differences in returns indicate that the low-institutional portfolios tend to underperform the high-institutional portfolios at the end of December, significantly so for the smaller capitalization stocks. Following the calendar turn, the low-institutional portfolios tend to outperform the corresponding high-institutional portfolios. The t-statistics indicate that for every quintile we can reject the hypothesis (beyond the 5 percent level) of equal average returns for the low- and high-institutional portfolios during the first four days of January.

To ensure that these results are not driven by the remaining capitalization differences between the high- and low-institutional portfolios, we regress returns on institutional holdings and capitalization.[11] Specifically, for all NYSE firms with adequate data we regress the mean daily return over the last (first) four days of December (January) on the firms' natural logarithm of capitalization (measured in year $t - 1$), the fraction of shares held by institutional investors (measured in the third quarter of year $t - 1$) and the firms' cumulative return over the previous calendar year, excluding the last four days of December. The average coefficients across the 15 years with the t-statistics in parentheses are[12]:

Avg.Ret.$_{\text{Dec.}}$

$$= \frac{0.0598(\text{Intercept}) + 0.019(\%\text{Inst}) - 0.0029(\text{Ln Cap.}) - 0.0048(\text{Return}_{t-1})}{(4.57)^{***} \qquad\qquad (3.83)^{***} \qquad\quad (-5.07)^{***} \qquad\qquad (-1.97)^{*}}$$

Avg.Ret.$_{\text{Jan.}}$

$$= \frac{0.1285(\text{Intercept}) - 0.0214(\%\text{Inst}) - 0.0051(\text{Ln Cap.}) - 0.0313(\text{Return}_{t-1})}{(5.16)^{***} \qquad\qquad (-4.51)^{***} \qquad\quad (-4.12)^{***} \qquad\qquad (-6.17)^{***}}$$

where *** and * indicate statistical significance at the 1 and 10 percent levels, respectively.

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[11] Comparison across adjacent quintiles suggests the results are not driven by capitalization differences. For example, over the first four days of January, quintile three's low-institutional portfolio averaged over twice the daily return as quintile two's high-institutional portfolio.

[12] The t-statistics are calculated as: ((average coefficient)*$\sqrt{15}$)/(σ(coefficient)). The R^2 average 0.0180 for the December regressions and 0.0827 for the January regressions. Similar results are found when the return over the previous year is excluded from the regressions.

These results suggest that the return over the last four days of December is positively associated with the fraction of shares held by institutional investors. Conversely, the return over the first four days of January is negatively related to the fraction of shares held by institutional investors. The average coefficient associated with institutional holdings is statistically significant at the 1 percent level in both December and January. The regression results are consistent with the portfolio results given in Table III and suggest the relationship between institutional holdings and the turn-of-the-year effect is not due to size.[13] In addition, the regression results suggest that the average return in both late December and early January is stronger for smaller capitalization firms and for poorer performing firms.

III. Returns on Winner and Loser Portfolios

To further evaluate the relationship between performance and the relative importance of the tax-loss-selling and window-dressing hypotheses, we partition stocks in each capitalization-institutional-holdings portfolio into "winner" stocks (those with positive performance over the previous calendar year excluding the last four days of December) and "loser" stocks (those with negative performance over the previous calendar year excluding the last four days of December).

A. Loser Portfolios

The window-dressing hypothesis posits that institutional investors sell losers in December in order to present respectable portfolios to their clients. Similarly, the tax-loss-selling hypothesis implies that individual investors sell losers in December in order to recognize tax losses. Thus, both hypotheses predict that loser securities should exhibit a tendency to close at the bid in late December. Immediately following the calendar turn, both hypotheses predict that loser securities should exhibit a tendency to record prices closer to the ask. The window-dressing hypothesis suggests that in early January institutional investors purchase smaller, riskier securities (which are likely to have been losers), while the tax-loss-selling hypothesis suggests that prices of losers are no longer influenced by individual investors' heavy selling and should consequently close away from the bid. Thus, both hypotheses predict that the strategic behavior of institutional and individual investors *induces* the movement from bid prices in late December toward the midpoint of the spread in early January.

If tax-loss selling by individual investors is relatively more important than institutional investors' desire to eliminate losers from their portfolios, then two results should be apparent. First, the low-institutional portfolio should under-

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[13] For the individual year results, the coefficient associated with the fraction of shares held by institutional investors is positive and statistically significant (at the 10 percent level or better) in 12 of the 15 years for the "December" regression. The coefficient is negative and statistically significant (at the 10 percent level or better) in ten of the 15 years for the "January" regression.

perform the high-institutional portfolio in late December and outperform it in early January. Second, both hypotheses predict that the return due to movement across the bid-ask spread should be negative in late December and positive in early January. Thus, if a greater fraction of the securities in the low-institutional portfolios move to bid prices in late December and toward ask prices in early January, the low-institutional portfolios should garner a relatively greater fraction of their total eight-day return in early January. Alternatively, if window-dressing by institutional investors is more important, then we should observe the reverse pattern.

Panel A of Table IV reports the average daily return for the last four days of December and the first four days of January for loser stocks in both the low- and high-institutional portfolios. On average, the high-institutional daily portfolio return exceeds the low-institutional portfolio return by 58 percent over the last four days of December, a difference that is statistically significant at the 5 percent level. Following the turn-of-the-year, the high-institutional portfolios underperform the low-institutional portfolios (statistically significant beyond the 5 percent level for every capitalization quintile). On average, the high-institutional portfolios earned 61 percent of their eight-day return in January compared to 82 percent for the low-institutional portfolios.

An F-test of the hypothesis that the daily returns (or differences in returns) are equal in the last four days of December and the first four days in January shows that although the high-institutional portfolios tend to exhibit higher returns in January than December, we can only reject the hypothesis (at the 10 percent level) that the high-institutional returns are equal in December and January for the smallest capitalization quintile. In contrast, for *every* capitalization low-institutional portfolio, the F-statistic suggests that the loser stocks dominated by individual investors garner significantly larger returns in early January than late December. Further, for every capitalization quintile, we can reject the hypothesis (at the 5 percent level or better) that the differences between the high- and low-institutional portfolio returns are equal across the December and January periods. Thus, for stocks that have decreased in value over the previous year, the results indicate that securities in the low-institutional portfolios are more likely to move across the bid-ask spread, implying that tax-loss selling by individual investors is more important than window-dressing by institutional investors.

B. Winner Portfolios

The window-dressing hypothesis predicts that winner stocks would be more likely to record closing prices at ask quotes in late December because institutional investors prefer to show winners in their year-end statements, ceteris paribus. Immediately following the calendar turn, the hypothesis suggests that institutional investors move from buying winners to buying riskier stocks, thus, the winner stocks would not be as likely to close at the ask. Similarly, the tax-loss-selling hypothesis implies that because individual investors have a tendency to resist selling winners in order to avoid recognizing taxable gains,

Table IV

Average Daily Returns (in percent) Segmented by Winners and Losers: February 1, 1977–January 31, 1992

Each year, capitalization-sorted New York Stock Exchange (NYSE) stocks are further sorted into three portfolios by the fraction of shares held by institutional investors. The one-third of the total stocks in each capitalization quintile with the highest percentage of institutional ownership is designated as the high institutional portfolio; the one-third with the lowest percentage is designated as the low institutional portfolio; and the middle third is omitted from the analysis. Within each capitalization-institutional-fraction-sorted portfolio, securities are further segmented into winners (cumulative calendar return excluding the last four days of December ≥ zero) and losers (cumulative calendar return excluding the last four days of December < zero). The mean daily return (*t*-statistics in parentheses) over the last (December) and first (January) four days of the calendar year are reported for each portfolio. In addition, we report differences between the high- and low-institutional fraction portfolios for these periods as well as differences between winners and losers. *F* tests the hypothesis that returns do not differ in the last four days of December and the first four days of January. All *t*- and *F*-statistics are based on Newey–West (1987) heteroskedasticity and autocorrelation consistent standard errors.

	Panel A: Losers			Panel B: Winners		
	December	January	F	December	January	F
Average						
High institutional holdings	0.3879	0.6011	0.76	0.2452	0.1669	0.11
	(3.28)***	(3.04)***		(2.17)**	(0.90)	
Low institutional holdings	0.2455	1.1462	15.26***	0.1041	0.4591	4.26**
	(1.65)*	(5.38)***		(1.71)*	(3.09)***	
Difference: high–low	0.1424	−0.5452	26.47***	0.1411	−0.2922	21.19***
	(1.98)**	(−4.17)***		(1.98)**	(−4.49)***	
Smallest capitalization quintile						
High institutional holdings	0.5130	0.9532	2.73*	0.2322	0.3153	0.11
	(3.52)***	(4.68)***		(1.94)*	(1.61)	
Low institutional holdings	0.7835	1.7628	10.35***	0.1449	0.6660	6.86***
	(2.41)**	(5.63)***		(1.99)**	(3.55)***	
Difference: high–low	−0.2705	−0.8096	4.83**	0.0873	−0.3507	6.76***
	(−1.05)	(−3.41)***		(0.85)	(−2.85)***	
Capitalization quintile 2						
High institutional holdings	0.4930	0.6544	0.38	0.3502	0.2106	0.34
	(3.60)***	(3.25)***		(2.62)***	(1.13)	
Low institutional holdings	0.2383	1.1767	10.96***	0.0568	0.5654	5.69***
	(1.36)	(5.29)***		(0.80)	(3.21)***	
Difference: high–low	0.2547	−0.5223	9.46***	0.2934	−0.3548	19.01***
	(1.90)*	(−2.75)***		(2.47)**	(−3.76)***	
Capitalization quintile 3						
High institutional holdings	0.4375	0.5821	0.27	0.2665	0.1123	0.48
	(3.35)***	(2.37)**		(2.57)**	(0.59)	
Low institutional holdings	0.1122	1.3181	23.18***	0.0559	0.4809	7.31***
	(0.82)	(5.63)***		(0.94)	(3.75)***	
Difference: high–low	0.3253	−0.7360	17.50***	0.2106	−0.3686	31.00***
	(3.33)***	(−3.51)***		(3.25)***	(−4.06)***	
Capitalization quintile 4						
High institutional holdings	0.2860	0.4780	0.43	0.2261	0.0798	0.37
	(2.21)**	(1.96)**		(1.88)*	(0.43)	
Low institutional holdings	0.0078	0.8480	11.47***	0.1755	0.3467	1.10
	(0.07)	(3.73)***	.	(2.36)**	(2.62)***	
Difference: high–low	0.2783	−0.3701	9.11***	0.0506	−0.2670	6.85***
	(2.87)***	(−2.16)**		(0.56)	(−3.36)***	
Largest capitalization quintile						
High institutional holdings	0.2098	0.3376	0.27	0.1511	0.1167	0.02
	(1.87)*	(1.60)		(1.37)	(0.60)	
Low institutional holdings	0.0858	0.6255	4.53**	0.0875	0.2367	0.47
	(0.90)	(2.74)***		(0.98)	(1.38) ı	
Difference: high–low	0.1241	−0.2879	13.74***	0.0636	−0.1201	5.10**
	(2.23)**	(−3.05)***		(0.98)	(−1.78)*	

* indicates statistically significant at the 10% level; ** at the 5% level; *** at the 1% level.

winners would also be more likely to record closing prices at the ask in late December. Following the calendar turn, individual investors are then more willing to sell winner stocks so the prices would move toward the midpoint of the spread. Thus, both hypotheses predict that the strategic behavior of institutional and individual investors should *reverse* the movement across the bid-ask spread at the turn-of-the-year for winners versus losers.

If institutional window-dressing is more important than individual investors' resistance to recognizing taxable gains, then two results should be apparent. First, the high-institutional winner portfolios should outperform the low-institutional winner portfolios in late December and the relative performance should be reversed in early January. Second, both hypotheses predict that the return due to movement across the bid-ask spread should be positive in late December and negative in early January. Thus, if a greater fraction of the securities in the high-institutional portfolios move to ask prices in late December and toward bid prices in early January, the high-institutional portfolios should garner a relatively greater fraction of their total eight-day return in late December. Alternatively, if individual investors' resistance to recognizing taxable gains is more important than window-dressing, then we should observe the reverse pattern.

Panel B of Table IV presents the average daily return for the last four days of December and the first four days of January for those stocks that have increased in value over the previous year (winners) in both the low- and high-institutional portfolios. Again we find that the return behavior differs between institutional-dominated and individual-dominated portfolios. In the last four days of December, on average, the high-institutional portfolios tend to outperform the low-institutional portfolios. Examining the individual capitalization quintiles reveals that the difference for winners is not as strong as it is for losers (i.e., the difference is statistically significant for quintiles 2 and 3 only). Following the turn-of-the-year, the low-institutional winners strongly outperform the corresponding high-institutional winners across all quintiles (differences are statistically significant at the 1 percent level for all but the largest capitalization portfolio).

The return behavior in December for the institutional versus individual winner portfolios appears to be consistent with the hypothesis that window-dressing by institutional investors is relatively more important than tax avoidance by individual investors. It should be cautioned, however, that these results are driven more from the return behavior of the low-institutional portfolios than that of the high-institutional portfolios. That is, although the point estimates suggest the high-institutional portfolios tend to exhibit higher returns in December than January, in no case can we reject (at traditional levels) the hypothesis that the returns of the high-institutional winners are equal. Conversely, the low-institutional winner portfolios tend to earn greater returns in early January than late December, which is inconsistent with the hypothesis that individual investors are reluctant to recognize taxable gains. As with the loser stocks, on average, the low-institutional portfolios earned 82 percent of their eight-day return in January. For the three smallest low-

institutional portfolio quintiles, the differences between the January and the December returns are statistically significant at the one percent level. Thus, although the high-institutional winner portfolios tend to outperform (underperform) the similar capitalization low-institutional winner portfolios in December (January), the *F*-statistics suggest the difference is primarily due to the behavior of the low-institutional portfolios.

It should also be noted that the relative behavior of winners versus losers is inconsistent with both the tax-loss selling and window-dressing hypotheses. That is, both hypotheses predict that winners (which should be more likely to record December prices at the ask) should outperform losers (which should be more likely to record December prices at the bid) in December. However, high- and low-institutional loser portfolios outperformed their corresponding winner portfolios in December, on average. Likewise, the regression results presented in the previous section suggest losers outperform winners in December, which is inconsistent with both hypotheses.

IV. Individuals and Institutions at the 1990–1991 Turn

Because the Torq data covers a December–January period, we also evaluate the buying and selling activities of institutional and individual investors around the eight-day window at the 1990–1991 turn-of-the-year.[14] Although the Torq data is limited to a single turn-of-the-year, it provides an unprecedented look at the buying and selling activities of institutional and individual investors around a calendar turn.

To examine the buying and selling behavior of institutional and individual investors, we again focus on price-setting volume. For each firm, we calculate the total volume of price-setting transactions (i.e., uptick buys + zero uptick buys + downtick sells + zero downtick sells) for three distinct periods—the last four trading days of 1990, the first four trading days of 1991, and the period from November 1, 1990 through January 31, 1991, excluding the eight days around the turn-of-the-year. We divide these transactions into four classifications: price-setting buys and price-setting sells for institutional and individual traders. We then calculate fractional price-setting volume as the fraction of the total price-setting volume attributed to each trader type for the

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[14] Note that the 1990–1991 turn-of-the-year was not "typical" due to the increasing tensions between the United States and Iraq just prior to the Gulf War. For example, reporting on the market events for the fourth trading day in January 1991, *The Wall Street Journal* stated, "Stocks and bonds tumbled world-wide and the dollar and oil prices surged as war fears grew." In addition, the average daily return for the CRSP equal-weighted index over the first four days of January 1991 was 0.035 percent versus 0.642 percent for the first four days of the remaining Januarys in our sample (1978–1992, excluding 1991). Nonetheless, the performance of the high- versus low-institutional portfolios was relatively normal compared to the rest of our sample in that the high-institutional portfolios outperformed the low-institutional portfolios in December and vice versa in January. Specifically, during the last four days of 1990, the high-institutional portfolios averaged 1.88 percent return versus 0.28 percent for the low-institutional portfolios. Over the first four days of 1991, the high-institutional portfolios averaged −1.50 percent while the low-institutional portfolios averaged 1.38 percent return.

firms during the period under consideration. We define net price-setting volume induced by each trader type as the price-setting buying fraction less the price-setting selling fraction. In addition, to control for general market conditions around the 1990–1991 turn-of-the-year, we also estimate "adjusted" institutional price-setting volume as the raw institutional price-setting fraction during the last four days of December (or first four days of January) for firm i less the institutional price-setting fraction for firm i during the November 1990–January 1991 period (excluding the eight days around the calendar turn). We similarly estimate adjusted individual price-setting volume.

The cross-sectional mean price-setting buying-, selling-, and net-fractions for the winners ($n = 41$ Torq firms) and losers ($n = 98$ Torq firms) are presented in Panels A and C of Table V for each trader type. The corresponding adjusted price-setting fractions are reported in Panels B and D. In addition, we report ANOVA F-statistics for the hypothesis that net raw or adjusted price-setting volume is equal across the December and January periods.

Panel A of Table V demonstrates that institutional investors, on average, issued over 41 percent more winner-buy volume than winner-sell volume in late December. In January, however, institutional investors initiated approximately equal proportions of winner buy and sell volume (i.e., net price-setting volume is approximately zero). The adjusted price-setting fractions presented in Panel B (i.e., institutional investors' deviation from their general buying and selling during the November 1990–January 1991 period) suggest that institutional investors were selling fewer than usual winners in the last four days of December 1990 and buying fewer than usual winners in the first four days of January 1991. The difference between institutional investors' net price-setting volume in December and January (either raw or adjusted) is statistically significant at the 10 percent level. The "winner" results are thus consistent with the window-dressing hypothesis. In contrast, the "loser" results are inconsistent with the window-dressing hypothesis in that, as reported in Panels C and D, there was little difference for institutional investors in buying or selling losers in both late December 1990 and early January 1991.

We also find an inconsistency in the buying and selling behavior of the individual investors with respect to winner stocks. Panels A and B of Table V show no significant difference between December and January in the volume of buy and sell orders that are attributed to individual investors. This result is inconsistent with the hypothesis that individual investors resist selling winners in December in order to defer taxable gains. For loser stocks, however, the behavior of the individual investors is consistent with the tax-loss selling hypothesis in that, as shown in Panels C and D, individual investors issued a substantially greater volume of sell orders than buy orders for losers in late December 1990. Specifically, individual investors accounted for, on average, nearly 22 percent of the price-setting selling volume and only 13 percent of the price-setting buying volume for losers in December 1990. Following the turn-of-the-year, individual investors were still issuing a greater volume of sell orders than buy orders, but the net difference is substantially reduced from December levels (the difference between December and January is statistically

Table V

Institutional Versus Individual Investor Trading Activity Over 1990–1991 Turn-of-the-Year

For each Trades, Orders, Reports, and Quotes (Torq) firm, we compute total price-setting volume (uptick/zero-uptick buys and downtick/zero-downtick sells) for the last four trading days of 1990 and the first four trading days of 1991. The fraction of price-setting volume attributed to institutional buys/sells and individual buys/sells is computed for each firm (e.g., fraction of institutional price-setting buys = volume of institutional price-setting buys for firm/total price-setting volume for firm). Additionally, we calculate net price-setting volume attributed to each trader type (price-setting buy fraction less price-setting sell fraction). The cross-sectional mean price-setting buy, sell, and net fractions for winners (cumulative calendar return excluding the last four days of December $\geq$ zero) and losers (cumulative calendar return excluding the last four days of December $<$ zero) are reported in Panels A and B, respectively. In addition, we report an ANOVA F-statistic for the hypothesis that the net price-setting volume is equal in the December and January period.

Period	Institutional Investors			Individual Investors		
	Buy	Sell	Net	Buy	Sell	Net
	Panel A: Winners (n = 41)					
December	0.3648	0.2584	0.1064	0.1262	0.1650	−0.0388
January	0.3153	0.3104	0.0049	0.1180	0.1657	−0.0477
F-statistic			3.31*			0.08
	Panel B: Adjusted Winners (n = 41)					
December	0.0116	−0.0362	0.0479	0.0049	0.0379	−0.0330
January	−0.0378	0.0158	−0.0536	−0.0034	0.0386	−0.0419
F-statistic			2.85*			0.08
	Panel C: Losers (n = 98)					
December	0.2930	0.2372	0.0558	0.1335	0.2261	−0.0926
January	0.2850	0.2668	0.0182	0.1404	0.1640	−0.0237
F-statistic			0.68			3.23*
	Panel D: Adjusted Losers (n = 98)					
December	−0.0346	−0.0522	0.0176	−0.0011	0.0988	−0.1000
January	−0.0523	−0.0277	−0.0245	0.0170	0.0427	−0.0257
F-statistic			0.61			3.39*

* indicates statistically significant at the 10% level.

significant at the 10 percent level). The "loser" results are thus consistent with the tax-loss-selling hypothesis.

Two results from this analysis appear inconsistent with the tax-loss-selling and window-dressing hypotheses, i.e., there is no evidence that individual investors resisted selling winners in December 1990 in order to avoid recognizing taxable gains and no evidence that institutional investors avoided losers in December. Comparisons across the panels, however, yield results that are consistent with the implications of both hypotheses. That is, although institutional investors issued a greater volume of buy orders than sell orders for both

winners and losers in December, the net difference was strongest for winners. Similarly, although individual investors issued more sell orders than buy orders for both winners and losers in December, the net difference was strongest for losers.

The results presented in Table V are largely consistent with our previous results. Individual investors issued a preponderance of sell orders for losers, which in turn suggests securities in the low-institutional loser portfolios were more likely to record prices at the bid in late December and have relatively larger reported returns in early January than the portfolios dominated by institutional investors. Institutional investors issued a preponderance of buy orders for winners which in turn suggests securities in the high-institutional winner portfolios were more likely to record prices at the ask in late December and have larger recorded returns in December than the portfolios dominated by individual investors.

V. Discussion and Conclusions

Our results are largely consistent with much of the previous empirical evidence on the tax-loss-selling hypothesis.[15] As would be expected if individual investors' tax-loss-selling is more important than institutional investors' window dressing, we find loser stocks dominated by individual investors yield, on average, significantly lower returns in the last four days of December than loser stocks dominated by institutional investors. The returns on the low-institutional portfolios are then significantly higher during the first four days of January as would be expected. Similarly, our transaction results also provide support for the tax-loss selling hypothesis (with respect to losers) in that individual investors were predominately selling losers in December of 1990. For stocks that have increased in value, however, our results are inconsistent with the hypothesis that individual investors are reluctant to recognize taxable gains in late December. That is, a substantial "January effect" is still observed for individual investor-dominated securities that have increased in value over the previous year. Similarly, the transaction data reveals that individual investors were, on average, selling winners in late December 1990.

For stocks that have increased in value, the relative performance of institutional and individual investor dominated portfolios provides evidence consistent with the window-dressing hypothesis. Specifically, we find that winner securities dominated by institutional investors tend to outperform winner securities dominated by individual investors in late December and then un-

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[15] Although the turn-of-the-year effect has typically been associated with capitalization, recent work (e.g., Thomson (1989), Bhardwaj and Brooks (1992), and Kross (1985)) has suggested the January effect is tied more closely to share price than capitalization. Therefore, we repeat the analysis presented in the previous sections for portfolios sorted first on price then further sorted on the fraction of shares held by institutions. The results are largely consistent with the capitalization-sorted portfolio results. The price-sorted high- and low-institutional portfolios differ significantly in their behavior around the turn-of-the-year in the same manner as the capitalization-sorted portfolios used in this study.

derperform them in early January. Closer inspection, however, reveals that although the high-institutional winner portfolios tend to garner larger returns in late December than early January, differences between the high- and low-institutional portfolios in December and January are primarily driven by the low-institutional portfolios. The transactions data results for winners are consistent with the window-dressing hypothesis in that institutional investors were buying more winners than they were selling in December 1990.[16]

In summary, regardless of prior performance, the results suggest that the trading behavior of individual investors is more important than the trading behavior of institutional investors in causing the movement across the bid-ask spread at the calendar turn. Stocks that maintain higher levels of individual investor interest underperform stocks that maintain higher levels of institutional investor interest in late December and conversely outperform them in early January.

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[16] There are several reasons why our results differ from those of Griffiths and White (1993). First, the tax-year-end in Canada precedes the calendar year-end by five business days. This results in the period between the tax and calendar year-end (i.e., between Christmas and New Year) to be a period of extremely thin trading in Canada. Second, block trades in Canada are defined as trades exceeding $100,000. Third, Griffiths and White employ a restrictive exclusionary criterion to infer buyer- versus seller-initiated trading, which results in a very small sample size. Thus, although their initial data set is very large, only a small number of block trades are included in the final analysis.

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