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Predicting Contemporary Volume with Historic Volume at Differential Price Levels: Evidence Supporting the Disposition Effect

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ABSTRACT

This paper presents empirical evidence comparing two models of trading in equities—the well-known tax-loss-selling hypothesis and "the disposition effect." According to the disposition effect, investors are reluctant to realize losses but are eager to realize gains. This paper distinguishes between the two models with a new methodology that examines the relationship between volume at a given point in time and volume that took place in the past at different stock prices. The evidence overwhelmingly supports the disposition effect not only as a determinant of year-end volume, but also as a determinant of volume levels throughout the year.

THIS PAPER PRESENTS SOME strong empirical results relating to two competing models of trading volume in equities—the "tax-loss-selling hypothesis" and "the disposition effect."

The well-known tax-loss-selling hypothesis predicts that at year end the volume of trading in stocks that have performed poorly in previous periods will increase as traders sell to realize losses before the end of the tax year. Conversely, the volume of trading in stocks that have increased in price will decrease at the end of the tax year as traders postpone sales to avoid being taxed on the gains in the current tax year. The disposition effect, on the other hand, is based on the notion that investors behave as though they are reluctant to realize losses but are eager to realize gains.

The two models of investor behavior can be distinguished on the basis of their predictions of *year-end* trading volume. Tax-loss selling predicts that, if there is relatively heavy volume in the past at price levels that exceed the year-end level, volume will be relatively high at the end of the year as the investors that traded earlier realize losses. On the other hand the disposition effect predicts relatively low year-end volume for these stocks, based on the notion that these investors will be reluctant to sell.

The results of this paper are inconsistent with tax-loss selling and consistent with the disposition effect not only as a determinant of year-end volume, but as a determinant of volume levels throughout the year.

The paper introduces a new methodology that examines the relationship between volume at a given point in time and volume that took place in the past at different stock price levels. A change in price between two dates may not

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induce abnormal year-end volume under either model if relatively few shares traded at these prices. The contribution of this paper is to take volume levels at previous price levels into account in predicting the level of abnormal volume at a given point in time.

The first three sections review the tax-loss-selling hypothesis and the disposition effect. Section IV reviews existing evidence. Our methodology is discussed in Section V, and the results are presented in Section VI.

I. The Tax-Loss-Selling Hypothesis

Constantinides [6] shows that, in the absence of transactions costs, capital losses should be realized immediately. With transactions costs and with uncertainty relating to the level of taxable income against which these losses are applied, it may be in the interests of investors to wait until the end of the tax year to realize short-term losses. Based on these arguments, many have argued that one would expect to see large volume in December for stocks with accumulated losses within the previous interval considered as short-term by the I.R.S.

Constantinides also argues that, for stocks with high variability, it may be desirable to realize long-term capital gains to acquire similar stocks so that the new position is eligible for short-term losses. For those investors who wish to dispose of a stock with an accrued capital gain for this or any other reason, postponing the sale until the beginning of the next year results in a delay in payment of the tax. Consequently, trading volume for stocks with capital gains is expected to be low in December, and then to increase in January.[1]

Branch [4], Givoly and Ovadia [9], Reinganum [15], Roll [16], and many others have relied on the tax-loss-selling hypothesis to explain differential returns earned in December and January.

II. The Disposition Effect

Prospect theory was introduced by Kahneman and Tversky [10] in a descriptive theory of choice under uncertainty. The theory predicts that investors will have a disposition to hold on to losing stocks and sell winners.

Decision makers are presumed to employ an "S"-shaped "utility function" in the domain of gains and losses as in Figure 1. The function is assumed to be concave over gains and convex over losses.

Suppose we have an investor who is neither a winner nor a loser. The investor's

[1] There are several causes that may reduce the tax benefits implied by the above strategies. Lakonishok and Smidt [11] suggest several such reasons. If short-term capital losses are not offset by ordinary income or against short-term capital gains, their tax benefit will be reduced. Then, it may be better to carry the losses forward and reduce future taxes.

Furthermore, evidence for this tax-motivated trading may not be present in past December and January data because investors have ignored these conditions. It appears that up to 50 percent of realized capital gains are not being reported. Taking into account the likelihood of detection by the IRS, some investors find it best to forego reporting capital gains. On the other hand, some investors may be fearful that they may be "detected" having replaced a stock with a clone. The IRS does not allow tax benefits on wash sales.

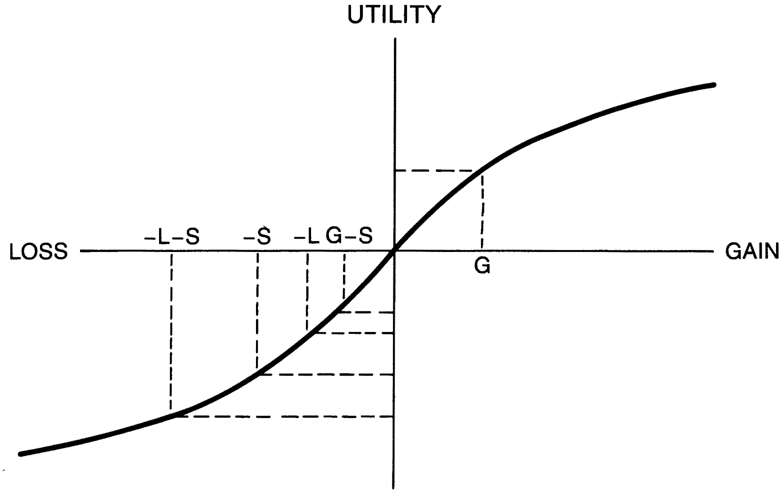

Figure 1. Investor's "Utility Function"

reference point is thus the origin of the graph. The investor faces an investment with two outcomes, a gain, G, and a loss, $-L$, with equal probability. Given the "utility function" depicted, the expected utility of the investment is zero, and the investor is indifferent.

Now suppose the same investor has a realized loss on the investment of $-S$. The investor's point of reference is now $-S$, and the two possible outcomes are now $-L - S$ and $G - S$. Clearly, the expected utility associated with holding on to the investment exceeds the utility associated with realizing the loss, because we have moved to a point of reference on the convex portion of the function. Similar arguments can be offered to show that investors will have a disposition to realize gains, because accrued gains move them to the concave portion of the function.

The upshot of this is that investors are predicted to have a propensity to hold on to stocks in which they have accrued losses and to get rid of stocks in which they have accrued gains.[2]

We shall refer to this propensity as the disposition effect (Shefrin and Statman [18]).

III. Competing Hypotheses

The tax-loss-selling hypothesis and the disposition effect have some competing implications. Particularly, the following hypotheses can be developed:

Hypothesis 1:

According to the tax-loss-selling hypothesis, the volume of trading in stocks

[2] See, for example, Arkes and Blumer [1], Shefrin and Statman [19], Statman and Sepe [20], and Staw [21]. Other attempts at formulating theories of choice include Bell [3] and Machina [14]. The examples of application of Kahneman and Tversky's prospect theory in finance include Shefrin and Statman [18], Shefrin and Statman [19] and Statman and Sepe [20].

with capital losses will exceed the volume of stocks with capital gains in December for stocks purchased within the past calendar year.[3]

In contrast, the disposition effect predicts that the volume of trading in stocks with capital gains will exceed the volume in stocks with capital losses.

Hypothesis 2:

The tax-loss-selling hypothesis predicts that stocks with capital gains will exhibit greater trading volume in January as compared to stocks with capital losses.

The disposition effect predicts the same trading pattern as the tax-loss-selling hypothesis.

Hypothesis 3:

The disposition effect predicts that the volume of trading in stocks with capital gains will exceed the volume in stocks with capital losses in all months of the year.

IV. Empirical Tests of the Tax-Loss-Selling and Disposition Hypotheses

Dyl [7] analyzed monthly trading volume for one hundred stocks for the ten years 1960–1969. He found that losing stocks, those with price depreciation greater than twenty percent, experienced abnormally high trading volume in December while those with a twenty percent or more price appreciation saw abnormally low trading volume. This is supportive of the tax-loss-selling hypothesis. On the other hand Dyl found no (statistically significant) abnormal trading volume for January, even for stocks with capital appreciation.

Shefrin and Statman [18] have a different interpretation of Dyl's results. They focus on the high abnormal trading volume in December for losing stocks and low abnormal trading volume for winning stocks. Instead of interpreting this as support for the tax-loss-selling hypothesis, they invoke self-control issues to argue that the disposition effect, in fact, predicts such a result. While individuals would prefer not to realize losses, the tax aspect may force them to override their disposition. In this task December plays a special role. The end of the year is a natural marker that persuades individuals to exert "self control" and forces them to realize the tax benefits.

A second study on the subject is the work of Lakonishok and Smidt [12]. Lakonishok and Smidt (L-S) formulate their hypotheses in the manner of this paper and perform comprehensive tests. Using both NYSE and ASE stocks, they analyze abnormal monthly trading volume during the years 1968–1982. The essence of their methodology consists of analyzing abnormal trading volume for stocks after grouping them based on their price performance over different past periods. Since individual investors, with the full impact of the tax-loss selling and the disposition effect, are more likely to trade on smaller stocks around the

[3] Assuming that one calendar year (365 days) is the period that marks the end of the short term for tax purposes.

year end, L-S results for American Stock Exchange stocks during December and January are described below.

1. For the twelve-year period, in only one December did the abnormal trading of losing stocks (considering losses compared to prices over the preceding two years) exceed the trading volume of winners.
2. Abnormal trading of winners exceeds that of losers by a wider margin in January than in December.
3. Abnormal volume of losers is higher than normal in December and the abnormal volume of winners is higher in January.

Their results are robust as to methodology (one-way analysis of variance, four-way analysis of variance and analysis of covariance). Point 1, above, is used to refute the tax-loss-selling hypothesis as the dominant explanation (Hypothesis 1). Nevertheless, Points 2 and 3 show that the tax-loss-selling hypothesis may be at work.

While Dyl and L-S find somewhat contrary results, they employ basically the same procedures—tracking abnormal volume, given past price performance over different holding periods. This procedure has the limitation that it ignores (1) differential volume of trading that occurred at prices during the holding periods and (2) the path that the price (with the accompanying volume) may take from the beginning to the end of the holding period.

The volume that occurred at prices during the holding period is of concern because it is indicative of the magnitude of the number of shares that, in fact, appreciate/depreciate by the end of the period. Suppose that two stocks, A and B, exhibit identical price patterns during a calendar-year holding period. For A volume is heavy at relatively high prices and light at relatively low prices. The opposite is true for B. Tax selling predicts heavy volume at the end of the year for A and not for B. Disposition predicts heavy volume for B but not for A.

V. Data and Methodology

The following choices of data and methodology are designed to test for the predictions of the tax-loss-selling and the disposition hypotheses using trading volumes and price performance:

1. The thirty smallest (by equity value as of July 1983) stocks that were listed on the CRSP tape from December 1981 to January 1985 are chosen for the study. Volume data from this period are used in our procedure. The "listing" bias reduces the effects on volume of startups, mergers, bankruptcies, etc. These stocks are chosen because the stocks of small firms are likely to exhibit high volatility in returns, making them ideal candidates for Constantinides' tax strategies, and because small firms are more likely to be held by tax-paying individuals. The list of firms and their size appears on Table I. As expected, most of the firms are listed on the American Stock Exchange. Only two firms are listed on the New York Stock Exchange. Descriptive statistics for the firms are provided in Table I and Table II. While they have the high variance we need for our sample design, they are not traded every day. We return to this problem later.

Table I

Descriptive Statistics Daily Averages, December 1981 through January 1985[a]

Name	Mean Price	Mean No. of Shares Outstanding (000s)	Var. (Daily ROR)
AIC Photo	2.95	1407.7	0.000842
BRT Realty	2.58	3404.4	0.005031
Beth. Corp.	4.98	1039.3	0.000664
Crown Crafts	5.42	1407.7	0.000955
Decorator Inds.	4.96	820.8	0.003207
Fairmont Chem.	3.49	1131.3	0.005069
USR Corp.	3.43	1129.5	0.004711
Kleerview	5.18	2156.3	0.010204
LaPointe	4.61	693.0	0.003859
Mangood	3.17	1501.3	0.003789
Noel Ind.	3.32	1127.1	0.001672
Ormand	3.17	314.0	0.002482
Overseas	7.17	270.0	0.004335
Pentron	0.96	3398.3	0.007324
Pioneer Elect.	19.38	258.4	0.038592
Plymouth Rubber	3.08	846.4	0.013225
Presid. Realty	8.01	479.0	0.025577
Howard B. Wolf	3.08	1256.0	0.005852
SFM Corp.	5.42	700.2	0.004845
School Pict.	3.04	1382.0	0.001762
Seaport Corp.	1.73	2071.0	0.007047
Sterling Extru.	6.20	644.0	0.002084
Tensor Corp.	9.46	521.3	0.000787
Thor Ener.	2.63	4159.7	0.000610
UNA Corp.	3.42	885.1	0.000404
Unilever	48.08	80.0	0.004711
Verit Ind.	3.93	5136.8	0.001442
Viatech Ind.	6.95	2629.2	0.002553
Weiman Inc.	3.99	736.0	0.004703
Welco Enter.	6.96	423.1	0.004561
	$\bar{x}$ = \$6.38	$\bar{x}$ = 1400.6	$\bar{x}$ = 0.005763

[a] The average daily variances for the S&P composite and for the fifth (smallest) quintile of NYSE stocks were 0.000225 and 0.000659 respectively during the years 1926–1984. Calculated from *Stocks, Bonds, Bills and Inflation 1985 Yearbook,* Ibbotson Associates and Capital Market Research Center, Chicago (Exhibit 3, p. 23).

2. Daily abnormal trading volumes are estimated using a "market"-model regression for volume:

$$V_{it} = A_i + B_i V_{im} + e_{it}, \tag{1}$$

where

V_{it} = turnover for stock i on day t,

$$= \frac{\text{Number of shares of stock } i \text{ traded on day } t}{\text{Total number of shares of stock } i \text{ outstanding on day } t},$$

Table II

Number of Days with No Trading

Exchange if Different from ASE	Names of Companies	Dec 82	Jan 83	Dec 83	Jan 84	Dec 84	Jan 85
	AIC Photo Inc.	0	2	3	6	4	5
	BRT Realty	0	2	4	6	0	3
	Bethlehem Corp.	3	0	9	11	4	3
	Crown Crafts	4	3	4	5	2	0
	Decorator Industries	3	7	0	2	4	3
	Fairmont Chemicals	10	4	12	12	8	6
	USR Corp.	3	2	3	4	2	4
	Kleerview Indust. Inc.	1	1	0	2	0	2
	LaPointe Indust. Inc.	0	0	1	1	0	1
	Mangood Inc.	15	11	3	0	8	6
	Noel Indust. Inc.	0	0	0	0	5	3
	Ormand Indust. Inc.	0	2	0	2	0	2
	Overseas Indust. Inc.	10	10	14	16	16	13
	Pentron Indust. Inc.	0	1	0	0	0	0
	Pioneer Electric Corp.	9	6	2	1	2	1
NYSE	Plymouth Rubber Inc.	6	6	6	12	5	3
	Presidential Realty	16	13	13	19	19	16
	Howard B. Wolf	8	3	5	4	3	1
	SFM Corp.	5	2	4	7	2	0
	School Pictures Inc.	7	6	4	8	12	9
	Seaport Corp.	6	1	2	0	2	4
	Sterling Extruder Corp.	0	1	4	0	0	3
	Tensor Corp.	4	5	5	5	3	2
	Thor Energy Corp.	0	0	3	2	0	2
	UNA Corp.	7	8	1	2	8	6
NYSE	Unilever PLC	17	19	11	15	15	13
	Verit Industries	2	5	7	5	6	4
	Viatech Inc.	0	0	3	6	1	0
	Weiman Inc.	11	9	8	5	6	7
	Welco Enterprises Inc.	6	13	10	8	10	8

$$V_{im} = \frac{\text{Number of shares of all stocks traded on day } t}{\text{Total number of shares of all stocks outstanding on day } t},$$

e_{it} = abnormal turnover for stock i on day t.

Following Beaver [2], Dyl [7] and L-S, (1) allows us to estimate e_{it}, the fraction of the outstanding stock of i traded on day t after removing the effects of market-wide events.

Abnormal turnovers for each stock are estimated by fitting (1) for each stock for the period December 1, 1981–January 31, 1985. The volume traded is taken from the Daily Stock Price Record for the American Stock Exchange (published by S&P Corp.), and the number of outstanding shares is obtained from the CRSP Master File tape. The market turnover is calculated using the total shares traded on the New York and American Stock Exchanges (collected from the Daily Stock Price Record of the American and New York Stock Exchanges) and the total number of all shares for all the firms on CRSP. Interestingly, as shown in the autocorrelation functions of Figures 2 and 3, while raw volume exhibits distinct positive autocorrelation, abnormal volume numbers are, for the most part, uncorrelated.

3. The relation of the abnormal turnover, e_{it}, for any stock at its given price, P_{it}, to its past turnover is formulated in the following fashion:

a. Eight price ranges around P_{it} are considered to classify past price for the stock, P_{in}, where n is a trading day in the past. These ranges are

Range 1: $P_{it} < P_{in} \leq (1 + x)P_{it}$

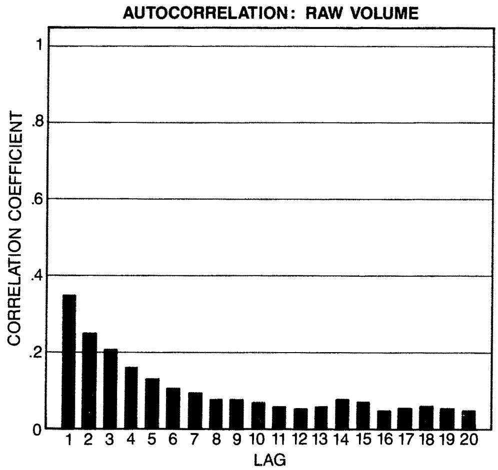

Figure 2. Average autocorrelation of daily turnover for the smallest thirty stocks on CRSP, Dec. 81–Jan. 85

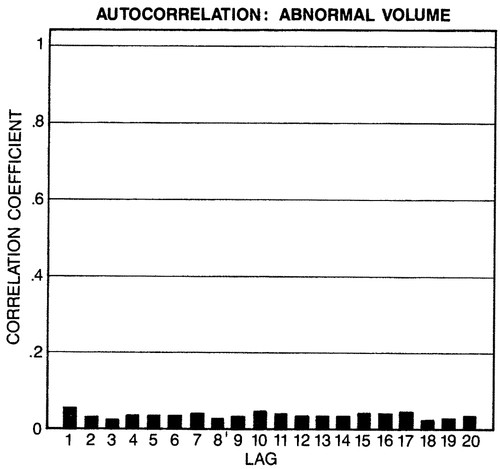

Figure 3. Average autocorrelation of daily abnormal turnover based on a volume "market model" for smallest thirty stocks on CRSP, Dec. 81–Jan. 85

Range 2: $(1 + x)P_{it} < P_{in} \leq (1 + 2x)P_{it}$

Range 3: $(1 + 2x)P_{it} < P_{in} \leq (1 + 3x)P_{it}$

Range 4: $(1 + 3x)P_{it} < P_{in}$

Range 5: $P_{it} \geq P_{in} > (1 - x)P_{it}$

Range 6: $(1 - x)P_{it} \geq P_{in} > (1 - 2x)P_{it}$

Range 7: $(1 - 2x)P_{it} \geq P_{in} > (1 - 3x)P_{it}$

Range 8: $(1 - 3x)P_{it} \geq P_{in}$

$x = .05, .075$, and $.10$.

The stock price on a past trading day (day n) is classified in one of the ranges 1 through 4 if the price on that day was greater than on day t. Similarly, prices lower than on day t would fall in one of the ranges 5 through 8.

b. When the abnormal turnover for day t is to be analyzed, the eight ranges corresponding to the closing stock price for day t are defined. Each past trading day, going back for one calendar year (365 calendar days), is classified as to range, and the raw (not abnormal) volume of trading for that day is assigned to that range. Finally, all the volume assigned to a range is added. The end-product is eight cumulative volume numbers, each representing the total of all the abnormal turnover that occurred for a range. Obviously, the volume traded at any past price will not necessarily be held up to and then traded on the particular day t that is being analyzed. Buyers at past price levels may obviously trade before or after day t. This makes the cumulative volumes noisy variables with possible double counting. In any case, volumes at all the price levels are affected in a similar manner, so this problem is not likely to import a bias to our regression results.

c. Then the following regression is formulated:

$$e_{it} = \alpha_0 + \beta_1 E_{1it} + \beta_2 E_{2it} + \beta_3 E_{3it} + \beta_4 E_{4it} + \beta_5 E_{5it} + \beta_6 E_{6it} + \beta_7 E_{7it} + \beta_8 E_{8it} + u_{it} \tag{2}$$

where E_{1it} is the cumulative raw volume experienced by stock i for all the days over the past calendar year (365 days) when its price was in range 1. The other variables are defined in the same manner.

4. Since Hypotheses 1 and 2 require testing during December and January, (2) is applied cross-sectionally for each trading day starting with the first trading day in December. To obtain more power for the regression, data for the same trading day but different years are pooled. Consequently, there are ninety observations for each cross-sectional regression and there is one such regression for each trading day. Hypothesis 3 is tested in the same way using trading days during the rest of the year.

5. According to Hypothesis 1, if the tax-loss-selling hypothesis is valid, for

trading days in December, we expect that

$$H1_0: \beta_k > 0 \quad \text{for} \quad k = 1, \cdots, 4 \quad \text{and} \quad \beta_k < 0 \quad \text{for} \quad k = 5, \cdots, 8.$$

The alternative, based on the disposition effect, is

$$H1_A: \beta_k < 0 \quad \text{for} \quad k = 1, \cdots, 4 \quad \text{and} \quad \beta_k > 0 \quad \text{for} \quad k = 5, \cdots, 8.$$

Hypothesis 2 suggests that under the tax-loss-selling hypothesis during the January trading days:

$$H2_0: \beta_k > 0 \quad \text{for} \quad k = 5, \cdots, 8.$$

Under the disposition effect also,

$$H2_A: \beta_k < 0 \quad \text{for} \quad k = 1, \cdots, 4 \quad \text{and} \quad \beta_k > 0 \quad \text{for} \quad k = 5, \cdots, 8.$$

Hypothesis 3 suggests that during all months of the year

$$H3: \beta_k < 0 \quad \text{for} \quad k = 1, \cdots, 4 \quad \text{and} \quad \beta_k > 0 \quad \text{for} \quad k = 5, \cdots, 8.$$

VI. Results

We shall initially concentrate on the results pertaining to volume levels at the turn of the year. Cross-sectional regression results using (2), one for each trading day, starting with the first trading day in December are presented in Table III. This is the base case for our analysis. It uses a 7.5 percent grid with ninety observations formed by pooling the thirty stocks for the three years. Later, we relax these constraints and form different samples to test the robustness of our results.

Two caveats regarding our analysis are in order. First, since the number of trading days is different in the Decembers of 1982 (23), 1983 (22) and 1984 (21), regressions for the 21st, 22nd and 23rd trading days must be interpreted with caution. They are a mix of January and December data. The total trading days December–January are listed below:

Period	No. of Trading Days
1. Dec. 1, 1982–Jan. 31, 1983	43
2. Dec. 1, 1983–Jan. 31, 1984	42
3. Dec. 1, 1984–Jan. 31, 1985	42

Regressions are reported for forty-two trading days. Later we present separate results for December and for January.

Second, the choice of small firms resulted in several days when the stocks did not trade. The extent of this non-trading is provided in Table II as the total number of days, not necessarily consecutive, when the stock did not trade during the Decembers and Januarys in our sample. The average stock missed trading for about 4.7 days per month. During these non-trading days the ranges were drawn assuming that the price grew linearly from the last traded price to the next traded price. To the extent that estimated prices will err above and below true values, the average error should be negligible in a sample of ninety observations.

Table III

Coefficients for the Regression $e_{it} = \alpha_0 + \beta_1 E_{1it} + \beta_2 E_{2it} + \beta_3 E_{3it} + \beta_4 E_{4it} + \beta_5 E_{5it} + \beta_6 E_{6it} + \beta_7 E_{7it} + \beta_8 E_{8it} + u_{it}$ for the Smallest Thirty Firms on CRSP (Dec. 82, Dec. 83, Dec. 84, Jan. 83, Jan. 84, Jan. 85)[a]

Trading Day	α_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	R^2 (adj)
1	−0.0016	−0.0363*	−0.0125*	−0.0194*	−0.0088*	0.0416*	0.0260*	0.0131*	0.0236	
	(−1.094)	(−3.088)	(−2.336)	(−2.597)	(−2.090)	(2.535)	(3.840)	(2.578)	(1.078)	.1749
2	0.0122	−0.1586*	−0.0391	−0.2270*	−0.0172*	0.1487*	0.0821*	0.1676*	0.1008	
	(1.741)	(−3.929)	(−1.195)	(−1.971)	(−2.194)	(2.313)	(2.781)	(2.351)	(1.785)	.1171
3	0.0420*	−0.1770	−0.0762*	−0.0531	−0.0023*	0.0089*	0.2115*	0.1613	0.2293	
	(2.037)	(−1.136)	(−2.079)	(−1.044)	(−2.109)	(2.024)	(2.463)	(1.182)	(1.802)	1442
4	0.0135	−0.3682*	−0.1854*	−0.1063*	−0.0398*	1.7144*	0.4203*	0.0186*	0.3746*	
	(1.418)	(−2.827)	(−2.754)	(−2.126)	(−2.535)	(4.052)	(2.348)	(2.111)	(2.591)	.1796
5	0.0004	−0.0653*	−0.0196*	−0.0617*	0.0036	0.0226	0.0356*	0.0286*	0.0471*	
	(1.015)	(−3.724)	(−2.440)	(−2.683)	(0.898)	(1.430)	(3.454)	(2.451)	(2.031)	.1812
6	0.0315*	−0.2191*	−0.1159*	−0.0262*	−0.5245*	0.2107*	0.0146	0.1903*	0.1743*	
	(2.041)	(−3.115)	(−2.073)	(−2.218)	(−2.212)	(2.598)	(1.142)	(2.885)	(2.685)	.1759
7	−0.0083*	−0.0495*	−0.0750*	−0.0392*	−0.0051	0.0236	0.0495*	0.0187*	0.3342*	
	(−2.063)	(−2.951)	(−2.212)	(−2.460)	(−1.575)	(1.814)	(2.570)	(2.607)	(2.713)	.1806
8	0.0025	−0.0286*	−0.0357*	−0.0761*	−0.0351*	0.0156*	0.0255*	0.0167	0.1832	
	(1.871)	(−2.6206)	(−2.526)	(−2.836)	(−2.399)	(2.171)	(3.322)	(1.799)	(2.107)	.1670
9	0.0322*	−0.0332*	−0.0248*	−0.0911*	−0.0399*	0.0097*	−0.0067	0.0209*	0.0148	
	(2.544)	(−2.360)	(−3.820)	(−2.102)	(−2.818)	(2.718)	(−1.287)	(2.582)	(1.362)	.1322
10	−0.0298	−0.0206*	−0.0661*	−0.0966*	−0.1419*	0.0449*	0.0900*	0.0238*	0.0187	
	(−1.826)	(−2.446)	(−3.576)	(−3.079)	(2.049)	(3.839)	(3.714)	(2.831)	(1.852)	.1895
11	0.0923	−0.0724*	−0.0849*	−0.0647*	−0.0789*	0.0258*	0.0295*	0.0484*	0.0373	
	(0.975)	(−2.780)	(−3.670)	(−3.219)	(−1.649)	(2.455)	(3.329)	(3.060)	(1.827)	.1660
12	0.0123	−0.0117	−0.0702*	−0.0217*	−0.0027*	0.0448*	0.0559*	0.0167*	0.0982*	
	(1.226)	(−1.221)	(−2.316)	(−2.226)	(−2.255)	(3.834)	(3.558)	(2.150)	(2.274)	.1681
13	0.0143	−0.0383	−0.0896	−0.0382*	−0.0986*	0.0169	0.0389*	0.1115*	0.0869*	
	(0.726)	(−1.726)	(1.676)	(−2.676)	(−2.584)	(1.814)	(2.278)	(2.250)	(2.172)	.1384
14	0.0130*	−0.0176*	−0.0404*	−0.0211*	−0.0452*	0.0104	0.0392*	0.0767	0.0539	
	(2.403)	(−2.763)	(−3.309)	(−2.016)	(−4.043)	(1.593)	(2.973)	(−1.416)	(1.770)	.1610

Table III, *continued*

Coefficients for the Regression $e_{it} = \alpha_0 + \beta_1 E_{1it} + \beta_2 E_{2it} + \beta_3 E_{3it} + \beta_4 E_{4it} + \beta_5 E_{5it} + \beta_6 E_{6it} + \beta_7 E_{7it} + \beta_8 E_{8it} + u_{it}$ for the Smallest Thirty Firms on CRSP (Dec. 82, Dec. 83, Dec. 84, Jan. 83, Jan. 84, Jan. 85)[a]

Trading Day	α_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	R^2 (adj)
15	−0.0196	−0.0107	−0.0849*	−0.0748*	−0.0920*	−0.0411	0.0289*	0.0848*	0.0638*	
	(−1.512)	(−1.743)	(−2.870)	(−3.270)	(−2.114)	(−1.856)	(3.661)	(2.299)	(2.483)	.1719
16	−0.0059	−0.0464*	−0.0223*	−0.0405*	−0.0204*	0.0525*	0.0120	0.0671*	0.0497*	
	(−1.023)	(−2.604)	(−3.843)	(−2.868)	(−2.655)	(2.659)	(1.033)	(2.374)	(2.021)	.1398
17	0.0430*	−0.0116*	−0.0215*	−0.0151*	0.0082	0.0015	0.0322*	0.0143*	0.0293*	
	(2.020)	(−2.968)	(−2.756)	(−2.493)	(1.064)	(1.462)	(2.048)	(2.306)	(2.117)	.1814
18	0.0381*	−0.0543*	−0.0147	−0.0153*	−0.0599*	−0.0249	0.0311*	0.0187*	0.0214*	
	(1.903)	(−2.503)	(−1.865)	(−2.556)	(−2.583)	(−1.608)	(2.294)	(2.188)	(2.672)	.1731
19	−0.0467*	−0.0316*	−0.0102*	−0.0626*	−0.0157	0.0125*	0.0874*	0.0172*	0.0932*	
	(−1.983)	(−3.461)	(−3.460)	(−2.418)	(−1.089)	(2.662)	(2.602)	(2.196)	(2.433)	.1289
20	0.0105	−0.0421*	−0.0166*	−0.0715*	−0.0122*	0.0548*	0.0358*	0.0351*	0.0829*	
	(1.416)	(−2.079)	(−2.116)	(−2.598)	(−2.077)	(2.543)	(2.386)	(2.109)	(2.018)	.1873
21	−0.0317	−0.0624*	−0.0279	−0.0703*	0.0189	0.0194*	0.0178*	0.0329*	0.0216*	
	(−1.043)	(−2.354)	(−1.406)	(−2.383)	(1.799)	(2.191)	(2.610)	(2.419)	(2.253)	.1139
22	0.0493	−0.0374*	−0.0219*	−0.0258*	−0.0712*	0.0483*	−0.0181	0.0431*	0.0136*	
	(1.224)	(−2.283)	(−2.188)	(−2.031)	(−2.553)	(2.269)	(−1.269)	(2.118)	(3.037)	.1730
23	0.0114*	−0.0194*	−0.0974*	−0.0265*	−0.0172	0.0336*	−.0887*	0.0796*	0.0329*	
	(2.363)	(−2.186)	(−2.110)	(−2.497)	(−1.141)	(2.327)	(2.354)	(2.381)	(2.681)	.1826
24	−0.0376	−0.0125*	−0.0269*	−0.0799*	−0.0274*	0.0988*	0.0220*	0.0864*	0.0538*	
	(−1.085)	(−2.113)	(−2.399)	(−2.742)	(−2.307)	(2.575)	(2.643)	(2.750)	(2.367)	.1243
25	0.0684	−0.0182*	−0.0107*	−0.0973*	−0.0221*	0.0943*	0.0263*	0.0127	0.0193*	
	(2.242)	(−2.450)	(−2.098)	(−2.366)	(−2.889)	(2.589)	(2.762)	(1.434)	(2.762)	.1807
26	−0.0114	−0.0156*	−0.0268*	−0.0059	−0.0183*	0.0230*	0.0575*	0.0189*	0.0363*	
	(−1.455)	(−2.614)	(−2.081)	(−1.034)	(−2.365)	(2.945)	(2.138)	(1.952)	(2.113)	.1438
27	0.0100	−0.0644	−0.0146*	−0.0733*	−0.0187*	0.0291*	0.0196*	0.0142*	0.0675*	
	(0.460)	(−1.162)	(−2.631)	(−2.137)	(−2.017)	(1.997)	(2.137)	(2.427)	(2.663)	.1780

28	−0.0143	−0.0238*	−0.0100*	−0.1366*	−0.0024*	0.1201*	0.0228*	0.0903*	0.0257	
	(−1.212)	(−2.150)	(−2.509)	(−2.807)	(−1.043)	(2.918)	(3.749)	(2.790)	(1.031)	.1165
29	−0.0035	−0.0362*	−0.0098*	−0.0891	0.0276	0.0278*	0.0441*	0.0544*	0.0678*	
	(−1.298)	(−2.371)	(−2.395)	(−1.395)	(0.982)	(2.614)	(3.493)	(2.309)	(2.394)	.1197
30	0.0122	−0.0117*	−0.0201*	−0.0483*	−0.0493*	0.0277*	0.0294*	0.0153*	0.1986*	
	(−1.503)	(−2.081)	(−2.247)	(−2.080)	(−2.242)	(2.889)	(2.729)	(2.817)	(2.179)	.1280
31	0.0594	−0.0703*	−0.0451*	−0.0323*	−0.0738	0.0139*	0.0626*	0.0261*	0.0398*	
	(1.684)	(−3.849)	(−2.375)	(−2.332)	(−1.742)	(3.451)	(2.701)	(3.742)	(2.432)	.1813
32	−0.0462	−0.0393*	−0.0426*	−0.0550	−0.0337*	0.0053	0.0638*	0.0411*	0.0825*	
	(−1.834)	(−2.810)	(−3.230)	(−1.194)	(−2.475)	(1.329)	(2.746)	(2.198)	(2.328)	.1376
33	0.0049	−0.0919*	−0.0551*	−0.0112*	−0.0164*	0.0143*	0.0232*	0.0698*	0.0731*	
	(1.248)	(−2.402)	(−2.960)	(−2.325)	(−2.102)	(2.109)	(2.098)	(2.132)	(2.227)	.1426
34	0.0142	−0.0707*	−0.0594*	0.0414	−0.0175*	0.0154*	0.0103*	0.0366*	0.0578*	
	(1.481)	(−3.374)	(−2.441)	(1.087)	(−2.430)	(2.236)	(3.198)	(2.567)	(2.038)	.1603
35	0.0321*	−0.0538	−0.1276*	−0.0257*	−0.0168*	0.0155*	0.0238*	0.0214*	0.0681*	
	(2.076)	(−1.318)	(3.276)	(−2.096)	(−2.658)	(2.186)	(2.915)	(2.210)	(2.453)	.1438
36	0.0075	−0.0146*	−0.1101*	−0.0156*	−0.0024	0.0187*	0.0198*	0.0184*	0.0293*	
	(1.062)	(−2.382)	(−3.583)	(−2.368)	(−1.030)	(2.302)	(3.493)	(2.806)	(2.753)	.1528
37	−0.0472*	−0.0248*	−0.0218*	−0.0143*	−0.0573*	0.0621	0.0093*	0.0159*	0.0289*	
	(−1.077)	(−2.591)	(−2.183)	(−2.759)	(−2.285)	(1.281)	(2.962)	(3.158)	(2.117)	.1769
38	0.0079	−0.0507	−0.0332*	−0.0119*	−0.0143*	0.0262*	0.0278*	0.0106*	0.0174*	
	(1.694)	(−1.809)	(−2.150)	(−2.530)	(−2.313)	(2.167)	(2.679)	(2.589)	(2.271)	.1622
39	0.0073	−0.0052*	−0.0206*	−0.0436*	−0.0419*	0.0137*	0.0058	0.0126*	0.0182*	
	(1.040)	(−2.538)	(−2.608)	(−2.258)	(−2.939)	(2.216)	(−1.072)	(2.863)	(2.936)	.1499
40	−0.0012*	−0.0189*	−0.0179*	−0.0104*	−0.0164*	0.0053*	0.0204*	0.0493*	0.0917	
	(−2.096)	(−2.141)	(−2.479)	(−2.992)	(−2.387)	(2.118)	(2.065)	(2.629)	(1.141)	.1312
41	0.0017	−0.0197*	−0.0724*	−0.0506*	−0.0863*	0.0394*	0.0223*	0.0952	0.0948*	
	(0.938)	(−2.127)	(−2.094)	(−2.273)	(−2.140)	(2.430)	(2.663)	(1.729)	(2.016)	.1386
42	−0.0073*	−0.0492*	−0.0349*	−0.0387*	−0.0215*	0.0513*	0.0289*	0.0247*	0.0921*	
	(−2.195)	(−2.695)	(−2.056)	(−2.098)	(−2.881)	(2.332)	(2.193)	(2.154)	(2.733)	.1432

[a] e_{it} = Abnormal turnover for stock i on day t, and E_{1it} = cumulative abnormal turnover for stock i for all past days in the previous 365 days from day t in which it traded in range 1. (E_{2it}, etc. are defined similarly.) The ranges are described in the body of the paper. Trading Day 1 is the first trading day of December.

t-Statistics are in parentheses; an asterisk indicates significance at the five percent level.

Turning to Table III, the adjusted R-squares show that on average about 15.5 percent of the variation in the abnormal turnover on any day can be explained by the cumulative turnovers in the eight ranges. The low coefficient of determination is explained by the fact that only a small fraction of historic volume is linked to trading on a given target day t. Note also that in thirteen out of the forty-two trading days the intercept term is significant.

Even casual observation reveals the dramatic significance and pattern of coefficients. The coefficients β_1 through β_4 are predominantly significant and negative while the coefficients β_5 through β_8 are largely significant and positive. We also formed Fama-MacBeth "t-statistics" for each of the coefficients using the daily time-series values for the forty-two trading days (in Table III). These t-statistics are

$$t(\bar{\beta}_k) = \frac{\bar{\beta}_k}{s(\beta_k)/\sqrt{42}}.$$

The t-statistics are presented in Table IV in the middle row for the 7.5 percent grid. Again, the results confirm the above observation on the coefficients. These results reject the tax-loss-selling hypothesis (Hypothesis 1) and favor the disposition effect (Hypothesis 3). (Hypothesis 2 is also supported but it does not distinguish between our competing models.) The sizes of the coefficients tell us the impact of historic volume at differential prices on contemporary volume. For the 7.5 percent grid in Table IV we note, for example, that the average β_1 is -0.005060. A hundred percent increase in turnover when the price was in range 1 would lower contemporary abnormal volume by about one half of one percent.

While year-end comparisons, as in Tables III and IV, test the tax-loss-selling hypothesis relative to the disposition effect, the disposition effect is applicable to every month of the year. In Table V we present the mean coefficients and their "t-statistics" for each month. Overwhelmingly, the results support the disposition effect. There is remarkable stability in the relationship from month to month. There appear to be few, if any, seasonal patterns in the coefficients. However, it does appear that the coefficients are correlated. As we move from month to month, the absolute values for the coefficients tend to move in concert. Overall, Hypothesis 3 is strongly supported by the analysis.

In the remainder of this section we examine the robustness of our findings.

Grid Size: The basic grid size for our analysis is 7.5 percent with ninety observations. In Table IV we also show the year-end results of changing the grid size to five percent and ten percent. The results are relatively insensitive to the size of the price grid. One purpose of this sensitivity check with grid size is to see if transactions costs affect the results, particularly for coefficients β_1 and β_5.

Year-To-Year: In Table VI we present the mean values of the coefficients at the turn of the year as well as their t-statistics. The table shows the average values for the coefficients in the months of December and January for the three years of our sample. Note that the pattern persists in each of the three years—volume at higher (lower) prices associated with abnormally low (high) levels of contemporary volume. This suggests robustness of results over time and also that our

Table IV

Coefficient Values and "t-Statistics" at the Turn of the Year (by Price Grid Interval) for the Smallest Thirty Stocks on CRSP (Dec. 82, Dec. 83, Dec. 84, Jan. 83, Jan. 84, Jan. 85)[a]

Grid			Volume at Higher Prices				Volume at Lower Prices			
Interval	Adj. R^2	α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8
5%	0.137	−0.000892	−0.00661*	−0.00289*	−0.00543*	−0.00631*	0.0039*	0.0046*	0.00424*	0.000586*
		(−0.584)	(−4.402)	(−5.188)	(−4.135)	(−3.465)	(6.870)	(7.763)	(5.540)	(6.007)
7.5%	0.146	0.000109	−0.005060*	−0.00597*	−0.00439*	−0.0027*	0.00461*	0.0041*	0.00538*	0.00434*
		(0.981)	(−8.198)	(−8.466)	(−7.059)	(−5.704)	(8.881)	(8.151)	(7.263)	(8.059)
10%	0.142	0.0002530	−0.00721*	−0.00391*	−0.00349*	−0.00331*	0.00455*	0.00541*	0.00653*	0.00535*
		(1.562)	(−5.959)	(−7.596)	(−5.799)	(−5.517)	(5.921)	(4.382)	(3.208)	(3.608)

[a] Means and Fama-MacBeth "t-statistics" (in parentheses) are formed from the forty-two time-series values for each of the coefficients such as in Table III for the 7.5% price grid. An asterisk indicates significance at the five percent level.

Table V

Mean Monthly Values for the Coefficients and "t-Statistics"[a]

Month	Adj. R^2	α	Volume at Higher Prices β_1	β_2	β_3	β_4	Volume at Lower Prices β_5	β_6	β_7	β_8
January	0.1005	0.0000965	−0.002704*	−0.001942*	−0.001449*	−0.0030325*	0.003668*	0.001164	0.00171*	0.00220*
		(0.902)	(−2.068)	(−2.069)	(−3.182)	(−2.639)	(3.478)	(1.792)	(3.298)	(2.010)
February	0.1221	−0.0003780*	−0.0030784*	−0.002736*	−0.002876*	−0.003138*	0.004133*	0.002654*	0.004203*	0.0032*
		(−2.762)	(−2.828)	(−3.443)	(−3.250)	(−3.926)	(2.827)	(2.959)	(3.339)	(2.830)
March	0.1050	0.0001431*	−0.003081*	−0.003881*	−0.003652*	−0.00325*	0.004463*	0.004010*	0.004563*	0.0030*
		(−3.367)	(−3.017)	(−4.107)	(−2.703)	(3.776)	(3.776)	(3.265)	(3.677)	(3.010)
April	0.099	0.0001001	−0.002540*	−0.002341*	−0.001679*	−0.003132*	0.003268*	0.001614	0.00272*	0.0025*
		(0.987)	(−2.166)	(−2.269)	(−3.382)	(−2.640)	(3.149)	(1.907)	(3.398)	(2.210)
May	0.1021	0.0001847	−0.004932*	−0.004279*	−0.004472*	−0.003833*	0.003627*	0.003760*	0.004225*	0.00270*
		(1.398)	(−4.092)	(−3.056)	(−3.932)	(−3.876)	(3.348)	(3.150)	(3.733)	(3.483)
June	0.1016	0.0000748	−0.0029443*	−0.001843*	−0.002418*	−0.001843*	0.002922*	0.00309*	0.003847*	0.00265*
		(0.559)	(−2.573)	(−2.874)	(−2.425)	(−2.235)	(2.011)	(2.889)	(3.687)	(3.961)
July	0.1044	−0.0002425*	−0.004027*	−0.004652*	−0.0026*	−0.00779*	0.003935*	0.003352*	0.004456*	0.0032*
		(−2.001)	(−2.461)	(−4.341)	(−2.067)	(−2.671)	(3.682)	(3.752)	(4.452)	(2.187)
August	0.1073	−0.0001686	−0.0027305*	−0.003974*	−0.003142*	−0.002261*	0.002397*	0.003501*	0.003035*	0.00390*
		(−1.565)	(−2.953)	(−5.217)	(−2.309)	(−2.211)	(3.819)	(3.5466)	(2.229)	(4.119)
September	0.1026	0.0001647	−0.004632*	−0.0037963*	−0.004678*	−0.003323*	0.003827*	0.002764*	0.003825*	0.002688*
		(1.198)	(−4.194)	(−3.153)	(−3.932)	(−4.003)	(3.438)	(3.154)	(3.737)	(3.591)
October	0.1055	0.0001314	−0.0032810*	−0.003418*	−0.003562*	−0.00325*	0.004536*	0.003910*	0.004336*	0.003*
		(1.0113)	(−3.576)	(−2.995)	(−4.0667)	(−2.713)	(3.746)	(3.165)	(3.577)	(3.161)
November	0.1093	−0.0001886	−0.0031305*	−0.004074*	−0.003512*	−0.002621*	0.002927*	0.003801*	0.003835*	0.0040*
		(−1.655)	(−2.593)	(−5.003)	(−2.498)	(−2.667)	(3.719)	(3.456)	(2.493)	(4.009)
December	0.1039	−0.0002255*	−0.003825*	−0.004525*	−0.0020*	−0.00705*	0.003585*	0.003025*	0.004547*	0.00237
		(−2.136)	(−2.631)	(−4.541)	(−2.167)	(−2.731)	(3.832)	(3.8516)	(4.652)	(2.186)

[a] For the smallest thirty stocks on CRSP, means and Fama-MacBeth "t-statistics" for the coefficents from the daily estimation of (2) with a 7.5% price grid; data from Dec. 82 to Jan. 85 pooled for each month. An asterisk indicates significance at the five percent level.

Table VI

Coefficient Values and "t-statistics" at the Turn of the Year (December-January) By Year[a]

			Volume at Higher Prices				Volume at Lower Prices			
Year	Adj. R^2	α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8
82–83	0.100	0.00025*	−0.00260*	−0.00296*	−0.00364*	−0.00308*	0.0038*	0.00452*	0.00466*	0.0038*
		(2.687)	(−3.690)	(−3.676)	(−3.968)	(−3.968)	(6.062)	(6.416)	(9.176)	(6.540)
83–84	0.104	0.000855	−0.0115*	−0.00606*	−0.00411*	−0.006*	0.00457*	0.00663*	0.00447*	0.00697*
		(1.703)	(−3.435)	(−2.692)	(−7.482)	(−3.812)	(6.235)	(3.280)	(4.292)	(2.877)
84–85	0.099	0.01164	−0.00853*	−0.0044*	−0.0064*	−0.0033*	0.00468*	0.00293*	0.0039*	0.00436*
		(1.639)	(−2.464)	(−2.903)	(−3.996)	(−3.829)	(7.659)	(4.006)	(6.241)	(5.899)

[a] For the smallest thirty stocks on CRSP, means and Fama-MacBeth "t-statistics" (in parentheses) for the coefficients from the daily estimation of (2) with a 7.5% price grid. An asterisk indicates significance at the five percent level.

Table VII

Six-Month Accumulation (Turn of the Year) Mean Values and "t-Statistics"[a]

Adj. R^2	α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8
0.117	0.00044	−0.00406*	−0.00734*	−0.00852*	0.00430*	0.00403*	0.00338*	0.00582*	0.00498*
	(1.913)	(−6.465)	(−3.171)	(−2.906)	(3.768)	(6.909)	(5.631)	(2.857)	(3.251)

[a] For the thirty smallest stocks on CRSP, means and Fama-MacBeth "t-statistics" for the coefficients from the daily estimation of (2) with a 7.5% grid. Data are pooled for Dec. 82, Dec. 83, and Dec. 84, and for Jan. 83, Jan. 84 and Jan. 85. An asterisk indicates significance at the five percent level.

sample of thirty stocks, without pooling to get ninety observations, is sufficient a year at a time.

Accumulation Period: In Table VII we present the results of shortening the period of volume accumulation to the previous six months as opposed to the previous year. Shortening the accumulation period also has very little impact on our results. This means the problem of double counting traded volume, which sould be reduced in this shorter period, had not produced our earlier results. We also attempt even shorter accumulation periods. In Figures 4 and 5, we divide the accumulation period into quarters. In Figure 4, moving down the graph from the top, we show the number of significant coefficients relating volume at *higher prices* to contemporary abnormal volume, where volume is measured with a four-, then a three-, a two- and finally a one-quarter lag. Note that the strongest relationship is associated with the raw volume that took place two quarters past. Figure 5 shows the analogous relationship for raw volume at lower prices. The two results are similar except that in the case of raw volume at higher prices we have an abundance of significant negative coefficients, while in the case of raw volume at lower prices, positive coefficients are in abundance. In Table VIII we provide the means and t-statistics for the coefficients and find that our results hold up for quarterly accumulations as well.

VII. Conclusion

This paper presents some strong results that are consistent with the disposition effect. The relationships we find are highly significant and are robust to sample

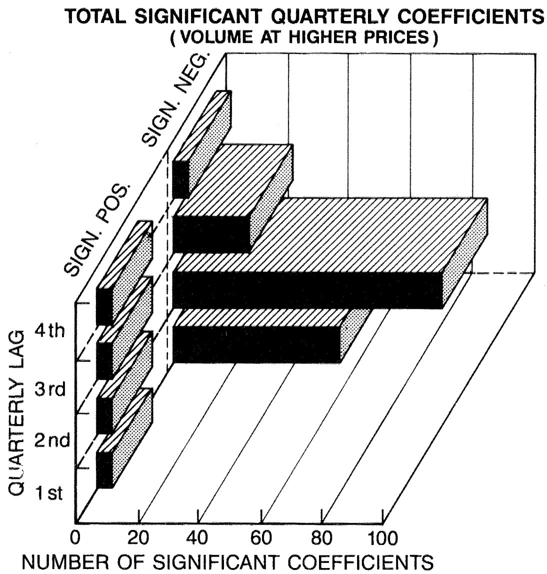

Figure 4. Number of positive and negative coefficients of past volume in the prediction of year-end volume. Historical volume is accumulated by quarters, and in this figure the breakdown is provided only for coefficients of historical volume that occurred at higher past prices. See Table VIII for further details and the corresponding Fama-MacBeth average of the coefficients.

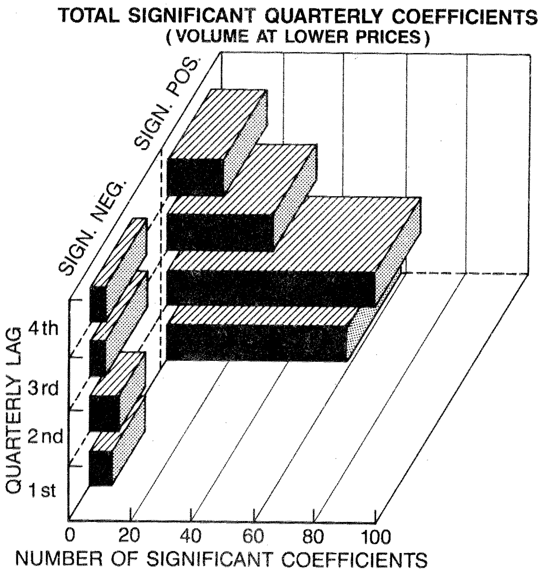

Figure 5. Number of positive and negative coefficients of past volume in the prediction of year-end volume. Historical volume is accumulated by quarters, and in this figure the breakdown is provided only for coefficients of historical volume that occurred at lower past prices. See Table VIII for further details and the corresponding Fama-MacBeth average of the coefficients.

Table VIII

Quarterly Accumulation (Turn of the Year) Means and "t-Statistics"

$$e_{it} = \alpha_0 + \beta_{11}E_{11it} + \beta_{12}\, E_{12it} + \beta_{13}\, E_{13it} + \beta_{14}\, E_{14it} + \cdots + \beta_{81}\, E_{81it} + \beta_{82}\, E_{82it} + \beta_{83}\, E_{83it} + \beta_{84}\, E_{84it} + U_{it}^{a}$$

Volume at Higher Prices				Volume at Lower Prices			
β_{11}	β_{12}	β_{13}	β_{14}	β_{51}	β_{52}	β_{53}	β_{54}
−0.00621	−0.00371	−0.00362	−0.00502	0.00038	0.00429	0.00363	0.00725
(−3.703)*	(−4.219)*	(−3.517)*	(−2.273)*	(4.220)*	(3.929)*	(3.227)*	(2.154)*
β_{21}	β_{22}	β_{23}	β_{24}	β_{61}	β_{62}	β_{63}	β_{64}
−0.00176	−0.00099	−0.00621	−0.00391	0.00621	0.00528	0.001923	0.00641
(−3.333)*	(−3.893)*	(−2.401)*	(−1.893)	(3.767)*	(4.782)*	(2.891)*	(2.223)*
β_{31}	β_{32}	β_{33}	β_{34}	β_{71}	β_{72}	β_{73}	β_{74}
−0.01092	−0.00217	−0.00101	−0.00762	0.00923	0.00227	0.00714	0.00032
(−3.561)*	(−4.701)*	(−2.703)*	(−2.095)*	(3.293)*	(3.891)*	(2.407)*	(2.698)*
β_{41}	β_{42}	β_{43}	β_{44}	β_{81}	β_{82}	β_{83}	β_{84}
−0.00542	−0.00735	−0.00351	0.0085	0.00912	0.00241	0.00562	0.00878
(−3.010)*	(−5.379*)	(−3.610)*	(1.783)	(4.001)*	(5.013)*	(2.661)*	(1.887)

$\alpha_0 = 0.00027$ with a t-value of 1.076; Adj. $R^2 = 0.093$.

[a] For the thirty smallest stocks on CRSP, means and Fama-MacBeth "t-statistics," with a 7.5% grid. Data are pooled for Dec. 82, Dec. 83 and Dec. 84, and for Jan. 83, Jan. 84 and Jan. 85. E_{11it} is the sum of the turnover volume that occurred in the previous quarter when prices were in range 1. E_{12it} relates to the quarter, one quarter back, for volume in the price range 1, etc. An asterisk indicates significance at the five percent level.

period and to sample design. We are struck by the strength and the stability of the relationship between contemporary volume and historical volume at higher and lower price levels. These results clearly call for further work with larger samples and with larger firms. It would also be interesting to determine whether the relationship found here has an impact on the level of stock prices. If it does, we may have some implications for the literature on efficient markets. As it stands, these results are best taken as those coming from a test of human behavior.

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