# The Individual Investor and the Weekend Effect: A Reexamination with Intraday Data

RAYMOND M. BROOKS
Oregon State University

Hongshik Kim
Daewoo Research Institute, Korea

*It is a well known empirical finding that returns, on average, are negative on Monday. Miller (1988) suggests that this anomaly could be the result of individual investor trading activity. Lakonishok and Maberly (1990) and Abraham and Ikenberry (1994) use odd-lot trading as a proxy for individual investor trading patterns and find evidence consistent with this individual investor hypothesis. We reexamine investor trading activity using intraday trades and the size of transactions to proxy for individual and institutional investors. We find that trading activity is significantly lower on Monday for large-size trades. Moreover, small-size trades have a higher percentage of sell orders on Monday morning compared to other days of the week. If small-size trades reflect individual investor activity and large-size trades reflect institutional investors then both types of investors play a role in the negative return on Monday. The individual traders directly contribute through their trading and institutional traders indirectly contribute through their withdrawal of liquidity.*

Harris (1986) finds that returns, on average, are negative on Monday and positive the remaining days of the week.[1] These daily return patterns have sparked a large set of theoretical and empirical investigations. Of particular interest is the negative return on Monday, the weekend effect. Miller (1988) suggests that this anomaly could be the result of individual investor trading patterns, the so-called individual investor hypothesis. Two factors impact the individual investor. First, individuals reflecting on their current needs over the weekend, when they are not distracted with other activities, initiate a higher percentage of trades on Monday. Second, the information individuals receive during the week from the brokerage community is biased toward buy recommendations (see Groth, Lewellen, Schlarbaum, and Lease, 1979; Diefenbach, 1972; Dimson and Fraletti, 1986). Over the weekend, small investors are less likely to receive recommendations from the brokerage community. Therefore, individuals initiate a

higher percentage of sell orders on Monday morning. This conjecture of individual trading patterns is the link between the individual investor and the negative returns observed on Monday. Lakonishok and Maberly (1990) and Abraham and Ikenberry (1994) use odd-lot trading as a proxy for individual investor trading patterns and find evidence consistent with this individual investor hypothesis. In addition, Abraham and Ikenberry find that negative Monday returns follow negative Friday returns. They conclude, "it [the weekend effect] is substantially the consequence of information released in prior trading sessions, particularly on Friday" (p. 276). They also conclude, based on their odd-lot trading proxy, that "individuals exert substantially greater selling pressure on Mondays following negative returns in prior trading sessions" (p. 276).

Lakonishok and Maberly (1990) look at proxies for both individual and institutional traders. Odd-lot trading is their proxy for individual trading patterns and large block trades their proxy for institutional trading patterns. Their evidence is consistent with selling pressure on Monday, yet they state, "a more powerful test could be performed if intraday trading data of various market participants were made available" (p. 232). More recently, Sias and Starks (1995) examine the weekend effect by indirectly investigating the role of institutional investors. They partition their sample of firms by the level of institutional holdings. They find the weekend effect is higher in firms with large institutional holdings and conclude that the weekend effect is primarily driven by institutional investors.

In the spirit of Lakonishok and Maberly (1990), we reexamine the individual investor hypothesis using intraday trading data for 276 randomly selected firms. Our proxy for individual and institutional trading activity is the size of the transaction. We use small-volume transactions as a proxy for individual investors and large-volume transactions as a proxy for institutional investors. However, our proxy is not without problems, as institutional trades may be broken into a series of small trades. Furthermore, individual traders can act collectively through mutual funds. Our use of small-size versus large-size trades is consistent with Lakonishok and Maberly. We also classify trades as market initiated buys if they are above the contemporaneous bid-ask spread midpoint and market initiated sales if below the midpoint.

We find large-size trades are significantly lower on Monday morning and consequently, small-size trades represent a larger percentage of trades. In addition, small-size trades have a greater percentage of sell orders on Monday versus other days of the week. If small-size trades reflect individual investor activity and large-size trades reflect institutional investors then both types of investors play a role in the negative return on Monday. The individual traders directly contribute through their trading and institutional traders indirectly contribute through their withdrawal of liquidity.

The increased selling activity of small-size transactions is consistent with the individual investor hypothesis and the findings of Lakonishok and Maberly (1990) and Abraham and Ikenberry (1994). The absence of large-size trades is

consistent with the findings of Sias and Starks (1995), where firms with greater institutional holdings have more pronounced negative returns on Monday. The next section describes the sample, data, and procedures. Section II presents some return characteristics of our sample. Section III presents our results. We conclude with a brief summary in the final section.

## I. SAMPLE, DATA, AND PROCEDURES

Abraham and Ikenberry (1994) use an intraday index to investigate the weekend effect. This has merit in that it avoids some of the problems of the market microstructure such as the bid and ask quoting convention and the discrete 1/8th prices. However, using an index prohibits investigating trading patterns for individual stocks and therefore individual traders. Lakonishok and Maberly (1990) use odd-lot trading and block trading volume of the NYSE to examine the weekend effect. This approach also has merit in that it attempts to separate individual and institutional trading patterns. But it ignores all the round lot trades smaller than 10,000 shares. We reexamine the weekend effect using intraday data for 276 NYSE and AMEX firms. We use the firm as its own control for trading activity on Monday versus other days of the week. This provides a different view of the weekend effect and adds a new dimension to the examination of the weekend puzzle.

We randomly select 276[2] firms with intraday trading data on the 1989 NYSE and AMEX Trades and Quotes Transaction File prepared by the Institute for the Study of Security Markets (ISSM). The intraday data from the ISSM tape include time-stamped transactions, bid and ask quotes, the size of the trade, opening quotes and prices, and closing prices. Our classification of trades begins with a partition of buys and sells. A buy transaction is from the perspective of the trade initiator and is defined as a transaction above the contemporaneous bid-ask spread midpoint. A sale is a transaction below the bid-ask spread midpoint.[3] Trades at the bid-ask spread midpoint are eliminated from comparisons relying on the type of trade but are used for other comparisons such as intraday and interday trading volume.[4] The 276 firms selected have over six million trades during 1989.

The second classification of trades is based on the size of the trade. Trades are classified into groups starting from one to five round lots (100 to 500 shares) for the smallest-volume transaction group to trades of 100 round lots (10,000 shares) or greater for the largest group. The other groups are trades from six to ten round lots, trades from 11 to 50 round lots, and trades from 51 to 99 round lots.

Three sets of observable prices are used for determining the returns: transaction prices, bid quotes, and ask quotes. Transaction prices for daily returns have inherent problems. For example, a transaction price could be from a market sale or a market buy. If clustering at the bid or ask occurs for a specific

trading time (i.e., Monday morning) then a calculated return could be understated or overstated.[5] Therefore, we also calculate returns using quotes.

The sample is also partitioned into ten portfolios based on the outstanding equity value of a firm on December 31, 1988. Eight of the ten portfolios, on average, have negative returns on Monday. In general, the smaller the equity value of a firm, the more negative the return on Monday.

The size of the order imbalance, orders awaiting execution, provides information about price pressure. However, our data only contain the depth of the highest bid and lowest ask. Missing is the depth of the market at the next best bid and ask quotes. In addition, the depth of a quote is not consistently updated on this data set. As a result, the depth of the quote may be stale. Therefore, we use the difference in the volume of executed buys and sales during a specific time period (usually one hour of trading) to proxy for price pressure. Our proxy for order imbalance is selling percentage. Selling percentage is selling volume divided by total volume (excluding trades at the bid-ask spread midpoint):

$$\text{selling pressure} = \text{selling volume} / \text{total volume} \qquad (1)$$

We examine the selling percentage across different sizes of transactions and different trading periods during the day. We propose that if individual investor selling decisions are influencing the negative returns on Monday, then selling percentage from small-volume trades should be higher on Monday compared to the remainder of the week. The alternative, failing to detect a significant change in selling percentage for small-volume trades, would indicate that individual investors are not influencing returns on Monday. The same logic is applied to large-volume trades and institutional investors.

We choose dollar volume as our primary measure of volume, instead of the number of transactions, to avoid giving extra weight to a series of small buys (sales) over a large sale (purchase). However, we did conduct the same tests with number of trades as the volume measure and found very similar results.

## II. RETURN CHARACTERISTICS OF 1989 SAMPLE

Our first investigation characterizes returns for our sample. This is especially important because we use a much smaller time period for returns than prior studies. The sample mean returns are a simple average of the 276 firm daily returns. The sample results are very similar to the short time series of Harris (1986) and the longer time series of Abraham and Ikenberry (1994). For the unconditional returns, Monday has a significant negative return of −0.250% and compares favorably with the finding of both Harris (1986), −0.211%, and Abraham and Ikenberry (1994), −0.116%. Returns from our sample, the CRSP equally weighted index for 1989, Harris (1986), and Abraham and Ikenberry (1994) are presented in Panel A of Table 1.

*Table 1.*   **Mean Weekday Returns**

| Study | Return %<br>(t-statistic) | | | | |
|---|---|---|---|---|---|
| | **Mon** | **Tue** | **Wed** | **Thu** | **Fri** |
| **Panel A: Unconditional Mean Returns** | | | | | |
| 1989 Sample | −0.250 | −0.029 | 0.125 | 0.013 | 0.089 |
| | (−3.85) | (−0.79) | (4.23) | (0.46) | (4.38) |
| 1989 CRSP equally-weighted | −0.089 | 0.064 | 0.183 | 0.109 | 0.134 |
| | (−1.54) | (1.39) | (17.02) | (1.77) | (1.27) |
| Harris | −0.202 | 0.138 | 0.146 | 0.170 | 0.195 |
| | (−1.31) | (1.17) | (1.23) | (1.79) | (1.95) |
| Abraham & Ikenberry | −0.116 | 0.010 | 0.143 | 0.112 | 0.214 |
| | (−4.56) | (0.54) | (7.15) | (5.89) | (11.46) |
| **Panel B: Conditional Returns, Positive** | | | | | |
| 1989 Sample Firm's Prior | −0.275 | −0.081 | 0.119 | 0.072 | 0.128 |
| | (−2.69) | (−1.45) | (2.78) | (1.84) | (4.39) |
| 1989 Sample CRSP Prior | 0.427 | 0.383 | 0.608 | 0.577 | 0.162 |
| | (8.64) | (2.97) | (10.92) | (15.12) | (1.67) |
| Abraham & Ikenberry | 0.113 | 0.169 | 0.302 | 0.280 | 0.382 |
| | (4.81) | (7.53) | (13.91) | (12.86) | (18.74) |
| **Panel C: Conditional Returns, Negative** | | | | | |
| 1989 Sample Firm's Prior | −0.211 | 0.041 | 0.134 | −0.085 | 0.032 |
| | (−4.25) | (1.03) | (3.55) | (−2.26) | (1.23) |
| 1989 Sample CRSP Prior | −0.731 | −0.286 | −0.602 | −0.738 | −0.153 |
| | (−11.39) | (−6.15) | (−9.07) | (−12.89) | (−1.74) |
| Abraham & Ikenberry | 0.607 | (−0.137 | −0.040 | −0.156 | −0.061 |
| | (−11.02) | (−4.94) | (−1.19) | (−4.87) | (−1.85) |

*Notes:*   1989 Sample mean returns are for a sample of 276 NYSE firms during the year 1989. The reported mean
return is a simple average of the 276 average weekday return for each firm. 1989 CRSP equally-weighted is
the index for all NYSE and AMEX stocks. Harris mean returns are for an NYSE equally-weighted portfolio
for the period December 1981 to January 1983. Abraham and Ikenberry mean returns are for CRSP
equally-weighted index returns from 1963 to 1991. Returns are calculated from closing prices. t-statistics
are in parenthesis and are based on the null hypothesis that the mean daily return is equal to zero.
 For Panels B and C, conditional mean returns for 1989 Sample are partitioned based on the individual
firm's prior return and on the prior day's CRSP return. Abraham and Ikenberry conditional mean returns
are based on the prior day's CRSP return.

We also examine conditional returns in the spirit of Abraham and Ikenberry
(1994). When the prior day's return (CRSP index) is negative, Abraham and
Ikenberry find returns are negative, regardless of the day of the week. When the
prior day's return is positive the day's return is positive, including Monday's
return. This serial correlation of index returns suggests that general market con-
ditions spill over into the following day's trading. We partition our sample of
firm observations into two subsamples based on the individual firm's prior
return (negative or positive). Our sample does not have an individual firm spill-
over effect; individual firm returns are not serially correlated. We find negative
returns on Monday following both negative and positive firm returns on Friday.

However, when we partition returns based on the CRSP equally-weighted index our sample returns are very similar to Abraham and Ikenberry; negative returns follow negative index returns and positive returns follow positive index returns. Our sample average returns are serial correlated with a general market index. Panel B of Table 1 presents the conditional return when the prior day's return is positive, Panel C when negative.[6]

We do find a high frequency of negative returns on Monday for 1989. For our sample of 276 firms, 149 firms, on average, have negative Monday returns (marginally significant at 0.1191). In addition, of the 12,651 Monday returns calculated on closing prices, over 43% are negative (5,532), less than 40 percent are positive (5,059), and 16% have no price change (2,060). Negative returns are significant at 0.0001.

We examine intraday returns, using three different prices: transaction prices, bid quotes, and ask quotes. Table 2, Panel A, presents the intraday Monday returns and Panel B presents the average returns for the remaining four trading days of the week.

On Monday, on average, the opening hour of trading is significantly negative across all three prices. The bid price rebounds in the second hour of the day, while the transaction price and ask price remain down. From noon until 2:00 p.m., the returns are small and, in general, not significantly different from

*Table 2.*  **Intraday Mean Return For 276 NYSE and AMEX Firms During 1989**

| Trading Period | Trade to Trade | Bid to Bid | Ask to Ask | A and I |
|---|---|---|---|---|
| **Panel A: Intraday Mean Returns, Monday** | | | | |
| $Close_{FRI}$ to 10:00 a.m. | $-0.0942^{***}$ | $-0.0939^{***}$ | $-0.0371^{*}$ | |
| 10:00 a.m. to 11:00 a.m. | $-0.0195^{**}$ | $0.0287^{***}$ | $-0.0415^{***}$ | $-0.1561^{***}$ |
| 11:00 a.m. to 12 noon | $-0.0185^{**}$ | $-0.0011$ | $-0.0238^{***}$ | $-0.0231^{***}$ |
| 12 noon to 1:00 p.m. | $0.0052$ | $0.0151^{**}$ | $-0.0058$ | $0.0056$ |
| 1:00 p.m. to 2:00 p.m. | $-0.0004$ | $-0.0017$ | $0.0118$ | $0.0219^{***}$ |
| 2:00 p.m. to 3:00 p.m. | $-0.0222^{***}$ | $-0.0243^{***}$ | $-0.0336^{***}$ | $0.0135$ |
| 3:00 p.m. to $Close_{MON}$ | $0.0699^{***}$ | $0.0491$ | $0.0503^{***}$ | $0.0479^{***}$ |
| **Panel B: Intraday Mean Returns, Tuesday through Friday** | | | | |
| $Close_{t-1}$ to 10:00 a.m. | $0.3559^{***}$ | $0.3701^{***}$ | $0.4044^{***}$ | |
| 10:00 a.m. to 11:00 a.m. | $0.0033$ | $0.0383^{***}$ | $-0.0140^{**}$ | $0.0397^{***}$ |
| 11:00 a.m. to 12 noon | $0.0055$ | $0.0141^{**}$ | $0.0029$ | $-0.0084$ |
| 12 noon to 1:00 p.m. | $0.0162$ | $0.0322^{**}$ | $0.0257^{***}$ | $0.0145^{***}$ |
| 1:00 p.m. to 2:00 p.m. | $-0.0087^{**}$ | $-0.0052$ | $0.0175^{***}$ | $0.0165^{***}$ |
| 2:00 p.m. to 3:00 p.m. | $0.0039$ | $0.0048$ | $0.0065^{*}$ | $-0.0195^{***}$ |
| 3:00 p.m. to 4:00 p.m. | $0.0280^{***}$ | $-0.0048$ | $0.0172^{***}$ | $0.0196^{***}$ |

*Notes:* Mean returns significantly different from zero at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively. Reported returns are the simple average of the 276 firms. Trade to trade returns are based on the last transaction for each period. Bid to bid and ask to ask returns are based on the standing quote at the end of each period. A and I are the unconditional returns reported by Abraham and Ikenberry (1994) using the S&P 500 index return for the period May 1970 to December 1991. Abraham and Ikenberry report only one return for the period close to 11:00 a.m. This return is displayed in the 10:00 a.m. to 11:00 a.m. row.

*Table 3.*   **Intraday Trading Volume, Monday vs. Tuesday through Friday (Thousands of Dollars)**

| Time of Day | Average Dollar Trading Volume, Monday / Average Dollar Trading Volume, Tuesday–Friday / [t-statistic] Size of Transaction | | | | | |
|---|---|---|---|---|---|---|
| | 1 to 5 | 6 to 10 | 11 to 50 | 51 to 99 | 100+ | Total |
| 9:30 to 10:00 | 90.97 | 88.73 | 326.37 | 115.41 | 601.54 | 1223.02 |
| | 86.88 | 89.80 | 355.86 | 125.14 | 845.69 | 1503.37 |
| | [2.20] | [−0.44] | [−3.26] | [−3.35] | [−10.66] | [−8.43] |
| 10:00 to | 133.37 | 134.40 | 499.71 | 157.20 | 651.08 | 1576.48 |
| 11:00 | 135.00 | 141.13 | 543.36 | 167.20 | 808.86 | 1795.55 |
| | [−0.62] | [−1.84] | [−3.01] | [−2.07] | [−6.27] | [−5.04] |
| 11:00 to | 117.45 | 105.92 | 360.04 | 116.25 | 529.43 | 1229.10 |
| Noon | 121.25 | 114.52 | 412.48 | 134.78 | 628.87 | 1411.90 |
| | [−1.73] | [−3.14] | [−4.94] | [−5.24] | [−4.35] | [−5.29] |
| Noon to 1:00 | 98.07 | 86.37 | 286.09 | 92.76 | 411.67 | 974.97 |
| | 101.07 | 94.93 | 326.45 | 106.36 | 507.02 | 1135.83 |
| | [−1.64] | [−3.85] | [−4.57] | [−4.62] | [−5.38] | [−6.02] |
| 1:00 to 2:00 | 88.81 | 78.47 | 259.40 | 84.87 | 357.00 | 868.56 |
| | 92.30 | 85.61 | 289.07 | 93.59 | 432.77 | 993.34 |
| | [−2.12] | [−3.39] | [−3.83] | [−3.02] | [−5.30] | [−5.48] |
| 2:00 to 3:00 | 106.66 | 97.17 | 320.01 | 101.40 | 386.40 | 1011.63 |
| | 106.94 | 97.84 | 328.10 | 105.33 | 455.25 | 1093.46 |
| | [−0.15] | [−0.26] | [−0.77] | [−1.24] | [−3.18] | [−2.59] |
| 3:00 to 4:00 | 128.82 | 123.81 | 416.53 | 132.69 | 544.17 | 1346.03 |
| | 131.16 | 130.23 | 438.42 | 137.74 | 570.66 | 1408.22 |
| | [−1.02] | [−1.89] | [−1.67]. | [−1.21] | [−0.75] | [−1.34] |
| Hourly | 109.38 | 102.37 | 353.52 | 114.65 | 498.54 | 1178.46 |
| Average (all | 110.87 | 107.96 | 385.67 | 124.55 | 607.71 | 1336.76 |
| day) | [−1.89] | [−5.27] | [−7.77] | [−7.31] | [−12.14] | [−11.88] |

*Notes:*   Volume is stated in thousands of dollars. Transaction size is the round lot size of a trade, for example, 1 to 5 is 100 to 500 shares and 100+ is 10,000 or more shares for the transaction. t-statistics are based on the null hypothesis that the average dollar volume on Monday is the same as the average dollar volume for the rest of the week (Tuesday through Friday). Time of day is the intraday trading time of a transaction. Hourly average is the average volume per hour for the entire day. All trading periods are one hour except the first period of trading which represents one half hour of trading.

zero. The returns are all significantly negative from 2:00 p.m. until 3:00 p.m., before a large positive return during the last hour of trading. These results are consistent with the intraday returns of Harris (1986) and Abraham and Ikenberry (1994). For the remaining four days of the week, the opening half hour of trading is positive, with all three measured returns significantly different from zero. The returns, in general, are positive during all intraday trading periods.

The overall implication of these return patterns is that the first hour or two of trading is the critical period with respect to price changes. Therefore, we focus part of our examination on the early Monday morning trading volume and selling percentage.

## III. RESULTS

### A. Trading Volume and Selling Percent

The average daily dollar volume per firm is presented in Table 3. Total dollar volume on Monday is significantly lower than the average of all other days of the week. On Monday, the average dollar volume is $8,250,000 per firm while the average daily volume is over $9,350,000 for the remaining days of the week.[7] However, Monday morning dollar volume is higher for the smallest-volume trades ($90,973 vs. $86,879) while significantly lower for the largest-volume

*Table 4.* **Intraday Selling Volume, Monday vs. Tuesday through Friday** (Thousands of Dollars)

| | Average Dollar Selling Volume, Monday<br>Average Dollar Selling Volume, Tuesday–Friday<br>[t-statistic] | | | | | |
|---|---|---|---|---|---|---|
| | **Size of Transaction** | | | | | |
| **Time of Day** | **1 to 5** | **6 to 10** | **11 to 50** | **51 to 99** | **100+** | **total** |
| 9:30 to 10:00 | 30.29 | 28.82 | 101.11 | 31.18 | 127.40 | 318.72 |
| | 28.18 | 28.10 | 106.39 | 34.45 | 168.29 | 365.40 |
| | [2.83] | [0.73] | [−1.49] | [−2.45] | [−5.12] | [−4.15] |
| 10:00 to | 51.34 | 46.98 | 161.45 | 49.38 | 210.45 | 519.61 |
| 11:00 | 49.88 | 49.40 | 177.51 | 54.20 | 259.56 | 590.55 |
| | [1.33] | [−1.70] | [−2.87] | [−2.35] | [−4.59] | [−4.28] |
| 11:00 to | 46.38 | 39.30 | 126.21 | 39.87 | 186.50 | 438.26 |
| Noon | 45.66 | 40.47 | 136.08 | 44.48 | 209.19 | 475.88 |
| | [0.76] | [−0.96] | [−1.97] | [−2.67] | [−1.61] | [−2.10] |
| Noon to 1:00 | 38.01 | 30.20 | 93.17 | 28.83 | 133.74 | 323.95 |
| | 37.55 | 33.06 | 104.77 | 32.89 | 162.31 | 370.57 |
| | [0.59] | [−3.37] | [−3.57] | [−3.06] | [−2.94] | [−3.82] |
| 1:00 to 2:00 | 34.71 | 28.69 | 84.39 | 26.67 | 114.88 | 289.34 |
| | 35.25 | 30.99 | 97.17 | 30.79 | 141.21 | 335.34 |
| | [−0.77] | [−2.56] | [−4.34] | [−2.90] | [−3.79] | [−4.79] |
| 2:00 to 3:00 | 41.64 | 35.73 | 109.62 | 33.33 | 125.61 | 345.94 |
| | 40.89 | 34.92 | 108.39 | 33.81 | 147.96 | 365.97 |
| | [0.93] | [0.74] | [0.27] | [−0.31] | [−2.56] | [−1.55] |
| 3:00 to 4:00 | 48.27 | 43.50 | 137.66 | 43.23 | 192.62 | 465.29 |
| | 48.83 | 46.22 | 146.17 | 45.12 | 186.64 | 472.98 |
| | [−0.58] | [−1.98] | [−1.61] | [−0.85] | [0.41] | [−0.39] |
| Hourly | 41.59 | 36.26 | 116.55 | 36.17 | 156.34 | 386.91 |
| Average | 40.97 | 37.68 | 125.50 | 39.48 | 182.49 | 426.13 |
| (all day) | [1.86] | [−3.27] | [−5.34] | [−5.14] | [−6.37] | [−7.00] |

*Notes:* Volume is stated in thousands of dollars. Transaction size is the round lot size of a trade, for example, 1 to 5 is 100 to 500 shares and 100+ is 10,000 or more shares for the transaction. t-statistics are based on the null hypothesis that the average dollar selling volume on Monday is the same as the average dollar selling volume for the rest of the week (Tuesday through Friday). Time of day is the intraday trading time of a transaction. Hourly average is the average volume per hour for the entire day. All trading periods are one hour except the first period of trading which represents one half hour of trading.

trades ($601,539 vs. $845,687). For the entire trading day, Monday volume for the smallest-volume trades is nearly identical to the average for the remainder of the week ($765,663 vs. $776,083). The largest-volume trades are significantly lower on Monday for the entire day ($3,489,787 vs. $4,253,977). Therefore, small-size trades reflect a higher percentage of trading activity on Monday, especially Monday morning.

The interday and intraday trading activity for selling volume are presented in Table 4. Monday morning has a significantly higher average selling volume for the smallest-volume trades compared to the average of Tuesday through Friday ($30,293 vs. $28,820). For the full day, the smallest-size trades' selling volume is marginally higher ($290,643 vs $286,248). However, for all other trade sizes for all periods during Monday, selling volume is either the same or significantly lower than the average of the other days of the week. The largest-volume trades have the most significant reduction in selling volume both in the morning ($127,401 vs. $168,286) and for the entire day ($1,091,204 vs. $1,275,164).]

One measure of price pressure is the difference between buying and selling volume. An increase in selling pressure (selling volume greater than buying volume) should be correlated with price decreases and negative returns. An increase in buying pressure (buying volume greater than selling volume) should be correlated with price increases and positive returns. We measure the selling percent across the trade sizes and times of the day.[8] Table 5 presents the selling percentage for Monday versus the average for the remaining days of the week.

Selling is more prominent for the small-size trades on Monday. For the whole day, selling represents 49.9% of the trading, up from the average of 48.9% for the remaining days of the week. Although the first half hour of trading is not significantly different for the smallest-size trades compared to the remainder of the week, from 10:00 a.m. to 3:00 p.m. selling is more prominent than buying (selling percentage is greater than 50%). For the largest-size trades, selling percent on Monday is higher (44.4% versus 43.4%) but on average remains below 50% for all trading periods.

We repeat the selling percent measure but substitute the number of transactions for dollar volume. The results are nearly identical. The smallest-size trades have a daily selling percent of 50.3% versus an average of 49.3% for the remainder of the week. This difference is significant at 0.0001 (t-statistic of 7.71). For the largest-size trades, the Monday selling percent is 44.4% and compares to 43.5% average for the remainder of the week (t-statistic of 2.58). In addition, from 10:00 a.m. to 3:00 p.m. the smallest-size trades have a selling percent in excess of 50% for each trading hour. For the largest-size trades, the selling percent ranges from only 33.2% (first half hour) to a high of 48.2% (11:00 a.m. to noon).

*Table 5.*   **Intraday Selling Percent, Monday vs. Tuesday through Friday**

| | **Percentage of Selling by Volume, Monday** **Percentage of Selling by Volume, Tuesday–Friday** **[t-statistic]** | | | | | |
|---|---|---|---|---|---|---|
| | **Size of Transaction** | | | | | |
| **Time of Day** | **1 to 5** | **6 to 10** | **11 to 50** | **51 to 99** | **100+** | **total** |
| 9:30 to 10:00 | 45.76 | 43.78 | 42.71 | 37.19 | 32.16 | 43.07 |
| | 45.41 | 43.41 | 42.41 | 37.47 | 30.96 | 42.24 |
| | [0.92] | [0.68] | [0.57] | [−0.28] | [1.38] | [2.16] |
| 10:00 to | 50.22 | 48.80 | 47.77 | 47.31 | 47.36 | 49.66 |
| 11:00 | 49.09 | 48.03 | 46.93 | 47.29 | 45.92 | 48.53 |
| | [3.28] | [1.60] | [1.70] | [0.23] | [1.63] | [3.21] |
| 11:00 to | 51.07 | 50.55 | 50.32 | 48.68 | 48.28 | 50.92 |
| Noon | 49.41 | 48.35 | 47.97 | 47.73 | 47.14 | 49.20 |
| | [4.62] | [4.32] | [4.49] | [0.85] | [1.16] | [4.73] |
| Noon to 1:00 | 51.09 | 49.29 | 48.31 | 45.62 | 46.17 | 50.21 |
| | 49.47 | 47.98 | 47.06 | 45.52 | 45.56 | 48.83 |
| | [4.30] | [2.42] | [2.22] | [0.83] | [0.56] | [3.60] |
| 1:00 to 2:00 | 51.17 | 49.21 | 47.64 | 45.34 | 45.53 | 49.62 |
| | 50.03 | 49.22 | 48.51 | 47.46 | 45.87 | 49.44 |
| | [2.97] | [−0.02] | [−1.49] | [−1.64] | [−0.30] | [0.45] |
| 2:00 to 3:00 | 51.38 | 50.32 | 49.09 | 45.75 | 46.01 | 50.00 |
| | 49.80 | 48.84 | 47.99 | 46.60 | 45.25 | 49.20 |
| | [4.30] | [2.83] | [2.02] | [−0.72] | [0.72] | [2.15] |
| 3:00 to 4:00 | 48.58 | 47.48 | 47.05 | 44.81 | 46.86 | 47.98 |
| | 49.08 | 48.24 | 47.65 | 47.05 | 45.38 | 48.58 |
| | [−1.44] | [−1.60] | [−1.21] | [−2.16] | [1.54] | [−1.72] |
| Hourly | 49.90 | 48.52 | 47.51 | 44.80 | 44.43 | 48.78 |
| Average | 48.91 | 47.76 | 46.89 | 45.42 | 43.39 | 48.02 |
| (all day) | [7.12] | [3.81] | [3.07] | [−1.50] | [2.77] | [5.47] |

*Notes:*   Selling percentage is dollar volume of selling divided by total dollar volume. Trades at the bid-ask spread midpoint are not included in trading volume. Trades below the bid-ask spread midpoint are classified as sales; trades above the midpoint are classified as buys. Transaction size is the round lot size of a trade, for example, 1 to 5 is 100 to 500 shares and 100+ is 10,000 or more shares for the transaction. t-statistics are based on the null hypothesis that the average selling percent on Monday is the same as selling percent for that size transaction for the same time period the rest of the week (Tuesday through Friday). Hourly average is the average selling volume per hour for the entire day. Time is clock time.

## B. Conditional Results

Abraham and Ikenberry (1994) note that returns are serially correlated using a market index. We explore the impact of the prior day's return on the trading activity by trade size. We condition the returns on both the prior return of the individual firm as well as the general market using the CRSP equally-weighted return.

On Monday, following a Friday price decline for a firm, dollar volume is higher for all trade sizes and selling percent is significantly higher (48.7% versus 42.6%) when compared to a Monday following Friday positive returns. This

same pattern persists for the other days of the week. For Tuesday through Friday, when a firm's prior return is negative, volume is higher and the percentage of seller-initiated trades is up (47.6% versus 43.1%).

Next, we use the CRSP equally-weighted return to partition trading days. Again, the same pattern is observed. Monday trading following a negative return index return on Friday is higher and the selling percent is up, 48.0% versus 41.51%, compared to a Monday following positive Friday index returns. Tuesday through Friday trading days are very similar with volume up following negative index returns and selling up (48.7% versus 42.6%).

The conditional selling percent, 48.8% on Monday and 48.0% on Tuesday through Friday, is higher than the unconditional average selling percent of 44.1% for all trading days. Therefore, selling activity tends to increase following negative daily returns and buying activity tends to increase following positive returns. As pointed out by Abraham and Ikenberry and consistent with our results, selling pressure is higher on Mondays following a decline in the market the previous Friday.

## C. Portfolio Results

Next we partition the firms by equity size into portfolios, in the spirit of Sias and Starks (1995). We examine trading volume, selling volume, and selling pressure across ten portfolios. The most consistent result across all portfolios is the reduction in large-size trades on Monday. Every portfolio has a significant reduction in block trading on Monday. Selling volume varies across transaction size and portfolios, with no distinct pattern. However, selling percent is higher for all portfolios in the small-size trades on Monday, with five of the ten portfolios significantly higher compared to the remaining days of the week. The pattern is the same across all portfolios; total dollar volume is significantly lower on Monday and there is a higher percent of selling for small-size trades.

## III.  SUMMARY AND CONCLUSIONS

We examine the well-known weekend effect (negative Monday returns) using intraday data for 276 firms during 1989. We find two significant changes to trading patterns on Monday. First, small-size transactions are more prominent with increased selling and second, there are fewer large-size transactions. If small-size transactions are correlated with individual investors and large-size transactions are correlated with institutional traders, then the weekend effect is a result of both individual and institutional investors. Individual investors directly contribute to the negative returns on Monday by their trading and institutional investors indirectly contribute by their absence, which reduces liquidity.

## NOTES

*Direct all correspondence to:  Raymond M. Brooks, Oregon State University, 200 Bexell Hall, Corvallis, OR 97331.

1.  Maberly (1995) credits Fred C. Kelly with the first documentation of the Monday effect in Kelly's book *Why You Win or Lose*, published in 1930. A study by M.J. Fields related to the Monday effect appears in *The Journal of Business, 4,* 1931.

2.  We start with 300 random ticker symbols from the ISSM tape listing and then screen the ticker symbols for "unusual stocks" such as the when-issued shares (AAA.WI), class stocks (BBB.C), or preferred stocks (CCC.PR).

3.  A second classification system proposed by Lee and Ready (1991), based on classifying trades at an up-tick as a market purchase and at a down-tick as a market sale, partitions the transactions essentially into the same buy and sell groups as a classification based on the quote midpoint. We use both methods but only report the findings using the bid-ask spread midpoint as the classification tool for buys and sells. Results are quantitatively the same under either method.

4.  For example, two market orders crossed at the bid-ask spread midpoint could be a buy market order and sell market order that arrived simultaneously. Therefore, the trade should not be classified as buyer initiated or seller initiated.

5.  See Lease, Masulis, and Page (1991) and Brooks and Chiou (1995) for examples of clustering at a quote price and the potential impact on event study results.

6.  The difference in conditional mean returns may be a function of the measuring process. Abraham and Ikenberry use an index return and capture general market conditions. We use both the individual firm's return and a general market index and capture firm-specific information and general market conditions. While general market conditions can and apparently do carry over into subsequent trading periods, firm-specific information is short-lived and prices quickly reflect this information, consistent with the generally accepted efficient market hypothesis. This finding is consistent with Lo and MacKinlay (1990) in that there appears to be a lead-lag relationship between large capital stocks which comprise common indices and small capital stocks which tend to trade later. Therefore, there may be a serial correlation between indices that is not evident in individual firm returns.

7.  The average daily dollar volume for a firm listed on the NYSE is 1989 was $3,890,000.

8.  See Equation 1. Selling percentage is greater than 0.5 when more selling is present than buying. Selling percentage is less than 0.5 when more buying is present than selling. Again, trades at the bid-ask spread midpoint are not included in total volume.

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