Day-of-the-Week Trading Patterns of Individual and Institutional Investors

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(Preliminary, comments welcome. Please do not quote)

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Abstract:

This study examines the day-of-the-week trading patterns of individual and institutional investors. Consistent with previous evidence, we find an increase in the proportion of trading volume accounted for by individual investors on Monday. However, we document that this increase in the fraction of trading by individual investors on Monday is a result of a reduction in trading by institutional investors, and not because of an increase in trading by individual investors. In fact, the trading by individual investors is significantly lower on Monday than on any other weekday. We also document that the degree of day-of-the-week variation in trading volume by individual and institutional investors is positively associated with the quality and dissemination of public information proxied by the market capitalization of each company.

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1. Introduction:

The interactions among different types of investors determine the trading volume, return volatility, transaction costs and the price of a stock. The trading behavior of investors might not the same, due to differences in their wealth, information and liquidity. Among various types of investors, the two groups that attract the most interest by researchers and practitioners are individual investors and institutional investors. Given the increasing importance of institutions in the U.S. equity markets, understanding the different trading patterns of the two groups can improve our knowledge of the stock price behavior.

Empirical evidence on stock returns, trading volume, return volatility and transaction costs for different days of the week is extensive. Return on Monday is documented to be generally negative [French (1980), Gibbons and Hess (1981), Keim and Stambaugh (1984), Lakonishok and Levi (1982), Rogalski (1984)] and Monday trading volume is found to be significantly lower than other days of the week [Jain and Joh (1988), Lakonishok and Maberly (1990)]. In addition, the adverse selection cost of trading appears to be highest on Monday [Foster and Viswanathan (1993)]. Return volatility over the weekend is significantly lower than the volatility over other days of the week [French and Roll (1986)].

One potential explanation for the above day-of-week anomaly could be the differential behavior of individual and institutional investors. Lakonishok and Maberly

(1990) as well as Abraham and Ikenberry (1994) propose that individual traders are the cause of the day-of-the-week regularity, while Sias and Starks (1995) maintain that institutional investors are the driving force. Even though these three studies examined different hypothesis, they appear to agree that the existence of differential trading patterns of institutional and individual investors could be the reason behind the day-of-the-week effect.

A number of empirical studies have examined trading by either institutional investors or individual investors over the week. Lakonishok and Maberly (1990), and Abraham and Ikenberry (1994) use odd-lot sales and purchases on the New York Stock Exchange (NYSE) as a percentage of the NYSE volume to proxy for the individual investors activities, and document an increase in the proportion of odd-lot trades on Monday. Foster and Viswanathan (1993) examine the interday variations in trading volume and find evidence of lower Monday volume for most actively traded stocks. Jain and Joh (1988) examine the variation in the aggregate NYSE volume. Sias and Starks (1995) use the institutional ownership data to proxy for the presence of institutional investors. However, these studies focus on the variation in trading within only one group of investors at a time when examining the day-of-the-week phenomenon. In this study, we attempt to fill the gap in the literature by simultaneously examining the trading behavior of both institutional and individual investors. Analyzing both groups of investors at the same time will allow us to have a better understanding about their relative trading activities and roles in the day-of-the-week anomaly.

Using methodologies developed by Lee (1992), we examine the trading activity on a sample of 300 NYSE stocks during the year 2000. We classify each trade as either large or small based on its dollar trading volume. All the transactions with dollar volume of less than $10,000 are classified as small trades, and those of more than or equal to $10,000 are classified as large trades. The small trades and large trades are used to proxy for the trading activity by individual investors and by institutional investors, respectively. This approach yields new insights into the variation in trading volumes throughout the week.

Specifically, we find that the fraction of trades made by individual investors is higher on Monday than on any other day of the week. Moreover, we document that individual investors trade less frequently on Monday than on other days of the week. Further analysis shows that the greater fraction of trades by individual investors on Monday is a result of a significant reduction in trades by institutional investors on that day. The evidence is consistent with the hypothesis suggested by Sias and Starks (1995) that the variation in trading activity by the institutional investors is likely to be the cause for the observed day-of-the-week effect.

The results of this study are related to the theoretical work by Foster and Viswanathan (1990). In their model, informed traders accumulate private information through the weekend, when public information is not produced at the normal rate. As a result, uninformed traders are at a larger disadvantage at the beginning of the week. Therefore, uninformed traders who have the discretion over the time to trade will delay their transactions until later in the week. The results from this study indicate that a

proportion of both individual investors and institutional investors try to avoid costly Monday trading and that the discretionary delay in trading is greater for institutional investors than for individual investors.

2. Data and Methodology

2.1. Data

We examine trading activity for a random sample of 300 common stocks (those with a CRSP code of either 10 or 11) listed on the NYSE. We use two databases in our analysis. The first one is TAQ database, from which we extract trading information. The second one is Center for Research in Security Prices (CRSP) from which we gather general information about the sample of securities. After matching stocks from the two databases, we keep only those equity securities that have a beginning-of-year price and an end-of-year price between $5 and $100 per share. The exclusion of stocks with a price less than five dollars ensures that liquidity is not affected by the relatively high bid-ask spread caused by low price, while stocks with price greater than $100 are excluded because they are less likely to have small trades. Finally, we require that stocks have at least an average of 12 trades per day to ensure enough observations for analysis. From the final sample, we randomly choose 300 stocks to use in our analysis. The descriptive statistics in Table 1 show that: the mean (median) market capitalization of the 300 sample firms is 8,422 (1,950) million dollars and the average (median) number of trades for the 300 stocks is 69,326 (24,131).

2.2. Methodology

This study uses a method developed by Lee (1992) to classify each trade as large or small based on its dollar volume. All the transactions of $10,000 or less are classified as small trades, and the others are classified as large trades[1]. Although individual investors may place orders valued greater than $10,000, it is unlikely that any institutional investors will trade at dollar volume less than $10,000. Lee (1992) justifies the use of the $10,000 threshold for small trades since "*it ensures small trades will have little institutional activity yet still contain enough observations*". Using this criterion, about 48% of all the trades are classified as small trades. The small trades are used to proxy for the trading activity by individual investors, while the large trades are used to proxy for the trading activity by institutional investors.

Each day, the numbers (volume and dollar volume) of small and large trades are obtained for each stock. To make them comparable across stocks, these numbers are further deflated by the total aggregated numbers (volumes dollar volume) of small and large trades of the stock during the year. The deflated measure on each day represents the small (large) trades on that day as a proportion of annual small (large) trades in year 2000. Mathematically, let

$$y_{it}^{z} = \frac{T_{it}^{z}}{Year_{i}^{z}}$$

where y_{it}^{z} is the scaled measure of number of trades (volume, dollar volume) of size z (small or large) of stock i during period t, T_{it}^{z} is the total number of trades (volume,

dollar volume) of size z (small or large) of stock i on day t. $Year_i^z$ is the total number of trades (volume, dollar volume) of size z of stock i during the year 2000.

For each stock, the following statistical model is estimated for both individual and institutional trades.

$$y_{it} = \mu_i + \sum_{j=2}^{5} D_j \cdot \mu_{i,j} + \varepsilon_{it} \qquad (1)$$

Where y_{it} is the measure of trading activity for stock i on day t, D_j (j = 2, 3, 4, 5) is the day of the week, from Tuesday through Friday. Therefore, μ_i will capture the average trading activity for stock i on Monday while $\mu_{i,j}$ will capture the difference in trading between other weekday and Monday. To reduce the impact of heteroscedesticity and serial-correlation in residuals, we employ generalized methods of moments (GMM) and Newey-West (1987) correction for residual serial correlation in our regression model. We use an asymptotic normal distribution to test the significance of coefficient on each day-of-the-week dummy variable.

Based on estimation on individual stock, we report the average of coefficients for each day-of-the-week dummy variable, the number of positive coefficients. These results are reported for the entire sample of 300 stocks and each capitalization-subsample of 100 stocks.

[1] To check the sensitivity of the results to the threshold of small trades, a threshold of $20,000 for small trades is also used. The results from the two different thresholds are qualitatively similar.

3. Empirical Evidence

3.1. Variation in the Proportion of Trades by Individuals

Table 2 provides evidence on day-of-the-week variation in the proportion of trades by individual investors. Panel A of Table 2 reports results based on the proportion of volume ordered by individual traders. For the entire sample, compare to Monday the proportion of individual trades 0.823%, 0.785%, 0.692%, and 0.581% higher for Tuesday, Wednesday, Thursday, and Friday, respectively; and all coefficient are significant at 0.001 level. This suggests that there is significant variation in day-of-the-week trading activity by individual investors.

A similar conclusion can be drawn from other panels. Panel B of Table 2 shows that the day-of-the-week variation in dollar trading volume is significant. For the entire sample, the dollar volume made by individual investors on Monday is 0.731% higher than that on Tuesday, 0.613% more than that on Wednesday, 0.583% more than that on Thursday and 0.461% more than that on Friday. Similarly, Panel C indicates that the proportion of number of trades by individuals on Monday higher than other trading day by 1.268%, 0.924%, 1.151% and 0804%, respectively. These results are consistent with the results of Lakonishok and Maberly (1990), which document a relative increase in trading activities by individual investors.

Another interesting finding on Table 2 is that the reduction in trading on Monday by individual is largest for the subsample of lowest capitalization. This result related to the work by Foster and Viswanathan (1990) that informed traders accumulate information during weekend when public information is not produced at normal rate. Therefore,

uninformed/individual traders are at large disadvantage on Monday and as a result, they should reduce their trading activities on Monday. Compare to large and medium stocks, small stocks should suffer more severe information asymmetry and hence Foster and Viswanathan (1990) model should predict that individual should limit their trading on those small size stocks even more on Monday; it is consistent with the finding on Table 2. In terms of trading volume, for small capitalization, Monday trading volume by individual about more than 1% lower than other trading day while for medium and large sample, the Monday trading is in all case less than 0.8%. Similar tendency can be observed for dollar volume and number of trade by institutions in Panel B and C.

While Table 2 documents a significant drop in trading by individuals on other week days compare to Monday, there can be two explanations for that phenomenon. It could result from greater participation by individual investors in the equity market on Monday, or from a reduction in trading activities by other traders, namely institutions, on Monday.

To clarify the above issue, in the following sections, we examine the absolute participation of individual investors and by institutions independently across days of the week. For brevity, from now on only the results based on trading volume are reported.[1]

3.2. Variation in Individual Trades

Table 3 provides details on the day-of-the-week variation in the individual trading volume. For the whole sample, the proportion on trading by individual on Monday is lower Tuesday by 1.652%. Also, the proportion on Monday is 1.381% and 1.293% lower when comparing with Wednesday and Thursday; the numbers are statistically significant

at 1% level. The difference between Friday and Monday is 0.730% and marginally significant at 10% level. Out of 300 stocks, there are about 200 positive coefficients for each day.

When we look at the 3 capitalization subsamples we see similar tendency. For example, on Tuesday, proportion of trading volume by individual is 1.235%, 1.965%, 1.862% higher than that on Monday for the 3 market capitalization groups, respectively. Also, the number of positive coefficients for the 3 size samples is74, 68, 85, respectively. On Wednesday and Thursday, the coefficients are all positive and significant at 1% level.

For the subsample of the highest market capitalization stocks, the average of the Tuesday coefficient is 0.01862%, which indicates that individual trading volume is higher on Tuesday than on Monday, by 0.01862% of the annual individual trading volume. The number of positive coefficients for this group of stocks is 85. The trading volume by individual traders is also significantly higher on Wednesday and Thursday than on Monday. Similar variation is observed in the subsample with medium market capitalization stocks.

The results on this section suggest that individual traders are less active on Monday in absolute terms. This finding indicates that the greater proportion of trading accounted for by individual traders on Monday (documented in Table 2) is not caused by an increases in trading by individual in other weekdays but by a greater reduction in institutional trading on Monday. The next section examines the day-of-the-week variation in institutional trading volume.

[1] The results based on dollar volume and number of trades are quantitatively and qualitatively similar to those based on trading volume, and are available upon request.

3.3. Variation in Institutional Trades

Table 4 reports the day-of-the-week variation in trading volume by institutions. It is evident that all coefficient show positive and significant and this implies that institutions also trade more on other days than on Monday. For the whole 300 stocks, Monday trading volume by institutions is lower than Tuesday, Wednesday, Thursday and Friday by 0.03742%, 0.03387%, 0.04680%, and 0.01491%, respectively. The number of positive coefficient for those 4 days is above 200. When we examine the 3 size subsamples, we see the similar picture; all coefficients are positive and statistically significant. This suggests that the variation in trading by institutions prevail for all market capitalization segments.

Another important finding is that, the coefficients viewed in Table 4 are significantly larger than corresponding number in Table 3. It means that on Monday, institutions reduce their trading more, in percentage terms, than do individual investors. For example, for the whole sample Monday trading by individual investors is 0.01687% lower than their activities on Tuesday while the difference for institutions is 0.03742%. Similarly, the difference number between Wednesday and Monday is 0.01404% and 0.03387% for individuals and institutions, respectively.

4. Conclusions

The literature has documented the day-of-the-week phenomenon in which trading activity on Monday is significantly lower than on other business days. A number of studies have investigated the day-of-the-week variation by examining the trading behavior of either institutions or individuals in isolation. In this study, we fill the gap in

the literature by simultaneously examining the trading behavior of both institutional and individual investors. Our results shed light on the role each type of investor plays in this anomaly.

Consistent with the literature, we find that the proportion of trading volume by individual investors increases on Monday. However, we also document that this does not occur because individual investors increase their trading on Monday compared to other days. Instead, this occurs because institutional investors decrease their activity level. The results are robust when studied with different metrics of trading activity including volume, dollar volume and number of trades.

From the two findings, we suspect that the proportional increase in trading by individual investors documented herein may be caused by a significant drop in trading by institutions. Consistent with our thesis, we document that trading by institutions on Monday is significantly less than their trading on other week days. Our findings support the hypothesis that uneven patterns of trading by institutions is the main factor behind the day-of-the-week agent variation phenomenon.

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Table 1. Descriptive Statistics

Our sample includes 300 random common stocks (those with a CRSP code of either 10 or 11) listed on the NYSE on the year 2000. We requires that stocks has an end-of- year price between $5 and $100 and has at least 12 trades per days to ensure that the sample has sufficient liquidity. This table reports descriptive statistics for our sample in terms of number of trades, market capitalization and average stock prices.

Characteristics	Mean (Median)	First Quartile (Third Quartile)	Minimum (Maximum)
Number of Trades	69,326 (24,131)	15,585 (65,838)	4,256 (2,969,473)
Market Capitalization at Beginning (In Millions of Dollars)	8,422 (1,950)	457.5 (7,595)	102.7 (45,532)
Average Price at the Beginning	30.8 (24.47)	18.35 (34.71)	5.21 (99.51)

Table 2. Day-of-the-Week Variation in the Proportion of Trades by Individuals

The proportion of individual trades on a given day is calculated by adding all the individual trades (volume, dollar volume) together across all the stocks, then divided by all the trades (volume, dollar volume) of all the stocks on that day. This proportion is then analyzed for the day-of-the-week variation.

$$y_t = \mu + \sum_{i=2}^{5} D_i \cdot \mu_i + \varepsilon_t$$

where ε_t is the error term, y_t is the dependent variable calculated as defined above, and the D_i is the day of the week dummy. ***,**,* are the significant level of 1%, 5% and 10%, respectively.

Panel A. Variation in Proportion of Volume by Individual Traders

Day-of-the-Week Tests	Lowest Market Capitalization	Medium Market Capitalization	Highest Market Capitalization	All 300 stocks
Tuesday	-1.723***	-0.633**	-0.795***	-0.823***
Wednesday	-1.435***	-0.662**	-0.634	-0.785***
Thursday	-1.480***	-0.432**	-0.537**	-0.692***
Friday	-0.634*	-0.351	-0.620*	-0.581***

Panel B. Variation in Proportion of Dollar Volume by Individual Traders

Day-of-the-Week Tests	Lowest Market Capitalization	Medium Market Capitalization	Highest Market Capitalization	All 300 stocks
Tuesday	-2.451***	-0.568***	-0.682***	-0.731***
Wednesday	-1.8652***	-0.452**	-0.235***	-0.613***
Thursday	-1.536***	-0.520***	-0.591***	-0.583***
Friday	-0.385	-0.153	-0.437***	-0.461***

Panel C. Variation in Proportion of Number of Trades by Individual Traders

Day-of-the-Week Tests	Lowest Market Capitalization	Medium Market Capitalization	Highest Market Capitalization	All 300 stocks
Tuesday	-2.102***	-0.721***	-1.289***	-1.268***
Wednesday	-1.587***	-0.652**	-0.952***	-0.924***
Thursday	-1.052***	-0.829**	-1.537***	-1.151***
Friday	-0.551*	-0.231	-1.025***	-0.804***

Table 3. Day-of-the-Week Variation in Trading Volume by Individual

For each trading day, the volume of individual trades on each stock is scaled by the 1992 total volume of individual trades on that stock. The following regression equation is estimated for each stock using GMM.

$$y_{it} = \mu_i + \sum_{j=2}^{5} D_j \cdot \mu_{i,j} + \varepsilon_{it}$$

where ε_{it} is the error term for stock i, y_{it} is the scaled individual trading volume on each day t, and the D_j is the day of the week dummy. ***,**,* are the significant level of 1%, 5% and 10%, respectively.

Day-of-the-Week Tests		Lowest Market Capitalization	Medium Market Capitalization	Highest Market Capitalization	All 300 stocks
Tuesday Coefficient	Average (*10^4)	1.235***	1.965***	1.862***	1.687***
	Positive Number	74	68	85	227
Wednesday Coefficient	Average (*10^4)	1.258***	1.102***	1.852***	1.404***
	Positive Number	51	78	95	224
Thursday Coefficient	Average (*10^4)	0.689**	1.981***	0.957***	1.209***
	Positive Number	62	59	74	195
Friday Coefficient	Average (*10^4)	0.892*	1.287**	0.012	0.730*
	Positive Number	51	40	38	129

Table 4. Day-of-the-Week Variations in Trading Volume by Institutions

For each trading day, the volume of institutional trades on each stock is scaled by the 1992 total volume of trades by institutions on that stock. The following regression equation is estimated for each stock using GMM.

$$y_{it} = \mu_i + \sum_{j=2}^{5} D_j \cdot \mu_{i,j} + \varepsilon_{it}$$

where ε_{it} is the error term for stock i, y_{it} is the scaled institutional trading volume on each day t, and the D_j is the day of the week dummy. ***,**,* are the significant level of 1%, 5% and 10%, respectively.

Day-of-the1491-Week Tests		Lowest Market Capitalization	Medium Market Capitalization	Highest Market Capitalization	All 300 stocks
Tuesday Coefficient	Average (*10^4)	3.261***	2.671***	5.293***	3.742 ***
	Positive Number	65	86	91	242
Wednesday	Average (*10^4)	4.201***	3.282***	2.679***	3.387***
	Positive Number	86	72	87	245
Thursday Coefficient	Average (*10^4)	4.251***	3.502***	6.287***	4.680***
	Positive Number	80	75	92	247
Friday Coefficient	Average (*10^4)	0.758*	0.897**	2.814***	1.491***
	Positive Number	58	77	95	230