Market Breadth and the Monday Seasonal in Stock Returns

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This study shows that when the Monday seasonal in stock returns was the strongest, the effect was broadly based, attributable to a large number of declines, as opposed to sharp declines in only a few stocks. The breadth of decline casts doubt on potential explanations relating to an excess of information announcements over the weekend. In the most recent decade, the average Monday return for the value-weighted index is larger than the average return for the rest of the week, confirming the disappearance of the Monday effect for large-firm securities. In contrast, the percent of declining issues, which places greater emphasis on small firm securities, remains greater on Monday than on the rest of the week. This finding suggests that the persistent Monday effect for small-firm securities, as documented in the literature, remains a broad-based effect.

Introduction

Cross (1973), French (1980), and Gibbons and Hess (1981) document the traditional Monday effect in stock returns where the average return on Monday is significantly negative and is significantly lower than the average returns on the other days of the week. Wingender and Groff (1989) reveal that the Monday effect is not due to outliers. Pettengill and Buster (1994) show that the Monday effect is characterized by about 104 to 138 additional declining stocks on Mondays, a number too large to be consistent with the announcement explanation. Kamara (1997), Brusa, Liu, and Schulman (2000), Mehdian and Perry (2001), and Steeley (2001) find that the traditional Monday effect has disappeared in the recent period for large stocks.

Our research considers the breadth of the Monday effect and how the breadth may have changed with the Monday seasonal in stock returns over the decades. Because the Monday effect is characterized by a negative return compared with the

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other days of the week, a measure of its breadth is the number or fraction of additional declining stocks on Monday compared with other days. We elect to use the percent of issues declining as the measure of breadth. Our null hypothesis is that the Monday effect is a narrow phenomenon, so that the percent of declining issues on Mondays is about the same as on other days of the week. The alternative is that the percent of declining issues on Mondays is greater than that on the other days of the week. The extent to which the Monday effect is considered broad depends on the degree of the difference supporting the alternative hypothesis.

Using daily returns on the New York Stock Exchange index, we find that the Monday seasonal in stock returns has deteriorated over time for large firms. The periods when the Monday seasonal in stock returns was the most pronounced were also the periods with the largest difference in the percent of declining issues for Mondays compared with other weekdays. In the most recent period, the Monday seasonal has disappeared in the value-weighted composite index returns. The percent of declining issues on Mondays may be slightly greater than other days of the week in the most recent period, but not at a statistically significant level.

Data and Methodology

We use the value-weighted New York Stock Exchange daily composite index to characterize the Monday seasonal. Daily returns are calculated in the usual manner:

$$RET_t = \left[\frac{INDX_t - INDX_{t-1}}{INDX_{t-1}} \right] * 100,$$

where:

RET_t = Return on day t; and

$INDX_t$ = Composite index closing value on day t.

Based on the daily change (or lack of change) in the closing price, traded stocks are categorized as advancing (increase), declining (decrease), or unchanged. Due to non-synchronous trading in a limited number of firms, the total number of issues traded may differ slightly from the total number of listed firms. The number of issues traded on the New York Stock Exchange has increased over time.[1] Consequently, the number of declining issues is not a suitable measure of market breadth of the Monday effect. A better measure is the percent of declines,[2] calculated as:

[1]At the beginning of 1966, there were 1,395 issues traded on the New York Stock Exchange. By the end of our data at the end of June 1999 the number had more than doubled to 3,516.

[2]Regardless of the market capitalization, a price decline in a large market capitalization firm is counted as one decline, just like a price decline in a smaller market capitalization firm. Consequently, unlike the value-weighted New York Stock Exchange composite index which is a proxy for large firms, the percent of declines is calculated using an equally weighted approach and can be viewed as a proxy for small firms. We are indebted to the editors for making this point.

$$\text{Percent of declines (DEC)} = \left[\frac{\text{Declining Issues}}{\text{Total Issues}}\right] * 100.$$

The data for the composite index and the numbers of advancing, declining, and unchanged issues from January 3, 1966, to June 25, 1999, were obtained from Market Data Source.[3]

The following regression model, with indicator variables representing the days of the week, is used to test for the Monday seasonal and market breadth:

$$y_t = \beta_1 x_{t,1} + \beta_2 x_{t,2} + \beta_3 x_{t,3} + \beta_4 x_{t,4} + \beta_5 x_{t,5} + \beta_6 x_{t,6} + \beta_7 x_{t,7} + \beta_8 x_{t,8} + \varepsilon_t$$

where:

y_t = The response value for day t for RET or DEC;
t = Day, from January 4, 1966, to June 25, 1999;
$x_{t,1}$ = 1 if t is in the 1960s, period 1, and 0 otherwise;
$x_{t,2}$ = 1 if t is in the 1970s, period 2, and 0 otherwise;
$x_{t,3}$ = 1 if t is in the 1980s, period 3, and 0 otherwise;
$x_{t,4}$ = 1 if t is in the 1990s, period 4, and 0 otherwise;
$x_{t,5}$ = 1 if t is in period 1 and the day is not Monday, and 0 otherwise;
$x_{t,6}$ = 1 if t is in period 2 and the day is not Monday, and 0 otherwise;
$x_{t,7}$ = 1 if t is in period 3 and the day is not Monday, and 0 otherwise;
$x_{t,8}$ = 1 if t is in period 4 and the day is not Monday, and 0 otherwise; and
ε_t = An independent error term for day t.

This model is equivalent to the model $RET_t = b_{r,\,Monday} + b_{r,\,Rest} * x_t + e_t$ applied to each period separately for estimating the intercept and slope. The intercept $b_{r,\,Monday}$ gives the average return for Mondays during the period and corresponds to β_1, β_2, β_3, or β_4 in our model. The slope $b_{r,\,Rest}$ gives the average additional return for the other days of the week, corresponding to β_5, β_6, β_7, or β_8 in our model. The Monday effect is characterized by $b_{r,\,Rest} > 0$ in a period, which is equivalent to the average return for Monday being less than that for the other days. Other authors use a slightly different definition of the Monday effect, that the average return for Mondays ($b_{r,\,Monday}$) be negative for period r. The breadth of the market is specified by the model above applied to DEC, the percent of declining stocks, which is equivalent to

[3]Market Data Source provides four separate files, one for the daily composite index and separate files for the advancing, declining, and unchanged issues. Discrepancies in the data files were handled as follows. If a date is missing in any of the files, the information was manually obtained from the Wall Street Journal (WSJ). For example, the information for February 23, 1967, was missing from the composite index file and obtained from the WSJ. There were several dates, for example November 26, 1981, that appeared only in the composite file. Such dates were excluded if the market breadth information was not obtainable from the WSJ. Some dates appear twice, such as January 8, 1999, and the correct entry was resolved from the WSJ.

$DEC_t = b_{d,\ Monday} + b_{d,\ Rest}*x_t + e_t$ applied to each period separately for estimating the intercept and slope. Our null hypothesis is that $b_{d,\ Rest} = 0$ in each of the four periods, or, in our model, $\beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$. We estimate the parameters using OLS regression.

Empirical Results

Table 1 provides the analysis of the Monday effect by decades. In period 1, the estimated difference in the average gain for the rest of the week minus the average gain for Mondays is $\hat{\beta}_5 = 0.2452$ per day, indicating that the rest of the week returns are 0.2452 percent higher than Monday returns during the 1960s. In periods 2 and 3, the rest of the week returns are 0.1761 percent and 0.2196 percent higher than Monday returns ($\hat{\beta}_6 = 0.1761$ and $\hat{\beta}_7 = 0.2196$) during the 1970s and the 1980s, respectively. These returns are different from zero at any reasonable significance level, confirming the Monday effect during the first three decades. In period 4, the rest of the week returns are 0.0542 percent lower than Monday returns ($\hat{\beta}_8 = -0.0542$), although the difference is not significant. During the 1990s, Monday returns are higher than the rest of the week returns, indicating that the traditional pattern of the Monday effect has disappeared in the most recent decade for large stocks. These results are consistent with the results in Kamara (1997), Brusa, Liu, and Schulman (2000), Mehdian and Perry (2001), and Steeley (2001).

Turning to the breadth of the Monday effect, we estimate the model applied to the percent declining, DEC. During the first, second, and third periods, we confirm a substantially greater fraction of declining issues on Mondays, estimated to be 4.60 percent, 3.24 percent, and 4.30 percent greater on Mondays than the average for the other days of the week, respectively. This difference is significant at any reasonable significance level, and, hence, we confirm the alternative hypothesis that more stocks decline on Mondays during the 1960s, 1970s, and 1980s. In the last period, however, the fraction of declining issues is only marginally higher on Mondays (0.76 percent), and the difference is not significant. Hence, there is no convincing evidence that Mondays have more declining issues than the other days of the week during the 1990s when considering all securities listed on the NYSE. Although Monday returns for large firms have (possibly) turned higher than the rest of the week returns in the most recent decade, the percent of declining issues on Mondays is a little higher than the rest of the week. Because all firms are weighted equally in calculating the percent of declines and small firms predominate numerically, the percent declines would predominately reflect activity among smaller firms, in contrast to the value-weighted average returns. Our results suggest that smaller firms experience slightly more declines on Monday than the other days of the week, leading to the continued presence of the Monday seasonal in small stocks.

Table 1—Market Breadth and Monday Seasonal

All Days				
	P1	P2	P3	P4
RET	0.0055	0.0109	0.0506	0.0516
DEC	0.4363	0.4009	0.3915	0.3873
Mondays				
	β_1 (P1)	β_2 (P2)	β_3 (P3)	β_4 (P4)
RET	-0.1913	-0.1315	-0.1271	0.0954
p-value	0.0021	0.0008	0.0012	0.0180
DEC	0.4732	0.4270	0.4263	0.3934
Rest of the Week				
	P1	P2	P3	P4
RET	0.0539	0.0446	0.0925	0.0413
DEC	0.4272	0.3947	0.3833	0.3858
Rest of the Week minus Mondays				
	β_5 (P1)	β_6 (P2)	β_7 (P3)	β_8 (P4)
RET	0.2452	0.1761	0.2196	-0.0542
p-value	0.0004	0.0001	0.0000	0.2272
DEC	-0.0460	-0.0324	-0.0430	-0.0076
p-value	0.0000	0.0000	0.0000	0.2184

The line "RET" gives the estimated average of the daily return, in percent, on the NYSE value-weighted composite index for the period specified by the columns. The periods are the 1960s (P1), 1970s (P2), 1980s (P3), and 1990s (P4). The first panel gives the average for all days in a period. The next two panels give, respectively, the estimates for Mondays and other days. The final panel gives the difference. The essence of the Monday effect is that Monday returns average less than for the other days of the week, so an appropriate measure of the effect is the difference in average returns, which is shown in the last panel. In the first, second, and third periods, the rest of the week returns were 0.2452, 0.1761, and 0.2196 percentage points higher than Monday returns, respectively, and the difference is statistically significant at any conventional significance level. In the last period, the rest of the week returns were 0.0542 percentage points lower than Mondays, but the difference is not statistically significant. Consequently, the Monday effect in returns was evident in the first three decades but not in the last decade, at least for the large stocks that predominately influence the value-weighted index. The breadth of the Monday effect is shown in "DEC," the percent of issues declining. In the first, second, and third periods, respectively, the percent declining was about 4.60, 3.24, and 4.30 percentage points more on Mondays than the rest of the week, and the difference is statistically significant at any conventional significance level. In the last period, the percent declining was about 0.76 percentage points more on Mondays but the difference is not significant

The estimates for the four periods can be compared, using the null hypothesis that the excess in declining issues for Mondays remained the same over time (H_0: $\beta_5 = \beta_6 = \beta_7 = \beta_8$). The F-value of 6.92 for DEC (and 8.32 for RET) and the p-value of 0.00 (0.00 for RET) lead to rejection of the null hypothesis and suggest that the excess in declining issues (and the excess in average return, the average return for Mondays less the average for other days of the week) has changed over the decades. Additionally, we test to see if there was a change in the excess declining issues (and in the excess in the average return) from one decade to the next. Comparing the 1960s with the 1970s, we test the general linear hypothesis H_0: $\beta_5 - \beta_6 = 0$, obtaining a test statistic of 1.46 (0.71 for RET) and a p-value of 0.23 (0.40 for RET),

suggesting no significant change from the 1960s to the 1970s. The corresponding test comparing the 1970s with the 1980s tested H_0: $\beta_6 - \beta_7 = 0$, with a test statistic of 1.56 (0.50 for RET) and a p-value of 0.21 (0.48 for RET). Thus, the evidence is not convincing that the excess declining issues (or the excess in the average return) has changed from the 1960s to the 1970s or from the 1970s to the 1980s. However, the test that $\beta_7 - \beta_8 = 0$ gives a test statistic of 16.84 (19.14 for RET) and a p-value of 0.00 (0.00 for RET). Thus, there is compelling evidence that the excess declining issues has been reduced in the 1990s compared with the 1980s and that the absolute value of the excess in the average return for Monday compared with the rest of the days of the week has been lessened (i.e., the average for Monday returns is less negative, compared with the average for the other days of the week, a lessening of the Monday effect).

Alternatively, the Monday effect could be defined by simply the average return for Mondays being negative, without regard to the relationship between the average for Mondays and the average for the other days of the week, which would lead to comparing the average Monday percent declining (or average Monday return) for adjacent decades. Using this alternative definition, the test that the percent declining on Mondays (and the average return for Mondays) has remained the same in all four periods (H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4$) has an F-value of 21.25 for DEC (and 8.39 for RET), with p-value of 0.00 (0.00 for RET). Comparing the 1960s with the 1970s, H_0: $\beta_1 - \beta_2 = 0$, gave a test statistic of 20.80 (0.66 for RET) and a p-value of 0.00 (0.42 for RET). Comparing the 1970s with the 1980s gave a test statistic of 0.01 (0.01 for RET) and a p-value of 0.92 (0.94 for RET). Comparing the 1980s with the 1990s gave a test statistic of 17.97 (15.63 for RET) and a p-value of 0.00 (0.00 for RET). Thus, there is evidence that the raw percent declining on Mondays has not remained the same for the four periods and was not the same for the 1960s and 1970s, or for the 1980s and 1990s. This measure of the market would be influenced, of course, by the overall market exuberance, or lack thereof, and other factors affecting all trading days in a period, as well as factors unique to the Monday returns.

Returning to a possible rationale for the excess in declining issues, how many hypothetical negative announcements over the weekend would be required to account for the excess declining issues? The average number of securities for the first period was 1496, so a difference in the fraction declining of 0.4732 – 0.4272 = 0.0460 translates into an excess number of declining stocks of about 68.8. While negative announcements could be expected to translate into a decline in the affected stock, some of these stocks would have been expected to experience a decline anyway, about 47.32 percent during the first period in the absence of any special effect on Mondays. With an excess in negative announcements of 120.2, about 51.4 of the stocks would have been expected to decline anyway, leaving an excess in declines of about 68.8. Table 2 shows this calculation of hypothetical excess negative announcements for the four periods. Thus, about 120.2, 95.9, and 137.2 hypothetical,

negative announcements would be required, on average, to account for the excess in declines in the first, second, and third periods, respectively, which is consistent with the results of Pettengill and Buster (1994). As stated by Pettengill and Buster, it is unlikely that so many firms release bad news announcements over the weekend, so this is evidence against attributing the Monday seasonal to a proclivity to postpone adverse announcements to the weekend. As expected, the additional number of stocks declining on Mondays has been reduced substantially during the fourth period.

Table 2—Estimation of the Number of Excess Declining Issues

	Period			
	P1	P2	P3	P4
Average number of securities	1496.0	1794.8	1968.8	2785.9
Average fraction declining on Mondays	0.4732	0.4270	0.4263	0.3934
Average fraction declining on other days	0.4272	0.3947	0.3833	0.3858
Average number declining on Mondays	708.0	766.5	839.3	1096.0
Average number declining on other days	639.2	708.4	754.6	1074.8
Excess in the number declining on Mondays	68.8	58.1	84.6	21.2
Number of issues hypothetically affected	120.2	95.9	137.2	34.5

This table estimates the number of issues declining on Mondays as the average number of issues times the average percentage declining on Mondays, and likewise for the other days of the week. Subtraction gives the "excess in number of issues declining on Mondays." How many hypothetical adverse announcements on the weekend would be required to account for this excess? Suppose 120.2 issues experienced adverse announcements over a weekend during P1. Absent any other effects, we would expect that about 42.72 percent of stocks would experience a decline, so about 51.4 of the 120.2 issues would have been expected to decline anyway, leaving an excess in declining issues of 68.8. In general $x/(1 - y)$ negative weekend announcements would be required to give "x" as the expected value for "excess in the number declining on Mondays," where "y" is the "average fraction declining on other days"

Conclusions

During the period in which the Monday seasonal in stock returns was the most pronounced, there was a Monday influence in breadth, with a greater percent of declines on Mondays, confirming that the Monday effect extends broadly. A broad Monday effect casts doubt on the information announcement hypothesis as an explanation of the Monday effect. During the most recent decade, the Monday seasonal in value-weighted returns, emphasizing the activity of large stocks, has diminished. The percent of declining issues, in which all stocks are equally weighted, remains slightly greater on Mondays, but is not statistically significant. These results are consistent with a disappearance of the Monday effect in large stocks, but a persistence of the effect in smaller stocks.

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