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A New Look at the Monday Effect

KO WANG, YUMING LI, and JOHN ERICKSON*

ABSTRACT

It is well documented that expected stock returns vary with the day-of-the-week (the Monday or weekend effect). In this article we show that the well-known Monday effect occurs primarily in the last two weeks (fourth and fifth weeks) of the month. In addition, the mean Monday return of the first three weeks of the month is not significantly different from zero. This result holds for most of the subperiods during the 1962–1993 sampling period and for various stock return indexes. The monthly effect reported by Ariel (1987) and Lakonishok and Smidt (1988) cannot fully explain this phenomenon.

ONE OF THE MOST PUZZLING empirical findings reported in finance is the significantly negative average Monday stock return. After French (1980) documented the unusual stock returns over weekends, numerous studies confirmed the Monday (or weekend) effect using various time periods and different stock return indexes. This anomalous Monday return pattern exists not only in the U. S. stock market, but also in foreign stock markets (see, for example, Jaffe *et al.* (1989)) and across different types of securities (see, for example, Flannery and Protopapadakis (1988)).

Numerous explanations have been developed to rationalize the puzzling discovery of persistent negative daily returns. Lakonishok and Levi (1982) attribute the effect to the delay between trading and settlements in stocks and in clearing checks. However, they also report that only about 17 percent of the abnormally low Monday returns can be explained by the settlement period. Keim and Stambaugh (1984) report that neither measurement-error nor specialist-related explanations can explain the Monday effect. Flannery and Protopapadakis (1988) also suggest that institutional aspects of the stock market cannot explain the Monday effect.

Lakonishok and Maberly (1990) document that individuals tend to increase trading activity (especially sell transactions) on Monday, which they believe might explain part of the weekend effect. Kamara (1995) provides evidence that individual trading is an important cause of the Monday seasonal by noting that the magnitude of the Monday effect for the S&P 500 declined significantly over the 1962–1993 period, a period of increased institutional trading activity.

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However, Sias and Starks (1995) report that the day-of-the-week patterns in returns and volumes are more pronounced in securities in which institutional investors play a greater role.

Rogalski (1984), among others, documents that the average negative Monday return occurs during the nontrading period from Friday's close to Monday's opening (the weekend effect). Along this line of thought, Damodaran (1989) shows that firms tend to report bad news on Fridays and suggests that the delay of announcements of bad news might cause the negative Monday effect. However, he also reports that the delay of announcements of bad news on Friday can only explain a small proportion (approximately 3.4 percent) of the weekend effect. Given the available evidence, the Monday effect is still viewed as an anomaly that cannot be fully explained.

In this article we document that the Monday effect occurs primarily in the last two weeks of the month. That is, after excluding the last two weeks of the month, the average Monday return for the first three weeks is not significantly different from zero. Furthermore, we find that the difference between the mean returns of the first-half of the month and the second-half of the month is not significantly different from zero when Monday returns are excluded. Our finding narrows the possibilities and may make the search for an explanation for the Monday effect easier.

Section I of this article reports our empirical findings using the New York Stock Exchange-American Stock Exchange (NYSE-AMEX) and the Nasdaq value-weighted indexes obtained from the Center for Research in Security Prices (CRSP). Section II explores two potential explanations for our finding that the Monday effect is concentrated in the last two weeks of the month. The last section contains our conclusions.

I. Empirical Findings

We initially employ a total of three types of indexes for the analyses: the NYSE-AMEX equally- and value-weighted return indices, the Nasdaq equally- and value-weighted return indices, and the S&P Composite Index. The NYSE-AMEX return indices span the period from July 3, 1962 to December 31, 1993, which includes a total of 1,530 Monday returns. The Nasdaq return indices cover the period from January 2, 1973 to December 31, 1993 and include a total of 1,016 Monday returns. The S&P Composite Index spans the period from January 4, 1928 to December 31, 1993, which includes a total of 3,220 Monday returns. Because the qualitative conclusions derived using those indices are substantially the same, we only report the results using the NYSE-AMEX and Nasdaq value-weighted indices.

A. Monday Effect Categorized by the Week of the Month

Table I reports the mean, t-statistic, percentage positive, and number of observations when the 1,530 Monday returns are categorized by the week of the month for the 1962–1993 period and three subperiods. The Monday return

is the average daily return of all stocks that comprise a CRSP index for each Monday. For each month, there are a maximum of five Mondays. The first week of the month is defined as the week that contains the first trading day of the month. If the first trading day of the month is a Monday, then it will be the Monday for the first week of the month. Otherwise, there is no Monday return for the first week of the month.[1]

Based on this partition, Panel A and Panel B report the empirical results using the NYSE-AMEX and the Nasdaq value-weighted return indexes, respectively. When all the Monday returns are aggregated, the result is the well-known Monday effect (see the far right column). Not surprisingly, the Monday returns for the NYSE-AMEX value-weighted index (mean = −0.0757 percent, t-statistic = −2.96) and the Nasdaq value-weighted index (mean = −0.1618 percent, t-statistic = −5.35) are both significantly negative during the 1962–1993 period and the 1973–1993 period, respectively. In addition, except for the NYSE-AMEX value-weighted index during the 1983–1993 subperiod, the mean Monday returns for the subperiods are significantly negative, regardless of the index used.

However, when the Monday returns are categorized by the week of the month, we observe a distinct pattern. For the first week and the third week of the month, none of the average Monday returns for the NYSE-AMEX or the Nasdaq indices are significantly negative. For the second week of the month, the average Monday return is not significantly different from zero when the NYSE-AMEX index is used, but is negative and significant (mean = −0.1131 percent, t-statistic = −1.96) when the Nasdaq index is used. However, it should also be noted that for the same week during the 1983–1993 subperiod the mean return of the Nasdaq index is not significantly different from zero.

When the Monday returns of the first three weeks are combined, the average Monday returns of the NYSE-AMEX and the Nasdaq value-weighted indices for the 1962–1993 period and the 1973–1993 period are an insignificant 0.0086 percent (t-statistic = 0.30) and −0.0518 percent (t-statistic = −1.51), respectively. This result holds for two of the three subperiods for the NYSE-AMEX index. The exception is the 1962–1972 subperiod where the average Monday return of the first three weeks is negative, but marginally significant (mean = −0.0695 percent, t-statistic = −1.65). For the Nasdaq index, the average Monday return for the first three weeks is significantly negative for the 1973–1982 subperiod (mean = −0.1358 percent, t-statistic = −2.65), but is positive for the 1983–1993 subperiod.

In contrast to the first three weeks of the month, the average Monday returns of the fourth week of the month are significantly negative regardless of the subperiod or type of return index used. The average Monday returns of the fifth week are also significantly negative for all subperiods for the Nasdaq value-weighted index. For the NYSE-AMEX value-weighted index, the mean Monday returns of the fifth Monday are significantly negative during the

[1] This definition ensures that the Monday of the fourth week of the month always follows the options expiration date (the third Friday of the month).

Table I

Summary Statistics for the Monday Return Categorized by Week Using the NYSE-AMEX, and Nasdaq Value-Weighted Return Indices

The data for this table are from the New York Stock Exchange/American Stock Exchange/Center for Research in Security Prices (NYSE/AMEX/CRSP) tapes for the period 1962–1993 and three subperiods and the Nasdaq CRSP tapes for the period 1973–1993 and two subperiods (*t*-statistics in parentheses). The difference in the two periods is the difference in the means of the returns of the first three Mondays of a month (Mondays 1, 2, and 3) and the last two Mondays of a month (Mondays 4 and 5). The first Monday of the month is the Monday for the first week of the month. The first week of the month is defined as the week that contains the first trading day of the month. If the first trading day of the month is a Monday, then it will be the Monday for the first week of the month. Otherwise, there is no Monday for the first week of the month. The Monday return is the average daily return of all stocks that comprise a CRSP index for each Monday. The daily return is calculated as the change in the last sale price or closing bid-ask average of a day from the previous day's last sale price or closing bid-ask average plus any dividend divided by the previous day's last sale price or closing bid-ask average.

	First Week	Second Week	Third Week	Fourth Week	Fifth Week	First Three Weeks	Last Two Weeks	Difference in the Two Periods	All Weeks
Panel A: Using the NYSE-AMEX Value-Weighted Return Index									
1. 07/03/62 to 12/31/93									
Mean	−0.0065%	−0.0410%	0.0621%	−0.2357%	−0.1245%	0.0086%	−0.1848%	0.1934%	−0.0757%
t-statistic	(−0.08)	(−0.87)	(1.49)	(−3.53**)	(−2.20**)	(0.30)	(−4.14**)	(3.77**)	(−2.96**)
Percentage positive	42.26%	51.43%	57.10%	39.50%	47.57%	52.95%	42.28%		48.30%
Number of observations	147	350	366	362	305	863	667		1530
2. 07/03/62 to 12/31/72									
Mean	−0.0974%	−0.0969%	−0.0326%	−0.1976%	−0.2071%	−0.0695%	−0.2020%	0.1325%	−.1278%
t-statistic	(−0.88)	(−1.48)	(−0.52)	(−3.38**)	(−2.87**)	(−1.65*)	(−4.41**)	(2.12**)	(−4.10**)
Percentage positive	40.00%	46.92%	49.59%	36.89%	34.62%	46.88%	35.84%		42.02%
Number of observations	50	115	123	122	104	288	226		514
3. 01/02/73 to 12/31/82									
Mean	−0.0990%	−0.1226%	0.0210%	−0.2135%	−0.1036%	−0.0577%	−0.1630%	0.1053%	−0.1036%
t-statistic	(−0.60)	(−1.22)	(0.24)	(−2.18**)	(−1.02)	(−0.93)	(−2.31**)	(1.12)	(−2.22**)
Percentage positive	44.44%	47.32%	55.17%	43.86%	44.33%	50.18%	44.08%		47.52%
Number of observations	45	112	116	114	97	273	211		484
4. 01/03/83 to 12/31/93									
Mean	0.1611%	0.0854%	0.1913%	−0.2927%	−0.0613%	0.1429%	−0.1881%	0.3310%	−0.0002%
t-statistic	(1.36)	(1.14)	(3.06**)	(−1.83*)	(−0.53)	(3.16**)	(−1.84*)	(3.20**)	(−0.00)
Percentage positive	53.85%	59.35%	66.14%	38.10%	57.69%	61.26%	46.96%		55.08%
Number of observations	52	123	127	126	104	302	230		532

Table I—*Continued*

	First Week	Second Week	Third Week	Fourth Week	Fifth Week	First Three Weeks	Last Two Weeks	Difference in the Two Periods	All Weeks
Panel B: Using the Nasdaq Value-Weighted Return Index									
1. 01/02/73 to 12/31/93									
Mean	0.0127%	−0.1131%	−0.0184%	−0.3788%	−0.2172%	−0.0518%	−0.3052%	0.2534%	−0.1618%
t-statistic	(0.15)	(−1.96**)	(−0.38)	(−5.16**)	(−2.90**)	(−1.51)	(−5.79**)	(4.26**)	(−5.35**)
Percentage positive	47.42%	47.66%	50.21%	36.25%	40.80%	48.70%	38.32%		44.19%
Number of observations	97	235	243	240	201	575	441		1016
2. 01/02/73 to 12/31/82									
Mean	−0.1424%	−0.1847%	−0.0861%	−0.3134%	−0.2223%	−0.1358%	−0.2715%	0.1357%	−0.1950%
t-statistic	(−1.19)	(−2.11**)	(−1.19)	(−3.64**)	(−2.68**)	(−2.65**)	(−4.51**)	(1.72*)	(−4.97**)
Percentage positive	40.00%	45.54%	50.00%	42.98%	40.21%	46.52%	41.71%		44.42%
Number of observations	45	112	116	114	97	273	211		484
3. 01/03/83 to 12/31/93									
Mean	0.1470%	−0.0478%	0.0434%	−0.4381%	−0.2125%	0.0241%	−0.3361%	0.3602%	−0.1316%
t-statistic	(1.34)	(−0.63)	(0.67)	(−3.78**)	(−1.74*)	(0.53)	(−3.97**)	(3.98**)	(−2.90**)
Percentage positive	53.85%	49.59%	50.39%	30.16%	41.35%	50.66%	35.22%		43.98%
Number of observations	52	123	127	126	104	302	230		532

* Significant at the 0.10 level for a two-tailed test.
** Significant at the 0.05 level for a two-tailed test.

1962–1993 period and the 1962–1972 subperiod, but are insignificantly different from zero during the 1973–1982 and 1983–1993 subperiods. In general, the magnitude of the negative return is greater for the fourth week (mean = −0.2357 percent and −0.3788 percent for the NYSE-AMEX and the Nasdaq value-weighted indexes, respectively) than for the fifth week (mean = −0.1245 percent and −0.2172 percent, respectively). When the last two weeks are combined, the mean Monday returns of the NYSE-AMEX and the Nasdaq value-weighted indexes are a significant −0.1848 percent (t-statistic = −4.14) and −0.3052 percent (t-statistic = −5.79), respectively. The significantly negative returns for the fourth and fifth Mondays hold for each of the subperiods for both indexes.

More important, the difference in the average Monday returns between the first three weeks (weeks 1, 2, and 3) and the last two weeks (weeks 4 and 5) is large and significant. The average Monday return for the last two weeks is approximately 0.1934 percentage points lower than that of the first three weeks (t-statistic = 3.77) when the NYSE-AMEX index during the 1962–1993 period is used. For the Nasdaq index, the average Monday return for the last two weeks is 0.2534 percentage points lower than that of the first three weeks (t-statistic = 4.26) during the 1973–1993 period.[2] For the 1962–1972 and the 1983–1993 subperiods, the differences in stock returns between the first three and the last two Mondays are statistically significant for the NYSE-AMEX and the Nasdaq indices. The exception is the 1973–1982 subperiod where the difference in stock returns between the first three and the last two Mondays is significant only when the Nasdaq index is used.

To summarize, our results indicate that the well-known Monday effect is caused largely by the Mondays of the last two weeks of the month. The mean Monday return of the first three weeks of the month is, in general, not significantly different from zero and is generally significantly higher than the mean Monday return of the last two weeks.[3] Our finding seems to make it more difficult to explain the Monday effect. Indeed, there seems to be little reason to expect that the delay between the settlement of stock transactions and the clearing of checks should not be the same for different weeks (see Lakonishok and Levi (1982)). It is also difficult to explain why individuals should increase their trading activity only on the last two (but not the first three) Mondays of

[2] The result is similar when we use the Wilcoxon-Mann-Whitney test to detect whether there is a significant difference between the returns for the first three Mondays and the last two Mondays of the month. We also analyze the Monday returns for the 1962–1993 period using the ten equally-divided size portfolios obtained from the CRSP tapes and find that the differences between the mean Monday returns of the first three weeks and the last two weeks are significant for all the ten size portfolios.

[3] It should be noted that Black Monday (10/19/87) is included in the fourth week category. However, even after this Monday is excluded from the sample, the overall result is still substantially the same. Without Black Monday, the average Monday return of the last two weeks of the month for the NYSE-AMEX (Nasdaq) index during the 1962–1993 (1972–1993) period is −0.1579 percent (−0.2800 percent). When Black Monday is included in the analysis, the average Monday return of the last two weeks of the month for the NYSE-AMEX (Nasdaq) index is −0.1848 percent (−0.3052 percent).

the month (see Lakonishok and Maberly (1990)). Similarly, although it is purely an empirical question, there seems to be little reason for firms to report bad news only on the last two Fridays of the month (see Damodaran (1989)). However, from another perspective, our finding that the Monday effect is concentrated in the last two weeks of the month narrows the possibilities and may make the search for an explanation easier.

B. Relationship with the Monthly Effect

Ariel (1987) reports that the cumulative return for the first-half of the month during the 1963–1981 period is much higher than that of the last-half of the month (2555.40 percent versus −0.25 percent when the CRSP equally-weighted index is used). However, it should be noted that Ariel's definition of the first-half of the month includes the last day of the previous month and includes only the first nine trading days of the month. After excluding the last day of the previous month from the first-half of the month and utilizing all the trading days in a month, Lakonishok and Smidt (1988) report that the difference in rates of return for the Dow Jones Industrial Average between the first- and last-half of the month during the 1897–1986 period is only 0.237 percent (as opposed to the approximately 1 percent reported by Ariel).

Our finding that the Monday effect is concentrated in the last two weeks of the month, at a glance, seems to be related to the monthly effect. To address this issue, we partition the 7,927 daily returns during the 1962–1993 period by the day-of-the-week (Monday return and Tuesday to Friday returns) and by the first-half of the month and the last-half of the month (as defined by Lakonishok and Smidt (1988)). Panel A and Panel B of Table II report the summary statistics of the daily returns for the NYSE-AMEX and the Nasdaq value-weighted indices, respectively. We find that for both the NYSE-AMEX and the Nasdaq indices, the mean Tuesday to Friday returns of both the first-half and the last-half of the month are significantly positive. More important, the difference between the mean Tuesday to Friday returns of the first-half of the month and the last-half of the month is not significantly different from zero for both the NYSE-AMEX index (mean = 0.0116 percent, t-statistic = 0.60) and the Nasdaq index (mean = 0.0036 percent, t-statistic = 0.15).[4] We also analyze the differences in mean returns between the first-half and the last-half of the month using Tuesday returns, Wednesday returns, Thursday returns, and Friday returns. We find that none of the differences are significantly different from zero. In other words, the monthly effect does not exist for these four days of the week.

The differences between the mean Monday returns of the first-half of the month and the last-half of the month, however, are significantly different from zero for both the NYSE-AMEX index (mean = 0.1866 percent, t-statistic = 3.64) and the Nasdaq index (mean = 0.2457 percent, t-statistic = 4.06). It is

[4] We also employ the Wilcoxon-Mann-Whitney method to test if the Tuesday to Friday returns between the first-half of the month and the last-half of the month are different. The result is the same as that obtained using t-statistics.

Table II

Summary Statistics for Stock Returns Categorized by the Day of the Week and by the First- and Last-Half of the Month

The data for this table are from the New York Stock Exchange/American Stock Exchange/Center for Research in Security Prices (NYSE/AMEX/CRSP) tapes for the period 1962–1993 and the Nasdaq CRSP tapes for the period 1973–1993 (t-statistics in parentheses). The first-half of the month is from day 1 to day 15. When day 15 is not a trading day, the first trading day after day 15 is used as the last trading day of the first-half of the month as defined by Lakonishok and Smidt (1988). The Monday return is the average daily return of all stocks that comprise a CRSP index for each Monday. The Tuesday to Friday return is the average daily return of all stocks that comprise a CRSP index for each Tuesday, Wednesday, Thursday, or Friday. The daily return is calculated as the change in the last sale price or closing bid-ask average of a day from the previous day's last sale price or closing bid-ask average plus any dividend divided by the previous day's last sale price or closing bid-ask average. The difference in the two periods is the difference in the means between Monday returns and Tuesday to Friday returns. The performance difference in Panels A and B is the difference in the means between the first-half of the month and the last-half of the month.

	Monday Only	Tuesday to Friday	Difference in the Two Periods	All Days
Panel A: Using the NYSE-AMEX Value-Weighted Return Index				
1. First-half of the month				
Mean	0.0065%	0.0803%	−0.0739%	0.0646%
t-statistic	(0.22)	(5.83**)	(−2.24**)	(5.16**)
Percentage positive	52.80%	57.00%		56.11%
Number of observations	856	3,172		4028
2. Last-half of the month				
Mean	−0.1801%	0.0688%	−0.2489%	0.0257%
t-statistic	(−4.08**)	(5.04**)	(−6.91**)	(1.88*)
Percentage positive	42.58%	54.57%		52.50%
Number of observations	674	3,225		3899
3. Performance difference				
Mean	0.1866%	0.0116%		0.0389%
t-statistic	(3.64**)	(0.60)		(2.10**)
Panel B: Using the Nasdaq Value-Weighted Return Index				
1. First-half of the month				
Mean	−0.0540%	0.0965%	−0.1505%	0.0647%
t-statistic	(−1.56)	(5.75**)	(−4.06**)	(4.27**)
Percentage positive	48.42%	60.59%		58.02%
Number of observations	570	2,129		2699
2. Last-half of the month				
Mean	−0.2996%	0.0929%	−0.3926%	0.0258%
t-statistic	(−5.74**)	(5.47**)	(−8.86**)	(1.53)
Percentage positive	38.79%	60.44%		56.74%
Number of observations	446	2,164		2610
3. Performance difference				
Mean	0.2457%	0.0036%		0.0389%
t-statistic	(4.06**)	(0.15)		(1.71*)

* Significant at the 0.10 level for a two-tailed test.
** Significant at the 0.05 level for a two-tailed test.

clear that the difference between the returns of the first-half and last-half of the month is concentrated on Monday, regardless of whether the NYSE-AMEX index (0.1866 percent for Monday versus 0.0116 percent for Tuesday to Friday) or the Nasdaq index (0.2457 percent for Monday versus 0.0036 percent for Tuesday to Friday) is used.[5] This indicates that there is a need to examine the Monday and monthly effects jointly.

To test explicitly whether the monthly effect still exists after controlling for the Monday effect and the Mondays in the last-half of the month, we estimate the following two regressions:

$$\text{Return} = \alpha + \beta(\text{last-half month}) + \delta(\text{all Mondays}) + \gamma(\text{last-half month Mondays}) + \epsilon \tag{1}$$

$$\text{Return} = \alpha^* + \beta^*(\text{last-half month}) + \delta^*(\text{all Mondays}) + \gamma^*(\text{last two Mondays}) + \epsilon^* \tag{2}$$

The last-half month variable takes a value of one if the return is for the last-half of the month (as defined by Lakonishok and Smidt (1988)). The all Mondays variable takes a value of one if the return occurs on a Monday. The last two Mondays variable takes a value of one if the Monday is the fourth or fifth Monday of the month. The last-half month Mondays variable takes a value of one if the Monday falls on the last-half of the month. A total of 7,927 NYSE-AMEX and 5,309 Nasdaq value-weighted daily returns are used for the analysis.

An insignificant β (or β^*) coefficient will indicate that the return for the first-half of the month is not significantly different from that of the last-half of the month. Under this circumstance, the monthly effect disappears after we control for the Monday effect and the last two Mondays of the month. Given the findings reported in Table II, we hypothesize that $\beta = 0$ and $\beta^* = 0$. A significant negative δ (or δ^*) coefficient will indicate that the Monday return is significantly lower than that of the other four days of the week. A significant negative γ (or γ^*) coefficient will indicate that the return of the Mondays during the last-half of the month (or the last two Mondays of the month) is significantly lower than that of the first-half of the month (or the first three Mondays of the month). Given the findings reported in Tables I and II, we hypothesize that $\delta < 0$, $\delta^* < 0$, $\gamma < 0$, and $\gamma^* < 0$.

Panel A and Panel B of Table III report the regression results using the NYSE-AMEX and the Nasdaq indices, respectively. The results support our hypotheses. The coefficients of the last-half month variable are not significantly different from zero, regardless of the equation or index used. This result indicates that, after controlling for the Monday effect and the Mondays in the

[5] The result is the same if we define the first three weeks as the first-half of the month and the last two weeks as the last-half of the month. However, the monthly effect is still significant for the Tuesday to Friday returns if we use the first nine trading days and the last nine trading days of the month (as defined by Ariel (1987)) as the first-half and last-half of the month.

Table III

Cross-Sectional Regression Estimates from Regressing Stock Returns on Selected Independent Variables Using the NYSE-AMEX and Nasdaq Value-Weighted Return Indices

The data for this table are from the New York Stock Exchange/American Stock Exchange/Center for Research in Security Prices (NYSE/AMEX/CRSP) tapes for the period 1962–1993 and the Nasdaq CRSP tapes for the period 1973–1993 (*t*-statistics in parentheses). The dependent variable is the average daily return reported in the CRSP tapes. The daily return is calculated as the change in the last sale price or closing bid-ask average of a day from the previous day's last sale price or closing bid-ask average plus any dividend divided by the previous day's last sale price or closing bid-ask average. The four independent variables are dichotomous variables. The Last-Half Month variable takes a value of one if the return is for the last-half of the month. The first-half of the month is from day 1 to day 15. When day 15 is not a trading day, the first trading day after day 15 is used as the last trading day of the first-half of the month as defined by Lakonishok and Smidt (1988). The other days of a month are in the last-half of the month. The All Mondays variable takes a value of one if the return occurs on a Monday. The Last-Half Month Mondays variable takes a value of one if the return occurs on a Monday in the last-half of the month. The Last Two Mondays variable takes a value of one if the return occurs on the fourth or the fifth Monday of the month. The fourth (or fifth) Monday of the month is the Monday for the fourth (or fifth) week of the month. The first week of the month is defined as the week that contains the first trading day of the month. If the first trading day of the month is a Monday, then it will be the Monday for the first week of the month. Otherwise, there is no Monday for the first week of the month.

Independent Variables	Intercept	Last-Half Month	All Mondays	Last-Half Month Mondays	Last Two Mondays	Adjusted R^2	Number of Observations
Panel A: Using the NYSE-AMEX Value-Weighted Return Index as the Dependent Variable							
1	0.0803%	−0.0116%	−0.0739%	−0.1750%		0.7255%	7927
	(5.50**)	(−0.56)	(−2.33**)	(−3.72**)			
2	0.0797%	−0.0104%	−0.0711%		−0.1831%	0.7423%	7927
	(5.47**)	(−0.51)	(−2.26**)		(−3.89**)		
Panel B: Using the Nasdaq Value-Weighted Return Index as the Dependent Variable							
3	0.0965%	−0.0036%	−0.1505%	−0.2421%		1.8515%	5309
	(5.44**)	(0.14)	(−3.90**)	(−4.21**)			
4	0.0959%	−0.0025%	−0.1478%		−0.2509%	1.8717%	5309
	(5.41**)	(0.10)	(−3.85**)		(−4.37**)		

* Significant at the 0.10 level for a two-tailed test.
** Significant at the 0.05 level for a two-tailed test.

last-half of the month (or the last two Mondays of the month), the stock returns of the last-half of the month are not statistically different from the stock returns of the first-half of the month. In other words, the monthly effect disappears after we control for the Monday effect. On the other hand, the coefficients of the all Mondays variable and the last-half month Mondays variable (or the last two Mondays variable) are significantly negative. This result indicates that, after controlling for the monthly effect, the stock returns of Mondays are still lower than the returns of the other four days and the

returns of the last two Mondays (or Mondays during the last-half of the month) are still lower than the returns of the first three Mondays (or Mondays during the first-half of the month).

II. Two Possible Explanations

We have documented that the Monday effect is largely caused by the Mondays of the last two weeks of the month. In this section, we propose two possible explanations for this observation. The first explanation follows the well established literature on the correlation between the Friday return and the Monday return. The second explanation examines whether the expiration date of stock options (on the third Friday of the month) might cause the poor stock performance of the following Monday.

A. Correlation with the Friday Return

It is well known that the Monday return is positively correlated with the return on the prior trading day (see, for example, Abraham and Ikenberry (1994)). Given this, we examine whether the significantly lower returns for the fourth and fifth Mondays can be explained by the return of the previous trading day. Table IV reports the cross-sectional regression estimates obtained from regressing the Monday return on the previous trading day return and/or other selected independent variables. The 4th Monday or the 5th Monday dummy variable takes a value of one if the Monday is in the fourth or the fifth week of the month. The previous trading day variable is the first available return immediately preceding the Monday return. The last two variables (previous trading day * 4th Monday and previous trading day * 5th Monday) are the interaction terms between the Monday dummy variables and the previous trading day variable. Panel A of the table reports the results using the value-weighted NYSE-AMEX return index during the 1962–1993 period, while Panel B reports the results using the value-weighted Nasdaq index during the 1973–1993 period.

Equations (1) and (4) regress the Monday return on the 4th Monday and 5th Monday variables. As expected, for both indexes the coefficients of the 4th Monday variable and the 5th Monday variable are significantly negative. In addition to the two Monday dummy variables, equations (2) and (5) also include the previous trading day as an independent variable. We find that the coefficient of the 4th Monday variable is significantly negative, while the coefficient of the previous trading day variable is significantly positive. This result indicates that even after controlling for the impact of the previous trading day, the fourth Monday of the month still has, on average, a lower return than the first three Mondays of the month.

Equations (3) and (6) regress the Monday return on the 4th Monday, 5th Monday, the previous trading day, and the two interaction variables. The coefficients of the previous trading day variable and the interaction variable with the fourth Monday are significantly positive. This suggests that the

Table IV

Cross-Sectional Regression Estimates Obtained From Regressing the Monday Return on the Previous Trading Day Return Using the NYSE-AMEX and Nasdaq Value-Weighted Return Indices

The data for this table are from the New York Stock Exchange/American Stock Exchange/Center for Research in Security Prices (NYSE/AMEX/CRSP tapes) for the period 1962–1993 and the Nasdaq CRSP tapes for the period 1973–1993 (*t*-statistics in parentheses). The dependent variable is the Monday return. The Monday return is the average daily return of all stocks that comprise a CRSP index for each Monday. The daily return is calculated as the change in the last sale price or closing bid-ask average of a day from the previous day's last sale price or closing bid-ask average plus any dividend divided by the previous day's last sale price or closing bid-ask average. The 4th Monday and 5th Monday independent variables are dichotomous variables that take a value of one if Monday is in the fourth or the fifth week of the month. The first week of the month is defined as the week that contains the first trading day of the month. If the first trading day of the month is a Monday, then it will be the Monday for the first week of the month. Otherwise, there is no Monday for the first week of the month. The previous trading day return is the first available return immediately preceding the Monday return and includes 1,468 Friday returns, 61 Tuesday returns, and one Wednesday return. The previous trading day * 4th Monday and the previous trading day * 5th Monday are the interaction terms between the two Monday dummy variables and the previous trading day variable.

Independent Variables	Intercept	4th Monday	5th Monday	Previous Trading Day	Previous Trading Day * 4th Monday	Previous Trading Day * 5th Monday	Adjusted R^2	*F* Statistic
Panel A: Using the NYSE-AMEX Value-Weighted Return Index as the Dependent Variable								
1	0.0086%	−0.2443%	−0.1331%				0.93%	8.14**
	(0.25)	(−3.92**)	(−2.01**)					
2	−0.0536%	−0.1851%	−0.0745%	44.3529%			11.88%	69.72**
	(−1.66*)	(−3.14**)	(−1.19)	(13.82**)				
3	−0.0317%	−0.2096%	−0.0963%	28.7210%	54.4903%	14.3293%	14.65%	53.50**
	(−0.99)	(−3.61**)	(−1.56)	(7.01**)	(7.18**)	(1.62)		
Panel B: Using the Nasdaq Value-Weighted Return Index as the Dependent Variable								
4	−0.0518%	−0.3270%	−0.1654%				1.80%	10.32**
	(−1.30)	(−4.45**)	(−2.11**)					
5	−0.1740%	−0.2025%	−0.0787%	58.0925%			21.99%	96.34**
	(−4.79**)	(−3.07**)	(−1.12)	(16.22**)				
6	−0.1504%	−0.2253%	−0.1078%	46.9004%	29.2712%	20.2864%	22.84%	61.09**
	(−4.10**)	(−3.42**)	(−1.53)	(9.85**)	(3.42**)	(2.14**)		

* Significant at the 0.10 level for a two-tailed test.
** Significant at the 0.05 level for a two-tailed test.

returns for the fourth Monday are more sensitive to (positively correlated with) the return of the previous trading day. However, it should be noted that the coefficient of the 4th Monday variable is still significantly negative. It is apparent that the return of the previous trading day cannot fully explain why the average Monday return of the fourth week of the month is significantly lower than that of the first three weeks of the month.

Table V

Summary Statistics for the Monday Return Categorized by Options Availability

The data for this table are obtained from stocks listed on the New York Stock Exchange (NYSE) and American Stock Exchange (AMEX) stock exchanges for the period 1983–1993 (*t*-statistics in parentheses). The difference in the two periods is the difference in the means of the returns of the first three Mondays of a month (Mondays 1, 2, and 3) and the last two Mondays of a month (Mondays 4 and 5). The return on stocks with options traded on them represents the equally-weighted return on a portfolio of 221 NYSE or AMEX stocks with options traded on an exchange during both 1983 and 1993. The list of stocks with options traded on them was obtained from the Options Clearing Corporation. The return on stocks without options traded on them represents the equally-weighted return on a portfolio of 5,983 NYSE or AMEX stocks without options traded on an exchange during both 1983 and 1993. The difference in the two periods is the difference in the means of the returns of the first three Mondays of a month (Mondays 1, 2, and 3) and the last two Mondays of a month (Mondays 4 and 5). The first week of the month is defined as the week that contains the first trading day of the month. The first Monday of the month is the Monday for the first week of the month. If the first trading day of the month is a Monday, then it will be the Monday for the first week of the month. Otherwise, there is no Monday for the first week of the month. The Monday return is the daily return of each Monday reported in the Center for Research in Security Prices (CRSP) tapes. The daily return is calculated as the change in the last sale price or closing bid-ask average of a day from the previous day's last sale price or closing bid-ask average plus any dividend divided by the previous day's last sale price or closing bid-ask average. The performance difference is the difference in the means between the Monday return on stocks with options and stocks without options traded on them.

	First Week	Second Week	Third Week	Fourth Week	Fifth Week	First Three Weeks	Last Two Weeks	Difference in the Two Periods	All Weeks
Stocks with options trading									
Mean	0.1528%	0.0755%	0.1584%	−0.3422%	−0.1390%	0.1237%	−0.2503%	0.3740%	−0.0380%
t-statistic	(1.16)	(0.92)	(2.27**)	(−1.97*)	(−1.06)	(2.48**)	(−2.23**)	(3.29**)	(−0.67)
Percentage positive	51.92%	58.54%	59.06%	38.89%	54.81%	57.62%	46.09%		52.63%
Number of observations	52	123	127	126	104	302	230		532
Stocks without options trading									
Mean	0.1016%	0.0066%	0.0496%	−0.3219%	−0.1505%	0.0410%	−0.2444%	0.2855%	−0.0824%
t-statistic	(1.02)	(0.11)	(1.02)	(−2.57**)	(−1.39)	(1.11)	(−2.89**)	(3.35**)	(−1.93*)
Percentage positive	55.77%	49.59%	53.54%	35.71%	41.35%	52.32%	38.26%		46.24%
Number of observations	52	123	127	126	104	302	230		532
Performance difference									
Mean	−0.0512%	−0.0689%	−0.1088%	0.0203%	−0.0115%	−0.0826%	0.0059%		
t-statistic	(−0.31)	(−0.66)	(−1.28)	(0.09)	(−0.07)	(−1.33)	(0.04)		

* Significant at the 0.10 level for a two-tailed test.

** Significant at the 0.05 level for a two-tailed test.

B. Expiration Day of Stock Options

As noted earlier, since we define the first week of the month in terms of the first trading day of the month, the Monday of the fourth week will always follow the expiration day of stock options. Although it is difficult to explain why the expiration of stock options could lead to a lower return on the following trading day, we nevertheless examine this relationship empirically.[6] To do this, we analyze the stock return pattern before and after May, 1973 (the first full month after options began to trade in the stock market). The S&P Composite Index from January 4, 1928 to December 31, 1993 is used for the analysis.[7] We find that, during the 1928–1993 period, the mean return of the Mondays in the first-half of the month is significantly higher than the mean Monday return in the last-half of the month (difference in means = 0.1386 percent, t-statistic = 3.18).[8] Before the introduction of option trading (the 1928–1973 period), the mean Monday return in the first-half of the month is also significantly higher than the mean Monday return in the last-half of the month (difference in means = 0.0974 percent, t-statistic = 1.85). We also note that prior to June 1952 the NYSE permitted trading on six days of the week. Given this difference in the length of the trading week, we analyze the stock return pattern during the 1952–1973 period separately. The result is similar. The mean return of the Mondays in the first-half of the month is 0.1323 percentage points higher than that of the Mondays in the last-half of the month (t-statistic = 2.75). This evidence indicates that the introduction of option trading cannot explain why the Monday effect is concentrated in the last two weeks of the month.

Given the fact that there are only a relatively small number of stocks with options traded in the stock market, the impact may be diluted when we examine the returns of indexes. Because of this, we further examine the

[6] However, when a call option on a stock is written, the issuer is likely to hold the stock to cover the short call position. Holding everything else constant, the issuer may have more incentive to sell the stock after the call option has expired. Under this scenario, there may be more selling pressure on the fourth Monday of the month, which might help explain the significantly lower average return.

[7] We thank William Schwert for providing us with the S&P Composite Index. For a detailed description of the data, see Schwert (1990, p. 403). It should be noted that prior to June 1952, the stock market also traded on a Saturday. It is quite possible to have six weeks in a month if the starting trading day of a month is a Saturday and if the month has 31 days. During the 1928–1952 period, a total of 17 months falls into this category. For these 17 months, we ignore the first Saturday's trading when we categorize the stock returns by the week of the month.

[8] This long period of data also enables us to analyze whether our result is driven by some specific months of the year. When the Monday returns are categorized by the month of the year, the month of October exhibits the largest difference in returns between the first-half of the month and the last-half of the month (difference in means = 0.3625 percent). After excluding this month from the analysis, our result still holds. The mean Monday return in the first-half of the month is still significantly higher than the mean Monday return in the last-half of the month (difference in means = 0.1159 percent, t-statistic = 2.80). After the month of October is excluded, we fail to detect a month with a particularly large difference in returns. This result also holds when we use the NYSE-AMEX and Nasdaq returns index to perform the analysis.

Monday returns by partitioning the stocks traded on the NYSE and the AMEX into two categories: stocks with options trading and stocks without options trading. We first obtain from the Options Clearing Corporation a list of stocks with options traded on the NYSE, AMEX, Chicago Board Options Exchange, Pacific Stock Exchange, and Philadelphia Stock Exchange during the 1974–1993 period. An examination of the lists indicates that there are a relatively small number of stocks with options traded on them before 1982. Given this, we analyze only the performance of those stocks with options and those stocks without options during the 1983–1993 period. Using the NYSE-AMEX CRSP tapes, we identify a group of 221 firms with at least one stock option trading on an exchange during the 1983–1993 period. We also identify another group of 5,983 firms that do not have stock options trading on an exchange during the same period. Using these two groups of firms, we form two equally-weighted portfolios to construct the return indexes for stocks with options and stocks without options during the 1983–1993 period.

The result in Table V shows that using these two indexes is similar to using the CRSP NYSE-AMEX and the Nasdaq value-weighted indices. For both indices we observe that the mean Monday return of the last two weeks of the month is significantly negative and is significantly lower than the mean Monday return of the first three weeks of the month. For each of the five weeks, the t-statistic indicates that there is no difference between the performance of these two return indices. This result provides additional evidence that the expiration day of options cannot explain why the Monday effect is concentrated in the last two weeks of the month.

III. Conclusions

This article shows that the well-known Monday effect is largely caused by the Mondays of the fourth and fifth weeks of the month during the 1962–1993 period. In most cases analyzed, the average Monday return of the first three weeks is not significantly negative. For the most part, this result holds for each of the subperiods during the sample period and is not sensitive to the type of index used. Even after controlling for the monthly effect, the observation that the mean Monday return of the last two weeks of the month is significantly lower than that of the first three weeks of the month does not change. Our finding, by narrowing the Monday effect to the last two weeks of the month, may make the search for an explanation for the Monday effect easier.

As pointed out by Lakonishok and Smidt (1988), the magnitude of an anomaly should be examined in relationship to the size of a tick (the smallest change in a stock's price). Although the magnitudes of the negative returns of the fourth Monday (mean = −0.2357 percent) and the fifth Monday (mean = −0.1245 percent) of the month are much higher than that of the traditionally defined all weeks Monday return (mean = −0.0757 percent), they are still relatively small when compared to the movement of one tick (approximately 0.313 percent, as suggested by Lakonishok and Smidt). This indicates that it may be difficult for investors to profit based on the observed return pattern

even if transaction costs are ignored. However, for an investor who has already decided to buy or sell a particular stock, our finding might help in timing the transaction. When circumstances allow, an investor should sell before the end of the third week or buy after the fourth Monday of the month.

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