Re-examining Return Autocorrelation and Monday Returns

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This study examines conditional Monday returns in light of the recent evidence of a reversal of the Monday effect. Using S&P 500 and Nasdaq market returns from January 3, 1970 to December 31, 2001, the study finds that the reversal of the Monday effect for the S&P and the disappearance of a significant Monday effect for the Nasdaq cannot be attributed to the correlation of the Monday return with the previous day return. Shifts do occur in this correlation, but even accounting for good news/bad news markets and the week-of-the-month timing, these shifts do not explain shifts in the average Monday return. In the Nasdaq market, where Monday returns remain negative, daily return correlation has disappeared completely, suggesting that the wait-analyze-invest argument postulated by information-processing hypothesis is no longer supported.

Introduction

The previous articles in this special issue have examined various aspects of the Monday effect. Pettengill and Wingender (2003) provide an introduction to the Monday effect topic. Two papers examine Monday seasonal effects, one in relation to the individual investor (Gondhelekar and Mehdian, 2003) and the other in relation to market breath (Liano and Sullivan, 2003). Wingender and Singleton (2003) study the macro announcement effect on Monday returns, and Miller, Prather, and Mazumder (2003) suggest an operational strategy to capitalize on market return patterns using mutual funds and variable annuities.

As discussed by Pettengill and Wingender (2003), an additional area of research has been the examination of various Monday conditional relationships. The conditional Monday returns studies find that previous day returns are positively correlated to Monday returns (Bessembinder and Hertzel, 1993; Abraham and Ikenberry, 1994; Wang, Li, and Erickson, 1997; Chow, Hsiao, and Solt, 1997; Jaffe and Westerfield, 1989; and Tong, 2000), a bad news market environment is significantly correlated to the Monday effect (Penman, 1987; Jaffe and Westerfield, 1985; Fishe, Gosnell, and Lasser, 1993; and Tong, 2000), and Monday returns during the last half of the month are significantly negative while Monday returns during the first half of the month are

0747–5535/03/1400 & 1500/00029/$2.00

not significantly different from zero (Wang, Li, and Erickson, 1997; Mehdian and Perry, 2001).

After three decades of Monday effect research and publicity, recent studies find that US large-cap market Monday returns are no longer negative but are positive and significantly higher than the other days of the week (Kamara, 1997; Wang, Li, and Erickson, 1997; Brusa, Liu, and Schulman, 2000; and Mehdian and Perry, 2001). In light of the instability of the Monday effect, this study tests whether the previous day returns, a bad news market, and week-of-the-month conditional relationships have changed or reversed as the Monday effect reversed.

This paper extends the Monday effect literature by reexamining conditional Monday returns in light of the shift in mean Monday returns. The remainder of this paper reviews the literature and discusses the findings of this study.

Literature Review

Researchers have examined several conditional relationships in an effort to better understand the Monday effect anomaly. A widely-documented conditional relationship is the positive correlation between the previous trading day return and the Monday return. Using US equity data from 1885 to 1989, Bessembinder and Hertzel (1993) find a strong correlation between the previous trading day returns and Monday returns. They show that Monday returns are more highly correlated with previous day returns than are returns of the other days. After examining the relative correlation between returns and previous day returns for all trading days, they conclude that the pronounced asymmetry of information and the investment strategies of informed investors lead to the Monday effect and a partial reversal of the Monday effect on Tuesdays.

Using US equity data from 1963 to 1991, Abraham and Ikenberry (1994) find a positive correlation between previous trading day returns and Monday returns and discover that when the Friday market return is negative, the Monday market return is negative nearly 80 percent of the time. They suggest that the Monday effect conditional upon previous day returns arises from individual investor behavior or what they refer to as the information-processing hypothesis. Over the weekend, individual investors have more time to gather and analyze market information. If investors base their buy/sell decisions upon information gathered and weekends offer a low-cost opportunity to gather information, then individual investors are more likely to be active following a non-trading weekend. Lakonishok and Maberly (1990) find that individual investors tend to trade more on Mondays and tend to offer more sell than buy orders on Mondays. Both studies suggest that brokers tend to advise buy recommendations, are not likely to solicit sell orders, and have little contact with individual investors over the weekend. Therefore, individuals tend to postpone sell orders to trading days following a weekend and execute buy orders during the week. Further, because institutional orders tend to be lower on Mondays than on other days

of the week, their argument suggests that individual investors drive the Monday effect.

Chow, Hsiao, and Solt (1997) also find a strong correlation between Friday returns and Monday returns. Using S&P 500 data from 1970 to 1993, their results suggest that the correlation primarily reflects the correlation between Friday afternoon and Monday morning returns. The positive correlation between Friday and Monday returns is not limited to US stock markets. Jaffe and Westerfield (1989) find a positive correlation between Friday and Monday returns in the United States, Australian, Canadian, Japanese, and the United Kingdom equity markets.

Researchers have expanded the previous day return literature by dividing previous day returns into bad news markets and good news markets. A bad news market is defined as trading days with returns less than zero. A good news market is defined as trading days with returns greater than zero. Penman (1987) studied the effect of corporate announcements on market returns. Because unanticipated negative earnings announcements usually occur on Friday or over the weekend, he finds that the negative Monday returns are correlated with bad news. Fishe, Gosnell, and Lasser (1993) find evidence to support the Penman results. Like Penman, they find that unanticipated negative earnings announcements or bad news events tend to occur over the weekend. Using S&P data from 1962 to 1986, they find that bad news markets are highly correlated with negative Monday returns. Although neither study offers an explanation for the results, they are consistent with the Abraham and Ikenberry (1994) individual investor argument.

Tong (2000) examines market returns conditioned upon bad news markets for 25 international markets. He isolates conditional positive Monday returns and conditional negative Monday returns to examine the effect on market returns. He finds that Monday returns are lower than other days of the week whether conditioned upon positive or negative previous day returns.

The week-of-the-month is another line of inquiry relating to conditional Monday returns. As other researchers reported, Wang, Li, and Erickson (1997) find that the previous trade day returns significantly affect Monday returns in US equity markets. They further reveal that the negative Monday effect primarily occurs during the last half of the month. The results suggest that the negative Monday returns are at least partially explained by previous trade day returns and by the last half of the month Monday returns. As there is not a reason to expect individual investors to react differently to previous day returns during the first half of the month than during the last half of the month, they argue this phenomenon casts doubt on the information-processing hypothesis as a possible explanation for the Monday effect.

Using US equity data from June 1964 to February 1998, Mehdian and Perry (2001) examine the week-of-the-month relationship in light of the reversal of the Monday effect and find support for the Wang, Li, and Erickson (1997) results. Using data from five US stock market indexes from 1964 to 1998, they find that Monday

returns tend to be positive during the first half of the month and negative during the last half of the month. Using Chow tests and recursive coefficient estimations, they find a significant break in the data at the time of the October 1987 stock market crash. During the pre-crash period, the Monday effect was significantly influenced by the negative Monday returns during the last half of the month. During the post-crash period, mean Monday returns are significantly influenced by the positive Monday returns during the first half of the month. Neither study offers an explanation for the differences in Monday returns during a month.

Despite the recent findings of the disappearance and reversal of the Monday effect, a re-examination of conditional Monday returns research is limited. The Brusa, Li, and Schulman (2000) study is incomplete in this regard and does not include a regression analysis of the conditional relationships. Steeley (2001) examines the conditional relationship of information arrival in the UK equity markets but does not examine the previous day return or the week-of-the-month conditional relationships and does not include US markets in the study.

This paper offers three contributions to the Monday effect literature. First, the study expands the data set to include market returns through the end of 2001. Second, this paper examines the influence of previous day returns, good news/bad news markets, and week-of-the-month timing on mean Monday returns with regard to the shift of mean Monday returns. Third, this study relates the conditional Monday return results to the information-processing hypothesis in light of the shift of the Monday effect in the United States.

Data and Methodology

This study uses the Standard & Poor's 500 index (S&P) and the Nasdaq composite index to test whether the documented Monday conditional relationship changes when the Monday effect reverses. The closing point values are collected from December 31, 1969 through December 31, 2001 for a total of 8082 daily returns for each index. The daily returns are calculated for each trading day using close-to-close point values. The daily return is calculated as shown in equation (1):

$$R_t = \log(C_t / C_{t-1})*100 \quad (1)$$

where R_t is the daily percentage return on day t, and C_t and C_{t-1} are the closing point values on day t and t-1. To capture the instability of the Monday effect over time and to test for any changes in the conditional Monday return, the data are divided into five time periods. One time period includes the full 32-year data set, 1970 through 2001. The remaining time periods divide the data into four eight-year, subperiods: 1970 through 1977, 1978 through 1985, 1986 through 1993, and 1994 through 2001.

To test for a day-of-the-week effect and the instability of Monday returns over time, the regression model is estimated as shown in equation (2):

$$R_t = \sum \alpha_i D_{it} + e_t \quad \text{for } i = 1 \ldots 5 \quad (2)$$

where R_t is the daily percentage return on day t, and D_{1t}….D_{5t} are the dummy variables denoting Monday (D_{1t})…..Friday (D_{5t}). The coefficient, α_1, provides average return for Mondays ….. α_5 provides average return for Fridays. The constant is suppressed, so that t-statistics test whether the average returns for a particular day of the week are significantly different from zero. The F-test determines whether the average daily returns are jointly equal. To support the literature discussed in Pettengill and Wingender (2003), the sign and/or significance of average Monday returns should change over time.

In order to investigate differences in mean day-of-the-week returns and conditional Monday returns in light of a shift in mean Monday returns, equation (3) (shown below) provides estimates that include the influence of the previous day returns (PDR) for each day of the week. This allows estimation of δ_1 … δ_5, the pure average daily return (i.e., the expected daily return if the return for the previous day had been zero) and the estimation of β_1…β_5, the impact of the PDR for each weekday.

$$R_t = \sum\delta_i D_{it} + \sum\beta_i D_{it} R_{t-1} + e_t \text{ for } i = 1\ldots5 \quad (3)$$

where R_t is the daily percentage return on day t; D_{1t}….D_{5t} are the dummy variables denoting Monday (D_{1t})…..Friday (D_{5t}), and R_{t-1} is the percentage return on day t-1. The constant is suppressed so that the t-statistics test whether the average pure returns for a particular day of the week (δ_i) and influence of the PDR for a particular day of the week (β_i) are significantly different from zero.

To examine the instability of the Monday effect over time, this study uses equation (3) to investigate the influence of three conditional relationships. The first conditional relationship examines the influence PDRs have on mean daily returns. Regressions and pairwise comparison tests are estimated for the five time periods to investigate the instability of the Monday effect. The regression results test for any changes of the average pure Monday return and the influence of PDRs on mean Monday returns over time. To examine whether the influence of the PDR for Monday is significantly different from the other days of the week, two hypotheses are tested. The first hypothesis tests whether the influence of PDRs is the same for all days of the week, or H_o: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$. A significant F-test would reject the null hypothesis. The second set of hypotheses makes pairwise comparisons between the influence of the Monday PDR and the influence of each of the other days of the week PDR, or H_o: $\beta_1 = \beta_i$, for i = 2 … 5 where 2 = Tuesday….5 = Friday. A significant t-statistic would reject the null hypothesis. The results of the regressions and tests are compared over time to identify any shifts of the influence of PDRs on Monday returns.

The second conditional relationship builds on the first by accounting for market conditions. The data are divided into good news markets and bad news markets. Following the Fishe, Gosnell, and Lasser (1993) approach, a good news market is

defined as days with positive returns, and a bad news market is defined as days with negative returns. Regressions and pairwise comparison tests are re-estimated conditional on good news and bad news markets. The null hypotheses are reexamined to investigate if market conditions influence the mean Monday return and to find if the influence of market conditions changes over time.

The third conditional relationship also builds on the first by accounting for the week-of-the-month timing. Similar to the Wang, Li, and Erickson (1997) approach, the data are divided into the first half of the month (dates 1 through 15) and the last half of the month (dates 16 through the end of the month). The regressions and tests are re-estimated conditional on the week-of-the-month. The null hypotheses are again reexamined to investigate if the week-of-the-month influences the mean Monday return and to find if the influence of week-of-the-month changes over time.

Average Monday Return Empirical Results

Recent studies have found that for large-firm indexes the average Monday return is no longer negative and significantly different from the average returns of the other

Table 1—S&P and Nasdaq Day-of-the-Week Returns

	Monday[a]	Tuesday[a]	Wednes[a]	Thursday[a]	Friday[a]	F-test[b]
S&P						
1970-2001	-.0324	.0517**	.0805***	.0212	.0611***	5.422***
	(0.171)	(0.024)	(0.000)	(0.358)	(0.008)	(0.000)
1970-1977	-.1344***	-.0030	.0627	.0368	.0691	2.675**
	(0.003)	(0.945)	(0.152)	(0.406)	(0.183)	(0.020)
1978-1985	-.0692	.0618	.0947**	.0394	.0944**	2.907**
	(0.115)	(0.233)	(0.026)	(0.358)	(0.029)	(0.013)
1986-1993	.0013	.0724	.1202**	.0147	.0123	1.436
	(0.980)	(0.171)	(0.023)	(0.783)	(0.819)	(0.208)
1994-2001	.0738*	.0865**	.0440	-.0059**	.0778*	2.200*
	(0.099)	(0.045)	(0.308)	(.0437)	(0.075)	(0.052)
Nasdaq						
1970-2001	-.0611***	-.0205*	.0485***	.0529***	.0572***	16.20***
	(0.000)	(0.095)	(0.000)	(0.000)	(0.000)	(0.000)
1970-1977	-.0654***	-.0480***	.0104	.0443***	.0629***	8.567***
	(0.000)	(0.005)	(0.536)	(0.010)	(0.000)	(0.000)
1978-1985	-.0908***	-.0246	.0641***	.0688***	.0988***	20.71***
	(0.000)	(0.125)	(0.000)	(0.000)	(0.000)	(0.000)
1986-1993	-.0602***	-.0041	.0915***	.0435**	.0179	7.366***
	(0.003)	(0.834)	(0.000)	(0.027)	(0.367)	(0.000)
1994-2001	-.0279	-.0056	.0276	.0551	.0489	0.913
	(0.487)	(0.885)	(0.475)	(0.158)	(0.211)	(0.472)

*** significant at $p < .01$; ** significant at $p < .05$; * significant at $p < .10$

[a] The day-of-the-week dummy regression coefficients are the daily mean returns. The p-values of the regression coefficients are reported in parentheses below the estimates

[b] The F-test reports the analysis of the variance that all coefficients are jointly equal to zero. The p-values are reported in parentheses below the test statistic

days of the week. This section examines the influence conditional relationships have on Monday returns in an effort to better understand the instability of the average Monday return over time. To motivate this discussion, Table 1 reports the day-of-the-week return results when estimating equation (2) using the five time periods.

As expected, the average Monday return is not stable over time. While the average Monday return is negative during the 1970s, by the mid-1980s it is no longer negative for the S&P. For the 1978-1985 and 1986-1993 time periods, the average Monday return is not significantly different from zero, revealing the disappearance of the Monday effect. Further for the 1986-1993 time period, the F-test does not reject the null hypothesis that the average daily returns are equal. The average Monday return is no longer negative and jointly is not significantly different from the average returns of the other days of the week. For the 1994-2001 time period, the average Monday return was positive and significantly different from zero. This signifies a reversal of the Monday effect. The results reveal that not only is the average Monday return positive and significantly different from zero, but that the average Monday return is larger than the average Wednesday and Thursday returns. During this time period it is the average Thursday return, not the average Monday return, that is negative and significantly different from zero. The F-test rejects the null hypothesis of jointly equal average daily returns.

While the Nasdaq index does not show the same pattern in the average Monday return as does the S&P index, it does reveal the disappearance of a statistically significant Monday effect during the 1994-2001 time period. The average Monday return while negative is no longer significantly different from zero. Further the results find that during this time period, none of the average daily returns is significantly different from zero. Consistent with these results, the F-test result does not reject the null hypothesis that the average daily returns are equal during the 1994-2001. For all of the other time periods, the null hypothesis is rejected.

The day-of-the-week results reveal an unstable average Monday return for both the S&P and Nasdaq. In addition, the change of the F-test results appears to follow the movement of the average Monday return. To better understand the instability of the average Monday return, and the relationship between the average Monday return and the average returns of the other days of the week, the remainder of this section examines the influence conditional relationships have on the average Monday return.

Previous Day Returns

A recent line of inquiry finds a positive correlation between Friday returns and Monday returns. The research further finds that the relationship between Friday and Monday returns is stronger than any other combination of trading days. This section investigates whether the Friday return—Monday return relationship is stable, even though the average Monday return has been unstable over the last thirty years. Table

Table 2—S&P and Nasdaq Previous Day Returns Effect

	Monday[a]	Tuesday[a]	Wednes[a]	Thursday[a]	Friday[a]	MPDR[a]	TPDR[a]	WPDR[a]	HPDR[a]	FPDR[a]	MPDR=…=FPDR[b]
S&P											
1970-2001	-.0490**	.0503**	.0753***	.0138	.0575**	.3084***	-.0921***	.1004***	.0954***	.1728***	39.044***
	(0.037)	(0.026)	(0.001)	(0.547)	(0.012)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1970-1977	-.1452***	.0090	.0650	.0240	.0442	.4347***	.1401***	.2277***	.2310***	.3176***	5.149***
	(0.001)	(0.832)	(0.123)	(0.575)	(0.302)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
1978-1985	-.1017**	.0438	.0912**	.0327	.0827*	.3222***	-.1058**	.0644	.0765	.2717***	12.45***
	(0.020)	(0.297)	(0.029)	(0.440)	(0.052)	(0.000)	(0.015)	(0.172)	(0.116)	(0.000)	(0.000)
1986-1993	-.0001	.0753	.1102**	.0235	.0115	.3525***	-.1604***	.1415***	-.0708	.1193**	18.82***
	(0.999)	(0.148)	(0.034)	(0.656)	(0.828)	(0.000)	(0.000)	(0.010)	(0.222)	(0.031)	(0.000)
1994-2001	.0641	.0993**	.0455	-.0118	.0781*	.1142**	-.1777***	-.0165	.1336**	.0272	6.529***
	(0.152)	(0.021)	(0.291)	(0.786)	(0.072)	(0.029)	(0.000)	(0.727)	(0.018)	(0.581)	(0.000)
Nasdaq											
1970-2001	-.0763***	-.0158	.0501***	.0467***	.0493***	.2830***	.0984***	.0773***	.1293***	.1537***	9.700***
	(0.000)	(0.194)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
1970-1977	-.0935***	-.0372**	.0292*	.0425***	.0422***	.5525***	.2400***	.3804***	.2749***	.4391***	7.705***
	(0.000)	(0.018)	(0.064)	(0.007)	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1978-1985	-.1402***	.0094	.0737***	.0479***	.0831***	.5033***	.1944***	.4073***	.3429***	.2230***	7.570***
	(0.000)	(0.543)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1986-1993	-.0712***	.0121	.0913***	.0352*	.0048	.7082***	.3249***	-.0408	.0885*	.3165	31.19***
	(0.000)	(0.509)	(0.000)	(0.064)	(0.799)	(0.000)	(0.000)	(0.377)	(0.092)	(0.000)	(0.000)
1994-2001	-.0323	-.0063	.0277	.0528	.0465	.0905	-.0417	.0119	.0721	.0496	0.578
	(0.597)	(0.608)	(0.566)	(0.095)	(0.680)	(0.601)	(0.882)	(0.480)	(0.260)	(0.879)	(0.693)

*** significant at $p < .01$; ** significant at $p < .05$; * significant at $p < .10$

[a] The day-of-the-week dummy regression coefficients are the daily mean returns assuming the PDRs are zero. The PDR regression coefficients are the daily mean returns attributed to PDRs. The p-values of the regression coefficients are reported in parentheses below the estimates

[b] The F-test results tests whether that the influence of PDRs is the same for all days of the week, or Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$. The p-values are reported in parentheses below the test statistic

2 reports the influence of the previous day return on the average Monday return for the S&P and Nasdaq over the five time periods.

The S&P results in Table 2 show that the influence of the previous day return on the average Monday return throughout the 32-year period while positive and significant, has diminished over time. Supporting the findings of Keim and Stambaugh (1984), the 1970-2001 time period and the first three sub-periods show that the correlation between Friday and Monday returns is larger than the previous day returns for the other days of the week. This changes, however, during the 1994-2001 time period. While the Friday return is still positively correlated with the Monday return, the influence of the average Monday return on the average Tuesday return exhibits a stronger correlation. The results show that the average Monday return is partially reversed on Tuesday. For each time period, the correlations between Friday and Monday returns and between Monday and Tuesday returns are significantly different from zero. The correlation between Friday and Monday returns has diminished, however, while the correlation between Monday and Tuesday returns has increased. Also of note during the 1994-2001 time period is that the average pure Thursday return is now the lowest daily return and that the influence of the previous day return on the average Thursday return is the highest. The previous day returns for the other days of the week do not reveal a consistent relationship. The F-test results for the S&P reject the null hypothesis that the influence of previous day returns is jointly equal for the different days of the week for each time period.

Table 3 compares the influence of the previous day return on the average Monday return with each of the previous day returns for the other days of the week. The S&P pairwise comparison results show that the Monday previous day return is significantly different from the Tuesday previous day return and Wednesday previous day return for all time periods. The pairwise comparison results also reveal that during the 1994-2001 time period, the Monday previous day return was not significantly different from the previous day returns for Thursday and Friday.

The Nasdaq results from Table 2 also show that the influence of the previous day return on the average Monday return is not stable over the 32-year period. As with the S&P results, the Nasdaq results for the 1970-2001 time period and the first three sub-periods show that the trading day returns are significantly correlated and that the correlation between Friday and Monday is larger than for the other days of the week. For the 1994-2001 time period, however, the Nasdaq results reveal a dramatic shift in the influence of previous day returns. While the influence of the previous day return on the average Monday return has diminished for the S&P, it has vanished for the Nasdaq. In Table 3, the Nasdaq pairwise comparisons show that, consistent with the S&P findings, the Monday previous day return was significantly different from the previous day returns for the other days of the week for all time periods expect 1994-2001. For the Nasdaq over the period 1994-2001, the influence of the previous day return on the average pure returns for all days of the week

Table 3—S&P and Nasdaq Pairwise Comparisons

	MPDR=TPDR[a]	MPDR=WPDR[a]	MPDR=HPDR[a]	MPDR=FPDR[a]
S&P				
1970-2001	11.91***	5.667***	5.734***	3.615***
	(0.000)	(0.000)	(0.000)	(0.000)
1970-1977	4.306***	2.825***	2.959***	1.579
	(0.000)	(0.005)	(0.003)	(0.115)
1978-1985	6.090***	3.554***	3.342***	0.661
	(0.000)	(0.000)	(0.001)	(0.509)
1986-1993	8.045***	2.771***	5.411***	3.060***
	(0.000)	(0.006)	(0.000)	(0.002)
1994-2001	4.218***	1.860*	-0.251	1.212
	(0.000)	(0.063)	(0.802)	(0.225)
Nasdaq				
1970-2001	5.245***	5.715***	4.191***	3.476***
	(0.000)	(0.000)	(0.000)	(0.000)
1970-1977	4.917***	2.511**	4.233***	1.669*
	(0.000)	(0.012)	(0.000)	(0.095)
1978-1985	4.767***	1.384	2.364**	4.088***
	(0.000)	(0.166)	(0.018)	(0.000)
1986-1993	5.844***	10.48***	8.182***	5.254***
	(0.000)	(0.000)	(0.000)	(0.000)
1994-2001	0.288	0.890	-.0757	0.553
	(0.785)	(0.414)	(0.483)	(0.604)

*** significant at $p < .01$; ** significant at $p < .05$; * significant at $p < .10$

[a] Each t-statistic results from a pairwise comparison between the influence of the Monday PDR and the influence of each of the other days of the week PDR, or Ho: $\beta_1 = \beta_i$, for i = 2…5 where 2 = Tuesday….5 = Friday. The p-values are reported in parentheses below the t-statistic

including Monday is not significantly different from zero, and the influence of the Monday previous day return is not significantly different from the influence of the previous day returns for the other days of the week. The inconsistency of the influence of previous day returns on average Monday returns for the S&P and Nasdaq suggests that the information-processing hypothesis does not explain the Monday effect.

The S&P and Nasdaq results reveal that as the average Monday return has changed over time, the influence of previous day returns on Monday returns also has changed. For the S&P while the influence of the previous day return on the average Monday return is still significant, the magnitude of the influence has declined over time. For the Nasdaq the influence of the previous day return on the average Monday return is insignificant during the 1994-2001 period. Over the last sixteen years of the study, and especially over the 1994-2001 time period, the availability of information has dramatically increased and the cost of obtaining information has declined. The proliferation of online brokerage firms, low cost trades and the abundance of firm and market information have reduced transaction costs considerably. It appears that the availability and abundance of information have diminished investors' reliance on previous day returns as a signal for market information. Moreover, the negative

Monday effect persists in the Nasdaq returns where the Friday-Monday correlation is the weakest.

Keim and Stambaugh (1984) argue that the correlation between Friday and Monday returns supports the information-processing hypothesis. The hypothesis suggests that individual investors are influenced greatly by previous day returns. Individual investors gather investment information, including the Friday return, analyze the information over the weekend, and then act upon the information on Monday. They suggest that the strong correlation between Friday and Monday returns supports this hypothesis. The S&P results reveal a weakening of the correlation between the Friday and Monday return. The Nasdaq results show that although the average Monday return is negative, there is no correlation between the Friday and Monday return during the 1994-2001 time period. These results do not show a strong correlation between Friday and Monday returns and, therefore, contradict the information-processing hypothesis argument. While the individual investor behavior may influence market returns, the results do not support the wait-analyze-invest argument postulated by information-processing hypothesis. The results suggest that while the decline of the influence of previous day returns partially explains the instability of the Monday effect over time, it challenges the information-processing hypothesis argument.

Good News and Bad News Markets

Another line of inquiry finds that bad news markets are highly correlated with negative Monday returns. This section investigates whether dividing the data into good news and bad news markets can explain the instability of the average Monday return and the instability of the Friday return—Monday return correlation. Following the Fishe, Gosnell, and Lasser (1993) approach, a good news market is defined as days with positive returns, and a bad news market is defined as days with negative returns. If the market return for the day is positive, then it is assumed that the net effect of new information is positive. If the market return for the day is negative, then it is assumed that the net effect of new information is negative. The data are divided into good news markets and bad news markets based on PDR, and the regressions are estimated again.

Table 4 reports average pure returns for good news and bad news markets and the influence of previous day returns for the S&P from estimates of equation (3) for the five time periods. These results show that the correlation between the Friday return—Monday return is stronger and more consistent in bad news markets than in good news markets. In the good news market, the influence of the Monday previous day return has declined throughout the 32-year period and is no longer significantly different from zero. By the 1994-2001 time period, only the Thursday previous day return coefficient is positive and significant. Thus, in the good news market, previous day returns no longer influence Monday returns, and Monday returns are partially

Table 4—S&P Good News and Bad News Effect

	Monday[a]	Tuesday[a]	Wednes[a]	Thursday[a]	Friday[a]	MPDR[a]	TPDR[a]	WPDR[a]	HPDR[a]	FPDR[a]	MPDR=…=FPDR[b]
Good News											
1970-2001	.6601***	.7015***	.6333***	.6182***	.6594***	.0559**	-.1365***	.0563**	.1269***	.0486**	24.82***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.018)	(0.000)	(0.020)	(0.000)	(0.042)	(0.000)
1970-1977	.6671***	.6336***	.6748***	.6057***	.6468***	.1661***	.0563	-.0449	.1757***	.1327***	3.318***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.241)	(0.379)	(0.000)	(0.008)	(0.010)
1978-1985	.6299***	.7282***	.6812***	.6151***	.6754***	.1410***	-.0468	-.0097	.1297**	.1284**	3.371***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)	(0.296)	(0.840)	(0.016)	(0.014)	(0.003)
1986-1993	.6888***	.7373***	.5995***	.6443***	.6518***	.0063	-.1631***	.1990***	.0174	.0624	14.72
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.876)	(0.000)	(0.000)	(0.762)	(0.178)	(0.000)
1994-2001	.6159***	.7122***	.5843***	.6046***	.6393***	.0118	-.2585***	.0169	.1734***	-.1002**	12.38***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.786)	(0.000)	(0.729)	(0.002)	(0.021)	(0.000)
Bad News											
1970-2001	-.7282***	-.6204***	-.6092***	-.6260***	-.6154***	.4284***	.0640**	.0738***	.0157	.0960***	29.59***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.006)	(0.540)	(0.002)	(0.000)
1970-1977	-.7243***	-.6546***	-.6702***	-.5360***	-.5833***	.2114***	.0567	.1988***	.1093***	.1379**	2.153*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.133)	(0.000)	(0.000)	(0.013)	(0.072)
1978-1985	-.7998***	-.6180***	-.6216***	-.5838***	-.5096***	.1527***	-.0040	.0504	.0089	.1567***	3.076**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.914)	(0.211)	(0.816)	(0.001)	(0.017)
1986-1993	-.7857***	-.6229***	-.5702***	-.6682***	-.7354***	.9204***	.0758	.0269	-.0848	.0679	27.80***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.297)	(0.719)	(0.196)	(0.350)	(0.000)
1994-2001	-.6190***	-.5993***	-.5437***	-.6966***	-.6364***	.2801***	.1426***	.0229	.0661	.0499	3.146**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.010)	(0.611)	(0.227)	(0.376)	(0.014)

*** significant at $p < .01$; ** significant at $p < .05$; * significant at $p < .10$

[a] The day-of-the-week dummy regression coefficients are the daily mean returns assuming the PDRs are zero. The PDR regression coefficients are the daily mean returns attributed to PDRs. The p-values of the regression coefficients are reported in parentheses below the estimates

[b] The F-test results tests whether that the influence of PDRs is the same for all days of the week, or Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$. The p-values are reported in parentheses below the test statistic

reversed on Tuesdays. In the bad news market, the Friday return—Monday return correlation is positive and significant. The results also reveal that while the Monday return is partially reversed on Tuesday in the good news market, the Monday return is reinforced on Tuesday in the bad news market. The disappearance of the negative average Monday return during the 1986-1993 time period and the reversal of the Monday effect during the 1994-2001 time period for the S&P does correspond to an insignificant Friday return—Monday return correlation in the good news market. This diminished tendency for Monday returns to reinforce positive Friday returns, however, should decrease, not increase, Monday's return.

Table 5 reports the influence good news and bad news markets have on the average pure return and the influence of previous day returns for the Nasdaq when estimating equation (3) for the five time periods. The Nasdaq results show that for the 1970-1977, 1978-1985, and 1986-1993 time periods, the Friday return—Monday return correlation is positive and significant in both the good news and bad news markets. For the 1994-2001 time period however, the Friday return—Monday return correlation is no longer significant in the good news market or the bad news market. Further although not significantly different from zero, the Friday return—Monday return correlation is negative during the 1994-2001 time period in the good news market.

The disappearance of the significant negative average Monday return for the Nasdaq during the 1994-2001 time period corresponds to the disappearance of the Friday return—Monday return correlation in both the good news market and bad news market. However, the disappearance of the negative average Monday return for the S&P during the 1986-1993 time period corresponds to the disappearance of the Friday return—Monday return correlation in only the good news market. These results do not reveal a consistent pattern of changes in the conditional relationships as the average Monday return changes. This suggests that good news/bad news markets and previous day returns do not explain the Monday effect.

Week-of-the-Month Returns

The week-of-the-month literature has found that the average Monday return is positive during the first half of the month and negative during the last half of the month. This line of inquiry also found that even after accounting for the Friday return—Monday return correlation, the average Monday return is negative and significant during the last half of the month. This section investigates whether accounting for the week of the month explains the instability of the Monday effect and the instability of the Friday return—Monday return correlation. Following the Wang, Li, and Erickson (1997) approach, the data are divided into the first half of the month (date 1 to 15) and the last half of the month (date 16 to end), and the regressions are estimated again.

Table 5—Nasdaq Good News and Bad News Effect

	Monday[a]	Tuesday[a]	Wednes[a]	Thursday[a]	Friday[a]	MPDR[a]	TPDR[a]	WPDR[a]	HPDR[a]	FPDR[a]	MPDR=…=FPDR[b]
Good News											
1970-2001	.3033***	.3023***	.3055***	.0302***	.2906***	.0116	-.1061***	-.1245***	.0056	-.0206	6.733***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.671)	(0.000)	(0.000)	(0.814)	(0.394)	(0.000)
1970-1977	.1930***	.1963***	.2319***	.2389***	.2306***	.2470***	.0490	.0741	-.0024	.2542***	6.445***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.287)	(0.125)	(0.956)	(0.000)	(0.000)
1978-1985	.1771***	.2083***	.2303***	.2020***	.2453***	.1702***	.0425	.1453***	.2158***	-.0388	7.683***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.280)	(0.000)	(0.000)	(0.272)	(0.000)
1986-1993	.2257***	.2405***	.2732***	.2317***	.1868***	.2119***	.0583	-.2223***	.0133	.1349***	19.23***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.111)	(0.000)	(0.766)	(0.002)	(0.000)
1994-2001	.4775***	.5479***	.4897***	.5412***	.4745***	-.0654	-.1920***	-.1669	-.0132	-.0985**	2.353*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.207)	(0.000)	(0.000)	(0.774)	(0.039)	(0.052)
Bad News											
1970-2001	-.3645***	-.3332***	-.3410***	-.3425***	-.3256***	.2514***	.1480***	.1089***	.0839***	.1223***	3.926***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)	(0.003)
1970-1977	-.2796***	-.2672***	-.2635***	-.2130***	-.2280***	.3008***	.1206***	.2505***	.2213***	.2504***	2.180*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.069)
1978-1985	-.3082***	-.2266***	-.2028***	-.2322***	-.2261***	.3954***	.1569***	.3301***	.2007***	.1754**	4.692**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.002)	(0.030)	(0.030)
1986-1993	-.2724***	-.2336***	-.2206***	-.2925***	-.2591***	.7830***	.3520***	.1685***	-.0829	.2328***	19.063***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.049)	(0.239)	(0.000)	(0.000)
1994-2001	-.6075***	-.5838***	-.5804***	-.5715***	-.5330***	.0858	.1026**	.0883*	.0886	.0780	0.027
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.172)	(0.047	(0.054)	(0.117	(0.184)	(0.999)

*** significant at $p < .01$; ** significant at $p < .05$; * significant at $p < .10$

[a] The day-of-the-week dummy regression coefficients are the daily mean returns assuming the PDRs are zero. The PDR regression coefficients are the daily mean returns attributed to PDRs. The p-values of the regression coefficients are reported in parentheses below the estimates

[b] The F-test results tests whether that the influence of PDRs is the same for all days of the week, or Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$. The p-values are reported in parentheses below the test statistic

Table 6 reports the influence the week-of-the-month timing has on the average pure return and the influence of previous day returns for the S&P when estimating equation (3) for the five time periods. For the 1970-1977 and 1978-1985 time periods, the results show that when accounting for previous day returns, there is no marked difference in the average Monday returns during the first half of the month and the last half of the month. During the 1986-1993 and 1994-2001 time periods, however, the results find that when accounting for previous day returns there is a substantial difference in the average Monday return during the first half of the month and the last half of the month. As Wang, Li, and Erickson (1997) found, when accounting for previous day returns, the average Monday return is positive during the first half of the month and negative during the last half of the month.

Unlike Wang, Li, and Erickson (1997) however, the results find that Friday return—Monday return correlation while positive is not always significantly different from zero. The Friday return—Monday return correlation during the first half of the month is positive and significant for all time periods except for the 1994-2001 time period. In addition, the results reveal that the Friday return—Monday return correlation diminished over the four subperiods. The Friday return—Monday return correlation during the last half of the month is unstable. Except for the 1986-1993 time period when the correlation is positive and significant, the Friday return—Monday return correlation is not significantly different from zero. This suggests that the Friday return—Monday return correlation results arise from previous day returns during the first half of the month. Unfortunately, there is no logical explanation for why individual investors would be influenced by previous day returns during the first half of the month and not during the last half of the month. This finding provides more evidence to dispute the information-processing hypothesis. During the 1994-2001 period, the Friday return—Monday return correlation is not significantly different from zero during the first half and last half of the month.

Table 7 reports the influence the week of the month has on the average Monday return and the influence of previous day returns for the Nasdaq when estimating equation (3) for the five time periods. When accounting for previous day returns, the negative average Monday return is a result of significant negative returns during the first half of the month for the 1970-1977 and 1978-1985 time periods and a result of significant negative returns during the last half of the month for the 1986-1993 time period. When accounting for previous day returns, the average Monday return is not significantly different from zero during the first half and last of the month.

As found with the S&P results, the Nasdaq results show that Friday return—Monday return correlation is positive and significant during the first half of the month. As with the S&P, the correlation diminishes over the four subperiods. During the 1986-1993 time period, the Nasdaq Friday return—Monday return correlation is positive and significant and not significantly different during the first half of the month and the last half of the month. This is not true of the other subperiods. During

Table 6: S&P week-of-the-month effect

	Monday[a]	Tuesday[a]	Wednes[a]	Thursday[a]	Friday[a]	MPDR[a]	TPDR[a]	WPDR[a]	HPDR[a]	FPDR[a]	MPDR=…=FPDR[b]
First Half											
1970-2001	.0328	.0091	.0730**	.0055	.0771**	.2161***	-.0393	.0954**	.1317***	.1468***	7.911***
	(0.311)	(0.771)	(0.019)	(0.860)	(0.015)	(0.000)	(0.223)	(0.017)	(0.000)	(0.000)	(0.000)
1970-1977	-.0968	-.0149	.0767	.0087	.0475	.4655***	.0746	.3041***	.1491**	.3171***	5.269***
	(0.119)	(0.805)	(0.209)	(0.886)	(0.435)	(0.000)	(0.216)	(0.000)	(0.014)	(0.000)	(0.000)
1978-1985	-.1273**	-.0019	.1023*	.1116*	.1062*	.2931***	-.0802	.1716**	.1033	.3097***	5.147***
	(0.045)	(0.975)	(0.090)	(0.065)	(0.086)	(0.000)	(0.210)	(0.014)	(0.105)	(0.000)	(0.000)
1986-1993	.1980***	-.0000	.1090	-.0867	-.0379	.1389**	.0348	.0068	.0538	.0479	0.508
	(0.004)	(0.999)	(0.101)	(0.194)	(0.576)	(0.044)	(0.603)	(0.924)	(0.513)	(0.523)	(0.730)
1994-2001	.1517**	.0609	.0128	-.0045	.1499**	.0598	-.2272***	.0838	.2241***	-.1095	5.953***
	(0.016)	(0.315)	(0.832)	(0.940)	(0.014)	(0.001)	(0.000)	(0.212)	(0.003)	(0.153)	(0.000)
Last Half											
1970-2001	-.1200***	.0848***	.0768**	.0231	.0383	.3977***	-.1211***	.1133***	.05736	.1959***	32.93***
	(0.000)	(0.009)	(0.019)	(0.489)	(0.246)	(0.000)	(0.000)	(0.001)	(0.131)	(0.000)	(0.000)
1970-1977	-.1971***	.0418	.0560	.0427	.0408	.3903***	.2127***	.1675**	.3214***	.3183***	1.661
	(0.001)	(0.485)	(0.342)	(0.480)	(0.497)	(0.000)	(0.001)	(0.013)	(0.000)	(0.000)	(0.157)
1978-1985	-.0735	.0885	.0836	-.0460	.0539	.3574***	-.1306**	-.0282	.0357	.2173***	7.759***
	(0.221)	(0.128)	(0.149)	(0.439)	(0.360)	(0.000)	(0.029)	(0.658)	(0.637)	(0.006)	(0.000)
1986-1993	-.1969**	.1038	.1094	.1368*	.0513	.5418***	-.2166***	.2649***	-.1613**	.1688**	22.86***
	(0.016)	(0.186)	(0.164)	(0.089)	(0.520)	(0.000)	(0.000)	(0.001)	(0.045)	(0.033)	(0.000)
1994-2001	-.0126	.1406**	.0688	-.0121	.0036	.1682**	-.1313**	.0388	.0289	.1222*	2.858**
	(0.844)	(0.021)	(0.268)	(0.847)	(0.954)	(0.044)	(0.036)	(0.557)	(0.732)	(0.058)	(0.022)

*** significant at $p < .01$; ** significant at $p < .05$; * significant at $p < .10$

[a] The day-of-the-week dummy regression coefficients are the daily mean returns assuming the PDRs are zero. The PDR regression coefficients are the daily mean returns attributed to PDRs. The p-values of the regression coefficients are reported in parentheses below the estimates

[b] The F-test results tests whether that the influence of PDRs is the same for all days of the week, or Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$. The p-values are reported in parentheses below the test statistic

Table 7—Nasdaq Week-of-the-Month Effect

	Monday[a]	Tuesday[a]	Wednes[a]	Thursday[a]	Friday[a]	MPDR[a]	TPDR[a]	WPDR[a]	HPDR[a]	FPDR[a]	MPDR=…=FPDR[b]
First Half											
1970-2001	-.0434**	-.0254	.0466***	.0494***	.0615***	.3031***	.0379	.0895***	.1453***	.1482***	7.494***
	(0.017)	(0.142)	(0.007)	(0.004)	(0.000)	(0.000)	(0.274)	(0.007)	(0.000)	(0.000)	(0.000)
1970-1977	-.0756***	-.0360	.0345	.0411*	.0543**	.5905***	.1971***	.4468***	.2102***	.3200***	6.833***
	(0.001)	(0.107)	(0.124)	(0.065)	(0.018)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
1978-1985	-.1527***	-.0073	.0617***	.0808***	.0873***	.5940***	-.2570***	.4929***	.3443***	.4917***	4.251***
	(0.000)	(0.725)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
1986-1993	.0079	.0042	.0726***	-.0061	.0013	.4599***	.2562***	.2304***	.2821***	.2361***	1.893
	(0.745)	(0.857)	(0.002)	(0.798)	(0.955)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.110)
1994-2001	-.0101	-.0591	.0286	.0602	.0581	.1822**	-.1071	-.0351	.0757	.0425	2.195*
	(0.854)	(0.314)	(0.614)	(0.288)	(0.315)	(0.017)	(0.153)	(0.587)	(0.278)	(0.567)	(0.068)
Last Half											
1970-2001	-.1104***	-.0023	.0537***	.0437**	.0371**	.2467***	.1453***	.0649*	.1117***	.1582***	3.285**
	(0.000)	(0.892)	(0.002)	(0.012)	(0.032)	(0.000)	(0.000)	(0.057)	(0.002)	(0.000)	(0.011)
1970-1977	-.1132***	-.0343	.0219	.0453**	.0335	.4989***	.2853***	.3071***	.3527***	.5294***	2.993**
	(0.000)	(0.127)	(0.324)	(0.043)	(0.133)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.018)
1978-1985	-.1367***	-.0130	.0849***	.0146	.0616***	.4437***	.1415**	.3288***	.3462***	-.0129	7.601***
	(0.000)	(0.562)	(0.000)	(0.529)	(0.006)	(0.000)	(0.017)	(0.000)	(0.000)	(0.845)	(0.000)
1986-1993	-.1312***	.0273	.0956***	.0711**	.0074	.8994***	.3600***	-.2046***	-.0261	.3783***	34.57***
	(0.000)	(0.333)	(0.001)	(0.013)	(0.793)	(0.000)	(0.000)	(0.001)	(0.712)	(0.000)	(0.000)
1994-2001	-.0665	.04570	.0234	.0439	.0338	-.0316	.0139	.0692	.0678	.0570	0.340
	(0.229)	(0.385)	(0.657)	(0.415)	(0.524)	(0.695)	(0.825)	(0.303)	(0.336)	(0.420)	(0.851)

*** significant at $p < .01$; ** significant at $p < .05$; * significant at $p < .10$

[a] The day-of-the-week dummy regression coefficients are the daily mean returns assuming the PDRs are zero. The PDR regression coefficients are the daily mean returns attributed to PDRs. The p-values of the regression coefficients are reported in parentheses below the estimates

[b] The F-test results tests whether that the influence of PDRs is the same for all days of the week, or Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$. The p-values are reported in parentheses below the test statistic

the 1970-1977 and 1978-1985 time periods, the Friday return—Monday return correlation is negative, but insignificantly different from zero. Surprisingly during the 1994-2001 time period, however, the Friday return—Monday return correlation is negative and significant and is significantly different from the Friday return—Monday return correlation during the first half of the month. Again, this provides evidence to dispute the information-processing hypothesis by documenting the instability of conditional relationships over time.

Conclusion

Over the 32-year period examined, the average Monday return has been unstable for the S&P and Nasdaq markets. This study investigates the influence of the previous day return on the average Monday return under different market conditions. The study finds that the reversal of the Monday effect for the S&P and the disappearance of a significant Monday effect for the Nasdaq cannot be attributed to the correlation of the average Monday return with the previous day return. Even when accounting for the good news/bad news markets and the week-of-the-month timing, the results of this study suggest that the changes in the average Monday returns do not result from the changes of the Friday return—Monday return correlation.

The information-processing hypothesis suggests that individual investors are influenced greatly by previous day returns. Individual investors gather investment information, including the Friday return, analyze the information over the weekend, and then act upon the information on Monday. The strong correlation between Friday and Monday returns support this hypothesis. The results of this study contradict the information-processing hypothesis argument. Over the last sixteen years of the study, and especially over the last eight years of the study, information and transaction costs have significantly declined. The proliferation of online brokerage firms, low cost trades, and the abundance of firm and market information have reduced the need for investors to postpone investment decisions to the weekend. The diminished influence of the previous day returns on the average Monday return under the different market conditions suggests that the wait-analyze-invest argument postulated by information-processing hypothesis is no longer supported. The changes in the correlation between Friday returns and the returns of the following Monday, however, are not consistent with observed changes in Monday returns.

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