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Day-of-the-week returns and mood: an exterior template approach

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Abstract

Rule- and template-based pattern-recognition methods are alternative ways to identify various patterns in stock prices alongside more traditional econometric tools. In this study, we generate an exterior template of mood scores from two perplexingly similar samples of mood scores 50 years apart. The mood scores template enables us to deploy a direct test of the behavioral explanation for the day-of-the-week effect. Our evidence shows that the day-of-the-week mood template is a potentially valid explanation of the day-of-the-week effect. Subperiod analysis suggests that the magnitude of the day-of-the-week effect has declined over time. That decline, however, is not uniform across size deciles and is more pronounced in larger capitalization deciles. There is no decline though in the ability of mood to explain the day-of-the-week effect.

Keywords: Pattern recognition, Template, Day-of-the-week effect, Monday effect, Behavioral finance

Background

A large body of research investigates the day-of-the-week effect in US stock returns.[1,2] Some studies mainly focus on the large negative abnormal return on Monday (e.g., Kelly, 1930; French, 1980), and some on both the Monday-negative and Friday-positive abnormal returns (e.g., Chen and Singal, 2003). Other studies suggest, however, that the day-of-the-week effect is not limited to Friday and Monday (e.g., French, 1980; Keim and Stambaugh, 1984; Birru, 2017). Keim and Stambugh (1984) and Birru (2017), for example, indicate a tendency for returns to improve during the week.

Different studies propose a number of explanations for the day-of-the-week effect, including measurement errors (Gibbons and Hess, 1981), settlement procedures (Gibbons and Hess, 1981; Lakonishok and Levi, 1982), and the timing of new information (Defusco et al., 1993; Damodaran, 1989; Dyl and Maberly, 1988). A more recent explanation by Chen and Singal (2003) relates the Monday-negative and Friday-positive abnormal returns to the activity of short sellers around the weekend.

Another possible explanation for the day-of-the-week effect is the behavioral hypothesis, which relates the day-of-the-week pattern of returns to the pattern of improving mood throughout the week. The behavioral hypothesis emerges from a line of research in psychology, which suggests that lower mood is associated with more prudent behavior and reduced risk taking (e.g., Cole et al., 1998; Bader, 2005; Kahnman, 2011). Lower mood and the resulting increased prudence at the beginning of the week can therefore potentially explain the increased tendency of individual investors to sell stocks on Monday, as documented by Abraham and Ikenberry (1994), Brockman and Michayluk (1998), Brooks and Kim (1997), and Lakonishok and Maberly (1990). The relation between mood and prudence can also explain the results of Pettengill (1993), who found that investors tend to take higher financial risks before the weekend and lower financial risks after the weekend.

Jacobs and Levy (1988) and Rystrom and Benson (1989) are the first to propose the behavioral hypothesis as a possible explanation for the day-of-the-week effect; neither, however, carry out statistical tests of the hypothesis. Gondhalekar and Mehdian (2003) find some supporting evidence for the behavioral hypothesis by showing that the negative returns on Mondays are intensified during periods of investor pessimism. More recently, Hirshleifer et al. (2017) find supporting evidence for the behavioral explanation of the day-of-the-week effect by using mood-mimicking returns to study the cross-section of returns.

Our interpretation of the behavioral hypothesis is that as the week progresses, the remaining time to the weekend break is shortened, creating anticipation for the break and better mood. If this hypothesis is true, then the day-of-the-week effect is a full-week effect, not limited to just Mondays and Fridays. To test this hypothesis, we build a template of mood scores and then test the ability of this template to explain the day-of-the-week effect.

The template approach has parallels in the literature on pattern recognition in stock prices. Fu et al. (2007) suggest that a time series of stock prices can be investigated using rule- or template-based pattern-recognition methods. A number of studies have examined rule-based patterns common among technical analysts, including Lo et al. (2000), Brock et al. (1992), and Bessembinder and Chan (1998). To illustrate a rule-based pattern in the context of the day-of-the-week effect, consider the following rule:

$$r_{Fri} > r_{Thu} > r_{Wed} > r_{Tue} > r_{Mon}.$$

This rule says that returns improve throughout the week—that is, Friday's return is larger than Thursday's, Thursday's larger than Wednesday's, and so forth. A rule-based pattern-recognition analysis of the day-of-the-week effect could begin, for example, by counting the number of instances where the rule is matched and compare it to the expected number of instances based on randomness.[3]

Template-based pattern-recognition methods are another way to identify patterns in stock prices. There are many possible sources for finding templates suitable for stock price pattern recognition. These include, but are not limited to, templates common among technical analysts, templates generated from other stock prices or stock market indices, templates generated from the earlier observations of the time series, and templates such as momentum that are more consistent with traditional research in finance. A simple hypothetical example of a template in the context of the day-of-the-week effect is

$$r_{Mon} = -0.030\%, r_{Tue} = 0.001\%, r_{Wed} = 0.003\%, r_{Thu} = 0.004\%, r_{Fri} = 0.0005\%$$

The analysis can then proceed in various ways to examine the appropriateness of the template, for example, by applying various distance measures, such as mean squared error (MSE), that measure the distance between the template and the true data. The template we use here is not a template of stock returns but a template of mood scores that comes from the exterior domain of human psyche—hence the expression "exterior template" in the title of this paper.

The mood scores template is generated from two samples of mood scores 50 years apart: mood scores reported by Farber (1953) and the results of a more recent survey of preferences for days of the week that we conducted in 2007. Our mood scores show the same tendency as Farber's (1953)—namely, that mood gradually improves during the week. Moreover, our survey results are highly correlated with those of Farber (linear correlation coefficient of 0.98), suggesting that attitudes toward days of the week did not change much over a period of more than 50 years.

To test the behavioral explanation of the day-of-the-week effect, we replicate the weekly mood-score template and regress the time series of daily returns directly on the repeatedly occurring mood-score template. This approach has an advantage over the mood-mimicking returns approach used by Hirshleifer et al. (2017) since it is impossible to know with certainty whether mood-mimicking returns actually mimic mood properly.

Our results indicate that the mood template is a potentially valid explanation of the day-of-the-week effect. Regressions of daily returns from 1953 to 2006 suggest that a simple average of the mood scores in Farber (1953) and our survey can explain 35% to 90% of the variation in average daily abnormal returns. Given evidence that individual investors tend to disproportionately invest in small stocks (Lee, Shleifer, and Thaler, 1991; Grinblatt and Moskowitz, 2004; Nagel, 2005), we expected the mood variable to be more powerful for small stocks. Our findings confirm this hypothesis and show that the ability of mood to explain abnormal returns is considerably higher in small capitalization deciles.

Several studies suggest that the magnitude of the day-of-the-week effect has declined over time. Therefore, we repeated the full-period analysis for three 18-year subperiods and found that the magnitude of the day-of-the-week effect has indeed declined over time. However, we found that the ability of mood to explain the day-of-the-week effect has remained relatively stable.

The rest of this paper is organized as follows. In section 2, we generate various mood scores based on Farber (1953) survey and a more recent survey we conducted in 2007. Section 3 analyzes the relation between mood and daily returns. Section 4 repeats the analysis of section 3 for three subperiods. Section 5 concludes the paper.

Day-of-the-week mood template

In this section, we generate a mood template consisting of five mood scores for .Monday through Friday. In doing so, we rely on two main sources for mood scores: mood scores obtained from a survey by Farber (1953) and a more recent survey we conducted among students in 2007.

Our 2007 sample consists of 153 third-year economics students, of which 136 returned the surveys (17 students did not return the questionnaire). Students were asked to fill out a single-page questionnaire concerning preferences for days of the week. We asked the students to assign a score between 1 and 10 to each day of the week, depending on how much they liked or disliked that day, with 1 as the lowest score and 10 as the highest. Students were instructed to record their score in the morning each day for a full week. Students were also asked to provide an explanation of why they had positive/negative feelings toward the day they liked/disliked the most. The questionnaire that was administered to students is provided in Additional file 1. The average results of the mood scores are reported in Table 1 in the column titled "2007 scores."

The second column in Table 1, titled "Farber scores," lists mood scores obtained by Farber (1953) from a survey of 80 students. Farber's methodology is slightly different from ours. Farber asked students to assign a ranking from 7 to 1 to each day of the week based on how much they liked the day, with 1 given to the most liked day and 7 to the most disliked day. Unlike our survey, the scores in Farber's survey are given without replacement, meaning that if a student assigned a certain score to one day, the student could not assign it to another day.

Interestingly, although the methodologies differ, the linear correlation coefficient between the mood scores in our survey and Farber's is very high at –0.98.[4] Such a high correlation coefficient suggests that, although the samples are more than 50 years apart, attitudes toward days of the week have not changed much. Fig. 1 displays the two sets of scores against each other.

Since correlation is a linear measure, the high correlation between our scores and Farber's implies that one can transform Farber's mood template to our scale using linear transformation. To find this transformation, we estimate an OLS regression with our scores as the dependent variable and Farber's scores as the explanatory. The regression equation is.

$$\mathrm{OS_D} = 9.988\text{–}0.817\mathrm{FS_D},$$

where $\mathrm{OS_D}$ is our score for day D and $\mathrm{FS_D}$ is Farber's score for day D. Using this regression, we transform Farber's scores to our scale. The transformed Farber template is shown in the third column of Table 1, titled "Farber scores transformed." Fig. 2 plots the transformed Farber score and our score side by side. Aside from the high degree of proximity between the two sets of scores, it is also apparent from Fig. 2 that both mood templates (Farber's and ours) display a monotonously improving pattern of mood throughout the week.

The goal of this study is to analyze the relation between the day-of-the-week effect and mood by regressing daily returns on mood scores. For this purpose, we generate two representative weighted mood templates from Farber's (1953) scores and our 2007 scores. The first uses a simple average of the two sets of scores (ours and Farber's

Table 1 Day-of-the-week mood scores (Monday through Friday)

Day	2007 scores	Farber original scores	Farber scores transformed	Mood score - simple average	Mood score -weighted average
Monday	5.21	6.10	5.00	5.11	5.13
Tuesday	5.66	5.00	5.90	5.78	5.75
Wednesday	5.78	4.90	5.98	5.88	5.86
Thursday	6.67	4.30	6.47	6.57	6.60
Friday	7.67	2.90	7.62	7.64	7.65

Table 1 Presents mood templates for days of the week from Monday to Friday. The mood scores are obtained from two sources, a study conducted by Farber (1953) and a more recent survey we conducted in 2007. The column titled "2007 scores" presents average mood levels in our 2007 sample of 136 third-year finance students. The second column presents results from Farber's (1953) study. The third column presents Farber's scores linearly transformed to the basis of our 2007 scores. The forth column is a simple average of the first and third columns. The fifth column is a weighted average of the first and third columns, with student numbers serving as the weights (Farber's sample consists of 80 students while in ours there are 136 students)

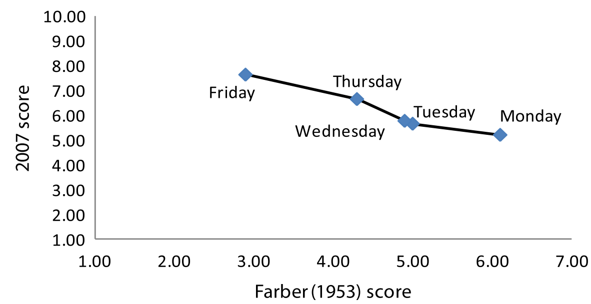

Fig. 1 The relation between mood scores in our (2007) sample and mood scores in Farber (1953) sample

transformed), and the second uses a weighted average with the weights determined by the number of students in each survey. The simple average and the weighted average mood templates are presented in columns 4 and 5 of Table 1 under the titles "Mood score – simple average" and "Mood score – weighted average," respectively.

Day-of-the-week effect and mood: Full-period analysis

In this section, we provide a full-period analysis of the day-of-the-week effect. First, we use a dummy variable model to study the day-of-the-week effect; next, we regress the time series of returns on the mood template.

The sample used in this study includes all stocks listed on the NYSE, AMEX, and NASDAQ in the CRSP daily data file. In 2005, the CRSP extended the daily data file from 1965 back to 1926. Since US exchanges moved from a six-day to a five-day trading week in mid-1952, the data we use are from 1953 to 2006. The analysis includes an equally-weighted (EW) portfolio of all stocks, a value-weighted (VW) portfolio, and 10 decile portfolios sorted by market capitalization, with 1 being the smallest capitalization decile and 10 the largest. Continuously compounded returns are calculated and then analyzed for each portfolio and decile.

Analysis of the day-of-the-week effect with a dummy variable model

Here, we regress the time series of daily returns on five dummy variables—a dummy variable for each day of the week. The regression dummy variable model is as follows:

$$r_{ab,p,t} = \sum\nolimits_{i=1}^{5} \widehat{\alpha}_{p,i} DW_{i,t} + e_{p,t} \qquad (1)$$

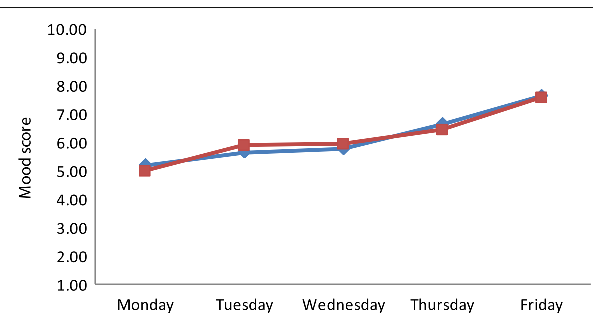

Fig. 2 Comparison of the linearly transformed Farber scores and our scores

where $r_{ab,p,t}$ is the abnormal return of portfolio p on day t (defined as the return of portfolio p on day t minus the portfolio's average return over the whole sample period), $DW_{i,t}$ is a dummy variable equal to 1 on day i of the week and 0 for other days, $i = 1,2,3,4,5$, $\widehat{\alpha}_{p,i}$ is the estimated regression coefficient of the respective dummy variable, and $e_{p,t}$ is the regression residual for portfolio *p*.

Note that in this setting, the regression coefficient $\widehat{\alpha}_{p,i}$ has an interpretation of average abnormal return for portfolio p on day i of the week. The results for the dummy variable regression model in (1) are reported in Table 2.

The upper part of Table 2 reports the single-coefficient results for the dummy variable model, including regression coefficients, Newey-West standard errors, and the corresponding *t*-statistics and *p*-values. The adjustment for serial correlation and heteroscedasticity follows evidence in the literature showing that daily returns are serially correlated and heteroscedastic (e.g., Kiymaz and Berument, 2003; Aggrawal and Schatzberg, 1997; Connolly, 1989; Bessembinder and Hertzel, 1993).[5]

The results in Table 2 suggest that the large majority of the single coefficients are statistically significant at conventional significance levels. Consistent with the behavioral hypothesis, in deciles 1 through 4, there is a clear trend of improving returns throughout the week. In deciles 5 through 9, and in the EW portfolio, there is also a general tendency for returns to improve throughout the week, but the pattern is disrupted by the fact that Wednesday's abnormal return is larger than Thursday's. In decile 10, and in the value-weighted portfolio, the interruption to the monotonicity of the pattern is even larger since Wednesday's abnormal return is larger than both Thursday's and Friday's abnormal returns. These results suggest that a pattern of improving returns is confirmed in the smallest capitalization deciles, but there is a larger degree of violation in the pattern as market capitalization becomes larger. In general, the results suggest that if the behavioral explanation is true, then its effect is more dominant in the smaller capitalization deciles. For illustration, Fig. 3 shows the patterns of abnormal returns in the EW and VW portfolios.

The bottom part of Table 2 reports the results for the regression model in (1) as a whole, including R^2 and $adjR^2$. F-statistics and the corresponding *p*-values for the null hypothesis

$$H_0 : \alpha_{p,1} = \alpha_{p,2} = \alpha_{p,3} = \alpha_{p,4} = \alpha_{p,5} = 0$$

are also reported using Newey-West standard errors. The results at the bottom part of Table 2 show that the *p*-values for the F-statistics are practically zero for all portfolios and deciles, suggesting strong statistical significance of the dummy variable model in (1).

Day-of-the-week effect and mood

The fact that both mood and returns show tendency to improve throughout the week (albeit with some violations of the pattern in the larger capitalization deciles) suggests that mood is a possible explanation for the day-of-the-week effect. We now follow to test this hypothesis using the following regression model:

$$r_{ab,p,t} = \widehat{\delta}_{p,0} + \widehat{\delta}_{p,1} mood_t + e_{p,t} \quad (2)$$

Where $mood_t$ is the mood on day t fitted by day of the-week, $\widehat{\delta}_{p,0}$ is the estimated regression intercept, and $\widehat{\delta}_{p,1}$ is the estimated regression slope coefficient.

Table 2 Dummy-variable model of the day-of-the-week effect, full-period analysis 1953-2006

	VW	EW	1	2	3	4	5	6	7	8	9	10
Mon. coefficient	-0.1222	-0.1844	-0.1595	-0.1891	-0.1974	-0.1977	-0.2008	-0.1935	-0.1823	-0.1707	-0.1612	-0.1105
Newey-West S.E.	0.0204	0.0178	0.0193	0.0180	0.0185	0.0189	0.0195	0.0199	0.0200	0.0199	0.0199	0.0210
t-statistic	-5.99	-10.36	-8.26	-10.51	-10.67	-10.46	-10.30	-9.72	-9.12	-8.58	-8.10	-5.26
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Tue. coefficient	-0.0080	-0.0714	-0.1417	-0.1188	-0.1025	-0.0931	-0.0746	-0.0659	-0.0537	-0.0423	-0.0361	0.0033
Newey-West S.E.	0.0156	0.0136	0.0163	0.0148	0.0148	0.0147	0.0152	0.0154	0.0158	0.0154	0.0151	0.0164
t-statistic	-0.51	-5.25	-8.69	-8.03	-6.93	-6.33	-4.91	-4.28	-3.40	-2.75	-2.39	0.20
p-value	*61.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*0.6%*	*1.7%*	*84.0%*
Wed. coefficient	0.0604	0.0568	0.0247	0.0412	0.0474	0.0512	0.0635	0.0682	0.0695	0.0740	0.0694	0.0578
Newey-West S.E.	0.0153	0.0132	0.0152	0.0134	0.0132	0.0135	0.0142	0.0147	0.0151	0.0150	0.0149	0.0159
t-statistic	3.95	4.30	1.63	3.07	3.59	3.79	4.47	4.64	4.60	4.93	4.66	3.64
p-value	*0.0%*	*0.0%*	*10.3%*	*0.2%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Thu. coefficient	0.0122	0.0505	0.0622	0.0630	0.0624	0.0595	0.0551	0.0547	0.0496	0.0397	0.0389	0.0038
Newey-West S.E.	0.0155	0.0136	0.0152	0.0140	0.0140	0.0140	0.0148	0.0152	0.0154	0.0154	0.0151	0.0160
t-statistic	0.79	3.71	4.09	4.50	4.46	4.25	3.72	3.60	3.22	2.58	2.58	0.24
p-value	*43.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*1.0%*	*1.0%*	*81.3%*
Fri. coefficient	0.0522	0.1420	0.2106	0.1981	0.1838	0.1736	0.1495	0.1293	0.1099	0.0923	0.0823	0.0405
Newey-West S.E.	0.0149	0.0125	0.0151	0.0131	0.0130	0.0131	0.0137	0.0142	0.0145	0.0143	0.0143	0.0155
t-statistic	3.50	11.36	13.95	15.12	14.14	13.25	10.91	9.11	7.58	6.45	5.76	2.61
p-value	*0.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.9%*
R^2	0.0058	0.0256	0.0308	0.0368	0.0335	0.0305	0.0247	0.0204	0.0162	0.0136	0.0119	0.0043
Adjusted R^2	0.0055	0.0253	0.0305	0.0365	0.0332	0.0302	0.0244	0.0201	0.0159	0.0134	0.0116	0.0040
F-statistic	15.0	85.2	107.7	131.9	116.2	102.1	78.0	61.1	48.4	40.1	33.9	10.6
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*

Table 2 describes the results for a dummy-variable regression model of the day-of-the-week effect. The regression model is estimated for value-weighted, equally-weighted, and size decile portfolios (with 1 indicating the smallest capitalization decile). The results show clear tendency for returns to improve throughout the week in the four smallest capitalization deciles, but the pattern is less monotonous in the larger capitalization deciles. F-statistics for the joint null hypothesis $H_0: \alpha_{p,1} = \alpha_{p,2} = \alpha_{p,3} = \alpha_{p,4} = \alpha_{p,5} = 0$ are reported at the bottom of Table 2. Corresponding p-values suggest that the null hypothesis is rejected for all portfolios. All the tests are adjusted for heteroscedasticity and serial correlation using Newey-West standard errors

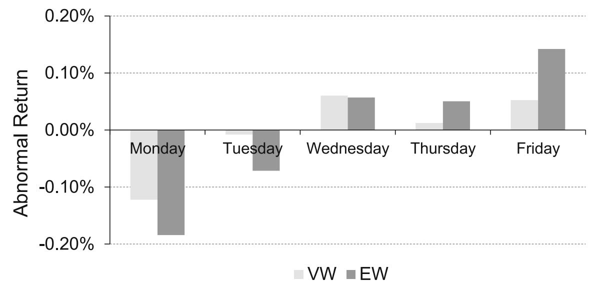

Fig. 3 Day-of-the-week abnormal returns in the equally- and value-weighted portfolios, 1953–2006

In estimating (2), we use the four mood templates reported in columns 1, 3, 4, and 5 of Table 1 (these are the "2007 scores," "Farber scores transformed," "mood score simple average," and "mood score weighted average"). The prediction of the behavioral hypothesis is that the sign of the regression slope coefficient, $\widehat{\delta}_{p,1}$, should be positive and statistically significant.

In addition to the standard regression output for the model in (2), we also measure the proportion of the variation of the average daily abnormal returns explained by mood. Our measure is the ratio of the R^2 of the mood regression divided by the R^2 of the corresponding dummy-variable regression. Note that since the denominator for the two R^2 is identical and equal to the sum of squares of unconditional returns, this measure is actually the ratio of the two explained sum of squares. Note also that the dummy variable model is, by construction, the best in terms of explaining the daily pattern of abnormal returns, and therefore the ratio of the two R^2 must be between zero and unity. The higher the ratio of the two R^2, the higher the proportion of variation in abnormal average returns that can be attributed to the mood template.

Table 3 reports the results of the mood regression models with the four mood scores reported in columns 1, 3, 4, and 5 of Table 1. Panel A in Table 3 shows the results with the 2007 mood scores, panel B with Farber's mood scores, panel C with the simple average of the two mood scores, and Panel D with the weighted average of the two mood scores. The results show that regardless of the mood score used, the coefficient of the mood score is positive for all deciles and portfolios. Furthermore, the regression coefficient of the mood variable is statistically significant in all cases. The results are thus consistent with the prediction of the behavioral explanation of the day-of-the-week effect.

Panels C and D in Table 3 report the results with the simple-average and weighted-average mood templates. Since those two averages incorporate mood scores from both 1953 and 2007, they may be more inclusive than the results for the standalone mood score reported in Panels A and B. An important result in Panels C and D is the proportion of variation of average daily abnormal returns explained by mood as measured by the ratio of the R^2 of the mood regression to the dummy variable regression. Panel C shows that these proportions are substantial, equaling 79.1% and 48.2% for the EW and VW portfolios, respectively. The results in Panel D are similar but slightly weaker: 77.9% and 45.9%, respectively. The results in Panel C also suggest a clear trend of declining ability of mood to explain the day-of-the-week effect: the ratio of the two R^2 monotonically declines from 87.4% in the smallest capitalization decile to 39.7% in the

Table 3 Day-of-the-week effect and mood

	VW	EW	1	2	3	4	5	6	7	8	9	10
Panel A: 2007 scores												
λ_0	-0.2899	-0.6905	-0.9099	-0.8949	-0.8544	-0.8172	-0.7357	-0.6647	-0.5852	-0.5039	-0.4621	-0.2288
Newey-West S.E.	0.0502	0.0417	0.0446	0.0412	0.0424	0.0439	0.0461	0.0484	0.0496	0.0489	0.0494	0.0520
t-statistic	-5.77	-16.56	-20.40	-21.72	-20.15	-18.62	-15.96	-13.73	-11.80	-10.30	-9.35	-4.40
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
λ_1	0.0467	0.1114	0.1467	0.1443	0.1378	0.1318	0.1186	0.1072	0.0944	0.0813	0.0745	0.0369
Newey-West S.E.	0.0079	0.0063	0.0067	0.0061	0.0063	0.0066	0.0070	0.0073	0.0075	0.0075	0.0076	0.0082
t-statistic	5.94	17.80	22.03	23.69	21.84	20.09	17.04	14.60	12.52	10.87	9.83	4.51
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
R^2	0.0023	0.0189	0.0269	0.0311	0.0274	0.0243	0.0179	0.0137	0.0101	0.0075	0.0063	0.0013
Adjusted R^2	0.0022	0.0188	0.0268	0.0310	0.0274	0.0243	0.0178	0.0136	0.0100	0.0075	0.0063	0.0013
Proportion of the effect explained by mood	39.5%	73.8%	87.4%	84.5%	81.9%	79.8%	72.4%	67.3%	62.3%	55.2%	53.4%	30.8%
Panel B: Farber scores												
λ_0	-0.3571	-0.7526	-0.9250	-0.9355	-0.9060	-0.8740	-0.8047	-0.7345	-0.6557	-0.5772	-0.5319	-0.2963
Newey-West S.E.	0.0521	0.0428	0.0460	0.0423	0.0436	0.0451	0.0474	0.0496	0.0508	0.0502	0.0506	0.0540
t-statistic	-6.85	-17.58	-20.11	-22.12	-20.78	-19.38	-16.98	-14.81	-12.91	-11.50	-10.51	-5.49
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
λ_1	0.0576	0.1213	0.1491	0.1508	0.1460	0.1409	0.1297	0.1184	0.1057	0.0930	0.0857	0.0478
Newey-West S.E.	0.0081	0.0064	0.0068	0.0062	0.0064	0.0067	0.0071	0.0074	0.0077	0.0076	0.0077	0.0084
t-statistic	7.12	19.10	21.83	24.28	22.78	21.16	18.35	15.91	13.82	12.24	11.14	5.66
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
R^2	0.0033	0.0212	0.0263	0.0321	0.0292	0.0263	0.0202	0.0158	0.0120	0.0093	0.0079	0.0021
Adjusted R^2	0.0032	0.0212	0.0262	0.0321	0.0291	0.0263	0.0201	0.0158	0.0119	0.0093	0.0079	0.0020

Table 3 Day-of-the-week effect and mood *(Continued)*

	VW	EW	1	2	3	4	5	6	7	8	9	10
Proportion of the effect explained by mood	56.7%	82.9%	85.3%	87.3%	87.0%	86.3%	81.9%	77.7%	73.9%	68.4%	66.9%	48.8%
Panel C: Simple average												
λ_0	-0.3266	-0.7297	-0.9287	-0.9260	-0.8904	-0.8553	-0.7788	-0.7073	-0.6272	-0.5462	-0.5022	-0.2649
Newey-West S.E.	0.0513	0.0425	0.0455	0.0419	0.0432	0.0447	0.0469	0.0493	0.0505	0.0498	0.0503	0.0532
t-statistic	-6.37	-17.17	-20.41	-22.10	-20.61	-19.13	-16.61	-14.35	-12.42	-10.97	-9.98	-4.98
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
λ_1	0.0526	0.1176	0.1497	0.1493	0.1436	0.1379	0.1256	0.1140	0.1011	0.0881	0.0810	0.0427
Newey-West S.E.	0.0080	0.0063	0.0068	0.0062	0.0064	0.0067	0.0071	0.0074	0.0076	0.0076	0.0077	0.0083
t-statistic	6.58	18.55	22.08	24.16	22.47	20.74	17.82	15.34	13.23	11.64	10.56	5.12
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
R^2	0.0028	0.0203	0.0269	0.0320	0.0286	0.0256	0.0192	0.0149	0.0111	0.0085	0.0072	0.0017
Adjusted R^2	0.0027	0.0202	0.0268	0.0319	0.0286	0.0256	0.0192	0.0148	0.0111	0.0084	0.0071	0.0016
Proportion of the effect explained by mood	48.2%	79.1%	87.4%	86.9%	85.4%	84.0%	77.9%	73.2%	68.7%	62.3%	60.6%	39.7%
Panel D: Weighted average												
λ_0	-0.3175	-0.7209	-0.9259	-0.9199	-0.8829	-0.8471	-0.7691	-0.6976	-0.6174	-0.5362	-0.4927	-0.2559
Newey-West S.E.	0.0510	0.0423	0.0453	0.0418	0.0430	0.0446	0.0468	0.0491	0.0503	0.0496	0.0501	0.0529
t-statistic	-6.23	-17.04	-20.44	-22.01	-20.53	-18.99	-16.43	-14.21	-12.27	-10.81	-9.83	-4.84
p-value	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
λ_1	0.0512	0.1162	0.1493	0.1483	0.1424	0.1366	0.1240	0.1125	0.0996	0.0865	0.0794	0.0413
Newey-West S.E.	0.0080	0.0063	0.0068	0.0062	0.0064	0.0066	0.0070	0.0074	0.0076	0.0076	0.0077	0.0083
t-statistic	6.42	18.39	22.09	24.07	22.32	20.60	17.64	15.18	13.07	11.44	10.37	4.98

Table 3 Day-of-the-week effect and mood *(Continued)*

	VW	EW	1	2	3	4	5	6	7	8	9	10
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
R^2	0.0027	0.0200	0.0270	0.0318	0.0284	0.0253	0.0189	0.0146	0.0109	0.0083	0.0070	0.0016
Adjusted R^2	0.0026	0.0199	0.0269	0.0318	0.0283	0.0253	0.0189	0.0146	0.0108	0.0082	0.0069	0.0015
Proportion of the effect explained by mood	45.9%	77.9%	87.6%	86.5%	84.7%	83.0%	76.6%	71.8%	67.1%	60.5%	58.8%	37.3%

Table 3 provides analysis of the day-of-the-week effect with mood as the explanatory variable. The results are reported in four panels corresponding to four types of mood scores presented in Table 1 (columns 1, 3, 4 and 5 in Table 1). The regression coefficient of the mood variable is positive and statistically significant for all deciles and portfolios suggesting that the behavioral hypothesis is a possible explanation for the day of the week effect. The bottom line of each panel presents the proportion of the daily variation of average abnormal returns explained by mood, measured as the ratio of the R^2 of the mood variable regression to the R^2 of the respective dummy variable regression. Using the simple average mood template (Panel C), these proportions are approximately 79% and 48% for the EW and VW portfolios, respectively. The results for the R^2 ratios are declining with size suggesting that the ability of mood to explain the day-of-the-week effect declines with market capitalization. All the tests are adjusted for heteroscedasticity and serial correlation using Newey-West standard errors largest capitalization decile. In Panel D, a similar declining trend can be seen—from 87.6% in the smallest capitalization decile to 37.3% in the largest capitalization decile. We conclude that the ability of mood to explain the day-of-the-week effect is substantial but declines with market capitalization.

Day-of-the-week effect and mood: Subperiod analysis

In this section, we examine the day-of-the-week effect and its relation to mood in three 18-year subperiods: 1953–1970, 1971–1988, and 1989–2006. The main purpose of these tests is to examine the evolution of the day-of-the-week effect over time and to test whether the ability of mood to explain the effect is consistent over time.

Subperiod analysis of the day-of-the-week effect using a dummy variable model

Here, we repeat the analysis with the dummy variable model in (1) applied to each of the three subperiods. The main purpose of these regressions is to obtain a benchmark for the performance of mood in the three subperiods and to get a sense of the evolution of the effect over time. The estimation results for the three subperiods are reported in Table 4.

Panel A in Table 4 reports the results for the first subperiod, Panel B for the second subperiod, and Panel C for the third subperiod. The first part in each panel reports the daily coefficients and their statistical significance, and the second part reports results for the regression as a whole (R^2, adj R^2, F-statistics, and corresponding *p*-values). All tests are adjusted for serial correlation and heteroscedasticity using Newey-West standard errors (Newey and West 1987).

An examination of the coefficients in Table 4 suggests that the pattern of improving returns throughout the week is also present in the subperiods. However, as in the full-period analysis, Wednesday's return seems too high and violates the pattern in many cases. Furthermore, consistent with some recent studies, there is a tendency for the effect to decline over time. This can be observed in the size of the F-statistics in the EW and VW portfolios. In the VW portfolio, the F-statistic is 30.0 in the first subperiod, 6.6 in the second, and 6.6 again in the third. In the EW portfolio, the F-statistics are 37.7, 40.3, and 16.3, respectively. Hence, although not entirely smooth, there is a clear tendency of decline in the magnitude of the day-of-the-week effect over time. Note also that, as part of this decline, the effect disappeared in the last subperiod in the largest capitalization decile and became borderline significant in decile 9. Nevertheless, the effect remains statistically significant in all other 8 deciles and in the EW and VW portfolios, even in the last subperiod. Consistent with other studies, we conclude that the results show a decline in the magnitude of the effect over time (e.g., Brusa et al., 2000; Gu, 2004; Kohers et al., 2004; Mehdian and Perry, 2001; Kamara, 1997, for similar evidence), but the effect has not vanished.

Subperiod analysis using mood as an explanatory variable

Here, we examine the ability of mood to explain the day-of-the-week effect in the three subperiods. For this purpose, we estimate again the mood regression model in (2) in each of the three subperiods. For the sake of brevity, we only report the results for the simple average mood template reported in column 4 of Table 1. The results are shown in Table 5.

The results in Table 5 are generally consistent with the prediction of the behavioral hypothesis for the day-of-the-week effect: the sign of the mood coefficient is positive

Table 4 Dummy variable model of the day-of-the-week effect, subperiod analysis

	VW	EW	1	2	3	4	5	6	7	8	9	10
Panel A: 1953-1970												
Mon. coefficient	-0.2158	-0.2158	-0.1825	-0.2124	-0.2344	-0.2309	-0.2348	-0.2299	-0.2173	-0.2062	-0.1978	-0.2036
Newey-West S.E.	0.0299	0.0299	0.0334	0.0323	0.0321	0.0319	0.0329	0.0321	0.0303	0.0295	0.0284	0.0293
t-statistic	-7.11	-7.21	-5.47	-6.58	-7.31	-7.23	-7.13	-7.16	-7.17	-7.00	-6.95	-6.96
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Tue. coefficient	-0.0583	-0.0583	-0.1311	-0.1050	-0.0768	-0.0821	-0.0560	-0.0437	-0.0367	-0.0267	-0.0192	-0.0025
Newey-West S.E.	0.0210	0.0210	0.0260	0.0248	0.0245	0.0231	0.0239	0.0227	0.0219	0.0203	0.0200	0.0222
t-statistic	-0.54	-2.77	-5.04	-4.23	-3.14	-3.55	-2.34	-1.93	-1.68	-1.31	-0.96	-0.11
p-value	*59.1%*	*0.6%*	*0.0%*	*0.0%*	*0.2%*	*0.0%*	*1.9%*	*5.4%*	*9.3%*	*18.9%*	*33.9%*	*91.2%*
Wed. coefficient	0.1005	0.1005	0.0890	0.0956	0.1082	0.0896	0.1196	0.1139	0.1055	0.1061	0.0932	0.0920
Newey-West S.E.	0.0213	0.0213	0.0247	0.0232	0.0231	0.0230	0.0239	0.0232	0.0221	0.0209	0.0202	0.0219
t-statistic	4.52	4.72	3.60	4.13	4.67	3.90	5.00	4.91	4.77	5.08	4.62	4.21
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Thu. coefficient	0.0392	0.0392	0.0615	0.0486	0.0475	0.0509	0.0344	0.0390	0.0348	0.0192	0.0247	0.0151
Newey-West S.E.	0.0219	0.0219	0.0261	0.0244	0.0245	0.0241	0.0247	0.0236	0.0221	0.0213	0.0199	0.0198
t-statistic	0.98	1.79	2.36	1.99	1.94	2.11	1.39	1.65	1.57	0.90	1.24	0.76
p-value	*32.9%*	*7.3%*	*1.9%*	*4.6%*	*5.2%*	*3.5%*	*16.3%*	*9.8%*	*11.6%*	*36.6%*	*21.6%*	*44.7%*
Fri. coefficient	0.1317	0.1317	0.1618	0.1712	0.1528	0.1699	0.1336	0.1175	0.1106	*0.1047*	0.0962	0.0958
Newey-West S.E.	0.0197	0.0197	0.0269	0.0233	0.0228	0.0218	0.0224	0.0207	0.0202	0.0186	0.0179	0.0189
t-statistic	5.42	6.70	6.03	7.35	6.71	7.80	5.96	5.67	5.47	5.62	5.38	5.07
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
R^2	0.0284	0.0344	0.0273	0.0345	0.0343	0.0364	0.0319	0.0313	0.0302	0.0302	0.0285	0.0258
Adjusted R^2	0.0275	0.0336	0.0265	0.0337	0.0335	0.0355	0.0310	0.0304	0.0293	0.0293	0.0277	0.0249
F-statistic	30.0	37.7	25.7	37.0	36.2	40.6	33.5	32.8	31.5	33.0	29.8	27.0

Table 4 Dummy variable model of the day-of-the-week effect, subperiod analysis *(Continued)*

	VW	EW	1	2	3	4	5	6	7	8	9	10
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Panel B: 1971-1988												
Mon. coefficient	-0.1589	-0.1998	-0.1498	-0.1902	-0.2001	-0.2119	-0.2321	-0.2308	-0.2195	-0.2144	-0.2090	-0.1439
Newey-West S.E.	0.0424	0.0332	0.0310	0.0327	0.0343	0.0354	0.0362	0.0367	0.0374	0.0377	0.0387	0.0442
t-statistic	-3.75	-6.01	-4.82	-5.82	-5.83	-5.98	-6.41	-6.28	-5.87	-5.68	-5.40	-3.26
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*
Tue. coefficient	0.0001	-0.1007	-0.1432	-0.1554	-0.1415	-0.1446	-0.1251	-0.1152	-0.0982	-0.0783	-0.0585	0.0206
Newey-West S.E.	0.0271	0.0241	0.0264	0.0259	0.0268	0.0277	0.0274	0.0279	0.0279	0.0270	0.0265	0.0289
t-statistic	0.00	-4.18	-5.43	-5.99	-5.28	-5.23	-4.56	-4.12	-3.52	-2.90	-2.21	0.71
p-value	*99.6%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.4%*	*2.7%*	*47.6%*
Wed. coefficient	0.0596	0.0424	-0.0057	0.0158	0.0212	0.0454	0.0505	0.0560	0.0605	0.0647	0.0711	0.0578
Newey-West S.E.	0.0280	0.0226	0.0228	0.0231	0.0231	0.0239	0.0247	0.0252	0.0260	0.0256	0.0263	0.0293
t-statistic	2.13	1.87	-0.25	0.68	0.91	1.90	2.04	2.22	2.33	2.52	2.71	1.97
p-value	*3.4%*	*6.1%*	*80.4%*	*49.4%*	*36.0%*	*5.8%*	*4.1%*	*2.7%*	*2.0%*	*1.2%*	*0.7%*	*4.9%*
Thu. coefficient	0.0248	0.0709	0.0523	0.0854	0.0848	0.0866	0.0848	0.0857	0.0789	0.0781	0.0665	0.0116
Newey-West S.E.	0.0267	0.0220	0.0236	0.0228	0.0237	0.0239	0.0245	0.0248	0.0250	0.0246	0.0248	0.0282
t-statistic	0.93	3.23	2.22	3.74	3.58	3.63	3.45	3.46	3.15	3.17	2.68	0.41
p-value	*35.4%*	*0.1%*	*2.7%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*0.1%*	*0.2%*	*0.2%*	*0.7%*	*68.1%*
Fri. coefficient	0.0661	0.1798	0.2433	0.2392	0.2296	0.2174	0.2134	0.1955	0.1694	0.1408	0.1205	0.0459
Newey-West S.E.	0.0261	0.0216	0.0222	0.0226	0.0229	0.0236	0.0239	0.0244	0.0244	0.0242	0.0246	0.0274
t-statistic	2.53	8.32	10.96	10.58	10.04	9.22	8.94	8.02	6.93	5.82	4.90	1.67
p-value	*1.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*9.4%*
R^2	0.0079	0.0342	0.0433	0.0476	0.0425	0.0405	0.0388	0.0345	0.0279	0.0240	0.0199	0.0056
Adjusted R^2	0.0071	0.0333	0.0425	0.0468	0.0417	0.0397	0.0380	0.0337	0.0270	0.0231	0.0190	0.0048

Table 4 Dummy variable model of the day-of-the-week effect, subperiod analysis *(Continued)*

	VW	EW	1	2	3	4	5	6	7	8	9	10
F-statistic	6.6	40.3	69.1	65.5	54.1	46.6	46.2	39.1	30.5	24.6	19.3	4.2
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*
Panel C: 1989-2006												
Mon. coefficient	0.0007	-0.1357	-0.1456	-0.1640	-0.1566	-0.1492	-0.1339	-0.1181	-0.1087	-0.0896	-0.0751	0.0194
Newey-West S.E.	0.0320	0.0270	0.0330	0.0259	0.0268	0.0280	0.0298	0.0325	0.0345	0.0344	0.0345	0.0326
t-statistic	0.02	-5.02	-4.41	-6.32	-5.85	-5.33	-4.50	-3.63	-3.16	-2.61	-2.18	0.60
p-value	*98.3%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.2%*	*0.9%*	*3.0%*	*55.1%*
Tue. coefficient	-0.0127	-0.0553	-0.1504	-0.0958	-0.0887	-0.0524	-0.0426	-0.0386	-0.0261	-0.0218	-0.0302	-0.0083
Newey-West S.E.	0.0317	0.0239	0.0295	0.0236	0.0235	0.0235	0.0258	0.0278	0.0302	0.0308	0.0305	0.0329
t-statistic	-0.40	-2.31	-5.09	-4.07	-3.77	-2.23	-1.65	-1.39	-0.86	-0.71	-0.99	-0.25
p-value	*68.8%*	*2.1%*	*0.0%*	*0.0%*	*0.0%*	*2.6%*	*9.9%*	*16.5%*	*38.8%*	*47.9%*	*32.2%*	*80.1%*
Wed. coefficient	0.0276	0.0285	-0.0072	0.0140	0.0148	0.0196	0.0222	0.0361	0.0435	0.0522	0.0448	0.0245
Newey-West S.E.	0.0296	0.0243	0.0296	0.0223	0.0221	0.0226	0.0250	0.0277	0.0296	0.0303	0.0298	0.0304
t-statistic	0.93	1.17	-0.24	0.63	0.67	0.87	0.89	1.30	1.47	1.73	1.50	0.81
p-value	*35.0%*	*24.1%*	*80.8%*	*53.0%*	*50.2%*	*38.5%*	*37.4%*	*19.3%*	*14.2%*	*8.4%*	*13.3%*	*41.9%*
Thu. coefficient	-0.0073	0.0413	0.0727	0.0551	0.0549	0.0410	0.0460	0.0393	0.0350	0.0220	0.0257	-0.0152
Newey-West S.E.	0.0319	0.0258	0.0272	0.0240	0.0233	0.0240	0.0269	0.0293	0.0314	0.0323	0.0318	0.0328
t-statistic	-0.23	1.60	2.67	2.29	2.36	1.71	1.71	1.34	1.11	0.68	0.81	-0.46
p-value	*81.9%*	*10.9%*	*0.8%*	*2.2%*	*1.8%*	*8.8%*	*8.7%*	*18.1%*	*26.6%*	*49.7%*	*41.9%*	*64.2%*
Fri. coefficient	-0.0085	0.1143	0.2261	0.1836	0.1686	0.1336	0.1013	0.0748	0.0499	0.0316	0.0303	-0.0197
Newey-West S.E.	0.0314	0.0233	0.0273	0.0209	0.0213	0.0223	0.0243	0.0278	0.0297	0.0304	0.0306	0.0326
t-statistic	-0.27	4.90	8.27	8.80	7.93	5.98	4.16	2.69	1.68	1.04	0.99	-0.60

Table 4 Dummy variable model of the day-of-the-week effect, subperiod analysis *(Continued)*

	VW	EW	1	2	3	4	5	6	7	8	9	10
p-value	*78.6%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.7%*	*9.3%*	*29.8%*	*32.1%*	*54.6%*
R^2	0.0002	0.0137	0.0284	0.0320	0.0279	0.0180	0.0107	0.0064	0.0041	0.0028	0.0022	0.0003
Adjusted R^2	-0.0006	0.0129	0.0276	0.0312	0.0270	0.0171	0.0098	0.0055	0.0032	0.0019	0.0013	-0.0005
F-statistic	0.3	16.3	37.2	41.6	35.9	21.6	11.7	6.4	4.2	2.8	2.2	0.4
p-value	*89.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*1.6%*	*5.5%*	*87.9%*

Table 4 describes the evolution of the day-of-the-week effect in three 18-year subperiods, 1953–1970, 1971–1988 and 1989–2006, using the dummy variable regression model. The dummy variable regression model is estimated for the value-weighted (VW), equally-weighted (EW), and 10 decile portfolios sorted by market capitalization. The upper part of each panel provides the coefficients for each of the dummy variables and the bottom part provides results for the regression as a whole. The results show a decline in the magnitude of the effect that is more pronounced in the large capitalization deciles. There is no evidence though that the effect has vanished. All the tests are adjusted for heteroscedasticity and serial correlation using Newey-West standard errors

Table 5 Day-of-the-week effect and mood, subperiod analysis

	VW	EW	1	2	3	4	5	6	7	8	9	10
Panel A: 1953-1970												
λ_0	-0.5841	-0.7243	-0.8092	-0.8558	-0.8237	-0.8748	-0.7486	-0.6979	-0.6549	-0.6031	-0.5723	-0.5646
Newey-West S.E.	0.0670	0.0684	0.0842	0.0760	0.0767	0.0749	0.0772	0.0740	0.0716	0.0661	0.0648	0.0689
t-statistic	-8.71	-10.59	-9.61	-11.26	-10.74	-11.69	-9.70	-9.43	-9.14	-9.12	-8.83	-8.20
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
λ_1	0.0942	0.1168	0.1305	0.1381	0.1329	0.1411	0.1208	0.1126	0.1056	0.0973	0.0923	0.0911
Newey-West S.E.	0.0101	0.0103	0.0130	0.0115	0.0117	0.0114	0.0117	0.0112	0.0108	0.0100	0.0098	0.0104
t-statistic	9.30	11.33	10.08	11.97	11.37	12.43	10.29	10.07	9.74	9.77	9.44	8.74
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
R^2	0.0152	0.0221	0.0195	0.0251	0.0229	0.0270	0.0188	0.0177	0.0171	0.0161	0.0156	0.0134
Adjusted R^2	0.0150	0.0218	0.0192	0.0249	0.0227	0.0267	0.0186	0.0175	0.0169	0.0159	0.0153	0.0132
Proportion of effect explained by mood	53.5%	64.1%	71.1%	72.7%	66.7%	74.1%	59.0%	56.6%	56.7%	53.4%	54.5%	51.9%
Panel B: 1971-1988												
λ_0	-0.4275	-0.8908	-1.0030	-1.0830	-1.0637	-1.0445	-1.0528	-0.9969	-0.8936	-0.7974	-0.7125	-0.3291
Newey-West S.E.	0.0946	0.0749	0.0678	0.0716	0.0764	0.0814	0.0813	0.0851	0.0871	0.0873	0.0895	0.0987
t-statistic	-4.52	-11.89	-14.79	-15.13	-13.92	-12.84	-12.95	-11.71	-10.26	-9.13	-7.96	-3.33
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*
λ_1	0.0689	0.1436	0.1617	0.1746	0.1715	0.1684	0.1697	0.1607	0.1441	0.1286	0.1149	0.0531
Newey-West S.E.	0.0145	0.0109	0.0096	0.0102	0.0110	0.0118	0.0119	0.0125	0.0128	0.0129	0.0134	0.0153
t-statistic	4.75	13.13	16.89	17.04	15.53	14.26	14.28	12.83	11.23	9.94	8.59	3.48
p-value	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*
R^2	0.0042	0.0293	0.0396	0.0427	0.0383	0.0346	0.0332	0.0287	0.0223	0.0180	0.0138	0.0022
Adjusted R^2	0.0040	0.0291	0.0394	0.0425	0.0381	0.0344	0.0330	0.0285	0.0221	0.0178	0.0136	0.0020
Proportion of effect explained by mood	52.9%	85.8%	91.5%	89.7%	90.1%	85.4%	85.6%	83.2%	80.1%	74.9%	69.4%	39.7%

Table 5 Day-of-the-week effect and mood, subperiod analysis *(Continued)*

	VW	EW	1	2	3	4	5	6	7	8	9	10
Panel C: 1989-2006												
λ_0	0.0329	-0.5721	-0.9736	-0.8388	-0.7833	-0.6458	-0.5338	-0.4260	-0.3319	-0.2370	-0.2208	0.1000
Newey-West S.E.	0.0981	0.0728	0.0792	0.0649	0.0661	0.0709	0.0793	0.0899	0.0962	0.0978	0.0996	0.1018
t-statistic	0.34	-7.86	-12.30	-12.91	-11.86	-9.11	-6.74	-4.74	-3.45	-2.42	-2.22	0.98
p-value	*26.3%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*1.5%*	*2.7%*	*32.6%*
λ_1	-0.0053	0.0922	0.1569	0.1352	0.1262	0.1041	0.0860	0.0686	0.0535	0.0382	0.0356	-0.0161
Newey-West S.E.	0.0158	0.0112	0.0120	0.0097	0.0099	0.0108	0.0122	0.0139	0.0150	0.0153	0.0156	0.0164
t-statistic	-0.34	8.23	13.09	13.96	12.78	9.68	7.06	4.93	3.57	2.49	2.28	-0.98
p-value	*26.3%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*1.3%*	*2.3%*	*32.7%*
R^2	0.0000	0.0117	0.0255	0.0297	0.0257	0.0162	0.0091	0.0047	0.0024	0.0012	0.0010	0.0002
Adjusted R^2	-0.0002	0.0115	0.0253	0.0294	0.0255	0.0160	0.0089	0.0045	0.0022	0.0010	0.0008	0.0000
Proportion of effect explained by mood	NA	85.5%	89.9%	92.6%	92.1%	90.0%	84.9%	73.9%	59.4%	42.9%	46.5%	NA

Table 5 provides analysis of the day-of-the-week effect with the simple-average mood template (reported in column 4 of Table 1) as the explanatory variable. The results are reported in three Panels corresponding to three subperiods. The upper part of each panel presents the regression statistics for each portfolio, the bottom part reports the ratios of the R^2 of the mood variable regression to the R^2 of the respective dummy variable regression. The results show that the regression coefficient of the mood variable is positive and statistically significant in the large majority of the cases. The ratios of the R^2 of the mood variable regression to the R^2 of the dummy variable regression suggest that mood remains a valid explanatory variable of the day-of-the-week effect across the three subperiods and statistically significant in all cases. The only exceptions to this result are in the last subperiod where decile 10 and the VW portfolio display a mild negative sign for the mood variable.

The results in Table 5 also show that there is a decline in the *t*-statistic of the mood variable. For example, in the VW portfolio, the *t*-statistics in the first, second, and third subperiods are 9.30, 4.75, and −0.34, respectively. In the EW portfolio, the *t*-statistics are 11.33, 13.13, and 8.23, respectively. Thus, the decline in the magnitude of the *t*-statistics is much more pronounced in the VW portfolio.

There are two possible explanations for the decline in the magnitude of the *t*-statistics of the mood variable. One possible source for this decline is the general decline of the day-of-the-week effect as documented in the previous subsection. The second possible explanation is that the ability of mood to explain the effect has declined. It appears to us that this reflects more of a general decline in the magnitude of the day-of-the-week effect than a decline in the ability of mood to explain it. The basis for this conjecture is the fact that the proportion of variation of average abnormal returns explained by the mood variable, as measured by the ratio of R^2, does not show a declining trend over time. For example, in the EW portfolio, the proportion of variation of average abnormal returns explained by the mood variable in the first, second, and third subperiods is 64.1%, 85.8%, and 85.5%, respectively. Similar results can be seen in the small capitalization deciles. We conclude, therefore, that the reduction in the magnitude of the *t*-statistics of the mood variable is more likely the result of the general decline in the magnitude of the day-of-the-week effect than a decline in the ability of mood to explain the effect.

Conclusion

We design four mood templates based on day-of-the-week mood scores obtained from two surveys in 1953 and 2007. Quite remarkably, our results suggest that mood patterns throughout the week have changed very little, if any, in the last 50 years. Using the mood templates, we deploy a direct test of the behavioral explanation of the day-of-the-week effect by regressing daily returns on the mood templates.

The mood regressions show that mood has substantial explanatory power for the day-of -the-week effect. Between 35% and 90% of the variation of the average daily abnormal returns can be attributed to mood fluctuations throughout the week. We also find that the ability of mood to explain the day-of-the-week effect is larger in the smaller capitalization deciles.

We repeat the mood regressions in three subperiods. Although we find a decline in the magnitude of the day-of-the-week effect over time, the proportion of variation of daily average abnormal returns explained by mood remains relatively stable over time. This suggests that there has been no decline in the ability of mood to explain the day-of-the-week effect.

Endnotes

[1]See for example, French (1980), Gibbons and Hess (1981), Keim and Stambaugh (1984), Lakonishok and Smidt (1988), Abraham and Ikenberry (1994), Aggarwal and Schatzberg (1997), Chen and Singal (2003), Hirshleifer, Jiang and Meng (2017), Birru (2017).

[2]Investigation of the day-of-the-week effect has been also extended to other stock markets around the world, with evidence supporting the existence of the day-of-the-week effect in many of them. A partial list includes Cai et al. (2006), Demirer and Karan (2002), Brooks and Persand (2001), Keef and McGuinness (2001), Choudhry (2000), Dubois and Louvet (1996), Wong et al. (1992), Bishara (1989), Board and Sutcliffe (1988), and Hindmarch et al. (1983).

[3]This could be done by bootstrapping. See, for example, Bessembinder and Chan (1998) for application of bootstrapping to technical analysis rules.

[4]The negative correlation is a result of the fact that the two scales Farber's and ours are opposite. Our scale gives the highest score to the most liked day while Farber's gives the lowest score to the most liked day.

[5]Correlogram and White (1980) heteroskedasticity tests (not reported) confirm the strong presence of both serial correlation and heteroscedasticity in the residual terms.

Additional file

Additional file 1: Questionnaire about preferences towards days of the week. (DOCX 13 kb)

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