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No More Weekend Effect

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ABSTRACT

Before 1975, the mean weekend rate of return on the equal-weight (value-weight) stock market portfolio is significant −18bp (−19bp). After 1975, it is insignificant −5bp (−1bp). This break date is determined by a structural break test with unknown break date. The weekend effect is no longer an anomaly.

Keywords: Weekend effect, Structural break

JEL Codes: G10, G14, G19

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1 Introduction

Identified by practitioners as early as the late 1920s, French (1980) and Gibbons and Hess (1981) are credited as the first academics to show that stock returns on Monday tend to be negative.[1] This has spawned a number of follow-up studies proposing various explanations, such as data mining and statistical errors in Connolly (1989), market frictions in Lakonishok and Levi (1982), Keim and Stambaugh (1984), and Dyl and Martin (1985), differences in information flow in Damodaran (1989) and Peterson (1990), and differences in order flow in Foster and Viswanathan (1990), Lakonishok and Maberly (1990), Abraham and Ikenberry (1994), and Chen and Singal (2003). Overall, French (1980) and Gibbons and Hess (1981) are cited over 500 times in the Web of Science citation index.[2]

We show this weekend effect disappears after 1975 by testing for a structural break with unknown break date. The data are daily weekday returns (including dividends) on the CRSP (Center for Research in Security Prices) equal- and value-weight market portfolios of NYSE stocks, on the small-minus-big (SMB), and on the high-minus-low (HML) risk-factor mimicking portfolios of Fama and French (1993). The sample period begins on January 1, 1926 for the market portfolios and on July 1, 1926 for SMB and HML. It ends on December 31, 2014. These data enable us to test for a break before, during, and after the 1953 to 1977 sample period in French (1980) and the 1962 to 1978 sample period in Gibbons and Hess (1981).[3]

We test for a break in each time series by applying the Quandt (1960) and Andrews (1993) test to the data (Quandt/Andrews). The null hypothesis of Quandt/Andrews is constancy of the mean against the alternative of a significant break of unknown timing. As a general test for parameter instability, it is also useful as a test for constancy of the variance. The test also has good asymptotic local power against all alternatives for which parameters are not constant.[4]

Quandt/Andrews searches for a break by calculating a Chow (1960) F-statistic each day between and first and last 15 percent of the sample period. The *supF*-statistic is the maximum (supremum) of these F-statistics; the *supF*-test does not follow the F-distribution. Andrews (2003) calculates the critical values. Hansen (1997) derives the approximate asymptotic p-values. We are concerned the Andrews (2003) critical values do not hold for our application because of the well-known distributional properties of stock returns (non normal and heteroskedastic).[5] As a check, we bootstrap the distribution of returns on Monday.

[1] Cross (1973) is also sometimes credited as the first to show this.

[2] See Pettengill (2003) for a literature review.

[3] In comparison, the most closely-related study on persistence in the weekend effect is Marquering *et al.* (2006) in which the authors do not test for a break in daily data and assume the weekend effect ends after publication of the original studies.

[4] See Andrews (1993).

[5] We thank the Editor for bringing this point to our attention.

With 10,000 samples of over 4,000 Monday returns, the bootstrap critical values align almost perfectly with those from Andrews (2003). The *supF*-statistic rejects the null hypothesis of a constant mean return on Monday in all four portfolios (p-value < 0.01).

The mean return on Monday in the equal-weight (value-weight) market portfolio is significant −18bp (−19bp) before December 30, 1974 (September 30, 1974) and insignificant −5bp (−1bp) after. In SMB, the mean return on Monday is insignificant −1bp before September 11, 1978 and significant −9bp after. In HML, the mean return on Monday is significant −7bp before May 16, 1960 and significant 4bp after. We conclude the weekend effect is no longer an anomaly.

The remainder of the study proceeds as follows. In Section 2 we describe the empirical method. We discuss the results in Section 3. Section 4 concludes.

2 Method

We begin by applying Quandt/Andrews to French (1980) and Gibbons and Hess (1981) dummy variable regressions of the form:

$$r_t = \gamma_1 d_{1t} + \gamma_2 d_{2t} + \gamma_3 d_{3t} + \gamma_4 d_{4t} + \gamma_5 d_{5t} + u_t, \tag{1}$$

where r_t is the time-ordered continuously compounded return on day t and dummy variables indicate the weekday on which the return is observed ($d_{1t} =$ Monday, $d_{2t} =$ Tuesday, etc.).[6] We then apply Quandt/Andrews to the returns on each weekday and calculate the mean before and after significant break dates.[7] We discuss the results in the following section.

3 Results and analysis

For the French (1980) and Gibbons and Hess (1981) dummy variable regressions, we find heteroskedasticity and autocorrelation (HAC) consistent *supF*-statistics of 34.18, 35.85, 43.64, and 46.81 for the equal-weight, value-weight, SMB, and HML portfolios, respectively.[8] These compare to a critical value of 18.32 (22.66) for significance at the five (one) percent level. The null hypothesis of parameter stability in the French (1980) and Gibbons and Hess (1981) regressions is strongly rejected. We next consider the test results for a break in the mean return on each weekday.

[6] Replacing the continuously compounded returns with discrete returns does not change the *supF*-test results.

[7] We use computer software provided by the R Project for Statistical Computing in conjunction with the strucchange package of Zeileis *et al.* (2002) and Zeileis *et al.* (2003) to analyze the data.

[8] We use the method of Newey and West (1987, 1994) to calculate HAC consistent *supF*-statistics. The uncorrected values are 34.98, 41.71, 42.92, and 62.70 for each portfolio, respectively.

3.1 Market portfolios

Table 1 reports descriptive statistics for daily returns on the equal- and value-weight market portfolios.

Portfolio	Mean	Std. Err.	Break date	N	*supF*-stat
Equal-weight	5.49***	1.00		22,351	0.76
Monday	−12.33***	2.22		4,313	12.24
Segment 1	−18.10***	3.26	1974-12-30	2,398	
Segment 2	−5.11	2.62		1,915	
Tuesday	1.89	1.66		4,531	5.79
Wednesday	12.49***	1.78		4,554	6.73
Thursday	10.97***	1.60		4,486	8.85
Segment 1	20.61***	4.72	1947-08-28	1,085	
Segment 2	7.90***	1.47		3,401	
Friday	13.71***	1.43		4,467	3.56
Value-weight	3.02***	0.75		22,351	5.46
Monday	−10.99***	2.06		4,313	26.44
Segment 1	−19.46***	2.81	1974-09-30	2,385	
Segment 2	−0.51	2.75		1,928	
Tuesday	3.85*	1.52		4,531	4.42
Wednesday	8.95***	1.60		4,554	3.74
Thursday	5.59***	1.42		4,486	3.98
Friday	7.05***	1.36		4,467	3.13

Table 1: Weekday returns on CRSP NYSE stock market portfolios in basis points.

Description: Reported are descriptive statistics for daily log returns on the CRSP equal- and value-weight market portfolios of NYSE stocks. The sample period is from January 1, 1926 to December 31, 2014. These dates span the 1953 to 1977 sample period in French (1980) and the 1962 to 1978 sample period in Gibbons and Hess (1981). Break date is the last date of a time segment (if any significant breaks). *supF*-stat is the maximum (supremum) of Chow (1960) *F*-statistics. Standard errors and *supF*-stats are HAC consistent using the correction of Newey and West (1987, 1994). ***, **, and * indicate significance at the 0.001, 0.01, and 0.05 levels, respectively.

Interpretation: Mean weekday returns are not stable. The weekend effect is no longer an anomaly. Before 1975, the mean return on Monday in the equal-weight (value-weight) stock market portfolio is significant -18bp (-19bp). After 1975, it is insignificant -5bp (-1bp).

In the equal-weight portfolio, we find a break in the Monday and Thursday returns. The mean return on Monday is significant −18bp before December 30, 1974 and insignificant −5bp after. The mean return on Thursday is significant 21bp before August 28, 1947 and significant 8bp after.

In the value-weight portfolio, we find a break in the Monday returns. The mean return on Monday is significant −19bp before September 30, 1974 and insignificant −1bp after.

One possible explanation for the break in Monday returns is establishment of competitive commissions on the NYSE on May 1, 1975. Kamara (1997) suggests lower trading costs explain why the mean S&P 500 Index return on Monday is significantly negative from July 1962 to April 1975 and insignificant from May 1975 to April 1982 and from April 1982 to December 1993. Our results also complement those in Smirlock and Starks (1986) who find the weekend effect is not stable in hourly DJIA returns from the close of trading on Friday to the close of trading on Monday from 1963 to 1983.

3.2 SMB and HML

Table 2 reports descriptive statistics for daily returns on the SMB and HML portfolios.

In SMB, we find a break in the Monday, Tuesday, and Friday returns. The mean return on Monday is insignificant −1bp before September 11, 1978 and significant −9bp after. One explanation for this is if there are positive mean returns on Monday for big stocks after the break. The mean return on Tuesday is significant −8bp before February 16, 1999 and significant 5bp after. The mean return on Friday is insignificant −4bp before May 17, 1940 and significant 6bp after.

In HML, we find a break in the Monday, Tuesday, and Wednesday returns. The mean return on Monday is significant −7bp before May 16, 1960 and significant 4bp after. The mean return on Tuesday is significant −6bp before July 27, 1943 and significant 2bp after. The mean return on Wednesday is significant 5bp before February 2, 1966 and insignificant −1bp after.

In sum, we find the French (1980) and Gibbons and Hess (1981) weekday dummy variable regressions are not stable and the inferences drawn from them are not valid. The timing and direction of structural breaks in the mean return on Monday shows the weekend effect disappears after 1975.

4 Conclusion

French (1980) and Gibbons and Hess (1981) document a weekend effect anomaly in which stock returns on Monday tend to be negative. We show this effect disappears after 1975 by testing for a structural break with unknown break date.

We find the French (1980) and Gibbons and Hess (1981) weekday dummy variable regressions are not stable and the inferences drawn from them are not valid. Weekend effects are transient and unstable. The mean return on Monday in the equal-weight (value-weight) stock market portfolio is significant −18bp (−19bp) before December 30, 1974 (September 30, 1974) and insignificant −5bp (−1bp) after. In SMB, the mean return on Monday is insignificant −1bp before September 11, 1978 and significant −9bp after. In HML, the mean return on

Portfolio	Mean	Std. Err.	Break date	N	*supF*-stat
SMB (small-minus-big)	−0.10	0.46		22,227	4.33
Monday	−4.22***	0.91		4,289	22.16
Segment 1	−0.69	1.00	1978-09-11	2,551	
Segment 2	−9.40***	1.63		1,738	
Tuesday	−5.60***	1.15		4,505	21.81
Segment 1	−7.93***	1.24	1999-02-16	3,688	
Segment 2	4.88*	2.37		817	
Wednesday	0.95	0.86		4,528	1.23
Thursday	4.24***	0.85		4,461	5.11
Friday	4.01***	0.86		4,444	14.40
Segment 1	−4.33	3.48	1940-05-17	695	
Segment 2	5.56***	0.81		3,749	
HML (high-minus-low)	1.08*	0.48		22,227	3.85
Monday	−0.10	1.24		4,289	21.38
Segment 1	−7.33**	2.30	1960-05-16	1,660	
Segment 2	4.46***	1.17		2,629	
Tuesday	0.56	0.86		4,505	10.19
Segment 1	−5.94*	2.99	1943-07-27	857	
Segment 2	2.09**	0.78		3,648	
Wednesday	1.77	0.90		4,528	9.17
Segment 1	4.86**	1.48	1966-02-02	2,023	
Segment 2	−0.73	1.12		2,505	
Thursday	0.83	0.93		4,461	5.99
Friday	2.30**	0.79		4,444	2.82

Table 2: Weekday returns on SMB and HML in basis points.

Description: Reported are descriptive statistics for daily log returns on the SMB and HML risk-factor mimicking portfolios of Fama and French (1993). The sample period is from July 1, 1926 to December 31, 2014. These dates span the 1953 to 1977 sample period in French (1980) and the 1962 to 1978 sample period in Gibbons and Hess (1981). Break date is the last date of a time segment (if any significant breaks). *supF*-stat is the maximum (supremum) of Chow (1960) *F*-statistics. Standard errors and *supF*-stats are HAC consistent using the correction of Newey and West (1987, 1994). ***, **, and * indicate significance at the 0.001, 0.01, and 0.05 levels, respectively.

Interpretation: Mean weekday returns are not stable. The weekend effect is no longer an anomaly. The mean return on Monday in SMB is insignificant -1bp before 1979 and significant -9bp after. The mean return on Monday in HML is significant -7bp before 1961 and significant 4bp after.

Monday is significant −7bp before May 16, 1960 and significant 4bp after. We conclude the weekend effect is no longer an anomaly.

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