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AN EXTENDED LOOK AT THE SEASONALITY
OF STOCK RETURNS

by

Justin Michael Bagshaw

A report submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Financial Economics

Approved:

Tyler Brough
Major Professor

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UTAH STATE UNIVERSITY
Logan, Utah

2015

ABSTRACT

An Extended Look at the Seasonality
of Stock Returns

by

Justin Michael Bagshaw, Master of Science

Utah State University, 2015

Major Professor: Tyler Brough

Department: Finance and Economics

I examine seasonal effects relating to stock index returns including the weekend effect, December effect, and the turn-of-the-month effect with daily data from the Dow Jones Industrial Average and the S&P 500. I find that the publication of a paper in 1989 by Josef Lakonishok and Seymour Smidt has substantially reduced the amount of significantly abnormal returns in the years following. In some cases, the effects have also slightly reversed.

CONTENTS

ABSTRACT	ii
LIST OF TABLES	iv
INTRODUCTION.	1
DATA.	2
RESULTS.	3
A. WEEKEND EFFECT.	3
B. DECEMBER EFFECT	4
C. TURN-OF-THE-MONTH EFFECT	5
CONCLUSION	7
REFERENCES	9

LIST OF TABLES

1	Daily Returns, DJIA – Weekend Effect	10
2	Daily Returns, S&P 500 – Weekend Effect	11
3	Summary Statistics, DJIA – Weekend Effect.	12
4	Summary Statistics, S&P 500 – Weekend Effect.	14
5	Daily Returns, DJIA, by year – Weekend Effect.	16
6	Period Returns, DJIA – December Effect	20
7	Period Returns, S&P 500 – December Effect	21
8	Summary Statistics, DJIA – December Effect	22
9	Summary Statistics, S&P 500 – December Effect	23
10	Daily Returns, DJIA – Turn-of-the-Month Effect	24
11	Daily Returns, S&P 500 – Turn-of-the-Month Effect	25
12	Summary Statistics, DJIA – Turn-of-the-Month Effect	26
13	Summary Statistics, S&P 500 – Turn-of-the-Month Effect	28

INTRODUCTION

Many studies have examined seasonal anomalies in stock returns. Josef Lakonishok and Seymour Smidt (1988) conducted a study extending as far back as 90 years. Many of these anomalies, which are discussed below, are seen to exist due to a break in trading. For these different effects, there are observed positive returns before a break in trading such as before a weekend or before a holiday. Conversely, on the other side of a break, such as the beginning of a week or after a holiday, significantly negative returns have been observed.

Lakonishok and Smidt analyzed several of these seasonal anomalies and published their findings in *The Review of Financial Studies* 1988 entitled *Are Seasonal Anomalies Real? A Ninety-Year Perspective*. In this replication study, I examine further three of these effects. These are the weekend effect, the December effect, and the turn-of-the-month effect. If markets are efficient, we can expect these abnormal returns arbitrated away and see a gradual reduction of significant returns over time leading up to the event of their paper being published and ultimately a sharp reduction as soon as this information was made public.

The data used by Lakonishok and Smidt began in 1897 and continued until 1986. In the middle of 1952, Saturdays were discontinued as trading days in the DJIA. I use this as a starting point in analyzing the data so as to not deal with Saturday trading days. I extend the analysis until 2007 for the DJIA to determine if the effects still hold. I also look at the S&P 500 as a larger data set. This should benefit the strength of the findings. This data begins in 1962 and is analyzed until the end of 2014.

DATA

I examine two different sources of daily stock return data. The Dow Jones Industrial Average index has consisted of 30 large-cap stocks since 1928 and was the only data set used by Lakonishok and Smidt in their research of several seasonal anomalies. I have also included the S&P 500 by Standard & Poor's. The S&P 500 began in 1957; however, it wasn't until 1962 that Ultronic Systems Corp. began computing these indexes. This is the starting point I use for this paper. This index has consisted of 500 stocks and serves as a larger and better frequentist platform for which to perform analysis. For my uses, the DJIA runs from June of 1952 until December of 2007; the S&P 500 is used from July of 1962 until the end of 2014.

I split these two data sets into different periods corresponding to the periods used by Lakonishok and Smidt and similar size periods for modern times after which their paper was published. For these periods, returns were regressed against days of the week for the weekend effect, three different periods in the latter half of December for the December effect, and for days at the end of the month and beginning of the next month for the turn-of-the-month effect. F-tests to ascertain overall significance and resultant t-tests were used to determine if the mean returns were significantly different from zero. The results from the statistical regressions were obtained by using the White test for conditional heteroskedasticity.

RESULTS

A. THE WEEKEND EFFECT

This effect examines returns on each day of the week. Historically, Lakonishok and Smidt found significant positive returns on Mondays and negative returns at the end of the week on Fridays. I expected to see and found that there was a gradual reduction in the unusual returns until the study published by Lakonishok and Smidt caused an eventual disappearance altogether.

For the DJIA I observe results consistent with that of the paper being replicated. There are significantly negative returns on Mondays and abnormal positive returns on Fridays. In the middle of the week, Wednesdays are also correlated with positive returns. From 1952 until 1963, there are negative returns of -0.1883% and positive returns of 0.1286%. Both of these are significant at the 99% confidence level. For the following period, 1964-1975, Monday again has significantly positive returns at -0.1813%. Friday, however, no longer results in positive returns that are significant. The period after this, from 1976-1986 already results in an entire reduction in significantly abnormal returns. This remains the case until examining entirely new data from that which Lakonishok and Smidt used from 1987-2007. The finding is a reversal in returns. Monday has positive returns and Friday are negative, however, neither of these are statistically significant. These figures can be found in table 1.

Looking to the S&P 500 for evidence of this effect yields largely similar results. Significantly negative returns of -0.17% exist on Mondays from 1962-1975. Friday is also associated with positive gains of 0.0569% as seen in table 2. From 1976-1986, Fridays are still positive with a mean return of 0.072%. Mondays result in negative

returns, but these returns are no longer statistically different from zero. It is interesting to note that nothing significant for any day is seen following the approximate time frame that the paper by Lakonishok and Smidt was published. I also analyzed daily returns by year for the Dow Jones Industrial Average, however, significance seemed stochastic and economic implications were not apparent on first examination. This information can be found in table 5.

B. DECEMBER EFFECT

This effect takes a look at three periods of returns at the end of December. The first period takes the four trading days up to, but not including, the last trading day before Christmas. This is noted as the Pre-Christmas period in tables 6 and 7. The next includes the first trading day after Christmas up to, but not including, the last trading day before New Year's Day. This inter-holiday period generally consists of three or four trading days. Lastly, the last trading day before Christmas and last trading day before New Year's Day comprises the pre-holiday period.

Lakonishok and Smidt found very highly positive returns for the period with the day before Christmas and the day before New Year's Day. They also found that the inter-holiday period was significantly positive until 1910. Then from 1939-1963 they found only weak significance for positive returns for these days.

For the DJIA, I found large and significantly positive returns for the pre-holiday period until 1986. Then these returns reverse sign and become negative although insignificant. From 1952-1963, the inter-holiday days result in a mean positive return of 0.2422% and the two pre-holiday returns being 0.02964% as seen in table 6. From 1964-

1975 and 1976-1986, the inter-holiday periods are no longer significant, but the pre-holiday returns are quite large at 0.3953% and 0.2670% respectively. The four days comprising the pre-Christmas period are only convincingly significant when examining the period unobserved by Lakonishok and Smidt from 1987-2007. The findings indicate there has been a slight reversal in daily returns in the Dow.

When looking at the S&P to see if the December effect applies there as well, I found comparable results. For 1962-1975, I observed positive and significant returns for both the inter-holiday and pre-holiday periods of 0.2253% and 0.3303% respectively. The following period, 1976-1986, the inter-holiday period is no longer statistically meaningful. The pre-holiday returns for this period are again meaningful with returns at 0.2766%. The three periods after this, 1987-1997, 1998-2007, and 2007-2007 all show diminished evidence of abnormal positive or negative returns. When looking at the entire period of the data from 1962-2014, there is evidence of abnormal end of December returns for the inter-holiday and pre-holiday periods. The information represented in table 7 exhibits the reduction in the December effect.

C. TURN-OF-THE-MONTH EFFECT

For the turn-of-the-month effect, daily returns are observed for the last four trading days of the month and the first four trading days of the next month. Again, I use the same data as Lakonishok and Smidt as well as adding analysis of the S&P 500 to obtain a larger sample. They found that the last day of the month and days two and three of the next month resulted in positive returns from 1952-1963, but this vanished for the period of 1976-1986.

I found, just as Lakonishok and Smidt did, that returns on the last day of the month are statistically positive being 0.1781% from 1952-1963 and 0.1442% from 1964-1975 as seen in table 10. Days one, two, and three of the month yielded positive returns of 0.1295%, 0.2814%, and 0.1466% during 1952-1963. However, only the third trading day of the month remained significant for the next period. By 1976-1986, none of the days around the turn-of-the-month provided abnormal returns. Interestingly, some evidence of abnormal returns returned in the next periods. The first day of the month brought positive and significant gains at 0.284%, 0.3417%, and 0.3096% for each of the next three observed periods. The second trading day of the month also returned to strong statistical meaning for two of the next three periods.

Table 11 presents is found the results of analysis for the turn-of-the-month effect with the S&P 500. The conclusions are somewhat similar as to those of the DJIA. The first trading day of the month had positive returns in 1987-1997 and 1998-2007 of 0.2372% and 0.2957% respectively. This went away altogether in the last observed period. The last trading day of the month exhibits occasional significance in early periods as well.

CONCLUSION

After conducting the same process that Josef Lakonishok and Seymour Smidt conducted on the Dow Jones Industrial Average for seasonal anomalies in daily returns, I found the same results that they did. Furthermore, I have extended the time frame for which the analysis was conducted and added another data set with the S&P 500.

I have found evidence that the effects they encountered, namely the weekend effect, December effect, and turn-of-the-month effect largely disappeared at the advent of their study entitled *Are Seasonal Anomalies Real? A Ninety-Year Perspective*.

For the weekend effect, I observed an actual reversal in daily returns, although statistically insignificant. Means for daily returns shifted from negative on Mondays to positive and from positive on Fridays to negative. Wednesdays also experienced positive returns during these same periods. The significance of returns different from zero in the larger, more encompassing periods can probably be attributed to the magnitude of significance for returns in earlier periods despite the lack of it in later periods. The conclusions related to this effect are the same for both the DJIA and S&P 500.

The December effect also disappeared following the period containing 1986. The pre-Christmas period developed positive returns in later periods with a slight significance as a change over previous years. The S&P offers comparable results.

Lastly, the turn-of-the month effect exhibited a dramatic disappearance for the period following 1976-1986 only to reappear in the next period. This effect is demonstrated with strongly correlated positive returns on the first one to three trading days of the month and the last trading day of the month. The same periods replicated

with S&P data mirror the DJIA results, only with some scattered significant returns on the fourth to last trading day of the month.

REFERENCES

Lakonishok, Josef and Seymour Smidt. "Are Seasonal Anomalies Real? A Ninety-Year Perspective." *The Review of Financial Studies* 1988 1.4 (1989): 403-424.

Table 1
Daily rates of return for the Dow Jones Industrial Average in percent – Weekend Effect

Period	Monday	Tuesday	Wednesday	Thursday	Friday
1952-1986					
Mean	-0.1370***	0.0154	0.0667***	0.0203	0.0748***
Days	1572	1625	1660	1650	1580
1952-1963					
Mean	-0.1883***	0.0208	0.0740***	0.0317	0.1286***
Days	516	541	552	548	521
1964-1975					
Mean	-0.1813***	-0.0243	0.0755**	0.0259	0.0459
Days	549	565	562	570	552
1976-1986					
Mean	-0.0369	0.0530	0.0504	0.0028	0.0509
Days	507	519	546	532	507
1987-1997					
Mean	0.0671	0.1069	0.0721	-0.0250	0.0123
Days	511	518	549	533	510
1998-2007					
Mean	0.0767	-0.0037	0.0430	-0.0197	-0.0381
Days	447	461	497	484	461
1987-2007					
Mean	0.0716	0.0548*	0.0583*	-0.0225	-0.0116
Days	958	979	1046	1017	971
1952-2007					
Mean	-0.0580**	0.0302*	0.0634***	0.0040	0.0419**
Days	2530	2604	2706	2667	2551

* Significant at 90% confidence

** Significant at 95% confidence

*** Significant at 99% confidence

Table 2
Daily rates of return for the S&P 500 in percent – Weekend Effect

Period	Monday	Tuesday	Wednesday	Thursday	Friday
1962-1986					
Mean	-0.1190***	0.0322	0.0889***	0.0297	0.0637***
Days	1125	1153	1176	1172	1130
1962-1975					
Mean	-0.1700***	0.0092	0.0878***	0.0340	0.0569**
Days	618	634	630	640	623
1976-1986					
Mean	-0.0568	0.0604	0.0900**	0.0245	0.072**
Days	507	519	546	532	507
1987-1997					
Mean	0.0641	0.1053	0.0948	-0.0079	0.0310
Days	511	518	549	533	510
1998-2007					
Mean	0.0302	-0.0187	0.0723	0.0096	-0.0034
Days	448	461	497	484	461
2007-2014					
Mean	-0.0433	0.1231	-0.0060	0.0270	0.0099
Days	375	403	403	396	395
1987-2014					
Mean	0.0258	0.0734	0.0510	0.0132	0.0135
Days	1289	1337	1401	1364	1318
1962-2014					
Mean	-0.0417	0.0543	0.0683	0.0208	0.0367
Days	2414	2490	2577	2536	2448

* Significant at 90% confidence

** Significant at 95% confidence

*** Significant at 99% confidence

Table 3
 Summary Statistics for Dow Jones Industrial Average returns in percent – Weekend Effect

Period	Days	Mean	Standard Deviation	Minimum	Maximum
1952-1986					
Monday	1572	-0.1370	0.8940	-7.0002	3.7856
Tuesday	1625	0.0154	0.7897	-3.0842	4.6689
Wednesday	1660	0.0667	0.8057	-3.2332	4.8311
Thursday	1650	0.0204	0.7594	-4.8308	3.6548
Friday	1580	0.0748	0.7234	-2.6684	3.5339
1952-1963					
Monday	516	-0.1883	0.8066	-7.0002	2.1734
Tuesday	541	0.0208	0.6642	-2.4495	2.2257
Wednesday	552	0.0740	0.6530	-2.2480	3.9668
Thursday	548	0.0317	0.6148	-2.2871	3.6548
Friday	521	0.1286	0.5884	-2.0957	2.6255
1964-1975					
Monday	549	-0.1813	0.9041	-3.6309	3.7856
Tuesday	565	-0.0243	0.7872	-2.5784	3.8675
Wednesday	562	0.0755	0.8980	-3.2331	4.8311
Thursday	570	0.0259	0.7933	-2.3689	3.3932
Friday	552	0.0459	0.7660	-2.6684	3.5072
1976-1986					
Monday	507	-0.0369	0.9588	-3.6508	2.6963
Tuesday	519	0.0530	0.9042	-3.0842	4.6689
Wednesday	546	0.0504	0.8453	-2.5612	4.2692
Thursday	532	0.0028	0.8523	-4.8307	2.6988
Friday	507	0.0509	0.7961	-2.0175	3.5339
1987-1997					
Monday	511	0.0671	1.6827	-29.2166	3.7921
Tuesday	518	0.1069	0.9072	-3.5921	5.5551
Wednesday	549	0.0721	0.8741	-3.9566	9.2137
Thursday	533	-0.025	0.9188	-5.0587	4.7211
Friday	510	0.0123	1.0351	-7.4177	2.9239
1998-2007					
Monday	447	0.0767	1.1113	-6.7994	5.1365
Tuesday	461	-0.0037	1.0492	-3.8227	4.5821
Wednesday	497	0.043	1.0618	-3.2063	5.9691
Thursday	484	-0.0197	1.1406	-4.5715	6.4436
Friday	461	-0.0381	1.0917	-5.9945	4.0297

1987-2007					
Monday	958	0.0716	1.4438	-29.2166	5.1365
Tuesday	979	0.0548	0.9777	-3.8227	5.5551
Wednesday	1046	0.0583	0.9675	-3.9566	9.2137
Thursday	1017	-0.0225	1.0298	-5.0587	6.4436
Friday	971	-0.0116	1.0621	-7.4177	4.0297
1952-2007					
Monday	2530	-0.0580	1.1382	-29.2166	5.1365
Tuesday	2604	0.0302	0.8652	-3.8227	5.5551
Wednesday	2706	0.0634	0.8716	-3.9566	9.2137
Thursday	2667	0.0040	0.8725	-5.0587	6.4436
Friday	2551	0.0419	0.8688	-7.4177	4.0297

Table 4
 Summary Statistics for S&P 500 returns in percent – Weekend Effect

Period	Days	Mean	Standard Deviation	Minimum	Maximum
1962-1986					
Monday	1125	-0.1190	0.8786	-3.9689	4.1867
Tuesday	1153	0.0322	0.7932	-2.9578	4.7555
Wednesday	1176	0.0889	0.8225	-2.8716	5.0224
Thursday	1172	0.0297	0.7587	-4.8085	3.4997
Friday	1130	0.0637	0.7171	-2.2871	4.0806
1962-1975					
Monday	618	-0.1700	0.8420	-3.6713	4.1867
Tuesday	634	0.0092	0.7354	-2.6747	3.9093
Wednesday	630	0.0878	0.8281	-2.8716	5.0224
Thursday	640	0.0340	0.7109	-2.6842	3.4997
Friday	623	0.0569	0.6761	-2.2871	4.0806
1976-1986					
Monday	507	-0.0568	0.9182	-3.9689	2.7340
Tuesday	519	0.0604	0.8583	-2.9578	4.7555
Wednesday	546	0.0900	0.8167	-2.7268	3.9721
Thursday	532	0.0245	0.8132	-4.8085	2.7475
Friday	507	0.0720	0.7651	-1.9477	3.5361
1987-1997					
Monday	511	0.0641	1.3601	-20.4669	3.5859
Tuesday	518	0.1053	0.8720	-2.7006	5.3327
Wednesday	549	0.0948	0.8347	-2.9537	9.0994
Thursday	533	-0.0079	0.8769	-4.3525	4.9254
Friday	510	0.0310	0.9764	-6.7683	2.8680
1998-2007					
Monday	448	0.0302	1.1392	-6.8014	5.4078
Tuesday	461	-0.0187	1.1392	-3.8345	4.7336
Wednesday	497	0.0723	1.1107	-3.3962	5.7315
Thursday	484	0.0096	1.1384	-3.8370	4.7639
Friday	461	-0.0034	1.1154	-5.8278	3.9059
2007-2014					
Monday	375	-0.0433	1.5976	-8.9295	11.5800
Tuesday	403	0.1231	1.4832	-5.7395	10.7890
Wednesday	403	-0.0060	1.3511	-9.0350	4.3491
Thursday	396	0.0270	1.4607	-7.6167	6.9213
Friday	395	0.0099	1.1291	-4.1699	6.3248

1987-2014					
Monday	1289	0.0258	1.3793	-20.4669	11.5800
Tuesday	1337	0.0734	1.1630	-5.7395	10.7890
Wednesday	1401	0.0510	1.0958	-9.0350	9.0994
Thursday	1364	0.0132	1.1600	-7.6167	6.9213
Friday	1318	0.0135	1.0711	-6.7683	6.3248
1962-2014					
Monday	2414	-0.0417	1.1749	-20.4669	11.5800
Tuesday	2490	0.0543	1.0088	-5.7395	10.7890
Wednesday	2577	0.0683	0.9806	-9.0350	9.0994
Thursday	2536	0.0208	0.9947	-7.6167	6.9213
Friday	2448	0.0367	0.9249	-6.7683	6.3248

Table 5
Daily rates of return by year for the Dow Jones Industrial Average in percent

Year	Monday	Tuesday	Wednesday	Thursday	Friday
1952					
Mean	0.2716***	0.0512	-0.0162	0.0702	0.4044***
1953					
Mean	-0.2381***	-0.0311	0.1452**	0.0376	0.0019
1954					
Mean	0.0791	0.0110	0.0940	0.2160***	0.2349***
1955					
Mean	-0.3055	0.1252	0.1866*	-0.0019	0.2621***
1956					
Mean	-0.1809**	-0.1452	-0.0540	-0.0106	0.2229**
1957					
Mean	-0.5004***	-0.0688	0.2151*	-0.0120	-0.1177
1958					
Mean	0.0242	0.0994	0.0189	0.0789	0.2044**
1959					
Mean	-0.1296	0.0881	0.0040	0.0458	0.2472***
1960					
Mean	-0.3889***	-0.0175	-0.0340	0.0211	0.1196
1961					
Mean	-0.0953	0.0344	0.2326	-0.0210	0.1138
1962					
Mean	-0.3263	-0.0324	0.0010	-0.0815	-0.0372
1963					
Mean	-0.1008	0.1358**	0.0599	0.0565	0.1068**
1964					
Mean	-0.0187	-0.0286	0.1126**	0.0063	0.1749***
1965					
Mean	-0.1566**	0.0890	0.1203*	-0.0015	0.1312**
1966					
Mean	-0.2940**	-0.0580	0.1214	-0.1091	-0.0832
1967					
Mean	-0.1642*	0.0930	0.0865	0.2114**	0.0709
1968					
Mean	-0.0633	0.0996	0.0324	-0.1835**	0.0654

1969					
Mean	-0.3251***	-0.0937	-0.0123	0.0516	0.0463
1970					
Mean	-0.2710**	-0.1690	0.3027**	-0.0109	0.1043
1971					
Mean	-0.0581	0.0209	0.0258	0.0273	0.0058
1972					
Mean	-0.2042**	-0.0034	0.1201	0.0159	0.2686***
1973					
Mean	-0.4508***	0.0302	-0.0674	0.0898	-0.1216
1974					
Mean	-0.3667*	0.0562	-0.1057	-0.0803	-0.3497*
1975					
Mean	0.1935	-0.3069**	0.1313	0.2918**	0.2540
1976					
Mean	0.1449	0.1535	0.1227	-0.0809	-0.0882
1977					
Mean	-0.1760*	-0.1206	-0.1745*	-0.0100	0.0589
1978					
Mean	-0.0678	-0.1907	0.1742	-0.1542	0.1478
1979					
Mean	-0.0462	0.0147	-0.0415	0.1874**	-0.0099
1980					
Mean	-0.2371	0.3354***	0.2735**	-0.2978**	0.1015
1981					
Mean	-0.1365	-0.0945	-0.0546	-0.0406	0.0590
1982					
Mean	-0.0137	0.1855	0.0093	0.0357	0.1073
1983					
Mean	0.0672	-0.0590	0.2421**	0.1163	0.0313
1984					
Mean	-0.0903	0.1284	-0.2490**	0.1659	-0.0381
1985					
Mean	0.1343	0.1088	0.0735	0.0576	0.1374

1986					
Mean	0.0159	0.1086	0.1819	0.0477	0.0556
1987					
Mean	-0.7944	0.2691	0.4028*	0.0944	-0.1872
1988					
Mean	0.1580	0.1661	-0.0842	-0.2323	0.0785
1989					
Mean	-0.0316	0.1267	0.1733*	0.0713	0.1014
1990					
Mean	0.1218	-0.0445	0.0088	-0.2599*	0.0379
1991					
Mean	0.1316	0.0027	0.1778	0.1686	-0.1387
1992					
Mean	0.2064**	-0.0170	-0.0122	0.0675	-0.1169
1993					
Mean	0.2337***	-0.0235	0.1280*	0.0148	0.0150
1994					
Mean	0.0989	-0.0515	0.0125	-0.0746	0.0296
1995					
Mean	0.0967	0.0965	0.1374*	0.0597	0.1830**
1996					
Mean	0.2541**	0.0826	-0.0005	0.0881	0.1667
1997					
Mean	0.2621	0.5463***	-0.1562	-0.2657*	-0.0451
1998					
Mean	0.0352	0.1535	0.1236	-0.4231**	0.2206
1999					
Mean	0.1767	-0.3542**	0.1657	0.1522	0.2071
2000					
Mean	0.4203**	0.0458	-0.3363**	0.0367	-0.3346
2001					
Mean	0.0688	0.0860	-0.0957	0.1998	-0.2689*
2002					
Mean	-0.1796	-0.1846	0.1398	-0.0024	-0.1562
2003					
Mean	0.0934	0.1151	-0.1107	0.0588	0.0804
2004					
Mean	0.0412	0.1125	0.0598	-0.0857	-0.0417

2005					
Mean	0.0844	-0.0673	-0.0042	-0.0508	0.0313
2006					
Mean	0.0311	0.0970	0.2482***	0.0249	-0.0633
2007					
Mean	0.0126	-0.0390	0.2392*	-0.1166	-0.0295

* *Significant at 90% confidence*

** *Significant at 95% confidence*

*** *Significant at 99% confidence*

Table 6
 Daily rates of return of Dow Jones Industrial Average during last half of December in percent – December Effect

Period	Pre-Christmas	Inter-holiday	Pre-Holiday
1952-1986			
Mean	0.0371	0.1642***	0.3211***
Days	140	108	70
1952-1963			
Mean	-0.0508	0.2422***	0.2964***
Days	48	36	24
1964-1975			
Mean	-0.0154	0.1731	0.3953***
Days	48	37	24
1976-1986			
Mean	0.1902	0.0745	0.2670**
Days	44	35	22
1987-1997			
Mean	0.2048	0.2037	-0.0137
Days	44	34	22
1998-2007			
Mean	0.2461*	0.0875	-0.0654
Days	40	32	20
1987-2007			
Mean	0.2245**	0.1474	-0.0383
Days	84	66	42
1952-2007			
Mean	0.1073*	0.1578***	0.1863***
Days	224	174	112

* Significant at 90% confidence

** Significant at 95% confidence

*** Significant at 99% confidence

Table 7
Daily rates of return of S&P 500 during last half of December in percent – December Effect

Period	Pre-Christmas	Inter-holiday	Pre-Holiday
1962-1986			
Mean	-0.0142	0.1659**	0.3067***
Days	100	78	50
1962-1975			
Mean	-0.0642	0.2253**	0.3303***
Days	56	43	28
1976-1986			
Mean	0.0493	0.0929	0.2766***
Days	44	35	22
1987-1997			
Mean	0.2119	0.2515*	-0.0552
Days	44	34	22
1998-2007			
Mean	0.1810	0.1056	-0.0070
Days	40	32	20
2007-2014			
Mean	0.3247*	-0.0019	0.1888
Days	32	25	16
1987-2014			
Mean	0.2170**	0.1486*	0.0276
Days	112	88	56
1962-2014			
Mean	0.1079*	0.1567***	0.1592**
Days	212	166	106

* Significant at 90% confidence

** Significant at 95% confidence

*** Significant at 99% confidence

Table 8
 Summary Statistics for Dow Jones Industrial Average returns in percent – December Effect

Period	Days	Standard Deviation	Minimum	Maximum
1952-1986				
Pre-Christmas	140	0.7618	-2.2152	2.9555
Inter-Holiday	108	0.6593	-1.1542	2.7921
Pre-Holiday	70	0.5425	-0.6633	2.1533
1952-1963				
Pre-Christmas	48	0.4900	-1.0601	1.1920
Inter-Holiday	36	0.5076	-0.8234	1.1769
Pre-Holiday	24	0.3453	-0.1899	1.1194
1964-1975				
Pre-Christmas	48	0.7783	-1.4771	2.2648
Inter-Holiday	37	0.7452	-0.8635	2.7921
Pre-Holiday	24	0.6771	-0.4788	2.1533
1976-1986				
Pre-Christmas	44	0.9570	-2.2152	2.9555
Inter-Holiday	35	0.7069	-1.1542	2.4381
Pre-Holiday	22	0.5695	-0.6633	1.7212
1987-1997				
Pre-Christmas	44	1.0108	-1.9611	3.0022
Inter-Holiday	34	0.8456	-2.8355	2.0116
Pre-Holiday	22	0.5938	-1.5437	0.9396
1998-2007				
Pre-Christmas	40	0.8888	-2.5078	2.0169
Inter-Holiday	32	0.6426	-1.5278	1.2139
Pre-Holiday	20	0.7523	-1.1393	1.8044
1987-2007				
Pre-Christmas	84	0.9492	-2.5078	3.0022
Inter-Holiday	66	0.7506	-2.8355	2.0116
Pre-Holiday	42	0.6660	-1.5437	1.8044
1952-2007				
Pre-Christmas	224	0.8399	-2.5078	3.0022
Inter-Holiday	174	0.6932	-2.8355	2.7921
Pre-Holiday	112	0.6143	-1.5437	2.1533

Table 9
 Summary Statistics for S&P 500 returns in percent – December Effect

Period	Days	Standard Deviation	Minimum	Maximum
1962-1986				
Pre-Christmas	100	0.7658	-1.9826	2.7504
Inter-Holiday	78	0.6957	-1.1276	3.0571
Pre-Holiday	50	0.5399	-0.6856	2.0846
1962-1975				
Pre-Christmas	56	0.6731	-1.4198	2.1456
Inter-Holiday	43	0.7224	-0.8975	3.0571
Pre-Holiday	28	0.5847	-0.6842	2.0846
1976-1986				
Pre-Christmas	44	0.8738	-1.9826	2.7504
Inter-Holiday	35	0.6645	-1.1276	1.7607
Pre-Holiday	22	0.4888	-0.6856	1.6894
1987-1997				
Pre-Christmas	44	0.9371	-1.8197	2.5434
Inter-Holiday	34	0.8510	-2.5593	2.1355
Pre-Holiday	22	0.6141	-1.7391	0.7785
1998-2007				
Pre-Christmas	40	0.9107	-3.1296	2.0747
Inter-Holiday	32	0.6629	-1.6029	1.3317
Pre-Holiday	20	0.8308	-1.1145	2.4403
2007-2014				
Pre-Christmas	32	1.0565	-2.1163	2.9825
Inter-Holiday	25	0.7436	-1.4216	2.4407
Pre-Holiday	16	0.7933	-1.0311	1.6942
1987-2014				
Pre-Christmas	112	0.9617	-3.1296	2.9825
Inter-Holiday	88	0.7528	-2.5593	2.4407
Pre-Holiday	56	0.7379	-1.7391	2.4403
1962-2014				
Pre-Christmas	212	0.8804	-3.1296	2.9825
Inter-Holiday	166	0.7244	-2.5593	3.0571
Pre-Holiday	106	0.6640	-1.7391	2.4403

Table 10
Daily rates of return for the Dow Jones Industrial Average around the turn of the month in percent

Period	-4	-3	-2	-1	1	2	3	4
1952-1986								
Mean	0.0386	0.0274	0.0284	0.1268***	0.0370	0.1590***	0.1428***	0.0198
Days	415	415	415	415	415	415	415	415
1952-1963								
Mean	0.0663	0.0511	0.1743**	0.1781***	0.1295**	0.2814***	0.1466***	0.0215
Days	139	139	139	139	139	139	139	139
1964-1975								
Mean	-0.0403	0.0566	-0.0479	0.1442**	-0.0110	0.0860	0.1588**	0.0945
Days	144	144	144	144	144	144	144	144
1976-1986								
Mean	0.0956	-0.0295	-0.0419	0.0539	-0.0074	0.1099	0.1214	-0.0634
Days	132	132	132	132	132	132	132	132
1987-1997								
Mean	0.1386*	0.0747	0.1226	0.1177	0.2804***	0.2178***	0.0492	-0.0070
Days	132	132	132	132	132	132	132	132
1998-2007								
Mean	-0.0875	0.0907	0.0848	-0.1315	0.3417***	0.0466	0.0405	0.1215
Days	120	120	120	120	120	120	120	120
1987-2007								
Mean	0.0309	0.0823	0.1046	-0.0010	0.3096***	0.1363**	0.0450	0.0542
Days	252	252	252	252	252	252	252	252
1952-2007								
Mean	0.0357	0.0481	0.0572	0.0785**	0.1401***	0.1504***	0.1059***	0.0328
Days	667	667	667	667	667	667	667	667

* Significant at 90% confidence ** Significant at 95% confidence *** Significant at 99% confidence

Table 11
Daily rates of return for the S&P 500 around the turn of the month in percent

Period	-4	-3	-2	-1	1	2	3	4
1962-1986								
Mean	0.0199	0.0413	-0.0229	0.1290***	0.0021	0.1121**	0.1544***	0.0224
Days	294	294	294	294	294	294	294	294
1962-1975								
Mean	-0.0397	0.1048	-0.0128	0.1334**	-0.0215	0.0852	0.1729***	0.0853*
Days	162	162	162	162	162	162	162	162
1976-1986								
Mean	0.0931	-0.0366	-0.0354	0.1235*	0.0310	0.1451**	0.1316*	-0.0549
Days	132	132	132	132	132	132	132	132
1987-1997								
Mean	0.1350*	0.0942	0.1445*	0.1925**	0.2372***	0.2027***	0.0532	-0.0188
Days	132	132	132	132	132	132	132	132
1998-2007								
Mean	-0.0138	0.0130	0.1059	-0.0282	0.2957***	-0.0033	-0.0106	0.1478
Days	120	120	120	120	120	120	120	120
2007-2014								
Mean	0.3154*	0.1664	0.0155	-0.0495	0.0740	0.0762	0.0614	-0.1218
Days	96	96	96	96	96	96	96	96
1987-2014								
Mean	0.1431**	0.0806	0.1027	0.0483	0.2140***	0.1004*	0.0444	-0.0056
Days	336	336	336	336	336	336	336	336
1962-2014								
Mean	0.0856**	0.0622*	0.0441	0.0860**	0.1151***	0.1059***	0.0957**	0.0074
Days	630	630	630	630	630	630	630	630

* Significant at 90% confidence ** Significant at 95% confidence *** Significant at 99% confidence

Table 12
 Summary Statistics for Dow Jones Industrial Average returns in percent – Turn of the
 Month Effect

Period	Days	Standard Deviation	Minimum	Maximum
1952-1986				
-4	415	0.7661	-2.8881	2.7906
-3	415	0.8939	-5.7119	5.0764
-2	415	0.8293	-2.5126	4.6851
-1	415	0.7606	-2.3896	3.6326
1	415	0.8719	-2.5280	4.4596
2	415	0.7687	-2.8426	2.9661
3	415	0.8409	-2.3141	4.2472
4	415	0.8018	-3.2548	4.0862
1952-1963				
-4	139	0.7066	-2.8881	2.2763
-3	139	0.8614	-5.7119	4.5018
-2	139	0.8010	-1.4826	4.6851
-1	139	0.6631	-1.7009	1.8261
1	139	0.6658	-2.3402	2.2217
2	139	0.6386	-2.8426	2.1302
3	139	0.6601	-2.1986	1.7391
4	139	0.6448	-1.5361	1.5043
1964-1975				
-4	144	0.7786	-2.4109	2.7921
-3	144	0.9826	-2.3247	5.0764
-2	144	0.8155	-2.5126	3.1589
-1	144	0.8103	-2.2638	3.3098
1	144	0.9238	-2.5280	2.5639
2	144	0.8005	-2.6590	2.9661
3	144	0.8985	-2.3141	3.5123
4	144	0.7320	-2.4404	3.2741
1976-1986				
-4	132	0.8102	-1.9966	2.6855
-3	132	0.8275	-2.1747	2.4721
-2	132	0.8589	-1.9340	2.5621
-1	132	0.7999	-2.3896	3.6326
1	132	0.9940	-2.4040	4.4596
2	132	0.8451	-1.9512	2.7736
3	132	0.9455	-1.9475	4.2472
4	132	0.9978	-3.2548	4.0862

1987-1997				
-4	132	0.9313	-2.8355	4.7083
-3	132	0.7155	-1.9184	1.7572
-2	132	0.9461	-2.4570	4.9550
-1	132	0.8933	-4.0267	3.8171
1	132	0.8947	-1.9520	3.9416
2	132	0.8440	-2.5103	2.6110
3	132	0.9054	-3.9179	3.2120
4	132	0.8376	-3.4676	2.0624
1998-2007				
-4	120	1.0010	-2.6202	2.6840
-3	120	1.3063	-4.1927	6.8874
-2	120	1.0963	-3.6972	2.9420
-1	120	1.0471	-6.3665	1.9137
1	120	1.1911	-4.1028	4.5688
2	120	1.0453	-3.4077	2.8142
3	120	1.0340	-3.2419	3.2066
4	120	1.1422	-2.4539	4.2313
1987-2007				
-4	252	0.9698	-2.8355	4.7083
-3	252	1.0374	-4.1927	6.8874
-2	252	1.0185	-3.6972	4.9550
-1	252	0.9756	-6.3665	3.8171
1	252	1.0447	-4.1028	4.5688
2	252	0.9472	-3.4077	2.8142
3	252	0.9668	-3.9179	3.2120
4	252	0.9944	-3.4676	4.2313
1952-2007				
-4	667	0.8481	-2.8881	4.7083
-3	667	0.9503	-5.7119	6.8874
-2	667	0.9054	-3.6972	4.9550
-1	667	0.8498	-6.3665	3.8171
1	667	0.9495	-4.1028	4.5688
2	667	0.8400	-3.4077	2.9661
3	667	0.8911	-3.1979	4.2472
4	667	0.8789	-3.4676	4.2313

Table 13
 Summary Statistics for S&P 500 returns in percent – Turn of the Month Effect

Period	Days	Standard Deviation	Minimum	Maximum
1962-1986				
-4	294	0.7605	-2.8065	3.0571
-3	294	0.8848	-2.4604	5.0224
-2	294	0.7673	-2.2871	2.7475
-1	294	0.7492	-2.1558	3.2340
1	294	0.9224	-2.6583	3.9721
2	294	0.7770	-2.5950	2.5376
3	294	0.8443	-1.9366	3.9130
4	294	0.7964	-3.0740	3.2710
1962-1975				
-4	162	0.7610	-2.8065	3.0571
-3	162	0.9451	-2.4604	5.0224
-2	162	0.7406	-2.2871	2.5285
-1	162	0.7437	-2.1558	3.0862
1	162	0.8760	-2.6583	2.5277
2	162	0.7246	-2.5950	2.1704
3	162	0.7982	-1.9366	3.1737
4	162	0.6599	-1.8988	2.4523
1976-1986				
-4	132	0.7563	-1.9477	2.8770
-3	132	0.8013	-1.8412	2.4475
-2	132	0.8016	-2.2240	2.7475
-1	132	0.7588	-2.0748	3.2340
1	132	0.9790	-2.3555	3.9721
2	132	0.8384	-2.1916	2.5376
3	132	0.9002	-1.8427	3.9130
4	132	0.9340	-3.0740	3.2710
1987-1997				
-4	132	0.8679	-2.5593	5.1164
-3	132	0.7208	-1.6846	1.8047
-2	132	0.9450	-2.3402	4.9254
-1	132	0.8729	-4.1774	3.4488
1	132	0.8733	-1.9406	3.5859
2	132	0.8281	-1.9787	2.3728
3	132	0.8555	-3.5297	2.7001
4	132	0.8034	-3.0244	2.2172

1998-2007				
-4	120	1.0300	-2.3473	3.3276
-3	120	1.1665	-3.8370	5.4078
-2	120	1.1583	-3.7425	3.5266
-1	120	1.1299	-6.8014	2.5218
1	120	1.2178	-4.1536	4.0010
2	120	1.1958	-3.8345	5.0099
3	120	1.1100	-3.4296	3.8922
4	120	1.1614	-2.6242	4.3680
2007-2014				
-4	96	1.6340	-2.3473	10.7890
-3	96	1.1400	-2.9365	3.4291
-2	96	1.4973	-8.7897	3.5328
-1	96	1.2309	-2.8065	5.4203
1	96	1.6710	-8.9295	3.5896
2	96	1.2172	-4.0291	4.0826
3	96	1.2114	-5.2677	2.8719
4	96	1.5500	-5.0264	3.1331
1987-2014				
-4	336	1.1802	-2.5593	10.7890
-3	336	1.0010	-3.8370	5.4078
-2	336	1.1910	-8.7897	4.9254
-1	336	1.0834	-6.8014	5.4203
1	336	1.2604	-8.9295	4.0010
2	336	1.0908	-4.0291	5.0099
3	336	1.0513	-5.2677	3.8922
4	336	1.1737	-5.0264	4.3680
1962-2014				
-4	630	1.0075	-2.8065	10.7890
-3	630	0.9480	-3.8370	5.4078
-2	630	1.0167	-8.7897	4.9254
-1	630	0.9425	-6.8014	5.4203
1	630	1.1196	-8.9295	4.0010
2	630	0.9565	-4.0291	5.0099
3	630	0.9611	-5.2677	3.9130
4	630	1.0145	-5.0264	4.3680
