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High Stock Returns before Holidays: Existence and Evidence on Possible Causes

ROBERT A. ARIEL*

ABSTRACT

On the trading day prior to holidays, stocks advance with disproportionate frequency and show high mean returns averaging nine to fourteen times the mean return for the remaining days of the year. Over one third of the total return accruing to the market portfolio over the 1963–1982 period was earned on the eight trading days which each year fall before holiday market closings. Examination of hourly pre-holiday stock returns reveals high returns throughout the day. Pre-holiday stock returns in the post-test 1983–1986 period are also examined.

THIS PAPER EXPLORES A seeming empirical regularity in the pattern of daily stock index returns surrounding holidays: The trading day prior to holidays on average exhibits high positive returns. Over one-third of the return earned by the market over the twenty year test period accrued on the eight trading days which annually fall before holidays.

Intimations of the pre-holiday strength have appeared in the academic literature. In an examination of the frequency of Dow Jones Industrial Average advances on days surrounding weekends during the 1901 to 1932 period Fields (1934) finds a disproportionate frequency of advances on trading days preceding long holiday weekends. Roll (1983a) finds high returns accruing to small firms on the trading day prior to New Year's Day. Lakonishok and Smidt (1984) note that "prices also rise in all deciles (of market capitalization) on the last trading day before Christmas" and conclude that "the high Christmas returns of large companies might be considered (another) . . . mystery." A number of stock market advisors have also noted the pre-holiday strength. Merrill (1966) finds a disproportionate frequency of Dow Jones Industrial Average advances on days preceding holidays during the 1897 to 1965 period, and Fosback (1976) has noted high pre-holiday returns in S&P 500 index returns.

This paper is organized in four sections. Section I describes the data and the holidays considered. Section II reports several tests showing that large positive returns accrue to stocks on pre-holiday trading days; further, hourly returns and closing bid/ask data are examined to determine when high returns accrue on pre-holidays. Tests are also conducted showing that pre-holiday strength is not merely another manifestation of other seasonals such as the January or weekend effects. Section III is an examination of holiday returns during the post-test

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1983–1986 period. Finally, Section IV concludes with a discussion of possible explanations for the empirical regularity.

I. The Data

All tests to be reported in the body of the paper employ the daily stock index returns drawn from the Center for Research in Security Prices' (CRSP) value-weighted and equally-weighted daily index return files for the years 1963 through 1982.[1] Hourly values for the Dow Jones Industrial Average on days surrounding holidays are also examined.

The holidays considered are those which can provoke stock market closings. These holidays are: New Year's Day, Presidents' Days (formerly Washington's Birthday), Good Friday, Memorial Day, July Fourth, Labor Day, Thanksgiving, and Christmas. Some of these eight holidays (e.g., Good Friday, Thanksgiving) invariably fall on a weekday, and therefore are always accompanied by an extra stock market closing. Other holidays (e.g., July Fourth, New Year's Day) may fall on weekends and therefore will not always induce an extra market closing. No distinction has been made in this study between holidays accompanied by market closings and those which are not. During the twenty year test period there have been three occasions on which one of these holidays has not produced an extra stock market closing.[2]

II. High Pre-Holiday Returns

A. Means and Variances on Pre-Holidays

The 5020 trading days in 1963–1982 were divided into two subsets: the trading days prior to the holidays in this period (160 days), and all the rest (4860 days) (i.e., the first holiday in the period is New Year's Day of 1963; the last holidays is Christmas 1982. The 160 pre-holidays are the trading days prior to these holidays.) The means and variances of the two stock indexes for these two sets of days were calculated and are reported in Table I Panel A (henceforth Table I(A)), along with a t-statistic for the difference of the means.

The means of the pre-holiday returns exceed the means of the non-pre-holiday returns by factors of 9 and 14 for the equally- and value-weighted indices, respectively. The corresponding t-statistics for the differences of these means of 8.88 and 6.84 show that the differences of the means are statistically significant.

[1] The 1963–1982 test period corresponds to the start of the first full year of daily CRSP data and to the last available year of data at the time this study was initiated, respectively. The results of updating the study through the subsequent 1983–1986 post-test period is reported in Section III.

[2] Another "holiday", Election Day, was arbitrarily, but ex ante excluded from consideration. This exclusion was based on the following considerations: (i) Election Day itself is not a homogeneous holiday. In recent years the stock market has closed on the Tuesdays on which presidential elections are held but not for other elections. In contrast, the stock market is always closed when one of the other eight holidays falls on a weekday. (ii) The other eight holidays occasion general business shutdowns. Election day does not. (iii) One would expect significant information release concerning future economic policy around Election Day. There is no similar obvious expectation concerning the other eight holidays.

Table I

Sample Means, Standard Deviations, and Frequency of Positive Returns for the Pre-Holiday and Non-Pre-Holiday Subsets of Days for both CRSP Indices During 1963–1982

Panel A: The means and standard deviations of the two subpopulations consisting of pre-holidays and all other days during the 1963–1982 period, and a t-statistic for the differences of these means. Panel B: Frequencies of positive return days among all trading days in 1963–1982 and among the pre-holidays in this period, and a χ^2 test statistic for the equality of the positive return frequencies in these two groups of days.

1963–1982 Period	Equally-Weighted Index	Value-Weighted Index
Panel A: Means and Standard Deviations		
Mean of 160 pre-holiday returns	0.528%	0.364%
(standard deviation)	(0.656%)	(0.606%)
Mean of 4860 other day returns	0.059%	0.026%
(standard deviation)	(0.788%)	(0.781%)
t-statistic for difference of the means[a]	$t = 8.80$	$t = 6.87$
Ratio of pre-holiday returns to non-pre-holidays	8.9	14.0
Global mean, all 5020 trading days in sample period (global standard deviation)	0.074% (0.789%)	0.036% (0.781%)
Panel B: Frequency of Advances		
Positive return days among the 5020 days in 1963–1982 (fraction positive days)	2954 (.558)	2700 (.538)
Positive return days among the 160 pre-holidays (fraction positive days)	137 (.856)	120 (.750)
$\chi^2_{2\text{-}1}$-statistic[b]	39.2	26.7
(t-statistic)[c]	($t = 6.825$)	($t = 5.17$)
Implied p	<0.00001	<0.00001

[a] Standard error used in deriving the t-statistic is calculated as:

$$\sqrt{\frac{\sigma^2_{\text{holiday}}}{159} + \frac{\sigma^2_{\text{other}}}{4859}}.$$

[b] Letting O signify the oberved number of positive return pre-holidays and E signify the expected number of positive pre-holidays on the null hypothesis that pre-holidays are random draws from the global sample, the χ^2 statistic is calculated as: $\chi^2 = 2(O - E)^2/E$. There are 137 observed positive return pre-holidays. The expected number of positive return pre-holidays on the null hypothesis is the global fraction of positive return days (0.588) times the 160 pre-holidays in the sample.

[c] The number given here is the square root of the corresponding χ^2 statistic; it can be interpreted as a t-statistic for a two-tailed t-test.

(In Ariel (1984) the means and variances of pre-holidays and non-pre-holidays are reestimated after allowing for the autocorrelation which is characteristic of daily stock index returns. The results derived there confirm the high pre-holiday returns reported in Table I(A).)

The difference-of-the-means test reported in Table I(A) presupposes independence of the returns in the two sub-sets of days as well as constancy of the return generating process over the twenty years in the sample. A nonparametric test less sensitive to these assumptions can be performed by supposing the 160 pre-holidays are merely random draws from the 5020 trading days in the full period.

Table I(B) reports the χ^2-statistic testing the null hypothesis that the expected frequency of positive return days among the pre-holidays equals the realized frequency of positive return days among all trading days in the period. For both indices the resulting test rejects the hypothesis of equal positive return frequencies in the two groups of days in favor of the alternate hypothesis of more frequent pre-holiday advances. The significant χ^2-statistics also show that the high pre-holiday mean returns reported in Table I(A) do not derive from a small number of very high return pre-holidays.

To examine whether the high pre-holiday returns persisted during the entire sample period, the twenty years of data was divided in half, and mean pre-holiday returns calculated separately for the 80 pre-holidays in each ten-year period. For the equally-weighted index, the mean pre-holiday return during the first and second ten-year periods are a trivially different 0.503% and 0.556%; the number of advances among the 80 pre-holidays during the two periods are 70 and 67, respectively. For the value-weighted index, the corresponding figures are 0.343% and 0.386%, with 63 and 57 advances among the 80 pre-holidays. High pre-holiday returns persisted and were of comparable magnitude during the two halves of the twenty-year sample period. Merrill's (1966) finding of a disproportionate frequency of Dow Jones Industrial Average advances on days preceding holidays during the 1897 to 1965 period suggests that high pre-holiday returns have long predated the sample period employed in the present study.

Table I(A) also shows that on pre-holidays the mean return is 80% and 60% of the standard deviation for the equally- and value-weighted indices, respectively. This is surprising since the average return earned by stocks is typically negligible compared to the variation in the return.

Despite the much higher return, the pre-holiday variance of return is no larger than the return variance for all other days; means and variances do not increase proportionately, as would be the case if the pre-holiday mean return, which is 9 to 14 times the mean for the other days, resulted from 9 to 14 "regular" days somehow compounded into one day. Rather, it seems an extra component of return is added to a regular trading day.

Indeed, not only is the pre-holiday variance no greater than the variance for other days, the pre-holiday variance is actually *lower* than the variance of non-pre-holidays. This fact serves to emphasize that the high pre-holiday return is not a reward for bearing extra risk.

In Table I, and indeed in the remainder of this paper, the implicit assumption is made that all pre-holidays are treated as multiple draws from a single pre-holiday distribution despite the fact that the mean returns on different pre-holidays for the value-weighted index differ substantially, ranging from 0.604% for pre-Labor Day to 0.030% for pre-Presidents' Day (the latter being virtually identical to the global daily mean return). However, both parametric F-tests for the joint equality of mean returns on the eight types of pre-holidays. and nonparametric tests for the equal frequency of positive returns on the different pre-holidays, fail to reject the hypothesis of equal mean returns or of equal frequency of advances on the different holidays (tests not reported). The one demonstrable exception to this apparent holiday homogeneity is the pre-New Year holiday in the equally-weighted index, on which day the powerful January

effect dominates the return. With this one caveat, the convenient assumption of holiday homogeneity will continue to be employed.

B. Impact of Pre-Holidays on Holding Period Returns

A significant portion of the total twenty-year cumulative return earned by the market indexes can be attributed to the returns earned on pre-holidays. Table I shows the mean pre-holiday return exceeds the mean return for all non-pre-holidays by factors of 9 and 14 for the equally- and value-weighted indices, respectively. Hence, the eight pre-holidays collectively equal 72 or 112 non-pre-holidays in their impact on annual returns. Since there are 251 trading days in the average year, holiday returns will constitute a nontrivial fraction of the total return accruing to the indices. For example, the arithmetic mean monthly return accruing to the value-weighted index falls from 0.79% per month to 0.55% per month (i.e., falls by 30.4%) if the returns accruing on pre-holidays are ignored.[3] The annual continuously compounded return accruing to the value-weighted index falls from 8.35% to 5.45% (i.e., falls by 34.7%) if returns on pre-holidays are ignored;[4] fully 34.7% of the twenty-year cumulative return earned by the broad market accrued on the 160/5020 = 3.19% of days preceding holidays during this period.

C. Stock Returns on Days around Holidays

High returns predominate only on the single trading day preceding holidays and not on other days around the holiday period. Figure 1 graphically depicts the mean returns on the three trading days surrounding holidays. For the value-weighted index, only the mean return on the trading day immediately before holidays differs significantly from the return on all remaining trading days. However, for the equally-weighted index, mean returns on trading days immediately before *and* immediately after holidays are significantly different from the returns accruing to other days. The trading day following the New Year holiday is the single highest return day of the year for the equally-weighted index (Roll (1983a)) due to the very powerful "January Effect" on this day. Figure 1 also indicates by dotted lines the mean returns on the days immediately before and immediately after holidays if New Years' Days are omitted from the holiday set. Now, for both indices, only mean returns for the *single* trading day immediately prior to holidays differ significantly from the return on all remaining trading days.

[3] The daily re-weighting of stocks in an equally-weighted stock portfolio results in a severe upward bias which is very significant when daily returns are chained together to yield equally-weighted compounded returns (Blume and Stambaugh (1983); Roll (1983b)), and hence no comparable figures for the equally-weighted index are provided. No such upward bias affects the value-weighted index cumulative returns.

[4] The value-weighted index twenty-year buy-and-hold return of 431.2% corresponds to an annual continuously compounded return of $\ln(1 + 4.312)/20 = 0.0835$. If returns on pre-holidays are set equal to zero, the buy-and-hold return falls to 197.7%, implying an annual continuously compounded return of $\ln(1 + 1.977)/20 = 0.0545$.

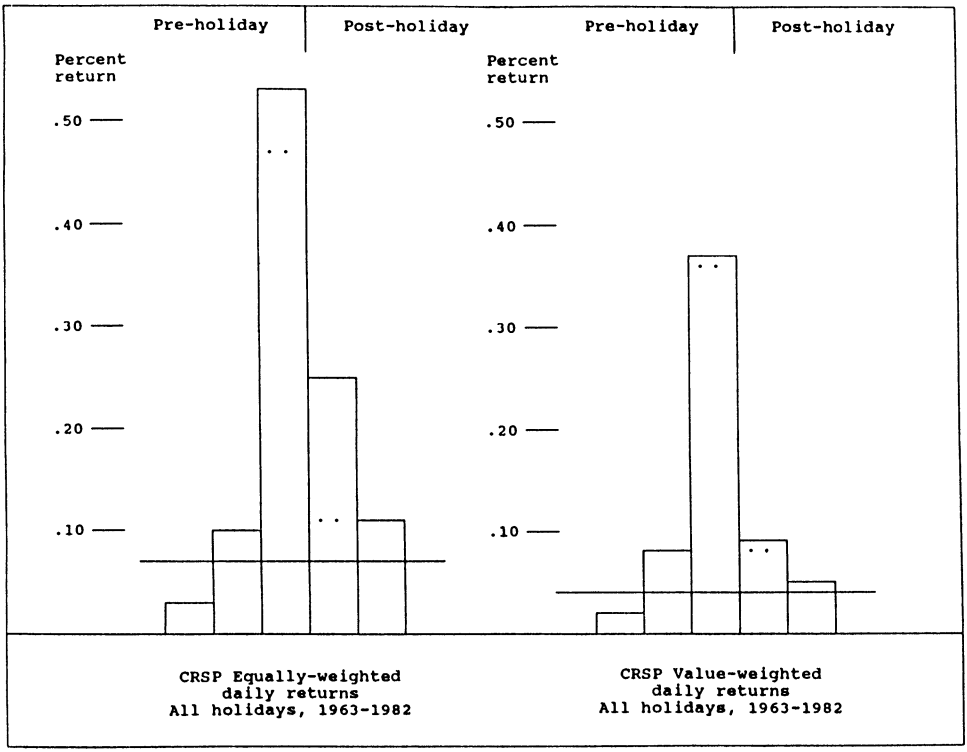

Figure 1. Mean returns on trading days surrounding holidays. Histogram showing mean returns (in percent) on the three trading days before and the two trading days after holidays in the 1963–1982 period. Figures show high returns only on the trading day before holidays. The two dots on the bars for the trading days immediately before and immediately after holidays represent the mean return if New Year's Days are omitted from the holiday sample; the equally-weighted index high return on the trading day following holidays is due entirely to high pre-New year returns induced by the January effect in the small-firm-dominated equally-weighted index. The horizontal lines cutting across the five bars show the mean daily return for each index during the entire period.

D. Hourly Stock Returns around Holidays

To further explore the intraday pattern of stock returns around holidays, hourly values for the Dow Jones Industrial Average[5] (DJIA) were collected from *Barron's* for the two trading days before and the trading day after each of the 160 holidays in the 1963–1982 period and converted into overnight, daily, and hourly returns during the trading day.

The evidence presented earlier shows that high pre-holiday CRSP index returns accrue on the trading day prior to holidays, which extends from the close of trading on the second day prior to holidays to the close of trading on pre-holidays. Table II reports in more detail the temporal pattern of return accumulation

[5] The DJIA is employed in this section since hourly values for this index are available. The pre-holiday effect is present in the DJIA, with mean daily return on the 160 1963–1982 pre-holidays of 0.316% ($t = 5.99$) compared with a global mean daily return during the comparable 1963–1983 period of 0.0106% (Smirlock and Starks 1986, Table I). See also Lakonishok and Smidt (1984) concerning the long standing presence of the holiday effect in DJIA returns.

around holidays for the DJIA.[6] The observed DJIA high pre-holiday mean return of 0.316% ($t = 5.99$) accrues during several hours of the pre-holiday period.

During pre-holidays stocks open significantly higher than the previous day's close, yielding a mean overnight return of 0.090% ($t = 3.16$) and advance during much of the remaining trading day. In particular, last hour returns are high (mean return 0.078%; $t = 4.84$) and display a disproportionate frequency of positive returns (108 observations greater than zero, compared with 48 less than zero; $\chi^2 = 23.1$, $p > 0.0001$).[7]

Interestingly, Table II also reveals a feature not apparent in the analysis of close-to-close CRSP index returns: returns are also significantly positive over the holiday itself, with stocks advancing 0.087% ($t = 3.47$) from the pre-holiday close to the post-holiday opening. The insignificance of the pre-holiday close to post-holiday close mean return reported in Section II.C. is consistent with significantly positive over-holiday returns, both because mean returns during post-holiday trading is slightly negative (−0.020%) and also because estimated variances (hence standard errors) are much higher over the close-to-close period which includes trading hours ($\sigma = 0.81\%$) than during the close-to-open over-holiday period which includes no trading hours ($\sigma = 0.32\%$) (see French and Roll (1986) and Rogalski (1984)).

In addition to reporting raw hourly mean returns around holidays, Table II also reports a better measure of the *incremental* holiday effect on the hourly returns of adjacent days by adjusting observed hourly returns to compensate for expected daily seasonals (Harris (1986); Smirlock and Starks (1986)).[8] This adjustment is effected by subtracting from each hour's observed return the expected return for that hour and for that day of the week as reported by Smirlock and Starks (1986) (hereafter SS) who quote hourly and overnight DJIA returns for each day of the week spanning the years 1963–1983; this data is taken as representing the expected return.[9] Mean hourly returns calculated from these adjusted returns thus reflect the *incremental* holiday effect on hourly returns.

[6] While hourly data was collected for the two trading days before holidays, only data for Day (−1), the pre-holiday, is presented in Table III since Day (−2) hourly data is completely unremarkable.

[7] None of the results reported are being driven by outliers and remain substantially unchanged if maximum and minimum hourly observations are deleted and the tests repeated.

[8] For example, the negative second hour and positive fourth hour returns evident in the returns on the trading day following holidays are consistent with the high frequency of post-holiday Mondays and the known Monday intraday seasonal with these characteristics.

[9] For example, the trading day before Thanksgiving 1963 fell on a Wednesday in the first of the subperiods reported by SS. Observed hourly returns on this pre-holiday are adjusted by subtracting from each hour's return the SS reported mean return for that hour on Wednesdays in the first subperiod. The over-holiday return from Wednesday's close to Friday's open is adjusted by subtracting the SS mean Wednesday close to Thursday open return. Finally, the post-Thanksgiving Friday hourly returns are adjusted by subtracting the appropriate SS hourly mean Friday returns.

The one exception to this method of adjustment occurs for trading days following holiday weekends, which, although calendar Tuesdays, are adjusted by subtracting the SS observed hourly returns for *Mondays* since Tuesdays which follow holiday weekends have returns comparable to Mondays (French 1980).

This adjustment procedure is only approximate since it takes the SS estimated hourly means as exact point values. Moreover SS treat short trading days by recording the last hourly observation, whenever it occurs, in clock time during the day, whereas this study treats the last two returns of each day as hour 5 and 6 returns, even if they occur earlier in the day. It is not expected that these rare occurrences will substantially bias the reported results.

Table II

Overnight, Hourly, and Daily Returns Accruing to the Dow Jones Industrial Average on the Trading Days Before and After Holidays

For each overnight, hourly, and daily observation interval surrounding holidays the following summary statistics are provided in this pattern:

Sample Mean in Percent	Obs. > 0	Obs. < 0
t-statistic	chi-square statistic	
(Standard Deviation)	Number of observations	

Sample mean and standard deviation are computed from all hourly or multihour returns in the sample. The number of observations ranges from 160 if an observation in that interval is available on every holiday to 141 when shortened trading results in fewer observations.[a] The sum of the number of observations greater than 0 and less than 0 need not sum to the total number of observations since some observations are identically 0. The chi-square statistic tests the null of equal number of observations greater than and less than 0; with 1 D.F. the 0.01 significance level is 6.63, the 0.001 level is 10.8. Data is provided both for the raw hourly returns and for the unexpected component of raw returns "adjusted" by subtracting the mean DJIA return for that hour on that day of the week.[b] The "adjusted" series shows the incremental effect of holidays on hourly and multihour returns.

Hourly Trading Day Returns and Overnight Returns around Holidays				
Trading Period	Raw Returns		Adjusted Returns	
Overnight; Close on Day −2 to Pre-Holiday Open	0.0900 $t = 3.16$ (0.3598)	87 69 $\chi^2 = 2.08$ 160	0.0713 $t = 2.52$ (0.3577)	77 83 $\chi^2 = 0.22$ 160
Pre-Holiday Hour 1 (First Hour)	0.0530 $t = 2.46$ (0.2720)	99 59 $\chi^2 = 10.13$ 160	0.0323 $t = 1.53$ (0.2658)	92 68 $\chi^2 = 3.60$ 160
Pre-Holiday Hour 2	−0.0032 $t = -0.17$ (0.2381)	85 71 $\chi^2 = 1.26$ 160	0.0106 $t = 0.54$ (0.2372)	91 69 $\chi^2 = 3.03$ 160
Pre-Holiday Hour 3	0.0446 $t = 2.55$ (0.2162)	81 69 $\chi^2 = 0.69$ 153	0.0399 $t = 2.29$ (0.2151)	80 73 $\chi^2 = 0.32$ 153
Pre-Holiday Hour 4	0.0305 $t = 1.49$ (0.2431)	75 65 $\chi^2 = 0.71$ 141	0.0090 $t = 0.44$ (0.2421)	69 72 $\chi^2 = 0.06$ 141
Pre-Holiday Hour 5	0.0284 $t = 1.61$ (0.2227)	95 63 $\chi^2 = 6.48$ 160	0.0448 $t = 2.53$ (0.2240)	100 60 $\chi^2 = 10.0$ 160
Pre-Holiday Hour 6 (Last Hour)	0.0783 $t = 4.84$ (0.2047)	108 48 $\chi^2 = 23.08$ 160	0.0682 $t = 4.24$ (0.2037)	108 52 $\chi^2 = 19.60$ 160
Over-Holiday: Close on Pre-Holiday to Open on Post-Holiday	0.0872 $t = 3.47$ (0.3182)	100 59 $\chi^2 = 10.57$ 160	0.0899 $t = 3.60$ (0.3158)	101 59 $\chi^2 = 11.02$ 160
Post-Holiday Hour 1 (First Hour)	−0.0038 $t = -0.18$ (0.2721)	83 74 $\chi^2 = 0.52$ 160	0.0325 $t = 1.50$ (0.2744)	91 69 $\chi^2 = 3.03$ 160
Post-Holiday Hour 2	−0.0657 $t = -3.00$ (0.2770)	59 100 $\chi^2 = 10.57$ 160	−0.0307 $t = -1.40$ (0.2761)	74 86 $\chi^2 = 0.90$ 160
Post-Holiday Hour 3	−0.0129 $t = -0.81$ (0.2000)	66 85 $\chi^2 = 2.39$ 155	−0.0070 $t = -0.43$ (0.2020)	68 87 $\chi^2 = 2.33$ 155

Table II—*Continued*

Trading Period	Raw Returns		Adjusted Returns	
Post-Holiday Hour 4	0.0286	73 63	0.0021	63 79
	$t = 2.01$	$\chi^2 = 0.74$	$t = 0.15$	$\chi^2 = 1.80$
	(0.1697)	142	(0.1699)	142
Post-Holiday Hour 5	0.0141	78 77	0.0106	82 78
	$t = 0.78$	$\chi^2 = 0.00$	$t = 0.60$	$\chi^2 = 0.10$
	(0.2291)	160	(0.2259)	160
Post-Holiday Hour 6	0.0214	76 81	0.0146	76 84
	$t = 1.05$	$\chi^2 = 0.16$	$t = 0.73$	$\chi^2 = 0.40$
	(0.2587)	160	(0.2521)	160
	Cumulative Multihour Returns			
Return Period	Raw Returns		Adjusted Returns	
Close on Day −2 to	0.3163	109 50	0.2756	110 50
Close on Pre-Holiday	$t = 5.99$	$\chi^2 = 21.89$	$t = 5.24$	$\chi^2 = 22.50$
Cumulative Return	(0.6683)	160	(0.6656)	160
Open on Pre-Holiday to	0.2260	106 52	0.2051	105 55
Close on Pre-Holiday	$t = 5.19$	$\chi^2 = 18.46$	$t = 4.68$	$\chi^2 = 15.63$
Cumulative Return	(0.5509)	160	(0.5540)	160
Close on Pre-Holiday	0.0671	90 70	0.1278	97 63
to Close on	$t = 1.04$	$\chi^2 = 2.50$	$t = 2.02$	$\chi^2 = 7.22$
Post-Holiday	(0.8145)	160	(0.8022)	160
Cumulative Return				
Open on Post-Holiday	−0.0202	84 74	0.0248	95 65
to Close on	$t = -0.35$	$\chi^2 = 0.63$	$t = 0.44$	$\chi^2 = 5.63$
Post-Holiday	(0.7315)	160	(0.7148)	160
Cumulative Return				

[a] The New York Stock Exchange observed shortened trading hours on some days in the sample so hourly DJIA index levels were converted to returns as follows: the return from the "open" to the first "hourly" DJIA observation is defined as the "hour 1" return (even if the interval is less than an hour). The returns accruing between the last three "hourly" DJIA observations (the last of which is the "close") are defined as "hour 5" and "hour 6" returns. Returns between all remaining DJIA observations are defined as "hour 2" and, if available, "hour 3" and "hour 4" returns.

[b] Hourly and daily returns on different days of the week during three subperiods of 1963–1983 are drawn from Smirlock and Starks (1986, Tables 1 and 3). Post-holiday-weekend Tuesdays are treated as Mondays. Returns are adjusted by subtracting the Smirlock and Starks reported mean return from the raw return.

These adjusted values are also reported in Table II. Unusually high returns accrue during the night before the pre-holiday and during pre-holiday trading. In particular, high returns accrue during the last hour of trading and during the holiday closing itself; both the parametric and nonparametric tests reported in Table I indicated high returns during both these periods. In contrast, the trading day following the holiday displays no period of unusual returns. Clearly, the holiday strength is just that: high returns ending with the start of trading following holidays.

E. The Last Hour of Pre-Holiday Trading and Possible Bid/Ask Influences

While high pre-holiday returns start prior to openings on pre-holidays, Table II also shows that especially high returns accrue during the last hour of trade, the last hour being responsible for one-fourth of the total pre-holiday

return. Keim and Stambaugh (1984) hypothesize, test, and reject the hypothesis that market makers transacting at the bid (ask) price with disproportionate frequency at the market close on certain days of the week could induce low (high) returns on those days. The high pre-holiday last-hour mean return might likewise be induced by a disproportionate frequency of last transactions at the ask price.

To determine whether numerous closing ask-price transactions could be one source of high pre-holiday returns, the bid, ask, and closing prices were gathered for a sample of 30 large, actively traded stocks on the *two* trading days (Day (−2) and Day (−1) prior to 25 holidays.[10] Market making activity could induce positive returns from the close on Day (−2) to the close on Day (−1) if more stocks which closed at the bid on Day (−2) closed at the ask on Day (−1) than vice versa. Table III tabulates the frequency with which stocks closed on Day (−1) at the bid, ask, or "between" bid and ask, contingent on where the stock closed on Day (−2).[11]

Given this data it is possible to calculate a rough estimate of the possible contribution of bid–ask effects to high pre-holiday returns; as Table III shows, of the 750 observation sets, there are 6 more stocks that advanced from the bid on day (−2) to the ask on day (−1) than the reverse, 8 more stocks that advanced from the bid to a "between" value than the reverse, and 19 more stocks that advanced from a "between" value to the ask than the reverse. Among these 750 stocks, the mean value of the bid–ask spread is 0.80% of the closing price of the stock (numerical data not reported). Assuming that all "between" prices are halfway between bid and ask prices, the contribution of the bid–ask effect to the mean return from Day (−2) to Day (−1) among this group of stocks is:

$$[\{6 + \tfrac{1}{2}(8 + 19)\} * (0.80\%)]/750 = 0.021\%.$$

This value is sufficiently small compared both to the magnitude of the pre-holiday mean return and to the last hour return that, subject to the usual caveats that this is a rough calculation and that this relatively small test sample may not be representative of all stocks, bid–ask effects can be discounted as an important contributor to the high pre-holiday returns.[12]

[10] Last transaction prices were obtained from the S&P *NYSE Stock Price Record.* Closing bid and ask quotes were obtained from Fitch *Stock Quotations on the NYSE* sheets. The data available to me covered only the holidays in the post-test 1983–1986 period, and data was available for only 25 of the 32 holidays during this period. (Omitted holidays were Thanksgiving 1984, Labor Day, Christmas, and New Year 1985, and Labor Day, Thanksgiving, and Christmas 1986.) For each available holiday the closing bid, ask, and last transaction prices were gathered for thirty randomly selected NYSE-traded S&P 500 stocks, new stocks being selected for each holiday, for a total of 750 observation sets. Stocks selling for less than $5 (3 cases) and stocks which experienced "extraordinary" occurrences, e.g., stock splits (4 cases) were excluded and new selections made. Since this test looks merely at whether a stock closed at the "bid" or "ask" price it is a nonparametric test and thus relatively insensitive to a few extreme price changes or other extraordinary events.

[11] A few stocks are recorded as having a last transaction either above the closing ask or below the closing bid price, perhaps due to the last transaction occurring well in advance of the market close. No use is made of these rare occurrences and they are excluded from all calculations.

[12] See, however, Keim (1989) for some evidence that OTC stocks may earn incremental positive pre-holiday returns due to systematic shift from bid to ask prices. This hints that high pre-holiday returns may have different causes in large and small firms or else that broad market pre-holiday price increases are incorporated by OTC market markers into small firm prices preferentially at the close.

Table III

Frequency of Stocks Closing at Bid and Ask Price on Trading Days Around Holidays

The frequency of stock closings at bid, ask, or "beween" bid and ask, on the two trading days before holidays. A total sample of 750 stocks are examined, consisting of 30 randomly selected NYSE-traded S&P 500 stocks on each of 25 holidays in the 1983–1986 period.[a] The table is read as indicating that, e.g., 50 stocks which closed at the bid price on day −2 (i.e., two days before the holiday) also closed at the bid price on day −1 (i.e., on the pre-holiday).

		Stock Price Closed on Day −2 at:				Row
		Bid	Ask	Between	Other	Totals:
Stock Price Closed on Day −1 at:	Bid	50	38	68	4	160
	Ask	44	63	91	8	206
	Between	76	72	197	8	353
	Other	12	9	9	1	31
Column Totals:		182	182	365	21	750

[a] These 25 pre-holidays fall outside the 1963–1982 period treated in most of this work but constitute all pre-holidays for which closing bid/ask data were available to the author. Appropriate caveats must therefore be applied before conclusions drawn from these data are applied to the earlier time period.

F. Pre-Holiday Returns Are Not a Manifestation of Other Calendar Anomalies

Not a January Effect: The last day and the beginning of months are seasonally strong periods (Ariel (1987)), and this applies especially for January, the highest return month of the year (Rozeff and Kinney (1976); Reinganum (1983)). Roll (1983a) observes that the period of January high returns in fact starts on the last trading day of December. This day is the trading day prior to the New Year and is thus one of the pre-holidays included in the above tests. Hence, the high January effect return on the pre-holiday before New Year's may be partially responsible for the statistical significance of the tests reported in Table I. As a check on this possibility, Table IV(A) reports a regression model in which a pre-holiday dummy variable is regressed against daily index returns, and Table IV(B) repeats the regression after adding a separate pre-New Year dummy variable in addition to the pre-holiday dummy. As shown in Table IV(B), the incremental return earned on pre-New Year's in excess of that earned on other pre-holidays is negligible for the value-weighted index but is large and statistically significant for the equally-weighted index, consistent with Roll's claim that small firm January effect high returns start on the day before New Year's. However, for both equally-weighted and value-weighted indices, the pre-holiday dummy remains large and statistically significant ($t = 5.97$ and 4.93, respectively), even in the presence of the separate pre-New Year dummy. Moreover, a non-parametric χ^2 test (analogous to that reported in Table I) finds that the frequency of positive returns among the 140 pre-holidays excluding pre-New Year's for the equally- and value-weighted indices, respectively, are 118 and 103 with corresponding χ^2 test statistics of 26.78 and 21.75 (the implied p values in both cases is less than 0.00001). These highly significant test statistics show that the January effect is not the driving force behind the observed pre-holiday strength through the January effect's impact on pre-New Year's Day.

Not a Weekend Effect: Some holidays such as Labor Day always fall on a Monday, and hence the trading day prior to these holidays will always be a

Table IV

Dummy Variable Regression Models Showing that High Pre-Holiday Returns are not Caused by (B) the January Effect or (C) the Weekend Effect. Models (D) Show Small Firms Earn no Significant Incremental Pre-Holiday Return

Results of regressing the CRSP equally-weighted (EW) and value-weighted (VW) daily index returns and a small firm excess return proxy (SF) against one or more dummy variables.[a] Panel A: Regression of returns against pre-holiday dummy only. The significance of the t-statistic attached to the pre-holiday dummy variable confirms the existence of the pre-holiday effect. Panel B: Regression of index returns against a pre-holiday dummy, and a separate pre-New Year's holiday dummy. The continuing significance of the pre-holiday coefficient demonstrates pre-holiday strength is not caused by the January effect. Panel C: Regression of index returns against day-of-the-week and pre-holiday dummy variables showing that the weekend effect is not a cause of the pre-holiday strength via the high frequency of Friday and low frequency of Monday pre-holidays. Panel D: (i) Regression of small firm excess return proxy against pre-holiday dummy variable showing apparent but spurious incremental small firm pre-holiday premium. (ii) Adding a separate pre-New Year's holiday dummy to control for high small firm January Effect returns renders the pre-holiday small firm premium only marginally significant. (iii) Addition of day-of-the-week dummies (to control for high small firm returns on Fridays (Keim and Stambaugh (1984))) renders the pre-holiday small firm premium insignificant.

$R_t =$ Constant	+ Monday	+ Wednesday	+ Thursday	+ Friday	+ Pre-Holiday	+ Pre-New Year's Holiday
Panel A: Significance of High Pre-Holiday Returns						
EW = 0.059					+0.469	
(t = 5.26)					(t = 7.44)	
VW = 0.025					+0.340	
(t = 2.27)					(t = 5.43)	
Panel B: Pre-Holiday Strength Not Caused by January Effect High Pre-New Year's Returns						
EW = 0.059					+0.401	+0.545
(t = 5.26)					(t = 5.97)	(t = 2.91)
VW = 0.025					+0.329	+0.082
(t = 2.27)					(t = 4.93)	(t = 0.44)
Panel C: Pre-Holiday Strength Not Caused By Weekend Effect						
EW = −0.003	−0.115	+0.132	+0.094	+0.205	+0.400	
(t = −0.11)	(t = −3.22)	(t = 3.82)	(t = 2.72)	(t = 5.89)	(t = 6.36)	
VW = 0.026	−0.148	+0.073	+0.007	+0.064	+0.304	
(t = 1.10)	(t = −4.28)	(t = 2.12)	(t = 0.20)	(t = 1.86)	(t = 4.85)	
Panel D: No Incremental Small Firm Pre-Holiday Premium						
SF = 0.034					+0.131	
(t = 6.38)					(t = 4.45)	
SF = 0.034					+0.072	+0.525
(t = 6.39)					(t = 2.30)	(t = 6.52)
SF = −0.030	+0.033	+0.060	+0.089	+0.142	+0.037	+0.501
(t = −2.63)	(t = 2.05)	(t = 3.73)	(t = 5.48)	(t = 8.69)	(t = 1.18)	(t = 6.28)

[a] The small firm excess return proxy (SF) is defined for each day as the equally-weighted index return minus the value-weighted index return. For all series observations span the years 1963–1982 (5020 observations including 160 pre-holidays). Dummy variables assume a value of 1 if the day is, respectively, a pre-holiday, a pre-New Year's holiday, a Monday, a Wednesday, etc., and 0 otherwise.

Friday; indeed 68 of the 160 pre-holidays fall on Friday. Other holidays (e.g., Thanksgiving) also always fall on other specific days of the week. French (1980) and Gibbons and Hess (1981) report that the mean returns differ on different days of the week, with mean returns highest on Friday and lowest on Monday. Hence the high frequency of Friday and low frequency of Monday pre-holidays may be partially responsible for the results reported earlier.

As a check on this possibility, Table IV(C) reports the results of regressing each of the two CRSP daily stock index returns against dummy variables for the days of the week plus an added pre-holiday dummy variable. The magnitude of the pre-holiday dummy will then represent the incremental returns earned on pre-holidays after correcting for the differing means across different days of the week. For both CRSP indices, the magnitude of the pre-holiday dummy is large and statistically significant, thereby showing that the high frequency of Friday and low frequency of Monday pre-holidays is not responsible for the observed pre-holiday strength.

Not a Small Firm Effect: The January and Weekend Effects generate significant premiums that accrue to small firms during the early days of January (Keim (1983); Roll (1983a)) or on Fridays (Keim and Stambaugh (1984)), respectively. While the high returns that accrue to the value-weighted index (Table I) demonstrate that pre-holiday strength is not confined to small firms, the substantially different pre-holiday mean returns between the equally- and value-weighted indexes (Table I: 0.528% vs. 0.364%) hint that small firms may earn a pre-holiday premium.

Table IV(D) employs the difference between the equally-weighted and value-weighted index returns as a small firm excess return proxy in order to test for a specific small firm component to pre-holiday returns.[13]

The first model in Table IV(D) shows that a small firm premium of 0.131% ($t = 4.45$) accrues on pre-holidays. However, after correcting both for January Effect high small firm returns by the addition of a pre-New Year dummy and for the Weekend Effect high small firm Friday returns by addition of day-of-the-week dummy variables, the incremental small firm pre-holiday return falls to an insignificant 0.037% ($t = 1.18$).[14] In sum, there is no evidence of an incremental return accruing to small firms solely because of a "holiday effect."

III. Holiday Strength in Post-Test Period

The above tests employ observations for the years 1963 through 1982 which represent all available data at the time this study was initiated. The subsequent

[13] This is the small firm excess return proxy employed by Roll (1983a) in his study of the January Effect. Note that this simple proxy is able to capture most of the salient seasonal characteristics of the small firm premium, including the very significant January (Roll 1983a) and Friday (Keim and Stambaugh, 1984) seasonals, as displayed in Table IV(D) model 3.

[14] The finding of no small-firm pre-holiday premium is very robust. For example, if in Table IV(D) model 3 the pre-New Year Holiday dummy is replaced by a *four* day turn-of-year dummy variable (which assumes a value of 1 on the last trading day and first three trading days of years) the pre-holiday small firm premium, as represented by the coefficient on the pre-holiday dummy, falls to a completely insignificant 0.002% ($t = 0.07$).

years 1983 through 1986 constitute a real-time post-test period, which can be examined for pre-holiday strength.

Repeating the test of Table IV(A) by regressing all observations in the 1963–1986 aggregate sample against a pre-holiday dummy variable, the magnitude of the dummy coefficient and associated t-statistic remains very significant (0.434% (t = 7.82) and 0.304% (t = 5.36) for the equally- and value-weighted indexes, respectively), a not surprising result considering the magnitude of the effect in the first 20 of these 24 years.

More interesting than the magnitude of pre-holiday strength in the aggregate 1963–1986 period is the question whether pre-holiday strength persisted in the post-test 1983–1986 period considered by itself. Point estimates for mean returns on 1983–1986 pre-holidays are 0.332% and 0.194% for the equally- and value-weighted indices, smaller than the point estimates for the 1963–1982 pre-holidays (Table I(A)), but still a factor of 5 times larger than the non-pre-holiday mean return. However, with only 32 holidays in 1983–1986, parametric difference-of-the-means tests permit the rejection of neither the hypothesis that the pre-holiday mean return equals the non-pre-holiday mean in 1983–1986 nor the hypothesis of equal pre-holiday mean returns during 1963–1982 and 1983–1986.[15]

The frequency of positive return pre-holidays during 1983–1986, 26 out of 32 (81%) and 22 out of 32 (69%) for the equally- and value-weighted indices, respectively, is similar to the frequency found in the 1963–1982 pre-holidays (Table I(B)) of 86% and 75%, respectively, and higher than the frequency of advances among all days during these four years (564 and 548, respectively, out of 1010 trading days). Nonparametric χ^2 tests, analogous to those reported in Table I(B) yield χ^2 test statistics of 7.40 (p = 0.004) and 2.48 (p = 0.12), respectively, suggesting at least for the equally-weighted index a disproportionate number of positive return pre-holidays.

In sum, while small sample size prohibits definitive conclusions concerning persistence of pre-holiday strength in the 1983–1986 post-test period, the weight of evidence is consistent with the belief that such strength has continued.

IV. Conclusions

The high mean return accruing to the CRSP equally- and value-weighted indexes on the trading day prior to holidays is statistically significant; on average the pre-holiday return equals nine to fourteen times the return accruing on non-pre-holidays. Over one-third of the return accruing to the broad market over the 1963–1982 period is attributable to the eight trading days prior to holidays during each year.

The data presented here can be employed to test a number of possible hypotheses that seek to account for the pre-holiday strength:

[15] Roughly, we can conclude neither that pre-holiday strength has persisted nor that it has abated in the post-test period. Low test power due to small sample size leads to a similar lack of definitiveness concerning the existence of pre-holiday strength in other four-year subperiods of the original sample period (e.g., in the first and the last four year subperiods, 1963–1966 and 1979–1982).

Activity by specialists at the market close can be ruled out as a major causal factor, both because positive returns start to accrue well in advance of the market close, and because there is little discernible bid/ask component to the return. Likewise, the hourly pattern of positive return accumulation throughout pre-holidays rules out many other measurement error accounts of pre-holiday strength.

Yet another explanation, encapsulating the "lore of the street" as reported in the popular press, attributes pre-holiday strength to covering by short-sellers who desire to close their allegedly very risky short positions in advance of holidays. However, it is not clear why traders should want to close short but not long positions in advance of holidays, and the unremarkable returns on post-holiday trading days suggest that these short positions are not reinstituted following the holiday. Further, if pre-holiday closing of short positions is responsible for high returns on pre-holidays, it cannot explain the observed positive returns from pre-holiday close to post-holiday open.

Among hypotheses consistent with the data, Ritter's (1988) and Harris and Gurel's (1986) demonstration that stock seasonals can be induced by specific clienteles' investment decisions suggests the possibility that there may exist in this case as well some clientele which preferentially buys (or avoids selling) on pre-holidays.

Whatever the reason for the pre-holiday strength, this quirk in stock returns is apparently of long-standing (Merrill (1966); Lakonishok and Smidt (1988)) and may need to be considered in other studies which treat holiday-rich periods such as the turn-of-the-year.

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