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A Month-by-Month Examination of Long-Term Stock Returns

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Abstract

This study provides a month-by-month examination of stock returns. The results reconfirm the January Effect as well as indicate a powerful anomaly in September. Investing in the CRSP equal-weighted index in only January turns $1 in 1926 to $87.40 by 2006. The second closest month is July, during which $1 grows to $3.11. September is a poor month to invest. The $1 invested in only September decreases to a mere $0.49. The Halloween Effect vanishes once the monthly anomalies are controlled for. The September Effect is also established in four out of the five international markets tested.

Keywords: January Effect, September Effect, seasonal patterns.
JEL Classification: G10, G11, G15.

> *October: this is one of the peculiarly dangerous months to speculate in stocks in. The others are July, January, September, April, November, May, March, June, December, August and February.*
>
> *Mark Twain*

Introduction

Prior research has uncovered several seasonal patterns in stock market returns. Perhaps the most famous is the January Effect (e.g., Rozeff and Kinney, 1976; Keim, 1983). Other notable seasonalities are related to the day of the week, May through Halloween, stock market holidays, and intra-month patterns[1].

While much research has been devoted to studying the January Effect, relatively little attention has been paid to patterns in other months. For instance, although the financial press sometimes refers to a September Effect (e.g., Browning, 2005), September receives virtually no special notice in the finance literature.

The primary purpose of this study is to evaluate monthly stock market patterns for each of the 12 calendar months. In the main testing, the month-by-month returns are separately examined over the 81-year time period from 1926 to 2006 to determine whether any months generate abnormal returns. Two additional effects based on patterns over several consecutive months are also explored: the summer rally and Halloween Effect. The Halloween Effect maintains that investing from November through April is better than May though October. Other testing evaluates monthly return patterns in five international markets.

The main findings suggest two monthly anomalies exist in United States stock market returns. As expected, the first is the well-known January Effect. Prior studies find that the stock market as a whole performs well in January (e.g., Rozeff and Kinney, 1976). However, most of this effect may be attributable to the superior returns of small stocks (Keim, 1983). This study corroborates the January Effect for the equal-weighted index only, consistent with the effect being isolated to small firms.

Confirming the financial press claims, the second monthly anomaly occurs in September. Unfortunately for September, it is the worst performing month in the stock market, generating a negative mean return over the 81-year sample period using either CRSP index. Furthermore, about half of the 81 September returns are below zero. October is also a relatively poor month for stocks. Its equal-weighted mean return is also negative over the sample period.

A good illustration of the difference in monthly returns is provided by the cumulative wealth index (CWI), which shows the ending value of $1 invested at the beginning of the period. The ending CWI is $87.41 if $1 is invested in the January equal-weighted CRSP index from 1926 to 2006. The second highest monthly equal-weighted CWI is July's $3.11. The same $1 investment decreases to $0.49 if invested in September and to $0.56 if invested in October.

January's performance is not nearly as striking when using the value-weighted CRSP index. In fact, it is merely second best. The value-weighted ending CWI for January is $3.79, a number less than the December ending CWI of $3.98. September remains the poorest month for investing and the only month generating negative value-weighted returns. Its ending CWI is $0.43.

While summer rallies are not supported, the Halloween Effect is strongly evident in this sample. For example, the equal-weighted ending CWI for November to April is $3891.98 compared to just $6.42 for May to October. This corresponds to a mean return difference of over 8% per year. However, the effect is primarily attributable to the monthly pat-

[1] See, for example, French (1980), Smirlock and Starks (1986), Ariel (1987), Lakonishok and Smidt (1988), and Bouman and Jacobsen (2002).

terns discussed earlier. If January, September, and October returns are excluded, the superior November to April performance virtually vanishes.

The final analysis evaluates international monthly stock returns. Five major indexes containing companies in France, Germany, the United Kingdom, Hong Kong, and Japan are also evaluated. The September Effect is found for four of the indexes. In Hong Kong, the only market where the effect is not established, September returns are still close to zero.

Overall, the results of this study demonstrate the existence of monthly seasonal patterns in the stock market, thus complementing similar studies in the important area of market anomalies. These seasonal patterns continue to present a challenge to the notion of market efficiency. The persistence of the January Effect even though it has been well known for about 30 years is particularly troubling. Despite much research, seasonalities remain among the more puzzling aspects of the stock market.

This study proceeds as follows. Section 1 describes the data. Section 2 presents the results. The last section concludes the paper.

1. Data and empirical methods

The United States total return data including dividends come from the Center for Research in Security Prices (CRSP)[1]. CRSP constructs two indexes consisting of all its covered firms. The CRSP equal-weighted index allows each firm the same impact on the overall index return. Alternatively, the CRSP value-weighted index is weighted by market capitalization and is therefore heavily influenced by larger firms. Differences in interpretations between the two indexes can be attributed to differences in the returns of large and small stocks. Small stocks are found to be superior overall performers (e.g., Banz, 1981) and superior performers in January (e.g., Keim, 1983).

The use of the CRSP indexes represents a departure from many previous studies. For example, Bouman and Jacobsen (2002) use the Morgan Stanley Capital International (MSCI) reinvestment indexes, while Lakonishok and Smidt (1988) use the Dow Jones Industrial Average. Because the CRSP indexes include all firms covered by the CRSP database, they are among the most broad-based of all domestic indexes.

The primary sample contains the CRSP monthly index returns from January 1926 through December 2006. Because the sample period extends 81 years, each month has 81 returns. Computed statistics include means, medians, standard deviations, maximums, minimums, and cumulative wealth indexes (CWIs). The CWIs are computed by assuming $1 is invested at the beginning of the return period. Ending period wealth is based on the buy-and-hold returns over the period examined.

The international analysis utilizes index returns from the world's biggest stock markets. Five indexes are evaluated over various sample periods depending on data availability: the CAC 40 of France (1991-2006), the DAX 30 of Germany (1991-2006), the FTSE 100 of the United Kingdom (1985-2006), the Hang Seng of Hong Kong (1987-2006), and the Nikkei 225 of Japan (1985-2006). France, Germany, the United Kingdom, and Japan represent the world's largest stock market capitalizations after the United States. After Japan, Hong Kong is the second largest stock market in Asia.

Significance levels of means and CWIs are computed. The means are tested by t-statistics based on the difference from zero or from the appropriate monthly mean return. Significance tests of the CWIs utilize a bootstrapping method. Monthly returns are randomly selected from the index and time period being evaluated. The number of returns selected equals the number of years in the time frame under examination. The CWI is then calculated for the randomly selected months. The process is repeated 1000 times and confidence levels are determined using the percentile ranking of the 1000 CWIs thus computed. The actual CWIs realized for each calendar month are compared to the bootstrapped distribution to evaluate significance levels.

As an illustration, in the overall sample period, 81 months are randomly selected without replacement from the 972 months available from 1926 through 2006. The CWI is computed using the returns of these 81 random months, representing an expected CWI if there are no seasonalities. This process is repeated 1000 times, and the distribution is estimated. The method is adjusted to consider the number of months needed for certain strategies and for different time periods. For example, in the sub-period analyses of Tables 3 and 4 (see Appendix), 20 or 21 months (as applicable) are randomly selected in each of the sub-periods.

2. Results

2.1. Month-by-month analysis. Table 1 reports summary statistics during the sample period for both the CRSP equal-weighted and value-weighted indexes over the 1926-2006 sample period. The January Effect is plainly evident when the returns are equally weighted. The mean January return is 5.90%, the highest of any month. July is a distant

[1] The results are repeated using the CRSP indexes without dividends.

second with a 1.67% mean return. January also has the highest median return at 4.40%, more than double the second highest month of November at 2.17%. Without January's spectacular CWI of $87.40, the total CWI drops from $24,967.34 to $285.67. Despite the superior performance, the risk in January, measured by the standard deviation of returns, is rather average. January's strength appears due to its low frequency of poor returns, not a high frequency of exceptional returns. January has the lowest minimum return at -7.56% (1939), but its maximum return of 31.57% (1934) is actually below average. The month has an astonishing 81.48% of positive returns.

The value-weighted CRSP index tells a different story. Returns are generally lower as would be expected given superior small firm performance (e.g., Banz, 1981). Moreover, the January Effect disappears. January's mean return (1.76%) and CWI ($3.79) are now second to those of December (1.79% and $3.98). January's median return is only the fifth highest of the 12 months. December now appears to be the best performing month with the highest mean, highest CWI, second highest median, lowest standard deviation, and the highest percent of positive returns.

The difference in conclusions between the indexes is, of course, due to the size effect. The equal-weighted index allows small firms equal performance, while the value-weighted index returns are dominated by larger firms. The January Effect is thus a product of outstanding small firm performance, not outstanding overall performance.

Although the January Effect garners the most attention, another month also generates abnormal returns, September[1]. Returns in this month are negative. Investing in the CRSP equal-weighted index in only September turns $1 in 1926 to a paltry $0.49 in 2006. The mean September equal-weighted return is negative (-0.55%), while the median return is close to zero (0.03%). Positive returns are generated in only 51.85% of the years. October is also a poorly performing month when using equal-weighted returns. The ending CWI is only $0.56 and positive returns are generated in 48.15% of the time.

The value-weighted index results for September are similar, which suggests the September Effect is more pervasive than that of January. The mean return is negative and $1 invested in 1926 shrinks to $0.43 at the end of 2006. October is the second worst month to invest in the value-weighted index. However, in contrast to the equal-weighted results, October now generates a small positive long-term return.

Other notable months include July, November, and December. These months all show returns that are significantly greater than zero for both CRSP indexes. However, all the CWIs are insignificant and almost all the mean returns are insignificantly different from the mean return of the overall sample. Furthermore, none of these months exert nearly as much influence as January does to overall equal-weighted returns.

To further explore the influence of monthly returns, Table 2 (see Appendix) presents the results of a GARCH (1,1) time series regression analysis with 12 lags. The regression equation specifies the monthly CRSP index return, either equal or value weighted, as the dependent variable. The independent variables are monthly dummies equal to one if the return month is January, September, and in some models October. For expositional convenience, the coefficients and t-statistics relating to the GARCH and lagged variables are excluded from the presentation.

The January dummy variable is positively significant when using the equal-weighted CRSP index as the dependent variable, but is insignificant when using the value-weighted CRSP index. The September dummy is negatively significant using either index. October is significant when predicting the equal weighted index. The models are also specified using July, November, and December dummy variables, but none of these additional variables are significant.

To evaluate the robustness across time, Table 3 in the Appendix reports summary statistics for the equal-weighted CRSP index by time period. Four 20- or 21-year time periods are specified: 1926-1946, 1947-1966, 1967-1986, and 1987-2006. From the table, it is apparent that the January Effect persists across time periods and is strong even in the last sub-period (1987-2006), a period during which it was well known. In each sub-period, performance in January is superior to the other months by the mean, median, and CWI. The poor performance in September and October is also fairly robust across time periods.

Table 4 reports the time period summary statistics for the value-weighted CRSP index. Returns in January are smaller than those of the equal-weighted index, but two of the four are significantly different from zero. November and December show performance similar to that of January. September's returns are negative in each sub-period.

Extraordinary returns may affect the results. For example, the poor performance in October is often attributed to two major events: the stock market crash of

[1] An April 16, 2008 Google search on "January Effect" and "stock market" yielded 66,200 results. A search on "September Effect" and "stock market" yielded 158 results.

1929 marking the start of the Great Depression, and the stock market crash of 1987 representing the largest one-day drop in market history. Indeed, these two events represent the two worst performing October months. The CRSP equal-weighted return is -21.27% in October 1929 and -27.23% in October 1987.

To explore the influence of extraordinary returns, not only in October, but in all the months, the CWIs are recomputed after excluding a specified number of best or worst returns. Table 5 reports the results after removing either one, two, or three best months. Table 6 reports the results after removing the same number of worst months.

Table 5 illustrates the importance of investing in the best months. If each month's best return is excluded, the total CWI reduces from $24,297.34 to $950.54. If the three best returns are excluded from each month, the CWI decreases to $42.30.

The equal-weighted CWI in January continues to tower over the other months even after removing its best returns. For example, after removing the three best January returns (in 1934, 1975, and 2001), January's CWI of 41.74 is still over 10 times higher than any other month's CWI computed without excluding any return. In addition, after removing the three best returns from each month, January alone generates virtually the entire $42.30 ending CWI.

Table 6 shows that the September Effect is robust to the exclusion of its worst months. Only after removing the three worst returns the September equal-weighted return is positive. However, excepting October, the September CWI of $1.05 is still lower than the CWIs of all the other months computed without removing any worst month. Additionally, September's CWI using the value-weighted CRSP index remains below $1 even after removing its three worst returns.

2.2. Summer rallies and the Halloween/Sell in May Effect. Two additional seasonalities are of special interest because they are based on a period of consecutive monthly returns. The first is the "summer rally" and the second is the Halloween Effect, which is often referred to as "Sell in May and Go Away".

The summer months are often anecdotally thought to offer excellent stock returns even though little evidence has been provided demonstrating the effectiveness of any summer-based strategy (e.g., Waggoner, 2000; Hulbert, 2007). In addition, as pointed out by Hulbert (2007) opinion is divided as to what exactly constitutes the "summer".

For purposes of this study, summer is defined as the months of June, July, and August. These months closely correspond to the meteorological definition of summer and are used by Hulbert (2007) in his testing.

To evaluate summer-related seasonalities, Table 7 reports the results after breaking each year into two periods: a summer rally period (June, July, and August) and a non-summer period excluding January (February through May and September through December). At a first glance, summer appears to be a good month to invest. The return over the three-month period is rather high considering the short time period of investment[1]. However, the summer mean returns and CWIs are insignificant. The value-weighted non-summer month mean return is significantly lower than its mean, however, suggesting poor returns in non-summer months.

Halloween Effect proponents argue that returns are better from November (i.e., post-Halloween) through April than in May through October (e.g., Dobosz, 2005). Bouman and Jacobsen (2002) show the effect exists in 36 of the 37 countries in their study.

To examine the Halloween Effect, Table 7 also reports results after breaking each year into a November to April and May to October period[2]. November through April is clearly a better time to invest. For example, investing in the equal-weighted CRSP index from November to April produces a significant ending CWI of $3891.98, much higher than the $6.42 of May to October. However, the November to April period includes the abnormally high returning month of January and excludes the abnormally low returning months of September and October. If those three months are left out of the analysis, the CWIs and difference in mean returns are insignificant. This conclusion is consistent with Lucey and Zhao (2008), who also express skepticism regarding a Halloween anomaly.

2.3. International analysis. While the January and September Effects are apparent in the United States, of particular interest is whether similar patterns exist in foreign markets. Accordingly, five major international indexes are evaluated: the CAC 40, the DAX 30, the FTSE 100, the Hang Seng, and the Nikkei 225. Unfortunately, these indexes are composed of large stocks and therefore cannot adequately evaluate the January Effect. However, it is reasonable to assume that these indexes can test September patterns because, unlike

[1] The summer returns imply an annual compounded return of 17.72% using the value-weighted CRSP and 19.99% using the equal-weighted CRSP. The non-summer months excluding January imply an annual compounded return of 9.53% using the value-weighted CRSP and 10.20% using the equal-weighted CRSP.

[2] The November through April period is computed each year by compounding the buy-and-hold returns from January through April with those of November and December.

the January Effect, the September Effect is not confined to small firms.

Table 8 presents the summary statistics by month. Not surprisingly given the composition of the indexes, January is not a particularly special month; it is the best month only for the Nikkei. September continues to be a poor month to invest in. In four of the five markets, September has a negative mean return, a negative median return, and a CWI below one. It is also the worst performing month for these four markets. The mean September return of the remaining index, the Hang Seng, is a rather unspectacular 0.24%. While the return is positive, the Hang Seng's ending CWI is just a penny above $1.

Conclusions

This study demonstrates the importance of monthly return patterns in overall U.S. stock market returns. The January Effect, driven by small firms, is powerful and exists throughout the 1926-2006 sample period. A September Effect is also evident as overall returns in September are negative. Upon an analysis of major indexes, the September Effect also appears in four of the five international markets tested. September is the worst month for investing in France, Germany, the United Kingdom, and Japan.

At a glance, summer investing appears beneficial, but significance testing reveals poor returns in the non-summer months excluding January as opposed to strong summer returns. Investing in November through April, as opposed to May through October, is clearly a winning strategy. However, this Halloween Effect disappears after accounting for returns in January, September, and October.

Overall, seasonal stock market patterns such as the January and September Effects pose serious challenges to notions of market efficiency. This is especially true given the fact that most seasonal patterns have been known for quite some time, yet they continue to persist. Future research can hopefully find compelling rationales for these anomalies, thus solving some of the most important mysteries of finance.

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Appendix

Table 1. Summary statistics by month

	Equal-weighted CRSP index						
	CWI ($)	Mean return	Median return	Standard deviation	Maximum	Minimum	Percent positive
January	87.40***	*0.0590***	0.0440	0.0713	0.3157	-0.0756	81.48
February	2.64	0.0134**	0.0137	0.0516	0.1571	-0.1554	65.43
March	1.33	0.0056	0.0120	0.0629	0.1121	-0.2856	61.73
April	2.02	0.0119	0.0140	0.0846	0.5182	-0.1815	62.50
May	1.49	0.0088	0.0082	0.0937	0.6060	-0.2698	61.73
June	1.87	0.0099	0.0103	0.0679	0.3065	-0.1887	58.02

Table 1 (cont.). Summary statistics by month

	Equal-weighted CRSP index						
	CWI ($)	Mean return	Median return	Standard deviation	Maximum	Minimum	Percent positive
July	3.11	0.0167**	0.0137	0.0746	0.4335	-0.1867	62.96
August	2.66	0.0154	0.0186	0.0900	0.6659	-0.1964	60.00
September	0.49**	*-0.0055*	0.0003	0.0794	0.3919	-0.3131	51.85
October	0.56**	*-0.0045*	-0.0033	0.0702	0.1447	-0.2723	48.15
November	2.94	0.0154**	0.0217	0.0637	0.1458	-0.1753	62.96
December	2.14	0.0107*	0.0173	0.0504	0.1171	-0.1876	62.96
Simple average	9.05	0.0131	0.0142	0.0717	0.3262	-0.2073	61.65
Total CWI	24,967.34						
	Value-weighted CRSP index						
	CWI ($)	Mean return	Median return	Standard deviation	Maximum	Minimum	Percent positive
January	3.79	0.0176***	0.0151	0.0464	0.1416	-0.0733	66.67
February	1.48	0.0057	0.0109	0.0398	0.1094	-0.1501	59.26
March	1.32	0.0048	0.0109	0.0499	0.0910	-0.2371	60.49
April	2.19	0.0117	0.0085	0.0654	0.3837	-0.1797	62.96
May	1.33	0.0053	0.0136	0.0581	0.2119	-0.2203	62.96
June	2.27	0.0115*	0.0115	0.0522	0.2359	-0.1579	58.02
July	2.90	0.0148**	0.0161	0.0589	0.3375	-0.1082	55.56
August	2.64	0.0138**	0.0159	0.0617	0.3660	-0.1577	62.96
September	0.43***	*-0.0085*	0.0002	0.0585	0.1596	-0.2903	50.62
October	1.10	0.0030	0.0089	0.0598	0.1656	-0.2253	55.56
November	3.38	0.0165***	0.0255	0.0521	0.1211	-0.1230	70.37
December	3.98	*0.0179***	0.0183	0.0368	0.1068	-0.1336	81.48
Simple average	2.23	0.0095	0.0130	0.0533	0.2025	-0.1714	62.24
Total CWI	2405.65						

Note: This table reports summary statistics for the equal-weighted and value-weighted CRSP index monthly returns over the 81-year sample period from 1926-2006. The means, medians, standard deviations, maximums, minimums, and percent of positive returns are computed for each month's 81 returns. The cumulative wealth index (CWI) indicates the ending value of $1 invested from January 1, 1926 to December 31, 2006. A positive return occurs when the monthly CRSP index return is greater than zero. The Simple average row shows the mean of the 12 monthly statistics. ***, ** and * indicate the CWI is significant or the mean return is significantly different from zero with 99%, 95%, and 90% confidence, respectively. Italics indicate the mean return for the month is significantly different from the overall sample period's mean return (Simple average) with 95% confidence.

Table 2. Regression models equating CRSP indexes to monthly dummy variables

	Dependent variable			
Independent variables	Equal-weighted CRSP index		Value-weighted CRSP index	
Intercept	0.0090***	0.0103***	0.0102***	0.0106***
	(4.20)	(4.96)	(6.02)	(6.01)
January dummy	0.0498***	0.0486***	0.0074	0.0068
	(8.12)	(8.26)	(1.51)	(1.38)
September dummy	-0.0121*	-0.0138**	-0.0163***	-0.0160***
	(-1.91)	(-2.28)	(-2.86)	(-2.85)
October dummy		-0.0136**		-0.0047
		(-2.23)		(-0.88)
R^2	0.0386	0.0441	0.0147	0.0147
N	972	972	972	972

Note: This table reports coefficients and t-statistics from a GARCH (1,1) time series regression model with twelve lags using either the CRSP equal-weighted or value-weighted index as the dependent variable. The independent variables are monthly dummies, set equal to one if the return month is January, September, or October as applicable and zero otherwise. The GARCH-related and lagged coefficient information are excluded from the presentation. The sample period extends from 1926 to 2006, a total of 972 months. The full regression model equates the CRSP index return at month *t* to the month dummy variables as follows:

$CRSP\ index\ return_t$ = intercept + a $January\ dummy_t$ + b $September\ dummy_t$ + c $October\ dummy_t$ + error $term_t$.

Table 3. Summary statistics by time period for equal-weighted CRSP index

	Equal-weighted CRSP index											
	January	February	March	April	May	June	July	August	September	October	November	December
	CWIs ($)											
1926-1946	3.68**	1.32	0.58	1.28	0.96	1.87	1.97	2.06	0.56*	0.73	1.05	0.86
1947-1966	1.96***	1.15	1.36	1.10	1.02	0.82**	1.64*	1.06	0.89*	1.13	1.61*	1.49
1967-1986	3.97***	1.18	1.36	1.27	1.04	1.05	0.98	1.33	1.04	0.89	1.25	1.22
1987-2006	3.06***	1.47	1.23	1.13	1.46	1.17	0.98	0.92	0.95	0.77***	1.40	1.36
	Means											
1926-1946	*0.0671****	0.0155	*-0.0204*	0.0204	0.0095	0.0356	0.0393	0.0435	-0.0184	-0.0110	0.0055	-0.0044
1947-1966	*0.0349****	0.0075	0.0161**	0.0054	0.0022	*-0.0091*	*0.0257****	0.0036	*-0.0052*	0.0065	0.0253**	0.0206**
1967-1986	*0.0746****	0.0096	0.0169	0.0141	0.0033	0.0034	0.0003	0.0157	0.0035	-0.0032	0.0129	0.0114
1987-2006	*0.0590****	0.0209*	0.0112	0.0073	0.0202*	0.0084	0.0002	-0.0025	-0.0012	-0.0098	0.0185	0.0159**
	Medians											
1926-1946	0.0434	0.0227	0.0007	0.0075	0.0244	0.0366	0.0368	0.0232	-0.0064	-0.0069	-0.0026	0.0178
1947-1966	0.0311	0.0128	0.0138	0.0195	0.0080	-0.0059	0.0294	0.0029	-0.0107	0.0097	0.0265	0.0219
1967-1986	0.0689	0.0173	0.0144	0.0220	-0.0020	0.0092	-0.0119	0.0178	-0.0002	0.0068	0.0242	0.0043
1987-2006	0.0630	0.0146	0.0188	0.0033	0.0227	0.0106	0.0105	0.0166	0.0098	-0.0023	0.0280	0.0155
	Standard deviations											
1926-1946	0.0850	0.0686	0.0970	0.1454	0.1670	0.1099	0.1223	0.1533	0.1352	0.0917	0.0841	0.0703
1947-1966	0.0403	0.0294	0.0326	0.0384	0.0456	0.0405	0.0338	0.0393	0.0392	0.0323	0.0466	0.0347
1967-1986	0.0876	0.0511	0.0558	0.0630	0.0566	0.0496	0.0556	0.0533	0.0554	0.0705	0.0617	0.0549
1987-2006	0.0597	0.0518	0.0392	0.0476	0.0461	0.0381	0.0474	0.0600	0.0491	0.0752	0.0587	0.0300

Note: This table reports summary statistics for the equal-weighted CRSP index monthly returns for four sub-periods: 1926-1946, 1947-1966, 1967-1986, and 1987-2006. The cumulative wealth index (CWI) indicates the ending value of $1 invested at the beginning of the sub-period. The ending CWIs, means, medians, and standard deviations are computed for each month's sub-period returns. ***, ** and * indicate the CWI is significant or the mean return is significantly different from zero with 99%, 95%, and 90% confidence, respectively. Italics indicate the mean return for the month is significantly different from the overall time period's mean return with 90% confidence.

Table 4. Summary statistics by time period for value-weighted CRSP index

	Value-weighted CRSP Index											
	January	February	March	April	May	June	July	August	September	October	November	December
	CWIs ($)											
1926-1946	1.50	1.16	0.66	1.17	0.86	1.75	1.82	1.92	0.59*	0.69	0.99	1.18
1947-1966	1.23	1.04	1.38	1.23	1.12	0.97*	1.59*	1.03	0.90**	1.25	1.61**	1.62*
1967-1986	1.40	1.03	1.27	1.29	0.99	1.15	0.89	1.46	0.89	1.21	1.54	1.22
1987-2006	1.46	1.19	1.15	1.19	1.40	1.16	1.13	0.91	0.92	1.05	1.38	1.69**
	Means											
1926-1946	0.0204*	0.0083	-0.0168	0.0126	-0.0026	0.0303	0.0325	0.0347*	-0.0204	-0.0148	0.0016	0.0092
1947-1966	0.0110	0.0024	0.0165**	0.0109	0.0065	-0.0009	*0.0238****	0.0023	*-0.0043*	0.0117*	0.0250**	*0.0248****
1967-1986	0.0188	0.0023	0.0130	0.0138	0.0000	0.0075	-0.0048	0.0203*	-0.0051	0.0115	0.0228*	0.0107
1987-2006	0.0201*	0.0095	0.0075	0.0094	0.0176**	0.0082	0.0071	-0.0031	-0.0034	0.0044	0.0173	*0.0272****
	Medians											
1926-1946	0.0098	0.0130	0.0048	0.0012	0.0184	0.0255	0.0349	0.0187	0.0059	-0.0122	0.0012	0.0200
1947-1966	0.0136	0.0091	0.0149	0.0278	0.0185	0.0002	0.0228	0.0041	-0.0057	0.0123	0.0222	0.0291

Table 4 (cont.). Summary statistics by time period for value-weighted CRSP index

	Value-weighted CRSP Index											
	January	February	March	April	May	June	July	August	September	October	November	December
1967-1986	0.0071	0.0048	0.0201	0.0070	-0.0022	0.0129	-0.0095	0.0208	0.0009	0.0043	0.0325	0.0113
1987-2006	0.0256	0.0141	0.0203	0.0110	0.0124	0.0085	-0.0013	0.0087	-0.0005	0.0161	0.0337	0.0189
	Standard deviations											
1926-1946	0.0450	0.0542	0.0760	0.1105	0.0969	0.0826	0.0919	0.0890	0.0916	0.0742	0.0647	0.0479
1947-1966	0.0364	0.0232	0.0300	0.0359	0.0380	0.0377	0.0304	0.0354	0.0378	0.0263	0.0427	0.0237
1967-1986	0.0607	0.0369	0.0399	0.0480	0.0381	0.0341	0.0457	0.0516	0.0434	0.0636	0.0489	0.0355
1987-2006	0.0433	0.0405	0.0344	0.0394	0.0344	0.0338	0.0427	0.0531	0.0454	0.0634	0.0494	0.0346

Note: This table reports summary statistics for the value-weighted CRSP index monthly returns for four sub-periods: 1926-1946, 1947-1966, 1967-1986, and 1987-2006. The cumulative wealth index (CWI) indicates the ending value of $1 invested at the beginning of the sub-period. The ending CWIs, means, medians, and standard deviations are computed for each month's sub-period returns. ***, ** and * indicate the CWI is significant or the mean return is significantly different from zero with 99%, 95%, and 90% confidence, respectively. Italics indicate the mean return for the month is significantly different from the overall time period's mean return with 90% confidence.

Table 5. Ending value of $1 invested from 1926 through 2006 without best months

	Equal-weighted CRSP index			
	All months ($)	Without best month ($)	Without two best months ($)	Without three best months ($)
January	87.40	66.43	51.13	41.74
February	2.64	2.29	2.02	1.78
March	1.33	1.19	1.08	0.98
April	2.02	1.33	1.10	0.97
May	1.49	0.93	0.82	0.75
June	1.87	1.43	1.16	0.98
July	3.11	2.17	1.91	1.69
August	2.66	1.60	1.43	1.30
September	0.49	0.36	0.32	0.29
October	0.56	0.49	0.44	0.39
November	2.94	2.57	2.27	2.03
December	2.14	1.91	1.73	1.58
Total	24,967.34	950.54	174.09	42.30
	Value-weighted CRSP index			
	All months ($)	Without best month ($)	Without two best months ($)	Without three best months ($)
January	3.79	3.32	2.94	2.60
February	1.48	1.34	1.24	1.16
March	1.32	1.21	1.12	1.04
April	2.19	1.58	1.38	1.26
May	1.33	1.10	1.01	0.94
June	2.27	1.84	1.62	1.42
July	2.90	2.17	1.97	1.81
August	2.64	1.93	1.73	1.54
September	0.43	0.37	0.35	0.33
October	1.10	0.94	0.84	0.78
November	3.38	3.02	2.72	2.46
December	3.98	3.59	3.29	3.04
Total	2405.65	274.16	82.34	28.27

Note: This table reports the cumulative wealth index (CWI) of the CRSP equal-weighted and value-weighted indexes. The CWI shows the ending value of $1 invested starting on January 1, 1926 and ending on December 31, 2006. The CWI is computed first for all months and then by removing a specified number of best months from the calculation.

Table 6. Ending value of $1 invested from 1926 through 2006 without worst months

	Equal-weighted CRSP index			
	All months ($)	Without worst month ($)	Without two worst months ($)	Without three best months ($)
January	87.40	94.55	99.15	103.19
February	2.64	3.13	3.43	3.70
March	1.33	1.86	2.25	2.69
April	2.02	2.47	2.95	3.47
May	1.49	2.04	2.56	2.98
June	1.87	2.30	2.59	2.83
July	3.11	3.83	4.29	4.74
August	2.66	3.31	3.72	4.16
September	0.49	0.72	0.89	1.05
October	0.56	0.77	0.98	1.19
November	2.94	3.56	4.06	4.60
December	2.14	2.63	3.04	3.38
Total	24,967.34	421,769.67	2,578,916.81	11,610,280.78
	Value-weighted CRSP index			
	All months ($)	Without worst month ($)	Without two worst months ($)	Without three best months ($)
January	3.79	4.09	4.40	4.71
February	1.48	1.75	1.94	2.06
March	1.32	1.74	1.97	2.24
April	2.19	2.67	2.98	3.31
May	1.33	1.70	2.15	2.48
June	2.27	2.70	2.94	3.16
July	2.90	3.25	3.60	3.92
August	2.64	3.14	3.45	3.79
September	0.43	0.61	0.71	0.81
October	1.10	1.41	1.76	2.02
November	3.38	3.86	4.39	4.89
December	3.98	4.59	4.97	5.25
Total	2405.65	23,688.25	106,650.34	349,480.67

Note: This table reports the cumulative wealth index (CWI) of the CRSP equal-weighted and value-weighted indexes. The CWI shows the ending value of $1 invested starting on January 1, 1926 and ending on December 31, 2006. The CWI is computed first for all months and then by removing a specified number of worst months from the calculation.

Table 7. Summary statistics of summer and May-Halloween patterns

	Equal-weighted CRSP index						
	CWI ($)	Mean return	Median return	Std. dev.	Maximum	Minimum	Percent positive
Summer							
June, July, August	15.46	0.0466	0.0251	0.1937	1.4687	-0.2592	65.43
All Others w/o January	18.48	0.0669	0.0805	0.2390	0.8624	-0.5881	70.37
Difference		-0.0203					
Halloween							
November to April	3891.98***	*0.1253*	0.1350	0.1988	0.5842	-0.3560	72.84
May to October	6.42***	*0.0410*	0.0243	0.1946	0.5583	-0.3887	64.20
Difference		0.0843***					
Adjusted Halloween							
Nov. to April, no Jan.	44.53	0.0606	0.0844	0.1593	0.5293	-0.3427	70.37
May to August	23.04	0.0537	0.0346	0.1928	0.9916	-0.2907	64.20
		0.0069					
	Value-weighted CRSP Index						
	CWI ($)	Mean return	Median return	Std. dev.	Maximum	Minimum	Percent positive

Table 7 (cont.). Summary statistics of summer and May-Halloween patterns

	Equal-weighted CRSP index						
	CWI ($)	Mean return	Median return	Std. dev.	Maximum	Minimum	Percent positive
Summer							
June, July, August	17.43	0.0416	0.0320	0.1195	0.8181	-0.1719	72.84
All others w/o January	36.42	*0.0626*	0.0933	0.1766	0.4338	-0.5093	70.37
Difference		-0.0210					
Halloween							
November to April	219.03*	0.0770	0.0883	0.1317	0.3776	-0.2460	71.60
May to October	10.98*	*0.0381*	0.0510	0.1272	0.3462	-0.3060	70.37
Difference		0.0389**					
Adjusted Halloween							
Nov. to April, no Jan.	57.81	0.0576	0.0641	0.1134	0.3642	-0.2614	72.84
May to August	23.16	0.0448	0.0419	0.1069	0.4408	-0.2067	70.37
		0.0128					

Note: This table reports CRSP equal- and value-weighted return summary statistics for two strategies: the summer rally and the Halloween Effect. The cumulative wealth indexes (CWIs), means, standard deviations, maximum, minimums, and percent of positive returns are computed for the strategy each year. The summer rally includes June, July, and August. These months are compared to all other months excluding January. For the Halloween Effect, in each year, January through April and then November through December are separated from May through October. The Adjusted Halloween Effect excludes January, September, and October. ***, ** and * indicate the CWI is significant or the mean return difference is significantly different from zero with 99%, 95%, and 90% confidence, respectively. Italics indicate the strategy's actual mean annual return is significantly different from the strategy's expected mean annual return with 90% confidence. The mean expected annual return is computed by compounding the simple average of the overall sample mean monthly return over the strategy's time frame.

Table 8. Summary statistics by month for international indexes

	Equal-weighted CRSP index											
	January	February	March	April	May	June	July	August	September	October	November	December
	CAC (1991-2006)											
CWI ($)	1.37	1.29	1.23	1.33	0.90	0.93	1.01	0.85	0.59***	1.49	1.38	1.45
Mean	0.0208	0.0182	0.0141	0.0191	-0.0059	-0.0029	0.0021	-0.0089	-0.0293	0.0268*	0.0213	0.0244*
Median	0.0267	0.0173	0.0214	0.0174	-0.0068	0.0069	0.0064	-0.0122	-0.0227	0.0185	0.0231	0.0291
Std. dev.	0.0494	0.0641	0.0479	0.0484	0.0341	0.0534	0.0586	0.0511	0.0788	0.0535	0.0487	0.0447
	DAX (1991-2006)											
CWI ($)	1.33	1.26	0.97	1.51	1.06	1.09	1.12	0.75	0.48***	1.64	1.59	1.57
Mean	0.0189*	0.0160	-0.0007	0.0280	0.0046	0.0065	0.0096	-0.0156	-0.0407*	0.0328**	0.0305**	0.0306*
Median	0.0205	0.0220	-0.0030	0.0086	0.0084	0.0028	-0.0001	0.0055	-0.0247	0.0354	0.0383	0.0300
Std. dev.	0.0427	0.0588	0.0461	0.0666	0.0478	0.0480	0.0770	0.0665	0.0824	0.0573	0.0470	0.0627
	FTSE (1985-2006)											
CWI ($)	1.26	1.27	1.13	1.39	1.09	0.90	1.20	1.03	0.73**	1.10	1.24	1.66**
Mean	0.0119	0.0118	0.0061	0.0157	0.0048	-0.0043	0.0090	0.0023	-0.0126	0.0074	0.0106	0.0237***
Median	0.0142	0.0057	0.0065	0.0167	0.0017	-0.0025	0.0087	0.0025	-0.0185	0.0256	0.0185	0.0243
Std. dev.	0.0518	0.0420	0.0357	0.0360	0.0404	0.0336	0.0413	0.0459	0.0567	0.0722	0.0407	0.0323
	Hang Seng (1987-2006)											
CWI ($)	1.08	2.15*	0.74	1.25	1.34	1.00	1.56	0.76	1.01	0.97	1.35	1.74
Mean	0.0064	0.0418**	-0.0133	0.0137	0.0181	0.0022	0.0239*	-0.0115	0.0024	0.0120	0.0171	0.0290
Median	-0.0063	0.0358	-0.0003	0.0164	0.0244	0.0055	0.0346	-0.0006	0.0127	0.0307	0.0113	0.0186
Std. dev.	0.0754	0.0796	0.0630	0.0708	0.0835	0.0658	0.0566	0.0634	0.0661	0.1554	0.0641	0.0757

Table 8 (cont.). Summary statistics by month for international indexes

	Equal-weighted CRSP index											
	January	February	March	April	May	June	July	August	September	October	November	December
	Nikkei (1985-2006)											
CWI ($)	1.40	1.11	1.32	1.21	1.13	0.86	0.92	0.91	0.66*	0.87	1.14	1.14
Mean	0.0167	0.0060	0.0147	0.0103	0.0072	-0.0051	-0.0025	-0.0013	-0.0170	-0.0045	0.0082	0.0076
Median	0.0079	0.0123	0.0203	0.0153	0.0092	0.0048	-0.0029	-0.0031	-0.0154	-0.0002	0.0194	0.0227
Std. dev.	0.0558	0.0493	0.0672	0.0580	0.0562	0.0585	0.0567	0.0780	0.0600	0.0657	0.0675	0.0550

Note: This table reports summary statistics for five foreign indexes: the CAC 40 of France, the DAX 30 of Germany, the FTSE 100 of the United Kingdom, the Hang Seng of Hong Kong, and the Nikkei 225 of Japan. The cumulative wealth index (CWI) indicates the ending value of $1 invested at the beginning of the period. The ending CWIs, means, medians, and standard deviations are computed for each index. ***, ** and * indicate the CWI is significant or the mean return is significantly different from zero with 99%, 95%, and 90% confidence, respectively. Italics indicate the mean return for the month is significantly different from the overall time period's mean return with 90% confidence.