Econ Journal Watch,
Volume 1, Number 1,
April 2004, pp 29-46.

Stock Market Efficiency Withstands another Challenge: Solving the "Sell in May/Buy after Halloween" Puzzle

EDWIN D. MABERLY* AND RAYLENE M. PIERCE**

A COMMENT ON: BOUMAN, SVEN AND BEN JACOBSEN. 2002. THE HALLOWEEN INDICATOR, 'SELL IN MAY AND GO AWAY': ANOTHER PUZZLE. *AMERICAN ECONOMIC REVIEW* 92(5): 1618-1635.

ABSTRACT, KEYWORDS, JEL CODES

OVER THE PAST TWENTY YEARS FINANCIAL ECONOMISTS HAVE documented numerous stock return patterns related to calendar time. The list includes patterns related to the month-of-the-year (January effect), day-of-the-week (Monday effect), day-of-the-month (turn-of-the-month effect), and market closures due to exchange holidays (the holiday effect) to name just a few.[1] This research is cited as evidence of market inefficiencies (see,

* University of Canterbury. Chiristchurch, New Zealand.
** Lincoln University. Canterbury, New Zealand.
This paper benefited from editorial comments by Professor Tom Saving of Texas A&M University and encouraging comments by Professor Burton Malkiel of Princeton University. Additionally, constructive comments were provided by an anonymous referee.
[1] The January effect is frequently misinterpreted as implying that stock returns, irrespective of market size, are unusually large in January. From Fama (1991, 1586-1587), the January effect refers to the phenomenon that "stock returns, especially returns on small stocks, are on average higher in January than in other months. Moreover, much of the higher January return on small stocks comes on the last trading day in December and the first 5 trading days in January."

for example, Schleifer (2000)). As a counter argument, Jensen (1978) highlights the importance of trading profitability when assessing market efficiency. If a trading rule is not strong enough to outperform a buy and hold strategy on a risk-adjusted basis then it is not economically significant.

In a *Wall Street Journal* commentary, Malkiel (2000) argues that "these attacks on the efficient market theory are far from convincing." In the same commentary, Professor Richard Roll (principal of the portfolio management firm, Roll and Ross Asset Management) is quoted as saying,

> If calendar time anomalies represent evidence of market inefficiencies, then they ought to represent an exploitable opportunity. I have personally tried to invest money, my client's and my own money, in every single anomaly and predictive result that academics have dreamed up. And I have yet to make a nickel on any of these supposed market inefficiencies. Real money investment strategies don't produce the results that academic papers say they should. If calendar time anomalies are evidence of market inefficiency, then there ought to be an exploitable opportunity (Malkiel 2000).

In a recent issue of the *American Economic Review*, Bouman and Jacobsen (2002) document yet another calendar time anomaly in stock prices, which they claim many Americans tend to be unfamiliar with. They label this anomaly the Halloween effect, as October 31 marks the end of the "scary period" for investors.[2] In particular, Bouman and Jacobsen conclude that stock returns are significantly lower during the May–October periods versus the November–April periods, and they propose a trading strategy to exploit this anomaly. The Halloween effect amounts to a "Sell in May and go away" strategy. The strategy is described as investing in a value-weighted index like the S&P 500 index during the November-April periods and in a risk-free investment like U.S. Treasury bills during the May-October periods. Bouman and Jacobsen remark that,

[2] Halloween is celebrated every October 31. Over a century ago, the American humorist Mark Twain (1894) remarked, "October, this is one of the peculiarly dangerous months to speculate in stocks." But then Twain knew that other dangerous months "are July, January, September, April, November, May, March, June, December, August, and February."

> Surprisingly, we find the Sell in May effect is present in 36 of the 37 countries in our sample. The effect tends to be particularly strong and highly significant in European countries, and also proves to be robust over time. Sample evidence shows that in a number of countries it has been noticeable for a very long time, and in the U.K. stock market, for instance, we have found evidence of a Sell in May effect as far back as 1694. We find no evidence that the effect can be explained by factors like risk, cross correlation between markets, or the January effect. We also try some alternative explanations . . . but none of them seems to provide an explanation for the puzzle (Bouman and Jacobsen 2002, 1618).

The U.S. equity market is the world's largest in terms of market capitalization, and the value-weighted S&P 500 index is used worldwide as a benchmark for U.S. stock market performance. If the Halloween strategy is economically significant as suggested by Bouman and Jacobsen, then this phenomenon should carry over to U.S. based index futures, in particular to the S&P 500 futures contract. Since transaction costs are lower for index futures versus cash market transactions of similar size, the S&P 500 futures contract constitutes fertile ground for testing the trading rule "Sell in May and go away" versus the Buy and Hold strategy—a benchmark for market efficiency. Our objective is to re-examine the evidence presented by Bouman and Jacobsen documenting a Halloween effect for the U.S. stock market. A second objective is to examine the S&P 500 futures contract for evidence of a Halloween effect and to compare the Halloween strategy with the Buy and Hold strategy.

According to Fama (1998), empirical studies documenting long-term return anomalies are sensitive to methodology. Most long-term return anomalies tend to disappear with reasonable changes in technique; our results support Fama's argument. Possible explanations for apparent discrepancies between the results presented in the current study and those of Bouman and Jacobsen are model misspecification and data snooping. Bouman and Jacobsen's documentation of significant Halloween effects for U.S. equity returns appears to be driven by two outliers. The first outlier, October 1987, is associated with the 1987 crash in world equity prices. The second outlier, August 1998, is associated with the collapse of the hedge fund Long-Term Capital Management. (Incidentally, it is our casual observation that a preponderance of major economic and/or political events that negatively impacted world equity prices have occurred during the May-October periods. Another example is the 1990 invasion of Kuwait by Saddam Hussein in August and the attendant increase in world oil prices.)

The S&P 500 futures contract debuted April 1982 on the Chicago Mercantile Exchange (CME), and, therefore, the futures' data set covers the period April 1982–April 2003. The empirical evidence supports the hypothesis that there is no economically exploitable opportunity in the S&P 500 futures market associated with the Halloween effect. For S&P 500 index futures, the Halloween strategy of "Sell in May and go away" under performs the Buy and Hold strategy by a wide margin, at least through April 2000. Thereafter, U.S. equity prices entered a bear market, and any strategy that includes short positions in S&P 500 futures yields superior results.

REVIEW OF HALLOWEEN EFFECT EVIDENCE

Bouman and Jacobsen investigate monthly returns across world stock markets for the period January 1970–August 1998 and conclude that monthly returns are unusually large during the November–April periods. Their study reports that, "A simple strategy based on the saying would outperform a buy and hold portfolio in many countries . . . and would also be a lot less risky" (1619). At first glance, the results reported by Bouman and Jacobsen appear to be at odds with the efficient market hypothesis. The closing line of their article notes that, "we are faced with the following problem: History and practice tells us that the old saying [Sell in May and go away] is right, while stock market logic tells us it is wrong. It seems that we have not yet solved this new puzzle" (1630).

Halloween Strategy: Previously Known by Wall Street Professionals

A widely known practitioner oriented investment book is Hirsch's *Stock Trader's Almanac*, an annual publication since 1968. In the 1986 edition and thereafter, Hirsch makes reference to a Six-Month Switching strategy that is identical to the Halloween strategy (In 1993, Ned David Research, Inc. published a similar study, and Bouman and Jacobsen cite this study). In particular, in the 1997 edition, Hirsch presents a spreadsheet of annual returns for the Six-Month Switching strategy over the period 1950-1996 (Hirsch 1997, 54). Results are reported for the Dow Jones Industrial Average (DJIA). Hirsch shows that a $10,000 investment in the DJIA beginning in 1950 grew to $206,762 conditional on the proceeds being invested exclusively over the November-April periods. In contrast, by investing the proceeds exclusively over the May–October periods the investment grew to only $17,272. The difference in the two investment strategies is striking, and in response Hirsch remarks, "Don't tell the big boys about this! Let's keep this one to ourselves (Hirsch 1997, 54)." Hirsch's Six-Month Switching strategy has been in the public domain since the late 1980s. The concept of efficient markets suggests that once information becomes widely known, then excess risk-adjusted returns are arbitraged away. The January effect received much publicity in the financial press in the early 1980s, and as Fama (1991, 1587-1588) demonstrates, the January effect became statistically insignificant over the period 1982–1991. In particular, the difference in January returns between small and large firms was economically exploitable over the period 1940-1981, but this phenomenon disappears after 1981. Finance theory predicts a similar fate for the Halloween anomaly, especially in well-developed capital markets like the United States.

Halloween Strategy: Robustness to Alternative Model Specifications

To test for the existence of a Halloween effect, Bouman and Jacobsen apply the usual dummy regression technique, which is equivalent to a simple means test—are monthly mean returns over the November-April periods significantly different from the May–October periods? To maintain consistency with Bouman and Jacobsen, in this study, this is represented as:

$$R_t = \mu + \alpha_1 S_t + \varepsilon_t \qquad (1)$$

The dependent variable R_t represents continuously compounded monthly index returns for a value-weighted index. Thus, R_t is defined as the natural logarithm of the price relative.

The dummy variable S_t takes on the value 1 if month t falls within the November-April periods and 0 otherwise. The constant term μ represents the monthly mean return over the May-October periods while $\mu+\alpha_1$ represents the monthly mean return over the November-April periods. A positive and significant α_1 indicates that monthly mean returns are larger over the November-April periods, and Bouman and Jacobsen take this as evidence of a significant Halloween effect.

As confirmation of Bouman and Jacobsen's results for the U.S. stock market, equation (1) coefficients are estimated over the period January 1970–August 1998 based on value-weighted Center for Research in Security Prices (CRSP) index returns with dividends.[3] The results, as reported in Panel A, Table 1, are virtually identical to those reported by Bouman and Jacobsen.[4] In particular, the monthly mean return over the May–October periods (μ = 0.4235 percent) is not significantly different from zero at a meaningful level. However, the coefficient of interest is α_1, positive at 1.0349 percent and significantly different from zero at the 5 percent level. A statistically significant and positive α_1 is confirming evidence of a Halloween effect in the U.S. stock market. However, differences between the Halloween strategy and the Buy and Hold strategy are not economically significant, especially after making adjustments for transaction costs and short-term capital gains taxes.

Impact of outliers on results

The October 1987 stock market crash was a worldwide phenomenon impacting all world stock markets. In October 1987, U.S. stocks fell on average by over 20 percent. As noted previously, Bouman and Jacobsen document unusually low U.S. monthly returns over the May-October periods, but their finding is potentially driven by the fact that the Crash of 1987 occurs in October. Irrefutably, the October 1987 stock market crash is an outlier, and this is verified by a within sample z-score of -6.234 and corresponding p-value of 0.3×10^{-9}. From time series estimation procedures,

---

[3] Bouman and Jacobsen examine value-weighted indices with dividends reinvested. To be consistent with Bouman and Jacobsen's results, this study examines a value-weighted index with dividends reinvested. A preferred choice is the S&P 500 index, but this index does not reflect the impact of dividends on holding period returns. However, the S&P 500 index yields almost identical results versus the value-weighted CRSP index with dividends. The correlation between monthly CRSP with dividends and S&P 500 index returns over the period January 1970–August 1998 equals 0.987. CRSP is associated with the University of Chicago's School of Business.

[4] Table 2 presents results for S&P 500 index futures. However, results reported in the two tables are not directly comparable due to differences in the time interval examined. The reader is referred to the explanatory notes for Table 2.

it is well known that estimation of equation (1) coefficients and their significance via ordinary least squares is highly sensitive to outliers.

Bouman and Jacobsen's data set contains 344 monthly returns with the most recent month being August 1998. On August 17, 1998, the Russian government unexpectedly announced a moratorium on debt repayment, and this event threw world financial markets into a tailspin. This event and others led to the collapse of the hedge fund Long-Term Capital Management in August 1998, a month in which U.S. stocks fell on average by over 15 percent. Thus, August 1998 is a potential outlier, and this is verified by a within sample z-score of –4.270 and corresponding p-value of $0.9*10^{-5}$. The decision by Bouman and Jacobsen to include August 1998 in their sample period increases the probability of rejecting the null hypothesis. Thus, two months are identified that potentially drive the findings of a statistically significant Halloween effect over the period January 1970–August 1998.

Controlling for the impact of outliers, equation (1) is modified by inserting a second dummy variable D_t, which is set equal to 1 for October 1987, 1 for August 1998, and 0 otherwise:

$$R_t = \mu + \alpha_1 S_t + \alpha_2 D_t + \varepsilon_t \qquad (2)$$

The estimated coefficients for equation (2) are reported in Panel B, Table 1, but the results are reversed from those reported for equation (1). In particular, the Halloween effect is represented by $\alpha_1 = 0.7784$ percent, but given a p-value of 0.092, this coefficient is no longer statistically significant at a meaningful level. Furthermore, monthly returns over the May–October periods are represented by $\mu = 0.6800$ percent, and this coefficient is now statistically different from zero at a p-value of 0.038. In equation (2), μ represents the monthly opportunity cost of being in Treasury bills over the May-October periods relative to the Buy and Hold strategy after adjusting for the impact of outliers, and this result is economically significant. The impact of the two outliers is represented by α_2, which is negative in sign and highly significant. It appears that documentation of a statistically significant Halloween effect in the U.S. stock market over the period January 1970–August 1998 is being driven by the large negative returns observed during the months of October 1987 and August 1998.

Table 1
The Halloween Effect: Review of Evidence for U.S. Equity Prices
January 1970 through August 1998

$$R_t = \mu + \alpha_1 S_t + \alpha_2 D_t + \alpha_3 J_t + \varepsilon_t$$

Panel A	Coefficient	t-value	p-value
μ	0.4235	1.21	0.226
α_1	1.0349	2.10	0.037
α_2	N/A	N/A	N/A
α_3	**N/A**	**N/A**	**N/A**
Panel B			
μ	0.6800	2.08	0.038
α_1	0.7784	1.69	0.092
α_2	-22.0560	-7.27	0.000
α_3	**N/A**	**N/A**	**N/A**
Panel C			
μ	0.6800	2.08	0.038
α_1	0.6205	1.28	0.200
α_2	-22.0560	-7.27	0.000
α_3	0.9363	1.08	0.282

R_t represents monthly continuously compounded returns for the value-weighted Center for Research in Security Prices index with dividends. The constant term μ represents the monthly mean return over the May-October periods. The monthly mean return over the November-April periods is represented by $\mu + \alpha_1$. The impact of the two identified outliers October 1987 and August 1998 is represented by α_2. The impact of January returns is represented by α_3. Panel A corresponds to Equation (1); Panel B corresponds to Equation (2); and Panel C corresponds to Equation (3).

Impact of January returns on results

Studies by Haugen and Lakonishok (1988) and others suggest that stock returns are unusually large in January and label this phenomenon the January effect.[5] The unusually large monthly returns documented by Bouman and Jacobsen during the November–April periods could be a manifestation of the January effect, and Bouman and Jacobsen test for this possibility by including a January dummy in their regression analysis. To duplicate Bouman and Jacobsen's analysis, equation (1) is modified by

[5] The reader is referred to footnote 1 for clarification of the January effect.

inserting a third dummy variable J_t, which is set equal to 1 whenever month t is January and 0 otherwise:

$$R_t = \mu + \alpha_1 S_t + \alpha_2 D_t + \alpha_3 J_t + \varepsilon_t \quad (3)$$

The estimated coefficients for equation (3) are reported in Panel C, Table 1, and are similar to those reported for equation (2). As before, the Halloween effect is represented by $\alpha_1 = 0.6205$ percent, but given a p-value of 0.200, the statistical significance of the Halloween effect is reduced further by inserting the January dummy.

INDEX FUTURES AND THE HALLOWEEN TRADING STRATEGY

Description of Data Set

On the CME, S&P 500 futures trade in four contract months—March, June, September and December—with the last trading day the Thursday preceding the third Friday of the contract month. In April 1982, the contract multiplier was set at $500, but after the close of business on October 31, 1997 the multiplier was halved to $250. The data set consists of daily S&P 500 futures settlement prices over the period April 30, 1982–April 30, 2003. Observations are selected from the contract closest to maturity with one minor modification related to contract expiration. On the last business day of the month prior to the contract month, observations are switched to the next most distant contract. For example, in January, observations correspond to the March contract, but then on the last business day of February, observations are switched to the June contract and so forth for the other contract months.

The Halloween Effect: S&P 500 Futures

In this section, the analysis is conducted in terms of rates of return using the natural logarithm of the price relative. Another return metric for futures contracts is the price change. As noted by Chance and Rich (2001), a forward (futures) contract is a zero investment strategy. Dusak (1973) argues that margin deposits do not represent capital invested in futures contracts, and her analysis is conducted in terms of price changes. The margin associated with futures is a performance bond, and U.S. investors have the option of satisfying the initial margin with Treasury bills.

To maintain consistency with the return metric used in equation (1) through equation (3) for spot prices, monthly S&P 500 futures returns are defined as the natural logarithm of the price relative. Monthly returns are calculated for each S&P 500 futures contract over the period April 1982–April 2003 based on the switching rule established earlier. The usual dummy regression technique is applied to test for the existence of a Halloween effect in the market for index futures. Equation (3) is replicated, but the dependent variable FR_t now represents monthly S&P 500 futures returns. This is represented as:

$$FR_t = \mu + \alpha_1 S_t + \alpha_2 D_t + \alpha_3 J_t + \varepsilon_t \quad (4)$$

As before, the dummy variable S_t takes on the value 1 if month t falls within the November-April periods and 0 otherwise. The previous section examines monthly returns to the value-weighted CRSP index with dividends, and October 1987 and August 1998 are identified as outliers. After adjusting for the impact of these two outliers, the Halloween effect disappears. October 1987 and August 1998 are identified as outliers for S&P 500 futures, and the dummy variable D_t in equation (4) is inserted to adjust for the impact of these two outliers on returns. D_t takes on the value 1 for October 1987, 1 for August 1998 and 0 otherwise. In equation (4) the dummy variable J_t, which is set equal to 1 whenever month t is January and 0 otherwise, is an adjustment for the January effect.

Table 2
The Halloween Effect: Review of Evidence for S&P 500 Futures
April 1982 through April 2003

$$FR_t = \mu + \alpha_1 S_t + \alpha_2 D_t + \alpha_3 J_t + \varepsilon_t$$

Panel A	**April 1982-April 2000***		
	Coefficient	**t-value**	**p-value**
μ	0.7928	20.7	0.039
α_1	0.3737	0.66	0.508
α_2	-20.3610	-2.80	0.000
α_3	0.9540	0.94	0.349
Panel B	**April 1982-April 2003**		
	Coefficient	**t-value**	**p-value**
μ	0.3369	0.88	0.378
α_1	0.5687	1.01	0.314
α_2	-19.9050	-3.02	0.000
α_3	0.8340	0.82	0.413
Panel C	**April 1982-April 2000**		
	Coefficient	**t-value**	**p-value**
μ	0.3042	0.7	0.486
α_1	0.7171	1.10	0.275
α_2	N/A	N/A	N/A
α_3	1.5470	1.29	0.197
Panel D	**April 1982-April 2003**		
	Coefficient	**t-value**	**p-value**
μ	0.0209	0.05	0.959
α_1	0.8847	1.46	0.147
α_2	N/A	N/A	N/A
α_3	1.8340	0.76	0.449

*Using the Center for Research in Security Prices (CRSP) value-weighted index and examining the period April 1982-April 2000, the respective coefficients are: μ= 1.200 (p-value = 0.001), α_1 = 0.6021 (p-value = 0.267), α_2 = -22.576 (p-value = 0.000) and α_3 = 0.7943 (p-value = 0.417).

FR_t represents monthly returns for the S&P 500 futures contract. The constant term μ represents the monthly mean return over the May-October periods. The return metric is the natural logarithm of the price relative. The monthly mean return over the November-April periods is represented by $\mu + \alpha_1$. The impact of the two identified outliers October 1987 and August 1998 is represented by α_2. The impact of January returns is represented by α_3. Panel A and Panel B correspond to Equation (4); Panel C and Panel D correspond to Equation (4) eliminating $\alpha_2 D_t$.

PRESENTATION OF EMPIRICAL RESULTS: S&P 500 FUTURES

Equation (4) coefficients are first estimated for the subperiod April 1982–April 2000, and these results are presented in Panel A, Table 2. April 2000 is identified as the end of an 18-year bull market that began in August 1982. The period after April 2000 marks the beginning of a major bear market. In particular, the Halloween effect is represented by α_1 = 0.3737 percent, but this coefficient is insignificant with a p-value of 0.508. Excluding the two identified outliers, monthly S&P 500 futures returns over the period May–October are positive (μ= 0.7928 percent) and significantly different from zero at a p-value of 0.039.[6]

In Panel B, Table 2, equation (4) coefficients are estimated for the period April 1982–April 2003, which includes the three-year bear market that commenced in April 2000. All of the coefficients are insignificant at a meaningful level except α_2, which reflects the impact of the two identified outliers.

Based on the evidence presented in Table 2, the hypothesis that there exists a significant Halloween effect for the S&P 500 futures contract is rejected. The Halloween effect coefficient α_1 remains insignificant at a meaningful level even after removing the outlier dummy from equation (4), and these results are presented in panels C and D, Table 2. Therefore, the lack of supporting evidence for a Halloween effect for S&P 500 futures is not dependent on inclusion of the outlier dummy variable.

The Halloween Effect: S&P 500 Futures Trading Strategies

Two S&P 500 futures trading strategies referred to as Strategy-I and Strategy-II are identified to exploit the Halloween effect, and both of these strategies are compared against the Buy and Hold strategy. These three trading strategies are defined as follows: (1) The Buy and Hold strategy: Long one S&P 500 futures contract over the investment horizon April 30, 1982–April 30, 2003; (2) Strategy-I: Long one S&P 500 futures contract over the November–April periods and short one S&P 500 futures contact over the May–October periods; (3) Strategy-II: Long one S&P 500 futures

[6] From the explanatory notes found in Table 2, similar results are reported for spot prices.

over the November–April periods, and no S&P 500 futures position over the May-October periods.

Profits (losses) for each S&P 500 futures trading strategy are calculated as $500 times the change in index points with all realized profits (losses) invested in Treasury bills.[7] As noted previously, the S&P 500 futures contract multiplier was split in half after October 1997, and thus the number of contracts identified with each strategy increases from 1 to 2 after this date. Treasury bill rates are taken from Ibbotson & Associates (2003) *Valuation Edition*.

The accumulated dollar profits from each of the three strategies over the investment horizon April 1982-April 2003 are depicted in Figure 1. The Buy and Hold strategy initially outperforms the other two strategies but loses ground momentarily around the October 1987 stock market crash. This observation is not unexpected, as both Strategy-I and Strategy-II benefited from either being short S&P 500 futures or out of the market in October of 1987. Thereafter, the Buy and Hold strategy outperforms the other two strategies by a wide margin through April 2000, which marks the beginning of a major bear market. For example, over the period April 1982–October 1997, the accumulated dollar profits to the Buy and Hold strategy equals $411,370 versus $83,733 for Strategy-I and $258,778 for Strategy-II.

A bear market commenced in April 2000 and thereafter the Buy and Hold strategy performs poorly relative to the other two strategies.[8] This observation is not unexpected, as both Strategy-I and Strategy-II are either short S&P 500 futures or out of the market entirely over the period May–October. Mark Hulbert, financial journalists and editor of *Financial Digest*, recently stated, "In bull markets, timers rarely beat their nemesis—a buy-and-hold. It's only in bear markets that they stand a chance of coming out ahead"(Hulbert 2003). Hulbert conjectures that market-timing strategies like the Halloween strategy outperform the Buy-and-Hold strategy only during bear market years, and this paper reports similar results. An interesting casual observation is that in bear-market years like 2000, 2001, and 2002 most of the decline in stock prices occurred during the May-October

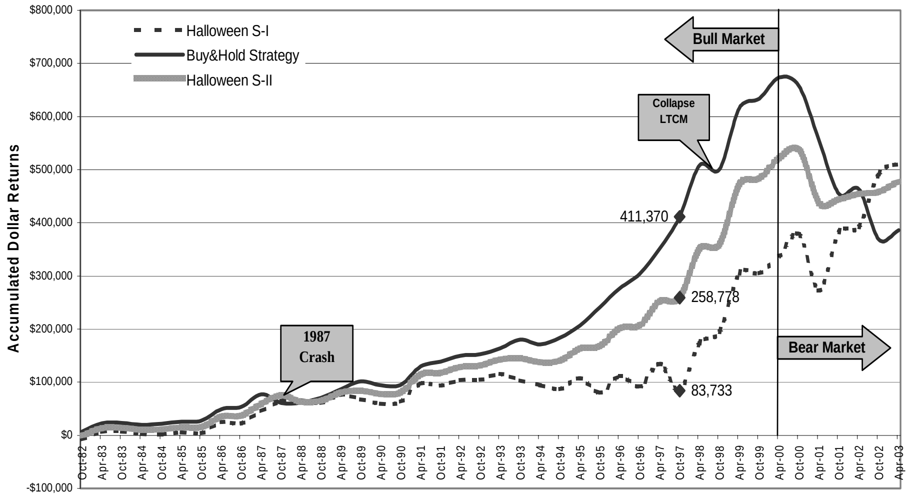
---

[7] In Figure 1, the return metric is the price change. The dollar difference between the Buy and Hold strategy and the other two strategies is the opportunity cost associated with the Halloween strategy.

[8] There is no precise definition for a bear market, but intuitively it represents a year when equity prices decline or a decline from peak to trough by more than 20 percent.

periods.[9] In summary, this paper rejects the hypothesis that the Halloween effect presents an exploitable trading rule for the S&P 500 futures contract.

Figure 1
Exploiting the Halloween Effect via S&P 500 Futures
Buy and Hold vs. Halloween Effect Trading Strategies
April 1982 through April 2003



Strategy-I: Long one S&P 500 futures contract over the November-April periods and short one S&P 500 futures contract over the May-October periods.
Strategy-II: Long one S&P 500 futures contract over the November-April periods and long T-Bills over the May-October periods.

CONCLUSION

Bouman and Jacobsen examine the period January 1970–August1998 and document unusually high monthly returns during the November-April periods for both U.S. and foreign equity markets, and label this phenomenon the Halloween effect. The Halloween effect is considered an

[9] For example, a $100,000 investment in the value-weighted CRSP index with dividends on December 31, 1999 declines to $62,250 by December 31, 2002. However, 70% of the decline in value, or $26,376, is attributable to the May-October periods.

exploitable anomaly, which is taken as another example of market inefficiency. The rule is to sell stocks at the end of April and buy stocks at the end of October with all proceeds invested in a risk-free investment in the interim.

This paper re-examines Bouman and Jacobsen's results for the U.S. stock market and extends the analysis to S&P 500 futures. The futures' data set covers the period April 1982–April 2003. On re-examination, the documentation of a Halloween effect in the U.S. disappears after an adjustment is made for the impact of outliers, in particular the large monthly declines for October 1987 and August 1998 associated with the stock market crash and collapse of the hedge fund Long-Term Capital Management, respectively. For the U.S., the empirical evidence indicates that the Halloween effect is not an exploitable anomaly, and this is true for both spot and futures prices. However, in bear market years there exists anecdotal evidence that most of the negative decline in equity prices occurs during the May-October periods.

Bouman and Jacobsen report significant Sell in May effects in 36 out of 37 countries examined. The current paper argues against the existence of exploitable Sell in May effects in U.S. financial markets. However, the existence of an exploitable Halloween effect in the other 35 foreign markets is not addressed in this paper and is a subject for future research. However, preliminary results for Japanese return data do not support the existence of an exploitable Halloween effect in Tokyo.[10]

In a recent *Financial Analysts Journal* editorial comment, Robert D. Arnott remarked, "liquidation of all stocks in an institutional portfolio . . . is a 'zero-tolerance decision,' in which a decision must succeed or else the manager is fired" (2003, 8). Followers of the Halloween strategy liquidated all stocks on April 30, 2003, which qualifies the Halloween strategy as a "zero-tolerance decision." The decision must succeed or else the manager is fired. Ex post, this decision was disastrous as S&P 500 index returns over

[10] The Japanese stock market is currently the world's second largest in terms of market capitalization. The period since the internationalisation of the Japanese stock market in the mid-1980s is examined for a significant Halloween effect. Equation (2) coefficients are estimated based on monthly returns to the Nikkei 225 index over the period January 1985–October 2003. Four outliers are identified: August 1987, August 1990, September 1990, and August 1998. The results seriously question the existence of an exploitable Sell in May anomaly in Tokyo. In particular, the Halloween effect is represented by $\mu_1 = 0.8451$ percent, but given a p-value of 0.293, this coefficient is insignificant. The August 1990 invasion of Kuwait by Saddam Hussein had a major impact on Japanese stock prices in both August and September of 1990 (Japan is heavily dependent on imported oil).

the period May 2003–October 2003 were unusually large at 14.59 percent and even larger for Japanese stocks (Nikkei 225 index) at 34.15 percent.

Richard Wyckoff, broker, trader and publisher during the early twentieth century, was prescience when he remarked some 70 years ago,

> At the time many thought that the market could be beaten by mechanical methods; that is, by some means other than human judgment. [Charles] Dow suggested a few of these. [Roger] Babson had one or more. All kinds of individuals came forward with ways of beating the stock market; each was certain his method would make a fortune. Not long afterward, however, after further study, I decided that methods of this kind, which substitute mechanical plays for judgment, must fail. For the calculations on which they are based omit one fundamental fact, i.e., that the only unchangeable thing about the stock market is its tendency to change. The rigid method sooner or later will break the operator who blindly follows it. (Wyckoff 1930, 163-164).

REFERENCES

Arnott, Robert D. 2003. What Risk Matters? A Call for Papers! *Financial Analysts Journal* 59(3): 6-7.

Bouman, Sven and Ben Jacobsen. 2002. The Halloween Indicator, 'Sell in May and Go Away': Another Puzzle. *American Economic Review* 92(5): 1618-1635.

Chance, Don M. and Don Rich. 2001. The False Teaching of the Unbiased Expectations Hypothesis. *The Journal of Portfolio Management* 27(4): 83-95.

Dusak, Katherine. 1973. Futures Trading and Investor Returns: An Investigation of Commodity Market Risk Premiums. *Journal of Political Economy* 81(6): 1387-1406.

Fama, Eugene F. 1991. Efficient Capital Markets: II. *Journal of Finance*, Decembe 46(5): 1575-1617.

_____. 1998. Market Efficiency, Long-term Return, and Behavioral Finance. *Journal of Financial Economics* 49(3): 238-306.

Haugen, Robert A. and Josef Lakonishok. 1988. *The Incredible January Effect: The Stock Markets Unsolved Mystery*. Dow-Jones Irwin: Homewood, IL.

Hirsch, Yale. 1997. *Stock Traders Almanac*. The Hirsch Organization: Old Tappen, NJ.

Hulbert, Mark. 2003. Online: http://www.marketwatch.com. (cited: July 23, 2003).

Ibbotson & Associates. 2003. *Valuation Edition*. Ibboston & Associates: Chicago, IL.

Jensen, Michael C. 1978. Some Anomalous Evidence Regarding Market Efficiency. *Journal of Financial Economics* 6(2/3): 95-101.

Malkiel, Burton G. 2000. Are Markets Efficient? *The Wall Street Journal*, December 28, 2000.

Schleifer, Andrei. 2000. *Inefficient Markets*. Oxford University Press: London.

Twain, Mark. 1894. *The Tragedy of Pudd'nhead Wilson*. The American Publishing Company: Hartford, CT.

Wyckoff, Richard D. 1985. *Wall Street Ventures & Adventures Through Forty Years* (1930). Fraser Publishing Company: Burlington, VT.

ABOUT THE AUTHORS

Edwin D. Maberly received his Ph.D. from Texas A&M University, and has held posts at Texas A&M University, University of Wyoming, Northern Arizona University, International University of Japan, University of Auckland, University of South Carolina, and the Atlanta Federal Reserve Bank. Currently Dr. Maberly is the Chaired Professor of Finance at the University of Canterbury in Christchurch, New Zealand. His publications have appeared in *The Journal of Finance*, *Journal of Financial and Quantitative Analysis*, *Journal of Banking and Finance*, and the *Financial Analysts Journal* among others. Dr. Maberly's research interest is in the area of market microstructure and market anomalies. He is currently writing a co-authored book, which examines financial history as viewed "From the Thinkers, Writers, and Doers of the Past." His email address is edwin.maberly@canterbury.ac.nz.

Raylene M. Pierce is in the final stages of Ph.D's from Texas A&M University (Educational Curriculum) and University of Canterbury (Finance). Currently Raylene is a Senior Lecturer in Finance at Lincoln University in Canterbury, New Zealand. Teaching is a new career for Raylene and in the past she has held positions as a Series 7 registered stock broker, risk assessment manager, and demographer. Raylene's research interests are in the areas of market microstructure and anomalies, and behavioral finance. Her email address is piercer@lincoln.ac.nz.