The Halloween Effect and Japanese Equity Prices: Myth or Exploitable Anomaly

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Abstract

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Bouman and Jacobsen (2002) examine monthly stock returns for major world stock markets and conclude that returns are significantly lower during the May-October periods versus the November-April periods in 36 of 37 markets examined. They argue that, in general, the Halloween strategy outperforms the buy and hold strategy thereby casting doubt on the validity of the efficient market paradigm. More recently, Maberly and Pierce (2004) re-examine the evidence for U.S. equity prices and conclude that Bouman and Jacobsen's results are not robust to alternative model specifications. Extending prior research, this paper examines the robustness of the Halloween strategy to alternative model specifications for Japanese equity prices. The Halloween effect is concentrated in the period prior to the introduction of Nikkei 225 index futures in September 1986. After the internationalization of Japanese financial markets in the mid-1980s, the Halloween effect disappears.

JEL classification: G14, G15

Key words: bull versus bear markets; efficient markets; money flows; Japanese stock market; market anomalies; trading rules

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1. Introduction

The existence of profitable mechanical trading rules is inconsistent with the efficient market paradigm, but especially mechanical trading rules transcending international boundaries. To this end, Bouman and Jacobsen (2002) examine monthly returns over two six-month periods (i.e., May-October versus November-April) for 37 international equity markets. Their study examines the period January 1970 through August 1998. The authors conclude that monthly stock returns are significantly higher during the November-April periods versus the May-October periods.

This phenomenon, labelled the Halloween effect, is present in 36 out of 37 stock markets examined and amounts to a "Sell in May and Go Away" strategy as the rule is to invest in stocks only over the November-April periods, with a risk-free investment like Japanese Government Bonds (JGBs) the preferred investment over the May-October periods. Bouman and Jacobsen (2002) argue that the Halloween strategy outperforms the buy and hold strategy on a risk-adjusted basis in the bulk of markets examined thereby casting doubt on the validity of the efficient market paradigm.

Fama (1998) argues that empirical studies documenting long-term return anomalies like the Halloween effect are sensitive to methodology. According to Fama, most long-term return anomalies tend to disappear with reasonable changes to technique. Using monthly United States (U.S.) stock return data over the January 1970 through August 1998 period, Maberly and Pierce (2004, p. 43) examine the robustness of the Halloween effect to alternative model specifications and extend the analysis to S&P 500 stock index futures. They conclude that "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."

As a logical extension of prior research, this study examines the robustness of the Halloween effect to alternative model specifications for the Japanese stock market. Potential explanations contributing to a Japanese Halloween puzzle are discussed. Over the period 1970 through 2003 and considering reasonable transaction costs, the Japanese Halloween strategy outperforms the buy and hold strategy, but the return differential becomes insignificant in the period following the introduction of Japanese index futures, which occurs in September 1986.[1] The profitability of the Halloween strategy for the most recent time periods is drastically reduced as evidenced by the 34.15 percent increase in the Nikkei 225 index over the May 2003 through October 2003 period, a period when according to the Halloween strategy investors are out of stocks and exclusively long JGBs. The results presented in this paper do not support the "out of sample" profitability of mechanical trading rules, and this is the major contribution of this paper.

Based on year-end 2002 prices, the Japanese stock market ranked second behind the U.S. stock market in terms of market capitalization, and this fact increases the importance of the results presented in this study.[2] The data set examined is monthly returns to the price-weighted Nikkei 225 index over the period January 1970 through December 2003, which is an extension of Bouman and Jacobsen's (2002) study by 64 months. The monthly time series of Nikkei 225 index returns is stationary based on results from an augmented Dickey-Fuller t-test with zero lags and a t-statistic of –20.24. Reasons for selecting the Nikkei 225 index include the following: the Nikkei 225 index is the index traditionally associated with Japanese equity prices; and the most popular Japanese stock index futures contract is based on the Nikkei 225 index. [3,4]

2. Possible Explanations for the Puzzle

January through December mean Nikkei 225 index returns for the period 1970 through 2003 are displayed in Table 1 along with relative ranks and standard deviations. Of the twelve possible breakpoints, the May-October versus April-November break point yields the optimal six-month trading strategy, and this is verified by examining the ranking of monthly returns (January is ranked first, March second, December third, April fourth, February fifth, and November sixth, all of which comprise the April-November period). January mean returns at 2.276 percent are unusually large, and this finding is consistent with the well-documented January effect, and this could explain the superior returns attributable to the Halloween strategy.[5]

[Table 1 here]

One question that immediately arises is that there appears to be no clear reason why the Halloween puzzle should exits in a well-developed capital market like the Japanese stock market. Bouman and Jacobsen (2002) address a number of potential explanations for a Halloween effect, but none appear to explain the puzzle. In particular, Bouman and Jacobsen consider that the Halloween puzzle is not economically exploitable after considering the impact of transaction costs. Data mining is another explanation but they ultimately reject data mining as a possible explanation.[6] Higher returns over the November-April periods could be due to higher risk in this period. The Halloween puzzle could be a manifestation of other calendar time anomalies, but in particular, the January effect. The puzzle could be caused by shifts in either interest rates or shifts in trading volume. And stock returns could be lower over the May-October periods because of a seasonal factor in the provision of news.

Bouman and Jacobsen (2002, p. 1630) argue that none of these potential explanations offer much explanatory power for the existence of the Halloween puzzle and "we are faced with the following problem: history and practice tells us that the old saying is right, while stock market logic tells us it is wrong. It seems that we have not yet solved this new puzzle."

Based on a unique data set, Brown, Goetzmann, Hiraki, Shiraiski and Watanabe (2002) examine Japanese mutual fund flows across investor categories for the period January 19, 1998 through January 18, 2000 and document the existence of a foreign versus domestic sentiment factor. The authors argue that mutual fund flows are an indicator of (Japanese) investor sentiment, and their research documents a significant correlation between a new index of investor sentiment and Japanese stock returns

As a test for seasonality in investor sentiment, foreign participant monthly net flows for the Japanese equity market were obtained from a proprietary data source for the period July 1982 through January 2002, and net transactions were examined for the November-April versus May-October periods.[7] Foreign participant monthly net flows are considerably higher over the November-April periods versus the May-October periods as is total trading volume. This evidence suggests that investor sentiment is related to the (Japanese) Halloween puzzle, and this is an area for future research.

3. Methodology

To test for the existence of a Halloween effect, Bouman and Jacobsen (2002) use regression analysis with dummy variables, which is equivalent to a simple means test. Their analysis is represented as:

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

R_t represents continuously compounded monthly index returns 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 intercept term μ represents the monthly mean return over the May-October periods and $\mu + \alpha_1$ represents the monthly mean return over the November-April periods. If α_1 is positive and significant at a meaningful level, then this is considered as evidence of a Halloween effect.

Studies by Haugen and Lakonishok (1988) among others suggest that stock returns are unusually large in January. Therefore, to consider the possibility that January returns are the driving force behind a significant α_1 coefficient in equation (1), Bouman and Jacobsen (2002) and Maberly and Pierce (2004) both modify equation (1) to include a January dummy. This is represented as:

$$R_t = \mu + \alpha_1 S_t + \alpha_2 J_t + \varepsilon_t. \quad (2)$$

J_t is set equal to 1 whenever month t is January and 0 otherwise.

Maberly and Pierce (2004) examine the impact of outliers on the estimation of equation (1) coefficients by including an outlier dummy. This is represented as:

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

D_t is set equal 1 whenever month t is identified as an outlier. They identify two outliers based on within sample Z-scores greater than –4.0. However, Japanese stock prices based on monthly returns are more volatile than U.S. stock prices.[8] Therefore, in this study, a month is identified as an outlier whenever the absolute value of the within sample Z-score is greater than 2.50. Using this criterion, thirteen outliers (i.e., nine negative and four positive) are identified over the period January 1970 through December 2003.[9] In particular, there is a concentration of negative outliers surrounding the 1990 invasion of Kuwait by Saddam

Hussein. August 1998 is also a negative outlier, and this month is associated with the collapse of the hedge fund Long-Term Capital Management. Of interest, the October 1987 Crash is not an outlier. Equation (4) combines the January dummy with the outlier dummy, and this is represented as:

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

4. Empirical Results

Among the major industrial countries, Japan ranked first in restrictiveness of foreign bank activity during the 1970s and early 1980s. Foreign banks were not permitted to operate full-service branches in Japan until 1985. Furthermore, a comparison of cross-border transactions in bonds and equities reveals that internationalization of Japanese financial markets occurs in earnest only after 1985.[10] On September 3, 1986, Nikkei 225 index futures began trading on the Singapore International Monetary Exchange (SIMEX), which was a major step towards the internationalization of Japanese financial markets.

Internationalisation of Japanese financial markets occurs mid-1980s, and this fact suggests that the 1970s and 1990s exhibit different stock return patterns. A contention of this study is that the Halloween effect is not robust with respect to the internationalisation of Japanese financial markets. To examine this possibility, the data set is divided into two subperiods based on the introduction in September 1986 of Nikkei 225 index future. To make the subperiods symmetric in length, the first subperiod covers the period from January 1970 through December 1986. The second subperiod covers the period from January 1987 through December 2003. Equation (1) coefficients are estimated for the entire period and for each of the two subperiods and so forth for equation (2) through equation (4).

4.1. January 1970 through December 2003

As noted previously, a positive and significant α_1 is evidence of a Halloween effect. Panel A of Table 2 refers to the basic model, equation (1). In this case, α_1 is positive at 1.4187 and highly significant basis a p-value of 0.013 for the t-statistic. This result is consistent with those presented by Bouman and Jacobsen (2002) and support the hypothesis of a significant Halloween effect for Japanese equity prices. Panel B includes the January dummy, equation (2), and panel C includes the outlier dummy, equation (3). In both cases, α_1 is positive and significant at a meaningful level. Panel D includes both the January and outlier dummy, equation (4).

[Table 2 about here]

To summarize, a highly significant Halloween effect is identified in the Japanese equity market over the period January 1970 through December 2003, and these results are robust to alternative model specifications. In contrast to the results reported by Maberly and Pierce (2004) for U.S. equity prices, the inclusion of an outlier dummy variable does not explain the existence of a Halloween effect for Japanese equity prices. However, as presented below, these results are not robust to the time period examined.

4.2. January 1970 through December 1986

Table 2 results are replicated for the first subperiod, January 1970 through December 1986, the period prior to the internationalization of Japanese financial markets. As reported in Table 3, a positive and significant α_1 is evident across all four equations. The results for the first subperiod are similar to those reported for the entire data set. In summary, the evidence supports the existence of a significant Halloween effect, and this result is robust to the inclusion of either a January dummy or an outlier dummy or both. In particular, the reader is referred to panel D of Table 3, which corresponds to equation (4).

[Table 3 about here]

4.3. January 1987 through December 2003

Table 2 results are replicated for the second subperiod, January 1987 through December 2003, the period following the internationalisation of Japanese financial markets. As reported in Table 4, although the α_1 coefficient is positive in Panel A through panel D, the corresponding t-statistics are not significant at meaningful levels throughout. An important observation is the lack of support for a significant Halloween effect in equation (1), and this is before the January and outlier dummy variables are included. Including the January and outlier dummy variables reduces the p-value associated with α_1 to 0.361. In particular, the reader is referred to panel D of Table 4, which corresponds to equation (4).

[Table 4 about here]

To summarize, the evidence supporting a significant Halloween effect is driven by the period prior to the internationalisation of Japanese financial markets. For the period after 1986, the Halloween effect disappears, and this result is independent of model specifications. Modelling time-varying volatility by use of a GARCH(1,1) model reduces the p-value for the α_1 coefficient even more so. The statistical evidence does not support the continuation of the Halloween puzzle for more recent Japanese return data.

5. Most Recent Evidence: Zero-tolerance Decision

The publication date for Bouman and Jacobsen's paper is December 2002. The first out of sample test of the Halloween strategy occurs on April 30, 2003. On this date, investors sold the Nikkei 225 index investing the proceeds in a risk-free security dominated in yen. However, over the next six months, the Nikkei 225 index increased by an unusually large 34.15 percent, and this represents the opportunity cost of following the Halloween strategy. Adding transaction costs and capital gain taxes increases this cost. The Halloween

strategy failed miserably for the most recent time period. The opportunity cost of following the Halloween strategy was 34.15 percent.

The *Financial Analysts Journal* (*FAJ*) is primarily directed at investment practitioners. In a recent *FAJ* editorial comment, editor Robert D. Arnott (2003) 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." Thus, the Halloween strategy fits Arnott's definition of a zero-tolerance decision, and as noted previously, the Halloween strategy was unsuccessful over the May through October 2003 period for Japanese equities. Using Arnott's logic, any manager following the Halloween strategy would have been fired.

Professor Richard Roll, a distinguished financial economist and principle of the portfolio management firm of Roll and Ross Asset Management, voices scepticism of profiting from mechanical trading rules like the Halloween strategy. "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" (as reported in Malkiel, 2000).

6. Bull Versus Bear Market Dichotomy

6.1. Market Timing Ability

Bouman and Jacobsen (2002, p. 1632) observe that, "the Halloween strategy appears to have better skills in forecasting bull markets than bear markets." They assume that the May through October periods predict a bear market (the return on the market is below the risk-free rate), and the November through April periods predict a bull market (the return on the market is higher than the risk-free rate). For a select group of 17 international stock

markets, Bouman and Jacobsen examine return data between 1973 through 1996 over each of the subperiods May through October versus November through April.[11] Based on their analysis, the authors conclude that, "the Halloween strategy has significant market-timing ability." Based on a reported p-value of 0.003, the market-timing ability of the Halloween strategy is strongest for the Japanese equity market.

A similar analysis is performed on the Nikkei 225 index between 1970 and 2003 with a slight modification to Bouman and Jacobsen's (2002) definition of bull and bear markets. If the observed Nikkei 225 index returns are negative (positive) over a particular May through October period, then this period is identified as a bear (bull) market and so forth for the November through April periods.[12] The total number of six-month periods equals 67. In particular, there are 34 May through October periods delineated into 16 bear markets and 18 bull markets. Furthermore, there are 33 November through April periods delineated into 9 bear markets and 24 bull markets. The hypergeometric distribution is used to estimate the probability that the empirical distribution of bull and bear markets across the two six-months subperiods is due to chance, and the p-value associated with this hypothesis is 0.0772. In this case, the market timing ability of the Halloween strategy is not strongly supported for Japanese equity prices. However, in any case, the existence of significant market timing ability for the Halloween strategy is not sufficient evidence to reject market efficiency. Any market timing ability must be judged against the buy and hold strategy and then an adjustment must be made for transaction costs and capital gains taxes.

6.2. Differences Within Bull and Bear Markets

Each year over the 1970 through 2003 period is divided into two groups depending on whether Nikkei 225 index returns for the year are positive or negative. Define positive years as bull markets and negative years as bear markets. A similar delineation is performed

within each of the two subperiods: (1) January 1970 through December 1986, which corresponds to the period prior to the internationalisation of Japanese financial markets in the mid 1980s; and (2) January 1987 through December 2003, which corresponds to the post internationalisation period. Bull markets are identified by the particular year and then the corresponding months of January, February, March, April, November and December are lumped together. In panel A of Table 5, the set containing these 126 months is compared with the set containing the other months of the year—May, June, July, August, September and October. In panel B of Table 5, a similar classification is performed for months corresponding to bear markets. The objective is to discern any difference in monthly returns within bull and bear markets between May-October periods and November-April periods.

6.3. January 1970 through December 2003

The results for the entire period are reported in Table 5. These results are very interesting and depict a significant difference between bull markets and bear markets. Bouman and Jacobsen (2002) argue that index returns with dividends are forecasted to be above the risk-free rate over November through April periods and below the risk-free rate over May through October periods. In the current analysis, all months over a November through April period occur within the same year, and this differs from the scenario adopted by Bouman and Jacobsen. Additionally, Nikkei 225 index returns as reported in this study exclude dividends, and this explains why no adjustment is made for the risk-free rate of interest when defining bull markets and bear markets.

[Table 5 about here]

In bull markets, the mean Nikkei 225 index return is positive for both periods—plus 0.753 percent for the May-October periods and plus 2.424 percent for the November-April periods. The difference of 1.67 percent appears unusually large. In contrast in bear markets,

the mean Nikkei 225 index return is negative for both periods—minus 2.086 percent for the May-October periods and minus 1.102 percent for the November-April periods. However, mean returns are statistically different only within bull markets as indicated by the reported t-statistic of 2.73 and corresponding p-value of 0.007. The evidence supporting the Halloween effect in Japanese equity markets is driven by the unusually large positive returns observed in bull markets over the November-April periods, and this is an important observation not previously documented in the literature.

6.4. January 1970 through December 1986

Results for the period prior to the internationalisation of Japanese financial markets in the mid-1980s are reported in Table 6. The difference between bull markets and bear markets is even more dramatic than the difference reported in Table 5. In particular in bull markets, the mean Nikkei 225 index return is positive for both periods—plus 0.646 percent for the May-October periods and plus 2.659 percent for the November-April periods. The difference of 2.013 percent is unusually large and highly significant. In contrast in bear markets, the mean Nikkei 225 index return is negative for both periods—minus 0.976 percent for the May-October periods and minus 1.110 percent for the November-April periods. Of importance is the observation that the mean return is more negative over the November-April periods conditional on a bear market, but the difference between periods within bear markets is small at 0.134 percent.

[Table 6 about here]

An important finding is that the Halloween effect reported for the period January 1970 through December 1986 is predominately a bull market phenomenon. Returns are higher over the November-April periods, but only for years classified as a bull market. In contrast, for years classified as a bear market, returns are actually more negative over the

November-April periods. The Halloween pattern disappears for years classified as a bear market. However, this observation is viewed with caution given the small number of bear market years (i.e., 4) within the 17-year sample period.

6.5. January 1987 through December 2003

Results for the period following the internationalisation of Japanese financial markets in the mid-1980s are reported in Table 7. The disappearance (reduction therein) of the Halloween effect over this period is supported by the observation that there is no statistical difference in mean Nikkei 225 index returns between November-April and May-October periods within bull markets and within bear markets. In bear markets, mean returns are negative for both six-month periods and conversely in bull markets, mean returns are positive for both six-month periods. The observation that returns are "more negative" within bear markets for May-October periods and "more positive" within bull markets for November-April periods cannot be profitably exploited, and this results, although interesting, is not inconsistent with the efficient market paradigm.

[Table 7 about here]

7. Conclusions

This study extends prior research on the Halloween effect to the Japanese equity market. A significant Halloween effect is documented but only over the period prior to the internationalisation of Japanese financial markets in the mid-1980s. An important observation is that conditional on a bull market, Nikkei 225 index returns are unusually large over the November-April periods, but this pattern does not carry over to years classified as a bear market. In fact, on average, Nikkei 225 index returns are negative over the November-April periods in years classified as a bear market year. Of the 34 years in the data set, 13 of these years (i.e., or about 40 percent) are classified as a bear market year. The major

conclusion of this study is that the (Japanese) Halloween effect cannot be profitably exploited. However, conditional on a bull market year, the evidence strongly suggests that returns over the November-April period will be numerical higher than those observed over the May-October period.

If an investor can identify a bull market year from a bear market year ex ante, then the optimal strategy is too be long stocks in a bull market year and out of stock (i.e., long JGBs) in a bear market year. The Halloween strategy is not optimal ex ante, and this is where the Halloween strategy breaks down. As a "zero-tolerance" strategy, the manager is fired over any extended bull market period of years.

Anecdotal evidence is presented suggesting that market sentiment is related to the (Japanese) Halloween puzzle. Increased buying pressure (money inflows) during bull markets, but especially over the November-April periods might explain the anomalous patterns documented in this paper, and this is an area for future research.

Endnotes

1. This time period also coincides with the internationalisation of Japanese financial markets.

2. See *The Tokyo Stock Exchange Fact Book 2003* for market capitalization of the major world stock markets but in particular page 11.

3. Bouman and Jacobsen (2002) examine a value-weighted index with dividends reinvested. Nikkei 225 index values exclude dividends, but this fact is not materially important to the results presented in this study. The JGB rate is offset by the dividend rate for the Nikkei 225 index, and it not unreasonable to assume that the two are equal over the period 1970 through 2003. Therefore, in this paper funding costs associated with the Halloween strategy are ignored.

4. Another measure of Japanese equity prices is the value-weighted Tokyo Stock Exchange Price Index (TOPIX). Results using the TOPIX do not differ materially from those reported for the Nikkei 225 index.

5. The January effect refers to the empirical observation that January returns are unusually large, but especially for small firms. The reader is referred to Haugen and Lakonishok (1988).

6. Bouman and Jacobsen's data set consists of 344 monthly returns with the last month being August 1998. On August 17, 1998, the Russian government unexpectedly announced a moratorium on debt repayments, and this event threw world financial markets into a tailspin. At –14.92 percent, August 1998 Nikkei 225 index returns are identified as an outlier. To include or to exclude August 1998 is an example of data mining, and by including August 1998, the Halloween puzzle is more pronounced.

7. Since 1987, foreign holdings of Japanese stocks have increased from 4.12 percent to a level above 20 percent today, and this data is from various issues of *Annual Securities Statistics*, Tokyo Stock Exchange.

8. The standard deviation of monthly returns was calculated for the Nikkei 225 (5.743 percent) and S&P 500 (4.575 percent) indexes and the Dow Jones Industrial Average (4.575 percent) for the period January 1970 through December 2003. The variance of monthly returns for the Nikkei 225 index in both cases is significantly higher at a p-value of 0.000.

9. The reviewer notes that this criterion is more or less arbitrary, but other reasonable threshold levels yield similar results.

10. The reader is referred to *The WG&L Handbook of International Finance* (1995, page 65).

11. Bouman and Jacobsen (2002) offer no explanations for the shortened time period 1973 to 1996 versus 1970 to August 1998.

12. This differs from Bouman and Jacobsen's (2002) definition. Nikkei 225 index returns are not compared to the risk-free rate for an obvious reason. The Nikkei 225 index excludes dividend payments, but the dividend rate does not differ materially from the JGB rate over the period examined.

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