The Halloween Indicator: Everywhere and all the time

Ben Jacobsen
Massey University
B.Jacobsen@Massey.ac.nz

Cherry Y. Zhang
Massey University
Y.Zhang6@Massey.ac.nz

We use all available stock market indices for all 108 stock markets and for all time periods to study the 'Halloween indicator' or 'Sell in May'-effect. In total 55,425 monthly observations over 319 years show winter returns – November through April - are 4.52% (t-value 9.69) higher than summer returns. The effect is increasing in strength: The average difference between November-April and May-October returns is 6.25% over the past 50 years. A Sell-in-May trading strategy beats the market more than 80% of the time over 5 year horizons. The data allows us to address a number of (methodological) issues that have been raised with respect to the effect.

Keywords: seasonal anomalies, sell in May, Halloween indicator, long time series data

JEL classification codes: G10, G14

1. Introduction

Since 2002 when Bouman and Jacobsen published their study on the Halloween Indicator, also known as the 'Sell in May and go away' effect, in the American Economic Review their study has attracted a lot of attention in both the academic and popular press. Bouman and Jacobsen (2002) find that returns during winter (November through April) are significantly higher than during summer (April-October) in 36 out of the 37 countries in their study. What makes the Halloween or Sell in May effect particularly interesting is that it challenges traditional economic theory, as it suggests predictably negative excess returns during summer.[1]

Recently, a number of papers have appeared that show the effect is also present out of sample in many of these countries (for instance, Andrade, Chhaochharia, & Fuerst, 2012; Grimbacher, Swinkels, & van Vliet, 2010; Jacobsen & Visaltanachoti, 2009). This is another reason why the effect is interesting. The anomaly does not suffer from Murphy's law as documented by Dimson and Marsh (1999). It does not seem to disappear or reverse itself after discovery, but continues to exist even though investors may have become aware of it.

As with other calendar anomalies, a number of studies have remained sceptical and raise a number of issues emphasising the possibility of data mining, sample selection bias, statistical problems, or economic significance (Maberly & Pierce, 2003; Maberly & Pierce, 2004; Lucey & Zhao, 2007; Zhang & Jacobsen, 2012; Powell, Shi, Smith, & Whaley, 2009). Moreover, we still lack a proper explanation on what causes the effect (see for instance, Jacobsen & Marquering, 2008).

The purpose of this paper is to rigorously re-examine the Halloween effect. To this purpose, we first consider all stock markets worldwide using the full history of stock market indices available for each market. While we are not aware of any study which has

[1] For instance, Grimbacher, Swinkels and van Vliet (2010) find a US equity premium over the sample period 1963-2008 of 7.2% if there is a Halloween effect and a Turn of the Month effect, and a negative risk premium of -2.8% in all other cases.

consider all available stock market data for all countries that have a stock market, this is probably the best safeguard against data mining and sample selection bias. Our data consists of all 108 stock markets in the world. For each market we cover all historical data available for that market. As our sample covers all stock market returns available we also cover all 37 stock markets examined in Bouman and Jacobsen (2002), using extended sample periods. The two main reasons for our rigorous examination are: Firstly, to answer the sceptics regarding whether or not a Halloween effect exists based on all empirical evidence available, rather than relying on a limited selection of one or more countries. For instance, Zhang and Jacobsen (2012) show that even with an extremely large sample for just one country (the same UK data set we use here) it is hard to determine whether monthly anomalies exist. The problem is the same as put forward by Lakonishok and Schmidt (1988): To detect monthly anomalies one needs samples of at least ninety years, or longer, to get any reliable estimates. Looking at all data across countries seems the best we can do. Secondly, we hope that a full analysis of the effect may contribute to finding what causes this anomaly. Is the effect present in all countries? All regions? All the time? Is it constant over time? Last but not least, we not only consider whether the effect is present, but whether as an investor it would make sense to assume it is by considering trading strategies and comparing these with buy and hold strategies.

Overall, the 55,425 monthly observations over 319 years show a strong Halloween effect. Winter returns – November through April - are 4.52% (t-value 9.69) higher than summer returns. The Halloween effect is prevailing around the world to the extent that the mean returns are higher for the period of November-April than for May-October in 81 out of 108 countries, and the difference is statistically significant in 35 countries, compared to only 2 countries having significantly higher May-October returns. Our evidence reveals that the size of the Halloween effect does vary cross-nation. It is stronger in developed and emerging markets than in frontier and rarely studied markets. Geographically, the Halloween effect is more prevalent in countries located in Europe, North America and Asia than in other areas. As we show, however, this may also be due to the small sample sizes yet available for many of these newly emerged markets.

Using time series subsample period analysis by pooling all market indices together as a general indication, we show over 31 ten-year sub-periods; 24 have November-April returns higher than the May-October returns. However, this difference only becomes statistically significant over the past 50 years starting from 1960s. The difference in these two 6-month period returns is very persistent and economically large ranging from 5.08% to 8.91% for the most recent five 10-year sub-periods. The world index from Global Financial Data reveals a similar trend. Subsample period analysis of 28 individual countries with data available for over 60 years also confirms this strengthening trend of the Halloween effect. More specifically, we show that the Halloween effect starts emerging around the 1960s, with 27 out of the 28 countries revealing positive coefficient estimates in the 10 year sub-period of 1961-1970. Both the magnitude and statistical significance of the Halloween effect keeps increasing over time, with the sub-period 1991 to 2000 showing the strongest Halloween effect among countries. Consistent with country by country whole sample period results, the Halloween effect is stronger in Western European countries.

We show the economic significance of the Halloween effect by investigating the out-of-sample performance of the trading strategy in the 37 countries used in Bouman and Jacobsen (2002). The Halloween effect is present in all 37 countries for the out-of-sample period September 1998 to April 2011. The out-of-sample gains from the Halloween strategy are still higher than the buy and hold strategy in 31 of the 37 countries; after taking risk into account, the Halloween strategy outperforms the buy and hold strategy in 36 of the 37 countries. In addition, given that the United Kingdom is the home of this old market wisdom, we examine the performance consistency of the trading strategy using long time series of over 300 years of UK data. The result shows that investors with a longer horizon would have had remarkable odds beating the market using this trading strategy: Over 80% for investment horizons over 5 years; and over 90% for horizons over 10 years, with returns on average around 3 times higher than the market.

We address a number of methodological issues concerning the sample size, impact of time varying volatility, outliners and problems with statistical inference using UK long time series data of over 300 year. In particular, extending the evidence in Zhang and Jacobsen

(2012), we revisit the UK evidence and provide rolling regressions for the Halloween effect with a large sample size of 100-year time intervals. The results show that the Halloween effect is often significant if measured this way, but even within this long sample there are subsamples where the effect is not always significant. In addition, while point estimates are always positive based on traditional regressions and estimates taking GARCH effects into account, outlier robust regressions occasionally show negative point estimates halfway through the previous century. Using this large sample size, however, the effect is more often than not statistically significant. Moreover, if we consider trading strategies assuming different investment horizons, investors would have been better off if they had assumed that the effect was present. This dataset also allows us to test an argument put forward by Powell et al. (2009). They question the accuracy of the statistical inference drawn from standard OLS estimation with Newey and West (1987) standard errors when the regressor is persistent, or has a highly autocorrelated dummy variable and the dependent variable is positively autocorrelated. They suggest that this may affect the statistical significance of the Halloween effect. This argument has been echoed in Ferson (2007). With the benefit of long time series data, however, we address this concern by regressions using 6 monthly, rather than monthly, returns. The bias if any seems marginal, we find almost similar standard errors regardless of whether we use the 6-month intervals, or the monthly data, to estimate the effect.

In short the results we provide here suggest that, based on all country evidence, there is a Halloween or Sell in May effect. While it may not be present in all countries, all the time, it most often is. The effect holds out-of-sample and cannot be explained by outliers, or the frequency used (monthly or six monthly) to measure it. The effect is economically large and seems to be increasing in the last fifty years and, even when in doubt of the statistical evidence, it seems that investors may want to give this effect the benefit of the doubt, as trading strategies suggest a high chance of outperforming the market for investors with a horizon of five years or more. Of course, just as with in-sample results, past out-of-sample data do not guarantee future out-of-sample results.

With respect to what may cause the effect, it seems that given all the statistical issues it might be difficult to rely on cross sectional evidence to find a definite answer. What we can say is that any explanation should allow for time variation in the effect and should be able to explain why the effect has increased so strongly in the last fifty years.

2 A short background on the Sell in May or Halloween effect

Bouman and Jacobsen (2002) test for the existence of a seasonal effect based on the old market wisdom 'Sell in May and go away' so named because investors should sell their stocks in May because markets tend to go down during summer. While many people in the US are unfamiliar with this saying there is a similar indicator known as the Halloween indicator, which suggests leaving the market in May and coming back after Halloween (31 October). Bouman and Jacobsen (2002) find that summer returns (May through October) are substantially lower than winter returns (November through April) in 36 of the 37 countries over the period from January 1970 through to August 1998. They find no evidence that the effect can be explained by factors like risk, cross correlation between markets, or – except for the US - the January effect. Jacobsen, Mamun and Visaltanachoti (2005) show that the Halloween effect is a market wide phenomenon, which is not related to the common anomalies such as size, Book to Market ratios and dividend yield. Jacobsen and Visaltanachoti (2009) investigate the Halloween effect among US stock market sectors. The Halloween effect is also studied in Arabic stock markets by Zarour (2007) and in Asian stock markets by Lean (2011). Zarour (2007) finds that the Halloween effect is present in 7 of the 9 Arabic markets in the sample period from 1991 to 2004. Lean (2011) investigates 6 Asian countries for the period 1991 to 2008, and shows that the Halloween effect is only significant in Malaysia and Singapore if modelled with OLS, but that 3 additional countries (China, India and Japan) become statistically significant when time varying volatility is modelled explicitly using GARCH models.

While Bouman and Jacobsen (2002) cannot trace the origin of this market wisdom, they are able to find a quote from the Financial Times on the effect dating back to 1964 before the start of their sample. Apart from the reasons already stated this makes the anomaly particularly interesting. Contrary to, for instance, the January effect (Wachtel, 1942), the Halloween effect is not data driven inference, but based on an old market wisdom. This reduces the likelihood of data mining (for instance, Bouman and Jacobsen (2002) need not consider all possible combinations of six month periods), but also shows that investors might have been aware of the existence of the old adage. They try many possible explanations, but find none. Although they cannot reject that the effects might be caused by summer vacations, which would also explain why the effect is predominantly European.

Our focus on the long-term history of UK data is especially interesting, as the United Kingdom is the home of the market wisdom "Sell in May and go away". Popular wisdom suggests that the effect originated from the English upper class spending winter months in London, but spending summer away from the stock market on their estates in the country: An extended version of summer vacations as we know them today. Jacobsen and Bouman (2002) report a quote from 1964 in the Financial Times as the oldest reference they could find at the time. With more and more information becoming accessible online we can now report a written mention of the market wisdom "Sell in May" in the Financial Times of Friday 10 of May 1935. It states: "A shrewd North Country correspondent who likes stock exchange flutter now and again writes me that he and his friends are at present drawing in their horns on the strength of the old adage 'Sell in May and go away.'" The suggestion is that, at that time, it is already an old market saying. This is confirmed by a more recent article in the Telegraph in 2005.[2] In the article "Should you 'Sell in May and buy another day?'" the journalist George Trefgarne refers to Douglas Eaton, who in that year was 88 and was still working as a broker at Walker, Cripps, Weddle & Beck. "He says he remembers old brokers using the adage when he first worked on the floor of the exchange as a Blue Button, or messenger, in 1934. 'It was always sell in May,' he says. 'I think it came about because that is when so many of those who originate the business in the market start to take their holidays, go to Lord's, [Lord's cricket ground] and all that sort of thing.'" Thus, if the Sell-in-May anomaly should be significantly present in one country over a long period, one would expect it to be the United Kingdom.

[2] http://www.telegraph.co.uk/finance/2914779/Should-you-sell-in-May-and-buy-another-day.html

Gerlach (2007) attributes the significantly higher 3-month returns from October through December in the US market to higher macroeconomic news announcements during the period. Gugten (2010) finds, however, that macroeconomic news announcements have no effect on the Halloween anomaly.

Bouman and Jacobsen (2002) find that only summer vacations as a possible explanation survive closer scrutiny, this might either be caused by changing risk aversion, or liquidity constraints. They report that the size of the effect is significantly related to both length and timing of vacations and also to the impact of vacations on trading activity in different countries. Hong and Yu (2009) show that trading activity is lower during the three summer holiday months in many countries. The evidence in these papers supports the popular wisdom, but probably the most convincing evidence to date comes from a recent study by Kaustia and Rantapuska (2012) using Finish data. They consider actual trading decisions of investors and find these trades to be consistent with the vacation hypothesis. They also report evidence which is inconsistent with the Seasonal Affective Disorder hypothesis put forward by Kamstra, Kramer and Levi (2003). Kamstra, Kramer and Levi (2003) document a similar pattern in stock returns, but attribute it to mood changes of investors caused by a Seasonal Affective Disorder. Not only, however, does the new evidence in Kaustia and Rantapuska (2012) not support the SAD hypothesis, but the Kamstra, Kramer and Levy (2003) study itself has been critisiced in a number of papers for its methodological flaws (for instance, Kelly & Meschke, 2010; Keef & Khaled, 2011; Jacobsen & Marquering, 2008, 2009). By itself this does not mean, however, that the Seasonal Affective Disorder effect could not play a role in financial markets, but our evidence that the absence of an effect in some periods, along with a strong increase in the last fifty years of the effect also seems hard to reconcile with a SAD effect. If it was a mood effect one would expect it to be relatively constant over time. The same argument also applies for a mood effect caused by temperature changes, as suggested by Cao and Wei (2005), who find a high correlation with temperature and stock market returns.

The long time series data we use here allows us to address a number of methodological issues that have emerged regarding testing for the Halloween effect. In particular, there has been a debate on the robustness of the Halloween effect under alternative model specifications. For example, Maberly and Pierce (2004) re-examine the Halloween effect in the US market for the period to 1998 and argue that the Halloween effect in the US is caused by two extreme negative returns in October 1987 and August 1998. Using a similar methodology, Maberly and Pierce (2003) claim that the Halloween effect is only present in the Japanese market before 1986. Haggard and Witte (2010) show, however, that the identification of the two extreme outliers lacks an objective basis. Using a robust regression technique that limits the influence of outliers, they find that the Halloween effect is robust from outliers and significant for the period of 1954 to 2008.

Using 20-year sub-period analysis over the period of 1926 to 2002, Lucey and Zhao (2007) reconfirm the finding of Bouman and Jacobsen (2002) that the Halloween effect in the US may be related to the January effect. Haggard and Witte (2010) show, however, that the insignificant Halloween effect may be attributed to the small sample size used, which reduces the power of the test. With long time series data of 17 countries for over 90 years, we are able to reduce the impact of outliers, as well as increase the sample size in examining the out of sample robustness and the persistence of the Halloween effect in these countries. As we noted earlier, Powell et al. (2009) question the accuracy of the statistical inference drawn from standard OLS estimation with Newey and West (1987) standard errors when the regressor is persistent, or has a highly autocorrelated dummy variable, and the dependent variable is positively autocorrelated. This argument by itself may seem strange as a regression with a dummy variable is nothing else than a difference in mean test. Still, it may be worthwhile to explicitly address the issue.

3. Data and Methodology

We collect monthly price index data from Global Financial Data (GFD) and Datastream for all the countries in the world with stock market indices available[3]. This means we have a

[3] Our price indices data do not include dividends, as there are not many countries having reliable total return data that includes dividends over long time periods. Nevertheless, dividend payments may only affect our results if it clusters in specific months. According to Gultekin & Gultekin (1983), Bouman and Jacobsen

total of 108 countries in our sample, consisting of all 24 developed markets, 21 emerging markets, 31 frontier markets classified by the MSCI market classification framework and an additional 32 countries that are not included in the MSCI market classification. We denote them as *rarely studied markets*[4]. Our sample has of course a considerable geographical coverage: we have 16 African countries, 20 countries in Asia, 12 countries from the Middle East, 39 countries located in Western and Eastern Europe, 3 countries from North America and 16 from Central/South America and the Caribbean area, as well as 2 countries in Oceania. Table 1 presents the source of the data and summary statistics for each country grouped on the basis of their MSCI market classification and geographic region. The world index we use is the GFD world price index that goes back to 1919[5], the information for the index is provided in the last row. Columns 4 to 6 report the starting date, ending date and the sample size for each index. For many of the countries, the time series almost cover the entire trading history of their stock market. In particular, we have over 310 years of monthly market index prices for the United Kingdom, more than 210 years for the United States and over 100 years data for another 7 countries. There are 28 countries in total having data available for over 60 years. This long time series data allows us to examine the emergence and persistence of the Halloween effect by conducting sub-period analysis. Although the countries with long time series data in our sample are primarily developed European and North American countries, we do have over 100 years

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(2002) and Zhang and Jacobsen (2012), dividend payments tend to have no seasonality, equally distributed over different months and do not have effect on seasonal stock market returns.

[4] Our market classification is based on "MSCI Global Investable Market Indices Methodology" published in August 2011. MSCI classifies markets based on economic development, size and liquidity, as well as market accessibility. In addition to the developed market and emerging markets, MSCI launched frontier market indices in 2007; they define the frontier markets as "all equity markets not included in the MSCI Emerging Market Index that (1) demonstrate a relative openness and accessibility for foreign investors, (2) are generally not considered as part of the developed market universe, (3) do not belong to countries undergoing a period of extreme economic or political instability, (4) a minimum of two companies with securities eligible for the Standard Index" (p.58). The countries classified as rarely studied markets in our sample are not necessarily the countries that are less developed than the frontier markets; they can be countries that are considered part of the developed markets' universe with relatively small size; for example, Luxembourg and Iceland; which are excluded from the developed market category by MSCI.

[5] The index is capitalisation weighted starting from 1970 and using the same countries that are included in the MSCI indices. Prior to 1970, the index consists of North America 44% (USA 41%, Canada 3%), Europe 44% (United Kingdom 12%, Germany 8%, France 8%, Italy 4%, Switzerland 2.5%, the Netherlands 2.5%, Belgium 2%, Spain 2%, Denmark 1%, Norway 1% and Sweden 1%), Asia and the Far East 12% (Japan 6%, India 2%, Australia 2%, South Africa Gold 1%, South Africa Industrials 1%), weighted in January 1919. The country weights were assumed unchanged until 1970. The local index values were converted into a dollar index by dividing the local index by the exchange rate.

data for Australia, South Africa and Japan, and over 90 years data for India. We also have countries with very small sample size; for example, there are 10 countries with data for less than 10 years. We calculate the continuously compounded monthly returns for each country. Columns 7 to 12 provide some basic descriptive statistics over the whole sample period. In general, we observe lower mean returns with relatively smaller standard deviations for countries in developed markets than the other markets, and the emerging market tends to have the highest average returns with the largest volatility. For example, the average annualised mean returns for all developed markets in our sample is 6.55%, which is only one-third of the average return of the emerging markets (10.59%) and about half the size of the frontier markets (11.62%) and the rarely studied markets (11.20%). Meanwhile, the volatility for the emerging markets is among the highest, with an annualised standard deviation of 36.70% comparing to 20.18% for the developed markets, and 28.57% and 28.46% for the frontier and rarely studied markets, respectively. The highest increase in monthly index returns is 143.90% in Uruguay in January 1986 and the largest plunge in index prices in a single month is 465.73% in Egypt in July 2008 (Note that because we use log returns, drops of more than 100% are possible). The unequal sample size among the countries does, however, make direct comparison across nations difficult. We address this by applying sub-period analysis in the later sections of the paper. The last column shows the index used for each country. All price indices are quoted at local currency, except Georgia where the only index data available is in USD.

Please insert Table 1 around here

As is common in the literature we investigate the statistical significance of the Halloween effect using the Halloween dummy regression model:

$$r_t = \alpha + \beta Hal_t + \varepsilon_t \quad (1)$$

where r_t is the continuously compounded monthly index returns and Hal_t is the Halloween dummy, which equals one if the month falls in the period of November through April and is zero otherwise. If a Halloween effect is present we expect the coefficient estimate β to be significantly positive, as it represents the difference between the mean returns for the two 6-month periods of November-April and May-October.

3. Results

3.1 Out of sample performance

To be relevant we must first insure that the Halloween effect still exists beyond the original Bouman and Jacobsen (2002) study. Their analysis ends in August 1998. Campbell (2000) and Schwert (2002) suggest that if an anomaly is truly anomalous, it should be quickly arbitraged away by rational investors. (Note that this argument also should have applied to the Bouman and Jacobsen (2002) study itself, as the market wisdom was known before their sample period.) To show whether the Halloween effect has weakened, we start with an out of sample test of the Halloween effect in the 37 countries examined in Bouman and Jacobsen (2002). Table 2 compares in-sample performance for the period 1970 to August 1998[6] with out-of-sample performance for the period of September 1998 to November 2011. The in-sample test using a different dataset presents similar results to Bouman and Jacobsen (2002), with stock market returns from November through April being higher than from May through October in 34 of the 37 countries, and the difference being statistically significant in 20 of the countries. Although a small sample size may reduce the power of the test, the out of sample performance is still very impressive. All 37 countries show positive point estimates of the Halloween effect. For 15 countries the effect is statistically significant out of sample. The Halloween effect seems not to have weakened in the recent years. Moreover, the point estimates in the out-of-sample test of 18 countries are even higher than for the in-sample test. The average coefficient estimate in the out-of-sample testing is 8.87%, compared to 8.16% in the in-sample test. Columns 4 and 7 show the percentage of years that November-April returns beats May-October returns in the sample for each country. Most of the countries have a value greater than 50%, suggesting that the positive Halloween effect is not due to outliers.

[6] In their study, they have 18 countries' data starting from January 1970, 1 country starting in 1973 and 18 countries starting from 1988. Our in-sample test begins from 1970 for those countries with data available in our sample prior to 1970. We use the earliest data available in our dataset (refer to Table 1 for the starting data of each country) for the 7 countries for which data starts later than 1970.

Please insert Table 2 around here

3.2 Overall results

Using all 55,425 monthly observations for all 108 countries over 319 years, the first row of Table 3 gives a general impression of how strong the Halloween effect is. The average 6-month winter returns (November through April) are 6.93%, compared to the summer returns (May through October) of 2.41%. The overall Halloween effect that measures the difference between winter and summer returns is 4.52%, with a t-value of 9.69. Despite the possibility that the statistical significance might be overstated due to cross correlations between markets, these results do provide an overall feeling of the strength of the Halloween effect. The Halloween effect from the world index returns in the second row reveals a similar result. The 6-month winter returns are 9.07% (t-value 3.31) higher than the 6-month summer returns.

Please insert Table 3 around here

3.3 Country by country analysis

Many explanations suggest cross-country variations of the strength of the Halloween effect. This section conducts the most comprehensive cross-nation Halloween effect analysis on all 108 countries with stock market indices available. The evidence shows that the Halloween effect is prevalent around the world to the extent that the mean returns are higher for the period of November-April than for May-October in 81 out of 108 countries and that the difference is statistically significant in 35 countries, compared to only 2 countries having significantly higher May-October returns.

3.3.1 Market development status, geographical location and the Halloween effect

Figure 1(A-D) plots the November-April returns and the May-October returns for all the individual countries in four charts grouped by market classification, each chart is ordered by descending summer returns. An overall picture is that the Halloween effect is more pronounced in developed and emerging markets than in the frontier and rarely studied markets. Figure 1-A compares the two 6-month period returns for the 24 developed markets; with Finland being the only exception, 23 countries exhibit higher average November-April returns than May-October returns. The differences are quite large for many countries primarily due to the low returns during May-October, with 12 countries even having negative average returns for the period May-October. The chart for emerging markets (Figure 1-B) shows a similar pattern; 19 of the 21 countries have November-April returns that exceed the May-October returns, and 7 countries have negative mean returns for May-October. As we move to the frontier and rarely studied markets, this pattern becomes less distinctive. Figures 1-C and 1-D reveal that 22 out of 31 (71%) countries in the frontier markets and 17 out of 32 (53%) countries in the rarely studied markets have November-April returns greater than their May-October returns.

Please insert Figure 1 around here

Table 3 provides statistical support for the Halloween effect across countries. The table reports average returns and standard deviations for the two 6-month periods, the coefficient estimates and t-statistics for the Halloween regression Equation (1), as well as the percentage of years that the November-April returns beat the May-October returns for each country. The countries are grouped based on market classifications and geographical regions. For the developed markets, a statistically significant Halloween effect is prevalent not only among the Western European countries, but also among the countries located in Asia and North America. In fact, the strongest Halloween effect in our sample is in Japan, which has a difference in returns of 8.31% with a t-statistic of 3.60. The Halloween effect is statistically significant in 17 out of 24 (71%) developed markets. The Middle East and Oceania are the only two continents where none of the countries exhibit a significant Halloween effect. This difference in the two 6-month returns cannot be justified by risk measured with standard deviations, since we observe similar or even lower standard deviations in the November-April returns. The number of countries with a statistically significant Halloween effect reduces as we move to less developed markets. Among 21 emerging countries, 9 countries have November-April returns reliably higher than their May-October returns. The Halloween effect is more prevalent in Asian and Eastern European countries than in other regions. None of the countries in Central and South America and the Caribbean area show significant slope estimates. For the frontier markets, although over 70% (22/31) of the countries show higher average returns during November-April than during May-October, only 5 countries have significant t-statistics. For the rarely studied markets, the countries with a significant Halloween effect drops to 4 out of 32. At this stage we are still not able to identify the root of this seasonal anomaly, nonetheless, over the total 108 countries, we only observe 2 countries (Bangladesh and Nepal from the frontier and rarely studied markets groups) to have a statistically significant negative Halloween effect; the overall picture, so far at least, suggests that the Halloween effect is a puzzling anomaly that prevails around the world. Another interesting observation that might be noted from the table is that, among the countries with a significant Halloween effect, the difference between 2 6-month period returns is much larger for the countries in the emerging, frontier and rarely studied markets groups than for the countries in the developed markets groups. The average difference in 6-month returns among countries with significant Halloween effect in the developed markets is 5.87%, comparing to 12.75% in the emerging markets, 23.54% in the frontier markets and 14.01% in the rarely studied markets. We need to be careful before making any judgement on the finding, however, since the sample size tends to be smaller in emerging, frontier and rarely studied markets, so a much higher coefficient is required to provide reliable estimates. In addition, the observations in those newly emerged markets tend to be more recent. If the overall strength of the Halloween effect is stronger in recent samples than in earlier samples, we may observe higher point estimates for the countries with shorter sample periods. We will address this issue by conducting cross sectional comparison within the same time interval using sub-period analysis in Section 3.4.

3.3.2 Sample Size and the Halloween effect

From Table 3, we observe that the Halloween effect is stronger in the developed markets than in the other markets. The sample size for the developed market tends, however, to be considerably larger than the sample size for the emerging, frontier, or rarely studied, markets. For example, the country with the smallest sample size in the developed market is Norway, which has 40 years data starting from 1970, while the sample starting date for many less developed countries is around the 1990s, or even after 2000. The difference in the strength of the Halloween effect between developed markets with large sized samples and other markets with small sized samples may not have any meaningful implication, as it may just be caused by noise. The importance of a large sample size to cope with noisy data is emphasized in Lakonishok and Smidt (1988), in that:

> *"Monthly data provides a good illustration of Black's (1986) point about the difficulty of testing hypotheses with noisy data. It is quite possible that some month is indeed unique, but even with 90 years of data the standard deviation of the mean monthly return is very high (around 0.5 percent). Therefore, unless the unique month outperforms other months by more than 1 percent, it would not be identified as a special month."*

We examine whether there is a possible linkage between the Halloween effect and the sample size among countries. Figure 2 plots each country's number of observations against its Halloween regression t-statistics. Two solid lines at $y = \pm 1.96$ indicate 5% significance level, and two dotted lines at $y = \pm 1.65$ indicate a 10% significance level. The graph reveals that a small sample size seems to have some adverse effects on detecting a significant Halloween effect. In particular, a large proportion of countries with an insignificant Halloween effect is concentrated in the area of below 500 (around 40 years) observations, with most of the negative coefficient estimates from those countries with less than 360 (30 years) observations. As the sample size increases, the proportion of countries with a significant Halloween effect increases as well.

Please insert Figure 2 around here

If we follow the advice of Lakonishok and Schmidt (1988) to the letter and only consider countries for which we have stock market data for more than ninety years, we find strong evidence of a Halloween effect. It is significantly present in 14 out of these 17 countries and the world market index. Two countries (Australia and South Africa have positive coefficients that are not significant and only for Finland we find a negative but not significant Halloween effect.)

3.4 The evolution of the Halloween effect over time

3.4.1 Pooled sub-sample period regression analysis

We provide an overview of how the Halloween effect has evolved over time using time series analysis by pooling all countries in our sample together. This gives us a long time series data from 1693 to 2011. We divide the entire sample into thirty-one 10-year sub-periods[7] and compare the two 6-month period returns in Table 4. These sub-period estimates allow us to detect whether, in general, there is any trend over time. The second column reports the number of countries in each sub-period. There is only one country in the sample during the entire eighteenth century, increasing to 6 countries by the end of 1900. The number of countries expands rapidly in the late twentieth century and reaches 107 in the most recent subsample period. Columns 4 to 7 report the mean returns and standard deviations for the two 6-month periods. The average 6-month return over the entire sample during November-April is 6.93%, compared to only 2.41% for the period of May-October. Figure 3 graphically plots the 6-months return differences of 31 ten-year sub-periods; twenty-four of the thirty-one 10-year sub-periods have November-April returns higher than their May-October returns. In addition, there is not much difference between the volatilities in the two 6-month periods; if anything, the standard deviation in November-April tends to be even lower than in May-October. For example, the 6-month standard deviation over the entire sample is 17.47% for November-April and 19.51% for May-October, indicating that

[7] To be precise, the first sub-period is 8 years from 1693-1710 and the last sub-period is about 11 years from 2001 to July 2011.

the higher return is not due to higher risk, at least measured by the second moment. Columns 8 and 9 show the Halloween coefficients in Equation (1) and the corresponding t-statistics corrected with Newey-West standard errors. Although the November-April returns are frequently higher than the May-October returns, the t-statistics are not consistently significant until the 1960s. For the most recent 50 years, the Halloween effect is very persistent and economically large. The November-April returns are over 5% higher than the May-October returns in all of the sub-periods, and this difference is strongly significant at the 1% level.[8] We report the percentage of times that November-April returns beat May-October returns in the last column. This non-parametric test provides consistent evidence with the parametric regression test; 24 of the 31 sub-periods have greater returns for the period of November-April than for May-October for over 50% of the years.

Please insert Table 4 and Figure 3 around here

The standard errors estimated from pooled OLS regressions may be biased due to cross-sectional correlations between countries. Thus, we also reveal the trend of the Halloween effect in the Global Financial Data's world index returns from 1919 to 2011. Figure 4 plots the Halloween effects using 10-year, 30-year and 50-year rolling window regressions. The dark solid line shows the coefficient estimates of the effect, and we also indicate the upper and lower 95% confidence intervels for the estimates with lighter dotted lines. The plots reveal that the Halloween effect is quite prevelant over the previous century. For example, with a 50-year rolling window, the Halloween effect is almost always significantly positive. Even with a 10-year rolling window, which is a considerably small sample size, the coefficient estimates only appears negative in the 1940s around the World War II period. In addition, all of the plots exhibit an increasing trend of the Halloween effect starting from around the 1950s and 1960s. The point estimates have become quite stable since the 1960s.

[8] We acknowledge that there are many problems with this simple pooled OLS regression technique. Our intention here is, however, only to provide the reader with a general indication on the trend of the Halloween effect over time. The panel data analysis using a random effect also gives a similar conclusion that the Halloween effect becomes significant since the 1960s.

Please insert Figure 4 around here

3.4.2 Country by country subsample period analysis

Understanding how persistent the Halloween effect is and when it emerged and became prevalent among countries is important since it may help to validate some explanations, while ruling out others. To be specific, if the Halloween effect is related to some fundamental factors that do not change over time, one would expect a very persistent Halloween effect in the markets. If the Halloween effect is triggered by some fundamental changes of institutional factors in the economy, we would expect to observe the Halloween effect emerging around the same period. Alternatively, if the Halloween effect is simply a fluke or a market mistake, we would expect arbitragers to take the riskless profit away, with a weakening Halloween effect following its discovery. Longer time series data is essential for the subsample period analysis. In this section, we divide countries with over 60 years' data into several 10-year subsample periods to test whether or not there is any persistence of the Halloween effect in the market. Table 5 presents the sub-period results for 28 countries that meet the sample size criterion, grouped according to market classification and regions. It consists of 20 countries from the developed markets, 6 from the emerging markets and 2 from the rarely studied markets. Geographically, we have 14 countries in Western Europe, 2 countries in Oceania, 2 countries in Asia, 1 African country, 2 North American countries, and 6 countries from Central/South America and the Caribbean area. The table reports coefficient estimates and t-statistics of the Halloween effect regression for the whole sample period and 11 sub-sample periods. The sub-period analysis not only enables us to investigate the persistence of the effect for each individual country, but it also allows a direct comparison of the size of the anomaly between countries within the same time frame. The Halloween effect seems to be a phenomenon that emerges from the 1960s and has become stronger over time, especially among the Western European countries. The coefficient estimates become positive in 27 of the 28 countries, in which 4 are statistically significant during the 10 year period from 1961 to 1970. The number of countries with statistically significant Halloween effect keeps growing with time. Sub-period 1991-2000 shows the strongest Halloween effect especially for the Western European countries. Of 27 countries, 25 have lower May-October returns than the rest of the year, in which 14 countries are statistically significant, with this group comprised of all the Western European countries except Denmark. In addition, the sizes of the Halloween effects are much stronger in European countries than in other areas. Although the most recent 10 year period reveals a weaker Halloween effect, the higher November-April returns are present in all the markets except Chile. For the five 10-year sub-periods since 1960, the point estimates are persistently positive in Japan, Canada, the United States, Australia, New Zealand, South Africa and almost all western European countries except Denmark, Finland and Portugal. Countries like Austria, Finland, Portugal and South Africa that do not have a Halloween effect over the whole sample also exhibit a significant Halloween effect in the recent sub-periods. The sizes of the Halloween effect in recent subsample periods are also considerably larger compared to the earlier sub-periods and whole sample periods. Since the data for most of the emerging/frontier/rarely studied markets that have a Halloween effect starts within the past 30 years, if we focus our comparison to the most recent 30 year sub-periods, the difference in size of the Halloween effect between the developed markets and less developed markets noted in the previous section in Table 3 is reduced substantially: The average size of the coefficient estimates for the countries with significant Halloween effect in developed markets is 12.70% for the period of 2000-2011, 14.97% for 1991-2000 and 16.49% for 1981-1990. The Halloween effect does not appear in Israel, India, and all the countries located in Central/South American area.

Please insert Table 5 around here

4. Economic significance

4.1 Out-of-sample performance in 37 countries examined in Bouman and Jacobsen (2002)

Bouman and Jacobsen (2002) develop a simple trading strategy based on the Halloween indicator and the Sell-in-May effect, which invests in a market portfolio at the end of October for six months and sells the portfolio at the beginning of May, using the proceeds to purchase risk free short term Treasury bills and hold these from the beginning of May to the end of October. They find that the Halloween strategy outperforms a buy and hold strategy even after taking transaction costs into account. We investigate the out-of-sample performance of this trading strategy in this section.

Please insert Table 6 around here

Our approach is to see how investors might profit from the Halloween effect if they follow the Halloween trading strategies from November 1998 to April 2011. Table 6 shows the out-of-sample performance of the Halloween trading strategy relative to the Buy and Hold strategy of the 37 countries originally tested in Bouman and Jacobsen (2002). We use 3-month Treasury Bill Yields in the local currency of each country as the risk free rate. The annualised average returns reported in the second and the fifth columns reveal that the Halloween strategy frequently beats a buy and hold strategy. The Halloween strategy returns are higher than the buy and hold strategy in 31 of the 37 markets. The standard deviations of the Halloween strategy are always lower than the buy and hold strategy, this leads the Sharpe ratios of the Halloween strategy to be higher than the buy and hold strategy in all 37 markets except Chile. The finding indicates that after the publication of Bouman and Jacobsen (2002), investors using the Halloween strategy are still able to make higher risk adjusted returns than using the buy and hold strategy.

4.2 Long term performance of the Halloween strategy in the UK data

With the availability of long time series data for UK stock market returns, we are able to examine the performance of this Halloween strategy over 300 years. Investigating the long term performance of the strategy in the UK market is especially interesting, since the United Kingdom is the origin of the market adage “Sell in May and go away” and it has been referred to as an old market saying as early as 1935, indicating that UK investors are aware of the trading strategy over a long time period.

Table 7 presents the performance of the Halloween strategy relative to the buy and hold strategy over different subsample periods[9].

Please insert Table 7 around here.

The average annual returns reported in the second and the fifth columns reveal that the Halloween strategy consistently beats a buy and hold strategy over the whole sample period, and in all hundred-year and fifty-year subsamples. It only underperforms the buy and hold strategy in one out of ten of the thirty-year subsamples (1941-1970). The magnitude with which the Halloween strategy outperforms the market is also considerable. For example, the returns of the Halloween strategy are almost three times as large as the market returns over the whole sample. In addition, the risk of the Halloween strategy, as measured by the standard deviation of the annual returns is, in general, smaller than for the buy and hold strategy. This is evident in all of the sample periods we examine. Sharpe ratios for each strategy are shown in the fourth and seventh columns. Sharpe ratios for the Halloween strategy are unanimously higher than those for the buy and hold strategy. Table 7 also reveals the persistence of the outperformance of the Halloween strategy within each of the subsample periods by indicating the percentage of years that the Halloween strategy beats the buy and hold strategy. Over the whole sample period, the Halloween strategy

[9] We use the UK 3-month T-bills rate as our proxy for the risk free rate earned for the out of the market period from October to May, however, this data series only starts from 1900. Prior to 1900, we choose the Bank of England base lending rate, beginning from August 1694, since its correlation with the UK T-bills rate is as high as 0.99. We set the interest rate to zero for the one year prior to August 1694 when there are no data available.

outperforms the buy and hold strategy in 63.09% (200/317) of the years. All of the hundred-year and fifty-year subsample periods have a winning rate higher than 50%. Only one of the thirty-year subsamples has a winning rate below 50% (1941-1970, 43.33%).

Most investors will, however, have shorter investment horizons than the subsample periods used above. Using this large sample of observations allows us a realistic indication of the strategy over different short term investment horizons. Table 8 contains our results. It compares the descriptive statistics of both strategies over incremental investment horizons, ranging from one year to twenty years. Returns, standard deviations, and maximum and minimum values are annualised to make the statistics of different holding periods comparable. The upper panel shows the results calculated from overlapping samples and the lower panel contains the results for non-overlapping samples.

Please insert Table 8 around here.

The two sampling methods produce similar results. For every horizon, average returns are significantly higher for the Halloween strategy: Roughly three times as high as for the buy and hold strategy. For shorter horizons the standard deviation is lower for the Halloween strategy than for the buy and hold strategy. For longer investment horizons, however, the standard deviation is higher. This seems to be the result of positive skewness, indicating that we observe more extreme positive returns for the Halloween strategy than for the buy and hold strategy. The frequency distribution plots in Figure 5 confirm this. The graphs reveal that the returns of the Halloween strategy produce less extreme negative values, and more extreme positive values, than the buy and hold strategy.

Please insert figure 5 around here.

This is also confirmed if we consider the maximum and minimum returns of the strategies shown in Table 8. Except for the one-year holding horizon, the maximum returns for the Halloween strategy of different investment horizons are always higher than for the buy and hold strategy, whereas the minimum returns are always lower for the buy and hold strategy.

The last column of Table 8 presents the percentage of times that the Halloween strategy outperforms the buy and hold strategy. The results calculated from the overlapping sample indicate that, for example, when investing in the Halloween strategy for any two-year horizon over the 317 years, an investor would have a 70.57% chance of beating the market. The percentage of winnings computed from the non-overlapping sample, shown in the lower panel, yield similar results. Once we expand the holding period for the Halloween trading strategy, the possibility of beating the market increases dramatically. If an investor uses a Halloween strategy with an investment horizon of five years, the chances of beating the market rises to 82.11%. As the horizon expands to ten years this probability increases to a striking 91.56%.

As a last indication of the persistency of the Halloween strategy in the UK market over time, in Figure 6 we compare the cumulative annual return over the three centuries. The buy and hold strategy hardly shows any increase in wealth until 1950 (note that this is a price index and the series do not include dividends). The cumulative wealth of the Halloween strategy increases gradually over time and at an even faster rate since 1950.

Please insert figure 6 around here.

5. Methodological issues

The long time series of over 300 years UK monthly stock market index returns allows us to address a number of mythological issues highlighted in the literature.

5.1 Sample size

Small sample size has always been an issue when testing monthly seasonal anomalies, as emphasised in Lakonishok and Schmidt (1988), even with 90 years data, monthly seasonals are difficult to identify due to the noise in the monthly return data. The long time series data provides us with a sufficiently large sample size to overcome the problem. Figure 7 extends the evidence in Zhang and Jacobsen (2012) and shows the Halloween effect of the

UK market over 100-year rolling window regressions. The dark solid line indicates the estimates of the Halloween effect, and the light dotted lines show the 95% confidence interval calculated based on Newey-West standard errors. The Halloween effect seems to be persistently present in the UK market for a long time period, the point estimates for the effect is always positive, and the size of the effect is quite stable in the eighteenth and nineteenth centuries. Even with this large sample size, however, the effect is not always statistically significant. The first half of the twentieth century shows a weakening Halloween effect. Consistent with the results in the world index in Figure 4 and the sub-sample period analysis in Table 5, the Halloween effect keeps increasing in strength starting from the second half of the twentieth century.

Please insert figure 7 around here.

5.2 Time varying volatility and outliers

To verify the impact of volatility clustering and outliers in the monthly index return we also show the rolling window estimates controlling for conditional heteroscedasticity using a GARCH model (Figure 8) and outliers using OLS robust regressions (Figure 9). For the GARCH model we use GARCH (1, 1) in Equation (2), since this simple parsimonious representation generally captures volatility clustering well in monthly data with a window of 50 years or more (Jacobsen & Dannenburg, 2003).

$$r_t = \mu + \beta_{Hal} Hal_t + \varepsilon_t,$$

$$\varepsilon_t | \Phi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \sigma_{t-1}^2 \quad (2)$$

For the robust regression, we use the M-estimation introduced by Huber (1973), which is considered appropriate when the dependent variable may contain outliers.

Please insert figure 8 and figure 9 around here.

The result from the GARCH rolling window is consistent with the normal OLS regressions. The estimates of the Halloween effect are always positive over the three centuries, and the strength of the effect reduces during the first half of the twentieth century, while it increases in the second half of the century. Although the result from the robust regressions reveals a similar trend, the point estimates become negative during the 1940s and 1950s.

5.3 Measuring the effect with a six month dummy

Powell et al. (2009) question the accuracy of the statistical inference drawn from standard OLS estimation with Newey and West (1987) standard errors when the regressor is persistent, or has a highly autocorrelated dummy variable and the dependent variable is positively autocorrelated. They suggest that this may affect the statistical significance of the Halloween effect. This argument has been echoed in Ferson (2007), however, it is easy to show that this is not a concern here. We find that statistical significance is not affected if we examine the statistical significance of the Halloween effect using 6-month summer and winter returns. By construction, this half-yearly Halloween dummy is negatively autocorrelated. Powell et al. (2009) show that the confidence intervals actually narrow relative to conventional confidence intervals when the regressor's autocorrelation is negative. This causes the standard t-statistics to under-reject, rather than over-reject, the null hypothesis of no effect. Thus, as a robustness check, it seems safe to test the Halloween effect using standard t-statistics adjusted with Newey and West (1987) standard errors from semi-annual return data. Table 9 presents the coefficient estimates and t-statistics.

Please insert Table 9 around here.

The results drawn from semi-annual data do not change our earlier conclusion based on monthly returns. If anything, these results show an even stronger Halloween effect. The periods with significant Halloween effects in our earlier tests remain statistically significant, with t-values based on semi-annual data. The first hundred years (1693-1800) period was not statistically significant using the monthly data, but now becomes significant at the 10% level. As a final test, we use a simple equality in means test. In this case, we also reject the hypothesis that summer and winter returns are different, with almost the same, highly significant, t-value (4.20).

6. Conclusion

This study investigates the Halloween effect for 108 countries over all the periods for which data is available.

The Halloween effect is prevailing around the world to the extent that mean returns are higher for the period of November-April than for May-October in 81 out of 108 countries, and the difference is statistically significant in 35 countries compared to only 2 countries having significantly higher May-October returns. Our evidence reveals that the size of the Halloween effect does vary cross-nation. It is stronger in developed and emerging markets than in frontier and rarely studied markets. Geographically, the Halloween effect is more prevalent in countries located in Europe, North America and Asia than in other areas. Subsample period analysis shows that the strongest Halloween effect among countries are observed in the past 50 years since 1960 and concentrated in developed Western European countries.

The Halloween effect is still present out-of-sample in the 37 countries used in Bouman and Jacobsen (2002). The out-of-sample risk adjusted payoff from the Halloween trading strategy is still higher than for the buy and hold strategy in 36 of the 37 countries. When considering trading strategies assuming different investment horizons, the UK evidence reveals that investors with a long horizon would have remarkable odds of beating the market; with, for example, an investment horizon of 5 years, the chances that the Halloween strategy outperforms the buy and hold strategy is 80%, with the probability of beating the market increasing to 90% if we expand the investment horizon to 10 years.

Overall, our evidence suggests that the Halloween effect is a strong market anomaly that has strengthened rather than weakened in the recent years. Plausible explanations of the Halloween effect should be able to allow for time variation in the effect and explain why the effect has strengthened in the last 50 years.

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Table 1. Summary statistics for 108 countries' market indices and the world index

The table presents the source, starting date, ending date and number of observations, as well as some basic descriptive statistics, for 108 market indices and the world index. Mean and standard deviation of monthly index returns expressed as percentage are annualised by multiplying by 12 and $\sqrt{12}$. Maximum and minimum monthly returns are also in percentages. Countries are grouped based on the MSCI market classification and geographical regions.

Status	Region	Country	Start	End	Obs	Mean	St Dev	Skew	Kurt	Max	Min	Index Name
Developed	**Asia**	Hong Kong	08/1964	07/2011	564	11.52	32.42	-0.78	6.89	51.44	-57.14	Hong Kong Hang Seng Composite Index
		Japan	08/1914	07/2011	1154	6.30	21.77	0.25	7.39	50.87	-31.84	Nikkei 225 Stock Average (w/GFD extension)
		Singapore	08/1965	07/2011	552	7.04	23.32	-0.53	3.68	27.16	-35.22	Singapore FTSE All-Share Index
	Mid East	Israel	02/1949	05/2011	748	23.66	23.12	0.08	3.64	34.12	-37.08	Tel Aviv All-Share Index
	North America	Canada	12/1917	07/2011	1124	5.03	16.12	-1.07	5.66	20.59	-33.46	Canada S&P/TSX 300 Composite (w/GFD extension)
		United States	09/1791	07/2011	2639	2.81	15.06	-0.58	10.18	35.24	-35.63	S&P 500 Composite Price Index (w/GFD extension)
	Oceania	Australia	02/1875	07/2011	1638	4.99	13.51	-1.89	28.37	21.70	-55.25	Australia ASX All-Ordinaries (w/GFD extension)
		New Zealand	01/1931	07/2011	967	4.33	14.22	-0.62	8.12	22.19	-33.88	New Zealand SE All-Share Capital Index
	Western Europe	Austria	02/1922	07/2011	1018	9.04	27.52	4.30	54.87	114.75	-39.72	Austria Wiener Boersekammer Share Index (WBKI)
		Belgium	02/1897	07/2011	1302	3.91	17.90	0.09	4.08	30.51	-26.03	Brussels All-Share Price Index (w/GFD extension)
		Denmark	01/1921	07/2011	1086	4.31	12.87	-0.34	4.28	17.24	-20.98	OMX Copenhagen All-Share Price Index
		Finland	11/1912	07/2011	1179	8.30	20.51	0.36	5.22	36.50	-31.32	OMX Helsinki All-Share Price Index
		France	01/1898	07/2011	1348	6.67	18.82	1.05	14.15	63.16	-27.61	France CAC All-Tradable Index (w/GFD extension)
		Germany	01/1870	07/2011	1692	2.55	25.03	-4.75	111.68	68.87	-146.00	Germany CDAX Composite Index (w/GFD extension)
		Greece	01/1954	07/2011	690	9.51	26.33	1.02	5.44	40.97	-32.67	Athens SE General Index (w/GFD extension)
		Ireland	02/1934	07/2011	930	5.67	16.29	-0.70	6.07	24.73	-32.09	Ireland ISEQ Overall Price Index (w/GFD extension)
		Italy	10/1905	07/2011	1264	5.44	23.95	0.94	6.49	46.81	-30.76	Banca Commerciale Italiana Index (w/GFD extension)
		Netherlands	02/1919	07/2011	1086	3.65	16.97	-0.55	2.79	22.51	-26.59	Netherlands All-Share Price Index (w/GFD extension
		Norway	01/1970	07/2011	499	10.81	24.37	-0.73	2.27	23.19	-32.05	Oslo SE All-Share Index
		Portugal	01/1934	07/2011	897	6.09	30.93	-5.78	132.51	62.91	-163.11	Oporto PSI-20 Index
		Spain	01/1915	07/2011	1116	5.35	17.31	0.30	8.88	45.87	-33.48	Madrid SE General Index (w/GFD extension)
		Sweden	01/1906	07/2011	1265	5.50	16.86	-0.66	5.45	24.30	-38.75	Sweden OMX Affärsvärldens General Index
		Switzerland	01/1914	07/2011	1155	3.19	15.24	-0.55	5.17	28.78	-28.22	Switzerland Price Index (w/GFD extension)
		United Kingdom	02/1693	07/2011	3817	1.44	13.86	-0.51	54.38	53.53	-73.55	UK FTSE All-Share Index (w/GFD extension)

Table 1. (continued)

Status	Region	Country	Start	End	Obs	Mean	St Dev	Skew	Kurt	Max	Min	Index Name
Emerging	**Africa**	Egypt	01/1993	07/2011	222	-7.37	112.88	-13.27	189.99	29.75	-465.73	Cairo SE EFG General Index
		Morocco	01/1988	07/2011	279	13.49	14.93	-0.17	2.91	17.88	-17.92	Casablanca Financial Group 25 Share Index
		South Africa	02/1910	07/2011	1218	7.67	16.76	-0.60	4.35	21.64	-35.14	FTSE/JSE All-Share Index (w/GFD extension)
	Asia	China	01/1991	07/2011	247	14.83	48.14	2.33	16.32	101.97	-37.33	Shanghai SE Composite
		India	08/1920	07/2011	1080	5.88	19.26	0.41	4.69	35.06	-27.30	Bombay SE Sensitive Index (w/GFD extension)
		Indonesia	04/1983	07/2011	340	13.13	31.02	0.82	12.53	69.37	-37.86	Jakarta SE Composite Index
		Korea	02/1962	07/2011	592	13.47	39.03	1.42	26.89	112.93	-81.49	Korea SE Stock Price Index (KOSPI)
		Malaysia	01/1974	07/2011	451	7.29	27.19	-0.46	3.39	29.44	-42.90	Malaysia KLSE Composite
		Philippines	01/1953	07/2011	703	2.87	28.93	0.23	2.73	40.94	-33.21	Manila SE Composite Index
		Taiwan	02/1967	07/2011	534	10.16	33.21	-0.29	3.90	40.64	-49.34	Taiwan SE Capitalization Weighted Index
		Thailand	05/1975	07/2011	435	6.70	29.14	-0.41	2.88	28.43	-35.92	Thailand SET General Index
	Central/South America & the Caribbean	Brazil	01/1990	07/2011	258	67.65	56.46	1.05	5.56	69.32	-69.32	MSCI Brazil
		Chile	01/1927	07/2011	1015	27.36	29.53	2.80	19.66	82.39	-37.56	Santiago SE Indice General de Precios de Acciones
		Colombia	02/1927	07/2011	1014	9.74	19.94	2.06	19.45	64.08	-24.68	Colombia IGBC General Index (w/GFD extension)
		Mexico	02/1930	07/2011	978	16.21	25.66	-0.32	10.03	36.23	-56.55	Mexico SE Indice de Precios y Cotizaciones (IPC)
		Peru	01/1933	07/2011	943	31.15	39.15	3.64	24.05	115.41	-46.65	Lima SE General Index (w/GFD extension)
	Eastern Europe	Czech Republic	10/1993	07/2011	214	7.07	30.06	0.37	4.93	45.34	-31.65	Prague SE PX Index
		Hungary	01/1995	07/2011	199	16.01	30.99	-0.55	4.62	37.54	-44.76	Vienna OETEB Hungary Traded Index (Forint)
		Poland	05/1994	07/2011	207	5.28	33.44	-0.44	3.93	34.12	-44.98	Warsaw SE 20-Share Composite
		Russia	10/1993	07/2011	213	41.72	51.37	0.16	5.30	79.92	-64.95	Russia AK&M Composite (50 shares)
		Turkey	02/1986	07/2011	306	43.29	53.65	0.70	3.05	81.94	-49.49	Istanbul SE IMKB-100 Price Index

Table 1. (continued)

Status	Region	Country	Start	End	Obs	Mean	St Dev	Skew	Kurt	Max	Min	Index Name
Frontier	**Africa**	Botswana	06/1989	07/2011	266	19.29	14.70	1.53	8.02	26.59	-10.70	Botswana SE Domestic Companies Index
		Ghana	01/1996	07/2011	187	11.62	18.49	0.76	3.55	25.12	-15.78	Standard and Poor's Ghana Broad Market Index
		Kenya	02/1990	07/2011	258	7.11	23.94	0.96	6.64	41.29	-25.67	Kenya Nairobi Stock Exchange
		Mauritius	08/1989	07/2011	264	13.16	16.42	-0.14	2.74	15.52	-20.77	Securities Exchange of Mauritius Index (SEMDEX)
		Nigeria	01/1988	07/2011	280	20.69	21.61	-0.81	8.16	32.41	-36.59	Nigeria SE Index
		Tunisia	01/1996	07/2011	187	3.44	16.62	0.10	3.23	21.89	-16.06	Standard and Poor's Tunisia Broad Market Index
		Zimbabwe	12/2010	07/2011	8	18.25	19.26	1.02	-0.69	10.37	-3.61	MSCI Zimbabwe
	Asia	Bangladesh	02/1990	07/2011	258	11.39	33.37	0.67	6.90	56.92	-36.16	Bangladesh Stock Exchange All Share Price
		Kazakhstan	08/2000	07/2011	132	24.53	38.13	-0.08	4.33	43.67	-38.36	Kazakhstan SE KASE Index
		Pakistan	08/1960	07/2011	608	9.61	23.34	-0.60	8.05	29.69	-44.88	Pakistan Karachi SE-100 Index
		Sri Lanka	01/1985	07/2011	319	15.90	25.81	0.37	1.04	30.97	-18.42	Colombo SE All-Share Index
		Viet Nam	01/2001	07/2011	127	6.66	41.63	-0.04	0.54	32.58	-35.50	Viet Nam Stock Exchange Index
						0.00	0.00					
	Central/South America & the Caribbean	Argentina	01/1967	07/2011	535	63.70	62.03	2.34	10.86	129.94	-43.89	Buenos Aires SE General Index (IVBNG)
		Jamaica	07/1969	01/2011	499	16.21	25.60	1.00	3.64	36.94	-26.03	Jamaica Stock Exchange All-Share Composite Index
		Trinidad And Tobago	01/1996	07/2011	187	12.67	14.40	0.67	2.48	15.35	-13.01	Standard and Poor's Trinidad and Tobago Broad Market Index
	Eastern Europe	Bosnia And Herzegowina	11/2004	07/2011	81	-8.45	32.26	0.57	0.94	27.57	-22.54	Sarajevo SE Bosnian Investment Funds Index
		Bulgaria	11/2000	07/2011	129	12.34	35.83	-0.73	4.68	35.04	-47.63	Bulgaria SE SOFIX Index
		Croatia	02/1997	07/2011	174	4.91	32.44	-1.46	7.48	29.68	-53.98	Croatia Bourse Index (CROBEX)
		Estonia	07/1996	07/2011	181	13.10	37.48	-0.68	3.87	37.03	-44.98	OMX Tallinn (Omxt)
		Lithuania	01/1996	07/2011	187	4.65	28.57	-0.60	6.76	32.55	-43.63	Standard and Poor's Lithuania Broad Market Index
		Romania	10/1997	07/2011	166	12.44	38.79	-0.70	2.62	29.95	-44.05	Bucharest SE Index in Lei
		Serbia	08/2008	07/2011	36	-18.94	60.86	-1.08	2.60	35.52	-54.95	MSCI Serbia
		Slovenia	01/1996	07/2011	187	6.66	25.32	0.94	5.30	41.53	-19.46	HSBC Slovenia Euro
		Ukraine	02/1998	07/2011	162	19.19	44.43	-0.30	1.45	40.21	-40.33	Ukraine PFTS OTC Index
	Mid East	Jordan	02/1978	07/2011	402	6.46	22.76	-0.03	3.70	27.17	-27.81	Jordan AFM General Index
		Kuwait	01/1995	07/2011	199	10.96	19.53	-0.67	3.54	18.47	-27.12	Kuwait SE Index
		Lebanon	02/1996	07/2011	186	2.45	28.23	1.03	4.32	39.01	-23.54	Beirut Stock Exchange Index
		Oman	12/1992	07/2011	224	8.54	20.56	-0.51	3.88	18.46	-31.32	Muscat Stock Market General Index
		Qatar	10/1999	07/2011	142	15.41	30.03	-0.46	1.67	25.96	-29.60	Qatar SE Index
		United Arab Emirates	01/1988	09/2008	236	12.73	19.65	0.52	5.46	29.28	-21.38	United Arab Emirates SE Index
	Western Europe	Bahrain	07/1990	07/2011	253	3.48	13.57	-0.25	0.75	12.47	-13.02	Bahrain BSE Composite Index

Table 1. (continued)

Status	Region	Country	Start	End	Obs	Mean	St Dev	Skew	Kurt	Max	Min	Index Name
Rarely Studied	Africa	Cote D`Ivoire	07/1997	07/2011	169	2.99	17.38	0.12	2.08	15.74	-17.53	Cote d'Ivoire Stock Market Index
		Malawi	04/2001	01/2011	114	22.63	38.02	-0.96	13.50	49.32	-55.28	Malawi SE Index
		Namibia	03/1993	07/2011	218	11.59	24.88	-1.31	6.28	20.28	-42.20	Namibia Stock Exchange Overall Index
		Swaziland	01/2000	04/2007	88	2.39	15.18	3.85	24.91	27.71	-14.18	Swaziland Stock Market Index
		Tanzania	12/2006	07/2011	56	5.11	7.66	1.89	7.96	9.28	-6.13	Dar-Es-Saleem SE Index
		Zambia	02/1997	07/2011	174	25.52	25.27	0.65	2.50	32.43	-17.98	Zambia Lusaka All Share (n/a)
	Asia											Standard and Poor's/IFCG Extended Front 150
		Georgia	11/2008	07/2011	33	32.74	68.50	-1.06	3.84	51.08	-56.42	Georgia Dollar
		Kyrgyzstan	01/2000	05/2011	137	6.68	42.52	0.14	3.41	45.53	-49.35	Kyrgyz Stock Exchange Index
		Mongolia	09/1995	05/2011	189	29.33	48.16	0.50	2.87	61.12	-43.38	Mongolia SE Top-20 Index
		Nepal	01/1996	07/2011	186	3.56	23.03	-0.07	1.09	18.01	-20.30	Nepal NEPSE Stock Index
	Central/South America & the Caribbean	Barbados	04/1989	02/2011	263	4.24	13.99	2.09	18.67	31.35	-20.71	Barbados SE Local Stock Index
		Costa Rica	10/1997	02/2011	161	13.90	21.48	-0.70	5.92	22.19	-32.91	BCT Corp. Costa Rica Stock Market Index
		Ecuador	02/1994	07/2011	210	1.80	23.17	0.78	7.99	39.64	-25.91	Ecuador Bolsa de Valores de Guayaquil (Dollars)
		El Salvador	01/2004	07/2011	91	7.41	8.07	0.60	4.70	10.16	-7.71	El Salvador Stock Market Index
		Panama	01/1993	07/2011	223	14.08	11.18	1.13	4.77	14.91	-10.76	Panama Stock Exchange Index (BVPSI)
		Paraguay	11/1993	09/2008	176	11.15	10.52	3.37	22.91	21.01	-11.81	Asuncion SE PDV General Index
		Uruguay	02/1925	12/1995	848	13.10	41.57	3.56	35.72	143.90	-49.60	Uruguay Stock Exchange Index
		Venezuela	01/1937	07/2011	891	13.51	23.59	0.72	10.21	43.41	-51.25	Caracas SE General Index (w/GFD extension)
	Eastern Europe	Cyprus	01/1984	07/2011	331	2.98	34.04	0.79	6.38	57.54	-32.55	Cyprus CSE All Share Composite
		Latvia	02/1996	07/2011	186	9.89	35.18	-0.72	6.12	35.78	-54.74	Nomura Latvia
		Macedonia	11/2001	07/2011	117	12.50	37.87	0.31	2.80	37.99	-39.33	Macedonia MBI-10 Index
		Montenegro	04/2003	07/2011	100	29.25	44.42	0.66	1.97	46.55	-32.19	Montenegro NEX-20 Index
		Slovak Republic	10/1993	07/2011	214	4.54	32.33	2.93	24.50	75.83	-37.76	Bratislava SE SAX Index
	Mid East	Iran	04/1990	06/2011	255	25.90	18.77	1.22	3.88	31.53	-12.85	Tehran SE Price Index (TEPIX)
		Iraq	11/2004	07/2011	79	10.88	59.11	0.05	9.37	70.98	-79.31	Iraq SE ISX Index
		Palestine	08/1997	07/2011	166	11.48	40.51	-1.32	17.87	52.05	-82.67	Palestine Al-Quds Index
		Saudi Arabia	01/1993	07/2011	222	6.59	23.43	-0.84	2.78	17.90	-29.78	Saudi Arabia Tadawul SE Index
		Syrian Arab Republic	01/2010	07/2011	19	2.70	28.18	-1.31	0.88	9.22	-17.92	Damascus Securities Exchange Weighted Index
	North America	Bermuda	09/1996	10/2010	170	1.78	20.48	-0.70	3.93	16.45	-28.99	Bermuda Royal Gazette BSX Composite Index
						0.00	0.00					
	Western Europe	Iceland	01/1993	07/2011	223	2.47	36.53	-8.08	92.42	17.17	-125.58	OMX Iceland All-Share Price Index
		Luxembourg	01/1954	07/2011	691	8.17	16.79	-0.91	7.20	17.91	-31.20	Luxembourg SE LUXX Index (w/GFD extension)
		Malta	01/1996	07/2011	187	7.51	18.89	1.00	2.03	22.17	-11.03	Malta SE Index
		World	02/1919	07/2011	1110	4.17	13.23	-0.83	3.61	13.93	-21.06	GFD World Price Index

Table 2. In-sample and Out-of-sample comparison of the Halloween effect

The table shows the coefficient estimates and t-statistics for the regression $r_t = \alpha + \beta Hal_t + \varepsilon_t$, as well as the percentage of times that November-April returns beat May-October returns for the in-sample period and out of sample period of 37 countries. The in-sample period refers to the sample period examined in Bouman and Jacobsen (2002) and runs from January 1970 (or the earliest date in our sample depending on data availability) to August 1998. The out-of-sample period is from September 1998 to July 2011. The coefficient β represents the 6-month return difference between November-April and May-October. T-values are adjusted using Newey-West standard errors. *** denotes significance at 1% level; **denotes significance at 5% level; *denotes significance at 10% level.

	IN SAMPLE				OUT OF SAMPLE			
Country	**β**	**t-value**		**%+**	**β**	**t-value**		**%+**
Argentina	3.64	0.28		0.66	15.26	1.51		0.57
Australia	5.39	1.49		0.59	2.91	0.89		0.50
Austria	8.79	2.72	***	0.69	14.11	2.84	***	0.71
Belgium	12.44	5.21	***	0.90	6.96	1.48		0.71
Brazil	37.43	1.72	*	0.67	9.58	1.29		0.50
Canada	7.72	2.57	**	0.69	5.98	1.54		0.50
Chile	-7.44	-0.7		0.45	1.43	0.37		0.57
Denmark	3.82	1.55		0.66	4.89	1.19		0.71
Finland	9.28	3.01	***	0.76	12.42	1.74	*	0.64
France	14.22	3.99	***	0.79	9.59	2.32	**	0.64
Germany	8.34	2.91	***	0.69	11.61	2.35	**	0.79
Greece	10.96	1.94	*	0.62	3.99	0.55		0.50
Hong Kong	5.18	0.75		0.66	0.11	0.01		0.43
Indonesia	12.60	1.5		0.56	14.60	1.89	*	0.57
Ireland	8.42	2.17	**	0.62	13.77	2.70	***	0.79
Italy	14.98	3.59	***	0.76	14.18	2.85	***	0.71
Japan	7.76	2.41	**	0.76	11.83	2.14	**	0.64
Jordan	4.52	1.08		0.52	3.06	0.72		0.43
Korea	1.67	0.43		0.55	12.82	1.70	*	0.71
Malaysia	12.86	1.9	*	0.68	5.83	1.04		0.57
Mexico	5.06	0.82		0.59	8.15	1.36		0.50
Netherlands	11.86	4.1	***	0.86	10.38	1.93	*	0.64
New Zealand	3.12	0.83		0.52	4.31	1.41		0.64
Norway	6.34	1.38		0.52	10.36	1.69	*	0.57
Philippines	13.01	1.96	*	0.62	2.56	0.36		0.43
Portugal	3.59	0.34		0.67	8.37	1.67	*	0.79
Russia	-6.37	-0.15		0.50	26.62	2.41	**	0.79
Singapore	7.78	1.52		0.62	4.74	0.78		0.50
South Africa	6.21	1.18		0.59	1.98	0.35		0.50
Spain	11.91	3.31	***	0.76	6.09	1.26		0.71
Sweden	11.70	3.44	***	0.76	13.80	2.95	***	0.79
Switzerland	6.29	2.2	**	0.72	5.03	1.30		0.71
Taiwan	20.11	3.44	***	0.72	15.00	1.69	*	0.79
Thailand	-0.29	-0.04		0.42	5.64	0.66		0.50
Turkey	0.73	0.05		0.46	18.75	1.48		0.50
United Kingdom	12.37	2.89	***	0.59	6.56	1.85	*	0.64
United States	5.82	2.45	**	0.72	4.90	1.57		0.57

Table 3. Country by country analysis

This table provides two 6-month (November-April and May-October) mean returns and standard deviations at percentage, the coefficient estimates and t-statistics for the regression $r_t = \alpha + \beta Hal_t + \varepsilon_t$, as well as percentage of times that November-April return beats May-October return for 108 countries' market index and the world index. β represents the 6-month mean returns difference between November-April and May-October. T-values are adjusted using Newey-West standard errors. The 6-month mean returns (standard deviations) are calculated by multiplying monthly returns (standard deviations) by 6 ($\sqrt{6}$).
*** denotes significance at 1% level; **denotes significance at 5% level; *denotes significance at 10% level. Countries are grouped based on the MSCI market classification and geographical regions.

Status	Region	Start Date	End Date	Country	November-April		May-October		Halloween		
					Mean	St Dev	Mean	St Dev	β	t-value	%+
	Pooled 108 countries	02/1693	07/2011	-	6.93	17.47	2.41	19.51	4.52	9.69***	58%
	World	02/1919	07/2011	-	4.35	8.75	-0.18	9.84	9.07	3.31***	67%
Developed	Asia	08/1964	07/2011	Hong Kong	7.08	22.48	4.44	23.39	2.64	0.56	58%
		08/1914	07/2011	Japan	7.31	16.05	-1.00	14.52	8.31	3.60***	66%
		08/1965	07/2011	Singapore	6.91	15.79	0.13	17.08	6.78	1.84*	60%
	Mid East	02/1949	05/2011	Israel	13.56	16.74	10.09	15.93	3.46	1.09	62%
	North America	12/1917	07/2011	Canada	5.29	9.94	-0.28	12.61	5.57	3.34***	61%
		09/1791	07/2011	United States	2.24	9.98	0.57	11.27	1.67	1.66*	57%
	Oceania	02/1875	07/2011	Australia	3.11	8.59	1.88	10.43	1.22	1.06	53%
		01/1931	07/2011	New Zealand	2.69	9.71	1.63	10.39	1.06	0.66	51%
	Western Europe	02/1922	07/2011	Austria	5.35	17.31	3.69	21.41	1.66	0.44	56%
		02/1897	07/2011	Belgium	3.99	12.03	-0.10	13.22	4.09	2.47***	62%
		01/1921	07/2011	Denmark	3.74	9.15	0.56	9.01	3.18	2.20**	64%
		11/1912	07/2011	Finland	4.08	14.14	4.22	14.87	-0.14	-0.06	50%
		01/1898	07/2011	France	7.05	13.50	-0.39	12.95	7.45	3.87***	66%
		01/1870	07/2011	Germany	4.09	14.36	-1.53	20.44	5.63	2.44***	59%
		01/1954	07/2011	Greece	8.65	18.50	0.84	18.63	7.81	2.00**	55%
		02/1934	07/2011	Ireland	6.14	10.85	-0.48	12.01	6.62	3.35***	69%
		10/1905	07/2011	Italy	6.11	16.89	-0.69	16.88	6.80	2.67***	60%
		02/1919	07/2011	Netherlands	5.62	10.90	-1.97	12.83	7.59	4.05***	67%
		01/1970	07/2011	Norway	9.19	16.18	1.60	18.13	7.58	1.97**	55%
		01/1934	07/2011	Portugal	4.87	26.91	1.21	15.20	3.66	0.94	62%
		01/1915	07/2011	Spain	6.26	12.47	-0.91	11.83	7.16	3.75***	69%
		01/1906	07/2011	Sweden	5.52	12.32	-0.03	11.41	5.56	3.14***	63%
		01/1914	07/2011	Switzerland	3.91	9.41	-0.73	11.92	4.64	2.94***	66%
		02/1693	07/2011	United Kingdom	2.40	9.34	-0.96	10.19	3.37	4.06***	59%
Emerging	Africa	01/1993	07/2011	Egypt	14.89	22.01	-22.26	110.45	37.15	1.32	58%
		01/1988	07/2011	Morocco	12.40	10.92	1.05	9.67	11.35	3.22***	71%
		02/1910	07/2011	South Africa	4.78	11.59	2.89	12.10	1.88	0.97	53%
	Asia	01/1991	07/2011	China	12.75	26.86	2.04	39.99	10.72	1.01	67%
		08/1920	07/2011	India	3.52	13.63	2.35	13.61	1.17	0.52	45%
		04/1983	07/2011	Indonesia	13.40	21.29	-0.18	22.27	13.58	2.14**	55%
		02/1962	07/2011	Korea	12.25	28.77	1.26	26.24	11.00	1.64*	62%
		01/1974	07/2011	Malaysia	8.86	18.56	-1.59	19.69	10.46	2.36**	63%
		01/1953	07/2011	Philippines	6.23	19.59	-3.37	21.13	9.60	2.26**	58%
		02/1967	07/2011	Taiwan	13.74	21.48	-3.58	24.87	17.31	3.70***	76%
		05/1975	07/2011	Thailand	4.29	17.99	2.42	22.93	1.87	0.38	46%

Table 3. (continued)

Status	Region	Start Date	End Date	Country	November-April		May-October		Halloween		
					Mean	St Dev	Mean	St Dev	β	t-value	%+
Emerging	Central/South America & the Caribbean	01/1990	07/2011	Brazil	43.92	39.80	23.72	39.77	20.20	1.28	59%
		01/1927	07/2011	Chile	11.70	17.01	15.66	24.13	-3.97	-0.94	52%
		02/1927	07/2011	Colombia	6.29	14.43	3.45	13.76	2.85	1.20	56%
		02/1930	07/2011	Mexico	9.76	17.74	6.45	18.53	3.30	1.13	56%
		01/1933	07/2011	Peru	13.72	23.77	17.43	31.13	-3.72	-0.68	49%
	Eastern Europe	10/1993	07/2011	Czech Republic	9.00	22.27	-2.03	20.01	11.03	1.73*	68%
		01/1995	07/2011	Hungary	14.69	21.23	1.26	22.35	13.42	1.91*	71%
		05/1994	07/2011	Poland	11.27	21.29	-5.75	25.35	17.02	2.43**	72%
		10/1993	07/2011	Russia	29.49	29.42	11.99	42.11	17.50	1.21	68%
		02/1986	07/2011	Turkey	26.51	39.78	16.78	36.02	9.73	0.90	46%
Frontier	Africa	06/1989	07/2011	Botswana	6.90	9.16	12.35	11.41	-5.45	-1.47	48%
		01/1996	07/2011	Ghana	8.46	14.12	3.13	11.91	5.33	1.00	63%
		02/1990	07/2011	Kenya	5.65	20.36	1.46	12.63	4.19	0.75	59%
		08/1989	07/2011	Mauritius	6.32	11.80	6.84	11.46	-0.52	-0.15	57%
		01/1988	07/2011	Nigeria	11.18	13.88	9.48	16.65	1.69	0.33	58%
		01/1996	07/2011	Tunisia	3.89	12.58	-0.47	10.84	4.35	1.01	81%
		12/2010	07/2011	Zimbabwe	22.33	14.88	-12.88	3.59	35.20	4.24***	50%
	Asia	02/1990	07/2011	Bangladesh	-5.45	24.43	16.84	21.89	-22.29	-2.46***	23%
		08/2000	07/2011	Kazakhstan	23.30	26.90	1.23	26.47	22.07	1.45	67%
		08/1960	07/2011	Pakistan	8.56	16.61	1.04	16.28	7.52	2.36**	62%
		01/1985	07/2011	Sri Lanka	6.22	18.72	9.69	17.81	-3.46	-0.63	52%
		01/2001	07/2011	Viet Nam	11.88	29.98	-5.36	28.67	17.23	1.17	64%
	Central/South America & the Caribbean	01/1967	07/2011	Argentina	35.90	38.66	27.78	48.55	8.12	0.76	64%
		07/1969	01/2011	Jamaica	11.48	18.34	4.74	17.79	6.74	1.49	56%
		01/1996	07/2011	Trinidad And Tobago	8.73	10.65	3.91	9.65	4.82	1.06	63%
	Eastern Europe	11/2004	07/2011	Bosnia And Herzegowina	-0.84	26.83	-7.87	17.73	7.03	0.46	50%
		11/2000	07/2011	Bulgaria	1.91	23.63	10.64	27.07	-8.73	-0.75	33%
		02/1997	07/2011	Croatia	9.33	20.74	-4.42	24.74	13.76	1.82*	60%
		07/1996	07/2011	Estonia	17.59	25.93	-4.38	26.45	21.97	2.28**	81%
		01/1996	07/2011	Lithuania	5.92	17.94	-1.31	22.26	7.22	0.84	56%
		10/1997	07/2011	Romania	9.56	27.50	2.81	27.46	6.75	0.55	47%
		08/2008	07/2011	Serbia	-3.70	37.88	-15.23	48.65	11.53	0.29	75%
		01/1996	07/2011	Slovenia	1.79	19.62	4.88	16.08	-3.09	-0.55	31%
		02/1998	07/2011	Ukraine	29.22	29.26	-10.03	31.63	39.25	2.74***	79%
	Mid East	02/1978	07/2011	Jordan	5.21	15.66	1.25	16.51	3.96	1.10	50%
		01/1995	07/2011	Kuwait	4.31	13.80	6.67	13.88	-2.36	-0.45	41%
		02/1996	07/2011	Lebanon	-3.57	19.44	6.02	20.39	-9.60	-1.27	63%
		12/1992	07/2011	Oman	5.16	13.89	3.36	15.22	1.80	0.34	45%
		10/1999	07/2011	Qatar	8.13	23.11	7.27	19.28	0.86	0.09	46%
		01/1988	09/2008	United Arab Emirates	6.51	13.34	6.22	14.48	0.29	0.05	48%
	Western Europe	07/1990	07/2011	Bahrain	-0.79	9.05	4.25	10.05	-5.04	-1.50	41%

Table 3. (continued)

Status	Region	Start Date	End Date	Country	November-April		May-October		Halloween		
					Mean	St Dev	Mean	St Dev	β	t-value	%+
Rarely Studied	Africa	07/1997	07/2011	Cote D`Ivoire	3.66	11.87	-0.65	12.69	4.31	0.92	80%
		04/2001	01/2011	Malawi	11.87	26.66	10.82	27.31	1.05	0.10	18%
		03/1993	07/2011	Namibia	10.93	15.14	0.66	19.60	10.26	1.71*	68%
		01/2000	04/2007	Swaziland	2.15	14.14	0.15	4.96	2.00	0.37	13%
		12/2006	07/2011	Tanzania	1.30	2.95	3.91	7.22	-2.62	-0.61	17%
		02/1997	07/2011	Zambia	7.34	15.70	18.18	19.64	-10.84	-1.54	47%
	Asia	11/2008	07/2011	Georgia	2.50	59.57	33.02	31.03	-30.52	-0.83	50%
		01/2000	05/2011	Kyrgyzstan	13.05	32.15	-6.80	27.34	19.84	1.80*	75%
		09/1995	05/2011	Mongolia	13.33	31.09	16.04	37.03	-2.71	-0.21	41%
		01/1996	07/2011	Nepal	-4.54	16.90	8.11	15.30	-12.65	-2.09**	31%
	Central/South America & the Caribbean	04/1989	02/2011	Barbados	0.37	8.52	3.85	11.08	-3.48	-1.08	43%
		10/1997	02/2011	Costa Rica	7.42	17.57	6.46	12.36	0.96	0.15	47%
		02/1994	07/2011	Ecuador	-1.95	15.05	3.74	17.61	-5.69	-0.96	56%
		01/2004	07/2011	El Salvador	2.82	7.17	4.61	3.70	-1.78	-0.52	13%
		01/1993	07/2011	Panama	7.09	8.15	6.99	7.68	0.10	0.03	53%
		11/1993	09/2008	Paraguay	3.40	7.24	7.85	7.58	-4.45	-1.44	19%
		02/1925	12/1995	Uruguay	14.86	34.28	-1.80	23.03	16.66	3.52***	62%
		01/1937	07/2011	Venezuela	6.70	16.52	6.81	16.85	-0.10	-0.04	53%
	Eastern Europe	01/1984	07/2011	Cyprus	1.07	22.59	1.91	25.53	-0.84	-0.12	61%
		02/1996	07/2011	Latvia	8.32	23.17	1.56	26.53	6.76	0.65	69%
		11/2001	07/2011	Macedonia	4.39	27.27	8.21	26.47	-3.82	-0.27	55%
		04/2003	07/2011	Montenegro	13.08	29.86	16.11	33.11	-3.02	-0.16	56%
		10/1993	07/2011	Slovak Republic	6.74	28.41	-2.29	15.19	9.03	1.14	68%
	Mid East	04/1990	06/2011	Iran	11.43	10.97	14.46	15.24	-3.03	-0.62	55%
		11/2004	07/2011	Iraq	15.88	40.08	-6.41	43.71	22.29	0.73	50%
		08/1997	07/2011	Palestine	10.42	35.87	1.06	18.90	9.36	0.97	73%
		01/1993	07/2011	Saudi Arabia	3.87	16.52	2.72	16.68	1.15	0.22	53%
		01/2010	07/2011	Syrian Arab Republic	-7.26	21.16	10.92	18.89	-18.18	-0.84	0%
	North America	09/1996	10/2010	Bermuda	1.23	15.28	0.55	13.75	0.68	0.09	60%
	Western Europe	01/1993	07/2011	Iceland	4.52	17.91	-2.08	31.93	6.60	0.74	58%
		01/1954	07/2011	Luxembourg	8.72	10.63	-0.56	12.74	9.28	3.71***	71%
		01/1996	07/2011	Malta	6.39	15.09	1.09	11.33	5.30	0.96	69%

Table 4. Pooled 10-year sub-period analysis

This table provides mean 6-month returns and standard deviations for two periods (November-April and May-October), the coefficient estimates and t-statistics for the regression $r_t = \alpha + \beta Hal_t + \varepsilon_t$, as well as the percentage of times that the November-April return beats the May-October return for 31 ten-year subsample periods. β represents 6-month mean returns differences between November-April and May-October. T-values are adjusted using Newey-West standard errors. The 6-month mean returns (standard deviations) are calculated by multiplying monthly returns (standard deviations) by 6 ($\sqrt{6}$).

*** denotes significance at 1% level; **denotes significance at 5% level; *denotes significance at 10% level.

Period	No of Countries	Sample Size	November-April		May-October		Halloween Effect		% of Positive
			Mean	St Dev	Mean	St Dev	β	t-value	
1693-2011	108	55425	6.93	17.47	2.41	19.51	4.52	9.69***	58%
1693-1710	1	215	-0.07	14.13	-3.70	15.40	3.63	0.73	61%
1711-1720	1	120	8.72	12.38	-2.01	32.95	10.73	0.97	60%
1721-1730	1	120	-1.63	7.90	-0.63	8.58	-1.00	-0.29	50%
1731-1740	1	120	0.64	2.93	-2.59	4.96	3.24	1.70*	80%
1741-1750	1	120	-0.65	4.72	2.10	3.68	-2.75	-1.58	20%
1751-1760	1	120	-0.75	3.12	-2.13	2.94	1.39	1.14	80%
1761-1770	1	120	2.65	5.41	-1.36	6.10	4.00	1.41	70%
1771-1780	1	120	-1.16	5.60	-0.75	3.77	-0.41	-0.15	60%
1781-1790	1	120	3.32	5.52	-1.10	5.19	4.41	2.01**	70%
1791-1800	2	232	-0.76	7.34	0.97	7.06	-1.72	-0.89	50%
1801-1810	2	240	0.43	4.64	0.03	5.36	0.40	0.24	30%
1811-1820	2	240	0.62	3.88	-2.15	4.30	2.77	1.89*	70%
1821-1830	2	240	2.40	17.00	-1.51	6.50	3.91	0.81	70%
1831-1840	2	240	-0.75	7.64	-0.82	7.06	0.07	0.03	55%
1841-1850	2	240	1.17	8.69	-0.16	7.09	1.32	0.47	60%
1851-1860	2	240	1.39	10.13	-3.48	10.16	4.86	1.26	75%
1861-1870	3	252	3.60	7.52	2.50	9.30	1.10	0.38	52%
1871-1880	4	431	1.06	8.96	-0.02	9.24	1.08	0.44	53%
1881-1890	4	480	-0.40	5.61	1.89	5.91	-2.29	-1.63	43%
1891-1900	6	563	2.24	6.97	0.10	7.34	2.15	1.28	62%
1901-1910	9	854	1.83	6.16	0.51	6.72	1.33	1.00	51%
1911-1920	16	1383	-0.90	11.71	-0.61	10.88	-0.29	-0.18	55%
1921-1930	22	2313	2.54	13.54	-0.36	18.76	2.90	1.51	63%
1931-1940	27	2977	1.85	13.60	0.22	14.85	1.63	1.00	54%
1941-1950	28	3182	3.12	14.85	3.09	15.87	0.03	0.02	45%
1951-1960	32	3628	4.05	10.01	4.91	10.11	-0.86	-0.91	46%
1961-1970	39	4211	4.80	13.56	-0.76	13.49	5.56	5.15***	64%
1971-1980	42	4831	9.09	20.05	4.00	18.44	5.08	3.34***	60%
1981-1990	57	5558	14.90	22.98	8.79	26.48	6.12	3.29***	64%
1991-2000	96	9151	11.56	21.12	2.65	21.42	8.91	6.87***	63%
2001-2011	107	12764	7.10	18.63	1.50	23.93	5.60	4.57***	57%

Table 5. Country by country sub-periods analysis

This table provide the coefficient estimates and t-statistics for the regression $r_t = \alpha + \beta Hal_t + \varepsilon_t$, for 28 countries that have data available over 60 years and the world market over the whole sample period and several 10-year sub-periods. The coefficient estimate β represents 6-month mean returns differences between November-April and May-October. T-values are adjusted using Newey-West standard errors. *** denotes significance at 1% level; **denotes significance at 5% level; *denotes significance at 10% level.

Status	Region	Country	Start Date	End Date	Whole Sample		Prior to 1911		1911-1920		1921-1930		1931-1940		1941-1950	
					β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value
Developed	Asia	Japan	08/1914	07/2011	8.31	3.60 ***	-	-	-3.26	-0.37	6.27	1.52	9.67	1.77 *	24.64	1.77 *
	Mid East	Israel	02/1949	05/2011	3.46	1.09	-	-	-	-	-	-	-	-	4.71	0.84
	North America	Canada	12/1917	07/2011	5.57	3.34 ***	-	-	-3.47	-0.86	4.58	1.01	3.81	0.50	-1.09	-0.27
		UnitedStates	09/1791	07/2011	1.67	1.66 *	0.85	0.70	-0.68	-0.15	6.70	1.31	-10.19	-1.08	-3.31	-0.68
	Oceania	Australia	02/1875	07/2011	1.22	1.07	-1.29	-0.92	6.64	2.28 **	-1.17	-0.31	-2.67	-0.72	-2.75	-0.98
		New Zealand	01/1931	07/2011	1.06	0.66	-	-	-	-	-	-	-1.62	-0.47	-1.09	-0.54
	Western Europe	Austria	02/1922	07/2011	1.66	0.44	-	-	-	-	-29.99	-1.26	9.31	1.09	-9.11	-0.44
		Belgium	02/1897	07/2011	4.09	2.47 **	0.43	0.11	-1.27	-0.21	-3.18	-0.42	1.88	0.23	-2.93	-0.56
		Denmark	01/1921	07/2011	3.18	2.20 **	-	-	-	-	1.08	0.27	-1.58	-0.49	0.53	0.20
		Finland	11/1912	07/2011	-0.14	-0.06	-	-	-19.35	-2.00 **	-0.77	-0.16	-6.42	-1.62	-18.20	-1.93 *
		France	01/1898	07/2011	7.45	3.87 ***	2.62	1.35	4.34	0.82	2.95	0.54	16.90	2.47 **	-8.86	-0.85
		Germany	01/1870	07/2011	5.63	2.44 **	-0.65	-0.41	-3.07	-0.39	22.54	1.05	11.54	1.98 *	12.31	0.82
		Ireland	02/1934	07/2011	6.62	3.35 ***	-	-	-	-	-	-	4.66	1.72 *	1.84	1.05
		Italy	10/1905	07/2011	6.80	2.67 ***	6.77	2.19 **	3.96	0.63	3.77	0.58	-4.06	-0.73	6.77	0.40
		Netherlands	02/1919	07/2011	7.59	4.05 ***	-	-	-13.92	-1.19	6.31	1.18	-2.04	-0.30	7.62	1.37
		Portugal	01/1934	07/2011	3.66	0.94	-	-	-	-	-	-	5.52	0.96	1.18	0.26
		Spain	01/1915	07/2011	7.16	3.75 ***	-	-	5.80	1.51	8.58	2.06 **	10.85	1.18	0.39	0.07
		Sweden	01/1906	07/2011	5.56	3.14 ***	0.47	0.09	5.11	1.23	6.81	1.52	-4.74	-0.56	1.27	0.45
		Switzerland	01/1914	07/2011	4.64	2.94 ***	-	-	9.03	1.61	0.67	0.19	4.19	0.66	-2.92	-1.10
		United Kingdom	02/1693	07/2011	3.37	4.06 ***	2.54	2.75 ***	-1.39	-0.62	1.68	0.66	1.22	0.21	-0.70	-0.20
Emerging	Africa	South Africa	02/1910	07/2011	1.88	0.97	4.29	0.80	-5.07	-1.57	-2.62	-0.97	5.57	0.97	-1.87	-0.48
	Asia	India	08/1920	07/2011	1.17	0.52	-	-	-	-	1.64	0.46	-2.33	-0.54	-3.28	-0.71
	Central/South America &the Caribbean	Chile	01/1927	07/2011	-3.97	-0.94	-	-	-	-	6.80	0.80	4.39	0.53	-5.85	-1.69 *
		Colombia	02/1927	07/2011	2.85	1.20	-	-	-	-	-3.52	-0.79	-2.66	-0.47	-5.31	-1.21
		Mexico	02/1930	07/2011	3.30	1.13	-	-	-	-	6.37	0.64	-4.37	-0.90	0.58	0.18
		Peru	01/1933	07/2011	-3.72	-0.68	-	-	-	-	-	-	-2.09	-0.61	-1.25	-0.33
Least Developed	Central/ South America & the Caribbean	Uruguay	02/1925	12/1995	16.66	3.52 ***	-	-	-	-	25.42	1.44	4.92	0.40	9.85	1.31
		Venezuela	01/1937	07/2011	-0.10	-0.04	-	-	-	-	-	-	1.97	0.33	1.54	0.62
		World	02/1919	07/2011	4.53	3.31 ***	-	-	-7.89	-1.47	6.60	2.25 **	0.50	0.10	-2.58	-0.81

Table 5. Continued

Status	Region	Country	Start	End	1951-1960		1961-1970		1971-1980		1981-1990		1991-2000		2001-2011	
			Date	Date	β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value	β_{Hal}	t-value
Developed	Asia	Japan	08/1914	07/2011	-4.32	-0.72	8.66	1.53	10.74	1.99 **	10.53	1.91 *	6.06	0.99	11.27	1.53
	Mid East	Israel	02/1949	05/2011	-0.78	-0.10	5.30	1.20	-2.07	-0.25	3.90	0.40	6.41	0.85	7.85	1.30 *
	North America	Canada	12/1917	07/2011	6.56	1.50	9.61	2.98 ***	9.27	1.66 *	8.82	1.53	5.21	1.19	6.20	1.20
		UnitedStates	09/1791	07/2011	5.02	1.40	5.54	1.47	6.66	1.50	6.62	1.42	4.20	1.38	5.65	1.17
	Oceania	Australia	02/1875	07/2011	-3.35	-0.97	4.03	0.96	5.52	0.80	6.11	0.85	7.02	1.63	1.87	0.40
		New Zealand	01/1931	07/2011	-6.51	-2.17 **	3.25	1.16	8.41	1.69 *	0.79	0.10	2.26	0.44	2.87	0.73
	Western Europe	Austria	02/1922	07/2011	-10.52	-2.11 **	6.17	1.15	4.16	1.67 *	10.91	1.56	13.40	2.25 **	14.88	1.96
		Belgium	02/1897	07/2011	-3.22	-1.09	7.50	2.54 **	10.92	2.73 ***	12.85	2.30 **	12.01	2.95 ***	8.10	1.27
		Denmark	01/1921	07/2011	3.45	1.77 *	8.96	3.07 ***	-1.85	-0.43	5.44	0.94	6.41	1.24	6.05	0.99
		Finland	11/1912	07/2011	-2.43	-0.49	-1.28	-0.39	7.88	1.50	8.38	1.56	21.11	2.52 **	5.21	0.58
		France	01/1898	07/2011	1.30	0.26	11.78	2.53 **	7.12	1.03	20.45	3.47 ***	16.77	3.65 ***	8.54	1.40
		Germany	01/1870	07/2011	-5.19	-0.97	5.17	1.10	9.80	2.04 **	5.31	0.93	13.88	2.67 ***	9.94	1.45 *
		Ireland	02/1934	07/2011	-0.88	-0.31	3.68	1.17	4.56	0.64	8.81	1.27	16.27	2.83 ***	13.08	1.77
		Italy	10/1905	07/2011	-7.44	-1.58	5.49	1.02	1.02	0.12	22.48	2.54 **	23.97	3.67 ***	11.71	1.93 *
		Netherlands	02/1919	07/2011	3.19	0.75	7.50	1.58	16.04	3.07 ***	11.72	2.54 **	12.39	2.67 ***	9.28	1.26
		Portugal	01/1934	07/2011	1.39	0.56	2.22	0.74	-2.90	-0.09	-1.63	-0.12	14.01	1.98 **	8.11	1.21
		Spain	01/1915	07/2011	3.20	0.80	1.65	0.47	10.36	1.76 *	9.88	1.19	16.95	2.86 ***	4.87	0.77
		Sweden	01/1906	07/2011	-4.33	-1.36	2.85	0.68	14.37	3.61 ***	8.79	1.26	16.76	2.37 **	11.12	1.65
		Switzerland	01/1914	07/2011	3.39	0.78	7.74	1.40	8.08	1.49	3.54	0.79	9.74	2.20 **	4.86	0.89
		UnitedKingdom	02/1693	07/2011	-2.19	-0.49	7.09	1.54	17.13	1.71 *	14.93	2.90 ***	7.34	1.99 **	6.30	1.24
Emerging	Africa	South Africa	02/1910	07/2011	-6.08	-1.66 *	9.37	1.22	2.25	0.25	0.27	0.03	14.12	2.10 **	2.69	0.40
	Asia	India	08/1920	07/2011	-1.42	-0.46	1.96	0.70	6.78	1.59	-4.52	-0.63	11.67	0.94	0.16	0.02
	Central/South America & the Caribbean	Chile	01/1927	07/2011	-11.77	-1.32	2.87	0.33	-40.24	-1.68 *	13.29	1.74 *	2.79	0.36	-1.55	-0.33
		Colombia	02/1927	07/2011	1.73	0.87	3.13	1.40	7.31	1.46	-3.35	-0.37	12.83	1.14	10.83	1.25
		Mexico	02/1930	07/2011	2.35	0.93	2.40	1.28	21.87	2.50 **	-14.49	-1.00	7.86	0.86	9.19	1.39
		Peru	01/1933	07/2011	-2.50	-1.29	0.24	0.23	-8.22	-0.92	-29.37	-0.91	-0.83	-0.06	13.63	1.29
Least Developed	Central/South America & the Caribbean	Uruguay	02/1925	12/1995	1.56	0.28	0.51	0.04	9.26	0.88	55.39	2.95 ***	-	-	-	-
		Venezuela	01/1937	07/2011	-1.97	-0.50	1.99	0.97	-3.85	-0.82	1.75	0.18	-1.30	-0.11	0.03	0.00
		World	02/1919	07/2011	2.34	0.89	5.77	1.98 **	7.27	1.58	10.66	2.16 **	5.77	1.84 *	6.49	1.18

Table 6. Out-of-sample Performance of Buy & Hold strategy versus Halloween strategy

The table presents the annualised average returns, standard deviations in percentages, and Sharpe ratios of the buy and hold strategy and the Halloween strategy, as well as the percentage of years that the Halloween strategy outperforms the Buy & Hold strategy for the sample period from October 1998 to April 2011.

Country	Buy & Hold Strategy			Halloween Strategy			Percentage of Winning
	Return	St Dev	Sharpe	Return	St Dev	Sharpe	
Argentina	18.67	32.19	0.58	21.53	24.15	0.89	38%
Australia	4.92	13.29	0.37	6.42	8.56	0.75	46%
Austria	6.68	20.59	0.32	11.43	12.15	0.94	46%
Belgium	0.46	17.78	0.03	4.50	12.09	0.37	38%
Brazil	17.25	26.54	0.65	21.52	19.37	1.11	54%
Canada	6.47	16.03	0.40	7.96	10.61	0.75	31%
Chile	15.23	14.34	1.06	10.66	10.89	0.98	38%
Denmark	6.78	18.58	0.36	6.47	12.71	0.51	23%
Finland	4.14	30.05	0.14	9.14	23.26	0.39	38%
France	2.29	19.05	0.12	6.85	12.86	0.53	38%
Germany	1.78	22.20	0.08	7.66	15.16	0.51	46%
Greece	-3.28	28.81	-0.11	1.81	19.10	0.09	54%
Hong Kong	6.79	23.59	0.29	5.74	16.42	0.35	38%
Indonesia	20.33	27.92	0.73	19.03	18.34	1.04	23%
Ireland	-2.87	22.17	-0.13	6.74	13.85	0.49	46%
Italy	-0.51	20.54	-0.02	7.30	15.09	0.48	46%
Japan	-2.56	20.73	-0.12	4.74	13.58	0.35	62%
Jordan	8.96	20.47	0.44	7.70	14.86	0.52	46%
Korea	13.54	28.44	0.48	15.90	20.99	0.76	46%
Malaysia	10.65	20.92	0.51	10.94	16.14	0.68	23%
Mexico	17.64	22.10	0.80	18.60	16.09	1.16	38%
Netherlands	-0.95	20.91	-0.05	5.59	13.36	0.42	46%
New Zealand	1.60	13.13	0.12	5.78	8.61	0.67	62%
Norway	10.71	22.97	0.47	12.50	14.69	0.85	38%
Philippines	7.21	23.57	0.31	9.59	16.05	0.60	38%
Portugal	-2.47	19.46	-0.13	3.83	13.44	0.29	46%
Russia	33.89	38.71	0.88	36.05	28.23	1.28	38%
Singapore	6.94	22.86	0.30	7.67	14.37	0.53	31%
South Africa	14.35	19.31	0.74	13.11	13.36	0.98	31%
Spain	2.90	19.69	0.15	5.57	13.64	0.41	38%
Sweden	5.90	21.57	0.27	10.74	15.46	0.69	38%
Switzerland	0.86	14.53	0.06	3.02	10.25	0.29	54%
Taiwan	1.83	26.92	0.07	9.75	18.53	0.53	54%
Thailand	9.55	27.84	0.34	10.80	18.53	0.58	54%
Turkey	27.61	45.88	0.60	38.98	38.52	1.01	46%
United Kingdom	1.85	15.15	0.12	6.23	9.79	0.64	46%
United States	1.73	16.28	0.11	5.02	11.32	0.44	46%

Table 7. Annual performance of Buy & Hold strategy versus Halloween strategy of the UK market

The table presents the average annual returns, standard deviations in percentages, and Sharpe ratios of the buy and hold strategy and the Halloween strategy, as well as the number of years, and the percentage of times that the Halloween strategy outperforms the Buy & Hold strategy for the whole sample period from 1693-2009 of the UK market index returns, three subsamples of around 100 years, six 50-year subsamples, and ten 30-year subsamples.

Sample Periods	Buy & Hold Strategy			Halloween Strategy			Obs.	Number of Winning	Percentage of Winning
	Return	Std. Dev.	Sharpe ratio	Return	Std. Dev.	Sharpe ratio			
1693-2009	1.38	14.58	0.09	4.52	10.71	0.42	316	200	63.29%
100-year interval									
1693-1800	-0.52	11.54	-0.05	2.95	8.92	0.33	107	70	65.42%
1801-1900	0.68	11.90	0.06	3.86	8.20	0.47	100	69	69.00%
1901-2009	3.91	18.71	0.21	6.69	13.68	0.49	109	61	55.96%
50-year interval									
1693-1750	-0.49	13.16	-0.04	3.19	10.82	0.29	57	32	56.14%
1751-1800	-0.56	9.45	-0.06	2.66	6.14	0.43	50	38	76.00%
1801-1850	-0.21	14.81	-0.01	4.62	10.46	0.44	50	38	76.00%
1851-1900	1.58	8.07	0.20	3.10	5.01	0.62	50	31	62.00%
1901-1950	0.20	11.07	0.02	1.59	6.00	0.26	50	28	56.00%
1950-2009	7.05	22.95	0.31	11.01	16.64	0.66	59	33	55.93%
30-year interval									
1693-1730	-0.62	15.52	-0.04	3.83	13.16	0.29	37	22	59.46%
1731-1760	-1.12	6.60	-0.17	1.71	3.50	0.49	30	20	66.67%
1761-1790	0.28	9.77	0.03	4.00	6.60	0.61	30	22	73.33%
1791-1820	-0.22	11.48	-0.02	3.04	5.75	0.53	30	21	70.00%
1821-1850	-0.39	16.82	-0.02	4.69	12.93	0.36	30	23	76.67%
1851-1880	1.45	9.03	0.16	3.45	5.57	0.62	30	18	60.00%
1881-1910	0.84	6.73	0.13	2.31	3.59	0.64	30	20	66.67%
1911-1940	-1.19	11.86	-0.10	1.12	7.01	0.16	30	17	56.67%
1941-1970	5.84	14.89	0.39	5.21	9.30	0.56	30	13	43.33%
1971-2009	7.61	25.75	0.30	13.36	18.68	0.72	39	24	61.54%

Table 8. Strategy performance over different trading horizons of the UK market

The table shows average returns, standard deviations, skewness, and the maximum and minimum values of the buy and hold strategy and the Halloween strategy for different holding horizons from one year to twenty years of the UN market index returns from 1693-2009. The average returns and the standard deviations are annualised by dividing the total returns (standard deviations) by n ($\sqrt{n}$). The No. of Winning and the % of Winning are the number of times and the percentage of times that the Halloween strategy beats the Buy & Hold strategy, respectively. The upper panel presents the results calculated using the overlapping sample, and the lower panel are the results from the non-overlapping sample.

Overlapping Sample

Holding Horizon	Buy & Hold Strategy					Halloween Strategy					Obs.	No. of Win	% Win
	Return	St.	Skewness	Maximum	Minimum	Return	St.	Skewness	Maximum	Minimum			
1-Year	1.38	14.58	0.12	86.01	-80.60	4.52	10.71	2.06	83.59	-30.96	317	200	63.09%
2-Year	1.42	14.50	-0.39	41.03	-59.11	4.56	11.16	1.60	59.91	-28.78	316	223	70.57%
3-Year	1.50	14.00	0.10	38.85	-35.39	4.61	11.09	1.75	46.05	-11.12	315	236	74.92%
4-Year	1.55	13.50	0.31	29.79	-25.50	4.63	11.40	1.58	35.02	-7.86	314	250	79.62%
5-Year	1.59	13.12	0.58	24.68	-16.06	4.64	11.92	1.59	33.33	-6.28	313	257	82.11%
6-Year	1.60	12.96	0.77	24.56	-15.91	4.65	12.34	1.66	29.53	-3.66	312	258	82.69%
7-Year	1.60	12.75	1.01	22.05	-12.75	4.65	12.76	1.76	29.35	-4.07	311	267	85.85%
8-Year	1.59	12.67	1.27	21.79	-10.89	4.66	13.21	1.81	27.33	-2.46	310	271	87.42%
9-Year	1.59	12.78	1.35	21.67	-7.98	4.66	13.73	1.87	27.15	-2.83	309	281	90.94%
10-Year	1.61	13.00	1.43	21.82	-8.16	4.67	14.23	1.91	27.06	-2.89	308	282	91.56%
15-Year	1.63	13.98	1.56	19.27	-6.52	4.67	16.27	2.04	24.81	-0.20	303	282	93.07%
20-Year	1.61	14.75	1.72	15.62	-3.56	4.64	17.82	2.04	20.57	0.18	298	281	94.30%

Non-Overlapping Sample

Holding Horizon	Buy & Hold Strategy					Halloween Strategy					Obs.	No. of Win	% Win
	Return	St.	Skewness	Maximum	Minimum	Return	St.	Skewness	Maximum	Minimum			
1-Year	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Year	1.33	16.35	-0.59	41.03	-59.11	4.53	12.50	1.66	59.91	-28.78	158	110	69.62%
3-Year	1.46	16.12	0.15	38.85	-35.39	4.55	12.51	2.22	46.05	-11.12	105	80	76.19%
4-Year	1.33	15.87	-0.14	21.70	-25.50	4.53	11.63	1.01	23.35	-7.86	79	60	75.95%
5-Year	1.46	13.36	-0.01	16.46	-16.06	4.55	11.49	1.01	22.53	-6.28	63	51	80.95%
6-Year	1.37	16.41	0.72	24.56	-15.91	4.52	14.23	2.23	29.53	-3.01	52	42	80.77%
7-Year	1.46	13.39	0.79	18.44	-8.76	4.55	13.55	1.15	20.27	-4.07	45	41	91.11%
8-Year	1.37	11.73	1.13	14.43	-6.98	4.52	12.58	1.64	20.17	-1.70	39	36	92.31%
9-Year	1.46	13.15	0.99	15.75	-7.98	4.55	14.06	1.85	21.66	-2.40	35	32	91.43%
10-Year	1.30	11.82	1.19	12.72	-5.45	4.51	13.80	1.73	18.57	-1.51	31	29	93.55%
15-Year	1.46	15.36	0.88	12.33	-4.08	4.55	16.47	1.77	17.75	0.38	21	20	95.24%
20-Year	1.24	15.36	1.53	9.16	-2.51	4.36	18.77	2.39	17.34	0.18	15	14	93.33%

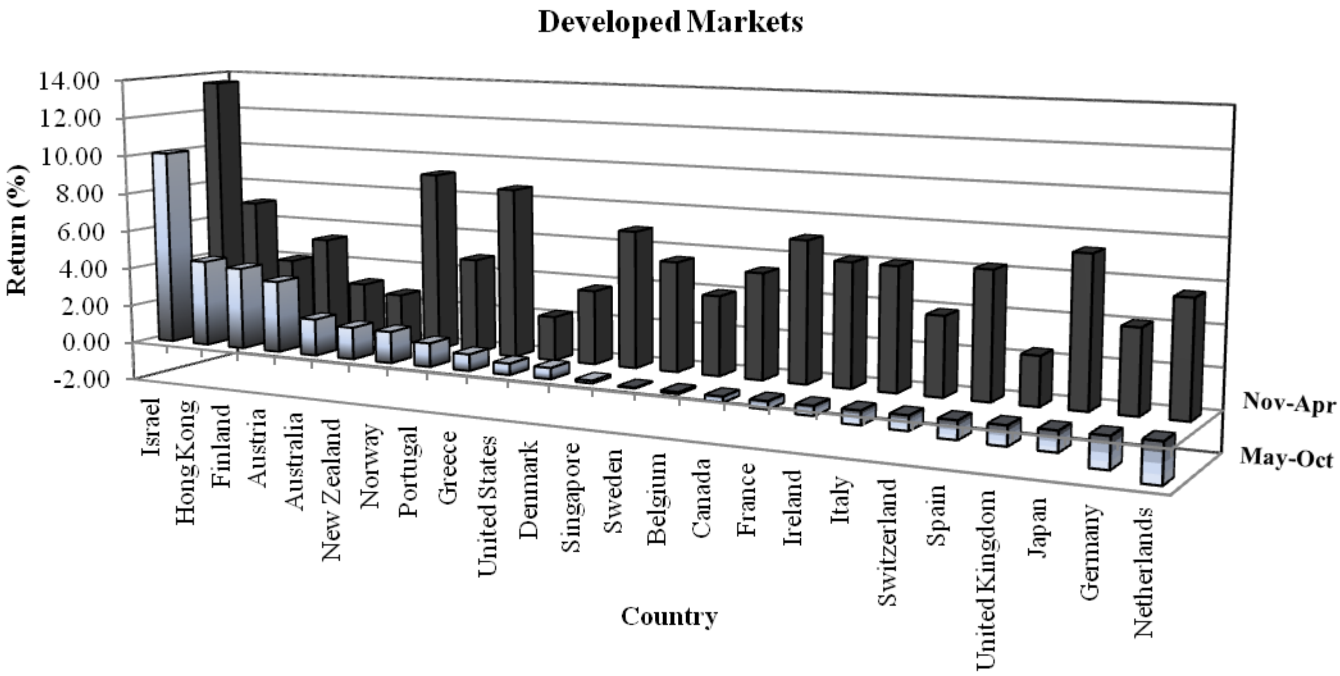
Table 9. Halloween effect semi-annual data versus monthly data

The table compares the regression results of the Halloween effect using semi-annual data and monthly data. Coefficient estimates are in percentage terms. T-statistics are calculated based on Newey-West standard errors. The sample is sub-divided into three sub-periods of approximately 100-year intervals and six sub-periods of 50-year intervals. ***denotes significance at the 1% level; **denotes significance at 5% level; * denotes significance at 10% level

Sample Periods	Semi-annual data		Monthly data	
	β	t-value	β	t-value
1693-2009	3.36	4.39***	0.56	4.26***
100-year Interval				
1693-1800	2.03	1.71*	0.34	1.6
1801-1900	3.14	3.03***	0.52	2.71***
1901-2009	4.87	3.04***	0.80	3.03***
50-year Interval				
1693-1750	2.83	1.47	0.48	1.29
1751-1800	1.10	0.88	0.18	0.93
1801-1850	5.06	2.88***	0.84	2.29**
1851-1900	1.22	1.33	0.20	1.46
1901-1950	0.67	0.4	0.08	0.31
1951-2009	8.43	3.59***	1.40	3.33***

Figure 1. Two 6-month sub-period (November-April and October-May) returns comparison for the developed markets, emerging markets, frontier markets and other markets

(A)



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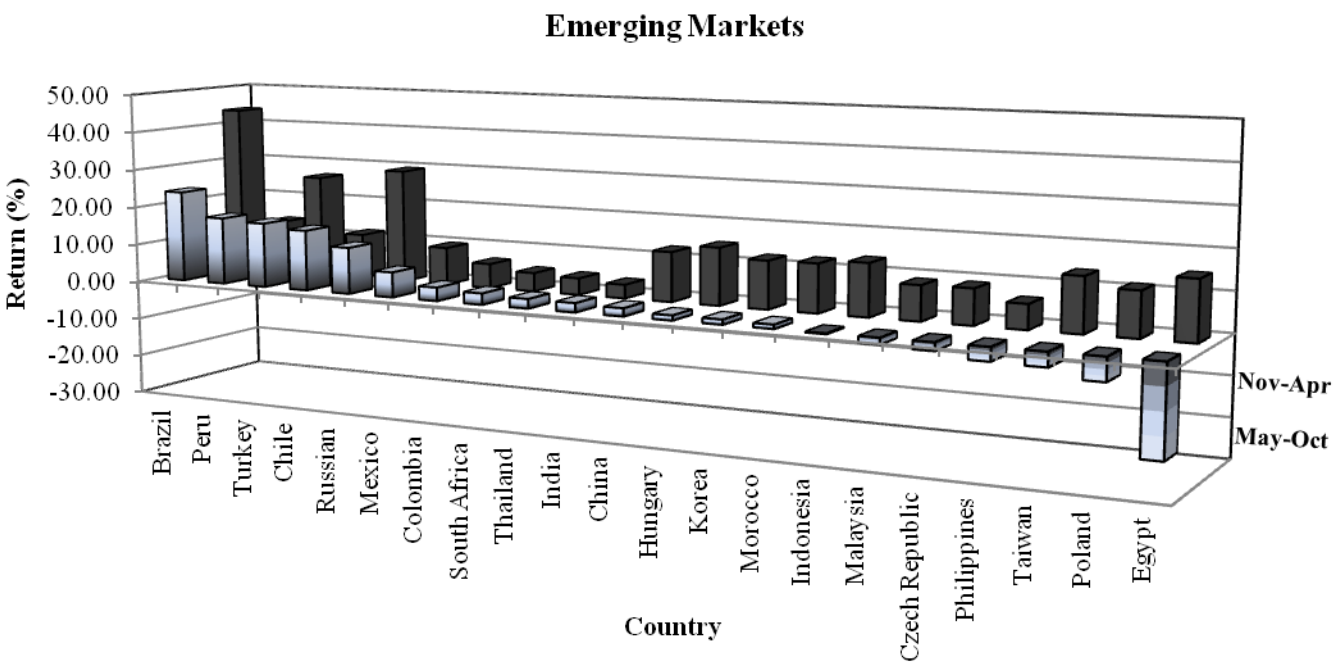
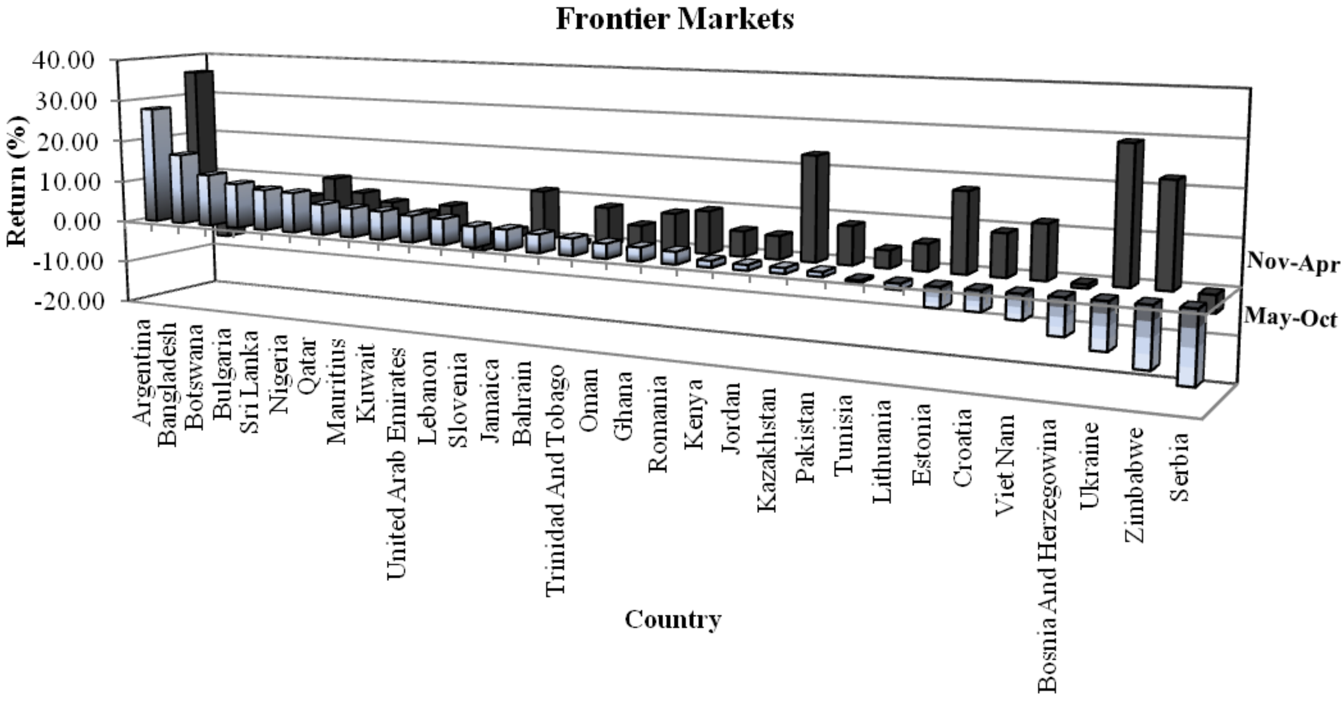


Figure 1. continued

(C)



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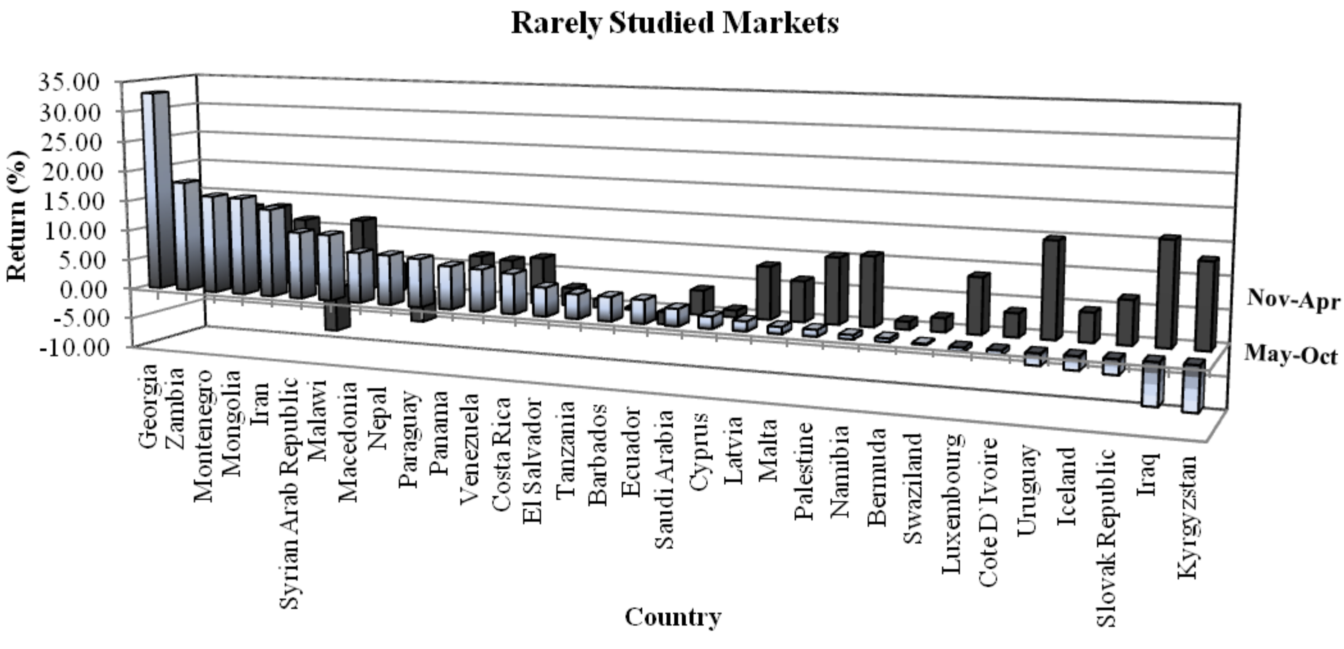


Figure 2. Halloween effect & Sample Size

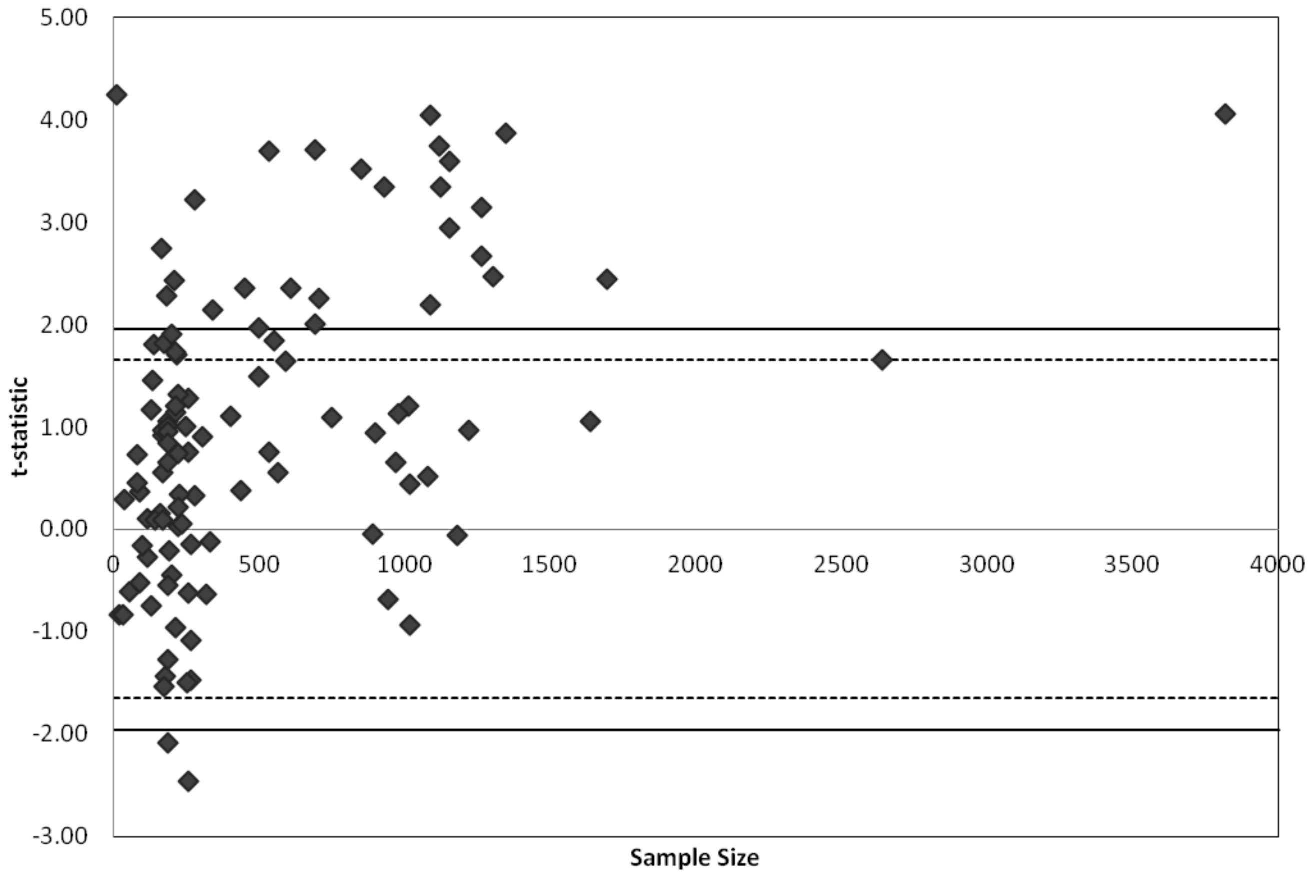


Figure 3. Size of the Halloween effect (difference between 6-month returns November-April and May-October) for 31 ten-year sub-periods from 108 pooled countries over the period 1693-2011

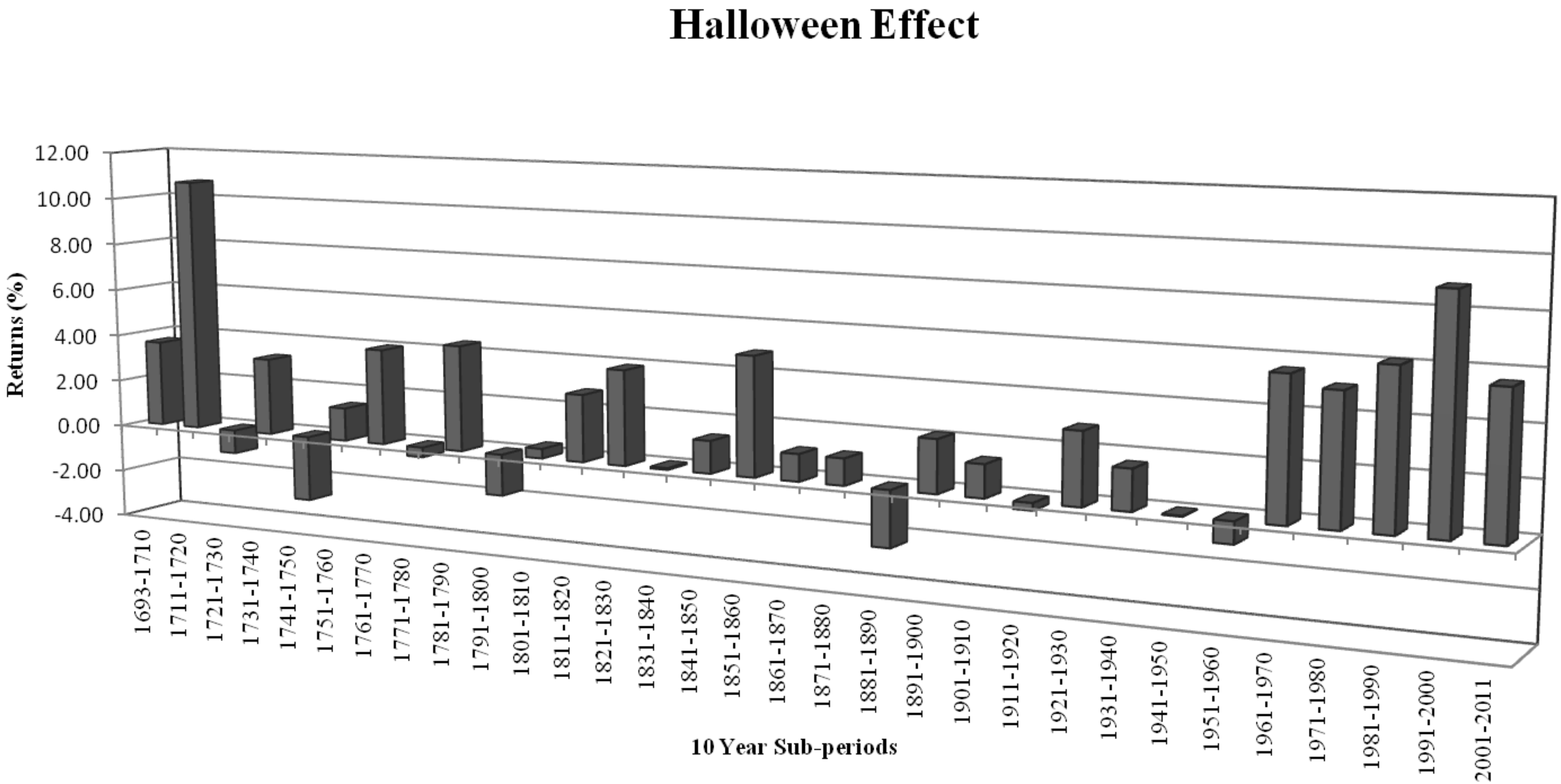
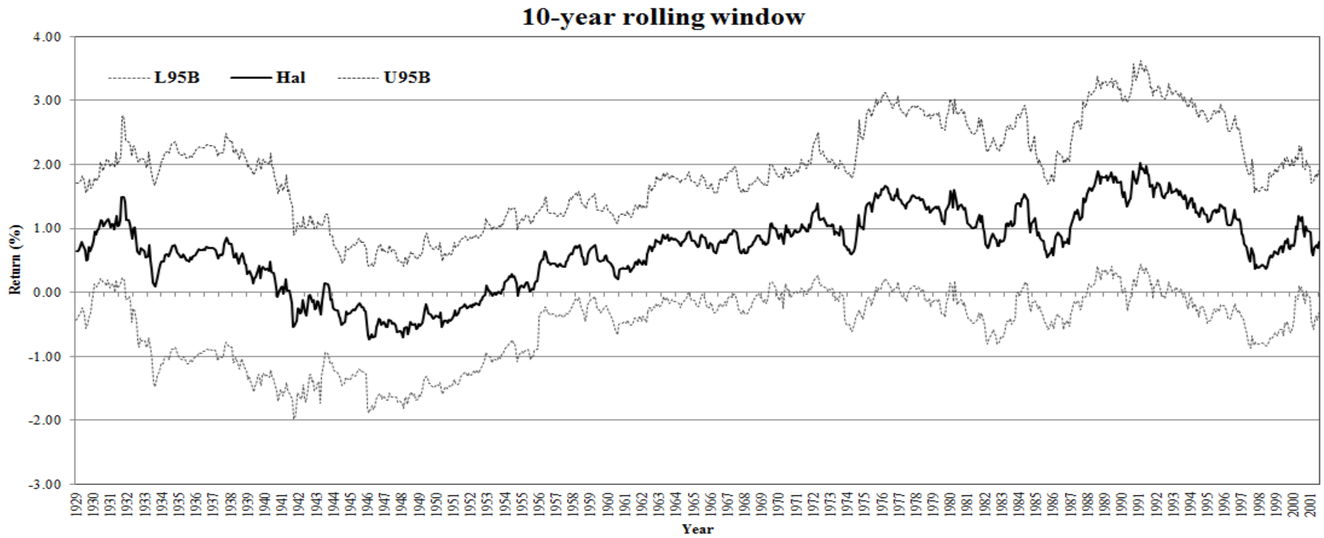
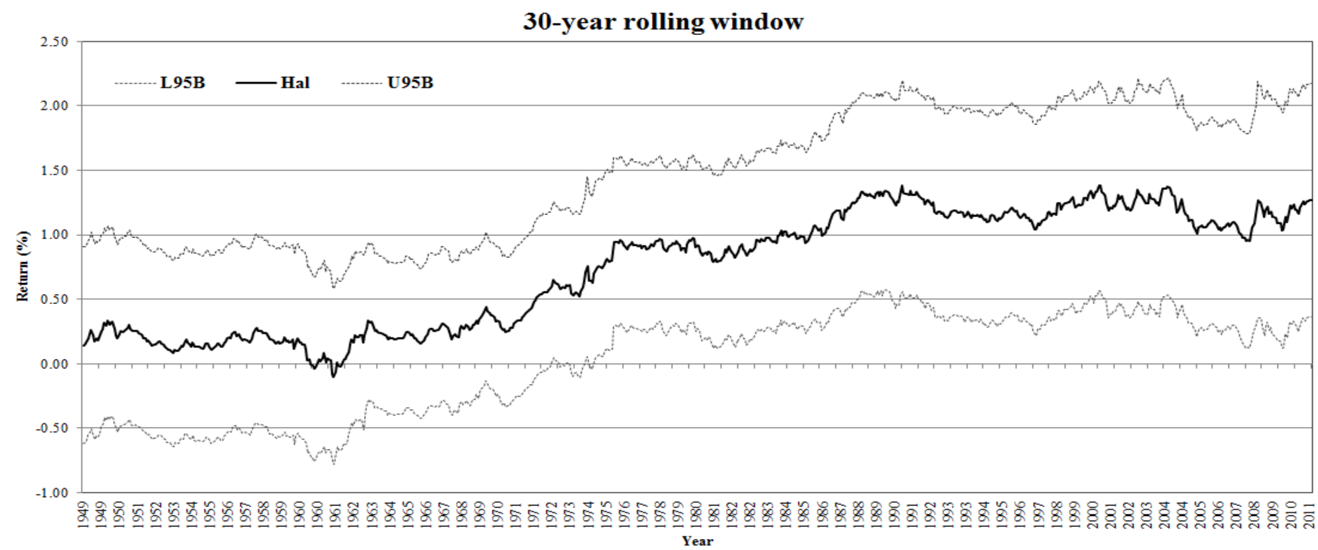


Figure 4. Rolling window regressions of the Halloween effect in the GFD world index returns (1919-2011)
The figure plots Halloween effects in the GFD world index returns from 1919 to 2011 using a 10-year rolling window, a 30-year rolling window and a 50-year rolling window. The dark solid line indicates the coefficient estimates of the effect, the light dotted lines indicates the upper and lower 95% confidence interval based on Newey-West standard errors





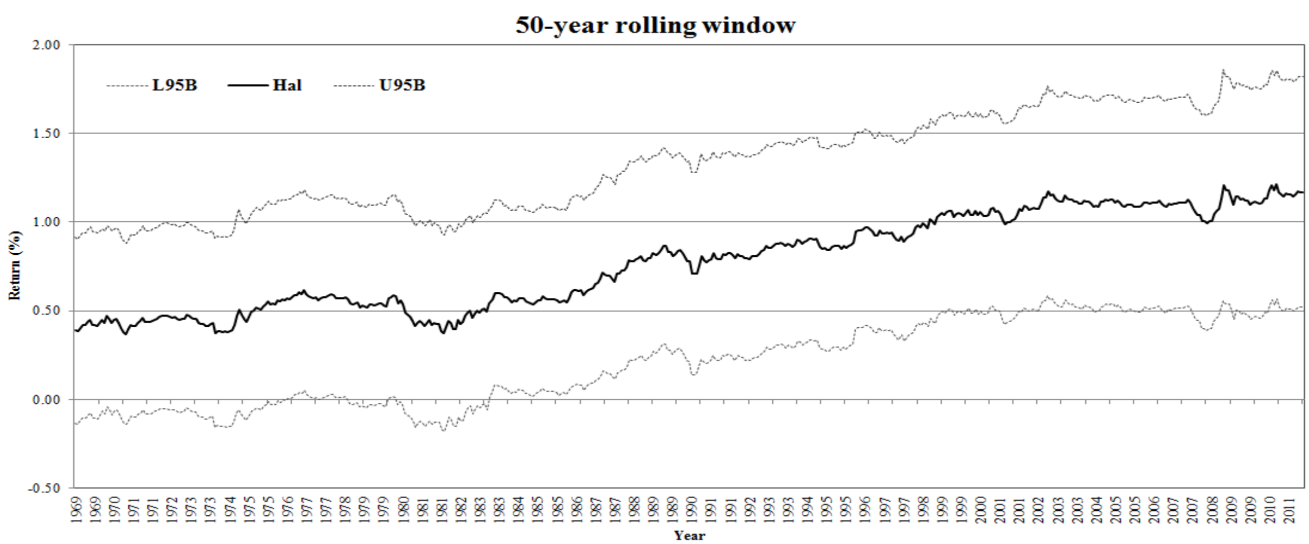


Figure 5. Return frequency distribution of Buy & Hold strategy and Halloween strategy

The figure shows the return frequencies of the Buy & Hold strategy and the Halloween strategy for the holding periods of seven years, ten years, fifteen years and twenty years. The returns are annualised and expressed in percentages.

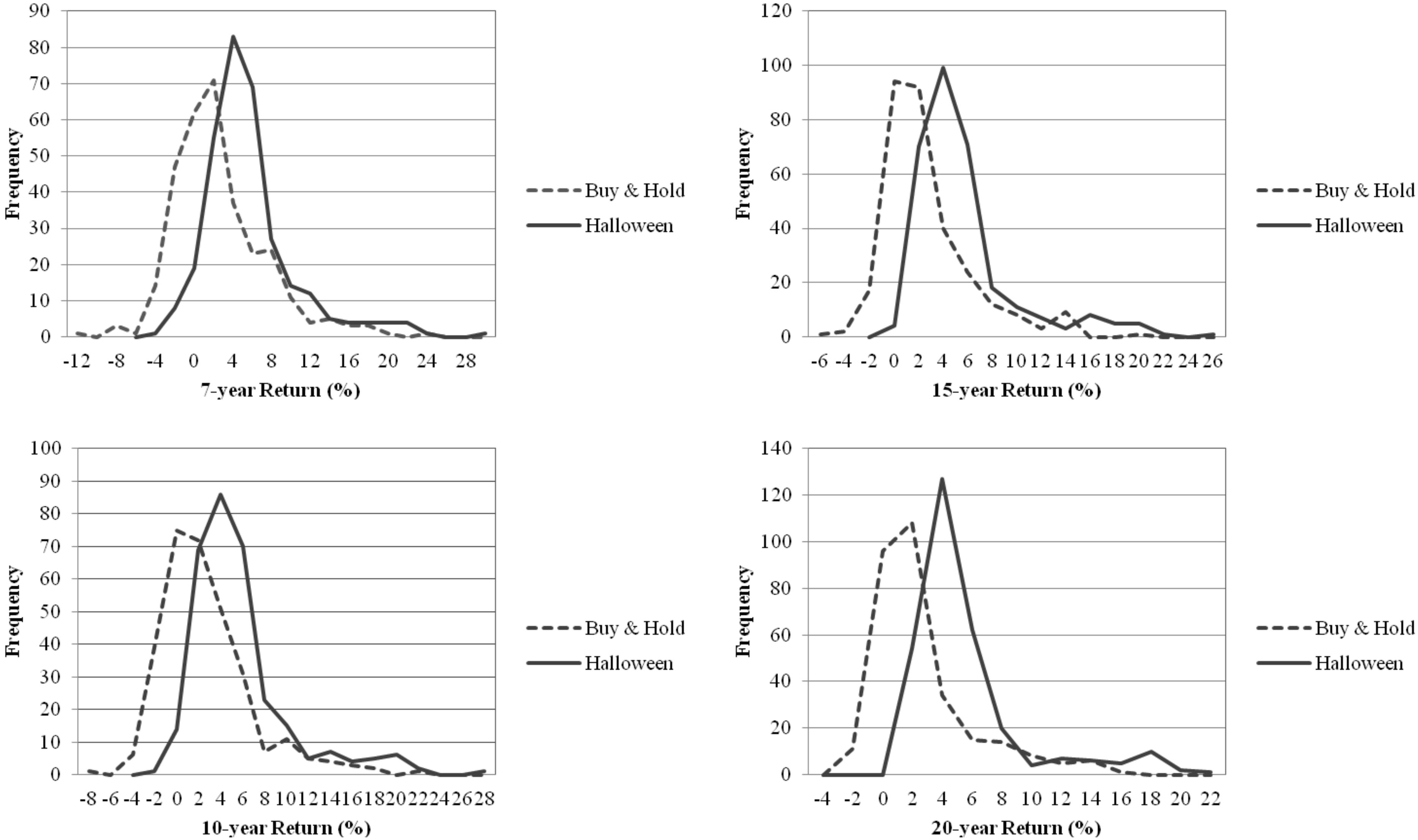


Figure 6. End of period wealth for the buy and hold strategy and the Halloween strategy for the period 1693 to 2009

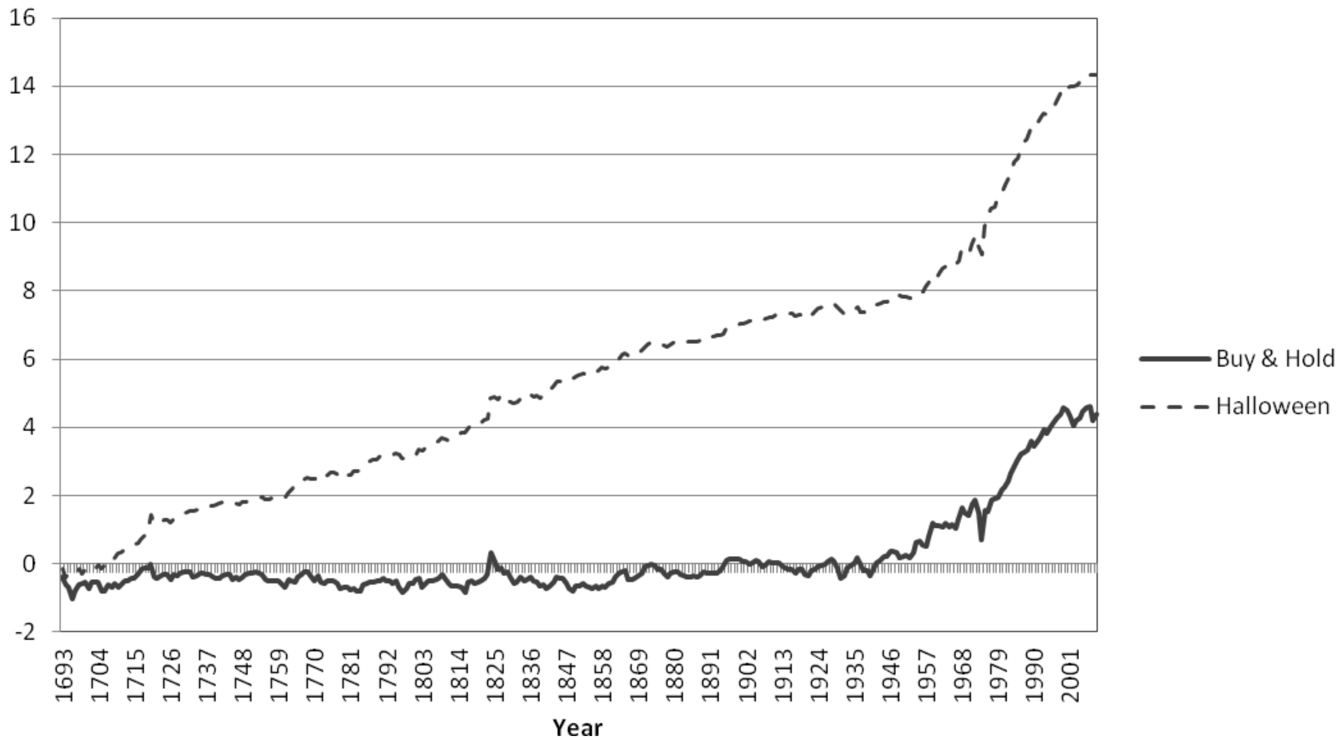


Figure 7. UK Halloween effect 100-year rolling window OLS regressions

The figure plots 100-year rolling window estimates of the Halloween effect for the UK monthly stock market index returns over the period 1693 to 2010. The dark solid line indicates the coefficient estimates of the effect, the light dotted lines show the upper and lower 95% bounds calculated based on Newey-West standard errors.

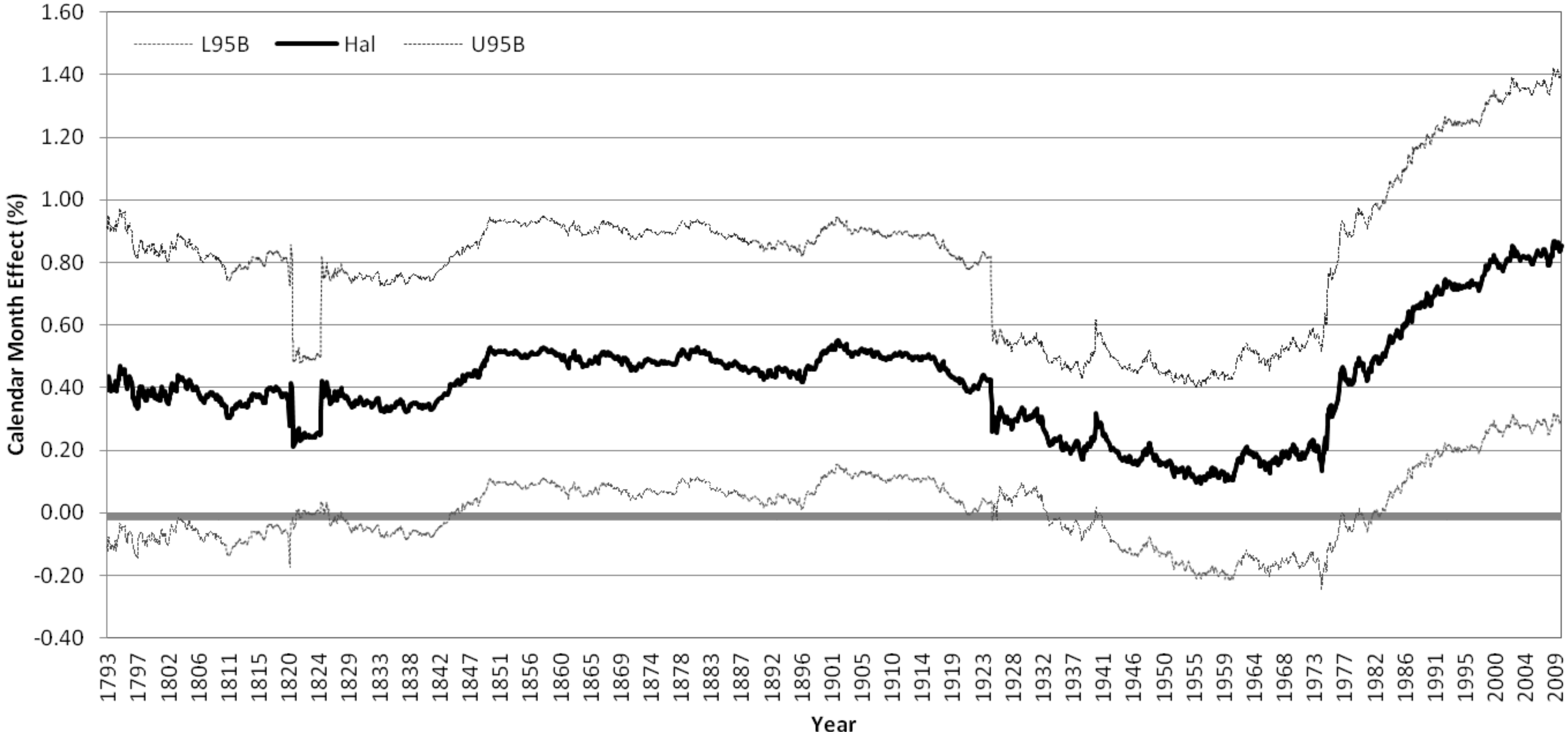


Figure 8. UK Halloween effect 100-year rolling window regressions estimated with GARCH (1,1)
The figure plots 100-year rolling window estimates of the Halloween effect based on time varying volatility GARCH (1,1) model for the UK monthly stock market index returns over the period 1693 to 2010. The dark solid line indicates the coefficient estimates of the effect and the light dotted lines show the upper and lower 95% bounds.

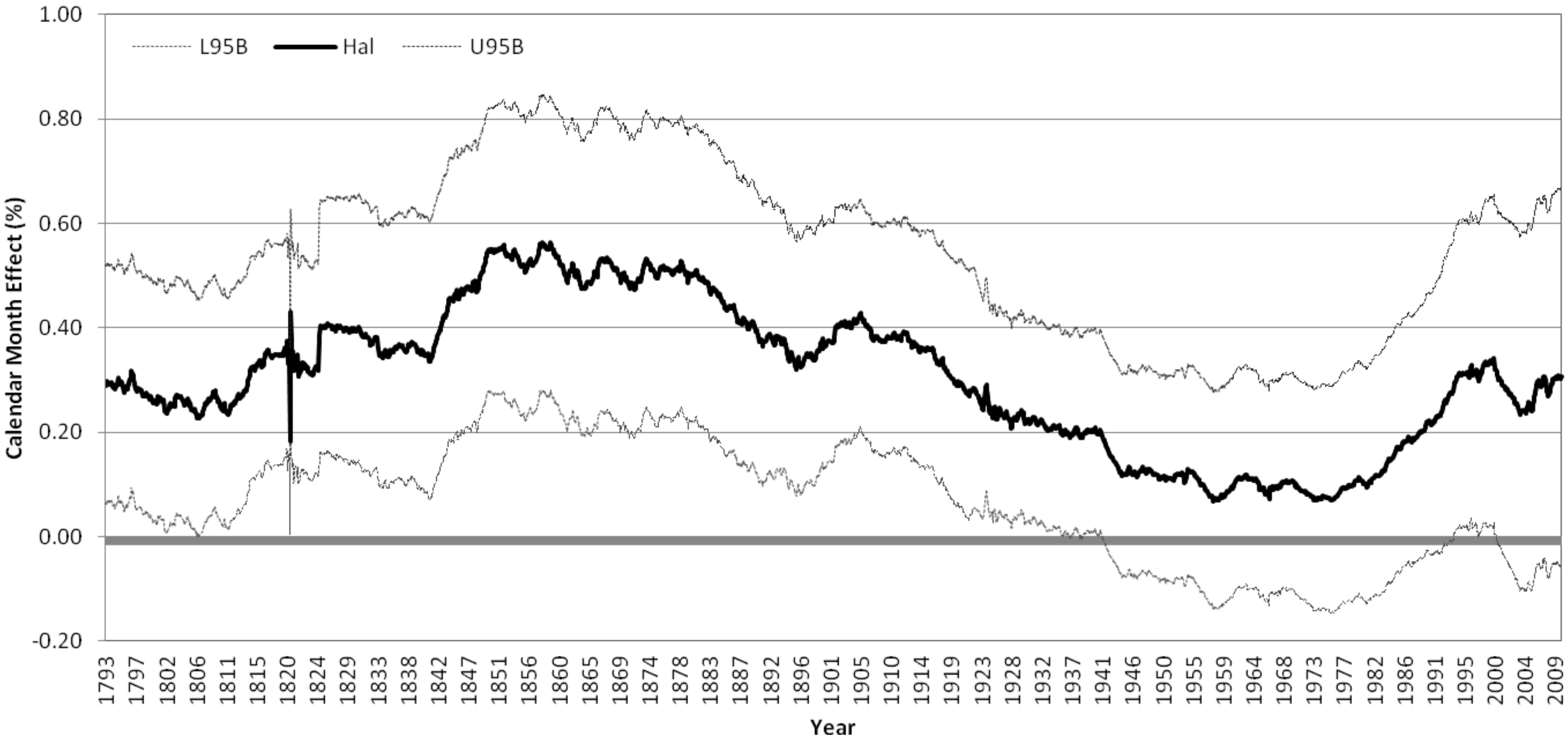


Figure 9. UK Halloween effect 100-year rolling window regressions estimated with Robust Regressions
The figure plots 100-year rolling window estimates of the Halloween effect from robust regressions based on M-estimation introduced in Huber (1973) for the UK monthly stock market index returns over the period 1693 to 2010. The dark solid line indicates the coefficient estimates of the effect and the light dotted lines show the upper and lower 95% bounds.