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The Halloween Effect in Multi-National Stock Markets

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Abstract

This thesis examines the Halloween effect, which states that stock returns during winter (November to April) are significantly higher compared to returns in the summer (May to October). I study different index types from 35 countries using distinct intervals between the time period from May 1991 to April 2017. I find an average 12.77% winter premium and evidence of the effect in all 35 countries during the first half of the period, in which 19 out of 35 countries report statistically significant regression results contradicting the efficient market hypothesis. However, the average Halloween effect drops to 4.40% during the latter period, wherein only 6 countries show significant results. Moreover, I show that the anomaly cannot be explained by the January effect or difference in risk between the semi-annual periods. Finally, I state that the Halloween effect as an investment strategy is not a superior choice over the traditional Buy & Hold strategy.

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1 Introduction

According to the efficient market hypothesis, it should be impossible to outperform the general market with eminent stock-picking or market timing because existing share prices always reflect and incorporate all relevant information. However, a plethora of seasonal anomalies have been identified from the efficient market hypothesis (Andrade et al., 2013). One of these anomalies is known as the "sell in May" effect or the Halloween effect (American phrasing).

Sell in May is a common saying among investors across all continents which dates back centuries in history. According to the effect, stock returns from November to April are significantly higher compared to the other half of the year (May to October). In other words, investors are better off selling their stocks in May and regaining full equity exposure when Halloween comes around. This study focuses on the American phrasing of the effect and is referred throughout the paper as the Halloween effect.

There are many reasons why one should find the Halloween effect more interesting to study compared to other seasonal anomalies. For instance, the Halloween effect seems to be present not only in most developed markets but also in emerging markets (Bouman and Jacobsen, 2002). Furthermore, the effect is not affected by Murphy's Law, documented by Dimson and Marsh (1999). This means that since the effect was discovered in academic papers, the effect has not disappeared by the vast exploitation of opportunistic investors (Haggard and Witte, 2010). Moreover, the Halloween effect is distinct among seasonal anomalies because it is the least affected by transaction costs. This is important, because anomalies from the efficient market hypothesis need to be exploitable trading opportunities net of transaction costs, even if the anomaly is not a statistical fluke (Andrade et al., 2013). This fact is consistent with the Halloween effect, since it only needs two transactions per year.

Even though seasonal anomalies in general have been under extensive empirical work globally, the Halloween effect has not received as much attention as the other seasonal anomalies, such as the January effect, the Monday effect, the Friday effect, the turn of the month effect and the holiday effect. In fact, Bouman and Jacobsen (2002) are considered to be the first authors to thoroughly study the effect. They found an existing Halloween effect in 36 out of 37 developed and emerging markets they studied, in which 20 out of 37 countries reported a statistically significant regression result (10% level). This finding augmented the public and academic interest in the Halloween anomaly.

This thesis studies comprehensively the Halloween effect in 35 out of 37 countries introduced by Bouman and Jacobsen (2002) in the initial academic paper of the anomaly. The time period has been split up to two equal-length periods in order to examine the development of economical and statistical significance of the effect using new and unexamined data. Furthermore, the anomaly is tested on small, mid and large cap MSCI equity indices in order to research if firm size affects the phenomena. Moreover, the robustness of the effect is tested to the consideration of volatility and the January effect. Finally, MSCI portfolios are constructed from the respective indices to determine if investing in a Halloween portfolio can outperform the market.

The rest of the thesis is organized as follows. The second Section gives an overview of the theoretical framework, related literature and main hypotheses. In Section 3, I present the data. Section 4 sheds light on the methods used to examine the hypotheses. Section 5 presents the results and finally Section 6 concludes the thesis.

2 Theoretical Framework and Literature Review

2.1 Market Efficiency

A market is called efficient when the price trend affects to all available information. This means that any information that can be used to determine future stock prices should be incorporated in current prices. Any new information indicating that a stock is under or overvalued should cause investors to immediately buy or sell the stock until a fair price is reached. In case of an efficient market, the asset prices should be equal to the present value of projected future cash flows. (Bodie et al., 2002.)

The father of the efficient market theory Eugene Fama (1970) stated three sufficient but not necessary stipulations for market efficiency. First, there are no transaction costs in trading securities. Second, all information is available without any costs to all market participants and finally, all agree on the implications of current information for the current market price and distributions of future prices. Consequently, if markets are efficient, stock returns are not predictable and therefore it is not possible to consistently outperform the market on a risk-adjusted basis.

One might argue that these conditions are not met in the real world. Nevertheless, this does not mean that all real-world markets are necessarily inefficient. These three requisites are sufficient for market efficiency but not compulsory, as stated earlier. As long as all market participants factor in all available information, even large transaction costs that influence the flow of transactions do not automatically mean that prices would not fully reflect all available information. Similarly, the market may also be efficient in a situation where not all but a sufficient number of investors have access to available information. It is also possible for the market to be efficient even if there are disagreements on the implications of information, unless there are investors who can consistently make better interpretations of the information than are implicit in market prices. (Fama 1970.)

The efficient market hypothesis was initially accepted but the academia started to point out some weaknesses to this theory as the knowledge of finance advanced. A few patterns and seasonal anomalies have been identified from the global stock markets. However, the investment strategies based on these patterns cannot be frequent and consistent over time (Matilde, 2015). Nevertheless, the question of how efficient the stock market really is still divides investors and academic researchers all over the world. If assuming a perfect market, it should not be possible to consistently earn abnormal returns without taking more risk.

2.2 Related Literature

Bouman and Jacobsen (2002) contributed to this discussion with the first academic paper of the Halloween anomaly. They study 37 equity markets and find an economically significant

Halloween effect in 36 countries. They use monthly returns from national MSCI indices with a time period from 1970 to 1988 and find a statistically significant effect in 20 countries. Stock returns during November-April periods are on average 10% higher compared to May-October periods. The authors note that the effect is particularly strong in European markets.

Bouman and Jacobsen (2002) consider several possible causes for the anomaly. These causes are the January effect, data mining, changes in interest rates, trading volume, the provision of news, and vacations. They are able to find a relation between trading volume and timing of summer vacations. The authors claim that the effect is strongest in countries with long summer vacations. However, arbitrage is a solid argument against this empirical link. Furthermore, the authors argue that an investment strategy based on the Halloween effect is able to beat the Buy & Hold strategy. [1]

The first publication of the effect by Bouman and Jacobsen (2002) sparked the debate around the anomaly. One year after the initial paper Kamstra et al. (2003) offer a possible explanation for the effect. They argue that the seasonal affective disorder (SAD) affects the anomaly. The authors believe that the decreasing hours of daylight depresses investors during the fall which leads to higher risk aversion and lower stock returns. Respectively, stock returns recover after the winter solstice when daylight starts to increase. However, many researchers contest the reliability of this claim. For instance, Jacobsen and Marquering (2008) note that the correlation between weather and stock returns are merely a data driven result and SAD does not explain the strong effects in countries close to the equator.

In 2004, Meberly and Pierce extend the methodologies introduced by Bouman and Jacobsen (2002). They use S&P 500 stock index futures and control for January and outliers in the data (October 1987 and August 1998 stock market crashes). After controlling for outliers and January, the Halloween effect decreases. However, Zarour (2007) reports a highly significant Halloween effect in seven out of nine Arabic stock markets. Zarour (2007) notes that the result does not change even when controlling for the January effect. The debate about outliers and controlling for January returns in 2008, when Lucey and Zhao provide evidence that the effect might be a manifestation of the January effect. However, Lucey and

[1] The strategy is to invest in the market index for November to April periods and 1-month treasury bills for the other half of the year (May to October).

Zhao use CRSP monthly data set consisting of monthly U.S stock returns differing from previous papers.

Several studies extend the analysis of the Halloween effect. Matilde et al. (2014) study 145 European mutual funds and find an economically significant effect in 139 funds. They conclude that 125 of these funds show statistically significant results on the 10% level. Furthermore, they reject the hypothesis that the effect is caused by the January effect and point out that the Halloween strategy is able to outperform the Buy & Hold strategy by a clear margin. Jacobsen and Visaltanachoti (2009) extend the research to sectors and industries. They find that all U.S stock market sectors and 48 of 49 industries perform better during the November-April period compared to the May-September period. According to the authors, a sector-rotating strategy[2] based on the Halloween effect outperforms the Buy & Hold strategy. Andrade et al. (2014) extend the research on the utilization of trading strategies based on the anomaly. They find an economically large and statistically significant Halloween effect for strategies that exploit the value, size, credit risk, foreign exchange (FX) carry trade, and equity-volatility risk premiums.[3]

2.3 Hypotheses

Based on the efficient market hypothesis, it should be impossible that the winter period (November-April) would persistently yield better returns compared to the summer period (May-October). Furthermore, the related academic literature gives no clear consensus whether the Halloween effect exists in the stock market. Intrigued by the theories and previous literature, my first hypothesis revolves around the existence of the anomaly itself:

Hypothesis 1: Stock returns are higher in November to April period than in May to October period.

[2] The sector-rotating strategy is to invest equal weights in five consumer sectors during the summer and five production sectors during the winter, respectively.

[3] The credit risk strategy is to invest in speculate-grade corporate bonds. The foreign exchange (FX) carry trade is a long-short strategy based on high and low interest rate currencies. The equity-volatility is based on short-term equity index options.

Another discordant thing pointed out by prior research is that the Halloween anomaly might be due to the January effect. From the family of seasonal anomalies, the January effect seems to be the most plausible candidate to cause the Halloween effect due to the fact that it is the only anomaly that is associated with higher returns in the winter period. Some researchers such as Bouman and Jacobsen (2002), Matilde (2015) and Zarour (2007) point out that the January effect is not the cause of the Halloween anomaly, whereas Lucey and Zhao (2008) report compelling evidence of the opposite. The second hypothesis is:

Hypothesis 2: Higher stock returns in the November through April period are caused by higher stock returns in January.

3 Data

3.1 Description of Data

I use value-weighted MSCI total stock return indices in local currencies for 35 countries studied in the initial paper by Bouman and Jacobsen (2002). Argentina and Brazil are dropped out from the original 37 country data set due to hyperinflation issues during the time period. The countries included are Australia, Austria, Belgium, Canada, Chile, Denmark, Finland, France, Germany, Greece, Hong Kong, Indonesia, Ireland, Italy, Japan, Jordan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Philippines, Portugal, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom and United States.

Following the previous literature, I use MSCI indices in order to account for dividends which is crucial for the research progress. I use two equal length time periods to test the development of the anomaly. The first period is from May 1991 to October 2003 and the second period is from November 2003 to April 2017. All countries follow these time periods except Russia (1995) and South Africa (1993) due to data unavailability.

In order to thoroughly test the hypotheses, I continue by dividing the standard MSCI indices into small, mid and large cap MSCI indices to research if capitalization affects the anomaly.

The time period used for the small, mid and large cap MSCI indices is May 1995-April 2017 except for 4 countries; Jordan (1996), Mexico (1996), Portugal (1998) and Taiwan (1997) due to data unavailability. The small, mid and large cap MSCI data is mainly available from 1995 onwards, and thus only one time period is considered compared to two distinct periods with regular MSCI indices. Greece and New Zealand are not included in this data set due to insufficient data. All MSCI data is taken from Datastream.

Year 2008 is removed from the final data set due to the rapid decline in stock prices during the fall months. The entire year is removed in order to drop out an equal number of observations from both half-year periods of the data. The Dot.com bubble at the turn of the millennium is preserved in the data set because the decline in stock prices were more evenly distributed throughout the months.

I use excess monthly returns in my study in order to eliminate the possible influence of interest rate variation to the index returns. I use Kenneth French monthly regional risk-free rates from their 3-factor portfolio as a proxy for the risk-free rate. The regional rates apply to North America, Europe, Asia-Pacific (excluding Japan), Japan and Global (excluding US).

Following the methodology used in most of the previous studies of the Halloween effect, the hypothesis testing is done with excess monthly returns calculated with continuous compounding. The index return on month t is defined as follows:

(1) $$r_t^i = ln\left(\frac{cv_t}{cv_{t-1}}\right)$$

and

(2) $$r_t^i = ln\left(\frac{cv_t}{cv_{t-1}} - rf_t\right).$$

Equation 1 is continuously compounded monthly return, and equation 2 is continuously compounded monthly excess return, where cv_t is the closing value of the index on the last trading day of month t, cv_{t-1} is the closing value on the last trading day of previous month, and rf_t is the monthly risk-free rate.

The final data to study the Halloween effect consists of 35,124 monthly observations from 35 countries in 6 different geographical regions. See Appendix 1 for a summary of the data.

4 Methodology

4.1 The Halloween Effect in General

The original methodology to test the existence of the Halloween effect follows the footsteps of Bouman and Jacobsen (2002). It involves standard ordinary least squares (OLS) regression with dummy variables, which is equivalent to a simple mean test: are mean returns in the November-April period significantly higher over the May-October period? The t-statistics are computed using Newey-West heteroscedasticity and autocorrelation consistent (HAC) standard errors, which are used in many other academic papers regarding the Halloween effect (see e.g. Andrade et al., 2014; Dichtl and Drobetz, 2013; Matilde, 2015). In order to test the first hypothesis and to maintain consistency with Bouman and Jacobsen (2002), the following equation is estimated:

(3) $$r_t^m = \alpha + \beta_1 Hal + \varepsilon,$$

where the dependent variable r_t^m represents the continuously compounded index return in month t, α is a constant, Hal is a dummy variable which gets a value of 1 if month t lies in the November-April period and 0 otherwise, and ε is an error term. A positive and statistically significant β_1 provides evidence against the null hypothesis of no Halloween effect. α is the mean return for the summer periods (May-October). β_1 can be interpreted as the winter premium, in other words the average winter returns (November-April) in excess of the summer returns, and $\alpha + \beta_1$ is the mean return for the winter periods (November-April). A regression analysis is preferred over a simple mean test, since additional variables can be added to the equation.

4.2 Controlling for January

The second hypothesis states that the January effect might be a possible explanation for the Halloween effect. In order to examine this, one more dummy variable is added to the equation:

$$(4) \qquad r_t^m = \alpha + \beta_1 Hal_{adj} + \beta_2 Jan + \varepsilon.$$

In this equation, Jan is the other dummy variable which gets a value of 1 in January and 0 otherwise. Respectively, Hal_{adj} gets a value of 1 in every month from November to April except for January. If β_2 is significant and β_1 is not, it would state that the January effect is causing the Halloween effect. Nevertheless, it must be noted that by adjusting the Halloween dummy, β_1 now represents the winter premium totally excluding January returns. This might exaggerate the size of the January effect and respectively understate the true size of the Halloween effect. This method was also introduced by Bouman and Jacobsen (2002).

4.3 Portfolio Construction and Performance Ratios

After testing the hypotheses, I create equal-weighted regional Halloween portfolios to examine if a strategy based on the Halloween effect can outperform the traditional Buy & Hold strategy. The time period for testing the strategies is from May 1991 to April 2017. The Buy & Hold strategy is to invest in the MSCI market index at the start of the period and keep a full equity exposure through the entire period. The Halloween strategy is to follow the same logic as the stated effect itself: each year to invest in the MSCI market index for the winter periods (November to April) and then to risk-free asset for the summer periods (May to October). The regions tested are MSCI Europe, MSCI USA, MSCI Asia, and MSCI Global[4].

[4] Due to small sample sizes in other geographical regions, I choose not to construct individual regional portfolios for North America excluding USA (n=2), South America (n=1), Africa (n=1) and Pacific (n=2). Thus, the Global portfolio represents an equally-weighted combination of the respective countries in the before mentioned regions (Canada, Mexico, Chile, South Africa, Australia and New Zealand).

Both strategies start with a 1,000 US dollar initial investment from where the progresses are plotted. A transaction cost of 0.25% per transaction is considered in order not to favour the Halloween strategy, which needs two transactions per year through the tested time period. Year 2008 is considered in the calculations in order to give as orthodox-as-possible results from a realistic investor perspective.

In order to compare thoroughly both strategies, the performances need to be evaluated on a risk-adjusted basis. For this purpose, Sharpe and Treynor ratios are calculated for both portfolios. To see more information about Sharpe and Treynor ratios, see Appendix 2.

The performance of the portfolios is evaluated by end-of-wealth progression in addition to Sharpe and Treynor ratios. If the Halloween strategy is able to beat the traditional Buy & Hold strategy with these measures, it would be implied as evidence against the efficient market hypothesis.

5 Results

This chapter presents the results of the study. The results are divided into four Sections. The first Section displays the results of the existence of the Halloween effect with regular MSCI indices followed by a division into small, mid and large cap MSCI indices. The second Section presents the results controlling for January with the respective indices. The third Section of the chapter analyses standard deviations of the regular MSCI indices in order to examine if risk affects the anomaly. Finally, the fourth Section demonstrates if investing in a portfolio which utilizes the Halloween effect can outperform the market.

5.1 The Halloween Effect in General

Table 1 presents the results for the Halloween effect from regular MSCI indices among 35 countries studied with two equal-length periods. The second column illustrates the mean return for the summer period (May-October), whereas column 3 represents the mean return for the winter period (November-April). The Halloween effect can be interpreted as the difference between these periods (in column 4). Newey-West HAC t-values are reported in the fifth column, where bolding indicates a statistically significant result at the 10% level.

Table 1 **Country-by-Country Regular MSCI Statistics by Time Period**

	Timeperiod 1, May '91-Oct '03				Timeperiod 2, Nov '03-April '17			
	α	$\alpha + \beta_1$	Halloween		α	$\alpha + \beta_1$	Halloween	
Country	May-Oct	Nov-Apr	Effect	t-value	May-Oct	Nov-Apr	Effect	t-value
Australia	-1.93	4.30	**6.23**	**1.692**	2.84	5.70	2.85	0.821
Austria	-8.96	6.35	**15.31**	**2.997**	0.83	10.53	**9.70**	**1.872**
Belgium	-3.25	5.19	**8.44**	**1.888**	4.58	8.31	3.72	0.964
Canada	-0.66	5.20	5.86	1.295	2.75	5.66	2.90	0.934
Chile	4.57	5.99	1.41	0.214	3.31	4.89	1.57	0.389
Denmark	-0.54	5.28	5.82	1.066	2.42	13.95	**11.53**	**2.724**
Finland	2.31	17.23	14.92	1.412	3.27	5.41	2.13	0.365
France	-4.98	9.69	**14.67**	**2.669**	1.39	6.93	5.54	1.356
Germany	-5.10	8.56	**13.66**	**2.155**	2.40	8.85	6.44	1.431
Greece	-7.35	12.03	**19.38**	**2.202**	-5.97	-0.35	5.58	0.565
Hong Kong	2.84	4.14	1.30	0.155	7.23	6.51	-0.71	-0.138
Indonesia	-6.91	11.99	**18.91**	**1.684**	8.99	14.87	5.88	1.039
Ireland	-5.87	9.32	**15.20**	**2.889**	-3.47	11.46	**14.93**	**2.928**
Italy	-8.43	14.38	**22.82**	**3.446**	-0.85	4,59	5.44	1.027
Japan	-6.38	0.42	5.96	1.123	-0.62	8.08	**8.71**	**1.862**
Jordan	-2.90	4.03	**6.93**	**1.753**	-0.76	3.18	3.95	0.703
Malaysia	-4.38	9.02	13.40	1.451	-4.38	9.01	13.39	1.458
Mexico	4.96	12.73	7.76	0.974	9.22	7.01	-2.21	-0.548
Netherlands	-3.25	7.69	**10.94**	**2.081**	4.00	7.05	3.04	0.765
New Zealand	-1.43	2.09	3.53	0.672	0.08	5.78	5.70	1.648
Norway	-4.88	7.21	**12.10**	**1.910**	3.89	8.65	4.75	1.025
Philippines	-5.50	8.28	13.78	1.518	8.72	8.76	0.04	0.007
Portugal	-4.60	7.11	**11.72**	**1.967**	-3.22	5.88	**9.11**	**1.956**
Russia	4.86	31.77	26.91	1.156	7.26	10.98	3.72	0.559
Singapore	-4.14	4.98	9.13	1.322	2.38	6.93	4.55	1.034
South Africa	-2.41	10.79	**13.20**	**1.933**	7.24	6.91	-0.33	-0.086
South Korea	-3.84	12.67	16.51	1.552	3.75	8.45	4.69	1.004
Spain	-4.90	12.73	**17.64**	**2.846**	6.83	1.49	-5.34	-0.983
Sweden	-2.43	12.88	**15.32**	**2.011**	2.22	9.96	**7.73**	**1.878**
Switzerland	-0.45	7.54	**7.99**	**1.669**	2.03	5.28	3.24	1.108
Taiwan	-10.89	14.05	**24.94**	**2.686**	1.13	6.57	5.43	1.189
Thailand	-3.47	5.76	9.23	0.761	6.03	7.47	1.43	0.795
Turkey	9.27	54.11	**44.84**	**2.645**	10.20	10.43	0.22	0.047
United Kingdom	-2.44	3.88	6.31	1.533	2.34	4.03	1.69	0.520
USA	0.31	5.07	4.76	1.124	3.48	6.59	3.11	0.900

Table 1 presents a summary of country-by-country MSCI total index returns in local currencies for two distinct time periods. Returns are expressed in percentages semi-annually. The Halloween effect is defined as the half-year return for November–April minus the half-year return for May–October (expressed in pps). T-statistics are computed using Newey-West heteroscedasticity and autocorrelation consistent (HAC) standard errors. The data starts in 1991 for all countries except for Russia (1995) and South Africa (1993). Coefficients that are statistically significant at the 10% level are in bold.

Consistent with the previous literature, the Halloween effect seems economically large averaging 12.77% during the first period. Moreover, the effect is found in all 35 countries studied. In addition, 19 out of 35 countries report statistically significant results at the 10% level. The effect is especially powerful in European countries, averaging a 15.27% winter premium. Furthermore, the effect seems to be strong in Asian countries as well, in exception of Hong Kong, averaging 13.20%. However, the Pacific countries on the other side of the equator report low premiums compared to other regions. The majority of the countries report a negative return during the summer, whereas all countries have positive returns during the winter. The results from period 1 truly contests the theories based on efficient markets.

However, the second period reveals different results. During the latter period, the average Halloween effect drops by almost 8.5 percentage points, to 4.40%, although the effect is still economically significant in 31 out of 35 markets. Nevertheless, a statistically significant effect can only be found in 6 out of 35 countries on the 10% level. The mean summer returns are now negative in only 7 markets. Much like the first period, the winter mean returns are positive in 34 out of 35 markets. The regional dispersion of the effect remains intact; European countries witness the largest Halloween effect followed close by Asian countries.

A further division into small, mid and large cap MSCI indices in Table 2 endorses the findings from Table 1. The Halloween effect is found in all countries across all index types except for Jordan large cap. The results are statistically significant at the 10% level in 23 small cap, 22 mid cap and 19 large cap indices. The average Halloween effect counts to 10.81% in small cap, 9.59% in mid cap and 8.45% in large cap indices.

Table 2	Country-by-Country Small, Mid and Large Cap MSCI Statistics											
	Small Cap				Mid Cap				Large Cap			
	α	$\alpha + \beta_1$	Halloween		α	$\alpha + \beta_1$	Halloween		α	$\alpha + \beta_1$	Halloween	
Country	May-Oct	Nov-Apr	Effect	t-value	May-Oct	Nov-Apr	Effect	t-value	May-Oct	Nov-Apr	Effect	t-value
Australia	2.40	4.50	2.10	0.723	1.34	4.68	3.34	1.246	0.00	6.21	**6.22**	**2.309**
Austria	-2.68	11.50	**14.19**	**3.871**	-1.34	9.24	**10.57**	**2.478**	-2.46	9.98	**12.43**	**1.942**
Belgium	-1.37	7.58	**8.96**	**2.856**	-1.06	9.06	**10.11**	**2.815**	2.44	7.04	4.60	1.342
Canada	1.16	7.87	**6.71**	**2.098**	1.49	7.97	**6.48**	**2.240**	1.18	5.76	4.59	1.502
Chile	2.02	5.36	3.35	0.853	1.71	4.52	2.81	0.772	-0.04	4.61	4.65	1.205
Denmark	4.17	12.61	**8.43**	**2.001**	3.86	10.29	6.43	1.602	1.29	11.06	**9.77**	**2.293**
Finland	1.28	12.55	**11.26**	**2.611**	-0.80	11.22	**12.02**	**2.753**	3.88	8.62	4.74	0.639
France	-0.87	13.10	**13.97**	**3.346**	-2.53	11.54	**14.06**	**3.810**	-1.55	8.26	**9.81**	**2.555**
Germany	-3.42	8.46	**11.88**	**2.873**	-0.51	8.52	**9.03**	**2.366**	-1.38	8.87	**10.25**	**2.456**
Hong Kong	-0.79	7.83	8.61	1.432	0.37	7.76	7.39	1.444	3.71	5.21	1.49	0.321
Indonesia	-3.85	11.44	**15.28**	**2.364**	2.01	14.81	**12.80**	**1.921**	1.17	14.76	**13.59**	**2.090**
Ireland	1.66	15.93	**14.27**	**2.711**	-1.26	8.82	**10.08**	**2.245**	-5.40	12.21	**17.61**	**3.670**
Italy	-3.77	12.53	**16.30**	**3.567**	-5.31	11.95	**17.27**	**3.404**	-3.90	8.03	**11.93**	**2.642**
Japan	-3.50	5.16	**8.66**	**1.973**	-2.53	4.46	**6.99**	**1.823**	-3.57	5.07	**8.64**	**2.437**
Jordan	-2.50	7.14	**9.64**	**2.316**	-3.94	2.66	6.60	1.056	7.19	4.86	-2.33	-0.316
Malaysia	-2.00	7.33	9.33	1.431	-2.32	7.06	**9.38**	**1.824**	-1.82	6.49	8.31	1.638
Mexico	1.46	8.81	**7.35**	**1.822**	4.14	6.34	2.20	0.365	4.96	9.03	4.07	0.962
Netherlands	-3.59	9.20	**12.79**	**3.200**	-0.68	7.68	**8.36**	**2.082**	0.50	7.71	**7.20**	**1.958**
Norway	-0.68	9.58	**10.26**	**2.229**	0.93	8.64	**7.71**	**1.753**	0.29	7.83	**7.54**	**1.802**
Philippines	1.69	6.20	4.52	0.776	1.30	9.51	8.21	1.256	-2.48	9.27	**11.74**	**2.101**
Portugal	-5.38	9.58	**14.96**	**2.869**	-10.06	8.09	**18.14**	**3.248**	-4.72	5.07	**9.80**	**2.106**
Russia	10.52	23.58	13.06	1.208	10.94	23.73	12.79	1.012	2.51	21.78	**19.27**	**2.151**
Singapore	-0.22	7.48	7.70	1.341	-1.13	5.96	7.09	1.432	-1.39	4.54	5.93	1.300
South Africa	3.65	9.21	5.56	1.854	1.09	7.95	**6.86**	**1.791**	3.05	6.82	3.77	0.894
South Korea	-2.18	7.57	9.75	1.446	0.09	7.46	7.38	1.254	-1.50	10.15	**11.65**	**1.841**
Spain	-0.28	11.16	**11.45**	**2.915**	-0.33	8.75	**9.08**	**2.240**	1.61	6.82	5.21	1.081
Sweden	0.51	13.92	**13.40**	**3.455**	-0.46	11.20	**11.66**	**3.147**	-0.73	10.93	**11.66**	**2.482**
Switzerland	-1.31	11.56	**12.87**	**3.421**	-0.28	7.88	**8.15**	**2.149**	0.43	5.82	**5.39**	**1.709**
Taiwan	-10.48	13.07	**23.55**	**4.021**	-8.12	9.97	**18.09**	**3.298**	-3.35	8.29	**11.64**	**2.232**
Thailand	0.79	4.37	3.59	0.555	-1.70	6.36	8.07	1.294	-2.08	6.05	8.12	1.157
Turkey	5.01	29.85	**24.84**	**2.789**	8.83	31.07	**22.25**	**2.468**	7.73	28.96	**21.23**	**2.079**
United Kingdom	-1.11	9.85	**10.96**	**3.091**	-0.29	7.06	**7.35**	**2.396**	-0.27	3.96	4.22	1.568
USA	2.09	9.37	**7.28**	**1.777**	1.46	9.21	**7.75**	**2.199**	2.01	6.19	4.18	1.370

Table 2 presents a summary of country-by-country small, mid and large cap MSCI total index returns in local currencies. Returns are expressed in percentages semi-annually. The Halloween effect is defined as the half-year return for November–April minus the half-year return for May–October (expressed in pps). T-statistics are computed using Newey-West heteroscedasticity and autocorrelation consistent (HAC) standard errors. The data starts in 1995 for all countries except for 4 countries; Jordan (1996), Mexico (1996), Portugal (1998) and Taiwan (1997). Coefficients that are statistically significant at the 10% level are in bold.

Similar to the results from Table 1, European countries report the highest Halloween effects. Based on these results, the Halloween effect seems not to be another “small firm anomaly”, since the effect can be statistically and economically found in all size capped indices. Furthermore, the economical and statistical differences between the different index types are rather marginal. All in all, the results show strong evidence for the first hypothesis of the thesis and against the efficient market hypothesis: The Halloween effect indeed exists on the stock market, although the economical and statistical impact of the effect seems to be significantly weaker on the latter time period.

5.2 The Halloween Effect Controlled for January

The next step is to test whether returns in January can explain the abnormal returns in the winter periods (hypothesis 2). In order to test this, a January dummy is added to the equation. Table 3 shows the results for estimating $r_t^m = \alpha + \beta_1 Hal_{adj} + \beta_2 Jan + \varepsilon$ with regular MSCI indices.

Table 3 **Country-by-Country Regular MSCI controlled for January Statistics**

	Timeperiod 1, May '91-Oct '03				Timeperiod 2, Nov '03-April '17			
Country	January Effect	t-value	Halloween Effect	t-value	January Effect	t-value	Halloween Effect	t-value
Australia	0.62	0.515	**5.61**	**1.771**	-0.55	-0.529	3.41	1.212
Austria	**2.71**	**1.654**	**12.60**	**2.789**	1.43	0.881	8.27	1.593
Belgium	0.40	0.321	**8.04**	**1.902**	1.24	1.047	2.49	0.754
Canada	1.51	1.057	4.34	1.105	0.08	0.094	2.82	1.040
Chile	0.87	0.090	0.54	0.421	0.69	0.349	0.90	0.669
Denmark	**3.36**	**1.902**	2.45	0.522	**3.24**	**2.562**	**8.28**	**2.341**
Finland	3.16	0.926	11.76	1.266	1.54	0.947	0.59	0.195
France	2.03	1.165	**12.64**	**2.745**	0.48	0.420	5.05	1.406
Germany	2.43	1.211	**11.19**	**2.104**	-0.08	-0.091	6.53	1.603
Greece	**5.99**	**2.212**	**13.39**	**1.753**	2.13	0.777	3.45	0.496
Hong Kong	-2.55	-0.985	3.84	0.555	0.54	0.374	-1.26	-0.277
Indonesia	**7.27**	**2.018**	11.63	1.205	-0.10	-0.052	5.98	1.210
Ireland	**3.50**	**2.098**	**11.70**	**2.563**	1.01	0.611	**13.93**	**3.211**
Italy	**5.93**	**2.901**	**16.89**	**2.920**	0.72	0.449	4.72	1.028
Japan	0.60	0.330	5.35	1.292	-0.18	-0.214	**8.89**	**2.259**
Jordan	**2.26**	**1.798**	4.67	1.277	2.50	1.429	1.44	0.214
Malaysia	1.14	0.434	12.25	1.551	0.37	0.537	2.03	0.777
Mexico	0.66	0.287	7.09	1.065	-1.88	-0.084	-0.32	-1.553
Netherlands	0.16	0.099	**10.78**	**2.364**	0.61	0.418	2.44	0.749
New Zealand	1.56	1.021	1.97	0.548	**1.71**	**1.665**	4.00	1.439
Norway	2.30	1.131	**9.81**	**1.792**	0.64	0.372	4.11	1.064
Philippines	4.27	1.495	9.51	1.285	1.19	0.813	-1.15	-0.245
Portugal	**4.65**	**2.497**	7.07	1.369	1.61	1.242	**7.51**	**1.832**
Russia	-1.43	-0.199	28.61	1.469	1.84	0.955	1.88	0.314
Singapore	-0.94	-0.451	10.07	1.616	0.37	0.281	4.18	1.194
South Africa	1.53	0.722	**11.70**	**1.954**	-0.42	-0.326	0.09	0.024
South Korea	**8.79**	**2.647**	7.73	0.888	0.39	0.297	4.30	1.143
Spain	**3.72**	**1.888**	**13.92**	**2.593**	-1.46	-0.891	-3.88	-0.822
Sweden	2.93	1.294	**12.39**	**1.800**	0.75	0.623	**7.00**	**1.940**
Switzerland	0.36	0.289	**7.64**	**1.784**	0.01	0.004	3.24	1.281
Taiwan	**5.70**	**1.859**	**19.24**	**2.357**	-0.47	-0.361	5.90	1.457
Thailand	**8.95**	**2.349**	0.28	0.022	-1.29	-0.658	2.72	0.531
Turkey	7.81	1.492	**37.03**	**2.489**	0.61	0.356	-0.39	-0.066
United Kingdom	-0.53	-0.411	**6.84**	**1.936**	-0.91	-0.975	2.60	0.930
USA	0.77	0.573	3.99	1.140	-1.15	-1.082	4.26	1.482

Table 3 presents a summary of country-by-country MSCI total index returns in local currencies for the Halloween effect controlled for January. The returns for the adjusted Halloween effect are expressed in percentages from November-April periods excluding January. The adjusted Halloween effect is defined as the half-year return for November–April excluding January minus the half-year return for May–October (expressed in pps). T-statistics are computed using Newey-West heteroscedasticity and autocorrelation consistent (HAC) standard errors. The data starts in 1991 for all countries except for Russia (1995) and South Africa (1993). Coefficients that are statistically significant at the 10% level are in bold.

For this equation, the Halloween dummy has been adjusted not to count for returns in January. The results from Table 3 indicate that the Halloween effect reduces slightly after controlling for January, as expected. For period 1, the mean winter premium reduces to 10.13% (12.77%)[5], while the average return for January counts to 2.64%. The t-values of β_1 are in general slightly lower with January excluded, making the Halloween effect statistically less significant but the difference is trivial: the coefficient stays significant in 17 out of 35 countries in the sample at the 10% level. Moreover, the Halloween effect still exists economically in every country in the sample. There are only 3 countries in the sample (Indonesia, Jordan and Portugal) where a statistically significant January effect propels the Halloween effect below the 10% threshold of statistical significance.

Following the result pattern in Table 1, the second period reports different results. Firstly, a statistically significant January effect can only be found in two countries (New Zealand and Denmark) compared to 17 significant coefficients in time period 1. Moreover, they do not affect the Halloween effect's statistical significance on the 10% level.

The average Halloween effect reduces to 3.60% (4.40%) and is statistically significant in 5 countries, compared to 6 significant coefficients with January included. The average return in January drops to 0.49% (2.64%) and is in general very insignificant statistically.

Being consistent with the methodology in this paper, the January effect is now controlled for small, mid and large cap MSCI indices. Table 4 presents the results.

The results from Table 4 fortify the survivability of the Halloween effect controlled for January. Although 17 statistically significant January effects can be found in small cap indices, the Halloween effect survives statistically in every country where a significant Halloween effect was found with January returns included. Similar results are found in mid cap indices, Malaysia being the only country where a statistically significant January effect turns the Halloween effect insignificant on the 10% level. Furthermore, South Korea is the

[5] From this point onward, the second value in parenthesis represents a comparable result in a previous table in order to clarify the interpretation.

only market among large cap indices where the Halloween effect does not survive controlling for January.

Table 4	Country-by-Country Small, Mid and Large Cap MSCI controlled for January											
	Small Cap				Mid Cap				Large Cap			
Country	January Effect	t-value	Halloween Effect	t-value	January Effect	t-value	Halloween Effect	t-value	January Effect	t-value	Halloween Effect	t-value
Australia	-0.76	-0.822	2.88	1.112	-0.47	-0.591	**3.83**	**1.658**	0.27	0.330	**5.96**	**2.542**
Austria	**3.67**	**3.385**	**10.50**	**3.395**	2.10	1.002	**8.47**	**2.244**	-2.48	-1.042	**14.91**	**2.568**
Belgium	**1.84**	**1.843**	**7.11**	**2.534**	1.78	1.578	**8.33**	**2.659**	-0.44	-0.346	5.06	1.549
Canada	0.74	0.731	**5.98**	**2.019**	0.64	0.728	**5.85**	**2.496**	0.49	0.538	4.10	1.532
Chile	0.73	0.635	2.62	0.772	0.48	0.399	2.33	0.700	0.32	0.341	4.33	1.195
Denmark	**4.25**	**3.549**	4.13	1.129	**2.07**	**1.745**	4.34	1.259	**2.81**	**2.158**	**6.94**	**1.883**
Finland	**3.21**	**2.495**	**8.03**	**2.159**	1.18	0.892	**10.86**	**2.771**	0.55	0.257	4.19	0.694
France	**3.92**	**3.241**	**10.02**	**2.754**	**2.35**	**2.195**	**11.71**	**3.654**	0.94	0.824	**8.88**	**2.817**
Germany	**3.86**	**3.009**	**7.99**	**2.290**	1.63	1.380	**7.40**	**2.216**	0.80	0.599	**9.47**	**2.582**
Hong Kong	-0.61	-0.235	**9.26**	**1.774**	-0.30	-0.184	7.72	1.641	-1.13	-0.741	2.65	0.563
Indonesia	1.21	0.603	**14.09**	**2.466**	0.49	0.256	**12.34**	**2.125**	**3.60**	**1.794**	**9.97**	**1.666**
Ireland	**3.64**	**2.395**	**10.61**	**2.398**	2.19	1.583	**7.89**	**1.853**	0.94	0.743	**16.72**	**4.021**
Italy	**3.58**	**2.542**	**12.71**	**3.284**	**4.49**	**2.798**	**12.74**	**2.583**	**2.27**	**1.666**	**9.65**	**2.539**
Japan	**2.26**	**1.624**	**6.38**	**1.694**	0.46	0.444	**6.55**	**2.018**	-0.34	-0.295	**9.02**	**2.849**
Jordan	**3.12**	**2.419**	**6.52**	**1.805**	3.27	-1.135	3.33	0.971	0.85	0.654	-3.20	-0.925
Malaysia	2.56	1.398	6.76	1.194	**2.64**	**1.659**	6.72	1.493	1.34	0.853	**6.97**	**1.683**
Mexico	0.02	0.017	**7.33**	**2.094**	-0.54	-0.699	2.75	0.556	0.19	0.191	3.88	0.582
Netherlands	**2.51**	**2.104**	**10.27**	**2.999**	1.44	1.146	**6.93**	**1.992**	0.02	0.016	**7.21**	**2.481**
Norway	2.23	1.549	**8.01**	**1.909**	-0.46	-0.463	**8.20**	**1.953**	1.08	0.824	**6.46**	**1.892**
Philippines	2.06	1.194	2.44	0.457	0.58	0.683	**7.63**	**1.692**	0.80	0.410	**10.95**	**2.175**
Portugal	**4.54**	**3.012**	**10.40**	**2.333**	1.54	0.895	**16.60**	**2.395**	0.97	0.534	**8.85**	**1.957**
Russia	4.65	1.432	8.42	0.835	-1.53	0.360	11.75	0.995	-1.00	-0.366	**16.92**	**1.882**
Singapore	0.41	0.246	7.31	1.483	0.96	0.643	6.13	1.439	0.12	0.090	**5.82**	**1.693**
South Africa	1.07	1.048	4.48	1.496	0.21	0.186	**6.65**	**1.683**	-0.45	-0.379	4.20	0.895
South Korea	3.54	1.778	6.17	1.159	**2.28**	**1.749**	5.12	1.249	**3.48**	**1.920**	8.15	1.583
Spain	**3.84**	**3.208**	**7.57**	**2.285**	0.95	0.771	**8.14**	**2.454**	0.08	0.055	5.15	1.256
Sweden	**1.93**	**1.698**	**11.48**	**3.986**	0.88	0.769	**10.80**	**3.205**	1.95	1.346	**9.72**	**2.305**
Switzerland	**1.84**	**1.632**	**11.03**	**3.435**	0.81	0.693	**7.35**	**2.249**	-0.42	-0.467	**5.83**	**2.159**
Taiwan	**5.62**	**3.028**	**17.94**	**3.569**	1.37	1.241	**16.73**	**3.092**	3.20	1.452	**8.44**	**1.693**
Thailand	1.81	0.991	1.76	0.321	-0.04	-0.22	**8.10**	**1.829**	**3.55**	**1.692**	4.54	0.739
Turkey	**5.66**	**1.996**	**19.15**	**2.407**	**2.80**	**1.684**	**19.45**	**2.946**	**5.37**	**1.684**	**15.83**	**1.774**
United Kingdom	0.63	0.619	**10.35**	**3.275**	-0.08	-0.088	**7.46**	**2.784**	-4.83	-1.112	**9.05**	**2.205**
USA	-0.52	-0.356	**7.83**	**2.158**	-0.26	-0.253	**8.03**	**2.648**	-0.37	-0.421	**4.57**	**1.748**

Table 4 presents a summary of country-by-country small, mid and large cap MSCI total index returns in local currencies for the Halloween effect controlled for January. The returns for the adjusted Halloween effect are expressed in percentages from November-April periods excluding January. The adjusted Halloween effect is defined as the half-year return for November–April excluding January minus the half-year return for May–October (expressed in pps). T-statistics are computed using Newey-West heteroscedasticity and autocorrelation consistent (HAC) standard errors. The data starts in 1995 for all countries except for 5 countries; Greece (2001), Jordan (1996), Mexico (1996), Portugal (1998) and Taiwan (1997). Coefficients that are statistically significant at the 10% level are in bold.

Although the mean Halloween effects drops to 8.41% (10.81%) in small cap, 8.43% (9.59%) in mid cap and 7.61% (8.45%) in large cap indices, the statistical and economical survivability in consideration to the January returns is remarkable. Therefore, the January effect can be ruled out as an explanation for the Halloween puzzle.

5.3 The Halloween Effect in Relation with Risk

An interesting question is whether higher returns during the winter period can be explained by compensation for risk. According to the theory, it should not be possible for one six-month period to consistently yield better returns compared to the other half of the year if both periods account for the same amount of risk. In order to investigate this, I report regular MSCI indices' average returns for both six month periods and their respective semi-annual standard deviations in Table 5.

Table 5 **Semi-annual Summary Statistics for Regular MSCI indeces' Mean Returns and Standard Deviations**

	Timeperiod 1, May '91-Oct '03				Timeperiod 2, Nov '03-April '17			
Country	Nov-April	Standard Deviation	May-Oct	Standard Deviation	Nov-April	Standard Deviation	May-Oct	Standard Deviation
Australia	4.30	8.98	-1.93	10.27	5.70	7.49	2.84	8.92
Austria	6.35	14.52	-8.96	17.70	10.53	13.69	0.83	14.52
Belgium	5.19	12.29	-3.25	11.87	8.31	9.81	4.58	12.29
Canada	5.20	10.52	-0.66	11.61	5.66	7.19	2.75	10.52
Chile	5.99	17.93	4.57	15.81	4.89	10.30	3.31	17.93
Denmark	5.28	13.04	-0.54	13.97	13.95	10.99	2.42	13.04
Finland	17.23	26.18	2.31	24.97	5.41	15.45	3.27	26.18
France	9.69	12.74	-4.98	14.79	6.93	9.07	1.39	12.74
Germany	8.56	14.41	-5.10	17.28	8.85	10.88	2.40	14.41
Greece	12.03	27.52	-7.35	28.14	-0.35	24.37	-5.97	27.52
Hong Kong	4.14	18.75	2.84	22.26	6.51	11.01	7.23	18.75
Indonesia	11.99	27.54	-6.91	35.98	14.87	13.44	8.99	27.54
Ireland	9.32	13.48	-5.87	15.06	11.46	12.82	-3.47	13.48
Italy	14.38	16.70	-8.43	16.74	4,59	13.23	-0.85	16.70
Japan	0.42	14.01	-6.38	14.70	8.08	11.86	-0.62	14.01
Jordan	4.03	9.69	-2.90	11.50	3.18	14.59	-0.76	9.69
Malaysia	9.02	23.72	-4.38	21.09	9.01	7.98	-4.38	23.72
Mexico	12.73	19.42	4.96	23.17	7.01	10.69	9.22	19.42
Netherlands	7.69	11.30	-3.25	14.00	7.05	9.33	4.00	11.30
New Zealand	2.09	12.22	-1.43	16.26	5.78	8.06	0.08	12.22
Norway	7.21	14.58	-4.88	16.46	8.65	10.25	3.89	14.58
Philippines	8.28	21.84	-5.50	23.74	8.76	12.27	8.72	21.84
Portugal	7.11	14.06	-4.60	17.58	5.88	11.56	-3.22	14.06
Russia	31.77	42.70	4.86	39.77	10.98	12.85	7.26	42.70
Singapore	4.98	17.04	-4.14	17.17	6.93	9.26	2.38	17.04
South Africa	10.79	16.04	-2.41	14.09	6.91	10.21	7.24	16.04
South Korea	12.67	27.45	-3.84	24.22	8.45	10.91	3.75	27.45
Spain	12.73	14.62	-4.90	17.22	1.49	12.60	6.83	14.62
Sweden	12.88	20.26	-2.43	17.89	9.96	9.69	2.22	20.26
Switzerland	7.54	10.67	-0.45	14.65	5.28	7.94	2.03	10.67
Taiwan	14.05	28.02	-10.89	24.28	6.57	11.31	1.13	28.02
Thailand	5.76	27.75	-3.47	31.65	7.47	14.22	6.03	27.75
Turkey	54.11	51.75	9.27	38.69	10.43	19.04	10.20	51.75
United Kingdom	3.88	9.76	-2.44	11.64	4.03	7.07	2.34	9.76
USA	5.07	10.27	0.31	10.94	6.59	8.04	3.48	10.27

Table 5 presents a summary of MSCI total index half-year mean returns and standard deviations. The standard deviations are calculated from monthly returns followed by multiplying the monthly standard deviations by the square root of six.

Strikingly, during the first period 25 out of 35 countries report a higher standard deviation during the summer period, when returns are lower. Moreover, Jordan is the only country on the latter period where standard deviation is higher during the winter period. Based on these results, the higher returns on the winter period cannot be explained by risk. For example, investors in Finland would require and additional risk premium of almost 15 percent in May 1991-October 2003 to compensate them for an additional 1.21 percent increase in standard deviation. The results are consistent with the previous literature (see e.g. Bouman and Jacobsen, 2002; Novakovic and Swagerman, 2010) contradicting the efficient market hypothesis. The results also hold for small, mid and large cap MSCI indices, see Appendix 2.

5.4 Comparison of Buy & Hold and the Halloween Strategy

The ultimate test is to compare the Halloween strategy to the traditional Buy & Hold strategy. The Buy & Hold strategy holds full equity exposure through the entire time period of May 1991 to April 2017. The Halloween strategy holds the market index through the winter periods (November-April) and switches to risk free asset for the summer periods (May-October). A transaction cost of 0.25% is included in the calculations in order to not favour the Halloween strategy. The portfolios with 1,000 USD initial investments are plotted in Figure 1.

The Halloween strategy is able to beat the Buy & Hold strategy in Europe and Asia. However, the Buy & Hold strategy yields higher end-of-period wealth in USA and the Global region. As reported in Table 1, the improved summer returns from 2003 onwards leads to an almost equal performance of the strategies through the end of the time period. Furthermore, the poor returns during the fall months of the financial crisis (2008) works in favour of the Halloween portfolio, since it holds the risk-free asset most of the turbulent time period. It seems that the Halloween strategy is not anymore “certainly” a superior investment strategy over the Buy & Hold portfolio initially reported by Bouman and Jacobsen (2002), since together with the improved summer returns, future stock crashes most obviously will not always land outside of the winter period. The results are consistent with Lucey and Zhao (2006) and Matilde (2015).

Figure 1 **Regional End-Of-Wealth Comparison For Buy & Hold and Halloween Strategies**

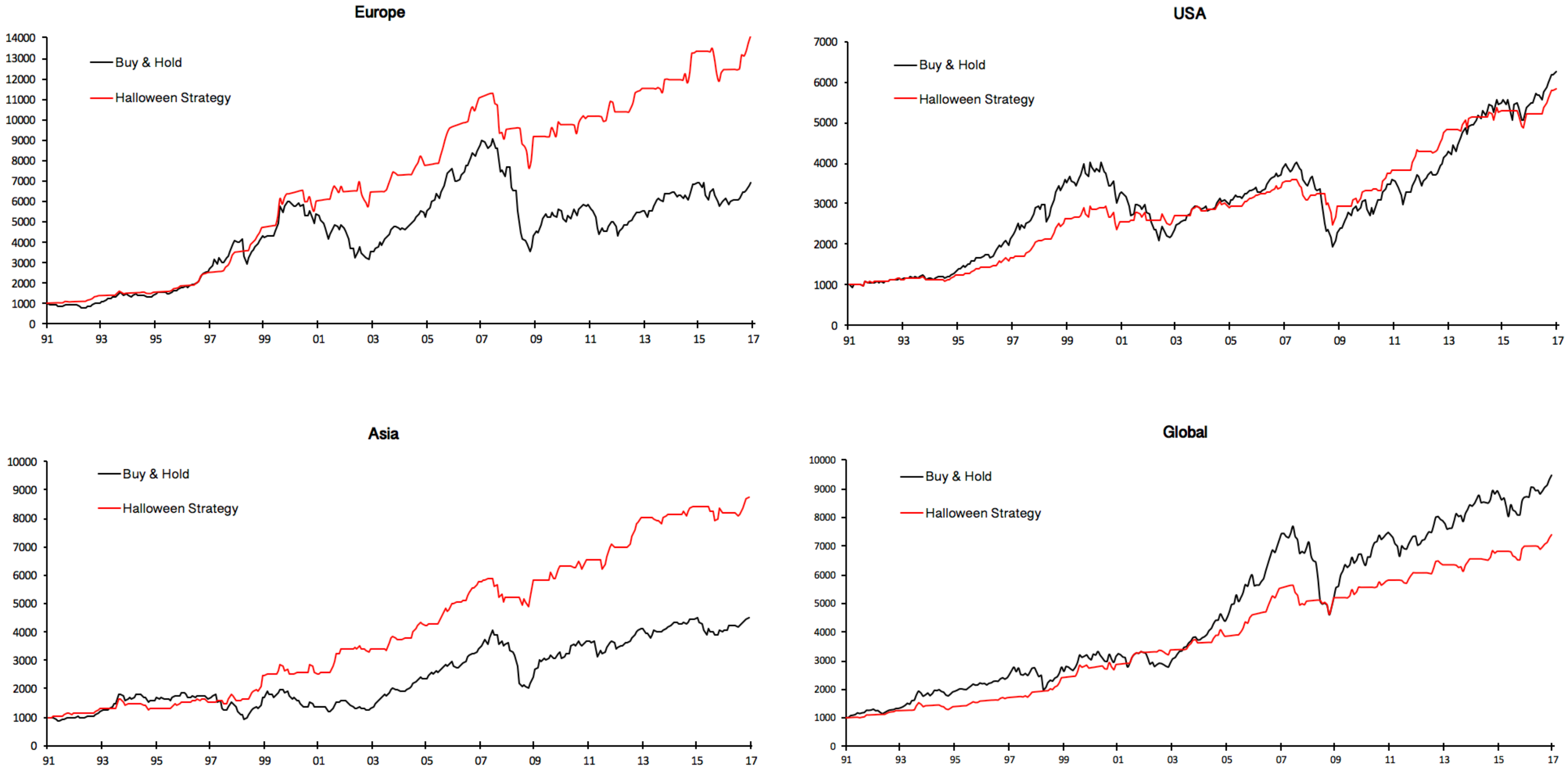

Figure 1 illustrates regional end-of-wealth for Buy & Hold and Halloween strategies. The Buy & Hold strategy invests in the spefic regional portfolio for the entire time period (May 1991-April 2017). The Halloween strategy invests in the regional portfolio for the winter periods (November-April) and shifts to risk-free rate for the summer periods (May-October). The regional portfolios are constructed with equal weights across the countries. A transaction cost of 0,25% is applied to the calculations. The Global region represents all the countries in the data set that do not belong to Europe, Asia or United States (see appendix 1). Russia (Europe) and South Africa (Global) are added to the portfolios in 1991 and 1995, respectively.

Table 6 presents the risk-adjusted performances of the Buy & Hold and the Halloween strategies. Although the Halloween strategy seems like definite choice over the Buy & Hold strategy in consideration of standard deviation, sensitivity to the general market movement (beta) and the two risk-adjusted performance indicators (Sharpe and Treynor ratios), the results are not unambiguous. As stated earlier, the financial crisis of 2008 most likely distorts the results. However, the European and Asian portfolios are able to perform commendably regardless of the turbulent time periods in the sample. As a sum up, the Halloween strategy seems - cautiously stated - like a considerable investment strategy in 2017, although it is not expected to outperform the Buy & Hold strategy anymore, at least not by a "clear margin".

Table 6 **Performance of Strategies**

	Europe		USA		Asia		Global	
	Buy & Hold	Halloween Strategy	Buy & Hold	Halloween Strategy	Buy & Hold	Halloween Strategy	Buy & Hold	Halloween Strategy
Mean	9.04	10.88	8.25	7.29	7.32	9.03	9.73	8.06
Standard Deviation	17.31	11.29	14.28	9.60	17.48	11.48	12.86	7.91
Beta	1.00	0.43	1.00	0.45	1.00	0.43	1.00	0.37
Sharpe Ratio	0.51	0.94	0.56	0.74	0.41	0.77	0.74	0.99
Treynor Ratio	0.09	0.25	0.08	0.16	0.07	0.21	0.10	0.22

Table 6 shows the performance ratios of the respective portfolios. Mean returns and standard deviations are shown in percentages (annualized). The annualized standard deviations are calculated by by multiplying the monthly standard deviations by the square root of 12.

6 Conclusion

In this thesis, I have examined whether there is a winter premium known as the Halloween effect on the stock market, i.e. if stock returns from November to April (winter) are significantly higher compared to stock returns from May to October (summer). The data consists of standard, small, mid and large cap excess monthly total returns from 35 countries across 6 different geographical regions, using distinct intervals between the time period from May 1991 to April 2017. Moreover, the survivability of the effect is tested in consideration of volatility and the January effect.

To test the Halloween effect, I use standard OLS regression with dummy variables, not differentiating significantly from a basic mean test. I find an economically significant Halloween effect in all 35 countries studied during the first half of the time period, averaging 12.77% across the studied markets. From these countries, 19 out of 35 markets report statistically significant results. Based on my results, European and Asian countries witness the highest winter premiums. However, the economical and statistical significance drops substantially during the latter period. Although the effect is found economically in 31 countries, the average winter premium drops to 4.40%, where only 6 countries report statistically significant results. I find that the improved summer returns during the latter period reduce the magnitude of the effect.

Similar results are also found when examining size capped indices with one comprehensive time period. While small cap indices report marginally the highest winter premiums (10.81%) over mid (9.59%) and large cap (8.45%), the effect is established not to be another small firm anomaly due to almost equal economical and statistical significance regardless of the index type. Furthermore, I find that the effect is not caused by January returns or differences in volatilities during the two half year periods in spite of applied index types or time periods used in this study.

Moreover, I find that an investment strategy based on the Halloween effect is able to beat the traditional Buy & Hold strategy in Europe and Asia, but underperforms in USA and the Global region which was constructed from all the other countries used in this study. The improved summer returns from 2003 onwards and the fact that future stock crises will most likely not land outside of the winter period makes the difference between the strategies rather marginal. Giving advice to an investor in 2017, the Halloween strategy seems to be a considerable investment strategy, but most obviously not a superior choice over the classic Buy & Hold. Contradicting the evidence from the initial paper by Bouman and Jacobsen (2002), these findings are consistent with the more recent research of the anomaly (see e.g. Lucey and Zhao, 2008; Matilde, 2015).

Topics for further research include expanding the geographical scope while studying the effect. Especially a comparison between countries close and far off from the equator would shed light on the geographical circumstances' effect on the anomaly. Furthermore, the solution to the Halloween puzzle remains unsolved. In order to contribute to this, other seasonal anomalies than the January effect could be tested on the Halloween anomaly, e.g., turn-of-the-month effect and the Holiday effect. In addition, the statistical testing could be done with different regression techniques in order to see if the results stay robust.

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Appendices

Appendix 1	**Country by Country Number of Observations, Time Periods and Risk-free Proxies**				
Region and Country	Number of Observations				Risk-free Proxy
	Regular MSCI		Small Cap	Mid Cap	Large Cap	
	Time period 1: '91 - '03	Time period 2: '03 - '17	Time period 1: '95 - '17			
Europe						
Austria	150	150	252	252	252	Kenneth French Europe
Belgium	150	150	252	252	252	Kenneth French Europe
Denmark	150	150	252	252	252	Kenneth French Europe
Finland	150	150	252	252	252	Kenneth French Europe
France	150	150	252	252	252	Kenneth French Europe
Germany	150	150	252	252	252	Kenneth French Europe
Greece	150	150	**n/a**	**n/a**	**n/a**	Kenneth French Europe
Ireland	150	150	252	252	252	Kenneth French Europe
Italy	150	150	252	252	252	Kenneth French Europe
Netherlands	150	150	252	252	252	Kenneth French Europe
Norway	150	150	252	252	252	Kenneth French Europe
Portugal	150	150	**216**	**216**	**216**	Kenneth French Europe
Russia	**102**	150	252	252	252	Kenneth French Europe
Spain	150	150	252	252	252	Kenneth French Europe
Sweden	150	150	252	252	252	Kenneth French Europe
Switzerland	150	150	252	252	252	Kenneth French Europe
Turkey	150	150	252	252	252	Kenneth French Europe
United Kingdom	150	150	252	252	252	Kenneth French Europe
Asia						
Hong Kong	150	150	252	252	252	Kenneth French Asia Pacific
Indonesia	150	150	252	252	252	Kenneth French Asia Pacific
Japan	150	150	252	252	252	Kenneth French Japan
Jordan	150	150	**240**	**240**	**240**	Kenneth French Asia Pacific
Malaysia	150	150	252	252	252	Kenneth French Asia Pacific
Philippines	150	150	252	252	252	Kenneth French Asia Pacific
Singapore	150	150	252	252	252	Kenneth French Asia Pacific
South Korea	150	150	252	252	252	Kenneth French Asia Pacific
Taiwan	150	150	**228**	**228**	**228**	Kenneth French Asia Pacific
Thailand	150	150	252	252	252	Kenneth French Asia Pacific
North America						
Canada	150	150	252	252	252	Kenneth French North America
Mexico	150	150	**240**	**240**	**240**	Kenneth French North America
United States	150	150	252	252	252	Kenneth French North America
South America						
Chile	150	150	252	252	252	Kenneth French Global
Africa						
South Africa	**126**	150	252	252	252	Kenneth French Global
Pacific						
Australia	150	150	252	252	252	Kenneth French Asia Pacific
New Zealand	150	150	**n/a**	**n/a**	**n/a**	Kenneth French Asia Pacific

Appendix 1 presents the geographical division, number of observations, time periods and risk-free proxies for 35 countries used in this thesis. There are a total of 18 European, 10 Asian, 3 North American, 1 South American, 1 African and 2 Pacific countries in the data set. Turkey and Russia are assumed European countries although they both extend to other geographical regions. Countries with deviant number of observations are marked in bold.

Appendix 2 Clarifications about Sharpe and Treynor Ratios

The Sharpe ratio is the most widely used method to assess risk-adjusted performance of a portfolio. It is calculated as follows:

(5) $$Sharpe\ ratio = \frac{r_p - r_f}{\sigma_p},$$

where $r_p - r_f$ is the annualized mean return of the portfolio in excess of the risk-free rate, and σ_p is the annualized standard deviation of the portfolio (Sharpe, 1964). Sharpe ratio demonstrates how much excess return the portfolio has earned for one unit of risk. The higher the ratio is, the better the risk-adjusted performance is for a specific portfolio.

Treynor ratio works similarly to the Sharpe ratio. The main difference is that Treynor ratio uses portfolio beta-factor as a proxy for risk instead of standard deviation as the Sharpe ratio. The beta-factor takes only systematic risk into account, whereas standard deviation takes both systematic and idiomatic risk into account. The beta-factor is calculated as follows:

(6) $$\beta_s = \frac{Cov(r_s, r_m)}{Var(r_m)},$$

where r_s is the return of the stock, and r_m is the return of the market for the same time period.

Furthermore, the Traynor ratio is

(7) $$Treynor\ ratio = \frac{r_p}{\beta_p},$$

where r_p is the annualized portfolio return and β_p is the portfolio´s beta-factor. The interpretation is the same: a higher ratio means better risk-adjusted performance (French, 2002).[6]

[6] Jack Treynor's article has never been published. Thus, a reprint of Treynor's paper by French, C. has been cited.

Appendix 3 **Semi-annual Summary Statistics for Small, Mid and Large Cap MSCI indeces' Mean Returns and Standard Deviations**

	Small Cap				Mid Cap				Large Cap			
Country	Nov-April	Standard Deviation	May-Oct	Standard Deviation	Nov-April	Standard Deviation	May-Oct	Standard Deviation	Nov-April	Standard Deviation	May-Oct	Standard Deviation
Australia	4.50	8.60	2.40	10.83	4.68	7.78	1.34	9.23	6.21	7.87	0.00	9.69
Austria	11.50	10.85	-2.68	13.12	9.24	12.36	-1.34	15.41	9.98	18.34	-2.46	19.61
Belgium	7.58	9.69	-1.37	10.86	9.06	11.29	-1.06	12.22	7.04	12.21	2.44	11.68
Canada	7.87	9.33	1.16	11.85	7.97	9.08	1.49	10.33	5.76	9.24	1.18	10.60
Chile	5.36	11.84	2.02	13.65	4.52	12.75	1.71	12.32	4.61	12.16	-0.04	12.83
Denmark	12.61	13.66	4.17	13.98	10.29	11.96	3.86	13.26	11.06	14.08	1.29	13.60
Finland	12.55	12.72	1.28	15.35	11.22	14.38	-0.80	15.48	8.62	25.43	3.88	22.50
France	13.10	12.31	-0.87	14.71	11.54	11.33	-2.53	12.55	8.26	10.97	-1.55	13.29
Germany	8.46	13.32	-3.42	13.92	8.52	11.89	-0.51	12.94	8.87	13.13	-1.38	15.39
Hong Kong	7.83	18.62	-0.79	20.41	7.76	15.69	0.37	18.55	5.21	14.82	3.71	18.23
Indonesia	11.44	18.76	-3.85	23.61	14.81	20.29	2.01	22.35	14.76	21.71	1.17	22.49
Ireland	15.93	17.09	1.66	17.10	8.82	15.55	-1.26	16.06	12.21	15.35	-5.40	16.33
Italy	12.53	15.91	-3.77	14.16	11.95	19.10	-5.31	14.53	8.03	15.18	-3.90	14.28
Japan	5.16	14.58	-3.50	14.46	4.46	12.03	-2.53	12.10	5.07	12.00	-3.57	12.69
Jordan	7.14	13.18	-2.50	12.99	2.66	18.88	-3.94	18.42	4.86	20.37	7.19	17.28
Malaysia	7.33	23.14	-2.00	18.71	7.06	19.20	-2.32	16.28	6.49	16.37	-1.82	15.85
Mexico	8.81	11.92	1.46	13.39	6.34	21.84	4.14	14.97	9.03	13.06	4.96	14.63
Netherlands	9.20	11.59	-3.59	14.32	7.68	12.20	-0.68	13.79	7.71	10.90	0.50	13.29
Norway	9.58	14.45	-0.68	15.85	8.64	14.04	0.93	16.90	7.83	12.62	0.29	14.70
Philippines	6.20	18.04	1.69	21.91	9.51	21.55	1.30	22.37	9.27	17.03	-2.48	19.75
Portugal	9.58	15.20	-5.38	16.15	8.09	15.93	-10.06	18.45	5.07	15.16	-4.72	13.18
Russia	23.58	30.31	10.52	37.66	23.73	37.83	10.94	44.05	21.78	30.40	2.51	29.65
Singapore	7.48	15.86	-0.22	20.99	5.96	14.63	-1.13	18.15	4.54	13.42	-1.39	15.29
South Africa	9.21	10.54	3.65	11.92	7.95	12.70	1.09	13.87	6.82	12.34	3.05	14.77
South Korea	7.57	24.93	-2.18	18.32	7.46	26.29	0.09	20.46	10.15	20.75	-1.50	19.87
Spain	11.16	11.54	-0.28	13.94	8.75	13.16	-0.33	12.76	6.82	14.41	1.61	16.79
Sweden	13.92	11.83	0.51	13.68	11.20	12.59	-0.46	12.56	10.93	15.42	-0.73	16.07
Switzerland	11.56	10.98	-1.31	12.91	7.88	9.84	-0.28	14.48	5.82	9.25	0.43	11.09
Taiwan	13.07	19.25	-10.48	18.00	9.97	18.48	-8.12	17.89	8.29	14.84	-3.35	17.11
Thailand	4.37	19.44	0.79	22.22	6.36	23.03	-1.70	24.42	6.05	21.70	-2.08	23.90
Turkey	29.85	34.05	5.01	24.65	31.07	36.19	8.83	24.17	28.96	39.08	7.73	29.01
United Kingdom	9.85	10.44	-1.11	12.55	7.06	9.07	-0.29	10.87	3.96	8.03	-0.27	9.99
USA	9.37	12.86	2.09	13.80	9.21	10.68	1.46	12.22	6.19	9.46	2.01	10.40

Appendix 3 presents a summary of MSCI small, mid and large cap total index half-year mean returns and standard deviations. The standard deviations are calculated from monthly returns followed by multiplying the monthly standard deviations by the square root of six.