The Halloween Indicator: Sell in May and go away

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Abstract

We test a trading strategy of (national) tactical asset allocation based on the popular market wisdom 'Sell in May and go away' also known as the 'Halloween indicator'. With this simple market timing strategy one holds a market portfolio of stocks during November through April and short term government bonds during May through October. We find that this simple market timing rule outperforms riskier market portfolios in almost all 17 countries in our study. Annualized returns in excess of returns on market indices in these countries are substantial. We show that this trading strategy has statistically significant market timing ability and we are able to reject mean variance efficiency of stock market indices for many countries in our study.

Key Words: Stock returns, Sell in May, Market timing, Return predictability, Halloween indicator.

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We test a trading strategy of (national) tactical asset allocation based on the popular market wisdom 'Sell in May and go away' also known as the 'Halloween indicator'. With this simple market timing strategy one holds a market portfolio of stocks during November through April and short term government bonds during May through October. We find that this simple market timing rule outperforms riskier market portfolios in almost all 17 countries in our study. Annualized returns in excess of returns on market indices in these countries are substantial. We show that this trading strategy has statistically significant market timing ability and we are able to reject mean variance efficiency of stock market indices for many countries in our study.

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1.1 INTRODUCTION

> "In 30 years in this business, I do not know anybody who has done it successfully and consistently, nor anybody who *knows* anybody who has done it successfully and consistently. Indeed, my impression is that trying to do market timing is likely, not only *not* to add value to your investment program, but to be counterproductive."
> (John Bogle, chairman of the Vanguard Group of Investments Companies, as quoted by Burton Malkiel in 'A Random Walk Down Wall Street', page 186, 1996, 6th edition)

We document the existence of a seasonal based on the popular market wisdom 'Sell in May and go away' also known as the Halloween indicator. This seasonal assumes that one invests in the stock market starting October 31 and through April 30 and out of the stock market in short term government bills during the remainder of the year. We compare annual returns of this simple trading strategy with annual returns on stock market indices of 17 countries and a broad world market index. This Halloween strategy outperforms a riskier stock market portfolio in nearly all countries over the period 1973-1996, except in Hong Kong and South Africa. Excess mean returns above the market index run as high as 6.7 percent. Based on a non parametric test of market timing developed by Merton and Henriksson[1], we find that the Halloween strategy has significant market timing ability in almost all countries considered. The strategy is able to accurately predict half-year bull and bear markets up to 75 percent of the time. Moreover, when we regress annual excess returns of the Halloween strategy on the excess returns on the indices in the different countries we are able to reject mean variance efficiency of market indices in more than half of the countries in our study.
While an obvious explanation would be that the Sell in May anomaly is simply the January-effect in disguise we find that this is not the case. The January-effect is of some importance, but even when we take this effect into account a significant Sell in May-effect remains present in our data[2].

One might wonder what the contribution of this study is as it is well known that there are seasonal effects in stock return series. Indeed, already many calendar anomalies have been discovered and documented in the literature. Some well known anomalies are the Monday-effect, the Friday-effect, the Turn of the Month-effect, the Holiday-effect and the January-effect. However, due to transactions costs it is generally difficult to exploit these anomalies in an economically profitable way[3]. The Sell in May-effect is different in that even net of transactions costs investors can earn higher mean returns in comparison to holding a market index. Thus, even after correcting for transactions costs it is possible to 'beat the market' with a trading strategy based on this anomaly. This extremely simple trading rule substantially outperforms a market portfolio in all but two countries in our sample. All the time series and cross sectional return predictability results that we know (even setting aside many technical problems that still exist for many) are not able to generate this level of outperformance, let alone this consistently in

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[1] Merton (1981), Henriksson and Merton (1981), Henriksson (1984).

[2] Also correcting for the stock market crash of 1987 does not fundamentally alter our results.

[3] Although an investor can implicitly profit from these anomalies by postponing or preponing buying (selling) when he or she has already decided to purchase (sell) certain stocks.

countries all over the world. These results are extremely persistent over time. Moreover, this strategy is substantially less risky than simply tracking a market index. It therefore seems that the Sell in May-effect offers opportunities to outperform the market if it continues to exist in the future. And, since the saying 'Sell in May and go away' is and has been well known to the investment community[4] we see no apparent reason why these results might not continue to hold in the future.

The longest time span for calendar anomalies generally considered in the literature is one month. For instance, Gultekin and Gultekin (1983) show, that over the years returns in different months tend to be different and especially that returns that coincide with the turn of the tax year (January in nearly all countries) are significantly higher. We show in addition that (even when we take the January effect into account) negative and positive periods are more or less clustered over the year. The innovation is that we break away from the convention of looking at monthly returns and consider longer time spans. This approach can also shed some new light on existing anomalies. If one is willing to take our results to the extreme another interesting observation arises. The existence of a January effect is well established in the financial literature. However, this existence is in fact conditional on the assumption that the January effect is not included in a time span that is itself a calendar anomaly. One could, based on our evidence, argue that conditional on the existence of a Sell in May effect the evidence of a January effect is seriously weakened. More precise, we find that assuming that a Sell in May effect exists halves the number of countries with a statistically significant January effect.

Our results can also be interpreted in a different fashion. The Halloween strategy is a simple tactical asset allocation strategy that proposes to switch between equity and cash (when we define cash as a nonequity investment in short term government bills) over the year. In a recent study Graham and Harvey (1996) investigate a sample of 237 investment newsletter strategies (in total 15,133 recommendations) in the period 1980-1992, that also advice on tactical asset allocation between equity and cash. They find that these newsletters fail to offer advice consistent with market timing. Given the results we report here it therefore seems that a simple tactical asset allocation strategy based on the Halloween indicator provides more information on the tactical asset allocation decision than the information in these newsletters.

Nowadays many seasonal effects have been reported in the literature. Hawawini and Keim (1995) provide a recent overview of research in this area and Agrawal and Tandon (1994) report extensive international evidence on many seasonals. The Halloween indicator has to our knowledge not been (thoroughly) investigated before. Levis (1985) only refers to the Sell in May-effect but does not test whether it exists. O'Higgins and Downs (1990) provide some results, but do so only for the United States. They fail to report the statistical significance of their findings. We show that although the effect is present in the United States it is not statistically significant.

The little attention this seasonal effect has provoked is surprising, particularly because a trading strategy based on this effect involves relatively small transactions costs and is quite simple to implement. An explanation might be that most of the empirical research uses U.S. data. While also for the U.S. data average returns tend to be higher during the

[4] Unfortunately, we do not know exactly how old this market wisdom is. The earliest reference we could obtain is Levis (1985). However, we expect that it was known well before the start of this sample.

November through April than during May through November (as reported by O'Higgins and Downs, 1990), we do not find a Sell in May-effect *significantly* present in this data set. Although the effect has to our knowledge never been extensively analyzed, we do find evidence in support of our results in many other studies, for instance, Gultekin and Gultekin (1983), Hawawini (1991), Ho (1990) and Rozeff and Kinney (1976)[5] However, none of these studies notices this Sell in May-effect that seems present in the data.

This chapter is organized as follows. In Section 1.2, we present the statistical evidence of a Sell in May-effect. In Section 1.3 we compare the results of a trading strategy based on the Sell in May-effect with a Buy and Hold strategy of a market portfolio. Section 1.4 concludes and contains some final remarks.

1.2 EMPIRICAL EVIDENCE OF A SELL IN MAY-EFFECT

To test for the existence of a Sell in May-effect we use a seasonal dummy variable S_t in the regression (basic model I):

$$r_t = m + a_1 S_t + e_t \text{ with } e_t = r_t - E_{t-1}[r_t] \tag{1.1}$$

This variable takes the value 1 if month *t* falls on the period November through April and 0 otherwise. We test whether the coefficient of S_t is significantly different from zero. When a_1 is significant and positive this rejects the null hypothesis of no Sell in May-effect.

One important consideration remains. The Sell in May hypothesis suggests that average returns are higher during November through April than during May through October. However, one might argue that since the January-effect generates high positive returns in many stock markets, the Sell in May-effect is simply the January-effect in disguise. To test this possibility, we include a dummy variable for this month. This results in our second basic model (basic model II):

$$r_t = m + a_1 S_t + a_2 Jan_t + e_t \text{ with } e_t = r_t - E_{t-1}[r_t] \tag{1.2}$$

where Jan_t denotes the January dummy that takes the value 1 when a returns falls in January and 0 otherwise.

For our investigation we use (continuously compounded) monthly stock returns of value weighted market indices[6] of 17 countries (local currencies) and a World Market Index (in US dollars). The countries analyzed are: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, the Netherlands, Singapore, South Africa, Switzerland, the United Kingdom, the United States.

[5] A table that summarizes the evidence of a Sell in May-effect in 23 countries, constructed from the studies mentioned above, is available on request from the authors.

[6] One advantage of the value weighted indices is that these indices are less influenced by the January-effect since this anomaly is closely related to the small firm effect (see for instance Hawawini and Keim, 1995).

All series are taken from Datastream. They consist of 288 observations over the period January 1973 through December 1996[7] and include dividends. Table 1 contains some summary statistics. In tables 2 and 3 we report our estimation results for the two basic models given by equations (1.1) and (1.2).

Table 1. Summary statistics of monthly returns of stock market indices over the period 1973-1996 in local currencies (World index in US dollars).

Country	Mean (%)	Std. Dev. (%)	Min. (%)	Max. (%)	Skewness	Kurtosis	ρ(1)	s.e.ρ(1)*
Australia	1.01	6.81	-53.82	21.67	-1.90	14.65	0.02	0.06
Austria	0.72	5.25	-26.98	24.84	0.36	6.60	0.25	0.11
Belgium	0.88	4.82	-27.32	23.06	-0.17	5.69	0.16	0.06
Canada	0.85	4.55	-25.32	13.64	-0.81	4.35	0.02	0.05
Denmark	1.01	5.11	-14.61	26.64	0.18	2.49	0.15	0.07
France	1.11	6.36	-25.19	21.97	-0.30	1.49	0.09	0.07
Germany	0.75	4.81	-24.75	13.89	-0.84	3.52	0.07	0.09
Hong Kong	1.25	10.86	-61.29	46.22	-1.20	7.39	0.08	0.08
Ireland	1.26	6.60	-33.46	33.98	-0.17	4.50	0.20	0.07
Italy	1.09	7.10	-22.51	25.99	0.23	1.02	0.10	0.07
Japan	0.59	5.14	-22.96	17.35	-0.36	2.25	0.03	0.09
The Neth.	1.06	4.34	-24.13	18.46	-0.67	4.82	0.11	0.07
Singapore	0.63	8.52	-48.98	46.90	-0.31	6.68	0.11	0.07
South Africa	1.57	7.29	-27.96	20.16	-0.49	1.02	0.07	0.06
Switzerland	0.63	4.48	-28.26	17.94	-1.08	6.70	0.13	0.08
UK	1.24	6.33	-30.08	42.98	0.34	8.78	0.10	0.09
United States	0.95	4.42	-23.65	16.36	-0.57	3.72	0.03	0.08
World index	0.91	4.16	-17.52	12.81	-0.51	1.88	0.07	0.07

* Heteroscedasticity consistent standard errors (White, 1980).

[7] Although we only report our results for the Datastream monthly indices here, we performed the same analysis on several other data sets with qualitatively similar results. In an earlier draft of this chapter we used daily data without dividend reinvestment over the period 1973-1993. These results are similar and available on request from the authors. Moreover, based on monthly data over the period January 1953 through January 1991 taken from Citibase and the Dutch Central Bureau of Statistics we find the Sell in May-effect significantly present at the 10 percent level in six out of the seven investigated countries: France, Germany, Italy, Japan, the Netherlands, the United Kingdom and the United States, (the latter one being not significant). For monthly data over a shorter period (21 years) for sixteen countries based on MSCI-indices we find a significant Sell in May-effect for ten of the sixteen countries (Austria, Belgium, Canada, France, Germany, Japan, the Netherlands, Spain, Sweden and the United Kingdom) and not significant for Australia, Denmark, Italy, Norway, Switzerland and the United States. For both data sets we corrected in our regression analysis for the stock market crash and the January-effect. Also the inclusion of a dummy for the stock market crash in 1987 does not fundamentally alter the results we report here.

Table 2. Estimation results for basic model I: $r_t = m + a_1 S_t + e_t$

r_t denotes this period's return; m denotes a constant and S_t denotes the Sell in May dummy that takes the value 1 during November through April and zero otherwise. Heteroscedasticity consistent standard errors are reported in square brackets. A, b, and c denote significant parameter values at the 1%, 5% and 10% level, respectively.

Country	μ ($\times 10^2$)	α_1 ($\times 10^2$)
Australia	0.548	0.924
	[0.631]	[0.799]
Austria	0.019	1.399[b]
	[0.451]	[0.612]
Belgium	-0.192	2.153[a]
	[0.382]	[0.553]
Canada	0.359	0.985[c]
	[0.380]	[0.532]
Denmark	0.794[c]	0.438
	[0.432]	[0.601]
France	0.018	2.188[a]
	[0.543]	[0.737]
Germany	0.235	1.029[c]
	[0.433]	[0.563]
Hong Kong	0.744	1.022
	[0.893]	[1.276]
Ireland	0.308	1.903[b]
	[0.533]	[0.769]
Italy	-0.074	2.324[a]
	[0.637]	[0.824]
Japan	-0.050	1.289[b]
	[0.411]	[0.600]
The Netherlands	0.119	1.883[a]
	[0.367]	[0.498]
Singapore	-0.105	1.478
	[0.706]	[0.999]
South Africa	1.498[b]	0.139
	[0.619]	[0.858]
Switzerland	0.251	0.749
	[0.409]	[0.525]
United Kingdom	0.177	2.123[a]
	[0.488]	[0.734]
United States	0.599	0.696
	[0.394]	[0.518]
World Market Index	0.381	1.058[b]
	[0.354]	[0.485]

Table 3. Estimation results for basic model II: $r_t = m + a_1 S_t + a_2 Jan_t + e_t$
where Jan_t denotes the January dummy that takes the value one when a returns falls in January and zero otherwise. r_t denotes this period's return; m denotes a constant and S_t denotes the Sell in May dummy that takes the value 1 during November through April and zero otherwise. Heteroscedasticity consistent standard errors are reported in square brackets. A, b, and c denote significant parameter values at the 1%, 5% and 10% level, respectively.

Country	μ ($\times 10^2$)	α_1 ($\times 10^2$)	α_2 ($\times 10^2$)
Australia	0.548	0.590	2.002
	[0.631]	[0.806]	[1.577]
Austria	0.019	1.380[b]	0.112
	[0.451]	[0.633]	[1.204]
Belgium	-0.192	1.856[a]	1.781[c]
	[0.382]	[0.580]	[1.023]
Canada	0.359	0.863	0.732
	[0.380]	[0.538]	[1.221]
Denmark	0.794[c]	-0.205	3.855[a]
	[0.432]	[0.590]	[1.375]
France	0.018	1.893[b]	1.768
	[0.543]	[0.755]	[1.489]
Germany	0.235	1.047[c]	-0.106
	[0.433]	[0.583]	[0.994]
Hong Kong	0.744	-0.033	6.329[a]
	[0.893]	[1.341]	[2.136]
Ireland	0.308	1.288[c]	3.693[b]
	[0.533]	[0.773]	[1.739]
Italy	-0.074	1.614[b]	4.260[a]
	[0.637]	[0.824]	[1.621]
Japan	-0.050	1.060[c]	1.370
	[0.411]	[0.635]	[1.087]
The Netherlands	0.119	1.557[a]	1.955[c]
	[0.367]	[0.506]	[1.016]
Singapore	-0.105	0.361	6.700
	[0.706]	[0.989]	[2.221]
South Africa	1.498[b]	0.498	-2.157
	[0.619]	[0.871]	[1.875]
Switzerland	0.251	0.481	1.606
	[0.409]	[0.529]	[1.047]
United Kingdom	0.177	1.622[b]	3.005
	[0.488]	[0.715]	[1.992]
United States	0.599	0.489	1.243
	[0.394]	[0.520]	[1.129]
World Market Index	0.381	0.952[c]	0.637
	[0.354]	[0.499]	[0.992]

The regression results in table 2 show that at the 10% level a significant Sell in May-effect exists in ten of the seventeen countries we consider (Austria, Belgium, Canada, France, Germany, Ireland, Italy, Japan, the Netherlands and the United Kingdom) and

also in the World index. Moreover, mean returns are higher (although not always significant) during the November through April months for all the investigated series. The effect is particularly strong (highly significant and high parameter values) for the United Kingdom, the Netherlands, Italy, France and Belgium. During the May through October months stock returns are only significantly different from zero in Denmark and South Africa. In all other countries (and the World index) mean returns are close to zero in this period and occasionally even negative.

Table 3 reports the results of the regression where we included a dummy for the January-effect (Basic model II). Although this reduces the Sell in May-effect to some extent, we find that this effect remains significantly present in nine of the ten countries that exhibit a significant Sell in May-effect and also in the World index. Also note (last column of table 3) that a significant January-effect is present in these value weighted indices for six of the eighteen series, when we assume that there is also a Sell in May-effect[8].

Summarizing the evidence in tables 2 and 3 we can conclude that in many countries there is strong evidence of a Sell in May-effect. This Sell in May-effect seems only partially related to the January-effect.

1.3 TRADING STRATEGIES

In this section we compare annual returns of the Halloween strategy with a Buy and Hold strategy:

- *Halloween strategy*: We assume that an investor who would like to profit from a Sell in May-effect, decides to buy a market portfolio at the end of October and sells this portfolio at the beginning of May. This investor will then invest in a risk free asset (short term treasury bonds)[9] from the end if April through the end of October.
- *Buy and Hold strategy*: This strategy holds the stock market portfolio throughout the 24 year period.

Table 4 contains the average annual returns and the standard deviation of the Buy and Hold strategy and the Halloween strategy. These results show that the Halloween strategy outperforms the Buy and Hold strategy in all countries except Hong Kong and

[8] When we do not include a Sell in May dummy we find a significant January-effect (10 percent level) in eleven countries.

[9] We used monthly short term interest rates (interbank or treasury bill rates) taken from either the OECD or the IMF. We used IMF interest rates when these rates are available for the full sample period, otherwise we take OECD short term interest rates. For Switzerland we had to construct a time series of interest rates from both sources as they were not available over the full sample. For Singapore we used the discount rate. For Hong Kong we used a national source: Hong Kong savings deposit rate (paid). As noted by Solnik (1993) the type of interest rates reported by the OECD tend to be different across countries. Therefore we checked our results for most countries using six months Euro-currency interest rates. Unfortunately these are only available since 1981. However, the results obtained with the Eurocurrency rates were qualitatively similar to the results reported here. More detailed information on the interest rates is available on request from the authors.

South Africa. The standard deviation of the Halloween strategy is substantially lower than the standard deviation of the Buy and Hold strategy in all countries.

Table 4. Average annual returns and standard deviations of a Buy and Hold strategy and the Halloween strategy over the years 1973 through 1996.

Country	Buy and Hold Strategy		Halloween Strategy	
	mean	standard deviation	mean	standard deviation
Australia	12.12%	25.15%	13.90%	14.52%
Austria	8.62%	26.39%	11.69%	17.11%
Belgium	10.62%	19.39%	16.00%	11.61%
Canada	10.22%	14.36%	12.48%	11.20%
Denmark	12.15%	27.15%	12.55%	12.05%
France	13.35%	26.90%	17.81%	16.13%
Germany	8.99%	21.69%	10.84%	12.33%
Hong Kong	15.06%	41.92%	12.81%	30.85%
Ireland	15.12%	34.68%	18.31%	21.41%
Italy	13.05%	28.44%	19.72%	16.45%
Japan	7.14%	19.90%	9.46%	16.39%
The Netherlands	12.73%	18.66%	15.15%	11.24%
Singapore	7.62%	34.99%	12.74%	31.75%
South Africa	18.80%	22.96%	15.14%	15.97%
Switzerland	7.51%	22.06%	8.09%	14.18%
U.K	14.86%	28.18%	18.84%	21.48%
U.S.	11.37%	16.40%	11.61%	11.38%
World index	10.92%	16.76%	12.47%	12.58%

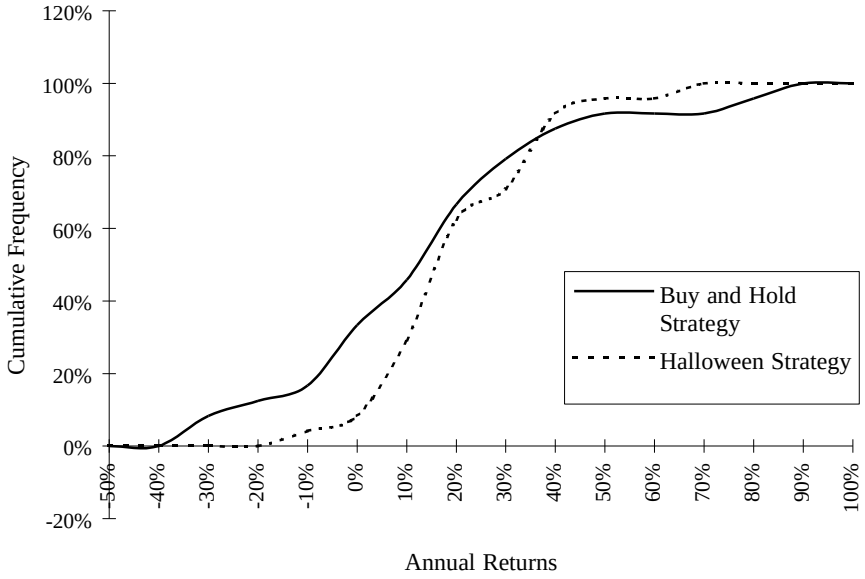
This results are confirmed when we compare cumulative frequency distributions of the two different strategies. Here, in figure 1 we only plot the cumulative frequency distribution for Italy. However, similar results, though somewhat less pronounced, are obtained for other countries.

An important question that has not been answered so far is, whether these results are statistically significant. There are several ways to test the statistical significance of these findings. Here we first test whether we are able to reject mean variance efficiency of the indices in the different countries. More specifically we use:

$$r_t^p - r_t^f = a + b\left(r_t^m - r_t^f\right) + e_t \text{ with } e_t = r_t^p - E_{t-1}[r_t^p] \qquad (1.3)$$

where r_t^p denotes the return in year t on the Halloween strategy in each country; r_t^f denotes the risk free rate in year t and r_t^m denotes the return on the index in every country. Table 5 contains the estimation results.

Figure 1. Cumulative frequency distributions for the Buy and Hold strategy and the Halloween strategy based on annual returns over the years 1973-1996.



As the null hypothesis that a should be equal to zero is frequently rejected this shows that in most countries mean variance efficiency of the stock market index is rejected. The estimates of b are well below one. This confirms our conclusion that the Halloween strategy is substantially less risky than investing in the market index in the respective countries.

Another way to test whether the Halloween indicator has forecasting power is to investigate the market timing ability of the Halloween strategy. Merton (1981), and Henriksson and Merton (1981) developed a (non parametric) test for the evaluation of market timing ability of investment managers[10]. In their analysis, the investor predicts when stocks will out- or underperform bonds but does not predict the magnitude of the superior performance[11]. The probability of a correct forecast given that the stock return is below the risk free rate is defined as p_1, and the probability of a correct forecast given that the stock return is above the risk free rate as p_2.

[10] As we already know the potential source of superior performance the Merton-Henriksson methodology is in our simple case similar to the methodology of Glosten and Jagannathan (1994).

[11] Note that no assumptions about the structure of equilibrium security prices are required, because ex ante the investment manager's predictions are known.

Table 5. Estimation results for the regression : $r_t^p - r_t^f = a + b\left(r_t^m - r_t^f\right)_t + e_t$

r_t^p denotes the return of the Halloween strategy in year t; r_t^f denotes the risk free rate in year t and r_t^m denotes the return on the index in every country. We report t-values based on heteroscedasticity consistent standard errors in square brackets. Regressions are based on annual observations over the period 1973-1996.

Country	α	β
Australia	0.031	0.396
	[1.24]	[4.17]
Austria	0.041	0.55
	[2.39]	[6.70]
Belgium	0.069	0.547
	[4.76]	[8.48]
Canada	0.033	0.543
	[1.70]	[5.08]
Denmark	0.015	0.389
	[1.17]	[9.35]
France	0.070	0.503
	[3.01]	[6.85]
Germany	0.032	0.431
	[2.18]	[4.90]
Hong Kong	0.020	0.606
	[0.55]	[6.44]
Ireland	0.054	0.570
	[2.56]	[6.70]
Italy	0.089	0.232
	[2.41]	[1.89]
Japan	0.037	0.751
	[2.30]	[9.05]
The Netherlands	0.056	0.568
	[4.36]	[6.81]
Singapore	0.048	0.721
	[1.24]	[5.14]
South Africa	0.017	0.343
	[0.75]	[3.18]
Switzerland	0.018	0.566
	[1.33]	[6.65]
United Kingdom	0.054	0.761
	[1.91]	[8.94]
United States	0.016	0.616
	[1.10]	[8.45]
World Market Index	0.027	0.664
	[1.71]	[7.01]

Table 6. Market timing ability: non parametric test of predictability of the Halloween strategy over the years 1973-1996. Every year is divided into two parts: May through October and November through April. For the first period the Halloween strategy predicts a bear market (a return on the market lower than the risk free rate) For the second period the Halloween strategy predicts a bull market (return higher than the risk free rate). Total number of half-year periods equals 48.

Country	Correct forecasts during May through October: Bear Markets	Correct forecasts during November through April: Bull Markets	Total number of correct forecasts (as percentage)	Market timing ability	p-value
Australia	13	16	60.4%	1.21	7.8%
Austria	16	15	64.4%	1.29	2.5%
Belgium	16	20	75.0%	1.50	0.1%
Canada	14	16	62.5%	1.25	4.5%
Denmark	12	12	50.0%	1.00	50.4%
France	16	17	68.8%	1.38	0.6%
Germany	12	16	58.3%	1.17	12.7%
Hong Kong	12	17	60.4%	1.21	7.8%
Ireland	13	16	60.4%	1.21	7.8%
Italy	16	16	66.7%	1.33	1.3%
Japan	16	18	70.8%	1.42	0.3%
Netherlands	13	18	64.6%	1.29	2.5%
Singapore	18	13	64.6%	1.29	2.5%
South Africa	11	16	56.3%	1.13	19.5%
Switzerland	12	17	60.4%	1.21	7.8%
United Kingdom	13	18	64.6%	1.29	2.5%
United States	9	15	50.0%	1.00	50.0%
World index	14	15	60.4%	1.21	7.8%

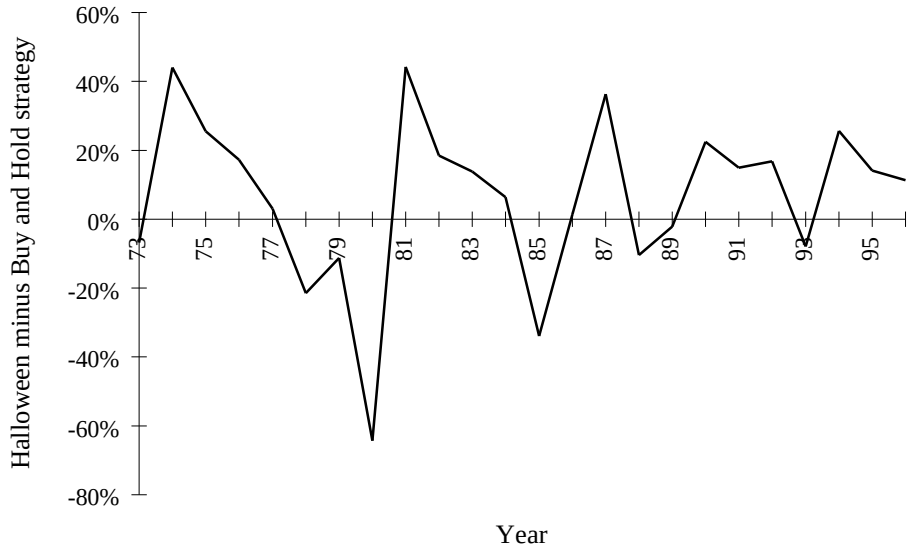
The null-hypothesis of no market timing ability is therefore $p_1 + p_2 = 1$. The alternative hypothesis is $p_1 + p_2 > 1$[12]. Perfect market timing ability gives $p_1 + p_2 = 2$. Henriksson (1984) used this test to investigate whether fund managers of 116 mutual funds exhibited positive forecasting ability over the period 1968-1980. For only four funds he was able to reject the null at 5% level. He found an average estimate for $(p_1 + p_2)$ of 0.984 with a standard deviation of 0.115.

We analyze whether the Halloween strategy has significant market timing ability. The analysis takes the possibility that forecasting skills are different for bull markets and for bear markets into account. The Halloween strategy predicts that Treasury bills will outperform the stock market in the period ranging from May to October, and that the stock market will outperform in the remaining period each year. The results of the non parametric test for 17 countries and the World index are set out in table 6 for the period between 1973 through 1996.

[12] If the forecasts are known and forecasters behave rationally, then a one tail test as we use is most appropriate. Otherwise, a two tailed test would be necessary. See Henriksson and Merton (1981).

On average, the Halloween strategy renders well when judged on its ability to time bear and bull markets. The Halloween strategy appears to have better skills in forecasting bull markets than bear markets, because the values in the first column are lower than those of the second column in most markets. The score on the market timing ability measure is above one or equal to one in all cases. In Belgium the strategy scores best, i.e. a market timing ability of almost 1.50. When these values are compared with those of table 4, we notice almost no differences. In general, when the annual outperformance of the Halloween strategy is high so is its market timing ability. Because we examine only 24 years our sample size is quite small (i.e. *N=48*). Nevertheless, the null hypothesis of no forecasting ability can still be rejected at a 90 percent significance level for 13 countries and the World index.

Figure 2. Comparison of the annual returns of the Halloween strategy with the Buy and Hold strategy in Italy.



While results reported here do not include transactions costs they can easily be implemented. For instance, assuming conservative transactions costs of 0.5 percent for a single transaction[13] the annual return on the Halloween would drop with approximately 1 percent[14]. For a practical implementation of the Halloween strategy it would however be

[13] One might argue that the costs of switching are in fact higher (two times 0.5%). However, we know of certain asset managers that charge transactions costs only once when an investor switches funds. Moreover, as noted by Pettengill and Jordan (1988): "certain families of mutual funds allow cost free switching from equity to money market funds".

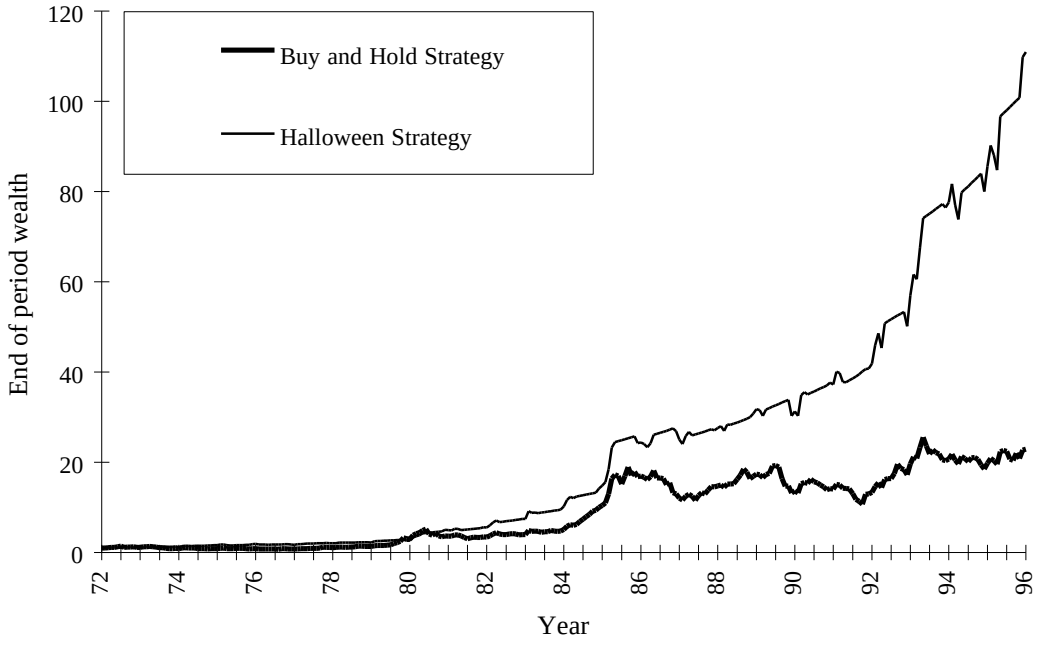
[14] Berkowitz et al. (1988) estimate the cost of a transaction on the NYSE to be 0.23 percent. One of the largest institutional investors world wide, i.e., the Robeco Group, estimates transactions costs in France 0.3%, Germany 0.5%, Italy 0.4%, Japan 0.3%, the Netherlands 0.3% and the United States 0.25%. In the United Kingdom the costs of a buy or sell transaction are 0.75% or

more appropriate to mimic this strategy using index futures. In that case transactions costs are much lower. For instance, Solnik (1993) estimates the round-trip transactions costs of 0.1% on futures contracts.

All results above could still be the consequence of one or two exceptional years. To investigate this issue we compare the annual out- and underperformance of the Halloween strategy with respect to the Buy and Hold strategy in every year for Italy (similar results are obtained for the other countries) in figure 2. As can be seen in this figure the high returns of the Halloween strategy cannot be attributed to one or several specific years.

Figure 3 shows the end of period wealth of an initial investment of 1 local currency unit during twenty four years in Italy. Clearly, following a consistent Halloween strategy would have resulted in substantial higher wealth at the end of this 24 year period.

Figure 3. End of period wealth for the two investment strategies over the period 1973-1996 in Italy.



1.4 CONCLUSIONS

The results reported here reveal that a trading strategy of tactical asset allocation based on the old wisdom "Sell in May and go away" generates abnormal returns in comparison with stock market indices in most countries in our study. We find that this Halloween strategy (as it has been called by O'Higgins and Downs, 1990) beats a market index in

0.25%, respectively. These estimates give an indication, and are not precisely accurate due to the complexity of tax and commission systems.

every investigated country, except in Hong Kong and South Africa. This is surprising as this outperformance is possible with a strategy that is less risky than simply holding the market index, measured by either standard deviation or beta. After correcting for risk we show that this outperformance is statistically significant in many countries. The non parametric test developed by Merton and Henriksson shows that this Halloween strategy is indeed very well able to predict half year bull and bear markets. Again, these predictability results are statistically significant in many countries in our study. It therefore seems that stock returns are to some extent predictable from their own past.

Some final considerations remain. A possible explanation of the observed Sell in May seasonal might be that higher returns are a compensation for a higher risk during November through April. In that case one would expect the variance of the indices in this period to be significantly higher than during the remainder of the year. For all data sets we considered (in this study and in earlier drafts) we found this explanation to be unlikely. In most countries the variance tends to be somewhat lower during the November through April period than during the remainder of the year. Modeling the time varying volatility more explicitly by use of GARCH(1,1) model and a GARCH(1,1) in mean process for daily data in an earlier draft we reached a similar conclusion.

One could argue that the Datastream market indices we use are not a proper benchmark and that also the Halloween strategy that invests half of the time in this index is therefore in practice an unobtainable investment strategy. The argument would be that is impossible to own a value weighted country index with dividends reinvested as the cost of continuously re-balancing this portfolio would be huge. The main reason to use indices with dividends reinvested is that the exclusion of dividends might, and in fact does, bias our results. This happens because in most countries dividend payments occur mainly during the May through October period. Excluding dividends would therefore bias the results in favor of the Halloween strategy. We also worked with market indices that do not correct for dividend payments (MSCI-indices and the Citibase indices). The results based on these indices favored the Halloween strategy even more strongly. While it is indeed difficult to mimic a value weighted index in practice there are several points to be made about this flaw in our analysis. First, one could implement this trading strategy using index futures. This would also reduce transactions costs. Second in many countries in our study nowadays index tracking funds exist and the correlation between these index tracking funds and the indices we use here seems extremely high[15]. Third most of the indices we used are used in practice to measure the results of portfolio managers all around the world. Fourth, most of the academic research uses value weighted indices. May be a more important problem with the implementation of this strategy is the large size of the tracking errors in some years in comparison with the market indices. This might for institutional investors be a serious drawback for implementing a Halloween strategy as professional clients generally do not appreciate large tracking errors. In this case a solution might be to use portfolio insurance during the May through October period. In a recent paper Waksman, Sandler, Ward and Firer

[15] Moreover, several institutions offer, occasionally tailor made, products that try to mimic a market in a specific countries. Examples of these products are the 'Perles' introduced by SBC Warburg.

(1997) show that in a situation where a market timing strategy is not perfect the use of portfolio insurance is optimal.

In our analysis we only considered stock market indices. It is possible that the Sell in May-effect might be a sector specific anomaly. If a stock market in a country is dominated by this particular sector this might explain why we observe this anomaly more strongly in some countries than in others. We investigated this issue by testing for the existence of a Sell in May in different sectors based on the World Sector Indices from Datastream[16]. The Sell in May-effect is present in every sector. (Most strongly, in the industrial and financial sectors). This suggests that a probable explanation for this effect should be at the macro level.
While we only report results for the period 1973-1996 it seems that the Sell in May-effect is fairly persistent over time. For instance, we find using Citibase indices over the period 1953 through 1991 a significant Sell in May-effect for six out of seven countries. Moreover, evidence constructed from studies by Ho (1990), Hawawini (1991), Rozeff and Kinney (1976) and Gultekin and Gultekin (1983) shows that the Sell in May-effect exists not only in many other countries but also in other time periods.

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[16] Results are available on request from the authors.

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