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THE HALLOWEEN EFFECT IN EUROPEAN SECTORS

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Master Dissertation in Finance

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Resumo

Bouman e Jacobsen (2002) documentaram a existência de um forte padrão sazonal na rentabilidade das acções, também conhecido como efeito *Halloween*. Estes autores demonstraram que num conjunto de mercados de capitais, os retornos durante os meses de Novembro a Abril tinham sido largamente superiores aos registados durante os meses de Maio a Outubro.

Seguindo de perto a metodologia proposta por Bouman e Jacobsen (2002), pretendemos estudar a existência do efeito *Halloween* na Europa desde Outubro de 1992 até Outubro de 2010 e fornecer algumas possíveis explicações para a existência da anomalia.

Concluiu-se que o efeito *Halloween* é economicamente e estatisticamente significante, constituindo portanto uma oportunidade passível de ser explorada. Considerámos várias possíveis soluções para a anomalia, mas nenhuma delas foi capaz de justificar por completo o efeito. Sugerimos, que a possível explicação poderá estar relacionada com os retornos médios negativos durante o período de Maio a Outubro, em vez de estar relacionada com a performance superior durante os meses de Novembro a Abril.

Palavras-chave: Efeito *Halloween*, Eficiência de Mercado, Anomalia, Retornos.

Classificação JEL: G10, G14

Abstract

Bouman and Jacobsen (2002) documented the existence of a strong seasonal effect in stock market returns, also known as the Halloween effect. They presented sample evidence that in a number of countries, returns have been unusually larger during the months of November to April than those during the months of May to October.

Following closely the methodology used by Bouman and Jacobsen (2002), we propose to examine the existence of the Halloween effect in Europe from October 1992 to October 2010 and to provide some insight on the possible explanations for the anomaly.

We concluded that the Halloween effect is economically and statistically significant, constituting therefore an exploitable opportunity. We have considered several possible explanations for the anomaly, but none was able to completely justify the seasonal effect. We suggest, that a possible explanation for the anomaly may be related with the negative average returns during the May–October period, rather than with a superior performance during the November–April period.

Key Words: Halloween Effect, Market Efficiency, Anomaly, Returns.

JEL Classification code: G10, G14

Sumário Executivo

O conceito de eficiência de mercado "nasceu" há já algumas décadas, tendo a sua origem no início do século XX, ainda que com uma diferente nomenclatura. Desde a sua "origem" este conceito tem gerado controvérsia, tendo-se tornado num dos paradigmas dominantes da literatura financeira desde meados do século passado. Desde então, surgiram inúmeros estudos demonstrando a dificuldade em obter retornos superiores ao mercado de forma persistente e continuada sem incorrer em níveis superiores de risco. Contudo, as últimas décadas assistiram a um aumento exponencial de artigos académicos, apontando e clamando evidências contra a hipótese de eficiência dos mercados. Num desses artigos, Bouman e Jacobsen (2002) documentaram a existência de uma das mais interessantes anomalias de mercado dos dias de hoje, o efeito *Halloween*. Esta anomalia que é baseada num velho provérbio *"Sell in May and go away"* que afirma que no período de Novembro a Abril os retornos são superiores aos verificados no período de Maio a Outubro.

Estes autores documentaram a existência do efeito *Halloween* em 36 dos 37 mercados de capitais analisados. Adicionalmente, demonstraram que a diferença de retornos entre os dois períodos de seis meses era estatisticamente significativa em 20 dos 37 Índices analisados, a um nível de significância de 10%, e em 10 Índices a um nível de significância de 1%.

Com a publicação do trabalho de Bouman e Jacobsen (2002) despoletou-se um debate, sobretudo a nível académico, sobre a real existência do efeito (ou não) e os seus motivos. Actualmente, ainda não existe consenso sobre o tema, nem quanto à sua origem, e naturalmente ainda menos quanto aos motivos que originam o efeito.

Esta dissertação segue de perto a metodologia proposta por Bouman e Jacobsen (2002) e pretende concluir acerca da existência do efeito *Halloween* para o Continente Europeu e caso este se verifique, aferir acerca das suas causas.

Para este estudo foram analisados retornos logarítmicos respeitantes à performance de 102 Índices sectoriais do mercado bolsista com diferentes classificações, tais como, *Industry*, *Supersector*, *Style* e *Size* com e sem dividendos, desde Outubro de 1992 até Outubro de 2010.

Os resultados sugerem a veracidade do provérbio "*Sell in May and go away*" no período analisado, visto que os retornos médios de Novembro a Abril revelaram ser superiores aos retornos médios de Maio a Outubro em todos os Índices da nossa amostra.

Curiosamente, evidência empírica revela que em dois terços dos Índices analisados, os retornos médios no período de Maio a Outubro foram negativos. Em contraste, os retornos médios de Novembro a Abril apresentam-se positivos para todos os Índices respeitantes à nossa amostra.

Recorrendo ao modelo de regressão linear simples e múltiplo, constatou-se que a diferença entre as rentabilidades médias do período Novembro – Abril e do período Maio – Outubro é estatisticamente significativa em 77 dos 102 Índices estudados, para um nível de significância de 10% .

Concluímos ainda, que uma estratégia baseada no efeito *Halloween* produz resultados de forma persistente, dado que funciona 2 em cada 3 anos. A estratégia *Halloween* consiste em investir no mercado accionista de Novembro a Abril e num activo sem risco de Maio a Outubro. Esta estratégia demonstrou obter melhores retornos do que a estratégia *Buy and Hold* em 75% dos Índices analisados. Supondo um investidor, que tenha seguido "de forma cega" a estratégia *Halloween* de Outubro de 1992 até Outubro de 2010 em todos os Índices da nossa amostra, este investidor teria um excesso de retorno anual médio de 2,2% face à estratégia *Buy and Hold*. Com base nos dados apresentados, concluímos portanto acerca da existência do efeito *Halloween*.

Posteriormente, um conjunto de possíveis explicações para a anomalia foram estudadas e discutidas. Contudo, nenhuma das hipóteses levantadas parece explicar a anomalia.

Especificamente, não encontrámos evidência da anomalia estar relacionada com o efeito de Janeiro, *data mining* e com o rebentar da bolha tecnológica nos mercados de capitais em 2001. Uma explicação natural para a existência de retornos superiores no período de Novembro a Abril, seria a existência de maior risco associado a estes meses, porém, tal não se verifica.

Algo que descobrimos, foi que parte do efeito *Halloween* se devia aos retornos acima da média nos meses de Abril. Contudo, a anomalia controlada para o efeito de Abril continua a revelar-se estatisticamente significante, ainda que para um número de Índices mais reduzido.

Evidência empírica demonstra que o efeito se torna estatisticamente insignificante após o estudo de Bouman e Jacobsen (2002), permanecendo, ainda assim, economicamente significante. Interessante é o facto de se observar uma convergência entre os valores de retorno e risco entre os períodos Novembro – Abril e Maio – Outubro, estando as diferenças a

dissiparem-se. Estará a hipótese da eficiência dos mercados a aplicar-se? Estaremos perante o início do desaparecimento do efeito *Halloween*?

Finalmente, sugerimos que uma possível explicação para a anomalia poderá passar pelos retornos negativos existentes entre Maio e Outubro e não tanto pela performance superior de Novembro a Abril. Na nossa opinião, a resposta ao efeito *Halloween*, não estará relacionada com o comportamento humano em resultado de condições climatéricas, transtorno afectivo sazonal, férias ou ciclo de optimismo como foi sugerido por outros autores. Na nossa opinião, a resposta estará relacionada com eventos económicos e/ou financeiros (tais como movimentos de fluxos financeiros devido a *mutual funds*, por exemplo) que originam rentabilidades negativas entre Maio e Outubro.

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1. Introduction

"Stock prices have reached what looks like a permanently high plateau"

Irving Fischer

The Efficient Market Hypothesis has more than a century since it was first introduced by Bachelier in 1900 (although not with the same nomenclature). However, one century later there is still no answer for the so-known million dollar question: "Are the Stock Markets Efficient?".

According to recent evidence stock market returns tend to be significantly lower in the May–October period than during the November–April period. Bouman and Jacobsen (2002) document this calendar time anomaly to be present in 36 of the 37 countries in their sample. They refer to this anomaly as the "Halloween effect" or the "Sell in May" effect. It is so--called because the anomaly is based on an old and inherited market saying by the European financial press, which is the "Sell in May and go away". The saying refers to a believing that during the months of November to April, monthly returns are unusually larger than those in the May–October period. This seasonal stock market pattern poses serious questions to the notions of market efficiency, especially, because the seasonal pattern has been known for quite some time, and yet, it seems to persist.

Extending prior research, this dissertation examines the existence of the Halloween effect for the European Stock Market with Sector Indices, namely, Industry, Supersector, Style and Size. This study contributes in several ways to the existing literature. First, it studies the effect with European Stock Market Sector Indices, which, to the best of our knowledge, it is the first time that the Halloween effect is studied on the European Continent with Sectorial data. Second, our results provide some new insights regarding the effect of dividends in the Halloween effect. Third, we show that the January effect do not explain the anomaly, as the impact of the January returns is to obscure, rather than to drive, the Halloween effect. Fourth, we document that the Halloween effect became statistically insignificant after Bouman and Jacobsen (2002) publication.

This dissertation is organized as follows. In Section 2 we give a more extended review of the literature on this subject. Section 3 presents the methodology and data we have used. Section 4 documents the existence of the Halloween effect. Section 5 discusses some possible explanations for the anomaly. Finally, Section 6 summarizes the main conclusions on this dissertation.

2. Literature Review

Calendar effects in stock market returns have confused financial economists for over 50 years. The evidence of equity market anomalies contradicts the prediction of the efficient market hypothesis (also known as EMH), at least in its weak form, because the predictable movements in asset prices provide investors with opportunities to generate abnormal returns. In addition, stock market anomalies may result from an inefficient flow of information in financial markets, which is a violation of an underlying assumption of the EMH.

At the beginning of the last century, Louis Jean-Baptiste Alphonse Bachelier a French mathematician, in his 1900 dissertation "The Theory of Speculation", has introduced by the first time the EMH. His work was unknown until the 1950s, but in the '30s and '40s the research by Alfred Cowles 3rd suggested that in general professional investors were unable to outperform the market. Cowles (1933) found that there was no discernable evidence of any ability to outguess the market[1]. Subsequently, Cowles (1944) provided corroborative results for a large number of forecasts over a much longer sample period. Therefore, the 1940s empirical research scattered evidence in favor of the weak and strong form of market's efficiency, though these terms were not yet in use. Other authors, like Kendall (1953), Roberts (1959) and Osborne (1959), also contributed to what came to be labeled the "random walk model" or even the "random walk theory".

The mid-1960s was a turning point in research on the random character of stock prices. Professor Eugene Fama developed and proposed the EMH at the University Of Chicago Booth School Of Business as an academic concept through his published Ph.D. thesis in 1965, where he argues that stock prices follow a random walk[2]. Other studies from Paul Cootner[3] (1964) and Paul Samuelson[4] (1965) point the same conclusion.

According to the EMH, no investor has an advantage in predicting a return on a stock price (which incorporates all the information at every time) since prices respond only to the

[1] Alfred Cowles 3rd, founder of the Cowles Commission and benefactor of the Econometric Society, published in the launch issue of Econometrica a painstaking analysis of many thousands of stock selections made by professional investors. Cowles analyzed 7500 recommendations from 16 financial services and the selection stock performance of 25 insurance companies and found that both achieved an average record worse than the average. In addition, the best records failed to exhibit the existence of any skill in investment.

[2] The problem of the optimal search procedure for finding a drunk left in a middle of a field was discussed early in the century by Karl Pearson (1905). If the drunk can be expected to stagger in a totally unpredictable and random fashion, he is likely to end up closer to where he had been left than to any other point. In finance, this analogy has been applied to series whose successive returns are serially independent.

[3] In 1964, Cootner published his collection of papers on the topic.

[4] Samuelson (1965) presented a microeconomic approach, which added rigour to the notion of a well-functioning market, since for every buyer exists a seller that act on their own self-interest.

information available in the market that everyone has access to and no one will have the ability to out-profit anyone else. Therefore, if markets are efficient[5], prices are not predictable but random, and thus no investment pattern can be discerned. Therefore, a planned approach to investment cannot be successful.

Fama (1970) published a review of the EMH where he includes the definitions for three forms of financial markets efficiency: weak, semi-strong and strong forms as Figure 1 represents.

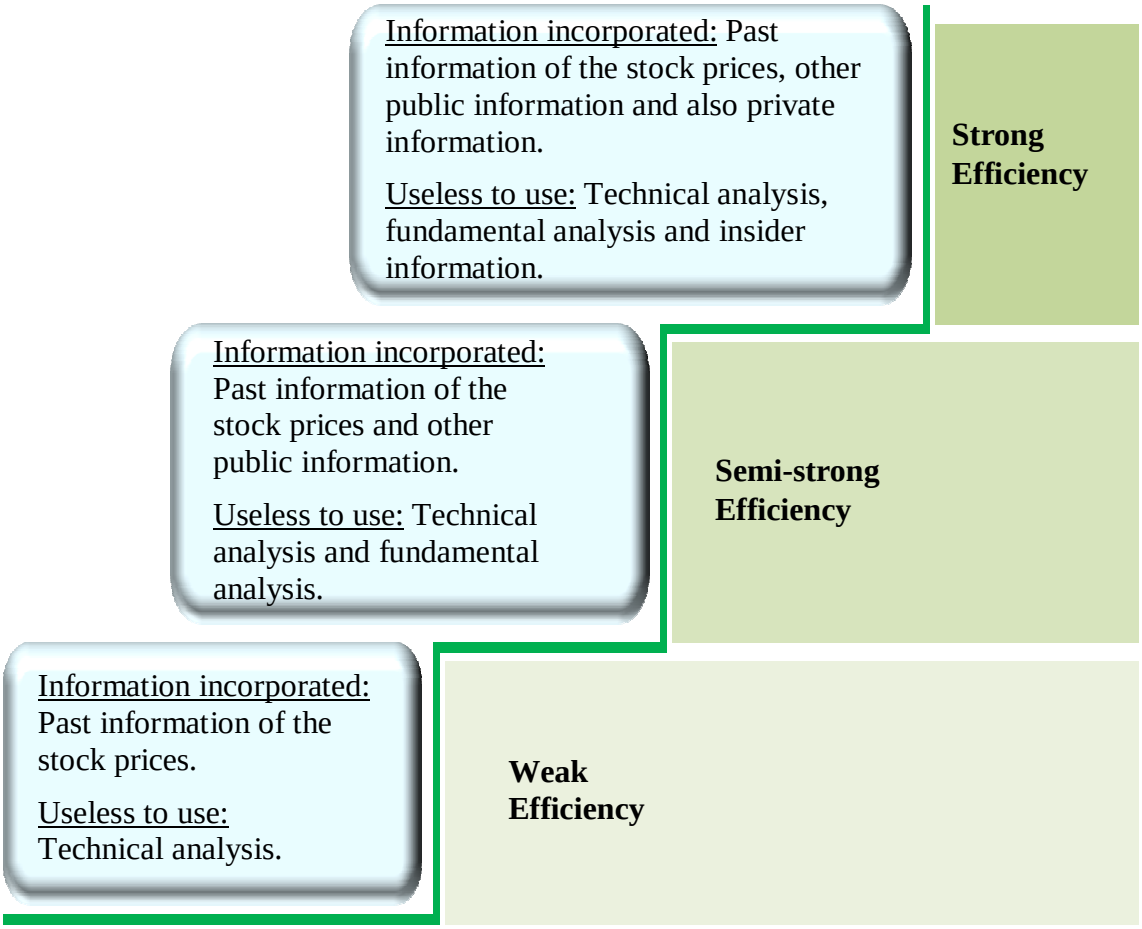

Figure 1 – The three forms of Market's Efficiency according to Eugene Fama (1970).

Starting by the Weak form of Efficiency, it states that an investor cannot use technical analysis to predict and beat the market, since the current price already reflects all the information about the past of the stock prices.

[5] Fama (1970) remarked: "*The three conditions for capital market efficiency are: (i) there are no transaction costs in trading securities, (ii) all available information is costlessly available to all market participants, and (iii) all agree on the implications of current information for the current price and distributions of future prices of each security. (…) Fortunately, these conditions are sufficient for market efficiency but not necessary to a market be sufficient*" (Fama, 1970: 387).

The Semi-Strong form of Efficiency sets that the use of technical analysis or either fundamental analysis is useless to achieve higher profits, because it assumes that the current price reflects all public information available on that stock (i.e. all past prices of that stock plus other public information).

Finally, the Strong form of Efficiency, which is difficult to find in the real markets, says that nothing can help the investor to have an advantage, either technical analysis, fundamental analysis or even insider information. None will result in higher than normal returns, since the price already incorporates all the available information, public and private.

This theory was widely accepted until the 1990s when empirical analyses have consistently found problems with the EMH.

Over the last years, with the computers evolution, it was possible to deeply study patterns and seasonal effects that have already been reported in literature[6].

To name just a few, there exist well-known anomalies related with month-of-the-year (January effect), day-of-the-week (Monday effect, Friday effect), day-of-the-month (Turn-Of--the-Month effect), related with market closures due to exchange holidays (the Holiday effect) and even with politic events (Presidential Cycle effect).

January effect is referred as the fact that January returns tend to be higher than the returns from the year remaining months. Several explanations have been proposed: increased January cash flows due to holiday bonuses, pensions, selling of not profitable stocks for tax reasons at the end of the year and reinvestment in January, financial manager's attempts to show better end-of-year portfolio structure and then increasing beta coefficient in January. January is also seen as a Barometer Month. The idea is that the direction of stocks in January is a good forecaster of their performance for the rest of the year. April is the other unique month with predictive ability although not as strong as January's.

The Monday effect (also known as the weekend effect), refers to the tendency of stocks to exhibit relatively large returns on Fridays compared to those on Mondays. Therefore, the "blue Monday on Wall Street" saying discourages buying on Friday afternoon and Monday morning. Some explanations include: measurement errors, differences in settlement time of transactions and investor's tendency to suspend the announcement of bad news until the weekend so that the market will have time to absorb the shock.

[6] See also Grimbacher *et. al.* (2010) where they study the interaction between the five most well-established calendar effects: the Halloween effect, January effect, turn-of-the-month effect, weekend effect and holiday effect.

The Turn-of-the-Month effect is described as a tendency of stock prices to increase during the last two days and the first three days of each month. Some say that the effect is due to the timing of monthly receiving cash flows by pension funds that are invested later in the stock market.

The Holiday effect refers that returns are higher on the days before vacations.

Regarding the Presidential Cycle effect, the reasoning, which is backed up by more than a century of data, is that stocks do better in the year before a presidential election and the election year than in the post-election and midterm election years, that is, stocks perform better in the presidential election cycle. The main reason is that a presidential candidate may want to promise measures that improves the economy and increase employment levels, having positive consequences on the stock prices.

In the real financial world there exist obvious arguments against the EMH. There are investors who have beaten the market, being the best example Warren Buffett, nowadays one of the richest people in the World. But there are still others, like portfolio managers who have better tracking records than the average and also investment houses with more renowned research analysis than others. So, it seems clear that some investors are beating and performing better than the market. Therefore how the performance can be random?

The EMH does not dismiss the possibility of anomalies in the market that result in the generation of higher profits. In fact, market efficiency does not require prices to be equal to fair value all the time. Prices may be overvalued or undervalued only in rare situations, so they eventually revert back to their average values. But as the deviations from a stock's fair value are themselves random, investment strategies that result in beating the market cannot be consistent phenomena.

Furthermore, the hypothesis argues that an investor who outperforms the market does so not out of skill but out of luck. EMH followers say this is due to the probability laws, i.e., at any point in time in a market with a large number of investors, some will outperform while others will lose or remain average.

Some papers have demonstrated that early identification of new information can provide substantial profits, violating the strong form of the EMH. Jensen (1967) on the other hand,

found that any advantage that the portfolio managers might have is consumed by fees and expenses[7].

However the question remains: "Are the Stock Markets Efficient?". Assuming a "Yes" answer to this question leads to assume that an investor will only receive the fair return for his investments. He will expect to get higher returns if he assumes higher risks and lower returns if he assumes lower risks, in the long-term.

In contribution to this discussion, Bouman and Jacobsen (2002) presented the Halloween effect as another anomaly of the market efficiency, which seems to constitute an exploitable opportunity. Their study follows an old saying "Sell in May and go away"[8]. The message under this saying is that stock returns should be lower during May through October than during the rest of the year. The reasoning behind this oft-repeated proverb is that markets go down in the summer, when deal-makers and rich investors spend summer months away from the stock market as they go out to enjoy the season and the sun on Caribbean cruises, leaving their nervous second-in-commands in charge. As a consequence, shares go nowhere or worse still, they go down.

Despite from nobody knows exactly how old the saying is, research by Jacobsen and Zhang (2010) indicates that exists a written reference in the Financial Times from the year of 1935[9]. After, this phenomenon was studied by a sort of different authors.

Levis (1985) mentioned the anomaly but he had not examined whether or not the "Sell in May" effect actually exists.

Hirsch (1986) made reference to a Six-Month Switching strategy that is identical to the "Sell in May and go away" strategy. Hirsch's Six-Month Switching strategy has been in the public domain since the late 1980s.

Afterwards, O'Higgins and Downs (1990) provided some results, but only for the United States market. In addition, they failed to analyze the statistical significance of their findings. In their study it is referred the same strategy (similar to the Hirsch's Six-Month Switching

[7] It is important to note that the EMH does not rule out small abnormal returns, before fees and expenses.
[8] There are two different endings for the saying. The first of these is "but remember to come back in September". The second is "but buy back on St. Leger Day", in which "St. Leger Day" refers to the date of a classic horse race run at Doncaster in England every September.
[9] Jacobsen and Zhang (2010) mention a written reference to the market wisdom in the English Financial Times of Friday 10 of May 1935: *"A shrewd North Country correspondent who likes stock exchange flutter now and again writes me that he and his friends are at present drawing in their horns on the strength of the old adage "Sell in May and go away."* (Jacobsen and Zhang, 2010: 4).

strategy) which they named as Halloween strategy or Halloween Indicator, since the strategy points to invest in the stock market (in equities) from October 31 through April 30 and to be out of the market (in cash) for the other half of the year.

Bouman and Jacobsen (2002) were the first authors that took this study into a further stage. They analyzed monthly returns in 37 countries across world stock markets from January 1970 through August 1998. For 36 of the 37 countries, mean monthly returns were lower over the period May to October than over the period November to April. The authors reported statistically significance at the 1 percent level for 10 countries and at the 10 percent level for 20 countries.

Moreover, the effect tended to be particularly strong and highly significant in European countries and also proved to be robust over time.

In addition, they presented sample evidence that in a number of countries it has been noticeable for a very long time. They trace returns on 11 markets back as far as records allow and report that it was profitable on a risk-adjusted basis in 10 out of the 11 markets. In 4 of the 11 countries the “Sell in May” effect was statistically significant at the 10 percent level and in 3 it was statistically significant at the 5 percent level. In the U.K. stock market more specifically, they have found evidence of a “Sell in May” effect as far back as 1694 (the longest return series used to test the persistence over time of this anomaly, which has more than 300 years!) at the 10 percent significance level.

Besides from U.K., the “Sell in May” effect has been persistent in the Japanese market since 1920, the Canadian market since 1933, and the Dutch market since 1950, at the 5 percent significance level.

The authors argued that the Halloween strategy outperforms the Buy and Hold strategy on a risk-adjusted basis in the bulk of markets examined casting doubt on the validity of the efficient market paradigm. The positive returns delivered by stock markets, they contend, tend to be concentrated in the November–April period, with the other half of the year delivering poor, often negative, returns.

Bouman and Jacobsen (2002) in order to find an explanation for the anomaly have tried different reasons like risk, cross correlation between markets, the January effect, data

mining[10], shifts in interest rates as well as shifts in trading volume, the possibility of the effect being Sector specific and also the existence of a seasonal factor in the provision of news, but according to the authors, none of these seemed to provide an explanation.

In their efforts to explain the anomaly, they have just found that the relative strength of the effect in different countries appeared to be related to the timing and length of summer vacations. This suggests that vacations imply changes in risk aversion. However, in their subgroup of southern-hemisphere countries, where summer vacations are at a different time relatively to those in the northern-hemisphere, they also find higher returns in the November–April period. At the end, they leave the seasonal anomaly unexplained.

Lucey and Whelan (2002) provided an out-of-sample analysis, since they conducted their analysis on the Irish stock market and used two different periods, from 1934 to 1970 and from 1970 to 1999. They have concluded that the abnormal returns from the Halloween strategy are indeed economically and statistically significant. The "Sell in May" effect revealed to be economically stronger during the second period of their sample and a plausible strategy to outperform the average risk-adjusted return on equity markets.

Kamstra *et. al.* (2003a) provided what they remarked to be an explanation for the Halloween effect, originating a controversial discussion around it. They related the seasonal nature of stock market returns to the Seasonal Affective Disorder (SAD) effect. They remarked that SAD – which is a medical condition whereby the shortness of the days leads to depression for many people – causes a higher level of risk aversion[11], leading to seasonal stock market returns depending on the length of the day.

Based on this, Kamstra *et. al.* (2003a) argued that stock returns during the fall should become lower and, then, become relatively higher during the winter months when days start to get longer. There is, low returns before winter solstice[12] and abnormally high returns following winter solstice. The support for this is that in autumn SAD-influenced individuals rebalance their portfolios in favor of relatively safe assets, resulting in lower returns. After winter

[10] They remark that the data mining argument does not apply since the effect is based on an inherited market saying which is well-known and has existed for decades.
[11] The authors remarked that experimental psychological research indicates that depression leads to higher risk aversion. More specifically, they argued that the medical and psychology literature have clinically established a positive relationship between the length of night and depression through the seasons, as well as a positive relationship between depression and risk aversion.
[12] Winter solstice occurs each year in December 21 or 22 in the Northern Hemisphere and in June 20 or 21 in the Southern Hemisphere, on the shortest day and longest night of the year. Winter solstice marks the beginning of winter season and after it, days start to get longer. The SAD effect results in the Southern Hemisphere are six months out of phase, as are the seasons.

solstice, when days begin to lengthen SAD-affected individuals invest their money on risky assets, resulting in abnormally high returns.

In short, their study argues that that weather affects stock returns through mood changes of investors. They also added that according to the medical evidence on the incidence of SAD, this seasonal relates to the length of the day, not to changes in the length of the day.

Kamstra *et. al.* (2003b) reinforced that stock returns are influenced when many people are suffering from depression due to SAD, as a result of increased length of night (or equivalently, reduced length of day), as documented in Kamstra *et. al.* (2003a). In addition, they remarked that SAD is associated with seasonality in other financial markets and take this as an evidence of the SAD hypothesis. First, they proved that returns on relatively safe government bond indices display a reverse seasonal pattern relative to stock returns[13]. Second, they found the seasonal pattern in stock returns to be more pronounced in riskier[14] classes of stocks. Third, they documented a seasonal pattern in the flow of funds between risky and safe assets, that is, money moves out of stocks and into bonds in fall as the days shorten (the reverse applies as days get longer). In their conclusion they remarked: "*Just as SAD is widely accepted as a serious emotional condition that influences the general population, this paper has shown that investors are no different. This should not be a surprise. After all, investors are human.*" (Kamstra *et. al.*, 2003b: 31).

We think that Kamstra *et. al.* (2003a) and Kamstra *et. al.* (2003b) arguments do not seem consistent. First, they argue that according to the medical evidence on the incidence of SAD, this seasonal is related to the length of the day and not to changes in the length of the day. Therefore, should not returns be higher in the spring and summer (where days are longer), rather than in winter (when days get longer)? Second, an association between sentiment--affecting events and stock prices is not sufficient to credibly establish a causal link between the two, but Kamstra *et. al.* (2003a) and Kamstra *et. al.* (2003b) chose to attribute the origin of the effect to SAD. Third, they should have examined whether the event-induced mood change actually affects investor perception of financial risk or return, whether such a change in perception manifests itself in trading behavior and, whether these sentiment-based trades impact stock prices, which they did not examine. Fourth, it is not difficult to believe that emotion plays a role in the individual decision-making process, but, is difficult to believe that

[13] In autumn, with increasing length of night, stock returns tend to drop, at the same time bond returns tend to rise. The reverse applies with the decreasing length of night.
[14] Risk measured by beta or standard deviation of return.

the valuation by rational investors do not compensate for the irrationality of others. If the stock market depends on the weather or the phases of the moon, then the market is plainly not efficient.

Evidence from other authors also suggests that the SAD explanation does not explain the Halloween effect.

- Goetzmann and Zhu (2005) examined if weather affects investors on their trading activity and found virtually no difference in individual's propensity to buy or sell equities on cloudy days as opposed to sunny days.
- Doeswijk (2008) stated that the summer holiday and the SAD-based explanation for the seasonal pattern in the stock market share a common disadvantage. Both explanations have a cycle parallel to the seasonal pattern in the stock market, so, they have appearances of data mining against them.
- Jacobsen and Marquering (2008)[15,16] in their comment to the study of Kamstra *et. al.* (2003a) confirmed that there was indeed a strong seasonal effect in stock returns in many countries, in which stock market returns tended to be significantly lower during May through October than during November through April, as documented by Bouman and Jacobsen (2002). In addition, Jacobsen and Marquering (2008) remarked that there is little evidence in favor of a SAD explanation and, that this explanation is premature. The SAD explanation argues that weather affects stock returns through changes of investor's mood. Jacobsen and Marquering (2008) state that the correlation between weather and stock returns, without any further support, does not acts as a possible explanation since the relation could just be data-driven. Furthermore, they remarked that the cross-sectional analysis suggests that the SAD argument is not robust in the countries near to the equator.
- Kelly and Meschke (2010) criticized the study of Kamstra *et. al*. (2003a). They noted that the SAD hypothesis is unsupported by the psychological literature, since the predictions of the SAD model do not correspond to the seasonal patterns in depression found in the general population. Furthermore, they document that the SAD effect is

[15] Kamstra *et. al*. (2009) documented several problems with their methodology (like misspecification of the economic model, misspecification of the econometric model and the use of inappropriate data) and reinforced the findings originally documented.

[16] Jacobsen and Marquering (2009) confirmed that Jacobsen and Marquering (2008) has used inconsistent data and remarked that they redid all the tests and that the main results and conclusions do not changed and, if anything, were only strengthened with the correct dataset.

mechanically driven by an overlapping dummy-variable specification which induces statistical significance where a properly specified model would find none.

- Concluding the literature review on the SAD explanation, we highlight the study of Jacobsen and Marquering (2009), in which the authors concluded that the same seasonal effect in stock returns is consistent with many alternative explanations, like a temperature effect, a "Sell in May" effect, overly optimistic expectations at the beginning of the year or vacations. To prove their point, they showed that the seasonal stock market pattern that Kamstra *et. al* (2003a) attribute to SAD can also be "explained" by variables like ice cream[17] consumption or airline travel[18]. Both seasonal variables do an excellent job, ice cream consumption is statistically significant in 21 countries with strong and negative relation with stock returns. The airline travel works even better, being statistically significant in 31 countries. Therefore, they concluded that any variable with a strong summer/winter pattern do the trick and "explains" the stock market seasonality.

Maberly and Pierce (2004) re-examined the Halloween effect for the U.S. stock market from April 1982 through April 2003. They contended that Bouman and Jacobsen (2002) documentation of a significant Halloween effect, for the U.S. equity returns, appear to be driven by two outliers – the "Crash" in world equity prices in October 1987 and the collapse of the hedge fund Long-Term Capital Management in August 1998 – and found that the effect disappeared after an adjustment for outliers.

Additionally, they remarked: "*Incidentally, it is our casual observation that a preponderance of major economic and/or political events that negatively impacted world equity prices have occurred during the May–October periods. Another example is the 1990 invasion of Kuwait by Saddam Hussein in August and the attendant increase in world oil prices.*" (Maberly and Pierce, 2004: 31). Furthermore, the authors have extended the analysis to the S&P 500 futures[19], in order to compare the Halloween strategy with the Buy and Hold strategy, which constitutes a benchmark for market efficiency. The output was that there is no economically

[17] The authors stated that in need of a theory one might argue that ice cream is a so-called comfort food, which people consume when they are feeling depressed. They also added that following the Kamstra *et. al.* (2003a) theory one might argue that depression makes people more risk averse and therefore ice cream consumption might be a good indicator of general risk aversion among investors.
[18] In the sense that as more people travel abroad the less likely they are to trade.
[19] Since transaction costs are lower for index futures versus cash market transactions of similar size, the S&P 500 futures contract constitutes fertile ground for such comparison.

exploitable opportunity in the S&P 500 futures market associated with the Halloween effect over the period April 1982–April 2000.[20]

Witte (2010) reported that Maberly and Pierce (2004) identified the two outliers without formalizing criteria and, dealt with them in an unsatisfactory way. Moreover, he found that the four biggest outliers, aside from October 1987 and August 1998, all work against finding a Halloween effect, concluding that these outliers would augment the Halloween effect. In addition, he suggested that outliers do not drive the Bouman and Jacobsen (2002) results, after using three robust regression methods (more appropriate to outliers, according to the author) to estimate the Halloween effect in the same time frame.

Maberly and Pierce (2005) have examined also the robustness of the results obtained by Bouman and Jacobsen (2002) in the Japanese stock market from January 1970 to December 2003 and have concluded that the Halloween strategy was not economically exploitable[21], being the effect only present in the period before the internationalization of the Japanese financial market in the mid-1980s.

Jacobsen *et. al.* (2005) remarked that the Halloween effect is a market wide phenomenon. In their study they used portfolios that shown higher average winter returns than summer returns and, in most portfolios this difference proved to be economically and statistically significant. Furthermore, they exhibited that average summer returns in excess of the risk-free rate are frequently negative. They found the Halloween effect to be unrelated with the January effect and with portfolios formed on Size, Book to Market ratios, Earnings Price ratios and Cash Flow Price ratios. The only link they found is that the Halloween effect is more pronounced in the low dividend yield portfolios[22].

Doeswijk (2008) tested the Halloween effect for the period 1970–2003 with global stock returns measured by the MSCI World index. In his study, the returns from May through September have been on average close to zero or negative. Additionally, the difference in average returns between the November–April periods and May–October periods is 7,6% and the Halloween strategy worked every two out of three years.

[20] Maberly and Pierce (2004) used data from April 1982 to April 2003; however after April 2000 U.S. equity prices entered in a bear market and any strategy that includes short positions in the S&P 500 futures yields superior results. Therefore, they presented values regarding the Halloween effect until April 2000.
[21] However, conditional on a bull market year, the evidence strongly suggests that returns over the November–April period will be numerical higher than those observed over the May–October period.
[22] They remarked this link to be specific to the United States.

Doeswijk (2008) also suggested that the seasonal pattern could be a result from an optimism cycle. The optimism cycle hypothesis assumes that investors think in calendar years instead of twelve-month rolling forward periods and, that the perceived outlook for the economy and earnings varies during the year. In the last quarter of the year, investors start looking forward to the next calendar year. At first, they are usually too optimistic about the economic outlook (as growth prospects for the economy and earnings). As the year proceeds, this reverses around the time of the summer break in the stock market and, investors become more pessimistic (or less optimistic if one prefers). So, from November through April investors should overweight equities and from May through October they should be underweight.

To test the optimism-cycle hypothesis, Doeswijk (2008) has examined a global zero-investment seasonal Sector-rotation strategy, which is long in cyclical[23] stocks and short in defensive stocks during the winter[24] period and, short in cyclical stocks and long in defensive stocks during the summer. During the winter, cyclical stocks with their high sensitivity to the economic cycle should perform relatively well, the opposite should happen in periods with worst economic expectations, like summer. This strategy results are impressive and highly significant (yields an average monthly logarithmic performance of 0.56% during the sample period, which translates into an annualized simple return of 7%). In short, Doeswijk (2008) documented a global seasonal sector rotation strategy that outperforms in up and down markets and in high and low volatility markets.

Lucey e Zhao (2008) re-examined the Halloween effect in the U.S. stock market between 1926 and 2002 and concluded that in the long term the evidence of this anomaly is reduced and when verifiable, may be attributable to the January effect. Moreover, they concluded that the Halloween strategy would not outperform the Buy and Hold strategy.

Ciccone and Etebari (2008) remark that investing in November through April, as opposed to May through October, is clearly a winning strategy in the U.S. stock market. They also provided a good illustration of the difference in monthly returns by recurring to the cumulative wealth index, where it is demonstrated that investing from November to April produces a significant ending Cumulative Wealth Index (CWI) of $3.891,98, much higher than the $6,42 of May to October, from 1926 to 2006.

[23] Cyclical companies are defined as companies in which their turnover and earnings are heavily dependent on the economy. The reverse applies to defensive companies whose growth is relatively stable and less affected by fluctuations in the economic cycle.

[24] In this dissertation, the winter represents the period November–April and the summer represents the period May–October.

Reichling and Moskalenko (2008) found that the "Sell in May and go away" saying seemed to prove true for both the U.S. and the Russian stock markets, based on the S&P 500 index from 1960 to 2006 and, the RTS index (on U.S. dollar basis) from 1995 to 2006, respectively. Their analysis showed that the advantage of the Halloween strategy is first, the entry time at the end of September and, second, the exit time at the end of May.

Jacobsen and Visaltanachoti (2009) remarked that they have found the Halloween effect to be related to different sectors and proposed an identical strategy to Doeswijk (2008), also labeled sector rotation strategy, where investors should expose their portfolios during winter to production-related sectors or industries and, during summer they should invest in consumer--related sectors or industries[25]. Their results suggested that the strategy outperforms the monthly market return in the both seasons, with robust performance from January 1990 through December 2006. The authors have not found link between summer and winter returns and liquidity measures.

Jacobsen *et. al.* (2009) proposed an alternative rotation strategy to explore the Halloween effect – that historically beats the market by 7 percent a year from 1948 to 2007 – which suggest to hold the market in early expansion and then to rotate between specific sectors[26] across business cycles.

Urbano (2009) remarked that the Halloween effect constituted an economically exploitable opportunity from October 1988 to October 2008, period in which 24 out of 31 Indices in his sample– representative of different stock markets across world – were statistically significant at the 10 percent level. Furthermore, he concluded that the Halloween effect did not disappear or gone into reverse[27] after Bouman and Jacobsen (2002) publication.

Haggard and Witte (2010) showed that the Halloween effect is robust to the consideration of outliers and to the January effect in U.S. in the period 1954–2008. Moreover, they remarked

[25] Doeswijk (2009) argued that the Jacobsen and Visaltanachoti (2009) study is incomplete mainly for three reasons. First, they do not mention the optimism cycle hypothesis in their list of possible behavioral explanations for the well known seasonal pattern. Second, the sector rotation strategy they propose is not new and strongly looks like Doeswijk (2008) sector rotation strategy. Third, to say the least, one could state that their study shows a significant overlap with the Doeswijk (2008) study, but even so, they do not refer to Doeswijk (2008).

[26] The strategy propose to hold the market portfolio in the early expansion cycle as there are not sectors that perform particularly better on this stage. In the middle expansion it suggests to rotate over the Candy & Soda, and Pharmaceuticals Sectors; in the late expansion over Mining and Tobacco Products; in the early recession over Shipping Containers, Food products, Utilities, and Entertainment; in the late recession over Personal Services, Food Products and once more Tobacco Products.

[27] Dimson and Marsh (1999) remarked that once an apparent anomaly is publicized, it often disappears or goes into reverse.

that the Halloween strategy provides risk-adjusted returns in excess of the Buy and Hold strategy, even after consideration of transaction costs.

Jacobsen and Zhang (2010) analyzed the existence of anomalies with long time series[28] to safeguard against sample selection bias, noise and data-snooping. They concluded that the Halloween effect persists over three centuries and is robust over different subsample periods. Their study shows that the Halloween strategy beats the market more than 80% of the time over 5-year horizons.

Until now, there is no established consensus first about the existence of the anomaly and then, about the underlying causes of this remarkable pattern.

Irving Fisher is not remembered for his innovative theory of interest or capital or his contributions to index construction or mathematical modelling in economics. The former professor of economics at Yale is remembered for a remark he made in October 1929. At the time he said, with regrettable timing, that stocks have reached what looks like a permanently high level. Irving Fisher lost his reputation and self-earned fortune in the stock market crash of 1929. So, are the academics involved in this type of research so convinced of their promising trading strategies that they will put their money on the same strategies they announce?

[28] They looked at over 300 years of monthly data on the U.K. stock market starting in 1694.

3. Methodology and Data

In this section we present the methodology followed and introduce the data we have studied.

3.1. Methodology

The performance of the different Indices used in this study was evaluated, with monthly logarithmic[29] returns, defined as $r = \ln\left(\frac{P_t}{P_{t-1}}\right)$. In which P_t represents the close value of the Index at the end of a specific month and, P_{t-1} represents the close value of the same Index at the end of the previous month. Logarithmic returns assume continuously-compounded returns[30] and, this is relevant for several reasons. First, stocks cannot have exactly normal discrete returns, defined as $z = \frac{P_t - P_{t-1}}{P_{t-1}}$. The worst that can happen is bankruptcy, in which case $P_t = 0$ and $z = -100\%$ (due to limited liability). Thus, the empirical distribution is truncated at this lower bound. This is not consistent with normal discrete returns. Saying that $z \sim N$ is the same as saying that prices can be negative and discrete returns can be lower than -100%.

With continuously-compounded returns it is assumed that the percentage changes in the stock price in a short period of time are normally distributed. Therefore, r [which is equal to $\ln(1+z)$] is normally distributed, so that z has a lognormal distribution. A variable that has a lognormal distribution can take any value between zero and infinity. Hence, it is guaranteed that $P_t > 0;\ \forall r \in \Re$.

Second, continuously-compounded returns have an additional property, (particularly useful in time series or stochastic processes) which is the time-series aggregation. That is, if short--horizon returns are independently normally distributed, then the long-horizon return, $r_{0,T}$, is also normally distributed.

[29] And with six-month logarithmic returns, but only to evaluate the Halloween strategy.

[30] Since $r = \ln\left(\frac{P_t}{P_{t-1}}\right) \Leftrightarrow P_t = P_{t-1}\ e^r$

Suppose short-term returns (say daily returns) are independently normally distributed[31], then:

$$r_{0,T} = \ln\left(\frac{P_T}{P_0}\right) \Leftrightarrow \ln\left(\frac{P_T}{P_{T-1}} . \frac{P_{T-1}}{P_{T-2}} ... \frac{P_2}{P_1} . \frac{P_1}{P_0}\right) \Leftrightarrow \; r_{0,1} + r_{1,2} + ... + r_{T-2,\,T-1} + r_{T-1,T} = r_{0,T} \; \sim \; N\left(\mu, \sigma^2\right)$$

Therefore, the distribution of continuously-compounded returns is close to a normal distribution. This is not the case with discrete returns since the product of normal variables is not normal: $\left(1 + z_{o,T}\right) = \left(1 + z_{0,1}\right)\left(1 + z_{1,2}\right)(...)\left(1 + z_{T-1,\,T}\right) \not\sim N$.

Third, the logarithmic returns also present the advantage that the return for multiple periods of time, is just the sum of the returns in each sub period.

To test the existence of the Halloween effect, there were used the simple and the multiple linear regression models. To keep consistency with Bouman and Jacobsen (2002), it was incorporated a seasonal dummy variable[32], in the usual regression model that takes the value 1 if month t falls on the period November through April and 0 otherwise.

$$r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t = r_t - E_{t-1}[r_t]; \quad \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right) \tag{1}$$

The dependent variable r_t represents continuously-compounded monthly index returns, thus, is defined as the natural logarithm of the price relative.

The constant term μ represents the monthly mean return over the May–October periods while $\mu + \alpha_1$ represents the monthly mean return over the November–April periods.

A positive and significant α_1 indicates that monthly mean returns are larger over the November–April periods and, is taken as evidence of a significant Halloween effect. In absence of significance for the estimated coefficient of S_t, then the difference in the average rates of return of the two periods is not statistically different from zero.

ε_t is the usual error term.

[31] It is an empirical question whether normality is a reasonable approximation to security returns. The answer is yes, subject to some qualifications: First, short-term daily returns have fat tails, that is, empirical returns have more kurtosis than the normal distribution. The problem is less severe at longer horizons, say monthly. Second, the return distribution for stock indices (which are proxies for the whole stock market) is skewed to the left, that is, extremely bad returns are more likely than under a true normal distribution. Despite these issues, the normallity is still the benchmark and the work-worse in finance.

[32] The regression equation is equivalent to a simple means t test, to test if the monthly mean returns over the November–April periods are significantly different from the monthly mean returns over the May–October periods. In the absence of the dummy variable the equation is reduced to the random walk model with drift for the log of the stock prices.

To estimate μ and α_1, we use the Ordinary Least Squares (OLS) method. In order to deal with errors we apply the OLS coefficients standard errors corrections; White (1980) procedures are applied in presence of heteroscedasticity and Newey-West (1987) procedures when in presence of heteroscedasticity and autocorrelation or autocorrelation only.

A great advantage of using this regression, as identified by Bouman and Jacobsen (2002), is that one can easily include other explanatory variables, as will be done, later.

3.2. Data Base

The data set used in this thesis consists of monthly[33] returns of 102 European Stock Market Sector Indices (Euro currency), from October 1992[34] to October 2010. However, the time horizon differs from Index to Index according to its establishment date or the availability of data, varying between 119 and 216 observations. The Indices used assume different classifications according to the Industry Classification Benchmark (ICB)[35], as well as, Industry, Supersector, Style and Size. In addition, it were also used Benchmark and Blue--Chip Indices relative to the European Stock Market, which will be used for out-of-sample tests purposes, as they provide a benchmark of sector performance, frequently used by practitioners.

The Indices used are Dow Jones STOXX and were collected from two different calculation methodologies, which are the Total Return Methodology[36]and the Price Return Methodology[37].

The Total and Price Return Indices, as well as the Index Value Calculation formula are displayed in Table A1 and Table A2, respectively. Within Europe, the Indices may represent

[33] And six-month returns to compute the statistical significance over the two half-year periods to evaluate the Halloween strategy.
[34] Some Indices are established since December 1991, however, only the returns after October 1992 (included) were used in order to assure the same number of observations in the November–April period and in the May–October period.
[35] The companies comprising the respective Indices are subdivided into different sector classification levels. There are 10 Industries and, derived from these in increasingly finer classifications, there are also 19 Supersectors, 41 Sectors and 114 subsectors. Each stock in the investable stock universe is uniquely classified into one of the 114 subsectors, depending on the company's primary source of revenue. Consequently, it is automatically and uniquely classified into one of the 41 sectors, one of the 19 Supersectors and one of the 10 industries.
[36] The Total Return Indices considers all price changes and include all dividend payments. Dividend payments are included in the appropriate Indices as net dividends: Net Dividend is equal to the declared dividend less withholding tax.
[37] The Price Return Indices only considers the price changes of the assets. It could also include cash dividends where the distribution is outside the scope of the regular dividend policy or where the company declares such distribution to be extraordinary or special, as well as, special dividends from non-operating income.

two regions, the Nordic region or the Eurozone region. The countries covered by each region are described in Table A3. The source of information is the Reuters 3000 Xtra.

The Benchmark and Blue-Chip Indices will be denominated as B&B Indices. The remaining Indices will be denominated as ISSS[38] Indices. In absence of specification the text is referring to the ISSS Indices.

There are five mainly reasons for the use of this data set. First, European researchers and traders are relatively unfamiliar with the Halloween effect compared to American researchers, looking at the investigation/research produced over the last years. Second, the European stock data constitutes a reasonably independent data set that presents an out-of-sample test[39], as pointed out by Sullivan *et. al.* (2001) and Schwert (2003), for the previous studies on this anomaly, with U.S. stock data, which is extremely well mined. Third, since this data covers a high percentage of European companies we will be able to examine the robustness of this anomaly. Fourth, the use of European Sectorial data in the study of the Halloween effect brings a new perspective, which, to the best of our knowledge, was never considered before. Fifth, it is intended to perceive if the results obtained are sensitive to the methodology used, since Bouman and Jacobsen (2002) argued that excluding dividends would bias the results in favor of the Halloween effect.

[38] It represents the Industry, Supersector, Style and Size Indices.

[39] European stock data will constitute an out-of-sample test to U.S. stock data; Benchmark and Blue-Chip Indices will constitute an out-of-sample test for the remaining European Indices.

4. Empirical Study about the existence of the Halloween Effect

The Halloween or "Sell in May and go away" effect maintains that investing from November through April is better than from May through October. As a consequence, one would define a strategy in order to outperform the market. According to the old saw, the month of May signals the start of a bear market, in which investors are better off selling their stocks and holding cash, until October 31.

This capital market anomaly contradicts the EMH, thus, it presents an interesting anomaly to study, reason why it will be tested whether the adage is truth or not.

Since the results tend to be similar and often equal, the focus will be on the Total Return Indices to save space[40]. Therefore, the statement from Bouman and Jacobsen (2002) that excluding dividends would bias the results in favor of the Halloween effect seems to be wrong[41].

The puzzle will be approached as follows. First, it will be studied whether it exist economic significance differences in the returns of the two half-year periods and if they are attributable to risk. Second, it will be studied if the economic differences are statistically significant. Third, it is intended to perceive if the Halloween strategy (defined as investing in the stock market during the November–April periods and in a risk-free investment during the May–October periods) constitutes an exploitable opportunity, for which will be analyzed its robustness, the distribution of returns by the different months and the Halloween strategy will be compared with the Buy and Hold strategy. A representation of the approach is in Figure 2.

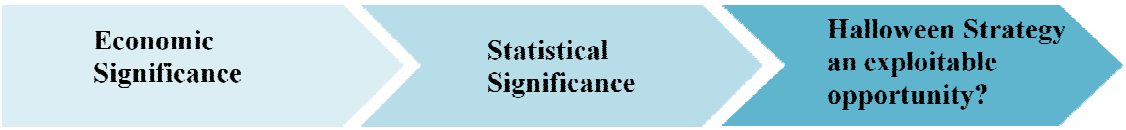

Figure 2 – Approach used to study the Halloween Effect.

The data set was studied over a full 18-year sample period and was also studied into two sub periods for two reasons. First, as Schwert (2003) points out[42] the use of several sub-samples is a remedy against the effects of data-snooping. Also Sullivan *et. al.* (2001) points the same, as

[40] The values presented are relative to the Total Return Indices, which does not mean that they are exactly the same as the ones with the Price Return Indices. Results from Price Return Indices will be presented and discussed, only if they provide additional insight.
[41] The only case where such happens is with Eurozone Indices, situation which will be addressed later on.
[42] More specifically, he points out that many well-known anomalies in the finance literature do not hold in different sample periods.

they dismissed the claim of statistical significance of any calendar-based trading rule, attributing the discovery of the alleged anomalies to a large data-mining exercise[43] of the academic and financial communities. In addition, they remarked that: *"The stability of the best-performing trading rule across sub-samples will provide important information about calendar effects. For example, if the same calendar rule appears to be optimal in many different sub-samples, it would indicate that this rule is indeed capable of outperforming the benchmark."* (Sullivan *et. al.*, 2001: 264).

Second, the burst of the dot-com bubble could influence our results, reason why the same procedure was adopted by Jacobsen *et. al.* (2009) to deal with this significant event. In 13th of March 2000, occurred the burst of the dot-com bubble which originated the beginning of the bear market in equity returns until the end of 2001. According to CNN, during the growth of the bubble was discussed in classrooms, boardrooms and on Wall Street itself, if technology, globalization and free-trade come together to create a truly new economy[44] which allowed to have strong growth, little inflation and historical low levels of unemployment. Later on, with the burst of the longest boom ever and, the consequent adjustments, many state that the market intervenients passed to adopt new behaviors when investing in the stock market.

Regarding investors' behavior in presence of a price bubble, the EMH predicts that rational investors trade against bubbles by shorting the overvalued asset, "causing these "bubbles" to burst" before they can even emerge[45]. On the other hand, Guenster *et. al.* (2009) empirically analyzed rational investor's optimal response to asset price bubbles. They concluded that riding bubbles is a rational investor's optimal strategy, in which a simple dynamic bubble--riding strategy more than compensates for the rise in risk. More specifically, they concluded that a rational investor should fuel bubbles (increase the weight) during the ride and lower its weight after the burst of the bubble. So, their study reinforces the theory that the market intervenients passed to adopt new behaviors when investing in the stock market after the burst of the dot-com bubble. For these two reasons, the data set was analyzed before and after the

[43] They remark that there is no single calendar effect that clearly dominates, in the sense that the optimal calendar rule changes between every single short sub-sample.

[44] The economic crisis in 2008/2009 is a deployment of the financial international crisis triggered by the bankruptcy of the investment banking Lehman Brothers. However, some economists consider that the subprime crisis has its origins on the dot-com bubble.

[45] "*If there are many sophisticated traders in the market, however, they may cause these "bubbles" to burst before they have a chance to really get under way (…) if there are enough of these sophisticated traders, they may tend to prevent these "bubbles" from ever occurring*" (Fama, 1965: 38).

burst of the dot-com bubble[46], to examine if the apparent regularities in stock returns really imply a rejection of simple notions of market efficiency, or are they just a result of a large, collective data-snooping exercise and, to understand if the change of the economy caused any impact on the Halloween effect.

The significance of the Halloween effect was studied for the following time-periods:

- From October 1992 to October 2010, later designated as "All Period";
- From October 1992 to August 2001, later designated as "Before Bubble Period"; and
- From September 2001 to October 2010, later designated as "After Bubble Period".

4.1. Economic Significance

According to the popular market saying "Sell in May and go away", stock market returns should be higher in the November–April periods (also known as winter months) than those in the May–October periods (also known as summer months). To examine the seasonal effect, also known as the "Halloween Indicator", is just to break down the annual returns of equity markets into the two fractions of a year and look at the results. Therefore, the returns were split into two six-month periods, May–October and November–April, and analyzed in the three different time-periods. In Table 1 it is reported the weighted average returns in the two half-year periods.

From October 1992 to October 2010:

In the "All Period" the effect is present in all the Indices, as they show higher average rates of return during winter. More specifically, the monthly average excess of return during the winter months is about 1,7% compared to the summer months. Returns over the period May–October are often negative (more than two-thirds of the ISSS Indices present negative average returns during summer[47]) or close to zero. In the November–April period all the Indices exhibit a positive average return[48].

[46] The turning point defined in this dissertation has occurred in 30th September of 2001, where the majority of the losses inflicted by the burst of the dot-com bubble have already been felt.

[47] During our research, we found this curiously statement: "*I am not aware of a paper that claims to find strong evidence that excess stock returns have been predictably negative*" (Schwert, 2003: 950). This shows, how relevant and interesting it is the Halloween effect, as the average returns during summer months are often negative.

[48] As a curiosity, in the "All Period" the Financials Industry Eurozone Index and the Large Size Nordic Index, are the worst Indices in terms of return, in the Total and Price Return Indices, respectively. The best Index in

Table A4 and Table A5 exhibit the risk and return in the "All Period" over the two six-month periods, for the Total and Price Return Indices, respectively.

In the sample, the Industrials Industry Index exhibits the higher difference between the two half-year periods returns in the Eurozone (2,7% of monthly average return difference), in the Nordic region is the Media Supersector Index whose takes this role (4,1% of monthly average return difference).

The Health Care Supersector Index has the lowest difference between the winter and summer average rates of return, both in Eurozone and Nordic regions. Curiously, this Index exhibits a positive average rate of return during May through October, both in Eurozone and Nordic regions. Hence, this may be the reason for the lower differences in the average rates of return in the two half-year periods. Relative to the remaining Indices where the Halloween effect revealed to be economically weaker, it can be found that exist a propensity for the Indices to possess positive average rates of return for the May–October period. Thus, the Halloween effect may not be resultant to higher than the usual returns in the November–April periods, but due to the lower (and sometimes negative) than the usual returns in the May–October periods.

The Halloween effect is economically stronger[49] in the Nordic region with the Total Return Indices and, in Eurozone with the Price Return Indices.

The empirical evidence supports the economically exploitable opportunity associated with the Halloween effect. For those more skeptics, it is presented an example of the use of the Halloween strategy over the period October 1992–October 2010, for the Health Care Supersector Nordic Index (the Sector with the lowest difference between the winter and summer average rates of return).

A €100 investment in this Index, beginning in 1992 grew to €773 conditional on the proceeds being invested exclusively over the November–April periods. In contrast, by investing the proceeds exclusively over the May–October periods, the investment grew to only €318. The difference in the two investment strategies is striking.

Great part of the return for the year is concentrated in the November–April period. The effect is therefore very pronounced, as it is illustrated in Figure A1.

terms of return is the Industrial Goods & Services Supersector Nordic Index, in both methodologies (with and without dividends).

[49] This means that the average difference between the rates of return in the November–April and May–October periods is higher, in the case, for a specific region.

Table 1 – Economic Significance of the Halloween Effect

Table 1 shows weighted average monthly rates of return in the period May–October and in the period November–April based on 102 European Stock Indices.

	Eurozone (34 Indices)		Nordic (17 Indices)		ISSS (51 Indices)	
	Nov.-Apr.	**May-Oct.**	**Nov.-Apr.**	**May-Oct.**	**Nov.-Apr.**	**May-Oct.**
	Total Return Indices					
"All Period"	1,4%	-0,2%	2%	0,2%	1,6%	-0,1%
"Before Bubble Period"	2,3%	0,01%	2,8%	0,6%	2,5%	0,2%
"After Bubble Period"	0,7%	-0,4%	1,3%	-0,1%	0,9%	-0,3%
	Price Return Indices					
"All Period"	1,3%	-0,5%	1,7%	0,1%	1,5%	-0,3%
"Before Bubble Period"	2,2%	-0,3%	2,6%	0,5%	2,4%	0%
"After Bubble Period"	0,6%	-0,6%	1%	-0,2%	0,7%	-0,5%

From October 1992 to August 2001:

In the "Before Bubble Period" the winter and summer differences in terms of returns are generally very large and economically significant, being the effect present in all Indices.

The winter monthly average excess of return (compared to the summer months) is slightly above 2,3%. Therefore, the Halloween effect reveals to be economically stronger during this time period on our sample.

Although, there are more Indices (than in the "All Period") in the sample with positive average rate of return during May through October, the number is still small (less than half). Even so, all the Indices analyzed exhibit positive average rate of return for the November–April periods[50]. Table A6 and Table A7 exhibits the risk and return in the "Before Bubble Period" for the Total and Price Return Indices, respectively.

The Halloween effect reveals to be a seasonal pattern equally stronger in the Nordic and Eurozone regions, with Total Return Indices. However, with Price Return Indices it is economically stronger in Eurozone.

[50] With the exception of the Mid and Small Size Nordic Price Return Indices.

From September 2001 to October 2010:

In the "After Bubble Period" the effect is present in the majority of the Indices in the sample, as it is reported in Table A8 and Table A9 – tables show risk and return values for the Total and Price Return Indices, respectively. Only 3 Indices do not present the effect: Automobiles & Parts Supersector Eurozone Index and the Telecommunications Supersector Nordic and Eurozone Indices.

During winter, as it is shown in Table 1, the monthly average excess of return is above 1,2% Therefore, besides the "Sell in May" effect be strongly present in many Indices the differences in average returns within this period are smaller than the ones from the "All Period" and the "Before Bubble Period", which makes this time-period the worst in terms of return (from those considered). In addition, the number of Indices with positive average rate of return during the May–October period is residual (besides this, there are Indices with negative average rate of return for the November–April period).

This confirms that the burst of the dot-com bubble has affected the economic significance of the Halloween effect. First, only after the burst of the bubble there exist Indices where the effect is not present. Second, the excess of return in the winter months in the "After Bubble Period" is lower, almost half, than the one from the "Before Bubble Period". Third, for the first time we found Indices with negative average rates of return during winter.

The Halloween effect, as in the remaining time-periods, is economically stronger in the Nordic region with Total Return Indices and in the Eurozone region with Price Return Indices.

Concluding, the Halloween effect is economically significant in all the Indices, independent of the time period considered (with the exception of the "After Bubble Period" where 3 Indices do not exhibit the effect). If an investor A (following a Halloween strategy) invest only in the winter months should have (in average) higher returns than another investor B that invests only in the summer months. In order to maximize the Halloween strategy an investor may invest in the Nordic region, which is a better option in terms of return in all the time--intervals considered.

Monthly average returns are almost always positive and unusually large during the winter months. In the summer months are often negative or close to zero. We suggest, that a possible explanation to the anomaly may be related with the negative average rates of return during the

May–October period, rather than a superior performance during the winter months. The Halloween effect reveals to be economically stronger during the "Before Bubble Period", casting doubt on a possible impact of the burst of the dot-com bubble on the anomaly. We conclude that excluding dividends strengths the effect in the Eurozone region, and in addition, reduces it in the Nordic region. As a consequence, the Halloween effect is stronger in the Nordic region with Total Return Indices and in the Eurozone with Price Return Indices.

Risk-Return Trade-off

A natural question is whether these results are related with risk. Are higher returns during the winter months a compensation for higher risk in this period? The answer is likely to be no. Risk, measured by the standard deviation of the monthly returns, tends to be similar in both two half-year periods and throughout the year. However, before we analyze if in average the returns during winter are statistically significant higher than those during summer, it is important to understand if the effect is explainable by the risk factor.

Table 2 reveals some interesting insights about the risk during the winter and summer months. First, it exhibits that the stronger it is the effect (economically stronger), the more risk it is concentrated in the winter months. Second, the Nordic region seems to be more risky than the Eurozone region.

Table 2 – Halloween Effect: summary results on risk

Table 2 shows the percentage of Indices, in the sample of 102 European Stock Indices, which exhibit lower risk (measured by standard deviation of the monthly returns) during the winter months than during the summer months.

	"All Period"	**"Before Bubble Period"**	**"After Bubble Period"**
	Total Return and Price Return Indices		
ISSS	73%	37%	82%
Eurozone	88%	50%	94%
Nordic region	41%	12%	59%

In the "All Period"[51] all Indices have higher returns during the winter months and, the majority of the Indices have lower risk as well. So, following a Halloween strategy seems to be a "win-win" guess in average.

In the "Before Bubble Period", period in our sample in which the Halloween effect is economically stronger, exists more Indices with higher risk during the winter months comparatively to the risk in the summer months.

In the "After Bubble Period", where the effect is economically weaker, the winter months are a safer option, compared to the summer months.

Therefore, since the risk seems to have a positive relation with returns – there is, when the excess of return during the winter months is higher, there exist more risk associated with the November–April period than the one it exists with the May–October period – it was computed the reward-to-risk ratio[52] for the two half-year periods. Such ratio allow us perceive if the risk is being properly rewarded and, in what half of the year it is more rewarded. The ratio is similar to the Sharpe Ratio[53] but without the risk-free rate of return.

To analyze if the return compensates the risk, it was assumed the investor to be risk neutral, because these investors are the more "rational ones". Neutral risk investors, in front of two different investments, with different levels of riskiness and payoffs, only are concerned about maximizing the return on a risk adjusted basis, i.e., maximize the reward-to-risk[54] ratio.

The results show that in the "All Period" and "Before Bubble Period", all the Indices present a reward-to-risk ratio that is superior during the November–April period. In the "After Bubble Period", 94,1% of the Indices have a higher reward-to-risk ratio. See Table A4 until Table A9.

In addition, we also analyzed if the burst of the dot-com bubble created changes in the level of risk of the different Indices. Bubbles cause misallocations of capital (as a result of the

[51] As a curiosity, in the "All Period" the Media Supersector Nordic Index and the Food & Beverage Supersector Eurozone Index are the worst and best Indices in terms of risk, respectively.

[52] The reward-to-risk ratio is defined as the average return per unit of risk (measured by the standard deviation of monthly returns): $\frac{\overline{R}}{\sigma}$.

[53] Sharpe Ratio is a measure of the excess return (or risk premium) per unit of risk in an investment asset or in a trading strategy. The ratio was developed by William Forsyth Sharpe in 1966. Technically is the portfolio's average return in excess of the risk-free asset (e.g. Treasury bill), divided by its standard deviation.

[54] A more risk adverse investor might not be interested in investments that generate more units of return per unit of risk, if the assets have a level of risk that the investor is not in dispose to incur. Such an investor would require for certain levels of risk a higher reward-to-risk ratio, than the one it requires for lower levels of risk.

increase in relative pricing levels) towards the areas. As a consequence, the subsequent correction (as the trend proves unsustainable) causes severe structural difficulties in the economy, reason of why, we computed the Chow Test[55] to check for the presence of a structural break in the risk. The conclusion is that 10[56] Indices have changed its risk structure at the 5 percent significance level. However, this does not seem to affect the previous conclusions about the Halloween effect.

To sum up, the market saying "Sell in May and go away" is a simple but profitable one. On average, stocks deliver return close to zero or negative in the six-month period from May through October, only rewarding the investors from November through April. Therefore, the effect cannot be accounted for by a seasonal incidence of risk. Additionally, the Nordic region is a better option in terms of return and the Eurozone in terms of risk, in all the time-periods considered.

4.2. Statistical Significance

Even though the Halloween effect is economically significant, it is important to notice that the relevant question is whether it is also statistically significant.

In Table A10 and Table A11 we report some summary statistics and some basic estimations results from equation (1) for the period October 1992–October 2010 relative to the Total and Price Return Indices, respectively.

The estimation results from equation (1) for the sub period October 1992–August 2001 are reported in Table A12 and Table A13, concerning Total and Price Return Indices, respectively.

Finally, are shown estimation results from equation (1) for the sub period September 2001–October 2010 in Table A14 and Table A15 representing Total and Price Return Indices, respectively.

[55] The Chow test is a statistical test of whether the coefficients in two linear regressions on different data sets are equal. The Chow test was proposed by the economist Gregory Chow in 1960.

[56] They are the Industrials Industry Eurozone, Basic Resources Supersector Eurozone, Insurance Supersector Eurozone, Telecommunications Supersector Eurozone, Consumer Services Industry Nordic, Media Supersector Nordic, Personal & Household Goods Supersector Nordic, Technology Supersector Nordic, Telecommunications Supersector Nordic and Large Size Nordic Indices.

In the "All Period", 34 out of 51 ISSS Indices show statistically significant differences in summer and winter returns, all with the expected sign, at the 10 percent level. The effect is highly significant, at the 1 percent level, for 4 Indices in the sample. Statistical significance results are summarized in Table 3.

As it is exhibited in Table A16 the period that shows more statistical significant Indices is the "All Period", followed by the "Before Bubble Period" and the "After Bubble Period"[57]. This means, that contrary to the economic significance results, the effect is not statistically stronger in the "Before Bubble Period", but instead in the "All Period".

The Halloween effect revealed to be a seasonal pattern statistically stronger in the Nordic region with Total Return Indices. However, if we exclude dividends, there is, if we use Price Return Indices, the Halloween effect is statistically stronger in the Eurozone.

Table 3 – Global results of the Halloween Effect statistical significance

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table 3 shows global results of the Halloween effect statistical significance based on 102 European Stock Indices from October 1992 to October 2010. The percentage of statistical significant Indices is the coefficient between the number of significant Indices with the total number of Indices. It is also exhibited the number of negative estimated coefficients. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors.

	Halloween effect - α_1		
Level of Significance	**1%**	**5%**	**10%**
	Total Return Indices		
Nº. of Significant Indices	**4**	**22**	**34**
% of Significant Indices	8	43	67
# negative estimated coef.	-		
	Price Return Indices		
Nº. of Significant Indices	**3**	**21**	**33**
% of Significant Indices	6	41	65
# negative estimated coef.	-		

[57] During this sub time period there exist 3 Indices with negative estimated coefficients, representing that these 3 Indices have lower return in the winter months than in the summer months. These Indices are the same that did not exhibit economically significance in this sub time period, therefore statistical conclusions support economic significance results.

Another interesting perspective is to understand if the burst of the dot-com bubble had an impact on the Halloween effect. Therefore, if we look at the statistical significance results of each region in the "All Period" and compare it with the homonymous from the "Before Bubble Period", we can conclude that in a considerable number of cases the dot-com bubble reinforced the Halloween effect in the Nordic region, but the same do not happened in the Eurozone.

In addition, it is important to notice that some classifications exhibit a higher percentage of statistically significant Indices. As an example, at the 5 percent level, the majority of the Style Eurozone Indices are statistically significant, value that reaches the 100% at the 10 percent level. Table A17 and Table A18, contain the percentage of Indices which are statistically significant within each classification (Industry, Supersector, Style and Size) over the "All Period", "Before Bubble Period" and "After Bubble Period", representing Total and Price Return Indices respectively.

Furthermore, it was our purpose to identify Indices that have demonstrated a similar pattern over different time periods independently of the methodology used (with or without dividends). Hence, this in-depth analysis was labeled as "Sector analysis" and, was performed at the 5 percent significance level. The main conclusions is that there exist 2 Indices that are statistically significant independently of taking into account or not the dividends, in the Eurozone and Nordic regions and both in the "All Period" and "Before Bubble Period", which are the Media and the Personal & Household Goods Supersectors. In addition, there exist Indices that only exist for the Eurozone which are statistically significant, both in the "All Period" and "Before Bubble Period"[58]. Table A19 and Table A20 represent in more detail the results obtained, for the Total and Price Return Indices, respectively.

Assuming market efficiency, one would be doubtful as to whether or not there could be any truth in a simple and inherited market saying such as the "Sell in May and go away" which refers to one of the most controversial anomalies, the Halloween effect. This saying is based on the observation that share prices apparently tend to decrease during the summer months. Indeed, we document the existence of a strong seasonal effect in stock returns, as the one it is described by the Halloween effect and, we proved the effect to be statistically significant in the majority of the Indices in our sample. In addition, we found that the excess of return

[58] In the Total Return Methodology are the Construction & Materials Supersector and the Growth, Growth Small and Value Small Style Indices. In the Price Return Methodology are the same mentioned earlier plus the Chemicals, Travel & Leisure and Utilities Supersectors and, Growth Mid Style Indices.

during the winter months is particularly strong in the Nordic region if we consider dividends and in the Eurozone if we exclude dividends. Finally, evidence suggests that the dot-com bubble reinforced the Halloween effect in the Nordic Indices.

4.3. Halloween Effect: A persistent and an exploitable opportunity?

Making investment or trading decisions at a specified times of the year has some attractive features. First, it is simple and the easiest approach one can follow (apart from taken advice from "experts" or to just "buy and hold"). Second, since the investor knows when action may need to be taken the rest of the time can be spent on non- investment activities if desired.

The main disadvantage of calendar based investing may be that, like all other methods, it is going to be "wrong" some times. Hence, an investor may give up on following it, particularly, if invests on years when the calendar based investment do not work well and do not take a chance to "even the score". Therefore, is important to realize if the Halloween effect is persistent and constitutes an exploitable opportunity.

4.3.1. Robustness of the Halloween Effect

A trading rule only is helpful for an investor if it is reliable on its persistence. Therefore, we studied the frequency with which the November–April period outperforms the remaining six months of the year.

The Halloween effect could perhaps be a consequence of an extraordinary performance in a couple of years. To actually control for the possibility of the abnormal return could be achieved by mere chance it was computed the percentage of years[59] that the November–Aril period achieved higher returns than the May–October period and the results are exhibited in Table A21.

Empirical results show that the Halloween strategy, based on the "Sell in May and go away" effect, is a reliable trading strategy. The weight average success ratio of 68% indicates that this strategy works every two out of three calendar years.

On a closer examination, this trading rule can be applied in all the Indices with the exception of three – Technology Supersector Nordic and the Telecommunications Supersectors in the

[59] For calculation reasons the year was assumed to begin in November and end in October.

Nordic and Eurozone regions – since the percentage of years, in which the returns during the winter months are superior to the returns over the summer months, is above 50%.

Popular media refer to this market wisdom ("Sell in May and go away") in the month of May, claiming that in the six months to come things will be different and the pattern will not show. However, as the effect has been strongly and persistently present in the majority of the European Stock Market Sector Indices (which covers a high percentage of European companies) these claims are often proved wrong. Concluding, the Halloween effect constitutes an interesting anomaly, represents an exploitable opportunity, and a strategy based on the "Sell in May and go away" saying works persistently.

4.3.2. Monthly Returns and Monthly Risk

An interesting question is whether the returns are more or less evenly spread over the months in all the Indices, or whether they can be attributable to specific months. Is the abnormal performance of the winter months a consequence of an extraordinary performance of one specific month? Is the lower performance of the summer months a result of a bad performance of one particular month?

To answer these questions, we computed the monthly average returns for each month, as reported in Figure 3. See Table A22 for results in more detail. The conclusions are:

- The Halloween effect is not a result of abnormal returns in one specific month.
- There is a tendency, for the winter months to display high monthly average rates of return and, for the summer months to exhibit low or negative monthly average rates of return. In general, returns tend to be below the average in all months from May through October, although results tend to be mixed for July and October.
    - Considering the effect of dividends, the four best months in terms of average return – April, December, November and March by descending order of return – belongs to the November–April period.
    - Without dividends, the three best months in terms of average return are April, December and November. March loses importance in this methodology, a result of the dividend distribution, which makes the prices go down in March.

- The two remaining months that constitute the Halloween strategy – January and February – are in the second half of the ranking table to hold a long position in the stock market, within the Indices in our sample.

Is also important to highlight the outstanding performance of April[60], the best month in terms of return, with more than 3% of monthly average return. The worst month in terms of return is September[61], with a negative monthly average return of less than -2%. Therefore, the difference of return between these two months is considerably high.

Additionally, in Table A23 and Table A24 are reported the differences between the monthly average return of each month and the monthly average return over all months for the Total and Price Return Indices, respectively. The accumulated difference of the November–April period is 305% which compares with -309% during the May–October period! An interesting point, from the study of the Halloween effect is that exist some months that clearly perform better than the remaining. One cannot expect the return to be exactly equally distributed, month after month, year after year, like if exists an invisible force that distributes the returns perfectly. If such exists, such market would not be a perfect market. Therefore, the big point is not that in a specific date (whatever it is), some months have performed better than others in average terms. Some would have to! The big point is that some months persistently have performed better than others and demonstrated to be economically significant, with large differences, as the ones cited above.

As Maberly and Pierce (2004) suggested, a possible solution for the "Sell in May and go away" puzzle could be the January effect. However, in light of these results, it can be concluded that January is not even one of the best six months to be invested in the stock market. Therefore, as it will be further analyzed, the January effect do not seems a possible explanation for this anomaly; by the contrary, in the Indices in our sample, it acts as a contrary force against the Halloween effect, which nevertheless, remains significant in some Indices.

The best strategy to follow, according to the results obtained, in order to have a long position in the market for a period of six-months, is to invest in October until the end of December, (be

[60] In April, all the Indices have positive average rates of return.
[61] In September, only four Indices present positive average rates of return, which are the Health Care Supersectors in the Eurozone and Nordic regions, the Consumer Services Industry Nordic and the Media Supersector Nordic.

out of the market in the months of January and February) get back to the market at the beginning of March and get out at the end of April (do not hold a long position in the months of May and June) and, finally be invested in July (i.e. be invested in the months of October, November, December, March, April and July). By doing such an investment, an investor would benefit from the return of the best six months of the year (at least, in average from October 1992 to October 2010, since past returns do not meant future ones). The main pitfall of this investment strategy is the transaction costs which would be 3 times higher than the ones from the Halloween strategy.

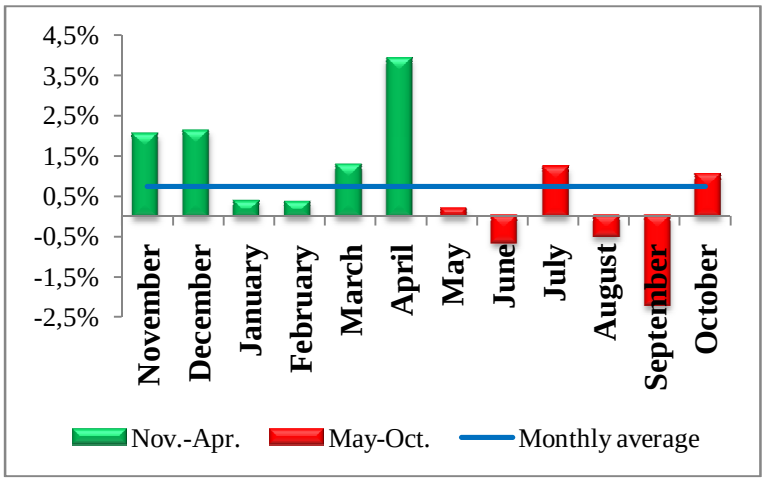

Figure 3 – Average Returns per Month

Figure 3 reports the average monthly returns per Month based on 51 Total Return European Stock Indices from October 1992 to October 2010. This figure is graphically identical to the representation of the average monthly returns per Month for the same period based on 51 Price Return European Stock Indices.

It was also analyzed the risk (measured by the standard deviation of the monthly returns) to guarantee that the higher performance of the winter months is not a consequence of more risk during that period. According to the EMH, a higher return cannot be expected without bearing additional risk and today even private investors are familiar with the *no risk, no fun* principle. Results are reported in Table 4 that contains the risk for each month:

It is important to notice the strong difference in terms of risk between October (month with higher risk) and June (month with lowest risk). Therefore, September and October are the worst months in terms of return and risk, respectively, and both of them are in the summer months.

In the months that compose the Halloween strategy, only 2 – February and April – are in the 6 riskier months, occupying the 8th and 11th places, respectively. Thus, it is important to cross the return and risk information's:

- February is the 8th month in terms of risk (and the 8th in terms of return).
- April it is the 11th month in terms of risk (but the 1st in terms of return).

Table 4 – Ranking of the Months according to the Risk

Table 4 exhibits the months sorted in ascending order of risk (measured by standard deviation of the monthly returns) based on 102 European Stock Indices from October 1992 to October 2010. In addition, it is reported the related monthly standard deviation on the right side of each month.

	Total Return Indices		Price Return Indices	
1º	June	4,05%	June	4,01%
2º	July	4,29%	July	4,29%
3º	December	4,3%	December	4,31%
4º	March	4,61%	March	4,6%
5º	January	4,75%	January	4,76%
6º	November	4,84%	November	4,84%
7º	May	4,89%	February	4,92%
8º	February	4,92%	May	4,92%
9º	August	5,01%	August	4,99%
10º	September	5,58%	September	5,59%
11º	April	5,63%	April	5,64%
12º	October	6,8%	October	6,82%

Since it is important to cross the information between return and risk, it was analyzed the reward-to-risk ratio of every month, which is exhibited in Table 5.

In the winter months, only January and February do not appear in the first sixth places regarding the reward-to-risk ratio. Therefore, there exist months in the period May through October that reward better the risk. The remaining winter months present a more favorable return in a reward-to-risk basis. As a result, it seems unlikely that risk would justify the difference in returns.

Table 5 – Ranking of the Months according to the reward-to-risk ratio

Table 5 exhibits the months sorted in descending order of the reward-to-risk ratio based on 102 European Stock Indices from October 1992 to October 2010. In addition, it is reported the related ratio on the right side of each month.

	Total Return Indices		Price Return Indices	
1º	April	0,69%	April	0,59%
2º	December	0,49%	December	0,48%
3º	November	0,42%	November	0,4%
4º	July	0,28%	July	0,26%
5º	March	0,27%	March	0,21%
6º	October	0,15%	October	0,14%
7º	January	0,08%	January	0,07%
8º	February	0,07%	February	0,07%
9º	May	0,03%	May	-0,09%
10º	August	-0,1%	August	-0,11%
11º	June	-0,16%	June	-0,23%
12º	September	-0,4%	September	-0,4%

Concluding, the Halloween effect is not a result of higher or lower than the usual returns in one particular month. In addition, the superior returns in the November–April period are not justifiable by higher levels of risk.

4.3.3. Trading Strategies

Some argue that calendar based trading can be hard to stay with, but it outperforms buying and holding over the long term with much less risk. By the other hand, if these anomalies existed, the market as soon as it was in the possession of that knowledge would correct them immediately. Thus, no market inefficiency would last. Furthermore, many economists argue that these anomalies only exist in the academic world, i.e., are not exploitable opportunities since it is not possible to realize profits due to the transaction costs.

Why is the study of the Halloween effect important? Seasonality is important, and can really bring good profits to the one who cares to look at it. The heating oil market is a clear example of a seasonal market. In fact, many homeowners and building managers cover their fuel needs before the heating season begins leading to early price increases. This demonstrates how important it is to conduct empirical studies and evaluations on seasonal trends and not be swayed by preconceived ideas about them. One simple application is to use seasonality as a filter, abstaining from positions that are against the seasonal trend. The probability of long trade profits could also be increased in this way. In the “Sell in May” strategy, it would also

be possible to adjust position size according to seasonal trends. Investors should overweight equities in the six-month winter period from November through April and be underweight during the summer period from May through October.

In the literature there is an ongoing discussion if the Halloween strategy offers a significantly higher profit than a buy and hold strategy throughout the whole year.

"The economic significance of this (Halloween effect) particular calendar anomaly is considerable. A simple trading strategy based on the saying would outperform a buy and hold portfolio in many countries in our study, and would also be a lot less risky. This also makes the 'Sell in May' effect potentially interesting for practitioners, as benefits can be obtained by just two trades a year and are therefore not wiped out transactions costs." (Bouman and Jacobsen, 2002: 1619).

Here we compare annual returns of the Halloween strategy with a Buy and Hold strategy. Halloween strategy is defined as a strategy where the investor buys a market portfolio at the end of October and sells this portfolio at the end of April. This investor will then invest in a risk-free asset from the end of April through the end of October. In the Buy and Hold strategy the investor holds the stock market portfolio all over the year.

Within this comparison three scenarios must be distinguished. First, the Halloween strategy outperforms the Buy and Hold strategy even without taking into account the risk-free investment. Second, the Halloween strategy outperforms the Buy and Hold strategy. Third, the Buy and Hold strategy outperforms the Halloween strategy. We measured annualized continuously-compounded returns from October 1992 to October 2010. Table 6 shows the percentage of Indices in each Scenario.

More than two-thirds of the Indices are in Scenario 1, where the Halloween strategy outperforms the Buy and Hold strategy even if one does not consider investing in a risk-free asset over the May–October periods. This happens, because the Indices often present negative average returns during the summer months, therefore any strategy that suggest to be out of the market during this period yields superior returns. The exploitable opportunity seems to be even higher with Price Return Eurozone Indices, which, as it was observed before, seems to be sensitive to the account of dividends. The point is that with Price Return Indices, the Eurozone exhibits less number of Indices with positive average return during the summer

months, decreasing the opportunity cost of being in the market in that period, something that do not applies for the Nordic Indices.

Table A25 and Table A26 exhibit annualized average returns during all the year and during the winter months, for the Total and Price Return Indices, respectively.

For the Indices which are not in Scenario 1, it were computed the annual continuously--compounded break-even rates of return required from the risk-free asset to equal the returns from the Halloween strategy and the Buy and Hold strategy[62]. The break-even rates of return are displayed in Table A27.

The Indices in which the break-even rate is below 2% (which corresponds to the continuously-compounded European Interbank Offered Rate[63] from October 1992 to October 2010, i.e., exactly the "All Period", and a benchmark for the risk-free rate), the Halloween strategy was assumed to outperform the Buy and Hold strategy (Scenario 2[64]) conditional on the proceeds being invested exclusively over the November–April periods in the stock market and then applied in the risk-free asset during the summer months (since it is better to hold for instance bonds than invest in the stock market during the summer months). In the remaining Indices, the Buy and Hold strategy presents a better trading strategy solution (Scenario 3).

In around three-quarters of the Indices the Halloween strategy outperforms the Buy and Hold strategy, constituting therefore an exploitable opportunity. Additionally, a strategy based on the "Sell in May and go away" saying is less risky (risk measured by standard deviation of the monthly returns) in all the Indices, compared to the Buy and Hold strategy. This contradicts the financial principles, in which, according to the risk-return tradeoff, invested money can render higher profits, if and only if, it is subject to higher levels of risk. Finally, only one--quarter of the Indices is in Scenario 3, where the Halloween strategy does not outperform the Buy and Hold strategy.

[62] Without accounting for the transaction costs.
[63] In detail it corresponds to the Libor ECU from October 1992 to December 1998 and to the Euribor from January 1999 to October 2010. We achieve a similar rate by using Libor ECU from October 1992 to October 2010. All rates with 6 months period and extracted from Bloomberg.
[64] Scenario 2 contains the Indices in Scenario 1 plus the Indices in which the return from the winter months together with the return from the risk-free asset is enough to outperform the Buy and Hold strategy.

Table 6 – Halloween Strategy vs. the Buy and Hold Strategy

Table 6 exhibits three scenarios based on 102 European Stock Indices from October 1992 to October 2010. Scenario 1 represents the percentage of Indexes in which the winter months by itself outperformed the Buy and Hold strategy. Scenario 2 shows the percentage of Indexes in which the Halloween strategy outperformed the Buy and Hold strategy. Scenario 3 represents the percentage of Indexes in which the Buy and Hold strategy outperformed the Halloween strategy.

	Scenario 1	Scenario 2	Scenario 3
	Total Return Indices		
Total	69%	73%	27%
Eurozone	79%	85%	15%
Nordic region	47%	47%	53%
	Price Return Indices		
Total	80%	80%	20%
Eurozone	97%	97%	3%
Nordic region	47%	47%	53%

The Halloween strategy is undeniably an exploitable opportunity. If in need of more convincing, we present the superior returns presented by this strategy in Table 7. Results per Index are reported in Table A28 and Table A29 for the Total and Price Return Indices, respectively.

With Total Return Indices, in average (considering all the Indices in our sample) the annualized continuously-compounded rate of return of the Buy and Hold strategy over the "All Period" is 8,6%. By following "blindly" the Halloween strategy in all Indices, an investor[65] would yield in average 10,8%. The average excess of return is about 2,2% with a significant reduction in risk and we are thankful for that. Now, assuming that the investor has the ability to outguess in which Indices it would be best to follow the Buy and Hold strategy and in which it would be preferable to follow the Halloween strategy (as we have gave some clues in that direction). In this situation the investor would beat the market with an extra return of about 2,7% and we are more than happy with it. Finally, considering only the Indices in which the Buy and Hold strategy is outperformed by the Halloween strategy (Scenario 2) the excess of return is striking and is 3,7%. In addition, the difference is higher with Price Return Indices. Do you still need more convincing?

[65] Assuming, an investor who does not has liquidity constraints.

Table 7 – Halloween Strategy: An exploitable opportunity

Table 7 show average annual continuously-compounded rates of return considering all the Indices in our sample. Results are based on 102 European Stock Indices from October 1992 to October 2010. Column three and five compare the return of the strategies with the return of the respective Benchmark (Buy and Hold strategy - the benchmark strategy is written in bold). The Buy and Hold strategy plus the Halloween strategy represents the mix between these two strategies, accordingly to what it is best for the investor in terms of return over all the period.

	Total Return Indices		**Price Return Indices**	
	Average annual continuously-compounded return	Difference against the Benchmark	Average annual continuously-compounded return	Difference against the Benchmark
Buy and Hold Strategy	8,6%	-	6,3%	-
Halloween Strategy	10,8%	2,2%	9,7%	3,4%
Buy and Hold Strategy + Halloween Strategy	11,2%	2,7%	10%	3,7%
Buy and Hold Strategy (Indices in Scenario 2)	6,6%	-	4,5%	-
Halloween Strategy (Indices in Scenario 2)	10,3%	3,7%	9,1%	4,7%

Moreover, it was also studied the statistical significance of the Halloween strategy with returns over the two six-month periods for the "All Period". There exist 23 Indices statistically significant at the 10 percent level and 2 highly significant at the 1 percent level. The estimation results[66] are reported in Table A30 and Table A31 for Total and Price Return Indices, respectively. See also Table A32 for global results on the statistical significance of the Halloween strategy. In addition, Table A33 shows statistical significance results by classification, where it can be seen the tendency to exist more statistically significant Eurozone Indices with Price Return Indices, inside each classification.

[66] The statistical significance estimation results with two six-month returns are lower than with monthly returns. Such difference is explained by the existence of fewer observations with the six-month returns. Furthermore, the OLS standard error corrections, whenever exists heteroscedasticity and/or autocorrelation problems, were not applied, due to the few number of observations.

Concluding, the Halloween strategy outperforms the Buy and Hold strategy in three-quarters of the Indices in our sample in terms of return and, exhibits less risk in all of the Indices. Furthermore, is impressive that more than two-thirds of the Indices present negative average rates of return during the summer months. Therefore, the Halloween strategy is especially suited to the risk-averse investor, as its claim is to remove unrewarding risk and it also allows achieving returns often above the average. We found that the Halloween effect shows a strong and economically significant seasonal pattern, especially in the Indices with negative average returns during the summer months. If we consider only the Indices with positive average returns during the summer months, the Halloween effect is residual[67]. Thus the main cause of the Halloween effect is the negative returns during the summer months. Finally, the Halloween strategy proved to be an exploitable opportunity and this strategy yields superior returns and beats with a wide margin the Buy and Hold strategy.

So far, we have concluded that all the Indices exhibit larger than the average returns during the winter months from October 1992 to October 2010. After that, we have showed that the differences in returns between the two six-month periods are indeed statistically significant for the majority of the Indices in our sample. In front of this, we have questioned ourselves about the persistence and reliability of this anomaly, so that the implementation of the Halloween strategy constitutes an exploitable opportunity. This strategy proved to work persistently. Another thought cross our mind. Is the Halloween effect a result of higher or lower than the usual returns in one particular month or are the returns evenly spread? We documented that with the exception of April and September, all the average monthly returns are within a reasonable range, although we found higher average returns during the winter months and, lower or negative average returns during the summer months. A natural explanation for the existence of higher than the average returns during the winter months, would be the existence of more risk associated with that period, however, this is not the case. Finally, the Halloween effect was submitted to its ultimate test. It was analyzed if the Halloween strategy outperformed the Buy and Hold strategy, a benchmark for market efficiency. The results are conclusive and impressive. In three-quarters of the Indices, the Halloween strategy outperforms the Buy and Hold strategy with an excess of return of 3,7%. Considering all of this, we conclude about the existence of the Halloween effect.

[67] We found a lower percentage of statistical significant Indices within the Indices with positive returns during the summer months, than the percentage of statistical significant Indices over the entire sample.

5. Results Discussion

Since the Halloween effect constitutes an anomaly which contradicts the EMH one would ask the reasons of such anomaly. Despite the fact that the a simple trading strategy based on the Halloween effect is very profitable, it lowers risk for free during the six-month summer period from May to October and persists over time, the seasonal pattern has received relatively little attention. The pattern is clearly evident in historical returns, but explanations vary and there is no agreement at all about the underlying causes. Much is and has been presumed about the reasons for this seasonal effect. The ones that support the anomaly argue that may due to some extent by end of the year actions such as investing bonuses received, funding retirement accounts, or that it can be also to take advantage of tax deferrals. And these are just a few of the possibilities mentioned in the literature. It is easy to think on additional plausible explanations: seasonality in news, liquidity differences[68], mismatch between perceived and true effects of seasonal adjustments of economic data, seasonally sensitive industries, etc.

Furthermore, Jacobsen and Marquering (2009) concluded that the same seasonal effect in stock returns is consistent with many alternative explanations. They demonstrated that any variable with a strong summer/winter pattern "explains" the stock market seasonality, particularly, they proved the Halloween effect to be related with the ice cream consumption and airline travel. The explanations offered in the previous studies – based on risk aversion or investor behavior – seem, at best, only partial explanations.

In this dissertation, one of the purposes is to find explanations for the anomaly and, as pieces for the puzzle there were considered: the economic significance of the anomaly, the case of the effect is resultant of a data mining exercise and the risk as an explanatory factor. It was even addressed the question if the Halloween effect is specific to a Sector or not.

Furthermore, some of the well known anomalies, like the abnormal returns in the January months, could be also a possible explanation. If the estimations of the Halloween effect controlled for the January returns, became statistically insignificant, would be enough to state that the Halloween effect was nothing else than a manifestation of the higher than the usual returns from January and, if so, any period which contains that month would outperform. In

[68] Jacobsen and Visaltanachoti (2009) evidence suggests that the Halloween effect is not related to seasonality in liquidity. Furthermore, they remarked that arbitrage (by investors who do not face liquidity constraints) would make the effect disappear.

addition, one might argue that since the April effect generates high positive returns in many stock markets, the Halloween effect is simply the April effect in disguise. Therefore, January and also April (month with the highest average rate of return) returns were controlled.

Moreover, some could argue that between October 1992 and August 2001 (i.e. "Before Bubble Period"), the stock markets have followed different patterns than the ones it follows today, as it corresponds to the period of the growth and burst of the dot-com bubble. So, it will be discussed if the burst of the dot-com bubble created some statistical significant impact on the Halloween effect and, if that event can explain the anomaly.

Finally, one could state that the Halloween effect was unknown, besides from being an old inherited market saying. We could argue that the saying never received a lot of credibility until the study of Bouman and Jacobsen (2002) and after their publication, the market efficiency as Eugene Fama defined it, has corrected such anomaly. According to Dimson and Marsh (1999), the anomalies have a tendency to disappear after their publication.

All the explanations were conducted with monthly returns[69] from October 1992 to October 2010.

5.1. Economic Significance

As it was demonstrated before, the Halloween effect is economically significant. From October 1992 to October 2010 the average excess return during the winter months is about 1,7% compared to the summer months. In addition, in the summer months, returns are close to zero or even negative.

"If a trading rule is not strong enough to outperform a buy and hold strategy on a risk--adjusted basis then it is not economically significant." (Maberly and Pierce, 2004: 30). Regarding this, we would like to add that the Halloween strategy outperforms the Buy and Hold strategy every three out of four Indices in our sample. Another finding result, was that an investor, by following "blindly" the Halloween strategy in all the Indices, would yield an average excess of return of about 2,2%, compared to the Buy and Hold Strategy . If one assumes reasonable trading costs, the Halloween strategy constitutes an exploitable

[69] With returns over the two six-month periods was not possible to control for the returns of the months of January and April. Furthermore, it was not possible to assure the number of observations needed to test the Halloween effect for the economic changes due to the burst of the dot-com bubble and to test the anomaly after Bouman and Jacobsen (2002) publication.

opportunity. Transaction costs, both explicit and implicit, are difficult to estimate[70] with any precision and depend on the stock, where it trades and, when it trades.

5.2. Data Mining

When market beating strategies are discovered via data mining, there are a number of potential problems in making the leap from a back-tested strategy to successfully investing in future real world conditions. One problem is to determine if the anomaly is unique to the specific sample where it was tested. Statisticians point often that if you torture the data long enough, it will confess to anything.

As a counter argument of data mining Bouman and Jacobsen (2002) stated: *"The difference in the case of the 'Sell in May' effect is that the data snooping argument does not apply. The effect is not just another calendar rule taken from the range of calendar rules, but an effect that is based on an inherited market saying (and the number of rules induced by market sayings seems limited)."* (Bouman and Jacobsen, 2002: 1619).

Schwert (2003) states that the obvious solution to the data mining problem is to test the anomaly on an independent sample, i.e., see if the anomaly exists in an out-of-sample test over different time periods and comparable markets.

As out-of-sample tests it were considered Benchmark and Blue-chip Indices for the Europe Continent, in the "All Period", "Before Bubble Period" and "After Bubble Period" sets.

The results are conclusive[71].

- First, during the three time periods considered all[72] the B&B Indices present differences in return in the two half-year periods, being that differences often very large and economically significant.
- Second, the differences in return found are statistically significant, even so, for a lower percentage of Indices than in the ISSS Indices.

[70] To give an example: *"(...) assuming conservative transactions costs of 0.5 percent for a single transaction the annual return would drop with approximately 1 percent. For a practical implementation of trading on this effect it would however be more appropriate to use 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"* (Bouman and Jacobsen, 2002: 1621).

[71] To save space, the results for the B&B Indices are in the same tables as the results for the ISSS Indices (e.g. the risk and return in the "All Period" are reported in Table A4 and Table A5, for the Total and Price Return B&B Indices respectively).

[72] Exception to the Price Return Benchmark Europe ex Eurozone 1 in the "Before Bubble Period".

- Third, the Halloween effect revealed to be economically stronger in the "Before Bubble Period" and weaker in the "After Bubble Period", as in the ISSS Indices.
- Fourth, in terms of risk, the B&B Indices show the same pattern as the ISSS Indices, i.e., the winter months are less risky in the "All Period" and in the "After Bubble Period", but more risky in the "Before Bubble Period". Moreover, only 1 Total Return Index and 2 Price Return Indices, have changed its risk structure[73] at the 5 percent significance level.
- Fifth, the reward-to-risk ratio results confirm that the winter months generate more units of return per unit of risk than the summer months.
- Sixth, the effect is persistent on the B&B Indices, since the frequency of years in which the returns during the winter months outperformed the returns during the summer months, is always above 50%.
- Seventh, evidence supports that the Halloween strategy outperforms the Buy and Hold strategy in more than 80% of the B&B Indices, even if one does not invest in the risk--free asset over the summer months. In addition, the Halloween strategy is less risky in all the Indices, compared to the Buy and Hold strategy.

Since the out-of-sample test results are in line with those obtained for the ISSS Indices, this makes the Halloween effect an interesting anomaly to study.

5.3. Risk

The risk (measured as standard deviation of monthly returns) do not seems to explain the differences in terms of return over the two six-month periods. In the "All Period" and "After Bubble Period" sets, most of the Indices exhibit less risk during the winter months than during the summer months. In these matters, only the "Before Bubble Period" exhibited more risk in the winter months, even so, this is the time-interval where the effect revealed to be economically stronger. As a result, it was computed the reward-to-risk ratio for every Index and the results are surprisingly. In the "All Period" and "Before Bubble Period" sets, the risk is more rewarded in the winter months in all the Indices and, in the "After Bubble Period" such occurs for 94,1% of the Indices.

[73] Recurring to the Chow-Test from the economist Gregory Chow in 1960.

5.4. Is the Halloween Effect sector specific?

Bouman and Jacobsen (2002) investigated whether the Halloween effect would be present in particular sectors (could be the case of seasonality sensitive industries) within an economy or, if it manifests itself in all sectors of the economy. In their study, they found that the effect was not related to specific sectors and, suggested the effect to be mostly country specific. However, in light of the present results, the effect might be related to some sectors[74]. Example of this, are the Media and the Personal & Household Goods Supersectors, which have demonstrated a statistical significance Halloween effect, in the "All Period" and "Before Bubble Period", in the Nordic and Eurozone regions, with and without considering dividends. Furthermore, these two Supersectors also remained statistically significant even if one control for the April returns in the Eurozone and Nordic regions, during the "All Period" (see the explanation regarding the Halloween effect controlled for the April effect). Some other examples could be given, but the question remains. Is the Halloween effect specific to a particular sector? Whether by chance or due to fundamentals time will tell.

5.5. Halloween Effect controlled for the January effect

The January effect is the tendency of the stock market to rise between December 31th and the end of the first week in January. The January effect occurs because many investors choose to sell some of their stock right before the end of the year in order to claim a capital loss for tax purposes. Once the tax calendar rolls over to a new year on January 1st these same investors quickly reinvest their money in the market, causing stock prices to rise. Although the January effect has been observed numerous times throughout history, it is difficult for investors to profit from it since the market as a whole expects it to happen and therefore adjusts its prices accordingly. The January effect is said to affect small caps more than mid or large caps.

For that reason, the unusually large monthly returns documented during the November–April periods could be a manifestation of the January effect. However, in our sample, January is not even one of the best six months to hold a long position in the market. As a result, January does not present an explanation for the puzzle. Nevertheless, in order to establish a comparison with Bouman and Jacobsen (2002) and Maberly and Pierce (2004) results, the January effect was controlled by inserting a second dummy variable J_t, which is set equal to

[74] While Bouman and Jacobsen (2002) do not find large differences between sectors, their results are subjected to small number of sectors, and here, it is used, much finer partition.

1 whenever month t is January and 0 otherwise and, the "Sell in May" dummy is adjusted by giving the value 1 in the period November to April, except in January, therefore, equation (1) is modified to:

$$r_t = \mu + \alpha_1 S_t^{adj} + \alpha_2 J_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right) \tag{2}$$

The estimated coefficients for equation (2) are reported in Table A34 and Table A35 for the Total and Price Return Indices, respectively. The statistical significance results are summarized in Table 8.

Table 8 – Halloween Effect controlled for the January effect

Estimations results for the regression (2): $r_t = \mu + \alpha_1 S_t^{adj} + \alpha_2 J_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table 8 shows global results of the Halloween effect statistical significance controlled for the January effect based on 102 European Stock Indices from October 1992 to October 2010. The percentage of statistical significant Indices is the coefficient between the number of significant Indices with the total number of Indices. It is also exhibited the number of negative estimated coefficients. In addition, the global results of the January effect statistical significance are reported. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors.

	Halloween effect - α_1			**January effect - α_2**		
Level of Significance	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**
	Total Return Indices					
Nº. of Significant Indices	**10**	**33**	**40**	**0**	**2**	**3**
% of Significant Indices	20	65	78	0	4	6
# negative estimated coef.	-			22		
	Price Return Indices					
Nº. of Significant Indices	**10**	**28**	**37**	**0**	**3**	**3**
% of Significant Indices	20	55	73	0	6	6
# negative estimated coef.	-			21		

The results are impressive due to several reasons:

- First, the statistical significance of the Halloween effect is higher[75] when it is controlled for the January effect. In total 40 (34 without controlling for the January effect) out of 51 Indices are statistically significant, all with the expected sign and

[75] In fact, it presents more statistical significant Indices than the ones exhibited in the "Before Bubble Period" and in the "After Bubble Period" (however, results reported for the "Before Bubble Period" and "After Bubble Period" are not directly comparable due to differences in the time-interval considered – the statistical significance of the Halloween effect controlled for the January returns was performed using the monthly average rates of return from October 1992 to October 2010 – therefore, it is only an intuitive comparison).

at the 10 percent level. Furthermore, the effect is highly significant for 10 (4 without controlling for the January effect) Indices in our sample at the 1 percent level.

- Second, these results contradict those obtained by Bouman and Jacobsen (2002) and Maberly and Pierce (2004), since the January effect do not drive the Halloween effect but instead obscure it.
- Third, in some Indices the estimated coefficient for the January effect is negative[76], contradicting the believing that the markets exhibit a January effect. Furthermore, few Indices present a statistical significant January effect.

Concluding, the January effect does not explain the Halloween effect. Apart from being residual the number of Indices that exhibit a statistical significant January effect, the impact of the January returns is to obscure, rather than to drive, the Halloween effect.

5.6. Halloween Effect controlled for the April effect

Another known anomaly is the April effect which is the only other month, with "predictive power" although historically not as strong as January's. Perhaps this is due to annual planning and tax considerations. However, contrary to January, April is the month with the highest average rate of return.

To test for the possibility of the Halloween effect being driven by the April returns, it was considered an additional regression. The "Sell in May" dummy now takes the value 1 in the period November to March. In addition, was included an April dummy in which A_t takes the value 1 when returns fall in April and 0 otherwise, resulting in equation:

$$r_t = \mu + \alpha_1 S_t^{adj2} + \alpha_3 A_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right) \tag{3}$$

In Table A36 and Table A37 – Total and Price Return Indices, respectively – are reported the estimation results for equation (3), but the results are reversed from those reported for equations (1) and (2) which allow us to conclude that:

- First, the statistical significance of the Halloween effect is noticeably lower when it is controlled for the April returns (nothing strange, given the fact that April is the month with the highest average rate of return), contrary to what happens with

[76] This is taken as evidence that January is not one of the best months to hold a long position.

January. Table 9 shows that in 14 of the 51 Indices there is a statistically significant "Sell in May" effect present at the 10 percent level (it were 34 without controlling for the April returns). The effect is highly significant in 1 Index in our sample at the 1 percent level (it were 4 without controlling for the April returns).

- Second, a high number of Indices present a statistical significant April effect[77], (confirming that April returns are higher than the average).
- Third, only the Media and Personal & Household Goods Supersectors remained statistically significant both to Eurozone and Nordic regions, with and without dividends, after controlling the Halloween effect for the April returns. Consequently, the Halloween effect may be related with specific Sectors.

Table 9 – Halloween Effect controlled for the April effect

Estimations results for the regression (3): $r_t = \mu + \alpha_1 S_t^{adj2} + \alpha_3 A_t + \varepsilon_t \quad with \ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table 9 shows global results of the Halloween effect statistical significance controlled for the April effect based on 102 European Stock Indices from October 1992 to October 2010. The percentage of statistical significant Indices is the coefficient between the number of significant Indices with the total number of Indices. It is also exhibited the number of negative estimated coefficients. In addition, the global results of the April effect statistical significance are reported. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors.

	Halloween effect - α_1			**April effect - α_3**		
Level of Significance	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**
	Total Return Indices					
Nº. of Significant Indices	**1**	**7**	**14**	**11**	**32**	**38**
% of Significant Indices	2	14	27	22	63	75
# negative estimated coef.	-			-		
	Price Return Indices					
Nº. of Significant Indices	**2**	**9**	**19**	**6**	**28**	**38**
% of Significant Indices	4	18	37	12	55	75
# negative estimated coef.	-			2		

It is important to notice, that by estimating regression (3), it is accepted that all excess returns in April (above the average returns in May through October months) are entirely due to an April effect and not caused by a "Sell in May" effect. Note that this might exaggerate the size

[77] Only 2 Indices present a negative value for the estimated coefficient associated with the April effect, which means that for those, April did not perform above the average.

of the April effect and might in addition understate the "true" size of the "Sell in May" effect. For instance, in Indices without a significant April effect but with a strong "Sell in May" effect, one might now find a significant April effect.

To be precise, with regression (3) it can be found a statistical significant April effect in 38 Total Return Indices and in 38 Price Return Indices (at the 10 percent level). However, with only a dummy for the April effect, we find a statistical significant April effect in 36 Total Return Indices and in 30 Price Return Indices.

Moreover, by estimating regression (3) with an unadjusted "Sell in May" dummy, we find a statistical significant April effect in 21 Total Return Indices and in 9 Price Return Indices, at the 10 percent level.

To conclude, it appears that part of the Halloween effect statistical significance over the period October 1992–October 2010, in the Indices in our sample, is being driven by the large returns observed during the months of April. However, the anomaly controlled for the April effect still exists and it is not completely explained, therefore, the puzzle is not solved yet.

5.7. The impact of the dot-com bubble in the Halloween Effect

To analyze if the burst of the dot-com bubble created impacts on the Halloween effect, equation (1) was modified by inserting a dummy variable C_t, which is set equal to 1 whenever month t is in the period from September 2001 to October 2010 and 0 otherwise[78], which results in equation (4):

$$r_t = \mu + \alpha_1 S_t + \alpha_4 C_t + \varepsilon_t \quad \text{with } \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right) \tag{4}$$

A bubble in the market occurs when the price of an asset rises far higher than the one it can be explained by characteristics, such as the income likely to derive from holding the asset.

Economists disagree whether bubbles are the result of irrational crowd behavior or, instead, are the result of rational decisions by people who have only limited information about the fundamental value of an asset.

The dot-com bubble was a speculative bubble which ended in 2001, during which the stock markets of the U.S. and other western nations saw rapid growth fueled by the Internet Index

[78] If the dummy variable assumed the value 1 whenever month t is in the period from October 1992 to August 2001, then the p-values would be exactly the same, but the estimated coefficients would have the opposite signal.

and related fields. These companies were primarily financed by venture capital and IPO's (Initial Public Offerings) of stocks.

By the middle of 2001, the majority of the losses (in the stock market) have been inflicted to the investors that hold such stocks and, the economies had to readjust. In front of such readjustment, have the Halloween effect remained or has it changed?

The estimation results for equation (4) for the Total and Price Return Indices are exhibited in Table A38 and Table A39, respectively. The results are similar to those reported for equation (1).

The burst of the dot-com bubble do not seem to have had an impact on the Halloween effect, in fact almost the totality[79] of the Indices present exactly the same statistical significance results as the ones reported for equation (1). Furthermore, it is residual the number of Indices that exhibits a dot-com bubble statistical significant effect.

Concluding, the hypothesis that the "Sell in May" effect is resultant of the burst of the dot--com bubble is rejected.

5.8. Halloween Effect after Bouman and Jacobsen (2002) publication

A finally possible explanation for the anomaly is that it exists because did not receive credibility from the intervenients in the stock market, or, was just unknown. Since Bouman and Jacobsen (2002) documented the Halloween effect, arose in the academic literature a discussion, in whether or not the anomaly really exists.

Besides from being an old inherited market saying, the fact is that, with the Bouman and Jacobsen (2002) publication, the Halloween effect has received a lot of mediatism over the years. Moreover, with their study was the first time that this anomaly was deeply studied, in terms of economic and statistical significance.

Schwert (2003) points out that after the anomalies be documented and analyzed in the academic literature they often seem to disappear, reverse, or attenuate. Also Dimson and Marsh (1999) point the same.

[79] With the exception of the Growth Small Style Eurozone Index (Total Return) which became statistically insignificant at the 5 percent level and, the Financial Services Supersector Nordic Index (Price Return) which became statistically insignificant at the 10 percent level.

As Fama (1991) demonstrated, the January effect became statistically insignificant over the period 1982–1991 in the result of a huge publicity in the financial press in the early 1980s. Therefore, it is required to understand if the Halloween effect still exists in the period after the publication of the Bouman and Jacobsen (2002) paper.

If the anomaly no longer exists, then, it is no more an exploitable opportunity, being just one more inefficiency that like others in the past, had been corrected, as soon, as it was of the general knowledge of the market. It is also important to refer that in 1999 and 2001, the "Sell in May" effect was even discussed on CNN and, the main focus, at the time, in the media in general, is whether or not the old market saying would hold up during the summer period to come.

In the study of Bouman and Jacobsen (2002), the anomaly did not suffer (at the time) from the Murphy Law[80] as documented by the authors *"this anomaly does not – at least not yet – seem to disappear or reverse itself after discovery, but continues to exist even though investors may have become aware of it."* (Bouman and Jacobsen, 2002: 1619). In addition, Urbano (2009) regarding different stock markets across the world concluded that the anomaly had not disappeared after the Bouman and Jacobsen (2002) publication.

Giving this, the statistical significance of the Halloween effect after Bouman and Jacobsen (2002) publication was tested. Contrary to the conclusions reached by Urbano (2009), the Halloween effect became statistically insignificant (since the coefficient of interest, α_1, became statistically insignificant), after Bouman and Jacobsen (2002) publication.

More specifically, in only 1[81] Index out of 102 the average returns are statistically significant higher in November through April than during the remainder of the year and, only at the 10 percent significance level. Furthermore, some of the estimated coefficients (α_1) exhibit negative values, which mean that in those Indices, the May–October periods have performed better than the November–April periods, in average. Results are reported in Table A40 and Table A41 concerning Total and Price Return Indices, respectively.

Since the Halloween effect in the years after the publication of the Bouman and Jacobsen paper is statistically insignificant, it were analyzed the returns during the same time period, to figure it out, if the effect is economically significant. Figure A2 reports the average returns in the period May–October and in the period November–April after Bouman and Jacobsen

[80] Murphy Law, as documented by Dimson and Marsh (1999), is the tendency for the anomalies to disappear or reverse after they are discovered and published.
[81] The Total Return Telecommunications Supersector in the Eurozone region.

(2002) publication. The risk, return and the reward-to-risk ratio after 2002 over the two six--month periods are exhibited on Table A42 and Table A43, for the Total and Price Return Indices, respectively. The main conclusions on this are:

Results suggest that the effect is economically significant in the majority of the Indices in the sample. During winter, the monthly weighted average excess of return is above 0,6% compared to the return during summer. Additionally, the Halloween effect is economically stronger in the Nordic region with Total and Price Return Indices. Surprisingly, it can be noticed that after 2002, the majority of the Indices present positive average rates of return during the summer months, something, that was not true before. Furthermore, there exist more Indices with negative average returns during winter.

Concluding, the Halloween effect is economically significant, but, it can be found signals of convergence between the winter and summer returns[82]. Assuming reasonable trading costs, the Halloween strategy still represents a valuable strategy and an exploitable opportunity. In addition, an investor can implicitly profit from the anomaly by postponing or preponing buying (selling) when he or she has already decided to purchase (sell) certain stocks.

It was also studied the risk, to understand if the higher than the usual returns during the winter months are due to higher levels of risk. The conclusion is that about 55% of the Indices exhibit lower risk during the winter months compared to the summer months, after 2002. Hence, the probability of a random Index to be riskier in the summer months compared to the winter months is close to 50%, what makes sense, and was not true before. Finally, was analyzed the reward-to-risk ratio over the two six-month periods, which allowed to conclude that 88% of the Indices gives more units of return per unit of risk, during the winter months.

Therefore, besides the Halloween effect became statistically insignificant after the Bouman and Jacobsen (2002) publication, it remains, economically significant. So, will the Halloween effect disappear completely? Is the market efficiency working? The guess is that we will have to wait and see, but it seems that both risk and return are converging and, the disparities seem to be disappearing.

[82] In the "Before Bubble Period" the difference between the winter and summer returns was above 2,3%. In the "After Bubble Period" the difference was 1,2% and, after the Bouman and Jacobsen (2002) publication the difference was 0,6%. It also can be found, an increasing in the number of Indices with positive average returns during summer and negative average returns during winter, which point, that the returns during the two six-month periods are getting equal.

6. Conclusions

The “Sell in May and go away” is an old saying that, poses a serious challenge to the market efficiency hypothesis. The saying refers to a believing that during the months of November to April monthly returns are unusually larger than those during the months of May to October. The present dissertation studied this so-called Halloween effect following closely Bouman and Jacobsen (2002), which were the first authors that took the study of this anomaly into a further stage.

We used monthly logarithmic returns of 102 European Stock Market Sector Indices (51 considering dividends and 51 without dividends), like Industry, Supersector, Style and Size Sectors. In addition, it were also used Benchmark and Blue-Chip Indices relative to the European Stock Market, which were used for out-of-sample tests purposes, as they provide a benchmark of sector performance, frequently used by practitioners.

This dissertation has reached some interesting conclusions. First, we document the existence of a strong seasonal effect in stock returns, as the one it is described by the Halloween effect and, we prove the effect to be economically significant in all the Indices in our sample from October 1992 to October 2010.

Second, a very interesting feature about the effect is that on average, stocks deliver returns close to zero and often negative in the six-month period from May through October, only rewarding the investors from November through April. This pattern goes against the EMH and it is difficult to explain, with any equilibrium asset pricing model and the assumption that the investors are risk averse. In comparison, the monthly average returns are almost always positive and unusually large during the winter months. Stock market returns should not be predictably lower than the short term interest rate (risk-free rate), and moreover, should not be predictably negative. More specifically, it was found that two-thirds of all the Indices have negative average returns during summer.

Third, the differences in returns between the two six-month periods are indeed statistically significant. From the 102 Indices analyzed 77 shown statistically significant differences between the winter and summer average returns, all with the expected sign, at the 10 percent level. The effect is highly significant (at the 1 percent level) for 7 Indices in the sample.

Fourth, we found that the excess of return during the winter months is particularly strong in the Nordic region if we consider dividends and in the Eurozone if we exclude dividends. In

addition, evidence suggests that the dot-com bubble reinforced the Halloween effect in the Nordic Indices something which did not happen in the Eurozone. Hence, excluding dividends strengths the effect in the Eurozone region and the dot-com bubble strengthened the effect in the Nordic region.

Fifth, the Halloween strategy (described as investing in the stock market from November through April and in a risk-free asset for the other half of the year) produces results persistently, as it works every two out of three calendar years. Moreover, the Halloween strategy outperforms the Buy and Hold strategy – a benchmark for market efficiency – in three-quarters of the Indices, constituting therefore an exploitable opportunity. By following "blindly" the Halloween strategy, in all the Indices in our sample, an investor would yield an average excess of return of about 2,2% compared to the Buy and Hold strategy and assure a significant reduction in risk in all the Indices.

Sixth, we have examined and discussed a number of possible explanations for this anomaly that constitutes an exploitable opportunity. We find no evidence that the effect can be explained by factors like risk, January effect or the burst of the dot-com bubble.

Also the data mining explanation was analyzed, but failed to explain the anomaly. We agree with Bouman and Jacobsen (2002) when they remarked that the data mining argument does not apply since the effect is based on an inherited market saying which is well-known and has existed for decades. We also provide some out-of-sample tests which results are in line with those obtained for the European Stock Market Sector Indices.

There are some clues which point that the effect may be present only in some sectors, but, the answer is not clear for now. We found that part of the Halloween effect statistical significance over the period October 1992–October 2010, with the Indices in our sample, is being driven by the large returns observed during the months of April. However, the anomaly controlled for the April effect still exists, as it remains economically and statistically significant, therefore, the puzzle is not solved yet.

One thing we did find was that the Halloween effect became statistically insignificant after the Bouman and Jacobsen (2002) publication, but, it remained economically significant and still representing an exploitable opportunity. Interestingly, it can be observed that both risk and return, from winter and summer months are converging and the disparities seem to be disappearing. Is the market efficiency working? The guess is that we will have to wait and see if the Halloween effect disappears completely or not.

Seventh, we suggest, that a possible explanation to the anomaly may be related with the negative average returns during the May–October period, rather than with a superior performance during the winter months. Bouman and Jacobsen (2002) concluded that both in the southern-hemisphere and in the northern-hemisphere, returns were superior in the November–April period. However, seasons are six months out of phase between the hemispheres. We think that the Halloween effect explanation, instead of be related with human behavior due to the weather, SAD, vacations or a optimism cycle, might be related with economic and/or financial events (like flows from mutual funds for instance) which conducts prices to be persistently negative during the summer months.

Considering how old and how well known these wise words are, “Sell in May and go away” and the fact that the strategy has not been optimized with technology, its abnormal performance is impressive. Furthermore, the Halloween effect is an especially attractive anomaly for investors, given the low number of transactions required and the easily predictable dates of those transactions.

Our findings suggest that the Halloween effect provides a “good and free lunch”, but, the puzzle is not solved yet.

We wish to suggest some possible directions that future research on the Halloween effect could take. The negative returns during the summer months and its reasons might explain this puzzle and further research is needed on this area. Furthermore, a switching strategy between the southern-hemisphere and the northern-hemisphere countries that explores the Halloween effect could be investigated. The existence of another anomaly that performs better than the Halloween effect was not addressed in this dissertation and it is a subject for future research. We have made some breakthroughs on the study of the Halloween effect and we have pointed some clues that may lead (we hope) for the true rationales for this anomaly, but we know for sure, that further research is needed to reconcile the existence of this stock seasonal pattern with rational human behavior.

As limitations for the present dissertation, it is emphasized the data base that is not as robust as we would like, since the Indices used have recently been available, which reduces the number of observations that we would desire to have. It was even not possible to study the anomaly in the Eastern Europe with Sector Indices due to the lack of data.

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8. Attachments

In this appendix we present Figures and Tables that support the conclusions presented and discussed before.

Figures Index

Tables Index

Table A1 – Description of the Total Return Indices

Table A1 shows the description of the 51 Total Return European Stock Indices. Column 1 contain the region and classification of the indices; the indices marked with ***** assume also an Industry classification, because the respective Industries only have one Supersector each. Column 2 contains the designation of each index used in this dissertation that was defined by the author. Column 3 contains the Reuters tickers available on Reuters 3000 Xtra. Bellow it is described the methodology for the index value calculation.

Indices by Region and Classification	Designation	Reuters
Eurozone – Industry (5)		
Basic Materials	Bas Mater EZ	.SXBSCT
Consumer Goods	Cns Goods EZ	.S3000T
Consumer Services	Cns Svcs EZ	.S5000T
Financials	Fincl EZ	.SXFINT
Industrials	Indus EZ	.SXIDUT
Eurozone – Supersectors (18)		
Automobiles & Parts	Aut&Prt EZ	.SXAT
Banks	Banks EZ	.SX7T
Basic Resources	Bas Res EZ	.SXPT
Chemicals	Chem EZ	.SX4T
Construction & Materials	Cns&Mat EZ	.SXOT
Financial Services	Fin Svcs EZ	.SXFT
Food & Beverage	Fd&Bvr EZ	.SX3T
Health Care *	Hea Care EZ	.SXDT
Industrial Goods & Services	Indus Gd EZ	.SXNT
Insurance	Insur EZ	.SXIT
Media	Media EZ	.SXMT
Oil & Gas *	Oil&Gas EZ	.SXET
Personal & Household Goods	Pr&Ho Gd EZ	.SXQT
Retail	Retail EZ	.SXRT
Technology *	Tech EZ	.SX8T
Telecommunications *	Telecom EZ	.SXKT
Travel & Leisure	Trv&Lsr EZ	.SXTT
Utilities *	Util EZ	.SX6T
Eurozone – Style (8)		
Growth	Growth EZ	.STGT
Growth Large	Growth Large EZ	.SLGT
Growth Mid	Growth Mid EZ	.SMGT
Growth Small	Growth Small EZ	.SSGT
Value	Value EZ	.STVT
Value Large	Value Large EZ	.SLVT
Value Mid	Value Mid EZ	.SMVT
Value Small	Value Small EZ	.SSVT

Eurozone – Size (3)		
Large	Large EZ	.LCXT
Mid	Mid EZ	.MCXT
Small	Small EZ	.SCXT

Nordic – Industry (5)		
Basic Materials	Bas Mater N	.TBSCG
Consumer Goods	Cns Goods N	.T3000Q
Consumer Services	Cns Svcs N	.T5000Q
Financials	Fincl N	.TFING
Industrials	Hea Care N	.TIDUG

Nordic – Supersectors (9)		
Banks	Banks N	.TBNKG
Basic Resources	Bas Res N	.TBASG
Financial Services	Fin Svcs N	.TFSVG
Health Care *	Hea Care N	.THCRG
Industrial Goods & Services	Indus Gd N	.TIGSG
Media	Media N	.TMDIG
Personal & Household Goods	Pr&Ho Gd N	.T3700Q
Technology *	Tech N	.TTECG
Telecommunications *	Telecom N	.TTLSG

Nordic – Size (3)		
Large	Large N	.KLXR
Mid	Mid N	.KMXR
Small	Small N	.KSXR

Europe – Benchmark (2)		
D. J. STOXX 600	Benchm Eur 1	.STOXXR
D. J. STOXX Total Market	Benchm Eur 2	.BKXR

Europe – Blue-chip (1)		
D. J. STOXX 50	Blue-Chip Eur	.STOXX50R

Eurozone – Benchmark (2)		
D. J. EURO STOXX	Benchm EZ 1	.STOXXER
D. J. EURO STOXX Total Market	Benchm EZ 2	.BKXT

Eurozone – Blue-chip (1)		
D. J. EURO STOXX 50	Blue-Chip EZ	.STOXX50ER

Europe ex Eurozone – Benchmark (2)		
D. J. STOXX ex EURO	Benchm Eur ex EZ 1	.SXXB
D. J. STOXX ex EURO Total Market	Benchm Eur ex EZ 2	.BKXB

Nordic – Benchmark (2)		
D. J. STOXX NORDIC	Benchm N 1	.DKXG
D. J. STOXX NORDIC Total Market	Benchm N 2	.BDXR

Nordic – Blue-chip (1)		
D. J. STOXX NORDIC 30	Blue-Chip N	.DK5G

Total Return Index Value Calculation

The Indices are calculated with the Laspeyres formula, which measures price changes against a fixed base quantity weight. Each index has a unique index divisor, which is adjusted to maintain the continuity of the index's values across changes due to corporation actions. The Indices are weighted by free float market capitalization. The Total Return Indices includes the reinvested dividends after taxes.

$$Index_t = \frac{\Sigma_{i=1}^{n} \left(p_{it} \,.s_{it} \,.\, ff_{it} \,.cf_{it} \,.x_{it} \right)}{D_t} = \frac{M_t}{D_t}$$

Where:

t - Time the Index is computed

n - Number of companies in the Index

p_{it} - Price of company (i) at time (t)

s_{it} - Number of shares of company (i) at time (t)

ff_{it} - Free float factor of company (i) at time (t)

cf_{it} - Weighting cap factor of company (i) at time (t) (if index is capped, otherwise equals 1)

x_{it} - Exchange rate from local currency into index currency for company (i) at time (t)

M_t - Free float market capitalization of the index at time (t)

D_t - Divisor of the Index at time (t) (*)

(*) The Divisor adjusts for the Cash Dividends.

Table A2 – Description of the Price Return Indices

Table A2 shows the description of the 51 Price Return European Stock Indices. Column 1 contain the region and classification of the indices; the indices marked with ***** assume also an Industry classification, because the respective Industries only have one Supersector each. Column 2 contains the designation of each index used in this dissertation that was defined by the author. Column 3 contains the Reuters tickers available on Reuters 3000 Xtra. Bellow it is described the methodology for the index value calculation.

Indices by Region and Classification	Designation	Reuters
Eurozone – Industry (5)		
Basic Materials	Bas Mater EZ	.SXBSCE
Consumer Goods	Cns Goods EZ	.S3000E
Consumer Services	Cns Svcs EZ	.S5000E
Financials	Fincl EZ	.SXFINE
Industrials	Indus EZ	.SXIDUE
Eurozone – Supersectors (18)		
Automobiles & Parts	Aut&Prt EZ	.SXAE
Banks	Banks EZ	.SX7E
Basic Resources	Bas Res EZ	.SXPE
Chemicals	Chem EZ	.SX4E
Construction & Materials	Cns&Mat EZ	.SXOE
Financial Services	Fin Svcs EZ	.SXFE
Food & Beverage	Fd&Bvr EZ	.SX3E
Health Care *	Hea Care EZ	.SXDE
Industrial Goods & Services	Indus Gd EZ	.SXNE
Insurance	Insur EZ	.SXIE
Media	Media EZ	.SXME
Oil & Gas *	Oil&Gas EZ	.SXEE
Personal & Household Goods	Pr&Ho Gd EZ	.SXQE
Retail	Retail EZ	.SXRE
Technology *	Tech EZ	.SX8E
Telecommunications *	Telecom EZ	.SXKE
Travel & Leisure	Trv&Lsr EZ	.SXTE
Utilities *	Util EZ	.SX6E
Eurozone – Style (8)		
Growth	Growth EZ	.STGE
Growth Large	Growth Large EZ	.SLGE
Growth Mid	Growth Mid EZ	.SMGE
Growth Small	Growth Small EZ	.SSGE
Value	Value EZ	.STVE
Value Large	Value Large EZ	.SLVE
Value Mid	Value Mid EZ	.SMVE
Value Small	Value Small EZ	.SSVE

Eurozone – Size (3)		
Large	Large EZ	.LCXE
Mid	Mid EZ	.MCXE
Small	Small EZ	.SCXE

Nordic – Industry (5)		
Basic Materials	Bas Mater N	.TBSCF
Consumer Goods	Cns Goods N	.T3000N
Consumer Services	Cns Svcs N	.T5000N
Financials	Fincl N	.TFINF
Industrials	Hea Care N	.TIDUF

Nordic – Supersectors (9)		
Banks	Banks N	.TBNKF
Basic Resources	Bas Res N	.TBASF
Financial Services	Fin Svcs N	.TFSVF
Health Care *	Hea Care N	.THCRF
Industrial Goods & Services	Indus Gd N	.TIGSF
Media	Media N	.TMDIF
Personal & Household Goods	Pr&Ho Gd N	.T3700N
Technology *	Tech N	.TTECF
Telecommunications *	Telecom N	.TTLSF

Nordic – Size (3)		
Large	Large N	.KLXP
Mid	Mid N	.KMXP
Small	Small N	.KSXP

Europe – Benchmark (2)		
D. J. STOXX 600	Benchm Eur 1	.STOXX
D. J. STOXX Total Market	Benchm Eur 2	.BKXP

Eurozone – Benchmark (1)		
D. J. EURO STOXX Total Market	Benchm EZ 1	.BKXE

Europe ex Eurozone – Benchmark (2)		
D. J. STOXX ex EURO	Benchm Eur ex EZ 1	.SXXA
D. J. STOXX ex EURO Total Market	Benchm Eur ex EZ 2	.BKXA

Nordic – Benchmark (2)		
D. J. STOXX NORDIC	Benchm N 1	.DKXF
D. J. STOXX NORDIC Total Market	Benchm N 2	.BDXP

Nordic – Blue-chip (1)		
D. J. STOXX NORDIC 30	Blue-Chip N	.DK5F

Price Return Index Value Calculation

The Indices are calculated with the Laspeyres formula, which measures price changes against a fixed base quantity weight. Each index has a unique index divisor, which is adjusted to maintain the continuity of the index's values across changes due to corporation actions. The Indices are weighted by free float market capitalization.

$$Index_t = \frac{\Sigma_{i=1}^{n} \left(p_{it} \,.wf_{it} \,.cf_{it} \,.x_{it} \right)}{D_t} = \frac{M_t}{D_t}$$

Where:

t - Time the Index is computed

n - Number of companies in the Index

p_{it} - Price of company (i) at time (t)

wf_{it} - Weighting factor of company (i) at time (t)

cf_{it} - Weighting cap factor of company (i) at time (t)

x_{it} - Exchange rate from local currency into index currency for company (i) at time (t)

M_t - Total 'units' of the index at time (t)

D_t - Divisor of the Index at time (t)

Table A3 – Countries covered by each region

Table A3 shows the countries covered by each region. Countries are displayed in alphabetic order.

* indicates that this region includes companies incorporated and listed in the European regional universe, regardless of the trading currency. ** indicates that this region includes companies incorporated and listed in the Eurozone that are traded in Euro. *** indicates this region includes companies incorporated and listed in the European regional universe excluding the Eurozone region, regardless of the trading currency. **** indicates that this region includes companies incorporated and listed in the Nordic region, regardless of the trading currency.

Country	Europe *	Eurozone **	Europe ex Eurozone ***	Nordic ****
Austria	X	X	-	-
Belgium	X	X	-	-
Denmark	X	-	X	X
Finland	X	X	-	X
France	X	X	-	-
Germany	X	X	-	-
Greece	X	X	-	-
Iceland	X	-	X	X
Ireland	X	X	-	-
Italy	X	X	-	-
Luxembourg	X	X	-	-
Netherlands	X	X	-	-
Norway	X	-	X	X
Portugal	X	X	-	-
Spain	X	X	-	-
Sweden	X	-	X	X
Switzerland	X	-	X	-
United Kingdom	X	-	X	-

Source: Dow Jones Stoxx Index Guide

Table A4 – Risk and return in the "All Period": Total Return Indices

Table A4 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Total Return European Stock Indices from October 1992 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May-Oct.	Nov.-Apr.
Bas Mater EZ	-0,18%	7,15%	1,68%	6,41%	-0,02%	0,26%
Cns Goods EZ	-0,12%	5,71%	1,48%	5,22%	-0,02%	0,28%
Cns Svcs EZ	-0,21%	5,53%	1,17%	5,37%	-0,04%	0,22%
Fincl EZ	-0,70%	8,13%	0,43%	7,16%	-0,09%	0,06%
Indus EZ	-0,90%	6,72%	1,79%	6,30%	-0,13%	0,28%
Aut&Prt EZ	-0,10%	7,78%	1,53%	8,10%*	-0,01%	0,19%
Banks EZ	-0,23%	7,93%	1,29%	6,67%	-0,03%	0,19%
Bas Res EZ	-0,31%	8,96%	1,77%	7,14%	-0,03%	0,25%
Chem EZ	0,09%	6,45%	1,98%	5,55%	0,01%	0,36%
Cns&Mat EZ	-0,58%	6,34%	1,90%	5,55%	-0,09%	0,34%
Fin Svcs EZ	-0,38%	6,73%	1,73%	5,57%	-0,06%	0,31%
Fd&Bvr EZ	0,08%	4,78%	1,27%	4,12%	0,02%	0,31%
Hea Care EZ	0,53%	4,54%	0,98%	4,77%*	0,12%	0,20%
Indus Gd EZ	-0,42%	6,90%	2,22%	6,10%	-0,06%	0,36%
Insur EZ	-0,33%	8,62%	1,09%	7,46%	-0,04%	0,15%
Media EZ	-0,61%	6,19%	1,37%	7,55%*	-0,10%	0,18%
Oil&Gas EZ	0,33%	5,52%	1,23%	5,03%	0,06%	0,24%
Pr&Ho Gd EZ	-0,32%	6,44%	1,67%	5,66%	-0,05%	0,30%
Retail EZ	0,19%	5,56%	0,99%	5,52%	0,03%	0,18%
Tech EZ	-0,47%	9,54%	1,53%	8,71%	-0,05%	0,18%
Telecom EZ	0,27%	7,23%	1,79%	7,89%*	0,04%	0,23%
Trv&Lsr EZ	-0,45%	7,84%	1,54%	5,69%	-0,06%	0,27%
Util EZ	0,18%	5,16%	1,52%	4,96%	0,03%	0,31%
Growth EZ	-0,66%	6,20%	1,24%	5,58%	-0,11%	0,22%
Growth Large EZ	-0,63%	6,22%	1,14%	5,71%	-0,10%	0,20%
Growth Mid EZ	-0,83%	6,52%	1,51%	5,55%	-0,13%	0,27%
Growth Small EZ	-0,67%	7,51%	1,68%	6,01%	-0,09%	0,28%
Value EZ	-0,56%	6,71%	1,25%	5,41%	-0,08%	0,23%
Value Large EZ	-0,63%	6,95%	1,14%	5,58%	-0,09%	0,20%
Value Mid EZ	-0,34%	6,23%	1,64%	5,45%	-0,06%	0,30%
Value Small EZ	-0,71%	6,59%	1,71%	5,15%	-0,11%	0,33%
Large EZ	-0,54%	5,98%	0,63%	5,65%	-0,09%	0,11%
Mid EZ	-0,42%	5,97%	1,12%	5,20%	-0,07%	0,22%
Small EZ	-0,48%	6,38%	1,54%	5,22%	-0,07%	0,30%

Bas Mater N	-0,22%	7,69%	1,81%	7,56%	-0,03%	0,24%
Cns Goods N	-0,21%	5,95%	1,92%	5,73%	-0,04%	0,34%
Cns Svcs N	0,53%	6,06%	2,51%	7,90%*	0,09%	0,32%
Fincl N	0,26%	7,31%	2,11%	7,52%*	0,04%	0,28%
Indus N	0,54%	7,95%	2,82%	7,06%	0,07%	0,40%
Banks N	0,45%	7,81%	2,07%	7,94%*	0,06%	0,26%
Bas Res N	-0,30%	7,94%	1,79%	8,45%*	-0,04%	0,21%
Fin Svcs N	0,48%	7,37%	2,43%	6,92%	0,06%	0,35%
Hea Care N	1,07%	5,37%	1,89%	5,62%*	0,20%	0,34%
Indus Gd N	0,60%	8,07%	2,86%	7,15%	0,07%	0,40%
Media N	-1,24%	8,70%	2,89%	14,22%*	-0,14%	0,20%
Pr&Ho Gd N	-0,37%	6,85%	2,33%	7,41%*	-0,05%	0,31%
Tech N	0,41%	10,96%	1,36%	12,39%*	0,04%	0,11%
Telecom N	0,42%	8,33%	1,42%	10,17%*	0,05%	0,14%
Large N	-0,71%	7,68%	1,19%	9,27%*	-0,09%	0,13%
Mid N	-0,32%	7,32%	1,79%	6,53%	-0,04%	0,27%
Small N	-0,31%	6,96%	1,77%	5,94%	-0,04%	0,30%

Benchm Eur 1	0,05%	5,01%	1,34%	4,38%	0,01%	0,31%
Benchm Eur 2	-0,43%	5,32%	0,38%	4,74%	-0,08%	0,08%
Benchm EZ 1	-0,14%	5,88%	1,51%	4,95%	-0,02%	0,30%
Benchm EZ 2	-0,64%	6,35%	0,46%	5,30%	-0,10%	0,09%
Benchm Eur ex EZ 1	-0,14%	4,25%	0,52%	4,57%*	-0,03%	0,11%
Benchm Eur ex EZ 2	-0,23%	4,51%	0,30%	4,52%*	-0,05%	0,07%
Benchm N 1	-0,65%	7,15%	1,36%	8,06%*	-0,09%	0,17%
Benchm N 2	-0,71%	7,31%	0,70%	7,55%*	-0,10%	0,09%
Blue-Chip Eur	0,15%	5,05%	1,18%	4,60%	0,03%	0,26%
Blue-Chip EZ	-0,06%	6,00%	1,46%	5,13%	-0,01%	0,28%
Blue-Chip N	-0,43%	6,34%	1,56%	7,05%*	-0,07%	0,22%

Table A5 – Risk and return in the "All Period": Price Return Indices

Table A5 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Price Return European Stock Indices from October 1992 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May-Oct.	Nov.-Apr.
Bas Mater EZ	-0,37%	7,14%	1,46%	6,37%	-0,05%	0,23%
Cns Goods EZ	-0,31%	5,69%	1,37%	5,20%	-0,05%	0,26%
Cns Svcs EZ	-0,45%	5,52%	1,09%	5,35%	-0,08%	0,20%
Fincl EZ	-0,98%	8,15%	0,31%	7,11%	-0,12%	0,04%
Indus EZ	-1,09%	6,72%	1,66%	6,29%	-0,16%	0,26%
Aut&Prt EZ	-0,28%	7,76%	1,41%	8,06%*	-0,04%	0,18%
Banks EZ	-0,60%	7,92%	1,18%	6,67%	-0,08%	0,18%
Bas Res EZ	-0,48%	8,95%	1,49%	7,19%	-0,05%	0,21%
Chem EZ	-0,15%	6,40%	1,78%	5,48%	-0,02%	0,32%
Cns&Mat EZ	-0,89%	6,29%	1,83%	5,53%	-0,14%	0,33%
Fin Svcs EZ	-0,74%	6,70%	1,62%	5,56%	-0,11%	0,29%
Fd&Bvr EZ	-0,15%	4,77%	1,17%	4,10%	-0,03%	0,28%
Hea Care EZ	0,30%	4,59%	0,92%	4,73%*	0,07%	0,19%
Indus Gd EZ	-0,64%	6,83%	2,09%	6,11%	-0,09%	0,34%
Insur EZ	-0,57%	8,62%	0,99%	7,39%	-0,07%	0,13%
Media EZ	-0,87%	6,18%	1,26%	7,53%*	-0,14%	0,17%
Oil&Gas EZ	-0,08%	5,35%	1,13%	5,03%	-0,01%	0,23%
Pr&Ho Gd EZ	-0,46%	6,41%	1,58%	5,66%	-0,07%	0,28%
Retail EZ	-0,02%	5,54%	0,92%	5,51%	0,00%	0,17%
Tech EZ	-0,58%	9,54%	1,40%	8,70%	-0,06%	0,16%
Telecom EZ	-0,08%	7,21%	1,67%	7,92%*	-0,01%	0,21%
Trv&Lsr EZ	-0,73%	7,85%	1,48%	5,68%	-0,09%	0,26%
Util EZ	-0,17%	5,12%	1,38%	4,93%	-0,03%	0,28%
Growth EZ	-0,83%	6,18%	1,15%	5,59%	-0,13%	0,21%
Growth Large EZ	-0,80%	6,20%	1,04%	5,72%	-0,13%	0,18%
Growth Mid EZ	-0,97%	6,51%	1,44%	5,54%	-0,15%	0,26%
Growth Small EZ	-0,82%	7,50%	1,60%	5,99%	-0,11%	0,27%
Value EZ	-0,86%	6,70%	1,10%	5,36%	-0,13%	0,21%
Value Large EZ	-0,95%	6,94%	1,00%	5,52%	-0,14%	0,18%
Value Mid EZ	-0,58%	6,22%	1,48%	5,40%	-0,09%	0,27%
Value Small EZ	-0,96%	6,59%	1,49%	5,11%	-0,15%	0,29%
Large EZ	-0,93%	6,13%	0,33%	5,66%	-0,15%	0,06%
Mid EZ	-0,64%	6,19%	0,90%	5,24%	-0,10%	0,17%
Small EZ	-0,67%	6,62%	1,34%	5,29%	-0,10%	0,25%

Bas Mater N	-0,30%	7,70%	1,49%	7,52%	-0,04%	0,20%
Cns Goods N	-0,28%	5,95%	1,68%	5,67%	-0,05%	0,30%
Cns Svcs N	0,46%	6,08%	2,35%	7,90%*	0,08%	0,30%
Fincl N	0,25%	7,32%	1,76%	7,43%*	0,03%	0,24%
Indus N	0,47%	7,94%	2,60%	6,97%	0,06%	0,37%
Banks N	0,45%	7,81%	1,68%	7,84%*	0,06%	0,21%
Bas Res N	-0,37%	7,95%	1,45%	8,42%*	-0,05%	0,17%
Fin Svcs N	0,46%	7,38%	2,07%	6,88%	0,06%	0,30%
Hea Care N	1,02%	5,37%	1,73%	5,66%*	0,19%	0,31%
Indus Gd N	0,52%	8,06%	2,66%	7,07%	0,07%	0,38%
Media N	-1,31%	8,70%	2,78%	14,32%*	-0,15%	0,19%
Pr&Ho Gd N	-0,48%	6,86%	2,08%	7,38%*	-0,07%	0,28%
Tech N	0,32%	10,94%	1,24%	12,37%*	0,03%	0,10%
Telecom N	0,30%	8,34%	1,14%	10,16%*	0,04%	0,11%
Large N	-1,31%	7,42%	0,54%	9,11%*	-0,18%	0,06%
Mid N	-0,47%	7,60%	1,39%	6,53%	-0,06%	0,21%
Small N	-0,41%	7,24%	1,21%	5,88%	-0,06%	0,21%
Benchm Eur 1	-0,20%	5,00%	1,15%	4,37%	-0,04%	0,26%
Benchm Eur 2	-0,22%	4,95%	1,16%	4,35%	-0,05%	0,27%
Benchm EZ 1	-0,88%	6,34%	0,32%	5,25%	-0,14%	0,06%
Benchm Eur ex EZ 1	-0,36%	4,37%	-0,12%	4,51%*	-0,08%	-0,03%
Benchm Eur ex EZ 2	-0,43%	4,50%	0,03%	4,50%	-0,10%	0,01%
Benchm N 1	-1,08%	7,22%	0,44%	7,67%*	-0,15%	0,06%
Benchm N 2	-0,77%	7,30%	0,43%	7,44%*	-0,11%	0,06%
Blue-Chip N	0,25%	6,40%	1,77%	6,36%	0,04%	0,28%

Table A6 – Risk and return in the "Before Bubble Period": Total Return Indices

Table A6 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Total Return European Stock Indices from October 1992 to August 2001. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May-Oct.	Nov.-Apr.
Bas Mater EZ	-0,40%	6,08%	2,20%	7,47%*	-0,07%	0,29%
Cns Goods EZ	-0,36%	5,44%	2,24%	4,77%	-0,07%	0,47%
Cns Svcs EZ	0,30%	4,73%	2,03%	5,27%*	0,06%	0,38%
Fincl EZ	0,19%	3,57%	0,48%	5,20%*	0,05%	0,09%
Indus EZ	-1,01%	3,97%	2,45%	7,99%*	-0,25%	0,31%
Aut&Prt EZ	-0,79%	7,03%	2,72%	6,31%	-0,11%	0,43%
Banks EZ	0,47%	6,66%	2,07%	4,95%	0,07%	0,42%
Bas Res EZ	-0,29%	7,17%	2,16%	5,82%	-0,04%	0,37%
Chem EZ	0,29%	6,25%	2,37%	5,08%	0,05%	0,47%
Cns&Mat EZ	0,03%	5,21%	2,07%	4,92%	0,00%	0,42%
Fin Svcs EZ	0,13%	6,22%	2,45%	4,83%	0,02%	0,51%
Fd&Bvr EZ	0,20%	4,50%	1,73%	4,40%	0,05%	0,39%
Hea Care EZ	1,59%	4,62%	1,70%	4,48%	0,34%	0,38%
Indus Gd EZ	-0,06%	5,62%	2,91%	6,27%*	-0,01%	0,46%
Insur EZ	0,67%	5,76%	2,09%	5,27%	0,12%	0,40%
Media EZ	-0,23%	5,30%	2,59%	8,69%*	-0,04%	0,30%
Oil&Gas EZ	0,84%	5,44%	2,04%	4,96%	0,15%	0,41%
Pr&Ho Gd EZ	-0,19%	5,84%	2,16%	6,00%*	-0,03%	0,36%
Retail EZ	0,79%	4,87%	1,66%	5,23%*	0,16%	0,32%
Tech EZ	-0,30%	8,99%	3,15%	8,67%	-0,03%	0,36%
Telecom EZ	-0,43%	7,87%	3,93%	9,50%*	-0,05%	0,41%
Trv&Lsr EZ	-0,07%	7,18%	2,14%	4,99%	-0,01%	0,43%
Util EZ	0,54%	4,56%	2,23%	4,68%*	0,12%	0,48%
Growth EZ	-1,14%	6,10%	3,22%	6,58%*	-0,19%	0,49%
Growth Large EZ	-1,19%	6,46%	3,39%	6,69%*	-0,18%	0,51%
Growth Mid EZ	-0,85%	4,95%	2,46%	6,63%*	-0,17%	0,37%
Growth Small EZ	-1,18%	6,01%	2,50%	6,79%*	-0,20%	0,37%
Value EZ	-0,77%	6,26%	2,02%	4,80%	-0,12%	0,42%
Value Large EZ	-0,85%	6,66%	2,02%	5,21%	-0,13%	0,39%
Value Mid EZ	-0,50%	5,05%	1,84%	4,18%	-0,10%	0,44%
Value Small EZ	-1,26%	5,17%	1,78%	3,91%	-0,24%	0,46%
Large EZ	-1,04%	3,78%	1,44%	6,61%*	-0,28%	0,22%
Mid EZ	-0,67%	2,68%	0,92%	6,20%*	-0,25%	0,15%
Small EZ	-0,89%	3,07%	1,78%	5,60%*	-0,29%	0,32%

Bas Mater N	0,08%	6,81%	2,56%	7,35%*	0,01%	0,35%
Cns Goods N	0,01%	5,02%	1,83%	5,62%*	0,00%	0,33%
Cns Svcs N	1,22%	6,70%	3,25%	9,23%*	0,18%	0,35%
Fincl N	1,25%	6,66%	2,58%	7,73%*	0,19%	0,33%
Indus N	1,21%	7,78%	3,68%	7,18%	0,16%	0,51%
Banks N	1,72%	6,88%	2,60%	7,38%*	0,25%	0,35%
Bas Res N	-0,06%	7,66%	2,85%	8,62%*	-0,01%	0,33%
Fin Svcs N	1,64%	6,71%	2,56%	7,33%*	0,24%	0,35%
Hea Care N	1,55%	5,77%	2,21%	5,80%*	0,27%	0,38%
Indus Gd N	1,24%	7,86%	3,77%	7,32%	0,16%	0,51%
Media N	-2,45%	7,99%	4,84%	17,63%*	-0,31%	0,27%
Pr&Ho Gd N	-0,27%	7,73%	2,59%	8,49%*	-0,03%	0,31%
Tech N	1,45%	12,18%	3,16%	13,82%*	0,12%	0,23%
Telecom N	-0,31%	8,25%	2,51%	13,52%*	-0,04%	0,19%
Large N	-2,43%	9,50%	3,41%	14,04%*	-0,26%	0,24%
Mid N	-1,07%	4,40%	0,93%	7,54%*	-0,24%	0,12%
Small N	-0,35%	3,54%	2,00%	5,60%*	-0,10%	0,36%

Benchm Eur 1	0,35%	4,62%	2,21%	3,87%	0,08%	0,57%
Benchm Eur 2	-3,27%	2,69%	-1,04%	5,24%*	-1,22%	-0,20%
Benchm EZ 1	0,13%	5,19%	2,45%	4,44%	0,03%	0,55%
Benchm EZ 2	-4,05%	2,42%	-0,99%	6,13%*	-1,67%	-0,16%
Benchm Eur ex EZ 1	-0,40%	3,38%	1,02%	4,90%*	-0,12%	0,21%
Benchm Eur ex EZ 2	-2,53%	3,27%	-1,10%	4,39%*	-0,77%	-0,25%
Benchm N 1	-2,26%	7,24%	2,67%	11,59%*	-0,31%	0,23%
Benchm N 2	-8,05%	6,51%	-3,64%	13,95%*	-1,24%	-0,26%
Blue-Chip Eur	0,54%	5,03%	2,31%	4,19%	0,11%	0,55%
Blue-Chip EZ	0,26%	5,56%	2,62%	4,48%	0,05%	0,59%
Blue-Chip N	-0,91%	4,92%	2,59%	9,30%*	-0,18%	0,28%

Table A7 – Risk and return in the "Before Bubble Period": Price Return Indices

Table A7 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Price Return European Stock Indices from October 1992 to August 2001. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May-Oct.	Nov.-Apr.
Bas Mater EZ	-0,58%	6,17%	1,93%	7,40%*	-0,09%	0,26%
Cns Goods EZ	-0,61%	5,38%	2,17%	4,75%	-0,11%	0,46%
Cns Svcs EZ	0,06%	4,67%	1,97%	5,27%*	0,01%	0,37%
Fincl EZ	-0,02%	3,67%	0,43%	5,19%*	-0,01%	0,08%
Indus EZ	-1,17%	3,99%	2,38%	8,00%*	-0,29%	0,30%
Aut&Prt EZ	-1,05%	6,97%	2,66%	6,30%	-0,15%	0,42%
Banks EZ	0,05%	6,63%	1,97%	4,96%	0,01%	0,40%
Bas Res EZ	-0,47%	7,14%	1,88%	5,80%	-0,07%	0,32%
Chem EZ	0,01%	6,19%	2,14%	5,04%	0,00%	0,42%
Cns&Mat EZ	-0,34%	5,13%	2,04%	4,92%	-0,07%	0,41%
Fin Svcs EZ	-0,34%	6,20%	2,38%	4,83%	-0,06%	0,49%
Fd&Bvr EZ	-0,07%	4,46%	1,62%	4,38%	-0,01%	0,37%
Hea Care EZ	1,32%	4,67%	1,66%	4,47%	0,28%	0,37%
Indus Gd EZ	-0,34%	5,46%	2,83%	6,27%*	-0,06%	0,45%
Insur EZ	0,44%	5,74%	2,07%	5,27%	0,08%	0,39%
Media EZ	-0,47%	5,26%	2,49%	8,69%*	-0,09%	0,29%
Oil&Gas EZ	0,36%	5,17%	1,99%	4,97%	0,07%	0,40%
Pr&Ho Gd EZ	-0,37%	5,79%	2,12%	6,00%*	-0,06%	0,35%
Retail EZ	0,57%	4,83%	1,60%	5,22%*	0,12%	0,31%
Tech EZ	-0,41%	9,01%	2,99%	8,70%	-0,05%	0,34%
Telecom EZ	-0,76%	7,73%	3,87%	9,51%*	-0,10%	0,41%
Trv&Lsr EZ	-0,38%	7,15%	2,12%	4,99%	-0,05%	0,43%
Util EZ	0,18%	4,48%	2,11%	4,66%*	0,04%	0,45%
Growth EZ	-1,28%	6,06%	3,18%	6,58%*	-0,21%	0,48%
Growth Large EZ	-1,32%	6,43%	3,34%	6,69%*	-0,21%	0,50%
Growth Mid EZ	-0,98%	4,93%	2,41%	6,64%*	-0,20%	0,36%
Growth Small EZ	-1,33%	5,98%	2,46%	6,79%*	-0,22%	0,36%
Value EZ	-1,04%	6,21%	1,93%	4,78%	-0,17%	0,40%
Value Large EZ	-1,12%	6,61%	1,94%	5,18%	-0,17%	0,37%
Value Mid EZ	-0,76%	5,03%	1,70%	4,17%	-0,15%	0,41%
Value Small EZ	-1,59%	5,09%	1,64%	3,88%	-0,31%	0,42%
Large EZ	-2,36%	3,26%	0,67%	7,26%*	-0,72%	0,09%
Mid EZ	-1,20%	2,86%	0,18%	6,87%*	-0,42%	0,03%
Small EZ	-1,39%	3,21%	1,38%	6,43%*	-0,43%	0,22%

Bas Mater N	0,00%	6,82%	2,29%	7,26%*	0,00%	0,32%
Cns Goods N	-0,08%	5,03%	1,63%	5,57%*	-0,01%	0,29%
Cns Svcs N	1,21%	6,70%	3,17%	9,20%*	0,18%	0,34%
Fincl N	1,24%	6,66%	2,28%	7,78%*	0,19%	0,29%
Indus N	1,13%	7,77%	3,53%	7,14%	0,15%	0,49%
Banks N	1,72%	6,88%	2,23%	7,42%*	0,25%	0,30%
Bas Res N	-0,11%	7,68%	2,57%	8,59%*	-0,01%	0,30%
Fin Svcs N	1,64%	6,71%	2,21%	7,37%*	0,24%	0,30%
Hea Care N	1,46%	5,77%	2,11%	5,87%*	0,25%	0,36%
Indus Gd N	1,16%	7,85%	3,62%	7,28%	0,15%	0,50%
Media N	-2,49%	8,02%	4,87%	17,87%*	-0,31%	0,27%
Pr&Ho Gd N	-0,46%	7,76%	2,44%	8,49%*	-0,06%	0,29%
Tech N	1,36%	12,12%	3,10%	13,85%*	0,11%	0,22%
Telecom N	-0,44%	8,25%	2,23%	13,56%*	-0,05%	0,16%
Large N	-7,04%	6,77%	1,69%	15,45%*	-1,04%	0,11%
Mid N	-2,15%	4,99%	-0,34%	8,07%*	-0,43%	-0,04%
Small N	-0,77%	4,23%	-0,07%	5,39%*	-0,18%	-0,01%

Benchm Eur 1	0,07%	4,61%	2,05%	3,87%	0,02%	0,53%
Benchm Eur 2	0,02%	4,45%	2,03%	3,82%	0,00%	0,53%
Benchm EZ 1	-4,29%	2,27%	-1,06%	6,08%*	-1,89%	-0,18%
Benchm Eur ex EZ 1	-0,87%	3,76%	-1,46% *	4,65%*	-0,23%	-0,31%*
Benchm Eur ex EZ 2	-2,72%	3,23%	-1,30%	4,41%*	-0,84%	-0,30%
Benchm N 1	-5,66%	6,20%	-1,26%	12,23%*	-0,91%	-0,10%
Benchm N 2	-8,08%	6,47%	-3,86%	13,80%*	-1,25%	-0,28%
Blue-Chip N	0,91%	6,02%	2,56%	6,45%*	0,15%	0,40%

Table A8 – Risk and return in the "After Bubble Period": Total Return Indices

Table A8 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Total Return European Stock Indices from September 2001 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May-Oct.	Nov.-Apr.
Bas Mater EZ	-0,11%	7,47%	1,53%	6,16%	-0,01%	0,25%
Cns Goods EZ	0,10%	6,00%	0,72%	5,59%	0,02%	0,13%
Cns Svcs EZ	-0,68%	6,18%	0,32%	5,38%	-0,11%	0,06%
Fincl EZ	-0,95%	9,04%	0,42%	7,65%	-0,11%	0,05%
Indus EZ	-0,87%	7,35%	1,60%	5,82%	-0,12%	0,28%
Aut&Prt EZ	0,54%	8,43%	0,35% *	9,48% *	0,06%	0,04%*
Banks EZ	-0,88%	8,96%	0,52%	8,00%	-0,10%	0,06%
Bas Res EZ	-0,33%	10,41%	1,38%	8,29%	-0,03%	0,17%
Chem EZ	-0,09%	6,68%	1,59%	6,00%	-0,01%	0,27%
Cns&Mat EZ	-1,14%	7,23%	1,72%	6,16%	-0,16%	0,28%
Fin Svcs EZ	-0,85%	7,20%	1,00%	6,19%	-0,12%	0,16%
Fd&Bvr EZ	-0,03%	5,07%	0,82%	3,80%	-0,01%	0,21%
Hea Care EZ	-0,46%	4,27%	0,25%	4,98%*	-0,11%	0,05%
Indus Gd EZ	-0,75%	7,93%	1,52%	5,91%	-0,10%	0,26%
Insur EZ	-1,26%	10,58%	0,08%	9,09%	-0,12%	0,01%
Media EZ	-0,97%	6,94%	0,15%	6,05%	-0,14%	0,03%
Oil&Gas EZ	-0,14%	5,60%	0,42%	5,00%	-0,03%	0,08%
Pr&Ho Gd EZ	-0,44%	7,00%	1,18%	5,31%	-0,06%	0,22%
Retail EZ	-0,37%	6,13%	0,32%	5,77%	-0,06%	0,05%
Tech EZ	-0,63%	10,09%	-0,09%	8,52%	-0,06%	-0,01%
Telecom EZ	0,92%	6,58%	-0,35% *	5,11%	0,14%	-0,07%*
Trv&Lsr EZ	-0,81%	8,46%	0,94%	6,31%	-0,10%	0,15%
Util EZ	-0,15%	5,69%	0,82%	5,16%	-0,03%	0,16%
Growth EZ	-0,44%	6,29%	0,36%	4,89%	-0,07%	0,07%
Growth Large EZ	-0,37%	6,15%	0,14%	4,96%	-0,06%	0,03%
Growth Mid EZ	-0,81%	7,17%	1,10%	5,01%	-0,11%	0,22%
Growth Small EZ	-0,44%	8,16%	1,31%	5,66%	-0,05%	0,23%
Value EZ	-0,46%	6,97%	0,91%	5,67%	-0,07%	0,16%
Value Large EZ	-0,53%	7,14%	0,75%	5,74%	-0,07%	0,13%
Value Mid EZ	-0,27%	6,74%	1,55%	5,96%	-0,04%	0,26%
Value Small EZ	-0,46%	7,19%	1,68%	5,65%	-0,06%	0,30%
Large EZ	-0,40%	6,50%	0,40%	5,40%	-0,06%	0,07%
Mid EZ	-0,35%	6,64%	1,18%	4,95%	-0,05%	0,24%
Small EZ	-0,36%	7,06%	1,47%	5,16%	-0,05%	0,29%

Bas Mater N	-0,49%	8,48%	1,06%	7,77%	-0,06%	0,14%
Cns Goods N	-0,42%	6,74%	2,02%	5,90%	-0,06%	0,34%
Cns Svcs N	-0,10%	5,39%	1,77%	6,30%*	-0,02%	0,28%
Fincl N	-0,65%	7,82%	1,65%	7,35%	-0,08%	0,22%
Indus N	-0,08%	8,13%	1,96%	6,90%	-0,01%	0,28%
Banks N	-0,72%	8,47%	1,53%	8,49%*	-0,08%	0,18%
Bas Res N	-0,53%	8,25%	0,73%	8,21%	-0,06%	0,09%
Fin Svcs N	-0,60%	7,84%	2,31%	6,54%	-0,08%	0,35%
Hea Care N	0,63%	4,99%	1,57%	5,47%*	0,13%	0,29%
Indus Gd N	0,00%	8,28%	1,96%	6,94%	0,00%	0,28%
Media N	-0,13%	9,24%	0,94%	9,47%*	-0,01%	0,10%
Pr&Ho Gd N	-0,46%	5,98%	2,07%	6,23%*	-0,08%	0,33%
Tech N	-0,56%	9,71%	-0,45%	10,59%*	-0,06%	-0,04%
Telecom N	0,99%	8,43%	0,57% *	6,51%	0,12%	0,09%*
Large N	-0,22%	7,11%	0,57%	7,51%*	-0,03%	0,08%
Mid N	-0,10%	7,98%	2,03%	6,28%	-0,01%	0,32%
Small N	-0,30%	7,69%	1,70%	6,08%	-0,04%	0,28%

Benchm Eur 1	-0,22%	5,38%	0,47%	4,72%	-0,04%	0,10%
Benchm Eur 2	-0,22%	5,41%	0,51%	4,73%	-0,04%	0,11%
Benchm EZ 1	-0,39%	6,49%	0,56%	5,28%	-0,06%	0,11%
Benchm EZ 2	-0,39%	6,49%	0,60%	5,26%	-0,06%	0,11%
Benchm Eur ex EZ 1	-0,06%	4,50%	0,39%	4,51%*	-0,01%	0,09%
Benchm Eur ex EZ 2	-0,07%	4,56%	0,43%	4,55%	-0,01%	0,09%
Benchm N 1	-0,19%	7,13%	1,00%	6,87%	-0,03%	0,15%
Benchm N 2	-0,18%	7,12%	1,10%	6,76%	-0,03%	0,16%
Blue-Chip Eur	-0,22%	5,07%	0,06%	4,75%	-0,04%	0,01%
Blue-Chip EZ	-0,35%	6,43%	0,30%	5,52%	-0,05%	0,05%
Blue-Chip N	-0,30%	6,72%	1,27%	6,37%	-0,04%	0,20%

Table A9 – Risk and return in the "After Bubble Period": Price Return Indices

Table A9 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Price Return European Stock Indices from September 2001 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May-Oct.	Nov.-Apr.
Bas Mater EZ	-0,31%	7,45%	1,33%	6,13%	-0,04%	0,22%
Cns Goods EZ	-0,04%	6,00%	0,58%	5,54%	-0,01%	0,10%
Cns Svcs EZ	-0,91%	6,21%	0,21%	5,33%	-0,15%	0,04%
Fincl EZ	-1,26%	9,04%	0,28%	7,60%	-0,14%	0,04%
Indus EZ	-1,07%	7,34%	1,46%	5,81%	-0,15%	0,25%
Aut&Prt EZ	0,43%	8,43%	0,17% *	9,39%*	0,05%	0,02%*
Banks EZ	-1,21%	8,97%	0,40%	8,01%	-0,14%	0,05%
Bas Res EZ	-0,48%	10,42%	1,10%	8,40%	-0,05%	0,13%
Chem EZ	-0,30%	6,65%	1,42%	5,91%	-0,05%	0,24%
Cns&Mat EZ	-1,41%	7,22%	1,62%	6,12%	-0,20%	0,26%
Fin Svcs EZ	-1,11%	7,17%	0,86%	6,15%	-0,15%	0,14%
Fd&Bvr EZ	-0,23%	5,07%	0,71%	3,79%	-0,04%	0,19%
Hea Care EZ	-0,64%	4,34%	0,17%	4,90%*	-0,15%	0,03%
Indus Gd EZ	-0,91%	7,93%	1,35%	5,91%	-0,12%	0,23%
Insur EZ	-1,51%	10,60%	-0,09%	8,95%	-0,14%	-0,01%
Media EZ	-1,25%	6,96%	0,02%	5,99%	-0,18%	0,00%
Oil&Gas EZ	-0,49%	5,53%	0,27%	5,00%	-0,09%	0,05%
Pr&Ho Gd EZ	-0,54%	7,00%	1,04%	5,29%	-0,08%	0,20%
Retail EZ	-0,57%	6,12%	0,23%	5,75%	-0,09%	0,04%
Tech EZ	-0,73%	10,10%	-0,20%	8,48%	-0,07%	-0,02%
Telecom EZ	0,56%	6,70%	-0,53% *	5,12%	0,08%	-0,10%*
Trv&Lsr EZ	-1,05%	8,50%	0,83%	6,28%	-0,12%	0,13%
Util EZ	-0,50%	5,67%	0,65%	5,12%	-0,09%	0,13%
Growth EZ	-0,63%	6,28%	0,25%	4,89%	-0,10%	0,05%
Growth Large EZ	-0,56%	6,13%	0,02%	4,97%	-0,09%	0,00%
Growth Mid EZ	-0,97%	7,16%	1,01%	4,99%	-0,14%	0,20%
Growth Small EZ	-0,58%	8,15%	1,22%	5,63%	-0,07%	0,22%
Value EZ	-0,78%	6,97%	0,73%	5,59%	-0,11%	0,13%
Value Large EZ	-0,86%	7,14%	0,58%	5,66%	-0,12%	0,10%
Value Mid EZ	-0,49%	6,74%	1,39%	5,91%	-0,07%	0,24%
Value Small EZ	-0,68%	7,21%	1,43%	5,60%	-0,09%	0,26%
Large EZ	-0,67%	6,49%	0,26%	5,36%	-0,10%	0,05%
Mid EZ	-0,55%	6,62%	1,05%	4,91%	-0,08%	0,21%
Small EZ	-0,55%	7,07%	1,34%	5,10%	-0,08%	0,26%

Bas Mater N	-0,58%	8,48%	0,69%	7,75%	-0,07%	0,09%
Cns Goods N	-0,48%	6,73%	1,73%	5,81%	-0,07%	0,30%
Cns Svcs N	-0,24%	5,42%	1,52%	6,31%*	-0,04%	0,24%
Fincl N	-0,67%	7,82%	1,25%	7,11%	-0,09%	0,18%
Indus N	-0,14%	8,12%	1,67%	6,74%	-0,02%	0,25%
Banks N	-0,73%	8,48%	1,12%	8,27%	-0,09%	0,14%
Bas Res N	-0,61%	8,26%	0,33%	8,17%	-0,07%	0,04%
Fin Svcs N	-0,65%	7,86%	1,94%	6,41%	-0,08%	0,30%
Hea Care N	0,61%	4,99%	1,36%	5,48%*	0,12%	0,25%
Indus Gd N	-0,07%	8,28%	1,69%	6,78%	-0,01%	0,25%
Media N	-0,22%	9,22%	0,68%	9,24%*	-0,02%	0,07%
Pr&Ho Gd N	-0,50%	5,98%	1,73%	6,15%*	-0,08%	0,28%
Tech N	-0,64%	9,72%	-0,63%	10,50%*	-0,07%	-0,06%
Telecom N	0,88%	8,43%	0,29% *	6,42%	0,10%	0,05%*
Large N	-0,29%	7,11%	0,30%	7,41%*	-0,04%	0,04%
Mid N	-0,17%	7,98%	1,75%	6,20%	-0,02%	0,28%
Small N	-0,34%	7,68%	1,43%	5,98%	-0,04%	0,24%

Benchm Eur 1	-0,45%	5,37%	0,26%	4,68%	-0,08%	0,06%
Benchm Eur 2	-0,45%	5,41%	0,30%	4,69%	-0,08%	0,06%
Benchm EZ 1	-0,64%	6,48%	0,45%	5,22%	-0,10%	0,09%
Benchm Eur ex EZ 1	-0,26%	4,50%	0,11%	4,49%	-0,06%	0,02%
Benchm Eur ex EZ 2	-0,27%	4,56%	0,15%	4,53%	-0,06%	0,03%
Benchm N 1	-0,26%	7,13%	0,73%	6,76%	-0,04%	0,11%
Benchm N 2	-0,25%	7,13%	0,82%	6,66%	-0,04%	0,12%
Blue-Chip N	-0,37%	6,72%	0,98%	6,23%	-0,05%	0,16%

Table A10 – Statistical significance in the "All Period": Total Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A10 shows summary results on 51 Total Return European Stock Indices from October 1992 to October 2010. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	Mean	Std. Dev.	α_1	p-value	Notes:
Bas Mater EZ	141	0,73%	6,84%	0,02	0,108	
Cns Goods EZ	216	0,68%	5,52%	0,02	0,032	
Cns Svcs EZ	216	0,48%	5,48%	0,01	0,065	
Fincl EZ	141	-0,15%	7,67%	0,01	0,383	
Indus EZ	141	0,41%	6,63%	0,03	0,016	
Aut&Prt EZ	216	0,72%	7,97%	0,02	0,133	
Banks EZ	216	0,53%	7,35%	0,02	0,114	NWP
Bas Res EZ	216	0,73%	8,15%	0,02	0,067	NWP
Chem EZ	216	1,04%	6,07%	0,02	0,022	
Cns&Mat EZ	216	0,66%	6,07%	0,02	0,003	
Fin Svcs EZ	216	0,68%	6,25%	0,02	0,023	NWP
Fd&Bvr EZ	216	0,68%	4,49%	0,01	0,052	
Hea Care EZ	216	0,75%	4,65%	0,00	0,481	
Indus Gd EZ	216	0,90%	6,63%	0,03	0,003	
Insur EZ	216	0,38%	8,08%	0,01	0,198	
Media EZ	216	0,38%	6,96%	0,02	0,036	
Oil&Gas EZ	216	0,78%	5,29%	0,01	0,212	
Pr&Ho Gd EZ	216	0,68%	6,13%	0,02	0,017	
Retail EZ	216	0,59%	5,54%	0,01	0,292	
Tech EZ	216	0,53%	9,17%	0,02	0,109	
Telecom EZ	216	1,03%	7,59%	0,02	0,142	
Trv&Lsr EZ	216	0,54%	6,91%	0,02	0,034	WP
Util EZ	216	0,85%	5,09%	0,01	0,052	
Growth EZ	160	0,27%	5,97%	0,02	0,043	
Growth Large EZ	160	0,23%	6,02%	0,02	0,064	
Growth Mid EZ	160	0,31%	6,16%	0,02	0,025	NWP
Growth Small EZ	160	0,47%	6,90%	0,02	0,049	NWP
Value EZ	160	0,32%	6,16%	0,02	0,063	
Value Large EZ	160	0,23%	6,36%	0,02	0,078	
Value Mid EZ	160	0,62%	5,92%	0,02	0,037	NWP
Value Small EZ	160	0,47%	6,04%	0,02	0,016	NWP
Large EZ	141	0,03%	5,83%	0,01	0,234	
Mid EZ	141	0,33%	5,64%	0,02	0,104	
Small EZ	141	0,51%	5,90%	0,02	0,042	

Bas Mater N	216	0,80%	7,68%	0,02	0,052	
Cns Goods N	216	0,85%	5,93%	0,02	0,008	
Cns Svcs N	216	1,52%	7,09%	0,02	0,040	WP
Fincl N	216	1,19%	7,46%	0,02	0,076	NWP
Indus N	216	1,68%	7,59%	0,02	0,037	NWP
Banks N	216	1,26%	7,90%	0,02	0,137	NWP
Bas Res N	216	0,74%	8,25%	0,02	0,062	
Fin Svcs N	216	1,46%	7,20%	0,02	0,046	
Hea Care N	216	1,48%	5,50%	0,01	0,272	
Indus Gd N	216	1,73%	7,69%	0,02	0,039	NWP
Media N	216	0,82%	11,94%	0,04	0,011	
Pr&Ho Gd N	216	0,98%	7,25%	0,03	0,006	
Tech N	216	0,88%	11,68%	0,01	0,552	
Telecom N	195	0,91%	9,27%	0,01	0,475	NWP
Large N	141	0,22%	8,52%	0,02	0,211	NWP
Mid N	141	0,71%	7,00%	0,02	0,082	NWP
Small N	141	0,71%	6,54%	0,02	0,087	NWP

Benchm Eur 1	216	0,70%	4,74%	0,01	0,067	NWP
Benchm Eur 2	119	-0,03%	5,04%	0,01	0,422	NWP
Benchm EZ 1	216	0,68%	5,48%	0,02	0,027	
Benchm EZ 2	119	-0,09%	5,85%	0,01	0,309	
Benchm Eur ex EZ 1	141	0,19%	4,41%	0,01	0,435	NWP
Benchm Eur ex EZ 2	119	0,03%	4,50%	0,01	0,574	NWP
Benchm N 1	141	0,34%	7,65%	0,02	0,140	NWP
Benchm N 2	119	-0,01%	7,43%	0,01	0,310	NWP
Blue-Chip Eur	216	0,67%	4,84%	0,01	0,148	NWP
Blue-Chip EZ	216	0,70%	5,62%	0,02	0,047	
Blue-Chip N	141	0,54%	6,75%	0,02	0,080	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A11 – Statistical significance in the "All Period": Price Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A11 shows summary results on 51 Price Return European Stock Indices from October 1992 to October 2010. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	Mean	Std. Dev.	α_1	p-value	Notes:
Bas Mater EZ	141	0,53%	6,81%	0,02	0,112	
Cns Goods EZ	216	0,53%	5,50%	0,02	0,024	
Cns Svcs EZ	216	0,32%	5,48%	0,02	0,040	
Fincl EZ	141	-0,35%	7,66%	0,01	0,318	
Indus EZ	141	0,26%	6,63%	0,03	0,013	
Aut&Prt EZ	216	0,57%	7,94%	0,02	0,117	
Banks EZ	216	0,29%	7,36%	0,02	0,063	NWP
Bas Res EZ	216	0,51%	8,16%	0,02	0,076	
Chem EZ	216	0,81%	6,02%	0,02	0,018	
Cns&Mat EZ	216	0,47%	6,06%	0,03	0,001	
Fin Svcs EZ	216	0,44%	6,25%	0,02	0,011	NWP
Fd&Bvr EZ	216	0,51%	4,48%	0,01	0,031	
Hea Care EZ	216	0,61%	4,66%	0,01	0,336	
Indus Gd EZ	216	0,73%	6,61%	0,03	0,002	
Insur EZ	216	0,21%	8,05%	0,02	0,154	
Media EZ	216	0,19%	6,96%	0,02	0,024	
Oil&Gas EZ	216	0,53%	5,22%	0,01	0,088	
Pr&Ho Gd EZ	216	0,56%	6,12%	0,02	0,014	
Retail EZ	216	0,45%	5,53%	0,01	0,214	
Tech EZ	216	0,41%	9,16%	0,02	0,113	
Telecom EZ	216	0,80%	7,60%	0,02	0,090	
Trv&Lsr EZ	216	0,37%	6,93%	0,02	0,019	WP
Util EZ	216	0,60%	5,07%	0,02	0,024	
Growth EZ	160	0,14%	5,97%	0,02	0,035	
Growth Large EZ	160	0,10%	6,03%	0,02	0,052	
Growth Mid EZ	160	0,21%	6,16%	0,02	0,021	NWP
Growth Small EZ	160	0,36%	6,89%	0,02	0,042	NWP
Value EZ	160	0,09%	6,14%	0,02	0,043	
Value Large EZ	160	0,00%	6,34%	0,02	0,053	
Value Mid EZ	160	0,43%	5,91%	0,02	0,031	NWP
Value Small EZ	160	0,23%	6,03%	0,02	0,015	NWP
Large EZ	131	-0,30%	5,91%	0,01	0,227	
Mid EZ	131	0,12%	5,77%	0,02	0,126	
Small EZ	131	0,33%	6,06%	0,02	0,056	

Bas Mater N	216	0,60%	7,64%	0,02	0,085	
Cns Goods N	216	0,70%	5,88%	0,02	0,014	
Cns Svcs N	216	1,40%	7,10%	0,02	0,051	WP
Fincl N	216	1,01%	7,40%	0,02	0,144	NWP
Indus N	216	1,54%	7,53%	0,02	0,051	NWP
Banks N	216	1,06%	7,83%	0,01	0,254	NWP
Bas Res N	216	0,54%	8,22%	0,02	0,103	
Fin Svcs N	216	1,26%	7,16%	0,02	0,097	
Hea Care N	216	1,38%	5,52%	0,01	0,345	
Indus Gd N	216	1,59%	7,64%	0,02	0,052	NWP
Media N	216	0,73%	11,99%	0,04	0,012	
Pr&Ho Gd N	216	0,80%	7,23%	0,03	0,009	
Tech N	216	0,78%	11,66%	0,01	0,565	
Telecom N	195	0,72%	9,27%	0,01	0,548	NWP
Large N	131	-0,40%	8,32%	0,02	0,205	
Mid N	131	0,45%	7,12%	0,02	0,134	
Small N	129	0,38%	6,64%	0,02	0,216	NWP

Benchm Eur 1	216	0,48%	4,73%	0,01	0,055	NWP
Benchm Eur 2	216	0,47%	4,70%	0,01	0,049	NWP
Benchm EZ 1	119	-0,29%	5,84%	0,01	0,261	
Benchm Eur ex EZ 1	129	-0,24%	4,42%	0,00	0,788	NWP
Benchm Eur ex EZ 2	119	-0,20%	4,49%	0,00	0,624	NWP
Benchm N 1	129	-0,33%	7,46%	0,02	0,249	
Benchm N 2	119	-0,18%	7,36%	0,01	0,383	NWP
Blue-Chip N	216	1,01%	6,41%	0,02	0,081	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A12 – Statistical significance in the "Before Bubble Period": Total Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A12 shows summary results on 51 Total Return European Stock Indices from October 1992 to August 2001. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column five contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	α_1	p-value	Notes:
Bas Mater EZ	31	0,03	0,295	
Cns Goods EZ	106	0,03	0,010	
Cns Svcs EZ	106	0,02	0,079	
Fincl EZ	31	0,00	0,856	
Indus EZ	31	0,03	0,141	WP
Aut&Prt EZ	106	0,04	0,008	
Banks EZ	106	0,02	0,164	
Bas Res EZ	106	0,02	0,056	
Chem EZ	106	0,02	0,062	
Cns&Mat EZ	106	0,02	0,040	
Fin Svcs EZ	106	0,02	0,061	NWP
Fd&Bvr EZ	106	0,02	0,081	
Hea Care EZ	106	0,00	0,898	
Indus Gd EZ	106	0,03	0,012	
Insur EZ	106	0,01	0,189	
Media EZ	106	0,03	0,046	WP
Oil&Gas EZ	106	0,01	0,237	
Pr&Ho Gd EZ	106	0,02	0,044	
Retail EZ	106	0,01	0,380	
Tech EZ	106	0,03	0,047	
Telecom EZ	106	0,04	0,012	
Trv&Lsr EZ	106	0,02	0,069	WP
Util EZ	106	0,02	0,063	
Growth EZ	50	0,04	0,019	
Growth Large EZ	50	0,05	0,018	
Growth Mid EZ	50	0,03	0,050	
Growth Small EZ	50	0,04	0,048	
Value EZ	50	0,03	0,085	
Value Large EZ	50	0,03	0,099	
Value Mid EZ	50	0,02	0,081	
Value Small EZ	50	0,03	0,024	
Large EZ	31	0,02	0,213	WP
Mid EZ	31	0,02	0,368	WP
Small EZ	31	0,03	0,114	WP

Bas Mater N	106	0,02	0,075	
Cns Goods N	106	0,02	0,083	
Cns Svcs N	106	0,02	0,196	WP
Fincl N	106	0,01	0,347	
Indus N	106	0,02	0,093	
Banks N	106	0,01	0,525	
Bas Res N	106	0,03	0,070	
Fin Svcs N	106	0,01	0,504	
Hea Care N	106	0,01	0,555	
Indus Gd N	106	0,03	0,090	
Media N	106	0,07	0,003	NWP
Pr&Ho Gd N	106	0,03	0,028	NWP
Tech N	106	0,02	0,501	
Telecom N	85	0,03	0,278	NWP
Large N	31	0,06	0,183	
Mid N	31	0,02	0,378	WP
Small N	31	0,02	0,177	WP

Benchm Eur 1	106	0,02	0,026	
Benchm Eur 2	9	0,02	0,469	
Benchm EZ 1	106	0,02	0,015	
Benchm EZ 2	9	0,03	0,384	
Benchm Eur ex EZ 1	31	0,01	0,359	WP
Benchm Eur ex EZ 2	9	0,01	0,606	
Benchm N 1	31	0,05	0,164	
Benchm N 2	9	0,04	0,582	
Blue-Chip Eur	106	0,02	0,053	
Blue-Chip EZ	106	0,02	0,017	
Blue-Chip N	31	0,03	0,205	WP

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A13 – Statistical significance in the "Before Bubble Period": Price Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A13 shows summary results on 51 Price Return European Stock Indices from October 1992 to August 2001. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column five contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	α_1	p-value	Notes:
Bas Mater EZ	31	0,03	0,313	
Cns Goods EZ	106	0,03	0,006	
Cns Svcs EZ	106	0,02	0,051	
Fincl EZ	31	0,00	0,782	
Indus EZ	31	0,04	0,132	WP
Aut&Prt EZ	106	0,04	0,005	
Banks EZ	106	0,02	0,093	
Bas Res EZ	106	0,02	0,064	
Chem EZ	106	0,02	0,017	NWP
Cns&Mat EZ	106	0,02	0,017	
Fin Svcs EZ	106	0,03	0,028	NWP
Fd&Bvr EZ	106	0,02	0,052	
Hea Care EZ	106	0,00	0,704	
Indus Gd EZ	106	0,03	0,007	
Insur EZ	106	0,02	0,130	
Media EZ	106	0,03	0,035	WP
Oil&Gas EZ	106	0,02	0,100	
Pr&Ho Gd EZ	106	0,02	0,032	
Retail EZ	106	0,01	0,292	
Tech EZ	106	0,03	0,051	
Telecom EZ	106	0,05	0,007	
Trv&Lsr EZ	106	0,03	0,040	WP
Util EZ	106	0,02	0,032	
Growth EZ	50	0,04	0,016	
Growth Large EZ	50	0,05	0,015	
Growth Mid EZ	50	0,03	0,047	WP
Growth Small EZ	50	0,04	0,041	
Value EZ	50	0,03	0,065	
Value Large EZ	50	0,03	0,076	
Value Mid EZ	50	0,02	0,067	
Value Small EZ	50	0,03	0,016	
Large EZ	21	0,03	0,227	WP
Mid EZ	21	0,01	0,550	WP
Small EZ	21	0,03	0,221	WP

Bas Mater N	106	0,02	0,097	
Cns Goods N	106	0,02	0,101	
Cns Svcs N	106	0,02	0,210	WP
Fincl N	106	0,01	0,461	
Indus N	106	0,02	0,101	
Banks N	106	0,01	0,712	
Bas Res N	106	0,03	0,093	
Fin Svcs N	106	0,01	0,681	
Hea Care N	106	0,01	0,568	
Indus Gd N	106	0,02	0,098	
Media N	106	0,07	0,004	NWP
Pr&Ho Gd N	106	0,03	0,026	NWP
Tech N	106	0,02	0,492	
Telecom N	85	0,03	0,306	NWP
Large N	21	0,09	0,106	WP
Mid N	21	0,02	0,549	
Small N	19	0,01	0,662	NWP

Benchm Eur 1	106	0,02	0,019	
Benchm Eur 2	106	0,02	0,014	
Benchm EZ 1	9	0,03	0,353	
Benchm Eur ex EZ 1	19	-0,01	0,762	Neg. α_1
Benchm Eur ex EZ 2	9	0,01	0,609	
Benchm N 1	19	0,04	0,329	
Benchm N 2	9	0,04	0,594	
Blue-Chip N	106	0,02	0,176	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A14 – Statistical significance in the "After Bubble Period": Total Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A14 shows summary results on 51 Total Return European Stock Indices from September 2001 to October 2010. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column five contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	α_1	p-value	Notes:
Bas Mater EZ	110	0,02	0,212	
Cns Goods EZ	110	0,01	0,575	
Cns Svcs EZ	110	0,01	0,372	
Fincl EZ	110	0,01	0,394	
Indus EZ	110	0,02	0,053	
Aut&Prt EZ	110	0,00	0,909	Neg. α_1
Banks EZ	110	0,01	0,337	NWP
Bas Res EZ	110	0,02	0,344	
Chem EZ	110	0,02	0,169	
Cns&Mat EZ	110	0,03	0,028	
Fin Svcs EZ	110	0,02	0,169	NWP
Fd&Bvr EZ	110	0,01	0,326	
Hea Care EZ	110	0,01	0,426	
Indus Gd EZ	110	0,02	0,092	
Insur EZ	110	0,01	0,477	
Media EZ	110	0,01	0,365	
Oil&Gas EZ	110	0,01	0,580	
Pr&Ho Gd EZ	110	0,02	0,177	
Retail EZ	110	0,01	0,548	
Tech EZ	110	0,01	0,762	
Telecom EZ	110	-0,01	0,260	Neg. α_1
Trv&Lsr EZ	110	0,02	0,223	
Util EZ	110	0,01	0,349	
Growth EZ	110	0,01	0,457	
Growth Large EZ	110	0,01	0,636	
Growth Mid EZ	110	0,02	0,107	WP
Growth Small EZ	110	0,02	0,194	WP
Value EZ	110	0,01	0,263	
Value Large EZ	110	0,01	0,303	
Value Mid EZ	110	0,02	0,147	NWP
Value Small EZ	110	0,02	0,102	NWP
Large EZ	110	0,01	0,482	
Mid EZ	110	0,02	0,205	NWP
Small EZ	110	0,02	0,136	NWP

Bas Mater N	110	0,02	0,320	
Cns Goods N	110	0,02	0,051	NWP
Cns Svcs N	110	0,02	0,097	
Fincl N	110	0,02	0,108	NWP
Indus N	110	0,02	0,160	
Banks N	110	0,02	0,143	NWP
Bas Res N	110	0,01	0,422	
Fin Svcs N	110	0,03	0,037	
Hea Care N	110	0,01	0,345	
Indus Gd N	110	0,02	0,180	
Media N	110	0,01	0,511	NWP
Pr&Ho Gd N	110	0,03	0,032	
Tech N	110	0,00	0,954	
Telecom N	110	0,00	0,773	Neg. α_1
Large N	110	0,01	0,575	
Mid N	110	0,02	0,123	
Small N	110	0,02	0,182	NWP

Benchm Eur 1	110	0,01	0,493	NWP
Benchm Eur 2	110	0,01	0,474	NWP
Benchm EZ 1	110	0,01	0,400	
Benchm EZ 2	110	0,01	0,383	
Benchm Eur ex EZ 1	110	0,004	0,640	NWP
Benchm Eur ex EZ 2	110	0,005	0,611	NWP
Benchm N 1	110	0,01	0,377	
Benchm N 2	110	0,01	0,335	
Blue-Chip Eur	110	0,003	0,766	
Blue-Chip EZ	110	0,007	0,568	
Blue-Chip N	110	0,02	0,212	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A15 – Statistical significance in the "After Bubble Period": Price Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A15 shows summary results on 51 Price Return European Stock Indices from September 2001 to October 2010. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column five contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	α_1	p-value	Notes:
Bas Mater EZ	110	0,02	0,212	
Cns Goods EZ	110	0,01	0,578	
Cns Svcs EZ	110	0,01	0,313	
Fincl EZ	110	0,02	0,338	
Indus EZ	110	0,03	0,048	
Aut&Prt EZ	110	0,00	0,876	Neg. α_1
Banks EZ	110	0,02	0,274	NWP
Bas Res EZ	110	0,02	0,385	
Chem EZ	110	0,02	0,155	
Cns&Mat EZ	110	0,03	0,020	
Fin Svcs EZ	110	0,02	0,144	NWP
Fd&Bvr EZ	110	0,01	0,276	
Hea Care EZ	110	0,01	0,358	
Indus Gd EZ	110	0,02	0,093	
Insur EZ	110	0,01	0,449	
Media EZ	110	0,01	0,309	
Oil&Gas EZ	110	0,01	0,451	
Pr&Ho Gd EZ	110	0,02	0,186	
Retail EZ	110	0,01	0,484	
Tech EZ	110	0,01	0,763	
Telecom EZ	110	-0,01	0,344	Neg. α_1
Trv&Lsr EZ	110	0,02	0,190	
Util EZ	110	0,01	0,269	
Growth EZ	110	0,01	0,415	
Growth Large EZ	110	0,01	0,584	
Growth Mid EZ	110	0,02	0,094	WP
Growth Small EZ	110	0,02	0,178	WP
Value EZ	110	0,02	0,215	
Value Large EZ	110	0,01	0,245	
Value Mid EZ	110	0,02	0,136	NWP
Value Small EZ	110	0,02	0,108	NWP
Large EZ	110	0,01	0,418	
Mid EZ	110	0,02	0,190	NWP
Small EZ	110	0,02	0,127	NWP

Bas Mater N	110	0,01	0,415	
Cns Goods N	110	0,02	0,079	NWP
Cns Svcs N	110	0,02	0,120	
Fincl N	110	0,02	0,175	NWP
Indus N	110	0,02	0,208	
Banks N	110	0,02	0,222	NWP
Bas Res N	110	0,01	0,550	
Fin Svcs N	110	0,03	0,062	
Hea Care N	110	0,01	0,459	
Indus Gd N	110	0,02	0,226	
Media N	110	0,01	0,576	NWP
Pr&Ho Gd N	110	0,02	0,056	
Tech N	110	0,00	0,996	
Telecom N	110	-0,01	0,684	Neg. α_1
Large N	110	0,01	0,669	
Mid N	110	0,02	0,162	
Small N	110	0,02	0,238	NWP

Benchm Eur 1	110	0,01	0,486	NWP
Benchm Eur 2	110	0,01	0,467	NWP
Benchm EZ 1	110	0,01	0,333	
Benchm Eur ex EZ 1	110	0,00	0,699	NWP
Benchm Eur ex EZ 2	110	0,00	0,665	NWP
Benchm N 1	110	0,01	0,459	
Benchm N 2	110	0,01	0,415	
Blue-Chip N	110	0,01	0,279	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A16 – Global results of the Halloween Effect statistical significance

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with \ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A16 shows global results of the Halloween effect statistical significance based on 102 European Stock Indices. The percentage of statistical significant Indices is the coefficient between the number of significant Indices with the total number of Indices. It is also exhibited the number of negative estimated coefficients. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors, except for the 6 month basis estimated coefficients.

	α_1 – "All Period"			**α_1 – "Before Bubble Period"**			**α_1 – "After Bubble Period"**		
Level of Significance	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**
	Total Return Indices								
Nº. of Significant Indices	**4**	**22**	**34**	**2**	**14**	**30**	**0**	**3**	**7**
% of Significant Indices	8	43	67	4	27	59	0	6	14
# negative estimated coef.		-			-			3	
	Price Return Indices								
Nº. of Significant Indices	**3**	**21**	**33**	**5**	**18**	**29**	**0**	**2**	**7**
% of Significant Indices	6	41	65	10	35	57	0	4	14
# negative estimated coef.		-			-			3	

Table A17 – Statistical significance by classification: Total Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A17 shows the percentage of Indices by classification with a statistical significant Halloween effect based on 51 Total Return European Stock Indices. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors, except for the 6 month basis estimated coefficients.

	"All Period" – 1%		**"Before Bubble Period" – 1%**		**"After Bubble Period" – 1%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	**Eurozone**	**Nordic**	
Industry	0	12,5	0	0	0	0	Industry
Supersectors	11,1	11,1	5,6	11,1	0	0	Supersectors
Style	0	-	0	-	0	-	Style
Size	0	0	0	0	0	0	Size
	"All Period" – 5%		**"Before Bubble Period" – 5%**		**"After Bubble Period" – 5%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	**Eurozone**	**Nordic**	
Industry	20	37,5	30	0	0	0	Industry
Supersectors	38,9	44,4	38,9	22,2	5,6	22,2	Supersectors
Style	62,5	-	50	-	0	-	Style
Size	33,3	0	0	0	0	0	Size
	"All Period" – 10%		**"Before Bubble Period" – 10%**		**"After Bubble Period" – 10%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	**Eurozone**	**Nordic**	
Industry	40	62,5	50	37,5	10	25	Industry
Supersectors	55,6	55,6	72,2	44,4	11,1	22,2	Supersectors
Style	100	-	100	-	0	-	Style
Size	33,3	66,7	0	0	0	0	Size

Table A18 – Statistical significance by classification: Price Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A18 shows the percentage of Indices by classification with a statistical significant Halloween effect based on 51 Price Return European Stock Indices. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors, except for the 6 month basis estimated coefficients.

	"All Period" – 1%		**"Before Bubble Period" – 1%**		**"After Bubble Period" – 1%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	**Eurozone**	**Nordic**	
Industry	0	0	20	0	0	0	Industry
Supersectors	11,1	11,1	16,7	11,1	0	0	Supersectors
Style	0	-	0	-	0	-	Style
Size	0	0	0	0	0	0	Size
	"All Period" – 5%		**"Before Bubble Period" – 5%**		**"After Bubble Period" – 5%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	**Eurozone**	**Nordic**	
Industry	40	12,5	30	0	10	0	Industry
Supersectors	50	22,2	55,6	22,2	5,6	0	Supersectors
Style	75	-	62,5	-	0	-	Style
Size	0	0	0	0	0	0	Size
	"All Period" – 10%		**"Before Bubble Period" – 10%**		**"After Bubble Period" – 10%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	**Eurozone**	**Nordic**	
Industry	60	50	50	12,5	10	12,5	Industry
Supersectors	72,2	44,4	77,8	44,4	11,1	22,2	Supersectors
Style	100	-	100	-	12,5	-	Style
Size	33,3	0	0	0	0	0	Size

Table A19 – "Sector Analysis" of the Halloween Effect: Total Return Indices

Table A19 exhibits the regions and time periods where each one of the 51 Total Return European Stock Indices is statistically significant. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. The value 1 means that the Index is statistically significant and 0 the contrary. In addition, we report within each time period, the percentage of regions where the Index is statistically significant, depending on the regions in which the Index exists.

Analysis with 5% Level of Significance	"All Period"			"Before Bubble Period"			"After Bubble Period"		
	Euro	Nordic	%	Euro	Nordic	%	Euro	Nordic	%
Industry									
Basic Materials	0	0	**0**	0	0	**0**	0	0	**0**
Consumer Goods	1	1	**100**	1	0	**50**	0	0	**0**
Consumer Services	0	1	**50**	0	0	**0**	0	0	**0**
Financials	0	0	**0**	0	0	**0**	0	0	**0**
Industrials	1	1	**100**	0	0	**0**	0	0	**0**
Supersector									
Automobiles & Parts	0		**0**	1		**100**	0		**0**
Banks	0	0	**0**	0	0	**0**	0	0	**0**
Basic Resources	0	0	**0**	0	0	**0**	0	0	**0**
Chemicals	1		**100**	0		**0**	0		**0**
Construction & Materials	1		**100**	1		**100**	1		**100**
Financial Services	1	1	**100**	0	0	**0**	0	1	**50**
Food & Beverage	0		**0**	0		**0**	0		**0**
Health Care**	0	0	**0**	0	0	**0**	0	0	**0**
Industrial Goods &	1	1	**100**	1	0	**5**	0	0	**0**
Insurance	0		**0**	0		**0**	0		**0**
Media	1	1	**100**	1	1	**100**	0	0	**0**
Oil & Gas*	0		**0**	0		**0**	0		**0**
Personal & Household	1	1	**100**	1	1	**100**	0	1	**50**
Retail	0		**0**	0		**0**	0		**0**
Technology**	0	0	**0**	1	0	**50**	0	0	**0**
Telecommunications**	0	0	**0**	1	0	**50**	0	0	**0**
Travel & Leisure	1		**100**	0		**0**	0		**0**
Utilities*	0		**0**	0		**0**	0		**0**
Style									
Growth	1		**100**	1		**100**	0		**0**
Growth Large	0		**0**	1		**100**	0		**0**
Growth Mid	1		**100**	0		**0**	0		**0**
Growth Small	1		**100**	1		**100**	0		**0**
Value	0		**0**	0		**0**	0		**0**
Value Large	0		**0**	0		**0**	0		**0**
Value Mid	1		**100**	0		**0**	0		**0**
Value Small	1		**100**	1		**100**	0		**0**
Size									
Large	0	0	**0**	0	0	**0**	0	0	**0**
Mid	0	0	**0**	0	0	**0**	0	0	**0**
Small	1	0	**50**	0	0	**0**	0	0	**0**

Represent Indices which are statistically significant both to Eurozone and Nordic regions, on the both periods: “All Period” and “Before Bubble Period”.

Represent Indices that ARE NOT statistically significant both to Eurozone and Nordic regions, on the both periods: “All Period” and “Before Bubble Period”.

Represent Indices that only exist for the Eurozone and are statistically significant for the two periods: “All Period” and “Before Bubble Period”.

Represent Indices that only exist for the Eurozone and ARE NOT statistically significant for the two periods: “All Period” and “Before Bubble Period”.

Represent an Index that in a specific period is statistically significant in the Eurozone and Nordic regions.

AAA Symbolizes an Index that in a specific period is statistically significant in every region in where the Index is displayed.

Table A20 – "Sector Analysis" of the Halloween Effect: Price Return Indices

Table A20 exhibits the regions and time periods where each one of the 51 Price Return European Stock Indices is statistically significant. The estimated coefficients are based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. The value 1 means that the Index is statistically significant and 0 the contrary. In addition, we report within each time period, the percentage of regions where the Index is statistically significant, depending on the regions in which the Index exists.

Analysis with 5% Level of Significance	"All Period"			"Before Bubble Period"			"After Bubble Period"		
	Euro	Nordic	%	Euro	Nordic	%	Euro	Nordic	%
Industry									
Basic Materials	0	0	**0**	0	0	**0**	0	0	**0**
Consumer Goods	1	1	**100**	1	0	**50**	0	0	**0**
Consumer Services	1	0	**50**	0	0	**0**	0	0	**0**
Financials	0	0	**0**	0	0	**0**	0	0	**0**
Industrials	1	0	**50**	0	0	**0**	1	0	**50**
Supersector									
Automobiles & Parts	0		**0**	1		**100**	0		**0**
Banks	0	0	**0**	0	0	**0**	0	0	**0**
Basic Resources	0	0	**0**	0	0	**0**	0	0	**0**
Chemicals	1		**100**	1		**100**	0		**0**
Construction & Materials	1		**100**	1		**100**	1		**100**
Financial Services	1	0	**50**	1	0	**50**	0	0	**0**
Food & Beverage	1		**100**	0		**0**	0		**0**
Health Care**	0	0	**0**	0	0	**0**	0	0	**0**
Industrial Goods &	1	0	**50**	1	0	**50**	0	0	**0**
Insurance	0		**0**	0		**0**	0		**0**
Media	1	1	**100**	1	1	**100**	0	0	**0**
Oil & Gas*	0		**0**	0		**0**	0		**0**
Personal & Household	1	1	**100**	1	1	**100**	0	0	**0**
Retail	0		**0**	0		**0**	0		**0**
Technology**	0	0	**0**	0	0	**0**	0	0	**0**
Telecommunications**	0	0	**0**	1	0	**50**	0	0	**0**
Travel & Leisure	1		**100**	1		**100**	0		**0**
Utilities*	1		**100**	1		**100**	0		**0**
Style									
TMI Growth	1		**100**	1		**100**	0		**0**
Growth Large	0		**0**	1		**100**	0		**0**
Growth Mid	1		**100**	1		**100**	0		**0**
Growth Small	1		**100**	1		**100**	0		**0**
TMI Value	1		**100**	0		**0**	0		**0**
Value Large	0		**0**	0		**0**	0		**0**
Value Mid	1		**100**	0		**0**	0		**0**
Value Small	1		**100**	1		**100**	0		**0**
Size									
Large	0	0	**0**	0	0	**0**	0	0	**0**
Mid	0	0	**0**	0	0	**0**	0	0	**0**
Small	0	0	**0**	0	0	**0**	0	0	**0**

Represent Indices which are statistically significant both to Eurozone and Nordic regions, on the both periods: “All Period” and “Before Bubble Period”.

Represent Indices that ARE NOT statistically significant both to Eurozone and Nordic regions, on the both periods: “All Period” and “Before Bubble Period”.

Represent Indices that only exist for the Eurozone and are statistically significant for the two periods: “All Period” and “Before Bubble Period”.

Represent Indices that only exist for the Eurozone and ARE NOT statistically significant for the two periods: “All Period” and “Before Bubble Period”.

Represent an Index that in a specific period is statistically significant in the Eurozone and Nordic regions.

AAA Symbolizes an Index that in a specific period is statistically significant in every region in where the Index is displayed.

Table A21 – Robustness of the Halloween Effect

Table A21 shows the 102 European Stock Indices sorted in descending order by the percentage of years that the winter months outperformed the remaining six months of the year from October 1992 to October 2010. In addition, it is reported the related p-values from the regression (1). The fields corresponding to the B&B Indices are filled with a grey color.

"All Period"					
Total Return Indices			**Price Return Indices**		
Index	**%**	**p-value**	**Index**	**%**	**p-value**
Cns&Mat EZ	83,33%	0,003	Cns&Mat	88,89%	0,001
Pr&Ho Gd EZ	83,33%	0,017	Pr&Ho Gd	83,33%	0,014
Cns Svcs EZ	77,78%	0,065	Cns Svcs EZ	77,78%	0,040
Media N	77,78%	0,011	Fd&Bvr EZ	77,78%	0,031
Growth EZ	76,92%	0,043	Trv&Lsr EZ	77,78%	0,019
Growth Large EZ	76,92%	0,064	Media N	77,78%	0,012
Growth Mid EZ	76,92%	0,025	Growth EZ	76,92%	0,035
Growth Small EZ	76,92%	0,049	Growth	76,92%	0,052
Bas Mater EZ	72,73%	0,108	Growth Mid	76,92%	0,021
Indus EZ	72,73%	0,016	Growth	76,92%	0,042
Large EZ	72,73%	0,234	Bas Mater	72,73%	0,112
Mid EZ	72,73%	0,104	Indus EZ	72,73%	0,013
Small EZ	72,73%	0,042	Chem EZ	72,22%	0,018
Mid N	72,73%	0,082	Fin Svcs EZ	72,22%	0,011
Small N	72,73%	0,087	Hea Care EZ	72,22%	0,336
Benchm Eur ex EZ 1	72,73%	0,435	Indus Gd EZ	72,22%	0,002
Benchm N 1	72,73%	0,140	Insur EZ	72,22%	0,154
Blue-Chip N	72,73%	0,080	Media EZ	72,22%	0,024
Chem EZ	72,22%	0,022	Oil&Gas EZ	72,22%	0,088
Fin Svcs EZ	72,22%	0,023	Retail EZ	72,22%	0,214
Fd&Bvr EZ	72,22%	0,052	Bas Mater N	72,22%	0,085
Indus Gd EZ	72,22%	0,003	Cns Goods	72,22%	0,014
Media EZ	72,22%	0,036	Bas Res N	72,22%	0,103
Retail EZ	72,22%	0,292	Fin Svcs N	72,22%	0,097
Bas Mater N	72,22%	0,052	Pr&Ho Gd	72,22%	0,009
Cns Goods N	72,22%	0,008	Benchm Eur	72,22%	0,055
Fincl N	72,22%	0,076	Benchm Eur	72,22%	0,049
Banks N	72,22%	0,137	Large EZ	70,00%	0,227
Bas Res N	72,22%	0,062	Mid EZ	70,00%	0,126
Fin Svcs N	72,22%	0,046	Small EZ	70,00%	0,056
Pr&Ho Gd N	72,22%	0,006	Mid N	70,00%	0,134
Benchm Eur 1	72,22%	0,067	Small N	70,00%	0,216
Benchm EZ 1	72,22%	0,027	Benchm Eur	70,00%	0,788
Blue-Chip Eur	72,22%	0,148	Value EZ	69,23%	0,043
Blue-Chip EZ	72,22%	0,047	Value Large	69,23%	0,053
Value EZ	69,23%	0,063	Value Mid	69,23%	0,031
Value Large EZ	69,23%	0,078	Value Small	69,23%	0,015
Value Mid EZ	69,23%	0,037	Cns Goods	66,67%	0,024

Value Small EZ	69,23%	0,016
Insur EZ	66,67%	0,198
Oil&Gas EZ	66,67%	0,212
Trv&Lsr EZ	66,67%	0,034
Hea Care N	66,67%	0,272
Benchm Eur 2	66,67%	0,422
Benchm EZ 2	66,67%	0,309
Benchm Eur ex EZ 2	66,67%	0,574
Benchm N 2	66,67%	0,310
Fincl EZ	63,64%	0,383
Large N	63,64%	0,211
Cns Goods EZ	61,11%	0,032
Bas Res EZ	61,11%	0,067
Hea Care EZ	61,11%	0,481
Tech EZ	61,11%	0,109
Util EZ	61,11%	0,052
Cns Svcs N	61,11%	0,040
Indus N	61,11%	0,037
Indus Gd N	61,11%	0,039
Aut&Prt EZ	55,56%	0,133
Banks EZ	55,56%	0,114
Telecom EZ	50,00%	0,142
Tech N	44,44%	0,552
Telecom N	31,25%	0,475

Benchm EZ	66,67%	0,261
Benchm Eur	66,67%	0,624
Blue-Chip N	66,67%	0,081
Fincl EZ	63,64%	0,318
Bas Res EZ	61,11%	0,076
Tech EZ	61,11%	0,113
Util EZ	61,11%	0,024
Cns Svcs N	61,11%	0,051
Fincl N	61,11%	0,144
Indus N	61,11%	0,051
Banks N	61,11%	0,254
Hea Care N	61,11%	0,345
Indus Gd N	61,11%	0,052
Large N	60,00%	0,205
Benchm N 1	60,00%	0,249
Aut&Prt EZ	55,56%	0,117
Banks EZ	55,56%	0,063
Benchm N 2	55,56%	0,383
Telecom EZ	50,00%	0,090
Tech N	44,44%	0,565
Telecom N	31,25%	0,548

Table A22 – Ranking of the Months according to the Average Rates of Return

Table A22 exhibits the months sorted in descending order by return (monthly continuously-compounded average returns) based on 102 European Stock Indices from October 1992 to October 2010. In addition, it is reported the related monthly average rate of return on the right side of each month.

	Total Return Indices		Price Return Indices	
1º	April	3,91%	April	3,33%
2º	December	2,11%	December	2,07%
3º	November	2,03%	November	1,93%
4º	March	1,27%	July	1,10%
5º	July	1,20%	October	0,97%
6º	October	1,02%	March	0,96%
7º	January	0,37%	February	0,33%
8º	February	0,34%	January	0,33%
9º	May	0,16%	May	-0,42%
10º	August	-0,49%	August	-0,54%
11º	June	-0,65%	June	-0,94%
12º	September	-2,21%	September	-2,26%

Table A23 – Difference between average returns: Total Return Indices

Table A23 shows differences between average returns in each specific month and the monthly average returns over all months for every one of the 51 Total Return European Stock Indices from October 1992 to October 2010. In column 14 it is presented the monthly average return of the respective Index.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Index Avg.
Bas Mater EZ	-4,4%	-1,2%	1,0%	4,5%	-0,7%	-0,4%	0,6%	-1,2%	-4,4%	0,5%	2,5%	3,1%	0,7%
Cns Goods EZ	-0,9%	-0,2%	1,5%	2,5%	-0,7%	-0,4%	0,5%	-1,9%	-3,1%	0,3%	-0,4%	1,9%	0,7%
Cns Svcs EZ	-0,7%	-0,3%	-0,1%	1,1%	-0,4%	-1,8%	-0,3%	-0,5%	-2,9%	0,2%	1,0%	1,5%	0,5%
Fincl EZ	-4,3%	-3,3%	1,0%	4,0%	-2,0%	-2,0%	-0,2%	0,2%	-4,6%	-0,1%	-0,4%	0,8%	-0,1%
Indus EZ	-2,0%	-0,5%	-0,3%	3,8%	-0,8%	-2,4%	-0,4%	-0,7%	-4,6%	-1,0%	2,9%	2,3%	0,4%
Aut&Prt EZ	0,1%	-0,5%	1,9%	4,1%	-1,0%	-0,4%	2,0%	-2,8%	-4,2%	1,3%	-2,2%	1,2%	0,7%
Banks EZ	-1,6%	-1,3%	0,9%	3,3%	-0,4%	-1,6%	1,8%	-1,2%	-4,4%	-0,1%	0,9%	1,1%	0,5%
Bas Res EZ	-0,6%	0,2%	0,4%	3,2%	-0,4%	-0,9%	1,6%	-1,1%	-5,2%	-0,4%	1,6%	1,2%	0,7%
Chem EZ	-2,7%	-0,1%	1,2%	3,9%	-0,4%	0,3%	1,1%	-2,2%	-3,1%	0,4%	1,9%	3,2%	1,0%
Cns&Mat EZ	-0,1%	0,1%	1,5%	2,3%	-0,4%	-1,8%	0,2%	-0,8%	-4,2%	-0,9%	1,2%	1,8%	0,7%
Fin Svcs EZ	-1,0%	-0,8%	1,6%	2,9%	0,0%	-2,1%	0,3%	-1,9%	-3,7%	0,6%	1,5%	1,7%	0,7%
Fd&Bvr EZ	-1,7%	0,3%	1,4%	0,9%	-0,1%	-0,6%	-0,6%	-0,6%	-1,6%	-0,4%	0,6%	1,7%	0,7%
Hea Care EZ	-0,7%	-1,4%	1,0%	1,2%	1,3%	-0,5%	-0,9%	-1,2%	-0,4%	0,3%	0,2%	1,0%	0,8%
Indus Gd EZ	0,5%	0,5%	-0,3%	2,8%	0,1%	-1,4%	1,2%	-1,9%	-4,0%	-1,0%	2,9%	2,4%	0,9%
Insur EZ	-2,8%	-1,7%	-0,5%	2,9%	-2,5%	-1,1%	1,8%	-1,6%	-3,8%	0,6%	1,6%	2,5%	0,4%
Media EZ	0,5%	0,1%	-1,9%	0,6%	-1,2%	-3,4%	0,0%	-1,1%	-3,2%	0,8%	2,0%	2,4%	0,4%
Oil&Gas EZ	-2,3%	-0,1%	1,9%	2,2%	1,7%	0,1%	-0,7%	-1,4%	-1,3%	-0,9%	-0,1%	1,3%	0,8%
Pr&Ho Gd EZ	-1,3%	-0,6%	1,4%	1,9%	-0,8%	-0,2%	0,4%	-1,9%	-3,4%	-0,4%	1,2%	2,9%	0,7%
Retail EZ	-1,5%	-0,6%	1,0%	1,3%	0,6%	-0,9%	-1,0%	0,3%	-2,0%	-0,4%	0,4%	0,8%	0,6%
Tech EZ	1,1%	-2,2%	1,3%	2,1%	-1,8%	-1,4%	0,0%	-1,8%	-4,9%	2,5%	2,0%	0,3%	0,5%
Telecom EZ	3,0%	-1,9%	-1,5%	1,6%	-1,3%	-1,0%	1,2%	-1,4%	-2,6%	2,1%	2,7%	2,3%	1,0%
Trv&Lsr EZ	-0,9%	-0,2%	1,3%	1,5%	-1,7%	-1,1%	2,1%	-1,6%	-6,1%	1,1%	1,0%	2,0%	0,5%
Util EZ	0,1%	-1,2%	-0,8%	1,8%	0,6%	-0,6%	-0,8%	-0,1%	-2,6%	0,0%	1,9%	2,9%	0,9%
Growth EZ	-1,4%	-1,3%	0,7%	1,7%	-0,7%	-1,8%	-0,8%	-2,7%	-3,2%	0,7%	1,5%	1,7%	0,3%
Growth Large EZ	-1,7%	-1,6%	0,7%	1,4%	-0,8%	-1,7%	-0,7%	-3,0%	-3,0%	1,0%	1,7%	1,9%	0,2%

Growth Mid EZ	-0,2%	-0,1%	0,7%	2,3%	-0,3%	-2,3%	-0,9%	-1,3%	-3,9%	-0,7%	0,8%	1,0%	0,3%
Growth Small EZ	1,2%	-0,4%	0,8%	2,8%	-0,2%	-2,2%	-0,2%	-1,6%	-4,1%	-0,2%	0,5%	0,6%	0,5%
Value EZ	-2,7%	-1,5%	1,4%	3,4%	-0,4%	-1,7%	0,5%	-2,0%	-4,2%	-0,1%	0,7%	1,7%	0,3%
Value Large EZ	-3,2%	-1,7%	1,4%	3,4%	-0,5%	-1,6%	0,5%	-2,3%	-4,5%	0,2%	0,7%	1,7%	0,2%
Value Mid EZ	-0,6%	-1,0%	1,4%	3,5%	0,5%	-2,1%	0,4%	-1,0%	-3,1%	-1,2%	0,3%	1,8%	0,6%
Value Small EZ	-0,4%	-0,3%	2,2%	3,1%	-0,5%	-2,3%	0,1%	-0,7%	-3,5%	-1,7%	-0,1%	1,2%	0,5%
Large EZ	-3,4%	-2,2%	0,0%	2,6%	-1,3%	-1,9%	-1,1%	-0,6%	-4,0%	1,1%	0,7%	1,6%	0,0%
Mid EZ	-1,5%	-0,8%	0,0%	2,8%	-0,6%	-1,9%	-0,8%	0,5%	-3,7%	-0,5%	0,5%	1,1%	0,3%
Small EZ	0,2%	0,0%	0,4%	2,9%	-0,5%	-2,5%	-1,0%	0,6%	-3,3%	-0,6%	0,2%	1,0%	0,5%

Bas Mater N	-1,1%	0,1%	0,4%	6,1%	-1,1%	-2,0%	1,2%	-0,1%	-3,5%	-0,2%	0,9%	-0,1%	0,8%
Cns Goods N	0,6%	1,9%	0,0%	3,4%	0,0%	-1,8%	1,1%	-1,6%	-1,9%	-1,7%	0,4%	0,7%	0,9%
Cns Svcs N	4,5%	-0,3%	0,1%	4,5%	-1,4%	-0,8%	1,4%	-1,2%	0,4%	0,2%	2,0%	-0,3%	1,5%
Fincl N	0,5%	0,4%	-0,3%	5,1%	-1,1%	-1,6%	2,2%	-1,7%	-1,3%	0,6%	2,0%	0,5%	1,2%
Indus N	1,4%	1,6%	0,8%	6,0%	-0,5%	0,0%	1,6%	-1,7%	-1,5%	0,8%	0,7%	1,9%	1,7%
Banks N	-0,6%	0,4%	0,4%	5,9%	-1,2%	-0,9%	2,7%	-1,3%	-1,3%	0,3%	1,7%	0,1%	1,3%
Bas Res N	-1,8%	0,2%	0,4%	6,8%	-1,4%	-2,5%	1,4%	0,2%	-3,5%	-0,5%	1,2%	-0,4%	0,7%
Fin Svcs N	0,6%	1,7%	0,0%	4,1%	-0,9%	-0,5%	2,0%	-2,4%	-1,3%	1,4%	2,9%	0,9%	1,5%
Hea Care N	1,5%	1,4%	0,4%	0,5%	1,3%	0,3%	-0,4%	0,7%	-0,4%	0,5%	1,7%	1,4%	1,5%
Indus Gd N	1,6%	1,7%	0,9%	6,2%	-0,5%	0,2%	1,6%	-1,6%	-1,5%	0,8%	0,6%	1,8%	1,7%
Media N	4,9%	-2,7%	-0,6%	7,8%	-2,1%	-3,6%	-0,9%	-3,2%	-0,7%	-1,6%	2,5%	0,9%	0,8%
Pr&Ho Gd N	0,5%	3,1%	-1,3%	4,3%	-0,4%	-3,3%	1,6%	-1,6%	-3,2%	0,2%	2,7%	0,2%	1,0%
Tech N	1,3%	0,0%	0,4%	1,1%	0,5%	-1,7%	-2,2%	-0,8%	-1,6%	3,7%	3,0%	-2,2%	0,9%
Telecom N	1,4%	-4,4%	-1,4%	0,8%	-0,4%	-2,0%	1,5%	-1,3%	-2,9%	3,2%	3,7%	4,0%	0,9%
Large N	-2,4%	-2,2%	0,7%	3,7%	-2,9%	-2,5%	-2,2%	-0,7%	-3,1%	2,7%	2,3%	0,4%	0,2%
Mid N	-1,5%	0,0%	0,6%	4,8%	-1,0%	-1,8%	0,2%	-0,6%	-3,1%	-0,1%	0,8%	1,4%	0,7%
Small N	-0,9%	-0,1%	1,4%	4,0%	-0,3%	-2,6%	0,6%	0,0%	-3,2%	-0,8%	-0,1%	1,5%	0,7%

Table A24 – Difference between average returns: Price Return Indices

Table A24 shows differences between average returns in each specific month and the monthly average returns over all months for every one of the 51 Price Return European Stock Indices from October 1992 to October 2010. In column 14 it is presented the monthly average return of the respective Index.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Index Avg.
Bas Mater EZ	-4,3%	-1,0%	0,8%	3,9%	-1,4%	-0,3%	0,7%	-1,0%	-4,2%	0,6%	2,6%	3,2%	0,5%
Cns Goods EZ	-0,7%	-0,1%	1,6%	2,3%	-1,2%	-0,5%	0,6%	-1,7%	-3,0%	0,5%	-0,3%	2,0%	0,5%
Cns Svcs EZ	-0,6%	-0,1%	0,1%	0,9%	-0,9%	-2,0%	-0,4%	-0,4%	-2,8%	0,4%	1,1%	1,7%	0,3%
Fincl EZ	-4,2%	-3,2%	1,1%	3,7%	-2,9%	-2,0%	-0,1%	0,1%	-4,4%	0,0%	-0,3%	1,0%	-0,3%
Indus EZ	-2,1%	-0,4%	-0,2%	3,8%	-1,2%	-2,6%	-0,4%	-0,5%	-4,4%	-0,9%	3,1%	2,4%	0,3%
Aut&Prt EZ	0,3%	-0,3%	2,1%	3,6%	-1,5%	-0,5%	2,0%	-2,5%	-4,2%	1,5%	-2,0%	1,3%	0,6%
Banks EZ	-1,5%	-1,2%	1,0%	3,2%	-1,7%	-1,7%	1,9%	-1,2%	-4,3%	0,0%	0,9%	1,2%	0,3%
Bas Res EZ	-0,5%	0,5%	-0,7%	3,1%	-0,6%	-1,0%	1,5%	-0,9%	-5,0%	-0,2%	1,7%	1,4%	0,5%
Chem EZ	-2,6%	0,1%	1,4%	2,9%	-1,3%	0,2%	1,2%	-2,0%	-2,9%	0,5%	2,1%	3,4%	0,8%
Cns&Mat EZ	0,0%	0,3%	1,6%	2,4%	-0,7%	-2,5%	0,0%	-0,6%	-4,2%	-0,8%	1,4%	1,9%	0,5%
Fin Svcs EZ	-0,9%	-0,7%	1,8%	2,7%	-0,8%	-2,4%	0,2%	-1,8%	-3,7%	0,7%	1,6%	1,8%	0,4%
Fd&Bvr EZ	-1,6%	0,4%	1,6%	0,9%	-0,8%	-0,6%	-0,5%	-0,5%	-1,5%	-0,3%	0,5%	1,8%	0,5%
Hea Care EZ	-0,5%	-1,2%	0,7%	1,6%	0,9%	-1,0%	-0,8%	-1,1%	-0,1%	0,5%	0,4%	1,1%	0,6%
Indus Gd EZ	0,4%	0,6%	-0,3%	2,8%	-0,2%	-1,5%	1,0%	-1,7%	-3,9%	-0,9%	3,1%	2,6%	0,7%
Insur EZ	-2,6%	-1,5%	-0,3%	2,6%	-3,0%	-1,0%	1,8%	-1,6%	-3,7%	0,7%	1,7%	2,6%	0,2%
Media EZ	0,7%	0,3%	-1,8%	0,2%	-1,9%	-3,5%	-0,2%	-1,1%	-3,1%	1,0%	2,2%	2,5%	0,2%
Oil&Gas EZ	-2,2%	0,1%	2,0%	2,3%	0,7%	-0,3%	-0,8%	-1,2%	-1,5%	-0,8%	-0,2%	1,4%	0,5%
Pr&Ho Gd EZ	-1,1%	-0,4%	1,3%	1,9%	-0,9%	-0,4%	0,5%	-1,8%	-3,3%	-0,2%	1,4%	3,1%	0,6%
Retail EZ	-1,3%	-0,4%	1,2%	1,1%	0,3%	-1,1%	-1,1%	0,4%	-1,9%	-0,2%	0,6%	1,0%	0,4%
Tech EZ	1,3%	-2,2%	1,1%	2,1%	-2,0%	-1,4%	0,2%	-1,5%	-4,8%	2,7%	2,2%	0,5%	0,4%
Telecom EZ	3,2%	-1,8%	-1,4%	1,4%	-2,2%	-1,4%	1,2%	-1,2%	-2,6%	2,3%	2,7%	2,5%	0,8%
Trv&Lsr EZ	-0,8%	0,0%	1,4%	1,6%	-1,9%	-1,7%	2,1%	-1,5%	-5,9%	1,3%	1,2%	2,1%	0,4%
Util EZ	-0,1%	-1,0%	-0,6%	1,7%	-0,1%	-1,1%	-1,1%	0,1%	-2,4%	0,1%	1,9%	2,9%	0,6%
Growth EZ	-1,3%	-1,2%	0,8%	1,6%	-1,2%	-1,8%	-0,7%	-2,5%	-3,1%	0,9%	1,6%	1,9%	0,1%
Growth Large EZ	-1,6%	-1,5%	0,8%	1,4%	-1,4%	-1,7%	-0,6%	-2,9%	-2,9%	1,2%	1,8%	2,1%	0,1%

Growth Mid EZ	-0,1%	0,1%	0,8%	2,3%	-0,6%	-2,4%	-0,9%	-1,1%	-3,7%	-0,5%	1,0%	1,1%	0,2%
Growth Small EZ	1,3%	-0,2%	0,9%	2,8%	-0,4%	-2,3%	-0,3%	-1,4%	-4,0%	-0,1%	0,7%	0,7%	0,4%
Value EZ	-2,6%	-1,4%	1,5%	3,0%	-1,2%	-1,9%	0,5%	-2,0%	-4,1%	0,0%	0,8%	1,9%	0,1%
Value Large EZ	-3,0%	-1,6%	1,6%	3,0%	-1,4%	-1,8%	0,5%	-2,3%	-4,4%	0,3%	0,8%	1,9%	0,0%
Value Mid EZ	-0,5%	-0,9%	1,4%	3,2%	-0,1%	-2,3%	0,4%	-0,9%	-2,9%	-1,1%	0,4%	1,9%	0,4%
Value Small EZ	-0,2%	-0,2%	1,9%	2,7%	-1,1%	-2,5%	0,1%	-0,6%	-3,5%	-1,6%	0,0%	1,3%	0,2%
Large EZ	-3,3%	-2,1%	0,0%	2,2%	-1,8%	-2,5%	-0,7%	-0,8%	-4,0%	0,9%	0,0%	1,7%	-0,3%
Mid EZ	-1,2%	-0,6%	0,2%	2,4%	-0,9%	-2,3%	-0,5%	0,4%	-3,7%	-0,4%	0,0%	1,2%	0,1%
Small EZ	0,3%	0,2%	0,3%	2,5%	-0,8%	-3,0%	-0,7%	0,6%	-3,1%	-0,6%	0,3%	1,1%	0,3%

Bas Mater N	-0,9%	0,3%	-0,7%	5,7%	-1,4%	-1,9%	1,4%	0,1%	-3,3%	-0,1%	1,1%	0,1%	0,6%
Cns Goods N	0,7%	2,0%	0,1%	2,4%	0,0%	-1,6%	1,3%	-1,4%	-1,8%	-1,5%	0,6%	0,9%	0,7%
Cns Svcs N	4,7%	-0,1%	0,1%	3,9%	-1,6%	-0,6%	1,6%	-1,0%	0,6%	0,4%	2,1%	-0,1%	1,4%
Fincl N	0,6%	0,6%	-0,7%	3,8%	-0,9%	-1,5%	2,4%	-1,5%	-1,1%	0,7%	2,2%	0,6%	1,0%
Indus N	1,6%	1,8%	0,7%	5,2%	-0,7%	0,2%	1,8%	-1,5%	-1,3%	1,0%	0,9%	2,0%	1,5%
Banks N	-0,4%	0,6%	-0,1%	4,5%	-1,1%	-0,7%	2,9%	-1,1%	-1,1%	0,4%	1,9%	0,2%	1,1%
Bas Res N	-1,6%	0,4%	-1,0%	6,5%	-1,6%	-2,4%	1,6%	0,3%	-3,3%	-0,3%	1,4%	-0,2%	0,5%
Fin Svcs N	0,8%	1,9%	-0,6%	2,9%	-0,8%	-0,3%	2,2%	-2,2%	-1,1%	1,6%	3,0%	1,1%	1,3%
Hea Care N	1,7%	1,6%	0,0%	0,3%	1,3%	0,5%	-0,3%	0,8%	-0,3%	0,7%	1,9%	1,5%	1,4%
Indus Gd N	1,7%	1,8%	0,8%	5,4%	-0,7%	0,4%	1,8%	-1,4%	-1,3%	0,9%	0,8%	2,0%	1,6%
Media N	5,0%	-2,5%	-0,5%	7,4%	-2,4%	-3,4%	-0,7%	-3,0%	-0,5%	-1,4%	2,7%	1,1%	0,7%
Pr&Ho Gd N	0,7%	3,3%	-1,3%	3,1%	-0,9%	-3,1%	1,8%	-1,4%	-3,1%	0,4%	2,9%	0,4%	0,8%
Tech N	1,5%	0,2%	0,2%	0,9%	0,2%	-1,5%	-2,0%	-0,6%	-1,4%	3,8%	3,2%	-2,0%	0,8%
Telecom N	1,6%	-4,2%	-1,5%	-0,4%	-0,9%	-1,8%	1,7%	-1,2%	-2,7%	3,4%	3,8%	4,2%	0,7%
Large N	-2,3%	-2,0%	-0,2%	3,0%	-3,1%	-3,8%	-2,1%	-0,5%	-3,5%	1,5%	0,7%	0,6%	-0,4%
Mid N	-1,3%	0,6%	0,0%	3,8%	-0,9%	-2,1%	0,6%	-0,6%	-3,1%	-0,1%	0,3%	1,6%	0,5%
Small N	-0,5%	0,1%	0,5%	3,2%	0,0%	-2,9%	0,8%	0,0%	-3,2%	-0,6%	-0,5%	1,0%	0,4%

Table A25 – Risk and return annualized: Total Return Indices

Table A25 shows risk and return during all year (Buy and Hold strategy) and during the winter months measured by annualized standard deviation and mean (continuously-compounded average returns) respectively. Results are based on 51 Total Return European Stock Indices from October 1992 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the January–December period. Conditional on the signal be in the columns 4 or 5, it represents that the Index has less average return or more risk, during the winter months than during all the year, respectively.

	During all year (Buy and Hold Strategy)		During winter months	
	Mean annualized	Std. Dev. annualized	Mean annualized	Std. Dev. annualized
Bas Mater EZ	8,76%	23,68%	10,06%	15,71%
Cns Goods EZ	8,14%	19,13%	8,89%	12,80%
Cns Svcs EZ	5,80%	18,98%	7,03%	13,15%
Fincl EZ	-1,77%	26,55%	2,58%	17,53%
Indus EZ	4,97%	22,98%	10,73%	15,43%
Aut&Prt EZ	8,62%	27,60%	9,20%	19,84%
Banks EZ	6,36%	25,46%	7,75%	16,34%
Bas Res EZ	8,73%	28,22%	10,61%	17,49%
Chem EZ	12,46%	21,04%	11,90% *	13,58%
Cns&Mat EZ	7,88%	21,04%	11,37%	13,60%
Fin Svcs EZ	8,11%	21,66%	10,37%	13,65%
Fd&Bvr EZ	8,14%	15,56%	7,64% *	10,09%
Hea Care EZ	9,02%	16,10%	5,85% *	11,68%
Indus Gd EZ	10,77%	22,97%	13,30%	14,95%
Insur EZ	4,53%	27,98%	6,51%	18,28%
Media EZ	4,54%	24,10%	8,22%	18,49%
Oil&Gas EZ	9,35%	18,31%	7,37% *	12,31%
Pr&Ho Gd EZ	8,14%	21,24%	10,03%	13,87%
Retail EZ	7,09%	19,20%	5,93% *	13,52%
Tech EZ	6,35%	31,75%	9,17%	21,33%
Telecom EZ	12,37%	26,29%	10,73% *	19,33%
Trv&Lsr EZ	6,52%	23,94%	9,24%	13,95%
Util EZ	10,22%	17,64%	9,14% *	12,14%
Growth EZ	3,18%	20,67%	7,45%	13,68%
Growth Large EZ	2,79%	20,86%	6,82%	13,98%
Growth Mid EZ	3,77%	21,35%	9,09%	13,61%
Growth Small EZ	5,66%	23,91%	10,05%	14,72%
Value EZ	3,88%	21,34%	7,50%	13,26%
Value Large EZ	2,80%	22,05%	6,85%	13,67%
Value Mid EZ	7,49%	20,52%	9,86%	13,34%
Value Small EZ	5,61%	20,92%	10,25%	12,62%
Large EZ	0,36%	20,20%	3,78%	13,84%
Mid EZ	4,00%	19,54%	6,74%	12,73%
Small EZ	6,12%	20,45%	9,24%	12,78%

Bas Mater N	9,55%	26,59%	10,85%	18,52%
Cns Goods N	10,25%	20,53%	11,53%	14,05%
Cns Svcs N	18,24%	24,57%	15,05% *	19,34%
Fincl N	14,26%	25,84%	12,68% *	18,43%
Indus N	20,18%	26,28%	16,91% *	17,29%
Banks N	15,12%	27,36%	12,40% *	19,44%
Bas Res N	8,94%	28,57%	10,76%	20,69%
Fin Svcs N	17,47%	24,94%	14,60% *	16,94%
Hea Care N	17,78%	19,05%	11,36% *	13,76%
Indus Gd N	20,76%	26,64%	17,19% *	17,52%
Media N	9,86%	41,37%	17,33%	34,84%
Pr&Ho Gd N	11,76%	25,11%	13,98%	18,16%
Tech N	10,59%	40,47%	8,14% *	30,35%
Telecom N	10,96%	32,13%	8,51% *	24,92%
Large N	2,63%	29,52%	7,12%	22,72%
Mid N	8,56%	24,24%	10,74%	16,00%
Small N	8,47%	22,65%	10,60%	14,55%

Benchm Eur 1	8,36%	16,42%	8,05% *	10,73%
Benchm Eur 2	-0,33%	17,45%	2,28%	11,62%
Benchm EZ 1	8,20%	18,99%	9,03%	12,12%
Benchm EZ 2	-1,09%	20,28%	2,77%	12,97%
Benchm Eur ex EZ 1	2,23%	15,27%	3,14%	11,20%
Benchm Eur ex EZ 2	0,38%	15,60%	1,78%	11,08%
Benchm N 1	4,04%	26,49%	8,17%	19,73%
Benchm N 2	-0,13%	25,73%	4,19%	18,48%
Blue-Chip Eur	7,99%	16,78%	7,10% *	11,26%
Blue-Chip EZ	8,43%	19,48%	8,78%	12,58%
Blue-Chip N	6,52%	23,37%	9,36%	17,27%

Table A26 – Risk and return annualized: Price Return Indices

Table A26 shows risk and return during all year (Buy and Hold strategy) and during the winter months measured by annualized standard deviation and mean (continuously-compounded average returns) respectively. Results are based on 51 Price Return European Stock Indices from October 1992 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the January–December period. Conditional on the signal be in the columns 4 or 5, it represents that the Index has less average return or more risk, during the winter months than during all the year, respectively.

	During all year (Buy and Hold Strategy)		During winter months	
	Mean annualized	Std. Dev. annualized	Mean annualized	Std. Dev. annualized
Bas Mater EZ	6,32%	23,60%	8,76%	15,61%
Cns Goods EZ	6,36%	19,06%	8,24%	12,73%
Cns Svcs EZ	3,84%	18,97%	6,52%	13,10%
Fincl EZ	-4,18%	26,53%	1,87%	17,41%
Indus EZ	3,07%	22,98%	9,96%	15,42%
Aut&Prt EZ	6,80%	27,49%	8,48%	19,73%
Banks EZ	3,47%	25,49%	7,10%	16,35%
Bas Res EZ	6,08%	28,27%	8,94%	17,62%
Chem EZ	9,77%	20,86%	10,67%	13,42%
Cns&Mat EZ	5,62%	21,01%	10,97%	13,54%
Fin Svcs EZ	5,28%	21,66%	9,72%	13,61%
Fd&Bvr EZ	6,11%	15,54%	7,00%	10,05%
Hea Care EZ	7,31%	16,13%	5,49% *	11,58%
Indus Gd EZ	8,74%	22,89%	12,55%	14,96%
Insur EZ	2,52%	27,88%	5,95%	18,09%
Media EZ	2,29%	24,10%	7,54%	18,45%
Oil&Gas EZ	6,33%	18,08%	6,80%	12,33%
Pr&Ho Gd EZ	6,76%	21,20%	9,50%	13,86%
Retail EZ	5,36%	19,16%	5,49%	13,50%
Tech EZ	4,91%	31,74%	8,38%	21,30%
Telecom EZ	9,56%	26,34%	10,04%	19,39%
Trv&Lsr EZ	4,50%	23,99%	8,87%	13,91%
Util EZ	7,23%	17,58%	8,27%	12,08%
Growth EZ	1,63%	20,67%	6,92%	13,70%
Growth Large EZ	1,16%	20,87%	6,26%	14,02%
Growth Mid EZ	2,46%	21,33%	8,66%	13,58%
Growth Small EZ	4,34%	23,88%	9,62%	14,68%
Value EZ	1,13%	21,27%	6,59%	13,12%
Value Large EZ	0,01%	21,98%	5,98%	13,52%
Value Mid EZ	5,13%	20,47%	8,90%	13,24%
Value Small EZ	2,82%	20,87%	8,97%	12,52%
Large EZ	-3,65%	20,48%	1,95%	13,87%
Mid EZ	1,46%	19,98%	5,40%	12,83%
Small EZ	3,93%	20,99%	8,07%	12,97%

Bas Mater N	7,15%	26,48%	8,95%	18,42%
Cns Goods N	8,37%	20,37%	10,07%	13,88%
Cns Svcs N	16,83%	24,58%	14,07% *	19,35%
Fincl N	12,08%	25,63%	10,58% *	18,21%
Indus N	18,42%	26,09%	15,59% *	17,08%
Banks N	12,75%	27,13%	10,06% *	19,20%
Bas Res N	6,49%	28,47%	8,71%	20,62%
Fin Svcs N	15,17%	24,82%	12,44% *	16,84%
Hea Care N	16,53%	19,11%	10,40% *	13,87%
Indus Gd N	19,08%	26,45%	15,93% *	17,31%
Media N	8,77%	41,54%	16,65%	35,07%
Pr&Ho Gd N	9,60%	25,03%	12,50%	18,09%
Tech N	9,35%	40,38%	7,42% *	30,31%
Telecom N	8,60%	32,10%	6,85% *	24,89%
Large N	-4,75%	28,83%	3,22%	22,32%
Mid N	5,44%	24,68%	8,37%	15,99%
Small N	4,61%	23,00%	7,27%	14,41%

Benchm Eur 1	5,73%	16,40%	6,93%	10,70%
Benchm Eur 2	5,64%	16,28%	6,99%	10,65%
Benchm EZ 1	-3,44%	20,22%	1,93%	12,87%
Benchm Eur ex EZ 1	-2,88%	15,32%	-0,71%	11,04%
Benchm Eur ex EZ 2	-2,45%	15,55%	0,16%	11,02%
Benchm N 1	-4,00%	25,83%	2,66%	18,80%
Benchm N 2	-2,15%	25,51%	2,56%	18,22%
Blue-Chip N	12,09%	22,21%	10,62% *	15,58%

Table A27 – Break-even rates for the Halloween Strategy

Table A27 show the annual continuously-compounded break-even rates that the monetary market must offer in order to be indifferent between choosing the Halloween strategy or the Buy and Hold strategy from October 1992 to October 2010. The break-even rates were computed only for the Indices in which the winter returns by itself do not outperform the Buy and Hold strategy (i.e. for the Indices which are not in scenario 1). The icon ✓ signals the Indices in which it is better to invest in the risk-free asset in the summer months (instead of invest in the stock market), and by doing that the Halloween strategy outperforms the Buy and Hold strategy. The icon ✗ signals the Indices in which the Buy and Hold strategy outperforms the Halloween strategy, being preferable to invest in the stock market during the summer months (instead of investing in the risk-free asset).

"All Period"					
Total Return Indices	**Break-even rate**	Invest in the risk-free asset?	**Price Return Indices**	**Break-even rate**	Invest in the risk-free asset?
Chem EZ	1,12%	✓	Hea Care EZ	3,64%	✗
Fd&Bvr EZ	1%	✓	Cns Svcs N	5,51%	✗
Hea Care EZ	6,33%	✗	Fincl N	2,98%	✗
Oil&Gas EZ	3,94%	✗	Indus N	5,68%	✗
Retail EZ	2,31%	✗	Banks N	5,37%	✗
Telecom EZ	3,27%	✗	Fin Svcs N	5,47%	✗
Util EZ	2,15%	✗	Hea Care N	12,27%	✗
Cns Svcs N	6,39%	✗	Indus Gd N	6,29%	✗
Fincl N	3,16%	✗	Tech N	3,86%	✗
Indus N	6,53%	✗	Telecom N	3,64%	✗
Banks N	5,44%	✗			
Fin Svcs N	5,74%	✗			
Hea Care N	12,84%	✗			
Indus Gd N	7,15%	✗			
Tech N	4,89%	✗			
Telecom N	5,10%	✗			

Table A28 – Buy and Hold Strategy and Halloween Strategy: Total Return Indices

Table A28 show annual continuously-compounded rates of return that an investor would have achieve if he had followed the respective strategy. Results are based on 51 Total Return European Stock Indices from October 1992 to October 2010. Column two contains the annual return of the Buy and Hold strategy in the period. Column three contains the annual return of the Halloween strategy. Column four contains the annual return of the mix between the Buy and Hold strategy and the Halloween strategy, accordingly to what it is best for the investor in terms of return over all the period.

Indices	Buy and Hold Strategy: Annual return	Halloween Strategy: Annual return	Buy and Hold and Halloween Strategy: Annual return
Bas Mater EZ	8,76%	10,86%	10,86%
Cns Goods EZ	8,14%	9,89%	9,89%
Cns Svcs EZ	5,80%	8,03%	8,03%
Fincl EZ	-1,77%	3,55%	3,55%
Indus EZ	4,97%	11,53%	11,53%
Aut&Prt EZ	8,62%	10,20%	10,20%
Banks EZ	6,36%	8,75%	8,75%
Bas Res EZ	8,73%	11,61%	11,61%
Chem EZ	12,46%	12,90%	12,90%
Cns&Mat EZ	7,88%	12,37%	12,37%
Fin Svcs EZ	8,11%	11,37%	11,37%
Fd&Bvr EZ	8,14%	8,64%	8,64%
Hea Care EZ	9,02%	6,85%	9,02%
Indus Gd EZ	10,77%	14,30%	14,30%
Insur EZ	4,53%	7,51%	7,51%
Media EZ	4,54%	9,22%	9,22%
Oil&Gas EZ	9,35%	8,37%	9,35%
Pr&Ho Gd EZ	8,14%	11,03%	11,03%
Retail EZ	7,09%	6,93%	7,09%
Tech EZ	6,35%	10,17%	10,17%
Telecom EZ	12,37%	11,73%	12,37%
Trv&Lsr EZ	6,52%	10,24%	10,24%
Util EZ	10,22%	10,14%	10,22%
Growth EZ	3,18%	8,29%	8,29%
Growth Large EZ	2,79%	7,68%	7,68%
Growth Mid EZ	3,77%	9,89%	9,89%
Growth Small EZ	5,66%	10,83%	10,83%
Value EZ	3,88%	8,34%	8,34%
Value Large EZ	2,80%	7,70%	7,70%
Value Mid EZ	7,49%	10,63%	10,63%
Value Small EZ	5,61%	11,02%	11,02%
Large EZ	0,36%	4,72%	4,72%
Mid EZ	4,00%	7,62%	7,62%
Small EZ	6,12%	10,06%	10,06%

Bas Mater N	9,55%	11,85%	11,85%
Cns Goods N	10,25%	12,53%	12,53%
Cns Svcs N	18,24%	16,05%	18,24%
Fincl N	14,26%	13,68%	14,26%
Indus N	20,18%	17,91%	20,18%
Banks N	15,12%	13,40%	15,12%
Bas Res N	8,94%	11,76%	11,76%
Fin Svcs N	17,47%	15,60%	17,47%
Hea Care N	17,78%	12,36%	17,78%
Indus Gd N	20,76%	18,19%	20,76%
Media N	9,86%	18,33%	18,33%
Pr&Ho Gd N	11,76%	14,98%	14,98%
Tech N	10,59%	9,14%	10,59%
Telecom N	10,96%	9,39%	10,96%
Large N	2,63%	7,99%	7,99%
Mid N	8,56%	11,53%	11,53%
Small N	8,47%	11,39%	11,39%

Benchm Eur 1	8,36%	9,05%	9,05%
Benchm Eur 2	-0,33%	3,27%	3,27%
Benchm EZ 1	8,20%	10,03%	10,03%
Benchm EZ 2	-1,09%	3,76%	3,76%
Benchm Eur ex EZ 1	2,23%	4,09%	4,09%
Benchm Eur ex EZ 2	0,38%	2,78%	2,78%
Benchm N 1	4,04%	9,02%	9,02%
Benchm N 2	-0,13%	5,16%	5,16%
Blue-Chip Eur	7,99%	8,10%	8,10%
Blue-Chip EZ	8,43%	9,78%	9,78%
Blue-Chip N	6,52%	10,18%	10,18%

Table A29 – Buy and Hold Strategy and Halloween Strategy: Price Return Indices

Table A29 show annual continuously-compounded rates of return that an investor would have achieve if he had followed the respective strategy. Results are based on 51 Price Return European Stock Indices from October 1992 to October 2010. Column two contains the annual return of the Buy and Hold strategy in the period. Column three contains the annual return of the Halloween strategy. Column four contains the annual return of the mix between the Buy and Hold strategy and the Halloween strategy, accordingly to what it is best for the investor in terms of return over all the period.

Indices	Buy and Hold Strategy: Annual return	Halloween Strategy: Annual return	Buy and Hold and Halloween Strategy: Annual return
Bas Mater EZ	6,32%	9,59%	9,59%
Cns Goods EZ	6,36%	9,24%	9,24%
Cns Svcs EZ	3,84%	7,52%	7,52%
Fincl EZ	-4,18%	2,85%	2,85%
Indus EZ	3,07%	10,77%	10,77%
Aut&Prt EZ	6,80%	9,48%	9,48%
Banks EZ	3,47%	8,10%	8,10%
Bas Res EZ	6,08%	9,94%	9,94%
Chem EZ	9,77%	11,67%	11,67%
Cns&Mat EZ	5,62%	11,97%	11,97%
Fin Svcs EZ	5,28%	10,72%	10,72%
Fd&Bvr EZ	6,11%	8,00%	8,00%
Hea Care EZ	7,31%	6,49%	7,31%
Indus Gd EZ	8,74%	13,55%	13,55%
Insur EZ	2,52%	6,95%	6,95%
Media EZ	2,29%	8,54%	8,54%
Oil&Gas EZ	6,33%	7,80%	7,80%
Pr&Ho Gd EZ	6,76%	10,50%	10,50%
Retail EZ	5,36%	6,49%	6,49%
Tech EZ	4,91%	9,38%	9,38%
Telecom EZ	9,56%	11,04%	11,04%
Trv&Lsr EZ	4,50%	9,87%	9,87%
Util EZ	7,23%	9,27%	9,27%
Growth EZ	1,63%	7,77%	7,77%
Growth Large EZ	1,16%	7,13%	7,13%
Growth Mid EZ	2,46%	9,47%	9,47%
Growth Small EZ	4,34%	10,40%	10,40%
Value EZ	1,13%	7,45%	7,45%
Value Large EZ	0,01%	6,85%	6,85%
Value Mid EZ	5,13%	9,70%	9,70%
Value Small EZ	2,82%	9,77%	9,77%
Large EZ	-3,65%	2,95%	2,95%
Mid EZ	1,46%	6,37%	6,37%
Small EZ	3,93%	9,01%	9,01%

Bas Mater N	7,15%	9,95%	9,95%
Cns Goods N	8,37%	11,07%	11,07%
Cns Svcs N	16,83%	15,07%	16,83%
Fincl N	12,08%	11,58%	12,08%
Indus N	18,42%	16,59%	18,42%
Banks N	12,75%	11,06%	12,75%
Bas Res N	6,49%	9,71%	9,71%
Fin Svcs N	15,17%	13,44%	15,17%
Hea Care N	16,53%	11,40%	16,53%
Indus Gd N	19,08%	16,93%	19,08%
Media N	8,77%	17,65%	17,65%
Pr&Ho Gd N	9,60%	13,50%	13,50%
Tech N	9,35%	8,42%	9,35%
Telecom N	8,60%	7,76%	8,60%
Large N	-4,75%	4,20%	4,20%
Mid N	5,44%	9,31%	9,31%
Small N	4,61%	8,13%	8,13%

Benchm Eur 1	5,73%	7,93%	7,93%
Benchm Eur 2	5,64%	7,99%	7,99%
Benchm EZ 1	-3,44%	2,92%	2,92%
Benchm Eur ex EZ 1	-2,88%	0,33%	0,33%
Benchm Eur ex EZ 2	-2,45%	1,17%	1,17%
Benchm N 1	-4,00%	3,62%	3,62%
Benchm N 2	-2,15%	3,54%	3,54%
Blue-Chip N	12,09%	11,62%	12,09%

Table A30 – Statistical significance in the "All Period": six-month Total Returns

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A30 shows summary results on 51 Total Return European Stock Indices from October 1992 to October 2010 with returns over the six-month period. α_1 refers to the parameter of regression (1). In addition, we report related p-values. The OLS standard error corrections were not applied, due to a few number of observations.

Indices	Number of Obs.	Mean (%)	Std. Dev. (%)	α_1	p-value
Bas Mater EZ	23	3,53%	17,82%	0,10	0,204
Cns Goods EZ	36	4,07%	14,89%	0,10	0,051
Cns Svcs EZ	36	2,90%	15,05%	0,08	0,100
Fincl EZ	23	-1,00%	20,56%	0,07	0,448
Indus EZ	23	2,01%	20,44%	0,16	0,068
Aut&Prt EZ	36	4,31%	19,10%	0,10	0,126
Banks EZ	36	3,18%	20,32%	0,09	0,181
Bas Res EZ	36	4,37%	21,94%	0,12	0,088
Chem EZ	36	6,23%	14,91%	0,11	0,020
Cns&Mat EZ	36	3,94%	16,53%	0,15	0,005
Fin Svcs EZ	36	4,05%	18,49%	0,13	0,038
Fd&Bvr EZ	36	4,07%	12,84%	0,09	0,181
Hea Care EZ	36	4,51%	12,60%	0,03	0,531
Indus Gd EZ	36	5,38%	20,91%	0,16	0,021
Insur EZ	36	2,26%	20,05%	0,08	0,208
Media EZ	36	2,27%	18,94%	0,12	0,058
Oil&Gas EZ	36	4,67%	12,91%	0,05	0,214
Pr&Ho Gd EZ	36	4,07%	15,70%	0,12	0,020
Retail EZ	36	3,54%	15,52%	0,05	0,363
Tech EZ	36	3,17%	23,49%	0,12	0,127
Telecom EZ	36	6,18%	21,99%	0,09	0,219
Trv&Lsr EZ	36	3,26%	17,45%	0,12	0,038
Util EZ	36	5,11%	14,43%	0,08	0,094
Growth EZ	26	1,73%	18,18%	0,11	0,110
Growth Large EZ	26	1,56%	18,00%	0,11	0,139
Growth Mid EZ	26	1,98%	19,32%	0,14	0,059
Growth Small EZ	26	2,68%	22,40%	0,15	0,094
Value EZ	26	1,97%	17,45%	0,11	0,107
Value Large EZ	26	1,40%	17,65%	0,11	0,118
Value Mid EZ	26	3,86%	17,85%	0,12	0,087
Value Small EZ	26	2,87%	19,54%	0,15	0,052
Large EZ	23	-0,02%	16,46%	0,07	0,335
Mid EZ	23	1,90%	17,55%	0,09	0,212
Small EZ	23	2,71%	18,21%	0,12	0,128

Bas Mater N	36	4,78%	18,40%	0,12	0,046
Cns Goods N	36	5,13%	17,73%	0,13	0,028
Cns Svcs N	36	9,12%	17,47%	0,12	0,040
Fincl N	36	7,13%	22,50%	0,11	0,141
Indus N	36	10,09%	23,31%	0,14	0,079
Banks N	36	7,56%	23,68%	0,10	0,225
Bas Res N	36	4,47%	19,46%	0,13	0,051
Fin Svcs N	36	8,74%	22,09%	0,12	0,112
Hea Care N	36	8,89%	14,59%	0,05	0,317
Indus Gd N	36	10,38%	23,34%	0,14	0,080
Media N	36	4,93%	32,71%	0,25	0,021
Pr&Ho Gd N	36	5,88%	18,62%	0,16	0,007
Tech N	36	5,29%	29,99%	0,06	0,576
Telecom N	32	5,41%	27,76%	0,06	0,536
Large N	23	0,90%	25,51%	0,11	0,324
Mid N	23	4,04%	21,39%	0,12	0,169
Small N	23	3,79%	21,04%	0,12	0,185

Benchm Eur 1	36	4,18%	14,66%	0,08	0,114
Benchm Eur 2	19	0,10%	15,83%	0,06	0,455
Benchm EZ 1	36	4,10%	15,88%	0,10	0,061
Benchm EZ 2	19	-0,31%	17,08%	0,07	0,361
Benchm Eur ex EZ 1	23	0,57%	13,95%	0,03	0,628
Benchm Eur ex EZ 2	19	0,49%	14,91%	0,04	0,580
Benchm N 1	23	1,56%	22,94%	0,11	0,244
Benchm N 2	19	0,89%	19,87%	0,11	0,246
Blue-Chip Eur	36	3,99%	14,71%	0,06	0,210
Blue-Chip EZ	36	4,22%	15,71%	0,09	0,081
Blue-Chip N	23	2,85%	19,39%	0,11	0,165

Table A31 – Statistical significance in the "All Period": six-month Price Returns

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A31 shows summary results on 51 Price Return European Stock Indices from October 1992 to October 2010 with returns over the six-month period. α_1 refers to the parameter of regression (1). In addition, we report related p-values. The OLS standard error corrections were not applied, due to a few number of observations.

Indices	Number of Obs.	Mean	Std. Dev.	α_1	p-value
Bas Mater EZ	23	2,34%	17,67%	0,10	0,204
Cns Goods EZ	36	3,18%	15,08%	0,10	0,042
Cns Svcs EZ	36	1,92%	15,16%	0,09	0,068
Fincl EZ	23	-2,22%	20,79%	0,08	0,390
Indus EZ	23	1,06%	20,54%	0,16	0,062
Aut&Prt EZ	36	3,40%	19,38%	0,10	0,117
Banks EZ	36	1,74%	20,54%	0,11	0,119
Bas Res EZ	36	3,04%	21,85%	0,12	0,106
Chem EZ	36	4,89%	14,87%	0,12	0,017
Cns&Mat EZ	36	2,81%	16,89%	0,16	0,002
Fin Svcs EZ	36	2,64%	18,71%	0,14	0,021
Fd&Bvr EZ	36	3,05%	13,00%	0,08	0,068
Hea Care EZ	36	3,65%	12,76%	0,04	0,396
Indus Gd EZ	36	4,37%	20,94%	0,16	0,017
Insur EZ	36	1,26%	20,33%	0,09	0,169
Media EZ	36	1,14%	19,05%	0,13	0,042
Oil&Gas EZ	36	3,16%	13,14%	0,07	0,097
Pr&Ho Gd EZ	36	3,38%	15,79%	0,12	0,018
Retail EZ	36	2,68%	15,57%	0,06	0,285
Tech EZ	36	2,45%	23,47%	0,12	0,131
Telecom EZ	36	4,78%	22,02%	0,11	0,155
Trv&Lsr EZ	36	2,25%	17,79%	0,13	0,023
Util EZ	36	3,62%	14,63%	0,09	0,055
Growth EZ	26	0,94%	18,32%	0,12	0,097
Growth Large EZ	26	0,73%	18,16%	0,11	0,122
Growth Mid EZ	26	1,31%	19,43%	0,15	0,052
Growth Small EZ	26	2,00%	22,42%	0,15	0,083
Value EZ	26	0,58%	17,73%	0,12	0,083
Value Large EZ	26	0,00%	17,95%	0,12	0,090
Value Mid EZ	26	2,66%	18,00%	0,12	0,076
Value Small EZ	26	1,45%	19,68%	0,15	0,049
Large EZ	21	-2,81%	15,98%	0,06	0,423
Mid EZ	21	0,11%	17,89%	0,08	0,297
Small EZ	21	0,95%	18,51%	0,11	0,202

Bas Mater N	36	3,58%	18,32%	0,11	0,078
Cns Goods N	36	4,18%	17,53%	0,12	0,042
Cns Svcs N	36	8,41%	17,54%	0,11	0,051
Fincl N	36	6,04%	22,32%	0,09	0,227
Indus N	36	9,21%	23,25%	0,13	0,101
Banks N	36	6,37%	23,50%	0,07	0,354
Bas Res N	36	3,24%	19,41%	0,11	0,091
Fin Svcs N	36	7,59%	21,86%	0,10	0,187
Hea Care N	36	8,27%	14,45%	0,04	0,384
Indus Gd N	36	9,54%	23,30%	0,13	0,100
Media N	36	4,39%	33,10%	0,25	0,024
Pr&Ho Gd N	36	4,80%	18,45%	0,15	0,010
Tech N	36	4,68%	29,99%	0,05	0,590
Telecom N	32	4,21%	27,78%	0,05	0,598
Large N	21	-4,93%	19,46%	0,06	0,480
Mid N	21	2,46%	22,11%	0,11	0,260
Small N	21	2,25%	21,67%	0,10	0,310

Benchm Eur 1	36	2,87%	14,73%	0,08	0,099
Benchm Eur 2	36	2,82%	14,77%	0,08	0,091
Benchm EZ 1	19	-1,51%	17,17%	0,08	0,324
Benchm Eur ex EZ 1	21	-1,50%	14,30%	0,01	0,837
Benchm Eur ex EZ 2	19	-0,94%	14,94%	0,03	0,625
Benchm N 1	21	-2,85%	19,96%	0,08	0,400
Benchm N 2	19	-0,11%	19,77%	0,10	0,304
Blue-Chip N	36	6,05%	18,06%	0,09	0,131

Table A32 – Statistical significance global results: six-month returns

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A32 shows global results of the Halloween effect statistical significance based on 102 European Stock Indices. The percentage of statistical significant Indices is the coefficient between the number of significant Indices with the total number of Indices. It is also exhibited the number of negative estimated coefficients. The OLS standard error corrections were not applied, due to a few number of observations.

	Halloween effect - α_1		
Level of Significance	**1%**	**5%**	**10%**
	Total Return Indices		
Nº. of Significant Indices	**2**	**11**	**23**
% of Significant Indices	4	22	45
# negative estimated coef.	-		
	Price Return Indices		
Nº. of Significant Indices	**1**	**12**	**26**
% of Significant Indices	2	24	51
# negative estimated coef.	-		

Table A33 – Statistical significance by classification: six-month returns

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A33 shows the percentage of Indices by classification with a statistical significant Halloween effect based on 102 European Stock Indices. The OLS standard error corrections were not applied, due to a few number of observations.

	Total Return Indices		**Price Return Indices**		
	"All Period" – 1%		**"All Period" – 1%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	
Industry	0	0	0	0	Industry
Supersectors	5,6	11,1	5,6	0	Supersectors
Style	0	-	0	-	Style
Size	0	0	0	0	Size
	"All Period" – 5%		**"All Period" – 5%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	
Industry	0	37,5	10	12,5	Industry
Supersectors	33,3	22,2	38,9	22,2	Supersectors
Style	0	-	12,5	-	Style
Size	0	0	0	0	Size
	"All Period" – 10%		**"All Period" – 10%**		
	Eurozone	**Nordic**	**Eurozone**	**Nordic**	
Industry	30	50	50	37,5	Industry
Supersectors	50	44,4	55,6	33,3	Supersectors
Style	50	-	87,5	-	Style
Size	0	0	0	0	Size

Table A34 – Halloween Effect controlled for the January effect: Total Return Indices

Estimations results for the regression (2): $r_t = \mu + \alpha_1 S_t^{adj} + \alpha_2 J_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A34 shows summary results on 51 Total Return European Stock Indices from October 1992 to October 2010. α_1 and α_2 refers to the parameters of regression (2) regarding the Halloween effect and the January effect, respectively. In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the Halloween effect estimated coefficient (α_1) is negative.

Indices	Number of Obs.	α_1	p-value	α_2	p-value	Notes:
Bas Mater EZ	141	0,03	0,016	-0,03	0,107	
Cns Goods EZ	216	0,02	0,014	0,00	0,999	
Cns Svcs EZ	216	0,02	0,040	0,00	0,874	
Fincl EZ	141	0,02	0,162	-0,03	0,250	
Indus EZ	141	0,03	0,005	0,00	0,868	
Aut&Prt EZ	216	0,02	0,123	0,01	0,623	
Banks EZ	216	0,02	0,042	-0,01	0,737	NWP
Bas Res EZ	216	0,02	0,035	0,00	0,805	NWP
Chem EZ	216	0,03	0,002	-0,02	0,174	
Cns&Mat EZ	216	0,03	0,002	0,01	0,415	
Fin Svcs EZ	216	0,03	0,004	0,00	0,954	NWP
Fd&Bvr EZ	216	0,02	0,007	-0,01	0,427	WP
Hea Care EZ	216	0,01	0,349	0,00	0,713	
Indus Gd EZ	216	0,03	0,003	0,02	0,324	
Insur EZ	216	0,02	0,075	-0,02	0,398	
Media EZ	216	0,02	0,044	0,02	0,281	
Oil&Gas EZ	216	0,01	0,053	-0,02	0,164	
Pr&Ho Gd EZ	216	0,02	0,005	0,00	0,887	
Retail EZ	216	0,01	0,149	-0,01	0,506	
Tech EZ	216	0,02	0,141	0,02	0,317	
Telecom EZ	216	0,01	0,302	0,04	0,069	
Trv&Lsr EZ	216	0,02	0,015	0,00	0,870	WP
Util EZ	216	0,01	0,041	0,01	0,618	
Growth EZ	160	0,02	0,022	0,00	0,974	
Growth Large EZ	160	0,02	0,028	0,00	0,842	
Growth Mid EZ	160	0,03	0,020	0,01	0,375	NWP
Growth Small EZ	160	0,02	0,052	0,03	0,157	NWP
Value EZ	160	0,02	0,016	-0,01	0,439	
Value Large EZ	160	0,02	0,018	-0,02	0,341	
Value Mid EZ	160	0,02	0,013	0,00	0,792	NWP
Value Small EZ	160	0,03	0,006	0,01	0,513	NWP
Large EZ	141	0,02	0,079	-0,02	0,260	
Mid EZ	141	0,02	0,057	0,00	0,877	
Small EZ	141	0,02	0,041	0,01	0,462	

Bas Mater N	216	0,02	0,025	0,00	0,953	
Cns Goods N	216	0,02	0,007	0,02	0,310	
Cns Svcs N	216	0,01	0,147	0,05	0,044	WP
Fincl N	216	0,02	0,068	0,01	0,678	NWP
Indus N	216	0,02	0,035	0,02	0,365	NWP
Banks N	216	0,02	0,077	0,00	0,910	NWP
Bas Res N	216	0,03	0,023	-0,01	0,711	
Fin Svcs N	216	0,02	0,035	0,01	0,637	
Hea Care N	216	0,01	0,337	0,01	0,410	
Indus Gd N	216	0,02	0,038	0,02	0,347	NWP
Media N	216	0,04	0,034	0,07	0,024	
Pr&Ho Gd N	216	0,03	0,003	0,02	0,506	WP
Tech N	216	0,01	0,631	0,02	0,575	
Telecom N	195	0,01	0,578	0,02	0,425	NWP
Large N	141	0,02	0,115	-0,01	0,664	NWP
Mid N	141	0,03	0,036	0,00	0,849	NWP
Small N	141	0,02	0,039	0,00	0,955	NWP

Benchm Eur 1	216	0,02	0,027	0,00	0,982	NWP
Benchm Eur 2	119	0,01	0,231	-0,01	0,596	NWP
Benchm EZ 1	216	0,02	0,014	0,00	0,838	
Benchm EZ 2	119	0,02	0,165	-0,01	0,543	
Benchm Eur ex EZ 1	141	0,01	0,238	-0,01	0,426	NWP
Benchm Eur ex EZ 2	119	0,01	0,411	-0,01	0,727	NWP
Benchm N 1	141	0,03	0,066	-0,01	0,697	NWP
Benchm N 2	119	0,02	0,177	-0,01	0,728	NWP
Blue-Chip Eur	216	0,01	0,050	-0,01	0,553	NWP
Blue-Chip EZ	216	0,02	0,018	0,00	0,796	
Blue-Chip N	141	0,02	0,041	0,00	0,883	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A35 – Halloween Effect controlled for the January effect: Price Return Indices

Estimations results for the regression (2): $r_t = \mu + \alpha_1 S_t^{adj} + \alpha_2 J_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A35 shows summary results on 51 Price Return European Stock Indices from October 1992 to October 2010. α_1 and α_2 refers to the parameters of regression (2) regarding the Halloween effect and the January effect, respectively. In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the Halloween effect estimated coefficient (α_1) is negative.

Indices	Number of Obs.	α_1	p-value	α_2	p-value	Notes:
Bas Mater EZ	141	0,03	0,018	-0,03	0,121	
Cns Goods EZ	216	0,02	0,011	0,00	0,909	
Cns Svcs EZ	216	0,02	0,025	0,00	0,743	
Fincl EZ	141	0,02	0,131	-0,03	0,287	
Indus EZ	141	0,03	0,004	0,00	0,826	
Aut&Prt EZ	216	0,02	0,113	0,01	0,566	
Banks EZ	216	0,02	0,021	0,00	0,857	NWP
Bas Res EZ	216	0,02	0,054	0,01	0,778	
Chem EZ	216	0,03	0,001	-0,02	0,264	WP
Cns&Mat EZ	216	0,03	0,001	0,01	0,331	
Fin Svcs EZ	216	0,03	0,002	0,00	0,828	NWP
Fd&Bvr EZ	216	0,02	0,007	-0,01	0,520	WP
Hea Care EZ	216	0,01	0,244	0,00	0,858	
Indus Gd EZ	216	0,03	0,002	0,02	0,332	
Insur EZ	216	0,02	0,058	-0,01	0,464	
Media EZ	216	0,02	0,032	0,02	0,220	
Oil&Gas EZ	216	0,02	0,017	-0,02	0,240	
Pr&Ho Gd EZ	216	0,02	0,005	0,00	0,946	
Retail EZ	216	0,01	0,108	-0,01	0,606	
Tech EZ	216	0,02	0,149	0,02	0,304	
Telecom EZ	216	0,01	0,217	0,04	0,048	
Trv&Lsr EZ	216	0,03	0,008	0,01	0,760	WP
Util EZ	216	0,02	0,017	0,01	0,623	
Growth EZ	160	0,02	0,017	0,00	0,934	
Growth Large EZ	160	0,02	0,023	0,00	0,882	
Growth Mid EZ	160	0,03	0,017	0,01	0,351	NWP
Growth Small EZ	160	0,02	0,046	0,03	0,138	NWP
Value EZ	160	0,03	0,011	-0,01	0,518	
Value Large EZ	160	0,03	0,012	-0,02	0,410	
Value Mid EZ	160	0,02	0,011	0,01	0,718	NWP
Value Small EZ	160	0,03	0,006	0,01	0,431	NWP
Large EZ	131	0,02	0,083	-0,02	0,341	
Mid EZ	131	0,02	0,079	0,00	0,990	
Small EZ	131	0,02	0,057	0,02	0,441	

Bas Mater N	216	0,02	0,048	0,00	0,983	
Cns Goods N	216	0,02	0,015	0,02	0,287	
Cns Svcs N	216	0,01	0,184	0,05	0,041	WP
Fincl N	216	0,02	0,140	0,01	0,675	NWP
Indus N	216	0,02	0,051	0,02	0,344	NWP
Banks N	216	0,02	0,171	0,00	0,912	NWP
Bas Res N	216	0,02	0,047	-0,01	0,735	
Fin Svcs N	216	0,02	0,085	0,01	0,630	
Hea Care N	216	0,01	0,439	0,01	0,393	
Indus Gd N	216	0,02	0,053	0,02	0,327	NWP
Media N	216	0,04	0,038	0,07	0,023	
Pr&Ho Gd N	216	0,03	0,006	0,02	0,477	WP
Tech N	216	0,01	0,656	0,02	0,554	
Telecom N	195	0,01	0,676	0,02	0,393	NWP
Large N	131	0,02	0,133	0,00	0,891	
Mid N	131	0,02	0,079	0,00	0,913	
Small N	129	0,02	0,145	0,00	0,848	NWP

Benchm Eur 1	216	0,02	0,023	0,00	0,865	NWP
Benchm Eur 2	216	0,02	0,023	0,00	0,744	NWP
Benchm EZ 1	119	0,02	0,139	-0,01	0,597	
Benchm Eur ex EZ 1	129	0,00	0,655	-0,01	0,722	NWP
Benchm Eur ex EZ 2	119	0,01	0,485	0,00	0,801	NWP
Benchm N 1	129	0,02	0,162	-0,01	0,792	
Benchm N 2	119	0,02	0,244	-0,01	0,751	NWP
Blue-Chip N	216	0,02	0,088	0,01	0,423	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A36 – Halloween Effect controlled for the April effect: Total Return Indices

Estimations results for the regression (3): $r_t = \mu + \alpha_1 S_t^{adj2} + \alpha_3 A_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A36 shows summary results on 51 Total Return European Stock Indices from October 1992 to October 2010. α_1 and α_3 refers to the parameters of regression (3) regarding the Halloween effect and the April effect, respectively. In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the Halloween effect estimated coefficient (α_1) is negative.

Indices	Number of Obs.	α_1	p-value	α_3	p-value	Notes:
Bas Mater EZ	141	0,01	0,353	0,05	0,011	
Cns Goods EZ	216	0,01	0,108	0,03	0,017	
Cns Svcs EZ	216	0,01	0,113	0,02	0,137	
Fincl EZ	141	0,00	0,865	0,05	0,023	
Indus EZ	141	0,02	0,069	0,05	0,007	
Aut&Prt EZ	216	0,01	0,392	0,05	0,015	
Banks EZ	216	0,01	0,366	0,04	0,022	NWP
Bas Res EZ	216	0,02	0,187	0,04	0,036	NWP
Chem EZ	216	0,01	0,113	0,05	0,003	
Cns&Mat EZ	216	0,02	0,009	0,04	0,017	
Fin Svcs EZ	216	0,02	0,098	0,04	0,003	NWP
Fd&Bvr EZ	216	0,01	0,082	0,02	0,171	
Hea Care EZ	216	0,00	0,704	0,01	0,231	
Indus Gd EZ	216	0,02	0,012	0,04	0,017	
Insur EZ	216	0,01	0,436	0,04	0,051	
Media EZ	216	0,02	0,045	0,02	0,267	
Oil&Gas EZ	216	0,01	0,459	0,03	0,052	
Pr&Ho Gd EZ	216	0,02	0,040	0,03	0,058	
Retail EZ	216	0,01	0,463	0,02	0,187	
Tech EZ	216	0,02	0,186	0,03	0,154	
Telecom EZ	216	0,01	0,195	0,02	0,286	
Trv&Lsr EZ	216	0,02	0,055	0,03	0,095	WP
Util EZ	216	0,01	0,116	0,02	0,067	
Growth EZ	160	0,02	0,092	0,03	0,082	
Growth Large EZ	160	0,02	0,119	0,03	0,119	
Growth Mid EZ	160	0,02	0,091	0,04	0,019	NWP
Growth Small EZ	160	0,02	0,143	0,04	0,019	NWP
Value EZ	160	0,01	0,222	0,05	0,011	
Value Large EZ	160	0,01	0,260	0,05	0,012	
Value Mid EZ	160	0,01	0,183	0,05	0,024	NWP
Value Small EZ	160	0,02	0,074	0,05	0,028	NWP
Large EZ	141	0,01	0,558	0,04	0,033	
Mid EZ	141	0,01	0,292	0,04	0,025	
Small EZ	141	0,02	0,132	0,04	0,023	

Bas Mater N	216	0,01	0,346	0,07	0,000	
Cns Goods N	216	0,02	0,044	0,04	0,003	
Cns Svcs N	216	0,01	0,164	0,05	0,010	WP
Fincl N	216	0,01	0,335	0,06	0,003	NWP
Indus N	216	0,01	0,197	0,06	0,002	NWP
Banks N	216	0,01	0,548	0,06	0,003	NWP
Bas Res N	216	0,01	0,408	0,08	0,000	
Fin Svcs N	216	0,01	0,149	0,04	0,017	
Hea Care N	216	0,01	0,225	0,00	0,908	
Indus Gd N	216	0,01	0,212	0,06	0,001	NWP
Media N	216	0,03	0,026	0,10	0,119	WP
Pr&Ho Gd N	216	0,02	0,034	0,05	0,003	
Tech N	216	0,01	0,612	0,01	0,628	
Telecom N	195	0,01	0,540	0,01	0,662	NWP
Large N	141	0,01	0,483	0,05	0,120	NWP
Mid N	141	0,01	0,321	0,06	0,015	NWP
Small N	141	0,01	0,283	0,05	0,016	NWP

Benchm Eur 1	216	0,01	0,235	0,03	0,007	NWP
Benchm Eur 2	119	0,00	0,898	0,04	0,023	NWP
Benchm EZ 1	216	0,01	0,085	0,03	0,022	
Benchm EZ 2	119	0,00	0,687	0,04	0,033	
Benchm Eur ex EZ 1	141	0,00	0,957	0,04	0,004	NWP
Benchm Eur ex EZ 2	119	0,00	0,895	0,04	0,008	Neg. α_1+NWP
Benchm N 1	141	0,01	0,410	0,06	0,057	NWP
Benchm N 2	119	0,01	0,707	0,05	0,100	NWP
Blue-Chip Eur	216	0,01	0,397	0,03	0,015	NWP
Blue-Chip EZ	216	0,01	0,131	0,03	0,031	
Blue-Chip N	141	0,01	0,290	0,06	0,008	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A37 – Halloween Effect controlled for the April effect: Price Return Indices

Estimations results for the regression (3): $r_t = \mu + \alpha_1 S_t^{adj2} + \alpha_3 A_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A37 shows summary results on 51 Price Return European Stock Indices from October 1992 to October 2010. α_1 and α_3 refers to the parameters of regression (3) regarding the Halloween effect and the April effect, respectively. In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the Halloween effect estimated coefficient (α_1) is negative.

Indices	Number of Obs.	α_1	p-value	α_3	p-value	Notes:
Bas Mater EZ	141	0,01	0,319	0,05	0,023	
Cns Goods EZ	216	0,01	0,075	0,03	0,023	
Cns Svcs EZ	216	0,01	0,062	0,02	0,173	
Fincl EZ	141	0,00	0,734	0,05	0,028	
Indus EZ	141	0,02	0,059	0,05	0,008	
Aut&Prt EZ	216	0,01	0,313	0,04	0,027	
Banks EZ	216	0,01	0,235	0,04	0,019	NWP
Bas Res EZ	216	0,02	0,220	0,04	0,043	NWP
Chem EZ	216	0,02	0,064	0,04	0,017	
Cns&Mat EZ	216	0,02	0,004	0,04	0,011	
Fin Svcs EZ	216	0,02	0,051	0,04	0,003	NWP
Fd&Bvr EZ	216	0,01	0,048	0,02	0,169	
Hea Care EZ	216	0,00	0,584	0,02	0,120	
Indus Gd EZ	216	0,02	0,008	0,04	0,017	
Insur EZ	216	0,01	0,325	0,04	0,068	
Media EZ	216	0,02	0,024	0,02	0,364	
Oil&Gas EZ	216	0,01	0,240	0,03	0,028	
Pr&Ho Gd EZ	216	0,02	0,033	0,03	0,059	
Retail EZ	216	0,01	0,323	0,02	0,227	
Tech EZ	216	0,02	0,190	0,03	0,159	
Telecom EZ	216	0,02	0,120	0,02	0,288	
Trv&Lsr EZ	216	0,02	0,033	0,03	0,072	WP
Util EZ	216	0,01	0,058	0,02	0,056	
Growth EZ	160	0,02	0,073	0,03	0,086	
Growth Large EZ	160	0,02	0,096	0,03	0,124	
Growth Mid EZ	160	0,02	0,077	0,04	0,020	NWP
Growth Small EZ	160	0,02	0,122	0,04	0,020	NWP
Value EZ	160	0,01	0,146	0,04	0,015	
Value Large EZ	160	0,01	0,171	0,04	0,017	
Value Mid EZ	160	0,02	0,144	0,04	0,034	NWP
Value Small EZ	160	0,02	0,062	0,04	0,040	NWP
Large EZ	131	0,01	0,490	0,04	0,054	
Mid EZ	131	0,01	0,286	0,04	0,056	
Small EZ	131	0,02	0,132	0,04	0,058	

Bas Mater N	216	0,01	0,438	0,07	0,001	
Cns Goods N	216	0,02	0,040	0,03	0,032	
Cns Svcs N	216	0,01	0,156	0,04	0,031	WP
Fincl N	216	0,01	0,383	0,04	0,024	NWP
Indus N	216	0,01	0,196	0,05	0,006	NWP
Banks N	216	0,01	0,634	0,05	0,026	NWP
Bas Res N	216	0,01	0,537	0,07	0,000	
Fin Svcs N	216	0,01	0,189	0,03	0,101	
Hea Care N	216	0,01	0,266	0,00	0,926	
Indus Gd N	216	0,01	0,208	0,05	0,005	NWP
Media N	216	0,03	0,024	0,09	0,145	WP
Pr&Ho Gd N	216	0,02	0,028	0,04	0,023	
Tech N	216	0,01	0,604	0,01	0,700	
Telecom N	195	0,01	0,511	0,00	0,943	NWP
Large N	131	0,01	0,416	0,05	0,075	
Mid N	131	0,01	0,329	0,05	0,038	
Small N	129	0,01	0,453	0,04	0,066	NWP

Benchm Eur 1	216	0,01	0,190	0,03	0,009	NWP
Benchm Eur 2	216	0,01	0,174	0,03	0,009	NWP
Benchm EZ 1	119	0,01	0,576	0,04	0,042	
Benchm Eur ex EZ 1	129	0,00	0,716	0,03	0,017	Neg. α_1+NWP
Benchm Eur ex EZ 2	119	0,00	0,870	0,04	0,012	Neg. α_1+NWP
Benchm N 1	129	0,01	0,559	0,05	0,044	
Benchm N 2	119	0,01	0,735	0,05	0,170	NWP
Blue-Chip N	216	0,01	0,221	0,04	0,029	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A38 – Halloween Effect controlled for the dot-com effect: Total Return Indices

Estimations results for the regression (4): $r_t = \mu + \alpha_1 S_t + \alpha_4 C_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A38 shows summary results on 51 Total Return European Stock Indices from October 1992 to October 2010. α_1 and α_4 refers to the parameters of regression (4) regarding the Halloween effect and the dot-com bubble effect, respectively. In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the Halloween effect estimated coefficient (α_1) is negative.

Indices	Number of Obs.	α_1	p-value	α_4	p-value	Notes:
Bas Mater EZ	141	0,02	0,109	0,00	0,900	
Cns Goods EZ	216	0,02	0,034	0,01	0,481	
Cns Svcs EZ	216	0,01	0,068	0,01	0,070	
Fincl EZ	141	0,01	0,384	0,01	0,692	
Indus EZ	141	0,03	0,016	0,00	0,797	
Aut&Prt EZ	216	0,02	0,136	0,01	0,632	
Banks EZ	216	0,01	0,116	0,01	0,199	NWP
Bas Res EZ	216	0,02	0,066	0,00	0,746	NWP
Chem EZ	216	0,02	0,023	0,01	0,482	
Cns&Mat EZ	216	0,02	0,003	0,01	0,347	WP
Fin Svcs EZ	216	0,02	0,024	0,01	0,207	NWP
Fd&Bvr EZ	216	0,01	0,054	0,01	0,349	
Hea Care EZ	216	0,00	0,506	0,02	0,006	
Indus Gd EZ	216	0,03	0,003	0,01	0,242	
Insur EZ	216	0,01	0,207	0,02	0,069	WP
Media EZ	216	0,02	0,037	0,02	0,089	WP
Oil&Gas EZ	216	0,01	0,222	0,01	0,070	
Pr&Ho Gd EZ	216	0,02	0,018	0,01	0,457	
Retail EZ	216	0,01	0,305	0,01	0,097	
Tech EZ	216	0,02	0,114	0,02	0,151	
Telecom EZ	216	0,01	0,147	0,01	0,156	WP
Trv&Lsr EZ	216	0,02	0,035	0,01	0,300	WP
Util EZ	216	0,01	0,055	0,01	0,129	
Growth EZ	160	0,02	0,042	0,01	0,313	
Growth Large EZ	160	0,02	0,062	0,01	0,263	
Growth Mid EZ	160	0,02	0,026	0,01	0,580	NWP
Growth Small EZ	160	0,02	0,050	0,00	0,890	NWP
Value EZ	160	0,02	0,064	0,00	0,718	
Value Large EZ	160	0,02	0,079	0,00	0,681	
Value Mid EZ	160	0,02	0,038	0,00	0,984	NWP
Value Small EZ	160	0,02	0,016	0,00	0,729	NWP
Large EZ	141	0,01	0,235	0,00	0,883	
Mid EZ	141	0,02	0,105	0,00	0,775	WP
Small EZ	141	0,02	0,043	0,00	0,919	

Bas Mater N	216	0,02	0,055	0,01	0,321	
Cns Goods N	216	0,02	0,008	0,00	0,875	
Cns Svcs N	216	0,02	0,042	0,01	0,145	WP
Fincl N	216	0,02	0,079	0,01	0,241	NWP
Indus N	216	0,02	0,037	0,02	0,216	NWP
Banks N	216	0,02	0,143	0,02	0,193	NWP
Bas Res N	216	0,02	0,064	0,01	0,247	
Fin Svcs N	216	0,02	0,048	0,01	0,200	
Hea Care N	216	0,01	0,281	0,01	0,299	
Indus Gd N	216	0,02	0,039	0,02	0,215	NWP
Media N	216	0,04	0,011	0,01	0,622	
Pr&Ho Gd N	216	0,03	0,006	0,00	0,713	
Tech N	216	0,01	0,572	0,03	0,077	
Telecom N	195	0,01	0,475	0,00	0,872	NWP
Large N	141	0,02	0,214	0,00	0,939	NWP
Mid N	141	0,02	0,075	-0,01	0,467	
Small N	141	0,02	0,089	0,00	0,915	NWP

Benchm Eur 1	216	0,01	0,067	0,01	0,126	NWP
Benchm Eur 2	119	0,01	0,385	-0,02	0,021	NWP
Benchm EZ 1	216	0,02	0,029	0,01	0,102	
Benchm EZ 2	119	0,01	0,288	-0,03	0,217	
Benchm Eur ex EZ 1	141	0,01	0,437	0,00	0,884	NWP
Benchm Eur ex EZ 2	119	0,01	0,538	-0,02	0,035	NWP
Benchm N 1	141	0,02	0,142	0,00	0,918	NWP
Benchm N 2	119	0,02	0,220	-0,06	0,005	NWP
Blue-Chip Eur	216	0,01	0,147	0,02	0,048	NWP
Blue-Chip EZ	216	0,01	0,049	0,01	0,053	
Blue-Chip N	141	0,02	0,081	0,00	0,812	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A39 – Halloween Effect controlled for the dot-com effect: Price Return Indices

Estimations results for the regression (4): $r_t = \mu + \alpha_1 S_t + \alpha_4 C_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A39 shows summary results on 51 Price Return European Stock Indices from October 1992 to October 2010. α_1 and α_4 refers to the parameters of regression (4) regarding the Halloween effect and the dot-com bubble effect, respectively. In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column seven contains comments on the OLS coefficients standard errors corrections used and when the Halloween effect estimated coefficient (α_1) is negative.

Indices	Number of Obs.	α_1	p-value	α_4	p-value	Notes:
Bas Mater EZ	141	0,02	0,113	0,00	0,912	
Cns Goods EZ	216	0,02	0,025	0,01	0,496	
Cns Svcs EZ	216	0,02	0,042	0,01	0,065	
Fincl EZ	141	0,01	0,318	0,01	0,651	
Indus EZ	141	0,03	0,014	0,00	0,767	
Aut&Prt EZ	216	0,02	0,120	0,01	0,639	
Banks EZ	216	0,02	0,063	0,01	0,210	NWP
Bas Res EZ	216	0,02	0,078	0,00	0,719	WP
Chem EZ	216	0,02	0,019	0,01	0,526	
Cns&Mat EZ	216	0,03	0,001	0,01	0,353	WP
Fin Svcs EZ	216	0,02	0,011	0,01	0,235	NWP
Fd&Bvr EZ	216	0,01	0,032	0,01	0,377	
Hea Care EZ	216	0,01	0,354	0,02	0,006	
Indus Gd EZ	216	0,03	0,002	0,01	0,245	
Insur EZ	216	0,02	0,161	0,02	0,057	WP
Media EZ	216	0,02	0,025	0,02	0,083	WP
Oil&Gas EZ	216	0,01	0,093	0,01	0,069	
Pr&Ho Gd EZ	216	0,02	0,015	0,01	0,449	
Retail EZ	216	0,01	0,224	0,01	0,095	
Tech EZ	216	0,02	0,118	0,02	0,159	
Telecom EZ	216	0,02	0,093	0,02	0,136	WP
Trv&Lsr EZ	216	0,02	0,020	0,01	0,292	WP
Util EZ	216	0,02	0,026	0,01	0,118	
Growth EZ	160	0,02	0,034	0,01	0,286	
Growth Large EZ	160	0,02	0,051	0,01	0,236	
Growth Mid EZ	160	0,02	0,022	0,01	0,562	NWP
Growth Small EZ	160	0,02	0,043	0,00	0,882	NWP
Value EZ	160	0,02	0,043	0,00	0,669	
Value Large EZ	160	0,02	0,053	0,01	0,624	
Value Mid EZ	160	0,02	0,032	0,00	0,991	NWP
Value Small EZ	160	0,02	0,015	0,00	0,726	NWP
Large EZ	131	0,01	0,225	-0,01	0,671	
Mid EZ	131	0,02	0,124	-0,01	0,580	
Small EZ	131	0,02	0,056	0,00	0,791	

Bas Mater N	216	0,02	0,088	0,01	0,293	
Cns Goods N	216	0,02	0,014	0,00	0,846	
Cns Svcs N	216	0,02	0,053	0,02	0,108	WP
Fincl N	216	0,01	0,148	0,01	0,221	NWP
Indus N	216	0,02	0,051	0,02	0,196	NWP
Banks N	216	0,01	0,264	0,02	0,184	NWP
Bas Res N	216	0,02	0,108	0,01	0,220	
Fin Svcs N	216	0,02	0,102	0,01	0,190	
Hea Care N	216	0,01	0,355	0,01	0,287	
Indus Gd N	216	0,02	0,052	0,02	0,198	NWP
Media N	216	0,04	0,012	0,01	0,554	
Pr&Ho Gd N	216	0,03	0,009	0,00	0,704	
Tech N	216	0,01	0,586	0,03	0,071	
Telecom N	195	0,01	0,548	0,00	0,876	NWP
Large N	131	0,02	0,189	-0,03	0,356	WP
Mid N	131	0,02	0,126	-0,02	0,229	
Small N	129	0,02	0,219	-0,01	0,399	NWP

Benchm Eur 1	216	0,01	0,054	0,01	0,125	NWP
Benchm Eur 2	216	0,01	0,048	0,01	0,144	NWP
Benchm EZ 1	119	0,01	0,243	-0,02	0,223	
Benchm Eur ex EZ 1	129	0,00	0,795	-0,01	0,229	NWP
Benchm Eur ex EZ 2	119	0,00	0,589	-0,02	0,038	NWP
Benchm N 1	129	0,01	0,256	-0,04	0,093	WP
Benchm N 2	119	0,01	0,287	-0,06	0,005	NWP
Blue-Chip N	216	0,01	0,085	0,01	0,100	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A40 – Halloween Effect statistical significance after 2002: Total Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A40 shows summary results on 51 Total Return European Stock Indices from January 2003 to October 2010. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column five contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	α_1	p-value	Notes:
Bas Mater EZ	94	0,01	0,576	
Cns Goods EZ	94	0,00	0,675	Neg. α_1
Cns Svcs EZ	94	0,00	0,696	
Fincl EZ	94	0,00	0,889	NWP
Indus EZ	94	0,02	0,263	NWP
Aut&Prt EZ	94	-0,02	0,364	Neg. α_1
Banks EZ	94	0,00	0,955	NWP
Bas Res EZ	94	0,01	0,620	NWP
Chem EZ	94	0,01	0,572	
Cns&Mat EZ	94	0,02	0,143	NWP
Fin Svcs EZ	94	0,01	0,409	NWP
Fd&Bvr EZ	94	0,00	0,805	
Hea Care EZ	94	0,01	0,507	WP
Indus Gd EZ	94	0,01	0,352	
Insur EZ	94	0,00	0,856	
Media EZ	94	0,00	0,809	NWP
Oil&Gas EZ	94	0,00	0,933	Neg. α_1
Pr&Ho Gd EZ	94	0,01	0,650	
Retail EZ	94	0,00	0,800	
Tech EZ	94	0,00	0,850	
Telecom EZ	94	-0,01	0,091	Neg. α_1
Trv&Lsr EZ	94	0,01	0,400	
Util EZ	94	0,00	0,695	NWP
Growth EZ	94	0,00	0,822	
Growth Large EZ	94	0,00	0,975	Neg. α_1
Growth Mid EZ	94	0,01	0,381	NWP
Growth Small EZ	94	0,01	0,418	NWP
Value EZ	94	0,00	0,723	NWP
Value Large EZ	94	0,00	0,791	NWP
Value Mid EZ	94	0,01	0,447	NWP
Value Small EZ	94	0,01	0,342	NWP
Large EZ	94	0,00	0,936	NWP
Mid EZ	94	0,01	0,564	NWP
Small EZ	94	0,01	0,434	NWP

Bas Mater N	94	0,01	0,476	
Cns Goods N	94	0,02	0,213	NWP
Cns Svcs N	94	0,02	0,156	
Fincl N	94	0,01	0,402	NWP
Indus N	94	0,01	0,403	
Banks N	94	0,01	0,513	NWP
Bas Res N	94	0,01	0,584	
Fin Svcs N	94	0,02	0,210	
Hea Care N	94	0,01	0,493	WP
Indus Gd N	94	0,01	0,418	
Media N	94	0,00	0,816	NWP
Pr&Ho Gd N	94	0,02	0,185	
Tech N	94	0,01	0,553	
Telecom N	94	0,00	0,750	Neg. α_1+NWP
Large N	94	0,01	0,408	
Mid N	94	0,02	0,323	NWP
Small N	94	0,01	0,423	NWP

Benchm Eur 1	94	0,00	0,963	NWP
Benchm Eur 2	94	0,00	0,941	NWP
Benchm EZ 1	94	0,00	0,843	NWP
Benchm EZ 2	94	0,00	0,820	NWP
Benchm Eur ex EZ 1	94	0,00	0,887	Neg. α_1+NWP
Benchm Eur ex EZ 2	94	0,00	0,911	Neg. α_1+NWP
Benchm N 1	94	0,01	0,363	
Benchm N 2	94	0,01	0,375	NWP
Blue-Chip Eur	94	0,00	0,730	Neg. α_1+NWP
Blue-Chip EZ	94	0,00	0,970	Neg. α_1
Blue-Chip N	94	0,01	0,327	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A41 – Halloween Effect statistical significance after 2002: Price Return Indices

Estimations results for the regression (1): $r_t = \mu + \alpha_1 S_t + \varepsilon_t \quad with\ \varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$

Table A41 shows summary results on 51 Price Return European Stock Indices from January 2003 to October 2010. α_1 refers to the parameter of regression (1). In addition, we report related p-values based on White heteroscedasticity consistent standard errors or Newey-West heteroscedasticity and autocorrelation consistent standard errors. Column five contains comments on the OLS coefficients standard errors corrections used and when the estimated coefficient is negative.

Indices	Number of Obs.	α_1	p-value	Notes:
Bas Mater EZ	94	0,01	0,576	
Cns Goods EZ	94	0,00	0,664	Neg. α_1
Cns Svcs EZ	94	0,01	0,601	
Fincl EZ	94	0,00	0,799	NWP
Indus EZ	94	0,02	0,202	NWP
Aut&Prt EZ	94	-0,02	0,338	Neg. α_1
Banks EZ	94	0,00	0,842	NWP
Bas Res EZ	94	0,01	0,664	NWP
Chem EZ	94	0,01	0,545	
Cns&Mat EZ	94	0,02	0,117	NWP
Fin Svcs EZ	94	0,01	0,360	NWP
Fd&Bvr EZ	94	0,00	0,730	
Hea Care EZ	94	0,01	0,429	WP
Indus Gd EZ	94	0,01	0,365	
Insur EZ	94	0,00	0,825	
Media EZ	94	0,00	0,703	NWP
Oil&Gas EZ	94	0,00	0,928	
Pr&Ho Gd EZ	94	0,00	0,679	
Retail EZ	94	0,00	0,723	
Tech EZ	94	0,00	0,847	
Telecom EZ	94	-0,01	0,157	Neg. α_1
Trv&Lsr EZ	94	0,01	0,341	
Util EZ	94	0,01	0,594	NWP
Growth EZ	94	0,00	0,763	
Growth Large EZ	94	0,00	0,959	
Growth Mid EZ	94	0,01	0,351	NWP
Growth Small EZ	94	0,01	0,393	NWP
Value EZ	94	0,01	0,642	NWP
Value Large EZ	94	0,00	0,695	NWP
Value Mid EZ	94	0,01	0,422	NWP
Value Small EZ	94	0,01	0,359	NWP
Large EZ	94	0,00	0,847	NWP
Mid EZ	94	0,01	0,537	NWP
Small EZ	94	0,01	0,414	NWP

Bas Mater N	94	0,01	0,588	
Cns Goods N	94	0,01	0,289	NWP
Cns Svcs N	94	0,01	0,192	
Fincl N	94	0,01	0,549	NWP
Indus N	94	0,01	0,494	
Banks N	94	0,01	0,667	NWP
Bas Res N	94	0,01	0,728	
Fin Svcs N	94	0,01	0,304	
Hea Care N	94	0,00	0,648	WP
Indus Gd N	94	0,01	0,500	
Media N	94	0,00	0,899	NWP
Pr&Ho Gd N	94	0,01	0,282	
Tech N	94	0,01	0,593	
Telecom N	94	-0,01	0,664	Neg. α_1+NWP
Large N	94	0,01	0,499	
Mid N	94	0,01	0,396	NWP
Small N	94	0,01	0,517	NWP

Benchm Eur 1	94	0,00	0,955	NWP
Benchm Eur 2	94	0,00	0,934	NWP
Benchm EZ 1	94	0,00	0,748	NWP
Benchm Eur ex EZ 1	94	0,00	0,813	Neg. α_1+NWP
Benchm Eur ex EZ 2	94	0,00	0,841	Neg. α_1+NWP
Benchm N 1	94	0,01	0,451	
Benchm N 2	94	0,01	0,447	
Blue-Chip N	94	0,01	0,425	

WP – White procedures were applied.

NWP – Newey-West procedures were applied.

Table A42 – Risk and return after 2002: Total Return Indices

Table A42 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Total Return European Stock Indices from January 2003 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May-Oct.	Nov.-Apr.
Bas Mater EZ	0,71%	6,87%	1,47%	6,15%	0,10%	0,24%
Cns Goods EZ	1,00%	4,70%	0,55% *	5,59% *	0,21%	0,10% *
Cns Svcs EZ	0,21%	4,66%	0,59%	4,92% *	0,04%	0,12%
Fincl EZ	0,11%	7,48%	0,32%	7,93% *	0,01%	0,04%
Indus EZ	0,01%	6,63%	1,61%	5,72%	0,00%	0,28%
Aut&Prt EZ	1,65%	6,60%	0,10% *	9,59% *	0,25%	0,01% *
Banks EZ	0,12%	7,75%	0,21%	8,33% *	0,02%	0,02%
Bas Res EZ	0,29%	10,01%	1,32%	8,28%	0,03%	0,16%
Chem EZ	0,82%	5,95%	1,52%	6,10% *	0,14%	0,25%
Cns&Mat EZ	-0,46%	6,84%	1,77%	6,21%	-0,07%	0,29%
Fin Svcs EZ	0,00%	5,94%	1,16%	6,52% *	0,00%	0,18%
Fd&Bvr EZ	0,55%	4,69%	0,77%	3,78%	0,12%	0,20%
Hea Care EZ	0,12%	3,56%	0,73%	5,12% *	0,03%	0,14%
Indus Gd EZ	0,28%	6,91%	1,50%	5,68%	0,04%	0,26%
Insur EZ	0,02%	8,09%	0,34%	9,26% *	0,00%	0,04%
Media EZ	0,17%	5,11%	0,41%	4,96%	0,03%	0,08%
Oil&Gas EZ	0,43%	5,25%	0,34% *	5,09%	0,08%	0,07% *
Pr&Ho Gd EZ	0,50%	5,71%	1,00%	5,04%	0,09%	0,20%
Retail EZ	0,33%	4,92%	0,61%	5,77% *	0,07%	0,11%
Tech EZ	-0,11%	7,34%	0,18%	7,25%	-0,01%	0,02%
Telecom EZ	1,36%	3,87%	-0,10% *	4,42% *	0,35%	-0,02% *
Trv&Lsr EZ	-0,03%	6,20%	1,04%	5,95%	0,00%	0,17%
Util EZ	0,64%	4,94%	1,08%	5,43% *	0,13%	0,20%
Growth EZ	0,32%	4,88%	0,54%	4,65%	0,07%	0,12%
Growth Large EZ	0,36%	4,66%	0,33% *	4,76% *	0,08%	0,07% *
Growth Mid EZ	0,08%	6,14%	1,16%	4,59%	0,01%	0,25%
Growth Small EZ	0,50%	6,86%	1,66%	5,32%	0,07%	0,31%
Value EZ	0,41%	5,86%	0,85%	5,79%	0,07%	0,15%
Value Large EZ	0,39%	5,82%	0,71%	5,81%	0,07%	0,12%
Value Mid EZ	0,50%	6,25%	1,52%	6,24%	0,08%	0,24%
Value Small EZ	0,14%	7,07%	1,52%	6,02%	0,02%	0,25%
Large EZ	0,40%	5,08%	0,48%	5,34% *	0,08%	0,09%
Mid EZ	0,50%	5,81%	1,20%	4,96%	0,09%	0,24%
Small EZ	0,45%	6,22%	1,43%	5,25%	0,07%	0,27%

Bas Mater N	-0,09%	8,08%	1,08%	7,76%	-0,01%	0,14%
Cns Goods N	0,04%	6,72%	1,73%	5,93%	0,01%	0,29%
Cns Svcs N	0,34%	4,98%	1,92%	5,72% *	0,07%	0,34%
Fincl N	0,26%	7,38%	1,58%	7,44% *	0,04%	0,21%
Indus N	0,78%	7,76%	2,06%	6,88%	0,10%	0,30%
Banks N	0,12%	8,47%	1,29%	8,78% *	0,01%	0,15%
Bas Res N	-0,20%	7,81%	0,72%	8,28% *	-0,03%	0,09%
Fin Svcs N	0,46%	6,86%	2,16%	6,10%	0,07%	0,35%
Hea Care N	1,16%	3,74%	1,81%	5,31% *	0,31%	0,34%
Indus Gd N	0,84%	7,91%	2,10%	6,95%	0,11%	0,30%
Media N	0,71%	8,32%	1,13%	9,30% *	0,09%	0,12%
Pr&Ho Gd N	-0,06%	5,74%	1,55%	5,99% *	-0,01%	0,26%
Tech N	-0,60%	7,88%	0,42%	8,68% *	-0,08%	0,05%
Telecom N	1,42%	7,40%	0,93% *	5,52%	0,19%	0,17% *
Large N	0,06%	5,99%	1,11%	6,24% *	0,01%	0,18%
Mid N	0,57%	7,54%	2,08%	6,27%	0,08%	0,33%
Small N	0,34%	7,45%	1,61%	6,20%	0,05%	0,26%

Benchm Eur 1	0,50%	4,41%	0,55%	4,70% *	0,11%	0,12%
Benchm Eur 2	0,51%	4,47%	0,58%	4,71% *	0,11%	0,12%
Benchm EZ 1	0,41%	5,19%	0,63%	5,24% *	0,08%	0,12%
Benchm EZ 2	0,41%	5,23%	0,66%	5,22%	0,08%	0,13%
Benchm Eur ex EZ 1	0,60%	3,79%	0,47% *	4,55% *	0,16%	0,10% *
Benchm Eur ex EZ 2	0,61%	3,86%	0,50% *	4,60% *	0,16%	0,11% *
Benchm N 1	0,21%	6,31%	1,38%	6,06%	0,03%	0,23%
Benchm N 2	0,25%	6,37%	1,44%	6,06%	0,04%	0,24%
Blue-Chip Eur	0,47%	4,00%	0,16% *	4,72% *	0,12%	0,03% *
Blue-Chip EZ	0,44%	4,95%	0,40% *	5,51% *	0,09%	0,07% *
Blue-Chip N	0,34%	5,73%	1,51%	5,76% *	0,06%	0,26%

Table A43 – Risk and return after 2002: Price Return Indices

Table A43 shows risk and return in the period May–October and in the period November–April measured by standard deviation of the monthly returns and monthly continuously-compounded average returns, respectively. In addition, it reports the reward-to-risk ratio. All results are based on 51 Price Return European Stock Indices from January 2003 to October 2010. * denotes that an Index exhibits a worst indicator in the November–April period than in the May–October period. Conditional on the signal be in the columns 4, 5 or 7, it represents that the Index has less average return, more risk or less reward-to-risk ratio, during the winter months, respectively.

	May-Oct.		Nov.-Apr.		Reward-to-risk ratio	
	Mean	Std. Dev.	Mean	Std. Dev.	May -Oct.	Nov. -Apr.
Bas Mater EZ	0,50%	6,87%	1,26%	6,11%	0,07%	0,21%
Cns Goods EZ	0,85%	4,71%	0,39% *	5,54% *	0,18%	0,07% *
Cns Svcs EZ	-0,04%	4,71%	0,47%	4,85% *	-0,01%	0,10%
Fincl EZ	-0,21%	7,53%	0,17%	7,86% *	-0,03%	0,02%
Indus EZ	-0,18%	6,62%	1,45%	5,69%	-0,03%	0,25%
Aut&Prt EZ	1,53%	6,62%	-0,09% *	9,48% *	0,23%	-0,01% *
Banks EZ	-0,23%	7,79%	0,08%	8,33% *	-0,03%	0,01%
Bas Res EZ	0,12%	10,04%	1,04%	8,40%	0,01%	0,12%
Chem EZ	0,59%	5,95%	1,34%	5,98% *	0,10%	0,22%
Cns&Mat EZ	-0,74%	6,83%	1,66%	6,16%	-0,11%	0,27%
Fin Svcs EZ	-0,27%	5,94%	1,01%	6,48% *	-0,05%	0,16%
Fd&Bvr EZ	0,35%	4,71%	0,65%	3,77%	0,07%	0,17%
Hea Care EZ	-0,09%	3,66%	0,64%	5,04% *	-0,02%	0,13%
Indus Gd EZ	0,12%	6,91%	1,31%	5,67%	0,02%	0,23%
Insur EZ	-0,24%	8,14%	0,15%	9,10% *	-0,03%	0,02%
Media EZ	-0,12%	5,19%	0,26%	4,88%	-0,02%	0,05%
Oil&Gas EZ	0,08%	5,20%	0,17%	5,08%	0,02%	0,03%
Pr&Ho Gd EZ	0,39%	5,70%	0,85%	5,01%	0,07%	0,17%
Retail EZ	0,13%	4,92%	0,52%	5,75% *	0,03%	0,09%
Tech EZ	-0,23%	7,35%	0,07%	7,19%	-0,03%	0,01%
Telecom EZ	0,95%	4,06%	-0,29% *	4,40% *	0,23%	-0,07% *
Trv&Lsr EZ	-0,30%	6,30%	0,91%	5,92%	-0,05%	0,15%
Util EZ	0,28%	4,93%	0,88%	5,39% *	0,06%	0,16%
Growth EZ	0,12%	4,87%	0,42%	4,65%	0,03%	0,09%
Growth Large EZ	0,15%	4,66%	0,20%	4,77% *	0,03%	0,04%
Growth Mid EZ	-0,09%	6,13%	1,07%	4,55%	-0,01%	0,24%
Growth Small EZ	0,34%	6,85%	1,57%	5,28%	0,05%	0,30%
Value EZ	0,08%	5,88%	0,65%	5,70%	0,01%	0,11%
Value Large EZ	0,04%	5,85%	0,52%	5,71%	0,01%	0,09%
Value Mid EZ	0,26%	6,27%	1,35%	6,18%	0,04%	0,22%
Value Small EZ	-0,08%	7,10%	1,25%	5,96%	-0,01%	0,21%
Large EZ	0,11%	5,10%	0,32%	5,29% *	0,02%	0,06%
Mid EZ	0,30%	5,80%	1,05%	4,91%	0,05%	0,21%
Small EZ	0,25%	6,23%	1,28%	5,18%	0,04%	0,25%

Bas Mater N	-0,19%	8,08%	0,70%	7,73%	-0,02%	0,09%
Cns Goods N	-0,01%	6,71%	1,42%	5,80%	0,00%	0,25%
Cns Svcs N	0,19%	5,02%	1,64%	5,72% *	0,04%	0,29%
Fincl N	0,24%	7,39%	1,16%	7,14%	0,03%	0,16%
Indus N	0,72%	7,76%	1,75%	6,66%	0,09%	0,26%
Banks N	0,11%	8,48%	0,86%	8,53% *	0,01%	0,10%
Bas Res N	-0,28%	7,82%	0,29%	8,21% *	-0,04%	0,04%
Fin Svcs N	0,41%	6,89%	1,79%	5,93%	0,06%	0,30%
Hea Care N	1,14%	3,73%	1,58%	5,31% *	0,31%	0,30% *
Indus Gd N	0,78%	7,91%	1,81%	6,74%	0,10%	0,27%
Media N	0,62%	8,31%	0,84%	8,99% *	0,07%	0,09%
Pr&Ho Gd N	-0,10%	5,74%	1,20%	5,86% *	-0,02%	0,20%
Tech N	-0,69%	7,89%	0,22%	8,56% *	-0,09%	0,03%
Telecom N	1,30%	7,41%	0,62% *	5,35%	0,18%	0,12% *
Large N	-0,02%	6,00%	0,82%	6,08% *	0,00%	0,14%
Mid N	0,50%	7,54%	1,79%	6,13%	0,07%	0,29%
Small N	0,29%	7,45%	1,32%	6,08%	0,04%	0,22%

Benchm Eur 1	0,27%	4,42%	0,32%	4,66% *	0,06%	0,07%
Benchm Eur 2	0,27%	4,47%	0,36%	4,67% *	0,06%	0,08%
Benchm EZ 1	0,15%	5,24%	0,50%	5,17%	0,03%	0,10%
Benchm Eur ex EZ 1	0,39%	3,79%	0,17% *	4,53% *	0,10%	0,04% *
Benchm Eur ex EZ 2	0,40%	3,86%	0,21% *	4,57% *	0,10%	0,05% *
Benchm N 1	0,13%	6,32%	1,09%	5,90%	0,02%	0,18%
Benchm N 2	0,18%	6,38%	1,15%	5,89%	0,03%	0,19%
Blue-Chip N	0,26%	5,74%	1,20%	5,55%	0,05%	0,22%

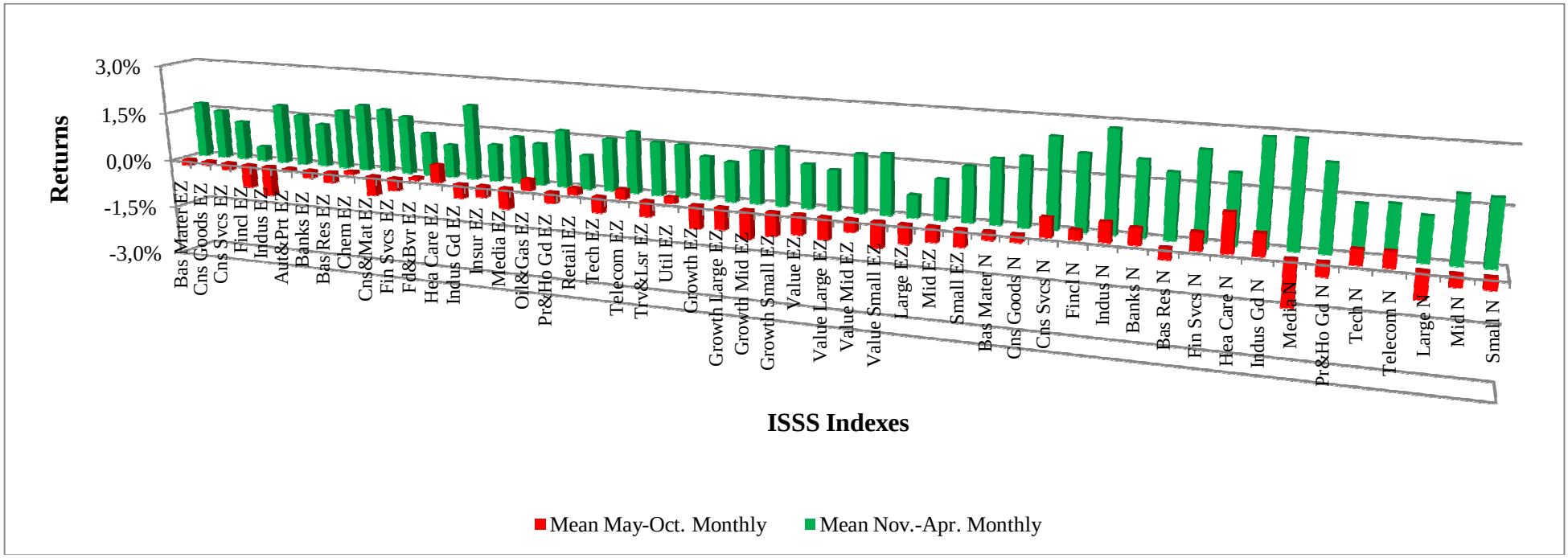

Figure A1 – Average rates of return from October 1992 to October 2010.

Figure A1 reports the average monthly returns in the May–October and November–April periods based on 51Total Return European Stock Indices from October 1992 to October 2010. This figure is graphically identical to the representation of the average monthly returns for the same period based on 51 Price Return European Stock Indices.

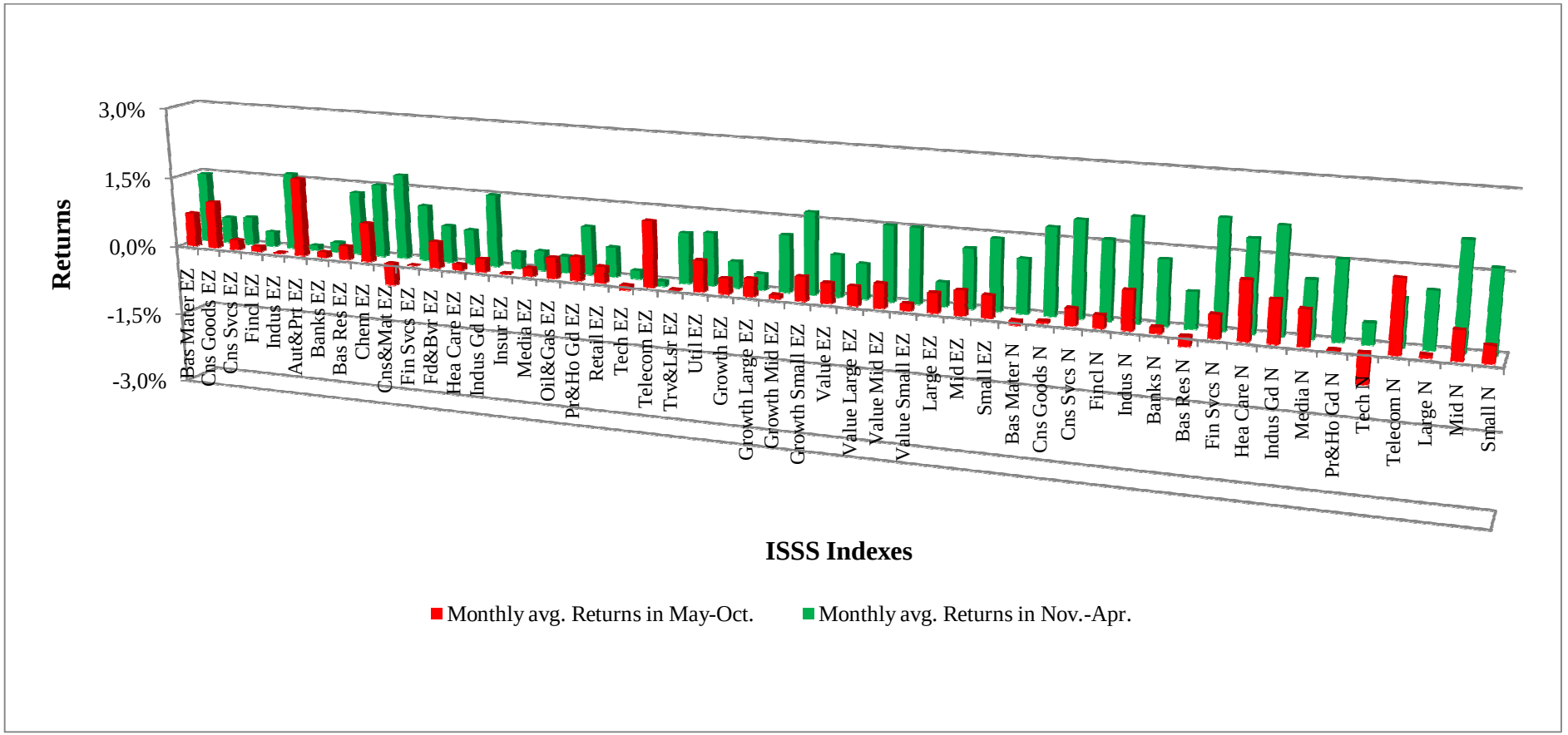

Figure A2 – Average rates of return from January 2003 to October 2010.

Figure A2 reports the average monthly returns in the May–October and November–April periods based on 51Total Return European Stock Indices from January 2003 to October 2010. This figure is graphically identical to the representation of the average monthly returns for the same period based on 51 Price Return European Stock Indices.