Seasonal, Size and Value Anomalies

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Abstract

Recent international evidence shows that in many stock markets, general index returns are significantly higher during winter months than during summer months. We study the interaction between this anomaly - known as the Halloween effect - and the January effect and other well-known anomalous findings on portfolios formed on Size, Dividend Yield, Book to Market ratios, Earnings Price ratios and Cash Flow Price ratios in equally but also value weighted portfolios for the US market. Our main findings are that contrary to the January effect, the Halloween effect seems a market wide phenomenon unrelated to these well-known anomalies. All portfolios in our study show higher average winter returns than summer returns. In most portfolios this difference is statistically and economically significant. We confirm recent results which suggest that the January effect plays an important role not only in explaining the small firm effect but also – together with size - in explaining the Book to Market ratio anomaly. In addition, we find in a similar fashion that controlling for the January effect and using value weighted portfolio returns substantially reduces the Earnings to Price, Cash Flow to Price and Dividend Yield effects.

Key Words: Halloween Effect, Sell in May, January effect, Book to Market, Value, Growth.

JEL Classification code: G14, G15

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1. Introduction

According to recent evidence stock market returns tend to be significantly lower during summer months (May through October) than during winter months (November through April). For instance, Bouman and Jacobsen (2002) show that investors in many countries would be better off if they would avoid investing in stocks during summer. Average summer returns in one third of the 37 countries in their study are below zero and close to zero in many of these counties. They refer to this finding as the 'Halloween-effect' or the 'Sell in May'-effect.[1] Although the differences between summer and winter returns are large and economically profitable, this puzzle has so far received surprisingly little attention in the literature. Current evidence for the Halloween effect is available for general stock market indices only.

As it is well known that another seasonal effect: the January effect; is related to both firm size (Banz, 1981, Reinganum, 1983) and Book to Market effects (Houge and Loughran, 2005, Loughran, 1997) this raises the question whether similarly to the January effect, this Halloween effect might also be related to well known anomalies in the literature. Furthermore, the question whether these two seasonal anomalies are related has to date also remained unanswered.

We use the well-known Fama and French data[2] to study the interaction between the Halloween effect and the January effect and the interaction between these seasonal anomalies and portfolios formed on different characteristics like Size, Book to Market ratios (B/M), Earnings Price ratios (E/P), Cash Flow Price ratios (CF/P) and

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[1] Bouman and Jacobsen (2002) find based on cross country evidence that this effect is related to a change in risk aversion or liquidity due to vacation behavior of investors. Kamstra, Kramer and Levi (2003) document a similar pattern in stock returns and explain it as a Seasonal Affective Disorder effect in stock returns. Cao and Wei (2004) find a strong inverse relation between temperature and stock returns. As average temperature tends to be higher during summer than during winter months this suggests a close link with the same seasonal effect. Indeed Jacobsen and Marquering (2005) show that while the three papers differ with respect to the potential cause of this seasonal effect they seem to measure the same seasonal effect in stock returns. They also show that as many things tend to be correlated with the seasons, it is hard to distinguish between these causes when trying to link stock returns to these potential explanations. Thus the verdict on what causes this seasonal effect in stock returns is still out.

[2] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Dividend Yield (D/P) in equally and also value weighted portfolios. Contrary to the January effect, we find that the Halloween effect is a market wide phenomenon. All portfolios in our study show higher average winter returns than summer returns and in most portfolios this difference is statistically and economically significant. Average summer returns in excess of the risk free rate are frequently negative and in most cases not significantly larger than zero. In addition, we document several other remarkable results. After controlling for a January effect we find no evidence of a size effect in equally weighted portfolios and a reversed size or, in other words, a 'large firm effect' in value weighted portfolios. We also find that not only the B/M effect is affected by January and firm size, but also that the other value effects are substantially reduced – almost halved in size - if we base our results on value weighted portfolios and control for a January effect. This suggests that size also matters for these effects. We find little evidence of a Dividend Yield effect. Controlling for January and firm size hardly justifies a conclusion of anomalous behavior with respect to this ratio.

This study contributes in several ways to the existing literature. Firstly, the January effect is extensively studied and well documented. However, we know little about the Halloween effect beyond the general market indices. All studies to date that document and try to explain this Halloween effect try to explain it as market wide phenomenon induced by investor behavior (change of risk aversion or changing liquidity due to vacations (Bouman and Jacobsen, 2002), risk aversion changes due to seasonal affective disorder (Kamstra, Kramer and Levi, 2003), or risk aversion changes due to temperature changes (Cao and Wei, 2004)). However, the issue whether the Halloween phenomenon is indeed a market wide phenomenon has so far not been tested in the literature. If the effect would only be concentrated in, say, smaller firms or high Earnings to Price portfolios this would invalidate all these explanations. In addition, as January falls in the winter months, precisely the months that show higher returns, it might be that the January effect and the Halloween effect are related. Our results indicate that the Halloween effect and the January effect are truly different anomalies. Moreover, all possible explanations reported in the literature seem to remain valid as the Halloween effect (with the exception of the high dividend yield portfolios), tends to be a market wide phenomenon. Moreover, we document that excess returns on almost all portfolios are during summer not significantly different from zero and negative in approximately half of all portfolios. This confirms the finding of Bouman and Jacobsen (2002) for international results also for the US: excess returns in the US on many portfolios are close to zero and often negative during summer months.

Secondly, our results also provide some new insights in the existing anomalies. We find that Size effect and the well known value effects, like Book to Market, Earnings to Price, Cash Flow to Price and Dividend to Price effects are not affected by the Halloween effect. These anomalies persist in summer and winter. Although we do find that the effect is almost absent in the high Dividend to Price portfolios. However, this result seems to be specific to the United States.

Thirdly, we show that the focus on equally weighted portfolios might overstate the size of the well known anomalies. We know that size and the January effect are related and that size and Book to Market ratio are highly correlated. Surprisingly, most studies that study value anomalies use equally weighted portfolios that assign relatively more weight to the smaller firms. This seems to be a convention without a sound theoretical or empirical foundation.[3,4] Value weighted portfolio returns are hardly ever used even though these have the advantage that they are less influenced by the January and the Small firm effect and therefore these effects do not interfere with the other effects we want to measure. Fama (1998) suggests to let the choice of value weighted versus equally weighted portfolios depend on the economic hypothesis of interest. We use both value weighted and equally indices to disentangle the different effects. Given the evidence by Loughran (1997) a robustness check on these effects using the value weighted indices and correcting for a January effect seems warranted. Our results confirm that conclusion.

Last but not least, our results are in several ways useful for practitioners. For instance, our results indicate that maybe value investors who hold value weighted

[3] See also the discussion in Loughran and Ritter, 2000 and Fama, 1998.

[4] One might argue that investors are able to hold equally weighted portfolios and thus these anomalies can be profitably exploited, but this seems for most professional investors questionable (see for instance Houge and Loughran, 2005).

portfolios ought to be careful in being overoptimistic about the outperformance of their portfolios. Moreover, we find that poor portfolio returns during the summer might be difficult to avoid for almost any investor in the US market.

This paper is organized as follows. In section 2 we discuss the main results on the interaction of the January effect and the use of value weighted portfolios for the well known effects. We show that we are able to reproduce most of the results reported in the literature and we also offer some new insights with respect to strength of the value effects. In section 3 we study the interaction with these portfolio anomalies and the Halloween effect. Section 4 concludes.

2 January, Size and Value

A. Data and Methodology.

All data are from the Fama and French data library[5] over the period July 1926 through December 2004. We use the information on the general market index, short term Treasury bill rate and the decile portfolio returns for all portfolios formed on Size, Book to Market ratio, Earnings to Price ratio, Cash Flow to Price ratio and Dividend Yield and also the 100 double sorted decile portfolios formed on Size and Book to Market ratio. We generally discuss our results based on graphical evidence. However, for the reader interested in detailed statistical significance of these findings, we include most important tables underlying the figures in the main text, in the Appendix.

While the literature generally focuses on equally weighted portfolios, we report results for value weighted portfolios as well, because results tend to differ in several cases. When results are similar we just report the results of the equally weighted portfolio. Contrary to the equally weighted portfolios, the value weighted portfolios assign relatively less weight to the smaller firms in the different decile portfolios. The choice between value weighted or equally weighted portfolio is an arbitrary one. Investors can hold both value weighted or equally weighted portfolios. However, given the interaction of January and size effect, and these two effects with the other

[5] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

effects it might be good to check robustness of previous findings against the value weighted portfolios as well.

Our methodology is simple. We analyze all time series of (log) portfolio returns starting with the random walk model and then include a January dummy, a Halloween dummy, or both, to study the interaction between these effects and the different portfolio returns. The January dummy takes the value one in January and zero otherwise, the Halloween dummy takes the value zero during the summer months (May-October) and one during the winter months (November-April). Thus, if we include both dummies we would have:

$$r_t = \mu + \alpha\, Hal_t + \beta\, Jan_t + \varepsilon_t \text{ with } \varepsilon_t = r_t - E_{t-1}[r_t] \quad (1)$$

where μ is a constant and ε_t the usual error term. In all cases we use t-values based on White standard errors.

B. Size, Value and Glamour effects.

We start with the well known results from the literature on equally weighted portfolios. We use decile portfolios formed on Size, B/M, E/P, CF/P and D/P. Table 1 contains the mean and standard deviations statistics for the equally weighted and value weighted portfolios. Figure 1 plots the different returns for the different decile portfolios (for equally weighted portfolios).

Please insert Table 1 and figures 1A – 1E over here.

Our results are well in line with earlier evidence in the literature. We find strong evidence of a small firm effect (Figure 1A), consistent with the findings of Banz (1981) and Reinganum (1983). Lower decile portfolios offer a return of 1.49 percent monthly and do much better than the largest decile portfolio with only 0.76 percent monthly on average over the sample period. Fama and French (1992) report 1.4 percent return for smallest size portfolio compared to a 0.89 percent for largest decile. We also find results that are in line with the literature for the usual *Value* and *Growth* effects. *Value* stocks: portfolios with high B/M ratios, high E/P ratio's, high CF/P ratios; tend to do better than the *Glamour* or *Growth* portfolios with low ratios (Figure 1B, C and D, respectively). *Value* portfolio using B/M as measure has over our sample period an average monthly return of 1.58 percent compared with the average monthly return of the *Glamour* portfolio of 0.53 percent. Lakonishok, Shleifer, and Vishny (1994) report a lower (0.53 percent monthly) return differential while Fama and French (1992) give a much higher (1.39 percent) monthly return differential between *Value* and *Glamour* portfolios. The highest decile *Value* portfolio based on E/P has a 0.86 percent additional monthly return compared to the corresponding lowest decile *Glamour* portfolio in our sample, similar to a *Value* premium of 0.73 percent reported by Fama and French (1992), but higher than the 0.33 percent differential reported by Lakonishok, Shleifer, and Vishny (1994). The CF/P *Value* portfolio returns a premium of 0.90 percent over the corresponding *Growth* portfolio. This difference is similar to differential reported by Lakonishok, Shleifer, and Vishny (1994). The D/P effect is less strongly present in our data. However, this result also is in line with the literature as the D/P effect is known to be less strong and in some countries tends to be reversed (Fama and French, 1998).

C January, Size and the interaction with Value and Glamour effects.

It is well known that the January effect is predominantly present in smaller firms (Banz, 1981, and Reinganum, 1983). Our data are no exception in that respect.

Please insert figure two around here.

Figure 2 shows the strength of the January effect in the different equally weighted size portfolios. We simply regress the returns of the portfolio on a constant and only a January-dummy in equation 1. This means that we report the January effect as the additional January return above the average return in any other month.

We now check the robustness of the different value effects once we control for both size effects and the January effect. In figure 3 we compare the results for value weighted portfolios and the equally weighted portfolios with and without controlling for January. [6]

Please insert figures 3A – 3E over here.

Figure 3A shows that changing from equally weighted to value weighted portfolios reduces the returns for the first decile portfolios substantially. This decile seems to show a strong size effect within the decile itself. It seems that the smaller stocks within that decile are responsible for the high average returns. Once we control for a January effect and look at the value weighted portfolios, we find a reversed size effect or in other words a 'large firm effect'. Without the additional January return the smaller firms have an average monthly return of 0.4 percent or roughly 5 percent annually and the larger decile portfolios show an average return that is almost twice as high (0.8 percent or 10 percent annually).[7]

Evidence by Loughran (1997) indicates that the Book to Market anomaly might be driven by the good performance of the smaller value stocks in January and the extremely poor performance of very small growth stocks in the past. If that conclusion also holds for our data one would expect that if we switch from equally weighted to value weighted portfolios the low return for the lowest decile portfolios should disappear (small growth firms have less of an effect). The high returns for the high decile portfolios should be reduced over the sample period (high small value firms play a less important role). In addition, the latter effect should become stronger because once we control for January because the small value firms did relatively better in that month. Our results confirm these findings. Figure 3B shows that a shift from equally weighted to value weighted has a drastic impact on the

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[6] All exact estimates related to these figures are reported in table A1 in the Appendix.
[7] This result has another implication. If this result would hold generally, it would imply that for instance the Small Minus Big risk factor (SMB) in the three factor model introduced by Fama and French should correct for the higher risk premium for the larger firms once we control for a January effect. This is exactly what we find. If we regress the SMB factor over the same period on a constant and a January dummy, we find a negative – although insignificant constant (-0.031% with a p-value of 0.777) and a highly significant January effect (2.43%, p-value 0.000). This result is not completely knew, Fama and French report a similar result: they also find an insignificant SMB risk premium once they control for a January effect. However, in their shorter data the SMB premium after controlling for a January effect was still positive, although not significantly so.

average returns for the lowest decile portfolio. Moreover, the highest decile portfolio is – although to a lesser extent - influenced by January and Size. After taking these effects into account the decile portfolios offer very little evidence of a Book to Market effect, confirming the conclusion of Loughran (1997). In fact, if anything the Book to Market anomaly seems reversed.[8]

Given the strong impact the size and January effect seem to have on these anomalies, it might be good to check how the E/P effect and the CF/P effect are affected by these effects. In Figure 3C and 3D we compare the different portfolios. In both cases the conclusion is that both effects remain present although they are substantially reduced in size. The E/P effect is reduced from a monthly return difference of 0.86% between the smallest and the largest equally weighted portfolio including the January effect, to a monthly return of 0.36% between the smallest and the largest value weighted portfolio after controlling for a January effect. For the CF/P effect we see a similar reduction from a monthly difference of 0.90% to 0.49%, if we make the same comparison.

Figure 3E shows that if a D/P effect existed in our data set, it has completely disappeared once we make similar corrections. It seems that also for these anomalies that to some extent size matters. In addition, on top of size the January effect also explains a substantial part of the return differences between these portfolios.

Our results so far confirm earlier results in the literature that the January effect plays an important role in the size effect and that both effects play an import role in explaining the Book to Market anomaly. We find that these effects also affect the E/P effect and the CF/P effect. Both effects remain present but are reduced to about half of their size previously documented in the literature. Given the strong interaction between these effects a natural question to ask is how a newly documented seasonal pattern known as the Halloween indicator might be

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[8] Similarly, to footnote 6 one might expect a negative estimate for the High Minus Low Book to Market factor in the Fama and French three factor model. However, this factor remains positive (0.17%) after controlling for a January effect (2.09%, p-value 0.000) although not significantly so (p-value constant equals 0.156).

responsible for these well-known effects, or vice versa whether this high difference between summer and winter returns is captured by these well known anomalies. In the next section we study the interaction between these well known anomalies and the Halloween effect.

3. Halloween and the other anomalies

A. Halloween and January.

Bouman and Jacobsen (2002) find a significant Halloween effect in the US market using the MSCI index over the period January 1970 through August 1998. However, as January falls in the winter period, the period with higher returns, a Halloween effect might be partially driven by the January effect. We start our analysis of the well known anomalies and the Halloween effect by studying the relation between these two seasonals.

We first try to replicate the Bouman and Jacobsen (2002) result using our data. We use the general market index (which includes all NYSE, AMEX, and NASDAQ firms) over the period July 1926- December 2004.

We start with the random walk model and include a dummy variable to test for the existence of a Halloween effect as in regression 1 but do not control for the January effect:

$$r_t = \mu + \alpha Hal_t + \varepsilon_t \text{ with } \varepsilon_t = r_t - E_{t-1}[r_t]$$

Where μ is a constant and ε_t the usual error term. The dummy variable Hal_t takes the value 1 if month *t* falls on the period November through April and 0 otherwise. We test whether the coefficient of Hal_t, α, is significantly different from zero. Next we replace the Halloween dummy with a January dummy and re-estimate regression 1. Finally we include both variables in the regression. Table 2 contains our estimation results.

Please insert Table 2.

For the general market index we find, using only a Halloween dummy, a significant Halloween effect at the 10 percent level. Note that the average return during a summer month is approximately 0.47 percent, whereas the average return over the winter months has been 1.14 percent. In fact for the total market average returns during the summer are only marginally higher than the average risk free rate of 0.30 percent monthly over this period. If we consider the regression results with only the January dummy we find that average returns during January are significantly higher (p-value equals 0.081) by almost one percent than returns during the remainder of the year. If we now include both dummies we find that both coefficients - although they are still positive and in economic terms large - are not significantly different from zero. These results for the general market index are well in line with the findings for the US market in Bouman and Jacobsen (2002). Note that the United States market is the exception in this case, in the sense that in many countries, both the January effect and the Halloween effect remain significantly present in the data, although both tend to be somewhat reduced. These results raise some interesting questions. Are the Halloween effect and the January effect somehow related? Or, is (part of) the January effect the Halloween effect in disguise[9] or vice versa? Are these two separate effects? All the probable causes put forward in the literature suggest that the Halloween effect has to be a market wide effect related to risk aversion of investors, whereas we know that the January effect is restricted to smaller firms (Keim, 1983, and Reinganum, 1983) and companies with larger B/M's (Loughran, 1997).

To disentangle the January effect and the Halloween effect and take Size and Book to Market effects into account, it seems natural to consider portfolios sorted on both size and book to market ratios. Here we report results for the equally weighted portfolios only because results for the value weighted portfolios are almost similar.

Please insert figures 4A – 4E over here.

[9] Note that although the January effect was discovered earlier than the Halloween effect that does not mean the January effect has been present longer in the data than the Halloween effect. In fact Bouman and Jacobsen (2002) document the Halloween effect in UK data as far back as 1692 (no typo!).

Figure 4A shows the average monthly returns for the hundred portfolios double sorted on size and B/M ratio[10]. With the exception of the portfolios with relatively low B/M 's the size effect seems present. Smaller firms show higher returns on average. Moreover the book to market effect seems present in especially the smaller portfolios. This again seems to confirm the Loughran (1997) result that the poor returns of small growth firms might be partially driving the Book to Market effect[11]. If we take out the January effect in Figure 4B that conclusion becomes even stronger. Small growth firms have negative returns on average in the non January months. The relatively good performance of the value firms in January shows up if we look at the January effect in all these portfolios (Figure 4C). The January effect is particularly strong in the smaller high book to market stocks. Larger firms with low B/M's show hardly any significant January effect. Similar to our result in section 2C, this confirms the second result of Loughran (1997) that a strong January effect in the smaller value firms plays a role in the B/M effect. If one ignores the poor performance of the small growth stocks and after controlling for January one might argue that the book to market anomaly is seriously flawed.

If the Halloween effect is unrelated to the January effect one would expect a different pattern for the Halloween effect in these double sorted portfolios. In Figure 4D we show the Halloween effect in these portfolios (after controlling for a January effect). This plot provides two remarkable insights. Firstly, a Halloween effect is present in all 100 portfolios. Every one of these hundred portfolios has higher returns in the winter months than during the summer months (note that figure shows winter returns in these portfolios in excess of summer returns). Secondly, we find the Halloween effect present almost consistently in all these portfolios. It seems a little bit stronger in the higher book to market portfolios, but note that these returns were somewhat higher to begin with. In Table A2 of the Appendix we report the average returns and their respective t-statistics for both the January effect (after

[10] All exact estimation results can be found in Table A2 of the Appendix.

[11] Loughran (1997) covers the period from 1963 to 1995. The results we report here cover whole period from 1926 to 2004. In addition, we tested whether these results are robust and found that if we divided our sample in two subperiods (July 1926 to June 1963 and July 1963 to December 2004) that results are similar in those subperiods as well.

controlling for the Halloween effect) and the Halloween effect (after controlling for the January effect). This confirms the conclusion from our plots. A strong and significant Halloween effect in almost all portfolios and a January effect restricted to the small firms and high B/M firms. It seems safe to conclude that the Halloween effect and the January effect are truly different anomalies. In addition, the Halloween effect seems unrelated to size effects and book to market effects.

While obvious, it might be good to point out that the consequence of a strong Halloween effect is that average summer returns should be low. It is interesting to see how low. In Figure 4E we show the summer returns in excess of the average monthly risk free rate over the same period of 0.3 percent on average. Note that these excess returns on almost all these portfolios are not significantly different from zero and negative in approximately half of all portfolios. This confirms the finding of Bouman and Jacobsen (2002) for international results also for the US: excess returns in the US on many portfolios are close to zero and often negative during summer months.

B. Halloween and the other effects.

As we found that the January effect and the Halloween effect are unrelated, we now investigate the Halloween effect in relation to the other anomalies. In figures 5A through 5J we report the average monthly return and the average monthly summer and winter returns for the equally weighted and value weighted portfolios formed on Size, B/M, E/P, CF/P and D/P[12]. Note that to facilitate comparison within each plot we report the total winter returns in all figures and not additional winter returns implied by the alpha from our earlier regression.

Please insert figures 5A – 5J over here.

The general conclusion from figures 5A through 5J is quite clear. The Halloween effect is present in all portfolios. It does not matter how they are sorted or weighted: in all cases we find that average winter returns are higher than average summer

[12] Table A3 contains the exact estimation results for the number used to create these figures.

returns. In most cases this Halloween effect is consistent across the decile portfolios. Only one exception occurs: When portfolios are formed based on D/P we find that the deciles that relatively pay the highest dividends, show less of a Halloween effect. The higher returns of the higher dividend yield portfolios cannot be attributed to this Halloween effect (Figure 5I). It seems that deciles offering higher dividend yields do better because they perform better during the summer months. At first sight one might expect this could be due to seasonality in dividend payments. However, there is little evidence of seasonality in dividend payments. For instance Lakonishok and Smidt (1988) report little difference between dividends during the summer and winter months. Sampling dividend payments in the years 1941, 1951, 1961, 1971, 1981 for stocks included in the DJIA they find that these firms pay 2.48% return in dividends during the winter and 2.42% during the summer months. In addition we find that there are also hardly any differences in dividend payments during the winter and summer in the more recent years.[13]

To check robustness of the difference in the strength of a Halloween effect in high and low dividend yield portfolios, we check whether this difference is also apparent in international high dividend and low dividend yield portfolios.[14] We find that the results for the United States are exceptional. For the twenty countries for which data are available we find a strong Halloween effect in both high and low dividend yield portfolios. More precisely, for the high dividend yield portfolios we find a significant Halloween effect in fifteen countries, for the low dividend yield portfolios results are statistically significant in twelve countries. In addition, if we consider returns of all countries together we find a difference of 1.70 percent for the high dividend yield portfolio with a t-value of 3.85 and a difference between winter and summer returns of 1.55 percent for the low dividend yield portfolios with a t-value of 3.19. This suggests that the difference in the US between the different D/P sorted decile portfolios is spurious.

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[13] The average daily dividend yield in the winter months (November to April) from 3 July 1962 to 31 December 2004 is 0.0134 percent compared to 0.0132 percent in the summer months (May to October).

[14] Fama and French also make international portfolio data available on their website. However, these data are limited in the sense that they are only divided in two groups instead of decile portfolios.

Summarizing our evidence these results show that the well known patterns are not captured by this Halloween pattern and also vice versa that these effects also do not capture the Halloween effect.

C. Some additional robustness tests.

We perform a robustness check of whether Halloween effect and January effect are different across decile portfolios sorted by size, book-to-market, E/P, cash flow to price, and dividend yield. We do so by running a seemingly unrelated regression (SUR) of the following equation system:

$$r_{i,t} = \mu_i + \alpha_i Hal_t + \beta_i Jan_t + \varepsilon_{i,t} \text{ with } \varepsilon_{i,t} = r_{i,t} - E_{t-1}[r_{i,t}] \tag{2}$$

where i represents the portfolio decile 1 to decile 10. The hypothesis that the Halloween effect is not significantly different across decile portfolios is equivalent to;

$$H_0 : \alpha_1 = \alpha_2 = ... = \alpha_{10} \tag{3}$$

whereas the hypothesis that the January effect is not significantly different across decile portfolios can be formalized by

$$H_0 : \beta_1 = \beta_2 = ... = \beta_{10} \tag{4}$$

Please insert Table 3 around here

Table 3 shows the Wald restriction test of hypotheses in equations 3 and 4 above. Consistent with our earlier findings, the Halloween effect is prevalent across all sorted decile portfolios except for the equally weighted portfolios sorted by dividend yield, while the degree of January effect varies across portfolios. These results hold in both value weighted and equally weighted portfolios sorted by size, book-to-market, earnings to price, cash flow to price, and dividend yield.

As a further robustness test of this result one would expect that if we run a regression including the general market portfolio, which itself does contain a Halloween effect, we would no longer find a Halloween effect but still for smaller firms with high B/M's that a January effect remains significantly present. To save space we do not report these results but this is exactly what we find. Once we include the general market index as an explanatory variable the Halloween effect has almost completely disappeared, whereas the January effect remains significantly present in these aforementioned portfolios.

4. Conclusions

We confirm several well-known results from the literature and report several new findings with respect to the interaction between seasonal, size and the value anomalies. Our new findings are that the small firm effect completely disappears in equally weighted portfolios, and even stronger is reversed in a 'large firm effect' once we take the January effect into account and use value weighted portfolio returns. We also show that the January effect and the size effect not only play an important role in the Size and the B/M anomaly but also are able to explain a large part of the other value anomalies, like E/P and CF/P. Although both effects do remain present in our data, these effects are reduced to half the size previously documented in the literature. Furthermore, we find little evidence of a D/P effect. Controlling for January and firm size hardly justifies a conclusion of anomalous behavior.

Contrary to the January seasonal effect, our results show that the Halloween effect is a market wide phenomenon. This Halloween effect is unrelated to the Size effect and the B/M anomaly and we also find no relation between the size of Halloween effect and portfolios formed on E/P and CF/P. The only link we find is that the Halloween effect is more pronounced in the low dividend yield portfolios, however, this result seems to be specific to the United States.

An important consequence of our analysis is that the search for the potential cause of this Halloween effect should explain the phenomenon market wide. The Halloween effect might be a result of an effect that affects all investors or a returning macro economic phenomenon that has so far not been discovered but which causes stock returns to fluctuate so consistently in a predictable way.

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Tables

Table 1: Descriptive Statistics
Monthly percentage averages and standard deviations of decile value weighted (VW) and equally weighted (EW) portfolio returns. Portfolios are sorted by size, book-to-market, earning-to-price, cash-flow-to-price, and dividend yield.

Deciles	Size		BE/ME		E/P		CF/P		D/P	
	VW	EW	VW	EW	VW	EW	VW	EW	VW	EW
	Panel A: Average Portfolio Return									
1	1.05	1.49	1.66	0.53	0.70	0.78	0.73	0.72	0.72	0.96
2	0.96	1.05	0.83	0.76	0.77	0.94	0.84	0.94	0.80	1.02
3	0.98	1.02	0.84	0.90	0.92	1.03	0.90	1.08	0.79	1.01
4	0.97	0.96	0.78	1.01	0.94	1.10	0.90	1.13	0.88	1.10
5	0.96	0.96	0.90	1.11	0.93	1.18	1.05	1.24	0.73	1.08
6	0.94	0.94	0.87	1.14	1.09	1.27	0.99	1.31	0.83	1.10
7	0.94	0.93	0.92	1.24	1.18	1.34	1.10	1.38	0.93	1.16
8	0.90	0.88	1.02	1.30	1.27	1.39	1.11	1.40	0.98	1.13
9	0.86	0.86	1.04	1.45	1.29	1.51	1.30	1.53	0.93	1.11
10	0.77	0.76	0.97	1.58	1.40	1.64	1.30	1.62	0.87	1.02
	Panel B: Standard Deviation of Portfolio Return									
1	9.30	9.69	5.36	7.28	5.54	6.45	5.41	6.43	6.51	6.98
2	8.54	8.80	5.60	6.78	4.55	5.54	4.54	5.53	5.80	6.41
3	7.76	8.00	5.45	6.70	4.39	5.24	4.34	5.08	5.61	6.09
4	7.31	7.55	5.96	6.89	4.23	4.93	4.51	4.83	5.42	5.91
5	7.13	7.34	5.57	6.78	4.37	4.81	4.39	4.72	5.60	5.75
6	6.80	6.98	6.18	6.91	4.29	4.62	4.28	4.67	5.51	5.86
7	6.49	6.66	6.48	7.06	4.22	4.55	4.25	4.61	5.35	5.59
8	6.16	6.32	6.58	7.50	4.31	4.51	4.24	4.72	5.84	5.91
9	5.91	6.11	7.75	8.22	4.56	4.65	4.29	4.82	5.95	5.84
10	5.16	5.48	8.78	9.44	5.12	5.29	4.90	5.32	6.35	6.53

Table 2: Halloween and January effect in the general market index

Halloween and January effect in the general market index over the period from July 1926 to December 2004. *P*-values of the estimate provided in parenthesis are calculated using heteroscedasticity consistent standard errors. Significant values (at the 10 percent level) are in bold.

μ	α	β
Panel A: Halloween Effect $r_t = \mu + \alpha\, Hal_t + \varepsilon_t$		
0.47	**0.67**	
(0.09)	**(0.06)**	
Panel B: January Effect $r_t = \mu + \beta\, Jan_t + \varepsilon_t$		
0.72		**0.96**
(0.00)		**(0.08)**
Panel C: Halloween and January Effect $r_t = \mu + \alpha\, Hal_t + \beta\, Jan_t + \varepsilon_t$		
0.47	0.56	0.66
(0.09)	(0.13)	(0.26)

Table 3: Difference of Halloween Effect and January Effect Across Decile Portfolios

Wald coefficient restriction test statistics from the seemingly unrelated regression (SUR).

$r_{i,t} = \mu_i + \alpha_i Hal_t + \beta_i Jan_t + \varepsilon_{i,t}$ with $\varepsilon_{i,t} = r_{i,t} - E_{t-1}[r_{i,t}]$ where i=1, 2, …, 10.

The test hypotheses are as follows:
Hypothesis 1: *The Halloween effect is not significantly different across decile portfolios.*
$(H_0 : \alpha_1 = \alpha_2 = ... = \alpha_{10})$
Hypothesis 2: *The January effect is not significantly different across decile portfolios.*
$(H_0 : \beta_1 = \beta_2 = ... = \beta_{10})$
The number in the bracket represents p-value adjusted for White standard errors.

Significant values (at the 10 percent level) in bold.

Decile portfolios	Halloween Effect		January Effect	
sorted by	VW	EW	VW	EW
Size	13.30	9.57	**122.95**	**156.95**
	(0.15)	(0.39)	**(0.00)**	**(0.00)**
Book to Market	7.04	10.23	**39.05**	**89.65**
	(0.63)	(0.33)	**(0.00)**	**(0.00)**
Earnings to price	7.29	3.74	**24.30**	**90.43**
	(0.61)	(0.93)	**(0.00)**	**(0.00)**
Cash flow to price	7.12	8.72	**35.56**	**67.48**
	(0.62)	(0.46)	**(0.00)**	**(0.00)**
Dividend to price	14.07	**21.98**	**43.14**	**65.98**
	(0.12)	**(0.01)**	**(0.00)**	**(0.00)**

Figures

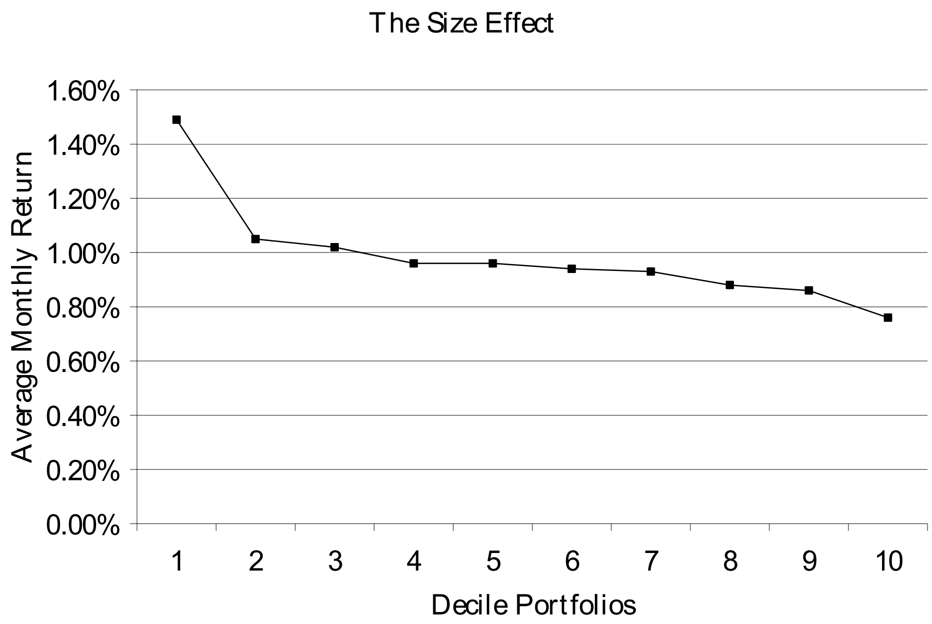

Figure 1A: Size Effect

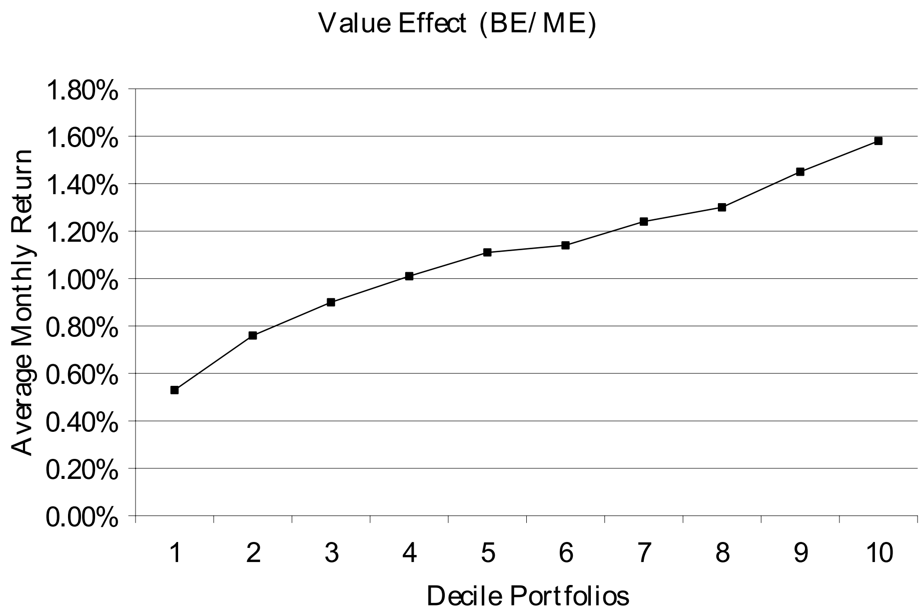

Figure 1B: Value Effect (BE/ME)

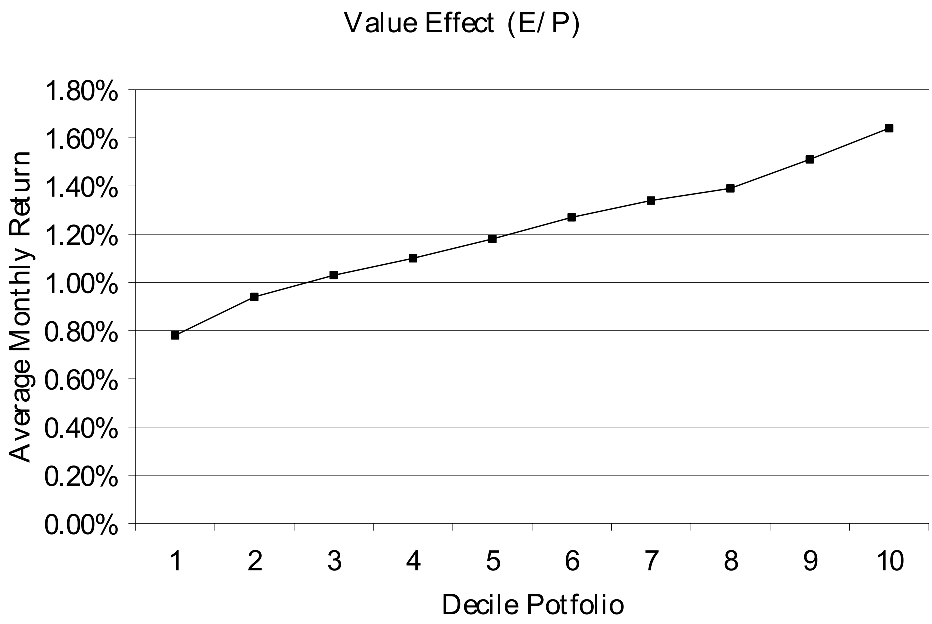

Figure 1C: Value Effect (E/P)

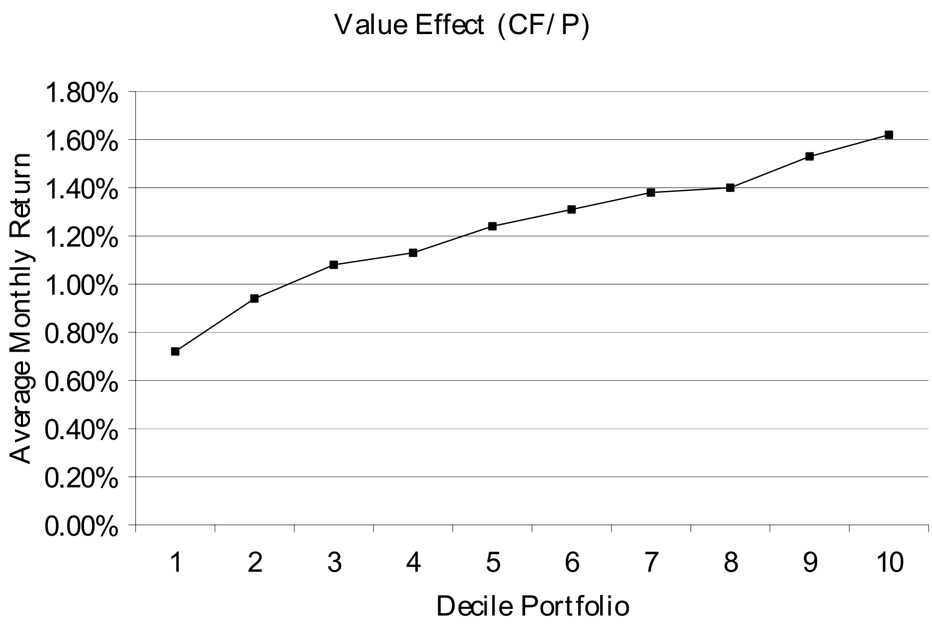

Figure 1D: Value Effect (CF/P)

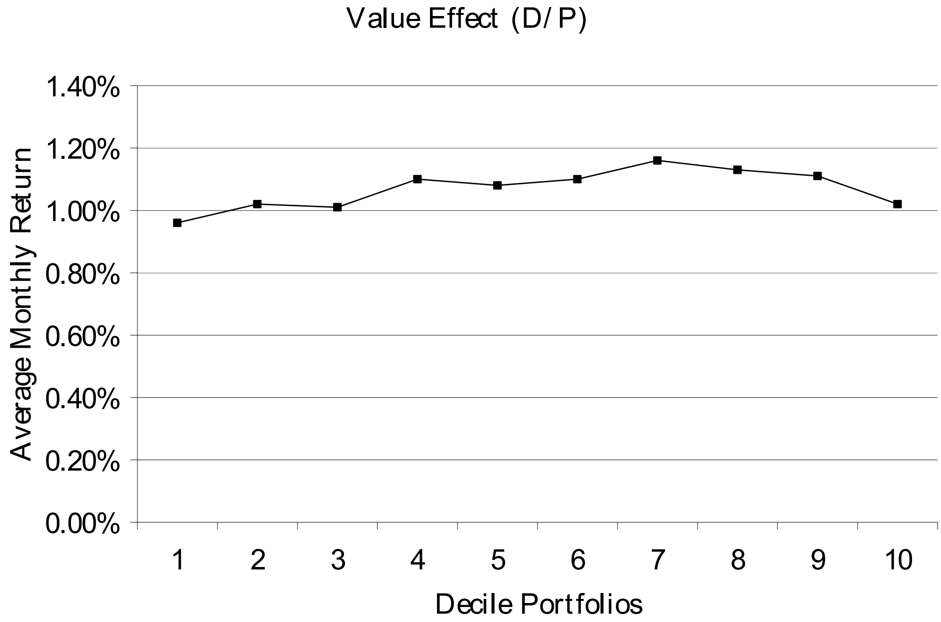

Figure 1E: Value Effect (D/P)

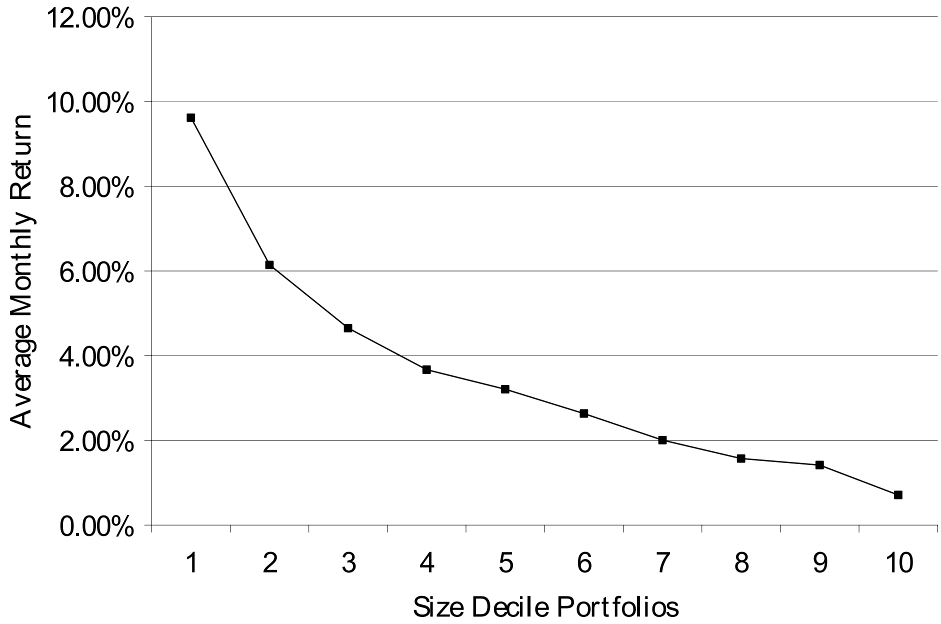

Figure 2: January return on Size decile portfolios.

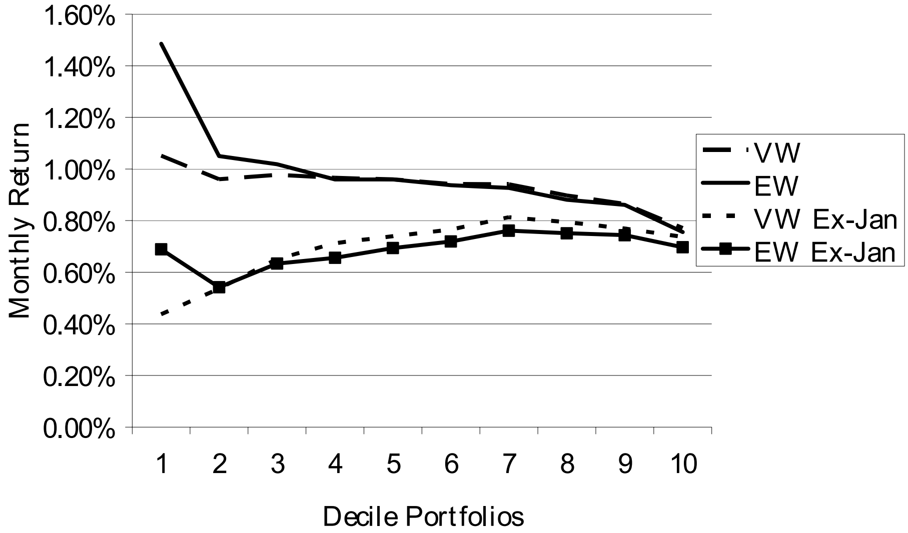

Figure 3A: Size effect and its interaction with January effect.

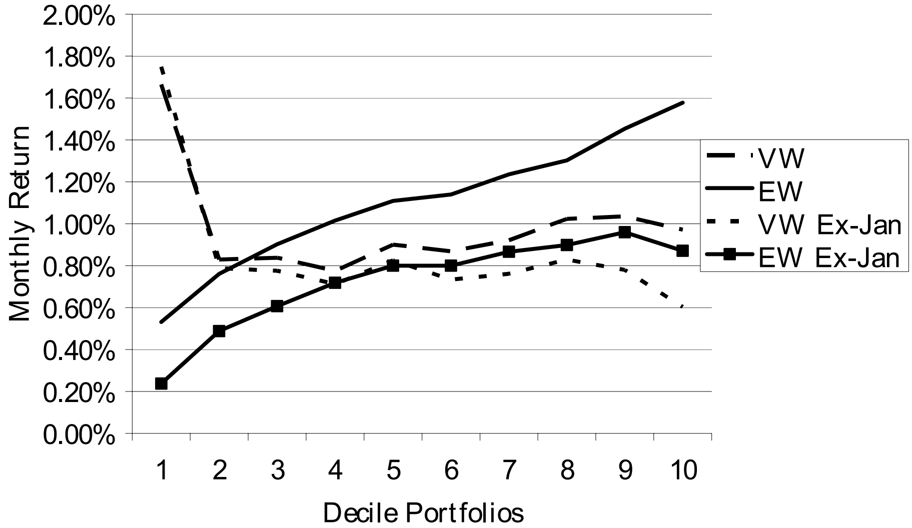

Figure 3B: B/M effect and its interaction with January and Size anomaly.

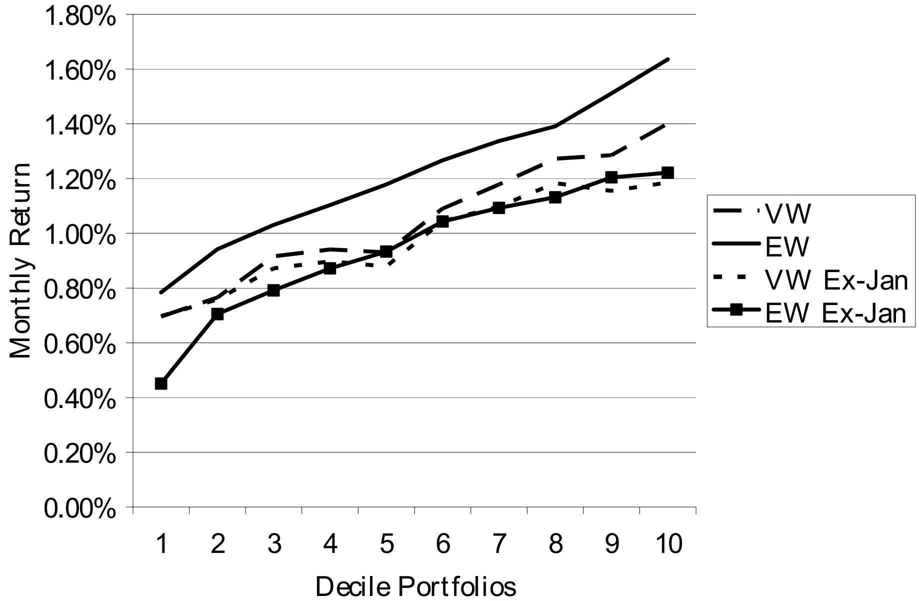

Figure 3C: E/P effect and its interaction with January and Size anomaly.

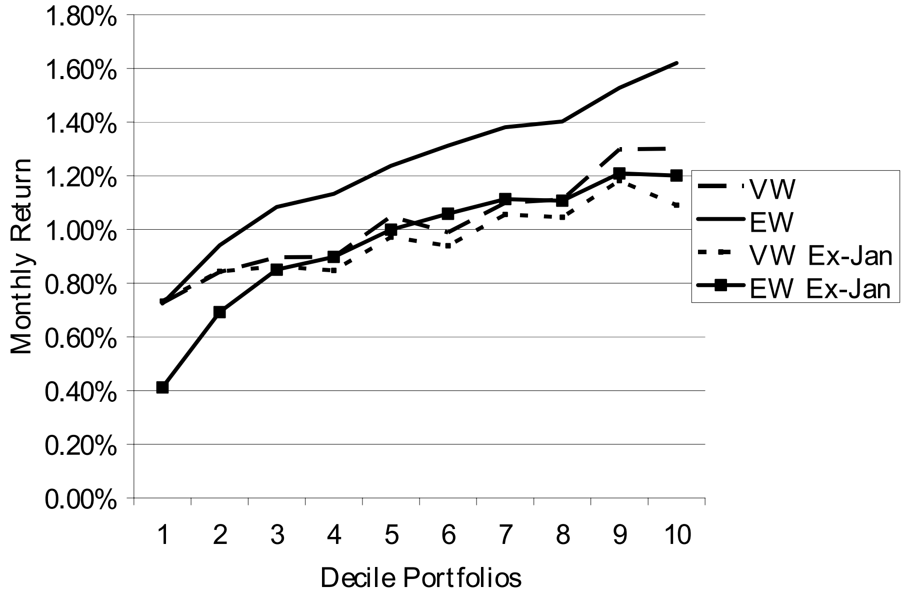

Figure 3D: CF/P effect and its interaction with January and Size anomaly.

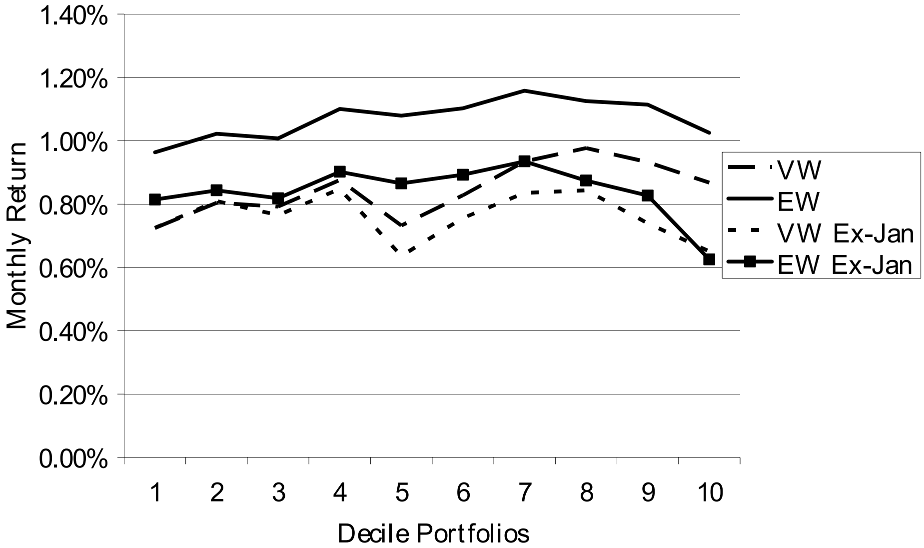

Figure 3E: D/P effect and its interaction with January and Size anomaly.

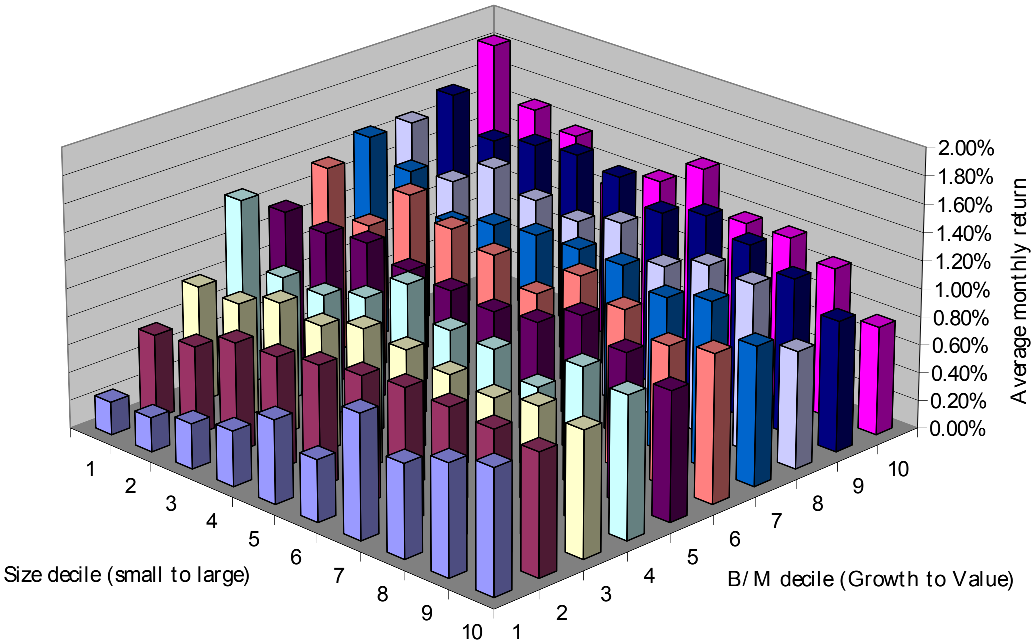

Figure 4A: Average monthly return on size and B/M double sorted portfolio.

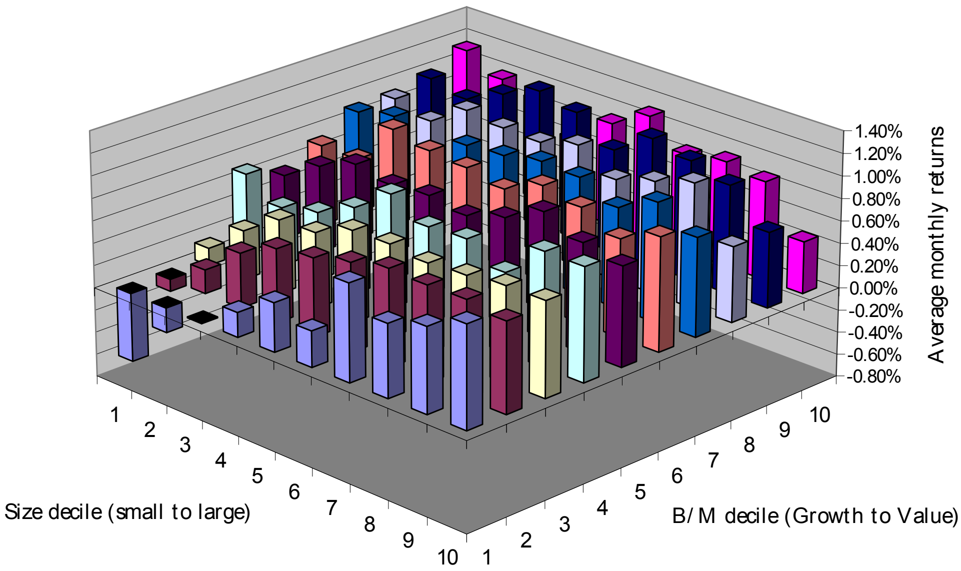

Figure 4B: Average monthly return of 100 equally weighted portfolios double sorted by size and B/M value without January effect.

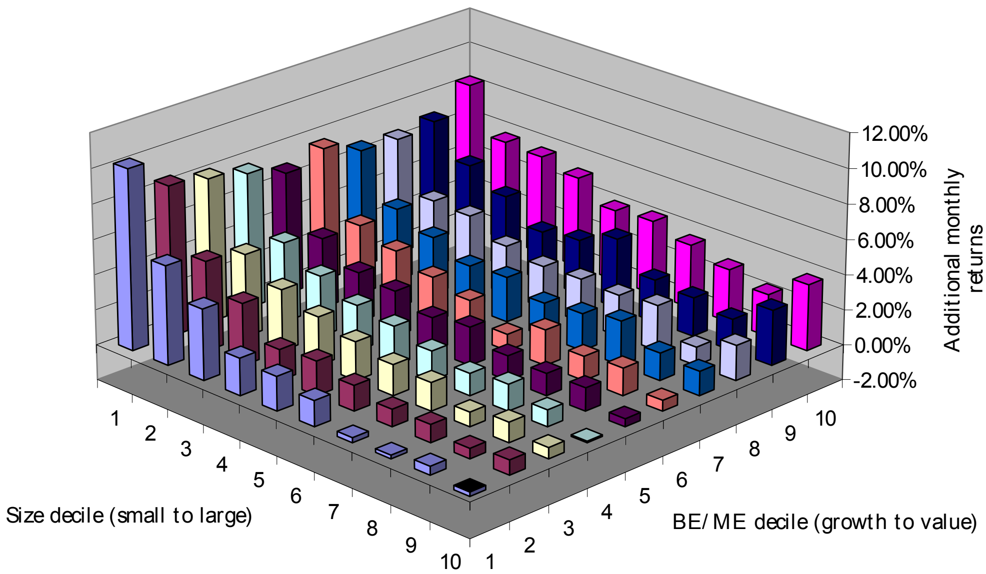

Figure 4C: January effect in 100 equally weighted portfolios double sorted by size and B/M value.

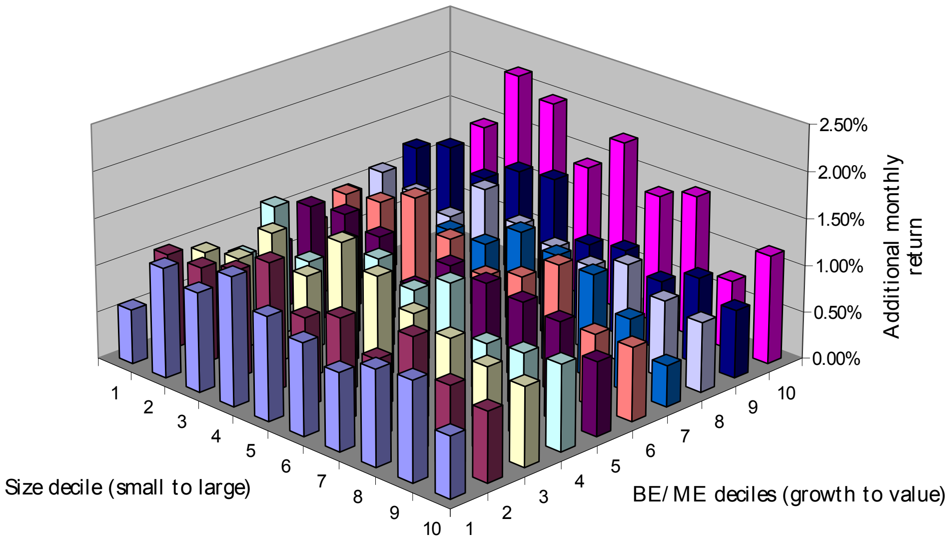

Figure 4D: Halloween effect after controlling for January effect in 100 equally weighted portfolios double sorted by size and B/M value.

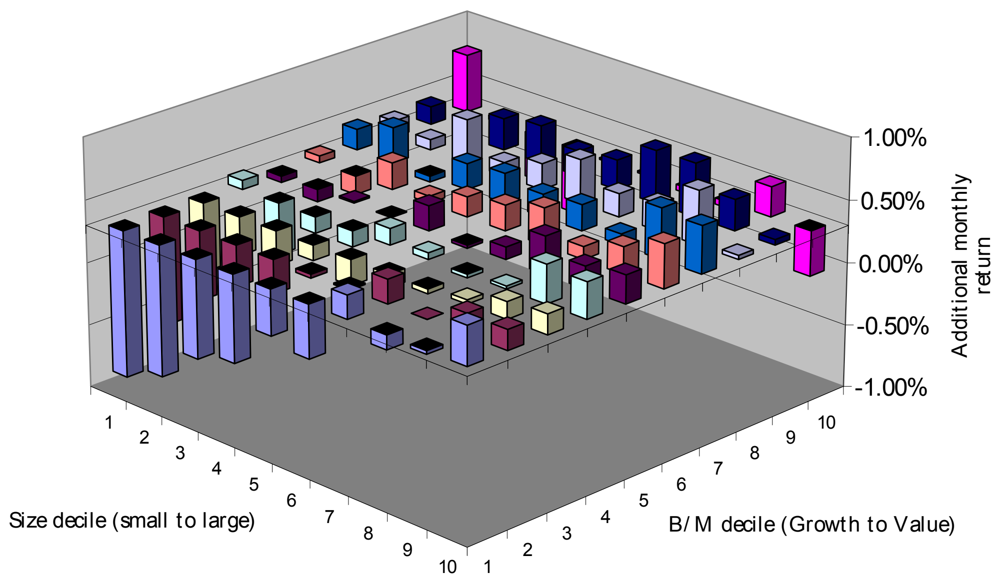

Figure 4E: Average summer return in double sorted equally weighted portfolios in excess to average monthly risk free rate.

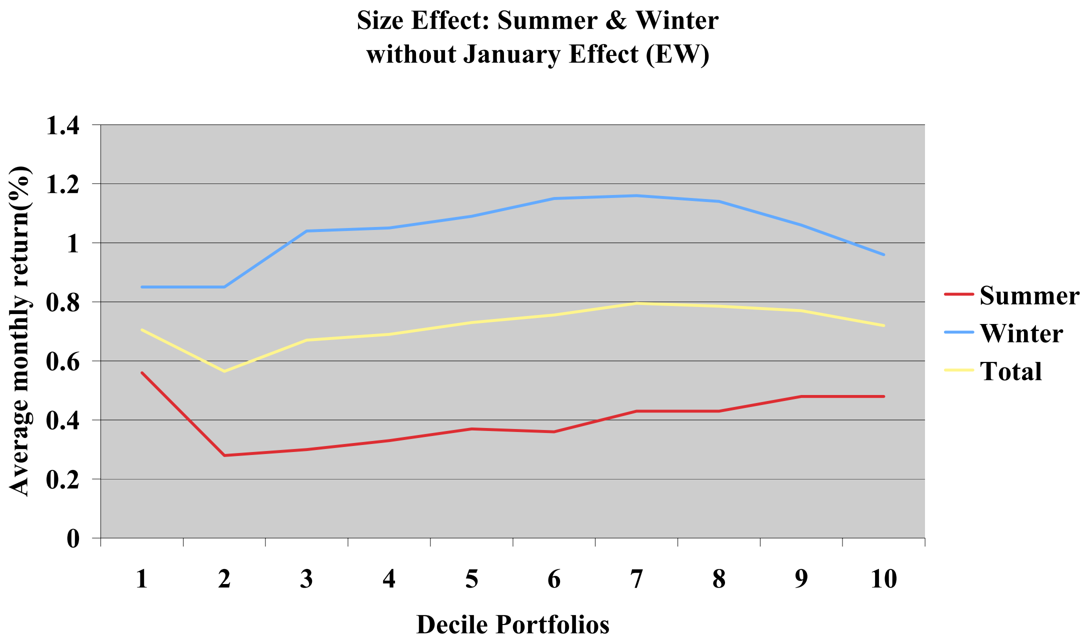

Figure 5A: Size effect in Summer and Winter months after controlling for January effect in equally weighted portfolios.

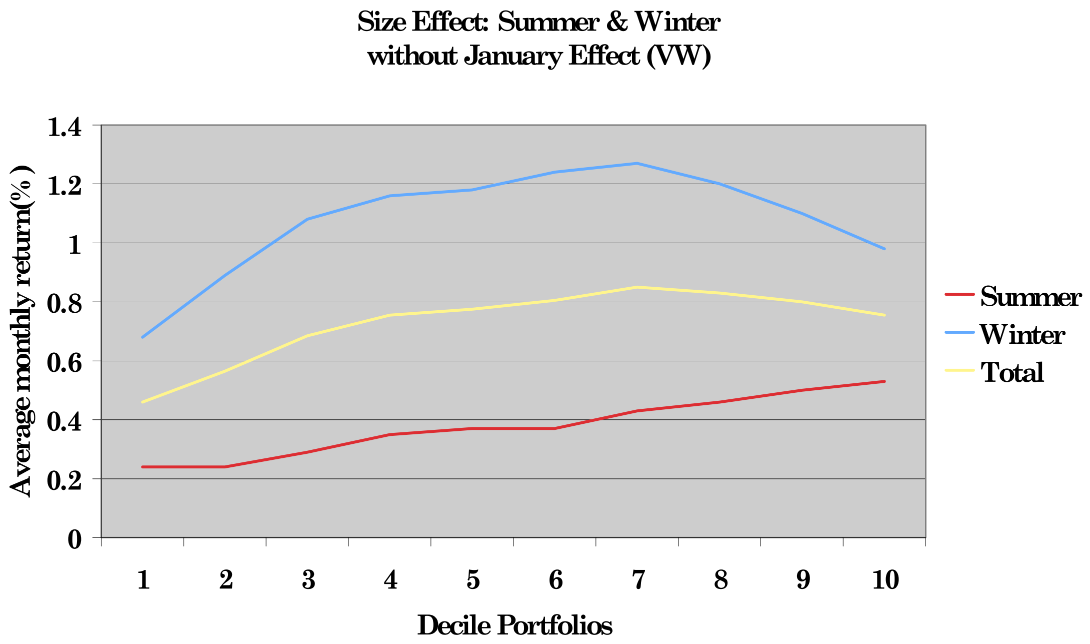

Figure 5B: Size effect in Summer and Winter months after controlling for January effect in value weighted portfolios.

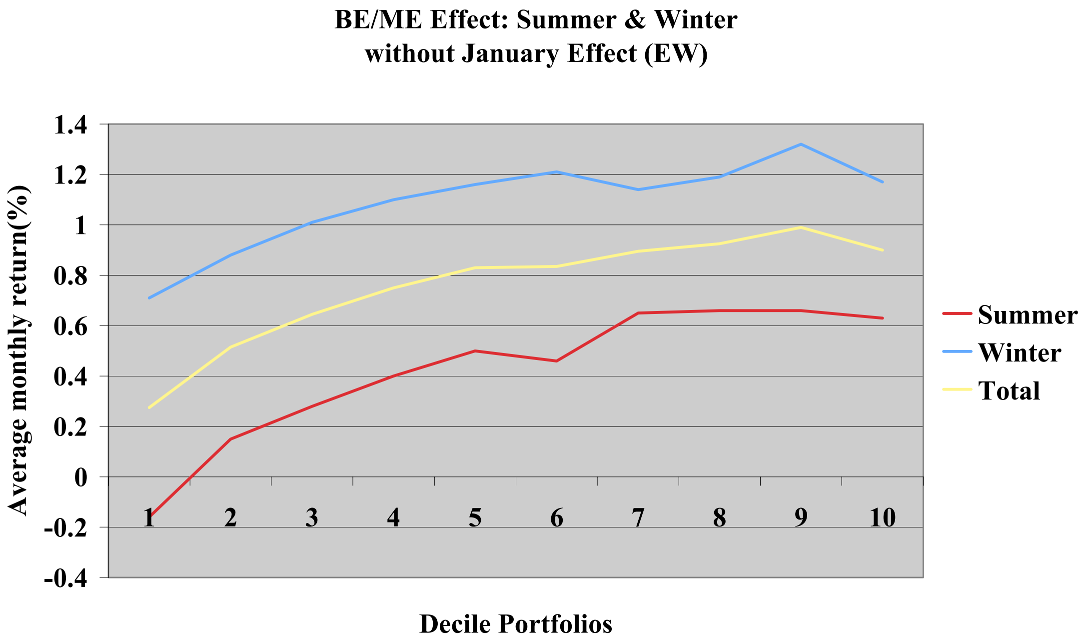

Figure 5C: Book to Market effect in Summer and Winter months after controlling for January effect in equally weighted portfolios.

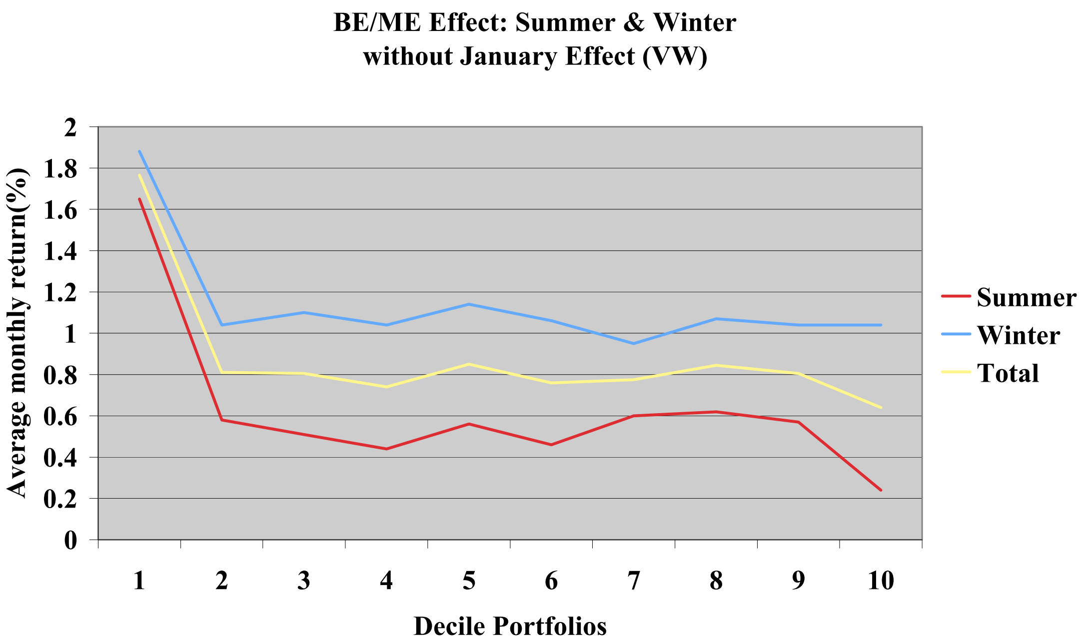

Figure 5D: Book to Market effect in Summer and Winter months after controlling for January effect in value weighted portfolios.

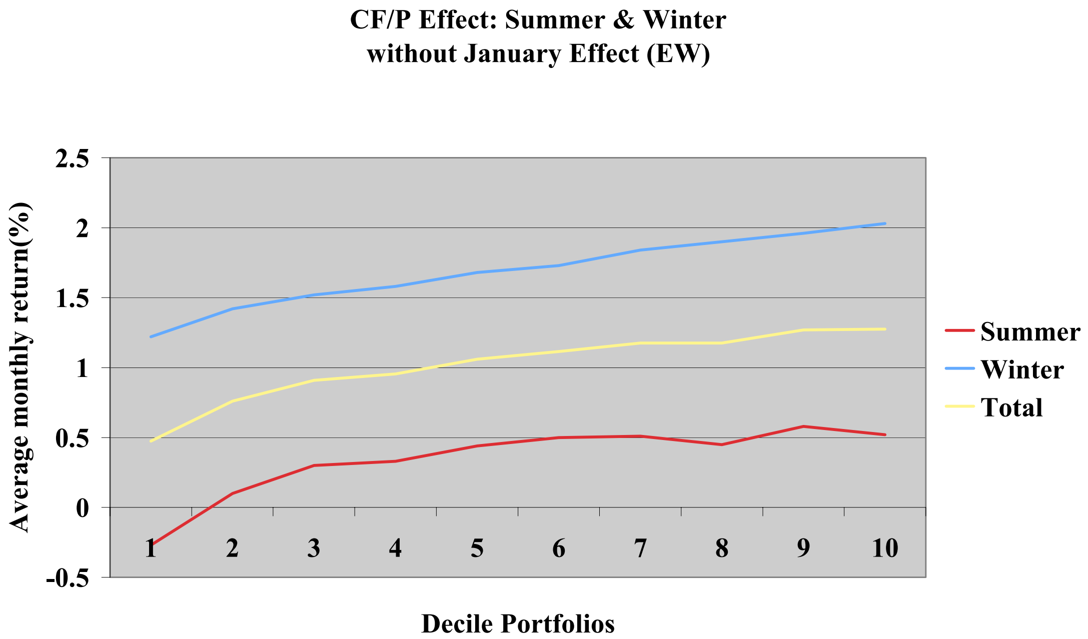

Figure 5E: Cash Flow to Price effect in Summer and Winter months after controlling for January effect in equally weighted portfolios.

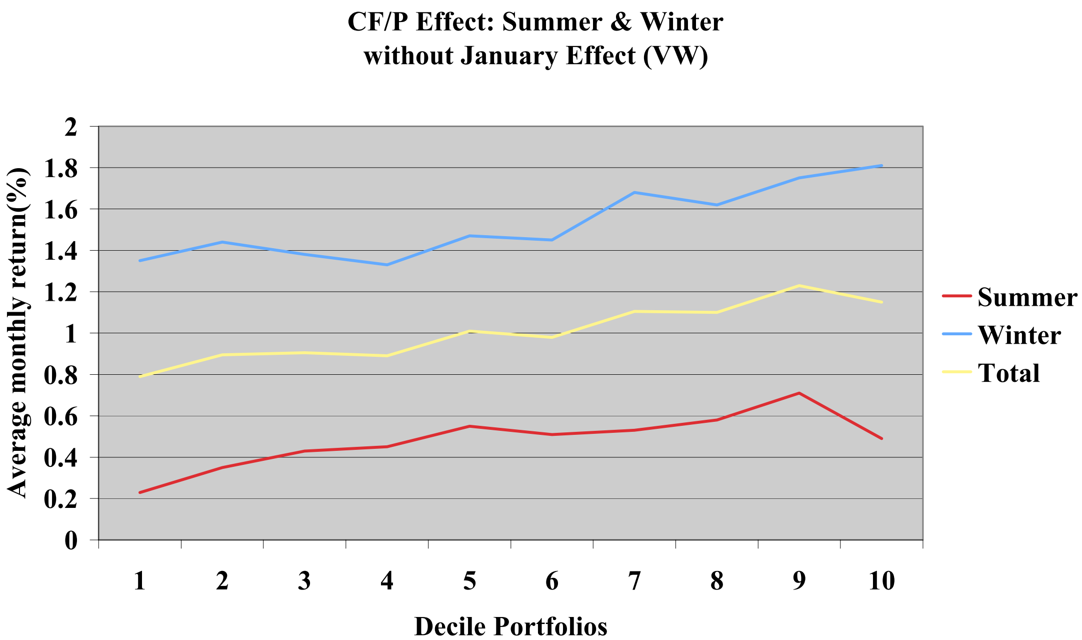

Figure 5F: Cash Flow to Price effect in Summer and Winter months after controlling for January effect in value weighted portfolios.

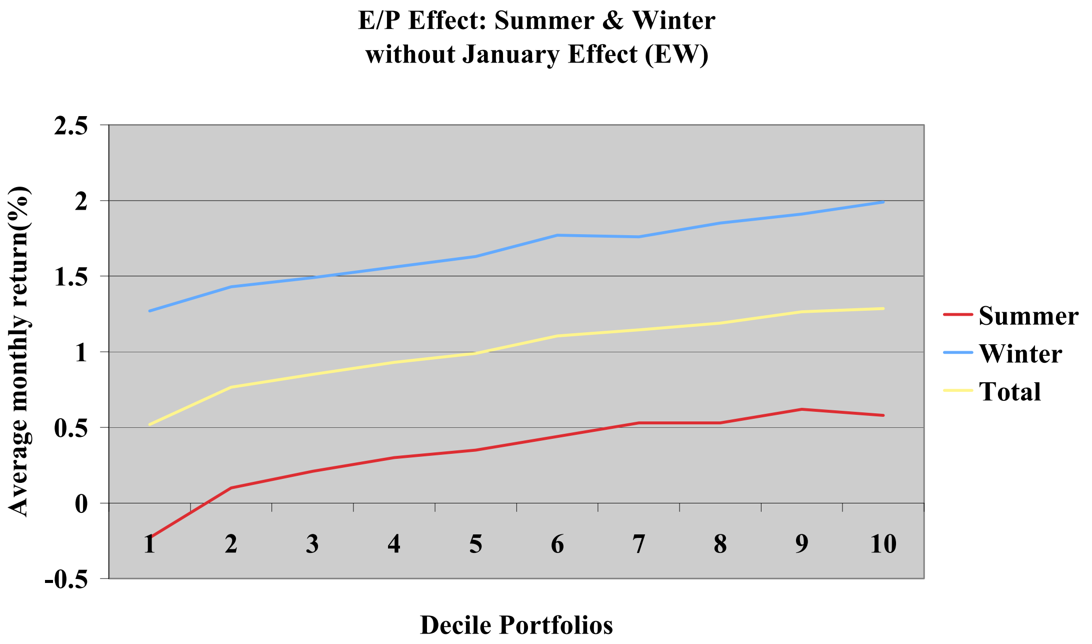

Figure 5G: Earning to Price effect in Summer and Winter months after controlling for January effect in equally weighted EW portfolios.

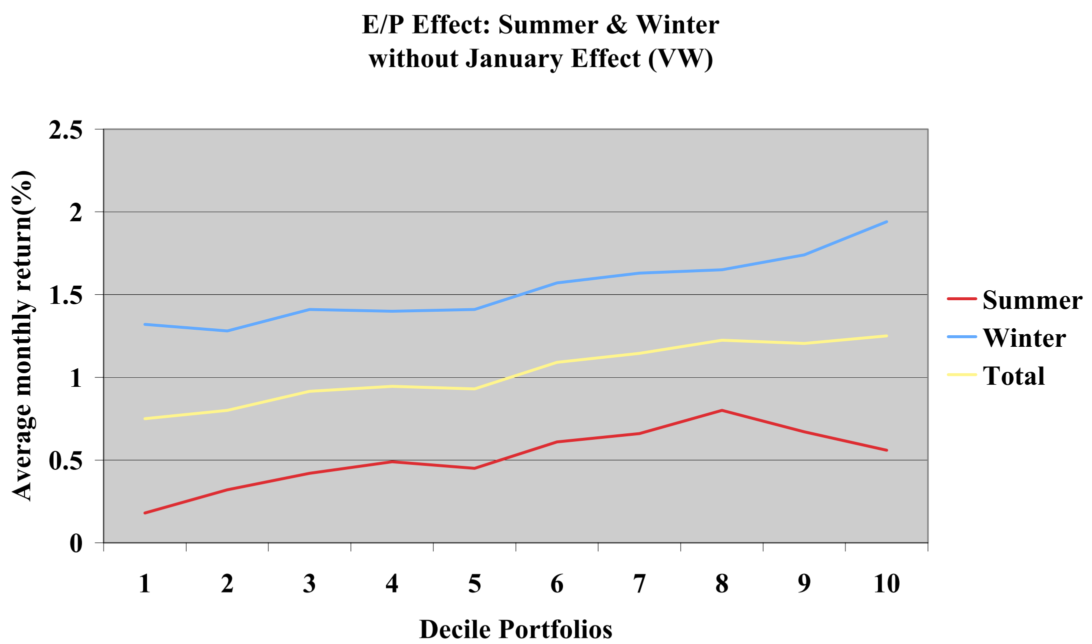

Figure 5H: Earning to Price effect in Summer and Winter months after controlling for January effect in value weighted portfolios.

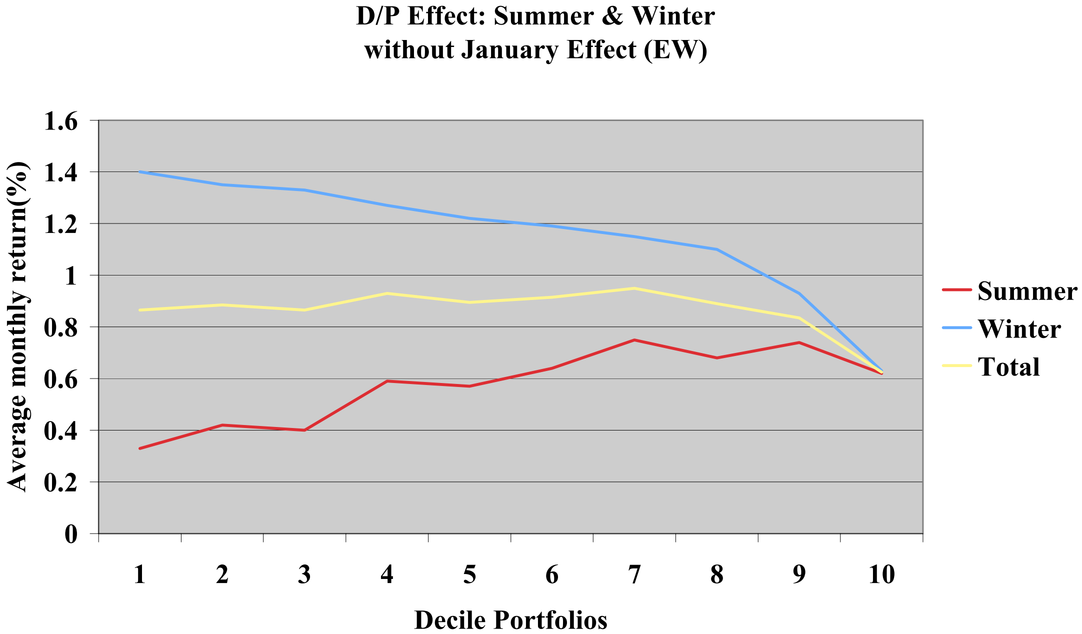

Figure 5I: Dividend to Price effect in Summer and Winter months after controlling for January effect in equally weighted portfolios.

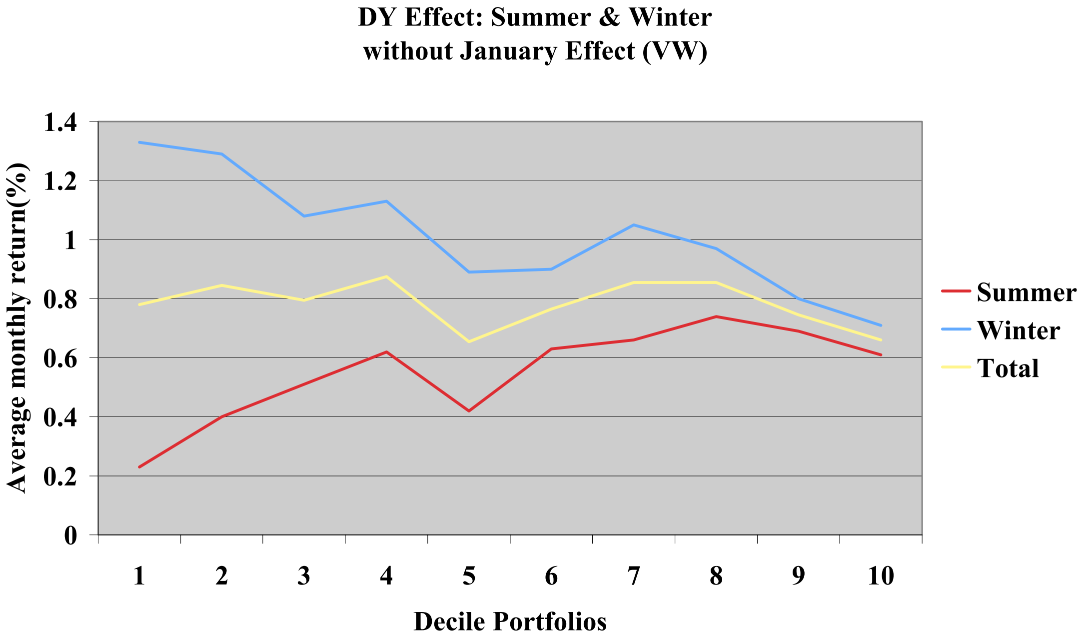

Figure 5J: Dividend to Price effect in Summer and Winter months after controlling for January effect in value weighted portfolios.

Appendix of Tables

Table A1: January Effect in Size, B/M, CF/P, E/P and D/P Portfolios

Estimation results of the regression $r_t = \mu + \beta \, Jan_t + \varepsilon_t$ with $\varepsilon_t = r_t - E_{t-1}[r_t]$

Panel A contains the estimates of μ and the corresponding t-statistics (based on White standard errors). Panel B contains the estimate of β and corresponding t-statistics.

	Size		B/M		C/P		E/P		D/P	
Panel A: Return after controlling for January effect										
Decile	VW	EW	VW	EW	VW	EW	VW	EW	VW	EW
1	0.44%	**0.69%**	**1.75%**	0.24%	**0.70%**	0.45%	**0.73%**	**0.41%**	**0.72%**	**0.81%**
	(1.41)	**(2.186)**	**(9.587)**	(0.965)	**(3.312)**	(1.59)	**(3.080)**	**(1.743)**	**(3.215)**	**(3.37)**
2	**0.54%**	**0.54%**	**0.79%**	**0.49%**	**0.76%**	**0.70%**	**0.84%**	**0.69%**	**0.81%**	**0.84%**
	(1.856)	**(1.845)**	**(4.077)**	**(2.113)**	**(4.567)**	**(3.131)**	**(4.081)**	**(3.158)**	**(4.032)**	**(3.819)**
3	**0.65%**	**0.63%**	**0.78%**	**0.61%**	**0.87%**	**0.79%**	**0.86%**	**0.85%**	**0.77%**	**0.82%**
	(2.462)	**(2.347)**	**(4.133)**	**(2.674)**	**(4.863)**	**(4.179)**	**(4.903)**	**(3.779)**	**(3.940)**	**(3.924)**
4	**0.71%**	**0.66%**	**0.71%**	**0.72%**	**0.90%**	**0.87%**	**0.85%**	**0.90%**	**0.85%**	**0.90%**
	(2.863)	**(2.566)**	**(3.472)**	**(3.072)**	**(4.609)**	**(4.675)**	**(5.238)**	**(4.446)**	**(4.546)**	**(4.439)**
5	**0.74%**	**0.69%**	**0.83%**	**0.80%**	**0.88%**	**0.93%**	**0.97%**	**1.00%**	**0.64%**	**0.87%**
	(3.028)	**(2.778)**	**(4.299)**	**(3.487)**	**(5.445)**	**(5.342)**	**(4.942)**	**(4.905)**	**(3.283)**	**(4.396)**
6	**0.77%**	**0.72%**	**0.73%**	**0.80%**	**1.04%**	**1.04%**	**0.94%**	**1.06%**	**0.76%**	**0.89%**
	(3.284)	**(3.023)**	**(3.457)**	**(3.43)**	**(5.410)**	**(5.736)**	**(6.024)**	**(5.705)**	**(3.966)**	**(4.447)**
7	**0.81%**	**0.76%**	**0.76%**	**0.87%**	**1.10%**	**1.09%**	**1.06%**	**1.11%**	**0.84%**	**0.94%**
	(3.645)	**(3.338)**	**(3.426)**	**(3.633)**	**(6.139)**	**(6.161)**	**(6.471)**	**(6.083)**	**(4.532)**	**(4.875)**
8	**0.79%**	**0.75%**	**0.83%**	**0.90%**	**1.18%**	**1.13%**	**1.05%**	**1.11%**	**0.84%**	**0.87%**
	(3.739)	**(3.458)**	**(3.677)**	**(3.549)**	**(6.227)**	**(5.988)**	**(6.83)**	**(6.4)**	**(4.16)**	**(4.302)**
9	**0.77%**	**0.74%**	**0.78%**	**0.96%**	**1.15%**	**1.20%**	**1.18%**	**1.21%**	**0.74%**	**0.83%**
	(3.769)	**(3.533)**	**(2.94)**	**(3.479)**	**(7.011)**	**(6.445)**	**(6.404)**	**(6.682)**	**(3.59)**	**(4.136)**
10	**0.74%**	**0.70%**	**0.60%**	**0.87%**	**1.19%**	**1.22%**	**1.09%**	**1.20%**	**0.65%**	**0.63%**
	(4.148)	**(3.69)**	**(2.026)**	**(2.81)**	**(5.582)**	**(5.844)**	**(5.813)**	**(5.966)**	**(2.979)**	**(2.842)**
Panel B: Additional January Return										
1	**7.42%**	**9.62%**	-1.02%	**3.55%**	-0.09%	**3.78%**	-0.02%	**4.03%**	0.00%	**1.81%**
	(7.28)	**(8.19)**	(-1.63)	**(4.23)**	(-0.11)	**(3.79)**	(-0.03)	**(3.94)**	(-0.01)	**(2.57)**
2	**5.12%**	**6.14%**	0.51%	**3.30%**	-0.03%	**3.02%**	0.08%	**2.87%**	-0.06%	**2.16%**
	(5.64)	**(5.98)**	(0.91)	**(4.61)**	(-0.04)	**(3.28)**	(0.12)	**(3.24)**	(-0.11)	**(3.19)**
3	**3.94%**	**4.65%**	0.75%	**3.56%**	0.42%	**2.83%**	0.53%	**2.90%**	0.33%	**2.29%**
	(4.93)	**(5.21)**	(1.35)	**(4.91)**	(0.62)	**(3.37)**	(0.72)	**(3.32)**	(0.55)	**(3.38)**
4	**3.06%**	**3.67%**	0.76%	**3.58%**	0.61%	**2.85%**	0.52%	**2.80%**	0.34%	**2.40%**
	(3.87)	**(4.30)**	(1.25)	**(4.83)**	(0.86)	**(3.47)**	(0.75)	**(3.33)**	(0.56)	**(3.83)**
5	**2.66%**	**3.21%**	0.91%	**3.73%**	0.93%	**2.88%**	0.63%	**2.97%**	**1.16%**	**2.58%**
	(3.65)	**(4.00)**	(1.63)	**(5.02)**	(1.33)	**(3.50)**	(0.90)	**(3.55)**	**(2.01)**	**(4.08)**
6	**2.14%**	**2.63%**	**1.63%**	**4.09%**	0.60%	**3.08%**	0.56%	**2.71%**	0.86%	**2.53%**
	(3.00)	**(3.46)**	**(2.57)**	**(5.42)**	(0.85)	**(3.79)**	(0.77)	**(3.32)**	(1.51)	**(4.00)**
7	**1.54%**	**2.00%**	**1.93%**	**4.47%**	0.52%	**3.24%**	0.98%	**2.96%**	**1.20%**	**2.70%**
	(2.32)	**(2.86)**	**(2.90)**	**(5.91)**	(0.73)	**(3.93)**	(1.33)	**(3.70)**	**(2.03)**	**(4.55)**
8	**1.25%**	**1.57%**	**2.34%**	**4.87%**	0.80%	**3.57%**	1.08%	**3.14%**	**1.61%**	**3.03%**
	(2.05)	**(2.42)**	**(3.45)**	**(6.15)**	(1.00)	**(4.32)**	(1.46)	**(3.88)**	**(2.86)**	**(5.12)**
9	**1.15%**	**1.42%**	**3.09%**	**5.96%**	**1.42%**	**3.86%**	**1.58%**	**3.71%**	**2.33%**	**3.47%**
	(2.01)	**(2.35)**	**(3.85)**	**(6.67)**	**(1.70)**	**(4.45)**	**(1.85)**	**(4.34)**	**(4.09)**	**(5.97)**
10	0.42%	0.71%	**4.45%**	**8.54%**	**2.55%**	**5.07%**	**2.61%**	**5.02%**	**2.62%**	**4.82%**
	(0.78)	(1.27)	**(4.63)**	**(7.58)**	**(3.03)**	**(5.44)**	**(2.96)**	**(5.45)**	**(4.00)**	**(6.74)**

Table A2: Halloween Effect in Presence of January Effect in 100 Portfolios Double Sorted by Size and Book-to-Market

Estimation results of the regression

$r_t = \mu + \alpha_1 Hal_t + \alpha_2 Jan_t + \varepsilon_t$ with $\varepsilon_t = r_t - E_{t-1}[r_t]$

Panel A contains the estimates of μ, Panel B contains estimates of α_1 and Panel C contains estimates of α_2. The number in the bracket represents t-statistics based on heteroskedasticity consistent standard errors. Significant values (at the 10 percent level) in bold.

B/M sorted	Size sorted deciles									
deciles	1	2	3	4	5	6	7	8	9	10
					Panel A: Average Summer Return (μ)					
1	**-0.88**	-0.75	-0.49	-0.40	-0.07	-0.13	0.49	0.19	0.27	**0.61**
	(-1.62)	(-1.30)	(-0.94)	(-0.80)	(-0.14)	(-0.27)	(1.21)	(0.45)	(0.72)	**(1.87)**
2	-0.57	-0.26	-0.03	0.03	0.27	0.29	0.49	0.30	0.46	0.46
	(-1.15)	(-0.53)	(-0.07)	(0.07)	(0.63)	(0.74)	(1.30)	(0.87)	(1.43)	(1.49)
3	-0.26	-0.01	0.02	0.18	0.09	0.19	0.26	0.33	0.44	0.46
	(-0.56)	(-0.02)	(0.05)	(0.42)	(0.24)	(0.52)	(0.75)	(0.95)	(1.38)	(1.50)
4	0.37	-0.11	0.17	0.17	0.43	0.35	0.27	0.32	**0.61**	**0.59**
	(0.79)	(-0.27)	(0.42)	(0.45)	(1.14)	(1.00)	(0.76)	(0.92)	**(1.81)**	**(1.90)**
5	0.25	0.20	0.31	0.29	0.50	0.28	0.40	**0.60**	0.48	**0.52**
	(0.60)	(0.52)	(0.85)	(0.80)	(1.39)	(0.82)	(1.14)	**(1.89)**	(1.51)	**(1.80)**
6	0.36	0.15	0.51	0.36	0.46	0.51	**0.59**	0.40	**0.51**	**0.65**
	(0.92)	(0.41)	(1.39)	(1.06)	(1.30)	(1.57)	**(1.77)**	(1.15)	**(1.70)**	**(2.22)**
7	0.47	**0.59**	0.25	0.51	0.54	0.48	0.51	0.39	**0.71**	**0.68**
	(1.28)	**(1.65)**	(0.72)	(1.45)	(1.63)	(1.52)	(1.54)	(1.22)	**(2.17)**	**(2.53)**
8	0.43	0.38	**0.65**	0.41	0.51	**0.65**	0.49	**0.51**	**0.73**	0.33
	(1.20)	(1.11)	**(1.94)**	(1.15)	(1.55)	**(2.08)**	(1.55)	**(1.78)**	**(2.48)**	(1.11)
9	0.45	0.30	0.55	**0.60**	0.50	0.54	**0.72**	**0.73**	0.55	0.34
	(1.25)	(0.83)	(1.60)	**(1.69)**	(1.45)	(1.49)	**(2.10)**	**(2.13)**	(1.68)	(0.95)
10	0.77	0.33	-0.06	-0.23	0.29	0.29	0.25	0.25	0.54	-0.06
	(2.12)	(0.81)	(-0.15)	(-0.50)	(0.67)	(0.73)	(0.59)	(0.55)	(1.42)	(-0.17)

B/M sorted deciles	Size sorted deciles									
	1	2	3	4	5	6	7	8	9	10
				Panel B: Marginal Halloween Effect (α_1)						
BTM1	0.58	1.17	1.06	**1.38**	**1.11**	0.99	0.83	**1.02**	**1.06**	0.65
	(0.77)	(1.39)	(1.47)	**(1.95)**	**(1.68)**	(1.57)	(1.48)	**(1.81)**	**(2.04)**	(1.51)
BTM2	1.03	1.03	**1.14**	**1.38**	**0.95**	**1.09**	0.81	**1.20**	**0.85**	**0.74**
	(1.51)	(1.57)	**(1.80)**	**(2.34)**	**(1.65)**	**(2.03)**	(1.57)	**(2.55)**	**(1.92)**	**(1.82)**
BTM3	0.91	0.98	**1.40**	**1.09**	**1.59**	**1.38**	**1.14**	**1.03**	**0.89**	**0.84**
	(1.40)	(1.60)	**(2.47)**	**(1.93)**	**(2.99)**	**(2.76)**	**(2.41)**	**(2.17)**	**(2.08)**	**(2.05)**
BTM4	0.73	**1.40**	**0.95**	**1.31**	**1.27**	**1.09**	**1.31**	**0.82**	**0.88**	**0.92**
	(1.09)	**(2.48)**	**(1.75)**	**(2.52)**	**(2.55)**	**(2.26)**	**(2.71)**	**(1.74)**	**(2.01)**	**(2.17)**
BTM5	0.71	**1.27**	**1.32**	**1.22**	**0.83**	**1.20**	**1.16**	**1.11**	**1.05**	**0.79**
	(1.23)	**(2.40)**	**(2.60)**	**(2.42)**	**(1.71)**	**(2.67)**	**(2.50)**	**(2.60)**	**(2.52)**	**(1.89)**
BTM6	0.82	**1.26**	**1.31**	**1.50**	**1.20**	**0.94**	**1.08**	**1.35**	**0.77**	**0.78**
	(1.50)	**(2.50)**	**(2.59)**	**(3.25)**	**(2.55)**	**(2.12)**	**(2.41)**	**(2.90)**	**(1.88)**	**(1.93)**
BTM7	**0.99**	**0.90**	**1.21**	**1.01**	**1.00**	**1.27**	**1.16**	**1.11**	**0.78**	0.44
	(1.93)	**(1.88)**	**(2.54)**	**(2.08)**	**(2.28)**	**(2.78)**	**(2.54)**	**(2.50)**	**(1.80)**	(1.14)
BTM8	**1.09**	**1.00**	**0.87**	**1.31**	**1.07**	**0.96**	**0.90**	**1.07**	**0.83**	**0.74**
	(2.14)	**(2.09)**	**(1.87)**	**(2.70)**	**(2.34)**	**(2.21)**	**(2.06)**	**(2.34)**	**(2.02)**	**(1.78)**
BTM9	**1.22**	**1.36**	**1.16**	**1.37**	**1.42**	**0.85**	**0.93**	0.74	**0.92**	0.72
	(2.44)	**(2.77)**	**(2.33)**	**(2.71)**	**(3.03)**	**(1.73)**	**(1.90)**	(1.53)	**(2.06)**	(1.47)
BTM10	0.83	**1.45**	**2.15**	**1.98**	**1.41**	**1.82**	**1.38**	**1.51**	0.74	**1.16**
	(1.61)	**(2.56)**	**(3.85)**	**(3.23)**	**(2.40)**	**(3.26)**	**(2.31)**	**(2.51)**	(1.40)	**(2.11)**

B/M sorted deciles	Size sorted deciles 1	2	3	4	5	6	7	8	9	10
					Panel C: Marginal January Effect (α_2)					
BTM1	**9.97**	**5.00**	**3.45**	1.36	1.34	0.93	-0.17	-0.35	-0.09	-0.60
	(7.00)	**(3.19)**	**(2.57)**	(1.15)	(1.07)	(0.81)	(-0.16)	(-0.35)	(-0.09)	(-0.66)
BTM2	**8.00**	**4.52**	**2.90**	1.00	1.43	0.84	0.54	0.36	0.12	0.43
	(6.49)	**(3.49)**	**(2.27)**	(0.88)	(1.38)	(0.79)	(0.56)	(0.38)	(0.15)	(0.59)
BTM3	**7.70**	**4.14**	**2.72**	**2.17**	1.32	0.99	0.98	0.26	0.65	0.17
	(6.61)	**(3.66)**	**(2.35)**	**(2.01)**	(1.21)	(0.99)	(1.00)	(0.28)	(0.79)	(0.21)
BTM4	**7.33**	**3.78**	**2.92**	**1.87**	1.54	1.08	0.54	1.06	0.47	-0.41
	(5.86)	**(3.43)**	**(2.68)**	**(1.78)**	(1.48)	(1.19)	(0.55)	(1.22)	(0.54)	(-0.51)
BTM5	**6.60**	**3.30**	**2.11**	**1.92**	1.43	1.52	0.76	0.65	0.73	0.02
	(6.07)	**(3.23)**	**(2.03)**	**(1.89)**	(1.42)	(1.68)	(0.91)	(0.70)	(0.90)	(0.03)
BTM6	**7.21**	**3.27**	**2.57**	**1.75**	1.40	0.42	1.43	0.63	1.13	0.18
	(6.63)	**(3.02)**	**(2.61)**	**(1.92)**	(1.48)	(0.51)	(1.59)	(0.72)	(1.47)	(0.25)
BTM7	**6.24**	**3.64**	**2.61**	**1.86**	**2.01**	1.19	1.48	**1.92**	1.13	1.13
	(5.92)	**(3.51)**	**(2.48)**	**(1.92)**	**(2.29)**	(1.39)	(1.61)	**(2.11)**	(1.29)	(1.42)
BTM8	**6.11**	**3.30**	**3.26**	**2.04**	**1.80**	**1.93**	**1.86**	**1.99**	0.59	**1.57**
	(5.74)	**(3.28)**	**(3.15)**	**(2.22)**	**(1.85)**	**(2.02)**	**(2.06)**	**(2.09)**	(0.75)	**(2.04)**
BTM9	**6.34**	**4.41**	**3.46**	**2.05**	**2.32**	**3.50**	**1.90**	**1.79**	1.29	**2.73**
	(6.56)	**(4.12)**	**(3.61)**	**(1.98)**	**(2.28)**	**(3.80)**	**(1.75)**	**(1.73)**	(1.51)	**(2.78)**
BTM10	**7.96**	**4.99**	**4.50**	**4.11**	**3.28**	**3.22**	**2.86**	**2.18**	1.97	**3.13**
	(7.13)	**(4.23)**	**(3.78)**	**(3.42)**	**(3.17)**	**(2.73)**	**(2.36)**	**(1.78)**	(1.64)	**(2.37)**

Table A3: Halloween Effect in Presence of January Effect in 100 Portfolios
Estimation results of the regression

$r_t = \mu + \alpha\, Hal_t + \beta\, Jan_t + \varepsilon_t$ with $\varepsilon_t = r_t - E_{t-1}[r_t]$

Panel A contains the estimates of μ, Panel B contains estimates of α and Panel C contains estimates of β. The number in the bracket represents t-statistics based on heteroscedasticity consistent standard errors. Significant values (at the 10 percent level) in bold.

Decile	Size	t-stat	B/M	t-stat	C/P	t-stat	E/P	t-stat	D/P	t-stat
					Panel A: Intercept (μ)					
1	0.56%	(1.100)	-0.16%	(-0.445)	-0.27%	(-0.710)	-0.23%	(-0.601)	0.33%	(0.937)
2	0.28%	(0.625)	0.15%	(0.463)	0.10%	(0.291)	0.10%	(0.309)	0.42%	(1.346)
3	0.30%	(0.730)	0.28%	(0.835)	0.30%	(0.973)	0.21%	(0.679)	0.40%	(1.339)
4	0.33%	(0.859)	0.40%	(1.219)	0.33%	(1.133)	0.30%	(1.021)	**0.59%**	**(2.091)**
5	0.37%	(1.014)	0.50%	(1.451)	0.44%	(1.536)	0.35%	(1.224)	**0.57%**	**(1.991)**
6	0.36%	(1.059)	0.46%	(1.342)	**0.50%**	**(1.733)**	0.44%	(1.593)	**0.64%**	**(2.211)**
7	0.43%	(1.333)	**0.65%**	**(1.764)**	**0.51%**	**(1.826)**	**0.53%**	**(1.933)**	**0.75%**	**(2.742)**
8	0.43%	(1.448)	**0.66%**	**(1.733)**	0.45%	(1.545)	**0.53%**	**(1.916)**	**0.68%**	**(2.396)**
9	**0.48%**	**(1.689)**	0.66%	(1.555)	**0.58%**	**(1.940)**	**0.62%**	**(2.110)**	**0.74%**	**(2.648)**
10	**0.48%**	**(1.931)**	0.63%	(1.355)	0.52%	(1.545)	**0.58%**	**(1.724)**	**0.62%**	**(1.836)**
					Panel B: Magnitude of Halloween Effect(α)					
1	0.29%	(0.464)	**0.87%**	**(1.822)**	**1.49%**	**(2.801)**	**1.50%**	**(2.785)_**	**1.07%**	**(2.411)**
2	0.57%	(1.022)	**0.73%**	**(1.682)**	**1.32%**	**(2.865)**	**1.33%**	**(2.867)**	**0.93%**	**(2.275)**
3	0.74%	(1.481)	**0.73%**	**(1.688)**	**1.22%**	**(2.887)**	**1.28%**	**(2.969)**	**0.93%**	**(2.422)**
4	0.72%	(1.504)	0.70%	(1.629)	**1.25%**	**(3.215)**	**1.26%**	**(3.117)**	**0.68%**	**(1.813)**
5	0.72%	(1.576)	0.66%	(1.565)	**1.24%**	**(3.249)**	**1.28%**	**(3.286)**	**0.65%**	**(1.769)**
6	**0.79%**	**(1.836)**	0.75%	(1.774)	**1.23%**	**(3.279)**	**1.33%**	**(3.575)**	0.55%	(1.508)
7	**0.73%**	**(1.796)**	0.49%	(1.088)	**1.33%**	**(3.653)**	**1.23%**	**(3.409)**	0.40%	(1.148)
8	**0.71%**	**(1.830)**	0.53%	(1.124)	**1.45%**	**(3.747)**	**1.32%**	**(3.699)**	0.42%	(1.166)
9	0.58%	(1.614)	0.66%	(1.255)	**1.38%**	**(3.536)**	**1.29%**	**(3.429)**	0.19%	(0.546)
10	0.48%	(1.501)	0.54%	(0.904)	**1.51%**	**(3.487)**	**1.41%**	**(3.236)**	0.01%	(0.035)
					Panel C: Magnitude of January Effect(β)					
1	**9.46%**	**(7.958)**	**3.07%**	**(3.403)**	**2.96%**	**(2.814)**	**3.21%**	**(3.003)**	**1.22%**	**(1.804)**
2	**5.83%**	**(5.441)**	**2.90%**	**(3.980)**	**2.30%**	**(2.449)**	**2.14%**	**(2.410)**	**1.65%**	**(2.476)**
3	**4.24%**	**(4.584)**	**3.17%**	**(4.266)**	**2.16%**	**(2.578)**	**2.20%**	**(2.513)**	**1.78%**	**(2.612)**
4	**3.27%**	**(3.666)**	**3.20%**	**(4.247)**	**2.16%**	**(2.650)**	**2.11%**	**(2.529)**	**2.03%**	**(3.225)**
5	**2.81%**	**(3.381)**	**3.37%**	**(4.417)**	**2.21%**	**(2.675)**	**2.28%**	**(2.729)**	**2.23%**	**(3.494)**
6	**2.20%**	**(2.806)**	**3.68%**	**(4.753)**	**2.40%**	**(2.999)**	**1.99%**	**(2.422)**	**2.23%**	**(3.457)**
7	**1.60%**	**(2.220)**	**4.20%**	**(5.441)**	**2.52%**	**(3.054)**	**2.29%**	**(2.881)**	**2.48%**	**(4.008)**
8	**1.18%**	**(1.781)**	**4.58%**	**(5.644)**	**2.78%**	**(3.358)**	**2.42%**	**(2.967)**	**2.81%**	**(4.459)**
9	**1.10%**	**(1.737)**	**5.60%**	**(6.070)**	**3.10%**	**(3.598)**	**3.01%**	**(3.478)**	**3.36%**	**(5.409)**
10	0.45%	(0.772)	**8.25%**	**(7.175)**	**4.25%**	**(4.454)**	**4.24%**	**(4.555)**	**4.82%**	**(6.144)**