THE JANUARY EFFECT: A GLOBAL PERSPECTIVE

by

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ABSTRACT

The January Effect is one of the most commonly studied anomalies in finance. While largely still considered a mystery, the January effect explanation that has garnered the most attention and validity is the tax-loss selling hypothesis. This paper begins with a review of the immense body of literature surrounding the January effect. Then I test, across 16 countries, whether or not there is a significant positive difference in the January returns (or whichever month is the beginning of the tax-year) from the remaining eleven months of the year. The January seasonal is found to be significant in seven of the 16 countries, while a surprising September seasonal, inadvertently discovered and tested, is significant in 13 of 16 countries. As is commonly the result when studying this anomaly, further study is warranted to discover a powerful explanation for the January effect.

Keywords: January effect; tax-loss; anomalies; calendar anomalies; small-firm

Subject Terms: Stocks-Prices; stock exchanges

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1 INTRODUCTION

The January effect, also known as the turn-of-the-year effect, is a calendar effect wherein securities increase in value more rapidly than in other months. Many papers cite Rozeff and Kinney (1976) as introducing the January effect to the world of finance. However, looking further back, Wachtel (1942) was actually the first researcher to discover the anomaly. There have been many studies that find statistical evidence supporting a January effect in stocks, most focused on US markets, but some international (Gultekin and Gultekin, 1983). Research has attempted to explain the effect with many explanations and combinations thereof. Researchers have successfully argued that the January effect is primarily a small-capitalization phenomenon; a significant example is Keim (1983). In additional to the small-firm effect, the explanation that has garnered the most attention and credibility has been the tax-loss selling hypothesis. For the purpose of narrowing scope and remaining focused on the most revealing findings, I will focus my literature survey on the tax-loss selling hypothesis; however, other explanations are discussed. While findings have sparked great excitement over the years, as they offer hope for explanation of the January effect, the phenomenon remains largely a mystery. Haug and Hirschey (2006) conducted studies similar to some of the original work and, even with the accumulated knowledge of 30 years of research, conclude that nothing can convincingly explain the January effect.

The paper proceeds as follows. Section 1 discusses findings from the literature, again with a focus on whether or not the tax-loss selling hypothesis can explain the January effect. Additionally, considering the amount of attention the January effect

receives from both academic researchers and practitioners, a brief look into research focused on data mining with respect to the January effect is essential. Section 2 introduces the data, while Section 3 provides detailed explanation and results of empirical tests for return seasonality with the purpose of validating the tax-loss selling hypothesis not just in the US, as most research has historically focused, but internationally. Section 4 provides a brief conclusion to the paper.

2 LITERATURE SURVEY

Seasonal anomalies, in particular the January effect, are likely one of the most highly studied areas of finance. The body of literature is immense, so, as the focus of this paper is the tax-loss selling hypothesis as it relates to the January effect, I have decided to make the primary focus of my literature survey papers concerning this hypothesis. The first researcher to discover the January effect was Wachtel (1942) and, surprisingly, is not highly referenced in the vast majority of the relevant literature. Wachtel opened his paper with reference to a previous study:

> In 1919 the Harvard Committee on Economic Research reported that a comprehensive study of stock prices from January, 1897, to January, 1914, revealed absolutely no evidence of seasonal tendencies (Wachtel, 1942, pp. 184).

Therefore, Wachtel's findings were clearly groundbreaking. He finds a significant seasonal effect in Dow Jones Industrial Average data from 1927 to 1942. This paper marked the beginning of what would become over a half century of research surrounding the highly intriguing January effect.

2.1 Articles in Favour of the Tax-Loss Selling Hypothesis

The research is divided on whether or not tax-loss selling can significantly explain the January effect. Many argue that individual investors are driving the January effect by selling their losing stocks in December, in order to realize capital losses for tax purposes, and then using the funds from these sales to reestablish their positions in small-capitalization stocks in January, thus driving up prices. Many who argue against tax-loss

selling as the solution, particularly Jones, Pearce, and Wilson (1987), Pettengill (1986), and Berges, McConnell, and Schlarbaum (1984), find that the phenomenon existed prior to Federal income taxes, therefore making the hypothesis void. To preface the discussion of evidence of tax-loss selling driving the January effect, it is necessary to qualify it with an explanation of why the focus tends to be on individual investors. As most agree that the January effect is driven by small stocks, the focus automatically shifts to individual investors as institutional money managers are generally focused on large-capitalization equities. If individuals have equity positions that have accrued losses, many wish to sell them before the end of the year in order to realize these losses for tax purposes; also, institutional investors are not usually concerned with tax issues (Eakins and Sewell, 1993).

In Wachtel (1942), the top possible explanatory factor for the seasonal effect was tax-loss selling. He argues that investors sell in mid-December and the following rally in stock prices in both late December and January is purely a reaction from the low stock market levels earlier in the month. In a seminal article by Reinganum (1983), it is found that small firms unequivocally exhibit higher returns in January. However, while he finds that tax-loss selling explains most of the phenomenon, a portion of the effect remains unexplained. As discussed in another highly significant article by Ritter (1988), the January effect comes into play when investors generally wait until January to reestablish investment in small stocks; this demand drives up prices of small stocks in January. Ritter finds that the January seasonal is explained by predictable portfolio rebalancing by individual investors, who are driven by taxes. These findings are supported by Johnston and Cox (1996), who find that there is a strong positive relationship between the January

effect and the level of individual ownership of a stock. They confirm that small firms have a significant rebound in January and that these small firms have a larger proportion of individual investors in comparison to firms that do not rebound in January. Also, in a highly cited article, Roll (1983) argues that since small-capitalization stocks are more volatile, they are better candidates for tax-loss selling. Interestingly, he also finds that tax-loss selling is present in large firms as well; however, as large firms are generally highly liquid, the effect is arbitraged away. Roll's findings support the idea of individual ownership, as he argues that small firms are driving the tax-loss selling explanation. Eakins and Sewell (1993) further confirm the relationship between firm size and individual ownership. While somewhat contradictory to the evidence supporting the small-firm effect, they find that the January effect remains even in large firms that have a high proportional individual ownership; this finding is similar to Roll (1983). This finding supports the tax-loss selling theory which is heavily founded on high levels of individual ownership of companies.

When considering the tax-loss selling hypothesis as an explanation for the January effect, numerous researchers conducted tests to see if the effect existed before tax laws were in place in the United States. Pettengill (1986), using 1913 as the first taxable year, finds no evidence of a post-tax January effect. However, four other studies, all using the War Revenue Act of 1917 as the start of the post-tax era, do find a significant seasonal effect once tax laws are in place. Shultz (1985) finds that a January effect did not exist in the United States prior to taxes for small firms. However, the period from 1918 to 1929 did exhibit a significant January effect, confirming the tax-loss selling hypothesis. Jones, Pearce, and Wilson (1987), using an equal-weighted index, find that

while the January effect is numerically larger during the post-tax period, cannot prove it with statistical significance. Jones, Lee, and Apenbrink (1991) find evidence that the January effect did not exist in any significance before the introduction of personal income taxes with the War Revenue Act of 1917. They find that the January effect in small firms was initiated by this tax introduction. Their evidence indicates a dramatic change in return behaviour starting in 1917, which also strongly supports the tax-loss selling hypothesis. Brailsford and Easton (1993) specifically test larger firms to attempt to eliminate the small-firm effect from the equation. They find a much more significant January effect over the post-tax period, however conclude that the tax-loss selling hypothesis cannot fully explain the seasonal anomaly.

From an international perspective, of which this paper is primarily focused, Gultekin and Gultekin (1983) find that in most major industrial countries, return seasonality is most significant at the turn-of-the-tax-year; for most industrial countries, this occurs in January. Contrary to the vast majority of findings, particularly in the U.S., Guletkin and Gultekin find that for most countries in their study, the January seasonal is not related to size, therefore discounting the small-firm effect from an international viewpoint.

2.2 Articles Against the Tax-Loss Selling Hypothesis

There is a strong body of research that discounts the tax-loss selling hypothesis. Chan (1986) addresses the issue by looking at the nature of the loss: short-term or long-term. Rational tax-loss selling is generally considered a short-term phenomenon; one sells the losing position to realize the tax loss and then repurchases to reestablish a similar position. His evidence shows that if tax-loss selling is the driving force behind the

January effect, then there is no distinction between short and long-term holding periods; this finding contradicts the general agreement that tax-loss selling is a rational behaviour. Chan concludes that the January effect is not a result of tax-loss selling. Also, Fountas and Segredakis (2002), in a study on emerging markets, find that while seasonality in stock returns exists in many countries, there is little evidence to prove that the tax-loss selling hypothesis explains the January effect.

Jones, Pearce, and Wilson (1987) study the January effect over fifty years preceding personal income taxes. They find evidence, contradicting Jones, Lee, and Apenbrink (1991), that the January effect did indeed exist prior to income taxes and that there was not a statistically significant change after the imposition of taxes. Similarly, Pettengill (1986) finds that the January effect existed before taxes, and also that the small-firm effect in relation to the January effect is more significant in the pre-tax period than in the post-tax period. A Canadian study by Berges, McConnell, and Schlarbaum (1984) documents a January effect from 1951-1980. These findings discount the tax-loss selling hypothesis, as Canada did not have a capital gains tax until 1973; the paper clearly finds that the January effect existed prior to this date. This Canadian study, like many others, also finds that the January effect is much more significant for firms with smaller market capitalizations. Not surprisingly, Berges, McConnell, and Schlarbaum feel that there is still a mysterious, fundamental economic factor that is at play in January.

In summary, the tax-loss selling hypothesis to explain the January effect is highly debated among academic researchers. There are many arguments both for and against this hypothesis and, as is no surprise with any topic regarding the January effect, I cannot find a strong conclusion emerging from the literature.

2.3 Explanations Other than the Tax-Loss Selling Hypothesis

While the tax-loss selling hypothesis is by far the most generally supported explanation of the January effect, other potential explanations do exist. This section will briefly discuss a number of these explanations; the detail in which they are covered generally corresponds with the attention the explanation has garnered.

One explanation that has garnered significant attention is window dressing. Window dressing refers to the action of institutional portfolio managers rebalancing their portfolios directly prior to the end of a reporting period. This rebalancing is generally focused on removing undesirable securities (generally poor performers or speculative holdings) and replacing them with more desirable holdings. The motivation behind this is to impress investors in the reports, and ultimately to secure one's job. While the window dressing hypothesis makes logical sense, it has garnered mixed results. Ritter and Chopra (1989) find that the stocks of small firms increase in value in January due to tax-loss selling and institutional portfolio rebalancing (window dressing). Lakonishok, Shleifer, Thaler, and Vishny (1991) find that some window dressing does exist in their study; however, this behaviour is not unique to the fourth quarter. In a following study, Lakonishok, Shleifer, and Vishny (1992) find that window dressing does not have an effect on prices. They find that while institutional investors follow many different investing styles, the diversified nature of these styles act as a stabilizing mechanism, therefore not impacting prices of individual stocks. Further, Eakins and Sewell (1994) find no indication of window dressing by institutional portfolio rebalancing and Ligon (1997) finds that window dressing does not significantly contribute to the January effect. In fact, he finds that institutional management may even reduce the effect. In summary,

most research concludes that window dressing is not a reasonable explanation for the January effect.

The Capital Asset Pricing Model (CAPM) attempts to have all risk variables represented by beta. Banz (1981) and Reinganum (1981) argue that beta does not represent all risk variables, particularly for small stocks. They argue that the simple, one period CAPM is misspecified. While this work was not directly focused on abnormal returns in January, it is important to recognize these findings as the January effect in the United States is unquestionably linked to the small-firm effect. In somewhat of a response to Banz and Reinganum, Stoll and Whaley (1983) introduce the idea that transaction costs were not considered by Banz and Reinganum, as they were looking at gross returns (before transaction costs). Stoll and Whaley find that transaction costs, for some time periods, can explain the small-firm effect.

Another interesting possible explanation for the January effect is the Intergenerational Transfers Hypothesis. This hypothesis argues that the wealth transfer from one generation to the next, around the holiday season, explains the January effect. Gamble (1993) asserts that while much evidence supports the tax-loss selling hypothesis, part of the January effect largely remains unexplained. He finds that the Intergenerational Transfers Hypothesis, working together with the tax-loss selling hypothesis, helps to more fully explain the abnormal returns in January. Gamble does not empirically test his hypothesis, stating that data was not available; however, his non-empirical tests support the hypothesis.

Some research was conducted surrounding the January effect and the business cycle. Kohers and Kohli (1982) find that the January effect was present during the entire

period and the expansionary phases, while not present during periods of contraction. Kramer (1994) builds a multi-factor model, with seasonal risk and risk premia, to study whether or not macroeconomic uncertainty can help explain the January effect. He concludes that the January effect can be explained by expected return shifts. A similar approach was taken by Priestley (1997) looking at United Kingdom stock returns. He also finds that stock return seasonality is driven by expected return seasonality. The primary driver of the expected returns was the high level of risk involved with holding stocks in January and December due to the importance these months hold in the business cycle.

Finally, Ogden (1990) argues that the January effect can be explained by an increase in investors' liquidity at the turn-of-the-year; with more cash at the end of the year, investors buy stocks. He also finds that monetary policy, particularly the expected liquid profits that come with loose monetary policy, help to explain abnormal returns in January.

There are numerous explanations for the January effect other than the tax-loss selling hypothesis; however, none have managed to generate the same level of confidence and support in the academic community.

2.4 Data Mining

As economic studies are generally tested on the very data that exposed the anomaly, data mining can be a serious problem, particularly when a topic is heavily researched. As the January effect fits this description, it is essential that I discuss data mining with respect to seasonal returns. Sullivan, Timmermann, and White (2001) conduct a detailed study specifically on the topic. They mention that stock market data is particularly vulnerable, as the data contains important outliers. The study concludes that:

> ...when assessed in the context of either a large universe or a restricted universe of calendar rules that could plausibly have been considered by investors and academics with access to our data set, the strength of evidence on calendar anomalies looks much weaker (Sullivan, Timmermann, and White (2001), pp. 282).

When adjusted for the effects of data mining, the study finds that no significant calendar effect exists. So, while this paper has reviewed many articles showing statistically significant results, the evidence surrounding data mining potentially undermines the entire body of literature.

2.5 Conclusions from Literature Survey

The body of literature evaluating and trying to explain the January effect is substantial and the proposed explanations of the January effect have been long debated and, based on the literature surveyed, it is clear that a definitive explanation has not been found. The literature is, however, in relative agreement that tax-loss selling is at least partially responsible for the January effect. Other explanations, such as window dressing, CAPM misspecification, transaction costs, intergenerational transfers, the business cycle, and seasonal liquidity have garnered some support, and may indeed help to explain some of the effect; however, the tax-loss selling hypothesis is simply the most broadly supported. The issue of data mining cannot be ruled out and must be carefully considered when studying seasonal anomalies. Continued research on the data mining problem and the January effect, using the most recent data, will be useful for confirming whether or not the January effect is dwindling. Such research will be useful in a practical setting for industry participants who transact based on seasonal movements in securities.

3 DATA

Stock market returns used in this study are monthly returns from the market-capitalization (value) weighted MSCI Standard Index Series for 16 countries and, additionally, the CRSP equal-weighted index for US stocks, for the period January 1970 - December 2006. The CRSP index has been included for the US as previous research on the January effect for US stock markets has shown that the anomaly is primarily found for small stocks. As the international data is value-weighted, I will not be testing a small-firm January effect; however, I will compare value-weighted and equal-weighted results specifically for the US stock markets.

4 RESULTS

The primary goal of this paper is to test whether or not the tax-loss selling hypothesis, as an explanation for the January effect, holds from a global perspective. First, I analyze the MSCI return data for all countries independently, calculating the monthly mean returns, as displayed in Table 1. Further, I calculate the monthly mean returns for all countries in aggregate for an international picture of monthly returns. From Figure 1, it is clear that the highest returns are earned in January, while the only month exhibiting negative returns is September. To test for a seasonal effect in January, I need to test for a significant positive difference between the January mean return and the mean returns for the remaining eleven months of the year. To do this, I use the following parametric test:

$$r_{it} = \alpha_i + \beta_i d_{it} + e_{it}$$

where, r_{it} is the monthly return of the stock market index i at time t, d_{it} is a dummy variable where $i = 1$ for January and $i = 0$ for all other months, at time t. α_i is the mean return of all months other than January and β_i is the difference between the January return and the mean of all remaining months. By definition, therefore, the sum of the intercept and slope is equal to the January mean return. This test is conducted for each country. If there is a significant positive difference between the January return and the mean of the remaining eleven months, at the 0.05 probability level, I have confirmed that a January seasonal anomaly exists.

The results of the test are displayed in Table 2. Seven of 16 tested countries exhibit the January effect, one of which, the United Kingdom, doesn't even have a December tax year-end. While the methodology of the test is slightly different, and I test more countries, Gultekin and Gultekin (1983) found a January effect for all countries except one. As expected, the MSCI data for the US doesn't generate a January effect, while the CRSP data does. This is clearly due to the small-firm effect in the US, as the MSCI data is heavily biased towards the largest-capitalization companies, while the CRSP data is equally weighted. The January effect was discovered in the US and was primarily found to exist for small stocks. Therefore, these results confirm the existence of the small-firm effect in the US. Gultekin and Gultekin (1983) came to the same conclusion regarding the US findings in their study. However, there is certainly no small-firm effect driving the anomaly for the seven countries found to display seasonality in the MSCI data; this is quite fascinating. So, from a global perspective, it appears that the January effect is not as powerful an anomaly as in the heavily tested United States and it certainly is not a global small-firm phenomenon.

I have already alluded to the fact that not all countries in this study have a December tax year-end. Therefore, if I am really trying to confirm the tax-loss selling hypothesis, I must not test for a January effect for these countries, but for a monthly seasonal for the first month of the tax year. I conduct the same test as for the January effect, but instead of testing for different returns in January, I test for different returns in the first month of the tax year. As is displayed in Table 3, the United Kingdom is the only nation that exhibited the seasonal anomaly.

As mentioned earlier, it is clear from Figure 1 that the mean return for September, across all 16 considered countries, is negative. I find this particularly interesting considering there is no economic rationale for such a finding. I consulted the literature and, while some papers mentioned negative returns in September, I found no discussion of a September anomaly or potential explanation for the result. In order to see if the September returns are significantly different from the other months, potentially the *September Effect*, I conduct the same parametric test that I used to test for the January effect, only changing the dummy variable so $i = 1$ for September and $i = 0$ for all other months; the results are staggering. The September returns exhibit a significant positive difference from the remaining eleven months for 13 of 16 countries. Interestingly, the US exhibits this seasonal for the MSCI data (value-weighted) but not the CRSP data (equal-weighted). Perhaps this September seasonal is a large-cap phenomenon. While this September study is purely data mining, it is very interesting. The problem is that I cannot think of a significant rational explanation as to why this is occurring. This is certainly an interesting topic that is open for much more research in the future.

5 CONCLUSION

As is most commonly the case when research is conducted on the January effect, I end up with a relatively inconclusive study. With the exception of Roll (1983), the vast majority of research supports that the tax-loss selling hypothesis makes rational, economic sense. However, from a global perspective, the evidence I have found is not heavily supportive. Seven of 16 countries tested in this study show a seasonal return anomaly for the first month of the tax year; this is hardly persuasive. Similar to previous papers, I have been unable to uncover a solid explanation for the January effect. However, two conclusive items have come from this paper: the small-firm effect is still very strong in the United States and, interestingly, the small-firm effect is not the driver of the January effect internationally. However, eight countries (not counting the US) showed no January, or turn-of-the-tax-year, seasonal. This finding opens the door for, believe it or not, future study surrounding the January effect. It would be interesting to test all countries using equal-weighted data to compare results with this study and see if the small-firm effect is solely a US phenomenon or if the results are more significant internationally when small firms are equally represented. As more global indices are becoming available, this should soon be possible, if not already. Perhaps such a study would find some conclusive evidence, for once, surrounding an explanation for this elusive anomaly.

Table 1
Monthly Mean Returns (in % per month)
January 1970 - December 2006 (444 observations)

Country	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Australia	2.32	-0.02	1.25	2.15	1.09	0.47	1.15	0.91	-0.36	0.44	0.36	3.01
Austria	1.15	3.19	1.09	1.61	0.23	0.57	1.01	-0.20	-1.08	-0.26	0.67	3.16
Belgium	2.78	2.07	1.03	2.64	-0.73	0.84	1.64	-0.13	-0.91	0.64	1.24	2.72
Canada	2.36	1.19	0.87	0.01	1.07	0.54	1.33	1.05	-1.20	-0.01	2.01	2.88
Denmark	3.70	0.18	0.25	1.55	1.52	1.77	1.42	0.27	-0.96	1.89	-0.01	2.84
France	2.99	2.05	2.19	2.71	0.16	-0.89	1.07	0.50	-1.49	0.99	1.38	1.71
Germany	1.88	1.40	1.35	1.39	-0.94	1.18	1.20	-0.52	-1.90	1.44	1.49	2.20
Hong Kong	4.50	4.34	-1.39	2.02	2.53	1.37	2.48	-0.43	-0.93	3.49	-0.15	4.75
Italy	4.93	2.53	2.00	1.66	-0.54	-0.75	0.44	1.14	-1.63	0.18	1.38	1.54
Japan	1.79	0.80	2.36	1.32	0.19	0.74	0.10	-0.20	-0.53	-0.36	1.11	2.24
Netherlands	2.58	1.04	2.39	2.33	0.28	0.95	1.30	0.15	-2.41	0.69	1.23	2.36
Spain	3.34	3.05	1.26	2.05	1.17	0.57	0.12	0.51	-1.78	1.12	2.15	0.78
Sweden	4.04	3.38	1.37	2.04	0.48	0.79	2.71	-1.68	-1.80	1.50	3.18	1.93
Switzerland	2.18	0.34	1.19	0.82	0.16	1.26	0.84	-0.24	-1.50	1.42	1.52	2.34
UK	3.30	1.85	1.09	3.00	-0.28	-0.22	0.82	1.25	-0.84	0.69	0.99	2.43
US	1.87	0.46	1.04	1.14	0.73	0.94	0.42	0.42	-0.70	1.31	1.96	1.89
US EW	6.70	1.91	1.34	0.65	1.03	0.68	0.13	0.46	-0.17	-0.92	1.65	1.42

Figure 1
Monthly Mean Returns for All Countries (in % per month)
January 1970 - December 2006 (444 observations)

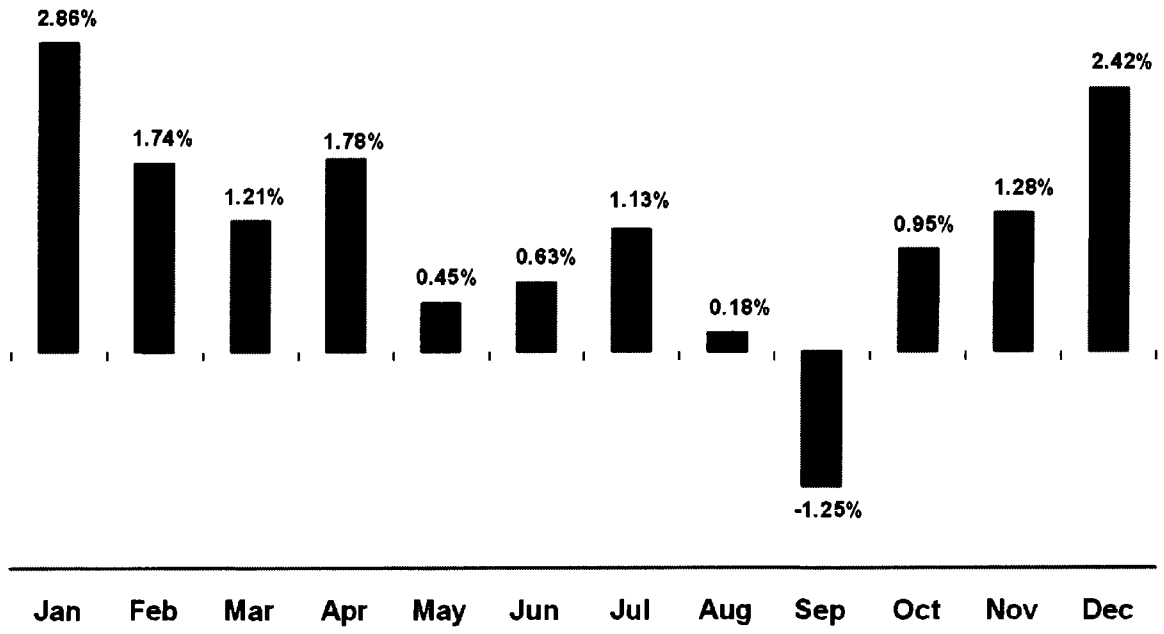

Table 2
Test Statistics for January Seasonality (in % per month)
January 1970 – December 2006 (444 observations)

$$r_{it} = \alpha_i + \beta_i d_{it} + e_{it}$$

r_{it} is the monthly return of the stock market index i at time t, d_{it} is a dummy variable where $i = 1$ for January and $i = 0$ for all other months, at time t. α_i is the mean return of all months other than January and β_i is the difference between the January return and the mean of all remaining months. By definition, the sum of the intercept and slope is equal to the January mean return.

All indices except the US EW (equal-weighted) are the MSCI (market-cap weighted) indices. The US EW is from the CRSP database. Countries highlighted with bold text are those with January returns that exhibit a significant positive difference from the rest of the months of the year at the 0.05 probability level.

Country	α	t-stat	β	t-stat	Jan Mean
Australia	0.95	3.34	1.37	1.38	2.32
Austria	0.91	3.43	0.24	0.26	1.15
Belgium	1.01	4.21	1.78	**2.15**	2.78
Canada	0.88	3.67	1.48	1.77	2.36
Denmark	0.97	3.93	2.73	**3.18**	3.70
France	0.94	3.24	2.05	**2.03**	2.99
Germany	0.75	2.71	1.12	1.16	1.88
Hong Kong	1.64	3.28	2.85	1.64	4.50
Italy	0.72	2.15	4.20	**3.61**	4.93
Japan	0.71	2.70	1.08	1.20	1.79
Netherlands	0.94	3.71	1.64	1.87	2.58
Spain	1.00	3.40	2.34	**2.30**	3.34
Sweden	1.26	3.89	2.77	**2.47**	4.04
Switzerland	0.74	3.09	1.44	1.73	2.18
UK	0.98	3.38	2.32	**2.31**	3.30
US	0.87	4.03	0.99	1.32	1.87
US EW	0.74	2.73	5.95	**6.31**	6.70

Table 3
Test Statistics for Non-December Tax Year-End Seasonality (in % per month)
January 1970 – December 2006 (444 observations)

$$r_{it} = \alpha_i + \beta_i d_{it} + e_{it}$$

r_{it} is the monthly return of the stock market index i at time t, d_{it} is a dummy variable where $i = 1$ for the first month of the tax year (FMOTY) and $i = 0$ for all other months, at time t. α_i is the mean return of all months other than the FMOTY and β_i is the difference between the FMOTY return and the mean of all remaining months. By definition, the sum of the intercept and slope is equal to the FMOTY mean return.

All indices are the MSCI (market-cap weighted) indices. Countries highlighted with bold text are those with January returns that exhibit a significant positive difference from the rest of the months of the year at the 0.05 probability level.

Country	α	t-stat	β	t-stat	1st Month of Tax Year Mean
Australia[1]	1.06	3.70	0.10	0.10	1.15
Hong Kong[2]	1.87	3.72	0.15	0.09	2.02
UK[3]	1.01	3.47	1.99	**1.98**	3.00

[1] July 1 tax year start
[2] April 1 tax year start
[3] April 6 tax year start for individuals, April 1 for corporations

Table 4
Test Statistics for September Seasonality (in % per month)
January 1970 – December 2006 (444 observations)

$$r_{it} = \alpha_i + \beta_i d_{it} + e_{it}$$

r_{it} is the monthly return of the stock market index i at time t, d_{it} is a dummy variable where $i = 1$ for September and $i = 0$ for all other months, at time t. α_i is the mean return of all months other than September and β_i is the difference between the September return and the mean of all remaining months. By definition, the sum of the intercept and slope is equal to the September mean return.

All indices except the US EW (equal-weighted) are the MSCI (market-cap weighted) indices. The US EW is from the CRSP database. Countries highlighted with bold text are those with September returns that exhibit a significant positive difference from the rest of the months of the year at the 0.05 probability level.

Country	α	t-stat	β	t-stat	Sept Mean
Australia	1.19	4.19	-1.55	-1.57	-0.36
Austria	1.11	4.22	-2.19	**-2.40**	-1.08
Belgium	1.34	5.63	-2.25	**-2.72**	-0.91
Canada	1.21	5.04	-2.41	**-2.91**	-1.20
Denmark	1.40	5.62	-2.36	**-2.74**	-0.96
France	1.35	4.66	-2.84	**-2.83**	-1.49
Germany	1.10	3.98	-3.00	**-3.13**	-1.90
Hong Kong	2.14	4.26	-3.07	-1.77	-0.93
Italy	1.32	3.90	-2.95	**-2.51**	-1.63
Japan	0.92	3.51	-1.45	-1.61	-0.53
Netherlands	1.39	5.61	-3.80	**-4.42**	-2.41
Spain	1.47	5.02	-3.24	**-3.21**	-1.78
Sweden	1.79	5.55	-3.59	**-3.20**	-1.80
Switzerland	1.07	4.51	-2.57	**-3.12**	-1.50
UK	1.36	4.67	-2.20	**-2.19**	-0.84
US	1.11	5.13	-1.81	**-2.42**	-0.70
US EW	1.37	4.82	-1.54	-1.56	-0.17

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