An Empirical Investigation Of The Persistence Of Stock And Bond Return Seasonality

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Abstract

The purpose of this paper is to investigate the persistence of seasonality in stock and bond returns using data from 1926 to 1992. This study finds evidence of seasonality in stock returns during the 1926-92 period. Dividing the data into sub-periods yields the following results: there was no evidence of stock market seasonality from 1926 to 1940, seasonality increased between 1941 and 1975 and then diminished slightly from 1976 to 1992. Specifically, the average January return was found to be significantly different than the average return in the other eleven months of the year. Seasonality was found in the high-quality end of the corporate bond market during the 1966-78 period, but there was no evidence of seasonality in the government bond market.

Introduction

The efficient markets hypothesis is a controversial topic in finance. The hypothesis states that stock prices follow a random walk, implying that price changes are unpredictable and random because they reflect all available information. Many people would agree that the market is at least weak-form efficient, meaning that current stock prices reflect past price information. Fundamental analysis of stock market trends, however, has revealed evidence that is inconsistent with the semi-strong form of the efficient market hypothesis. Seasonality in returns, specifically the January effect, is one anomaly that continues to puzzle academics and practitioners.

The January effect describes the fact that on average, security returns are significantly higher in January than in any other month of the year. While this is true for all stocks, it appears to be most pronounced in the returns of small firms. For this reason, the anomaly is often referred to as the "small-firm in January effect." The persistence of this January seasonality in returns is extremely puzzling. In an efficient market, seasonal patterns are not expected to persist; they should be eliminated by arbitrageurs buying in December and selling in early January. Despite the fact that investors know about the January effect and trade on their knowledge of it, the excess returns are not eliminated. Stocks, particularly small company stocks, continue to deliver excess returns in January.

The existence of seasonality in returns provides opportunities for investors to earn excess returns, and, therefore, it is a controversial topic that continues to receive substantial exposure. The purpose of this research is to determine whether the influence of the January effect on stock, high-quality corporate bond, and govern-

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ment bond returns has changed over the 1926-92 time period. This study finds evidence of seasonality in stock returns during the entire period from 1926 to 1992. Dividing the data into subperiods yields the following results: there was no evidence of stock market seasonality from 1926 to 1940, seasonality increased between 1941 and 1975, and then diminished slightly from 1976 to 1992. Specifically, during the years from 1941 to 1975, the average return in January was significantly different than the average return in the other eleven months of the year for small as well as medium-size company stocks. In the years from 1976 to 1992, the average return in January was significantly different from the average return in the other eleven months for small company stocks only. Seasonality was also found in the high-quality end of the corporate bond market during the 1966 to 1978 period, but there was no evidence of seasonality in the government bond market.

The remainder of this paper is organized as follows: *Section II* presents a brief literature review, *Section III* describes the data, *Section IV* presents the model, *Section V* describes the results, *Section VI* concludes the analysis, and *Section VII* provides suggestions for future research.

Literature Review

Stock Return Seasonality

Wachtel (1942) first identified a seasonal pattern in stock returns. In 1976, Rozeff and Kinney discovered statistically significant differences in mean stock returns among months of the year and concluded that seasonality does exist on the New York Stock Exchange (NYSE). Specifically, further study of stock returns showed that the seasonality is largely due to the higher mean of the January distribution of returns relative to the other eleven months.

Keim (1983) considered the results on seasonality in stock returns as well as the size effect. His study examined the empirical relation between abnormal returns and the market value of NYSE and AMEX common stocks on a month-by-month basis. He finds that 50% of the average magnitude of the size effect over the1963 to 1979 period was due to abnormal returns in January, and more than 50% of the January premium is attributable to large excess returns during the first trading week of the year. His findings also indicate that the relationship between abnormal returns and size is always negative in January, even in years when the average risk-adjusted return on large firms is higher than the average risk-adjusted return on small firms.

Gultekin and Gultekin (1983) examined the stock markets of several major industrialized countries and found that strong seasonality in stock market returns does exist around the world. Their work shows that seasonality around the world is generally caused by disproportionately large returns in the first month of the new tax year. In most countries, including the United States, the effect manifests itself in January while in the U.K. it is the April effect.

Potential Explanations of Stock Return Seasonality

Several hypotheses have been presented as potential explanations for seasonality in stock and bond returns. The accounting information effect as proposed by Rozeff and Kinney (1976) postulates that dissemination of year-end information may have a greater impact on the prices of small firms relative to large firms because the market for small firm stock is less efficient.

Ritter's (1988) tax-loss selling hypothesis says that individuals increase their selling of securities that have declined in value at the end of the year to realize tax losses. Reinvestment of those funds early in the following year pushes stock prices up. Eakins and Sewell (1993) test for a link between January abnormal returns and institutional ownership; they find a positive relationship between individual investors' ownership and abnormal January returns. Johnston and Cox (1996) analyze firms with large declines that are candidates for tax-loss selling. They find that firms that rebound in January with positive abnormal returns are, on average, smaller and have a higher proportion of individual ownership than firms that do not rebound in January. Despite this evidence in favor of the tax-loss selling hypothesis, the hypothesis does not completely explain the January effect. Some studies [Jones, Pearce, and Wilson (1987) and Pettengill (1986)] find that a turn-of-the-year (January effect) existed before income was taxed in the United States, and other studies [Brown, Keim, Kleidon, and Marsh (1983) and Gultekin and Gultekin (1983)] show that the effect occurs in countries with tax laws different from U.S. tax laws.

Other attempts to explain the January effect include Keim's (1989) evidence that a shift from trades at bid prices to trades at ask prices occurs at the turn of the year. Dyl and Maberly (1992) assume that odd-lot trading is a good proxy for trading by individual investors. They find evidence that the shift documented by Keim is explained by a dramatic decrease in odd-lot sales of common stock relative to odd-lot purchases around the turn of the year.

Roll (1983) suggests that the small firm premia at the turn of the year may simply be attributed to the fact that small firms have larger sales and earnings volatilities because they are not as well diversified. Larger returns may accrue to small firms during January because they are more likely to have experienced losses during the year and thereby are more likely to experience tax-loss selling. For example, current pricing methods may not accurately capture the risk inherent in small firms. Thus, the small firm risk premia may be due to some type of risk that remains unmeasured at present.

Another plausible reason for the persistence of the January effect, especially among small firms, may be the magnitude of transaction costs. The stock of small firms generally has lower prices and correspondingly higher transaction costs then the stock of large firms. These large transaction costs may offset any gain that would arise from trading on the knowledge of the recurring January effect and preclude traders from arbitraging the market into equilibrium. Thus, small firm risk premia at the turn of the year remain.

Bond Return Seasonality

After a January effect was documented in the stock market, researchers began to investigate seasonality in the bond market. The results of bond market seasonality studies have been mixed. Smirlock (1985) finds no evidence of seasonality in the bond market, except in low-grade corporate bonds. Keim and Stambaugh (1986) find evidence that bond market average excess returns were higher in some months (not only January) than others. Their findings suggest that a January effect exists in low grade bonds and private issuer instruments. Chang and Pinegar (1986) analyze the monthly returns of U.S. Treasuries and bonds rated Aaa, Aa, A, Baa, and B. They find an excess return in January for noninvestment-grade bonds only. Wilson and Jones (1990) studied returns from 1857 to 1987 on a variety of debt instruments. Their results suggest that there is an overall January effect in nominal corporate bond and commercial paper returns. However, this finding does not hold across all debt instruments or sub-periods.

Data

The stock return data for this study were obtained from the University of Chicago's Center for Research in Security Prices (CRSP) monthly stock return file for the 67-year period from 1926 to 1992. The sample consists of firms listed on the NYSE that had returns in the CRSP files during the entire calendar year under consideration. Following Keim (1983), the sample was divided into ten portfolios based on firm size. Firm size was measured by market value of common equity. Market value was computed by multiplying the number of shares of common stock outstanding at year-end by the year-end price per common share. Each yearly distribution of market values was then divided equally into ten portfolios on the basis of size. Each portfolio was updated annually. Portfolio 1 contains the monthly returns for stock of the smallest firms while Portfolio 10 contains the returns for stock of the largest firms. The bond return data for both government and corporate bonds were obtained from Ibbotson and Associates. The government bond series consists of total returns for Treasury bonds with 15 to 20 years to maturity, and the corporate bond series consists of total return for high-grade corporate bonds. The monthly data on total bond returns also spans the 67-year period from 1926 to 1992.

Table 1 describes the general behavior of monthly returns over the entire period for which data are available. Naturally, stocks provide a higher average return than either government or corporate bonds. In addition, it is clear that the portfolios of small firm stocks exhibit higher returns than the portfolios of larger firm stocks. This phenomenon is referred to as the "size effect." The difference in return between the portfolios of the smallest and largest firms is 0.83% per month, or just under 10% annually. In order to realize higher returns, investors must expose themselves to more total risk as measured by standard deviation of return. Indeed, the monthly standard deviation for the portfolio of large stocks is only 5.31% compared to 11.05% for the portfolio of small firm stocks. This translates to a difference in average standard deviation of 5.74% per month between the two portfolios. Corporate and government bonds, securities that are significantly less risky than stocks, provide average monthly returns of 0.42% and 0.47%, respectively. Their corresponding standard deviations are approximately 2% per month.

Previous studies such as Keim (1983) find that a large portion of the magnitude of the size effect can be attributed to abnormal returns in January. Indeed, Table 2 illustrates that the average monthly return in January for the small stock portfolio is 11.62% compared to 1.15% for the portfolio of large stocks. Figure 1 graphically compares the average return of the stocks in each portfolio for the months of January, April, July and October. For all but the portfolios that contain the largest stocks, January provides superior returns when compared to the other three months. Keim compares the abnormal returns earned in January with those earned throughout the other eleven months. He finds a monthly size effect of 15% in January as compared to only 2.5% across the other eleven months. He also finds that February, March and July often exhibit positive size premia, but as Table 2 shows, even the July return does not come close to matching the month of January. It is interesting to note that the average return in October is negative for all portfolios except those that contain the largest stocks. Clearly, there is something unique about the month of January.

The Model

Seasonality in stock and bond returns implies that there are significant differences in month-to-month mean returns. The existence of seasonality can be tested using either parametric or non-parametric tests. Parametric methods provide a straightforward test of a specific hypothesis about the pattern of seasonality (e.g. the existence of January seasonality) while non-parametric tests are more useful when a specific hypothesis about the pattern of seasonality can not be formulated (Ghysels, 1997). Gultekin and Gultekin (1983) find that parametric and non-parametric methods yield similar results. Following Keim (1983), this paper employs a parametric method to test the hypothesis that the expected returns for each month of the year are

Table 1
Monthly total return summary statistics by portfolio (1926-1992)

Portfolio	Smallest	2	3	4	5	6	7	8	9	Largest	Govt. Bonds	Corp. Bonds
Average	1.71%	1.40%	1.24%	1.24%	1.20%	1.20%	1.14%	1.04%	1.04%	0.88%	0.42%	0.47%
Std Dev	11.05%	9.47%	8.51%	7.83%	7.41%	7.19%	6.83%	6.39%	6.15%	5.31%	2.20%	2.00%
Maximum	104.41%	86.77%	88.59%	68.05%	58.31%	52.44%	57.92%	49.37%	45.90%	34.90%	15.24%	14.19%
Minimum	-35.87%	-35.20%	-34.17%	-31.76%	-32.56%	-32.40%	-30.83%	-31.37%	-32.58%	-27.83%	-8.41%	-8.90%

Table 2
Comparative average monthly returns by portfolio for January, April, July and October (1926-1992)

Portfolio	Smallest	2	3	4	5	6	7	8	9	Largest
January	11.62%	8.06%	6.46%	5.21%	4.47%	4.05%	2.99%	2.69%	2.30%	1.15%
April	0.84%	0.96%	0.84%	1.11%	1.09%	0.92%	1.31%	1.02%	0.97%	1.31%
July	2.23%	2.24%	2.11%	1.96%	1.93%	1.95%	1.86%	1.95%	1.72%	2.00%
October	-1.31%	-0.87%	-0.78%	-0.63%	-0.82%	-0.39%	-0.42%	-0.11%	0.02%	0.10%

Table 3
Standard deviation of monthly total return

	1926-92	1926-40	1941-75	1976-92
S&P 500	5.80%	9.58%	3.95%	4.46%
	1926-92	1926-65	1966-78	1979-92
Government Bonds	2.20%	1.19%	2.34%	3.70%
Corporate Bonds	2.00%	1.05%	2.20%	3.36%

equal. The hypothesis is tested using the following regression model:

$$R_t = a_1 + a_2D_2 + a_3D_3 + \ldots + a_{12}D_{12} + e_t .$$

In the above equation, R_t is the average monthly return in month *t* for the stock or bond portfolio under consideration, and the eleven dummy variables indicate the month of the year. The intercept, a_1, measures the return in January while a_2 through a_{12} measure the difference between the mean return in January and the returns for each of the other eleven months.

The null hypothesis is that the expected return for each month of the year is the same (no seasonality). Under the null, a_2 through a_{12} should be close to zero. If the F-statistic, which measures the joint significance of all the dummy variables, is not significantly different from zero, the null hypothesis of no seasonality cannot be rejected.

In order to test for the persistence of seasonality in stock returns, the stock return data were divided into three sub-periods: 1926-40, 1941-75, and 1976-1992. This division was used because a plot of the total return on the S&P 500 from 1926 to 1992 shows that stocks were more volatile during the 1926-40 period, the volatility subsided during the 1941-75 period and then increased during the most recent period from 1976 to 1992. Table 3 illustrates the differences in standard deviation between each of the designated sub-periods for stocks, government bonds and corporate bonds. The total return on government bonds and the total return on high-grade corporate bonds exhibited low volatility from1926-65, slightly higher volatility from 1966-78, and still higher volatility during the 1979-92 period.

Dividing the data into sub-periods also allows for a comparison between earlier years, when the January effect was an existent but relatively unrecognized phenomenon and more re cent times when the impact of the effect has been widely studied (the years from 1976 to the present). If the market is truly efficient, then persistence of the January effect is expected to decrease as more investors learn about it and arbitrageurs trade on their knowledge of previous return patterns. In other words, we would expect to detect a January effect in a higher percentage of the ten stock portfolios during 1926-40 period than the 1976-92 period. Equation (1) is estimated by OLS using data from the 1926-92 time period as well as the three sub-periods. The data consists of the total return on each of the ten portfolios of NYSE stocks, the difference in returns between the smallest and the largest stock portfolios, and the total return on both the government and the high-grade corporate bond portfolios.

Results

Stock Return Seasonality

The results of this study indicate that stock return seasonality existed among NYSE stocks during the 67-year period from 1926 to 1992. As Table 4 shows, the average monthly return in January, measured by the intercept of equation (1), is positive and significant at the 5% level (estimated *t-ratio*>1.65) for all ten portfolios. Furthermore, the differences between the mean return in January and the returns for every other month of the year are negative and significant for portfolios one through five. Together, these results suggest that January returns supersede average returns for the other months of the year, particularly for stocks of companies in the lower half of the size distribution.

The F-statistic allows us to test the null hypothesis that monthly returns are equal for all months. The F-statistics for portfolios one through six are significant at the 5% level, and the null hypothesis of equal monthly returns is, therefore, rejected for small and medium-size firm stocks during the 1926-92 time period. Rejection of the null hypothesis suggests that seasonality existed on the NYSE between 1926 and 1992.

In order to investigate persistence of seasonality, the data sample was divided into three sub-periods as previously described. Tables 5, 6 and 7 present the stock market findings for each sub-period. The average monthly return in January is positive and significant at the 5% level for the four smallest portfolios during the 1926-40 period, it is positive and significant at the 5% level for all portfolios except the largest portfolio during the 1942-75 time period, and it is positive and significant for all portfolios during the 1976-92 time period. For many of the portfolios, particularly those in the 1941-75 and 1976-92 sub-periods, the average return in January is larger than the average return for any other month as indicated by the negative monthly coefficients and significant t-ratios. This pattern is especially true of the portfolios that contain the smaller stocks. It is interesting to note that the average January return for portfolios 1 through 5 was highest during the 1926-40 period and decreased during the two subsequent periods.

The F-statistic is used to test for seasonality. For the 1926-40 period, none of the F-statistics for portfolios one through ten are significant at the 5% level. Thus, the null hypothesis of equal monthly returns can not be rejected for the 1926-40 period, and there is no evidence of stock market seasonality during that time. In contrast, for the years from 1941 to 1975 the F-statistic for the portfolio of the smallest stocks as well as the F-statistics for the next five portfolios are significant at the 5% level. These significant F-statistics indicate that the null hypothesis of equal average monthly returns should be rejected in favor of the alternative of seasonality in stock returns. Evidence of seasonality is also present in the 1976-92 period. The F-statistics for portfolios one through four are significant at the 5% level, indicating rejection of the null hypothesis that expected monthly returns are equal for all months. These results are surprising because they suggest that there was essentially no seasonality in the stock market prior to 1940, seasonality existed for both small and medium-size stocks from 1941 to 1975, and seasonality continues to persist, particularly in small company stocks. Seasonality has only diminished slightly in the years since 1976 despite the fact that the effect has been widely studied during the past twenty-five years, and many investors trade on the information each year.

Estimation of equation (1) for the difference in average monthly returns between the portfolio of the smallest and largest stocks indicates that the observed size premium for January is positive and significant for the entire 1926-92 period as well as each of the sub-periods. Thus, small company stocks earn significantly higher returns than large company stocks in January. The difference between the return in January and the return for each of the other months is negative and significant in all time periods. The F-statistics indicate that the null hypothesis of a stable month-to-month size effect can be rejected for all time periods. Consistent with Keim (1983), it appears that the size effect may be largely explained by monthly returns in January.

The seasonality results presented here are consistent with previous studies [Rozeff and Kinney (1976), Keim (1983), and Gultekin and Gultekin (1983)] that find evidence of seasonality in stock returns. This study also concurs with the others in finding January returns to be the major source of excess returns for stocks of smaller firms. The evidence provided through comparison of the regression results from the three sub-periods is particularly interesting because it indicates that stock return seasonality changed during the 1926-92 time period. From 1926 to 1940, there was no evidence of stock return seasonality. However, during the 1941-75 period, the six smallest portfolios showed evidence of a significant difference between returns in January and returns in the other months of the

Figure 1
Average monthly return by portfolio: January, April, July, October

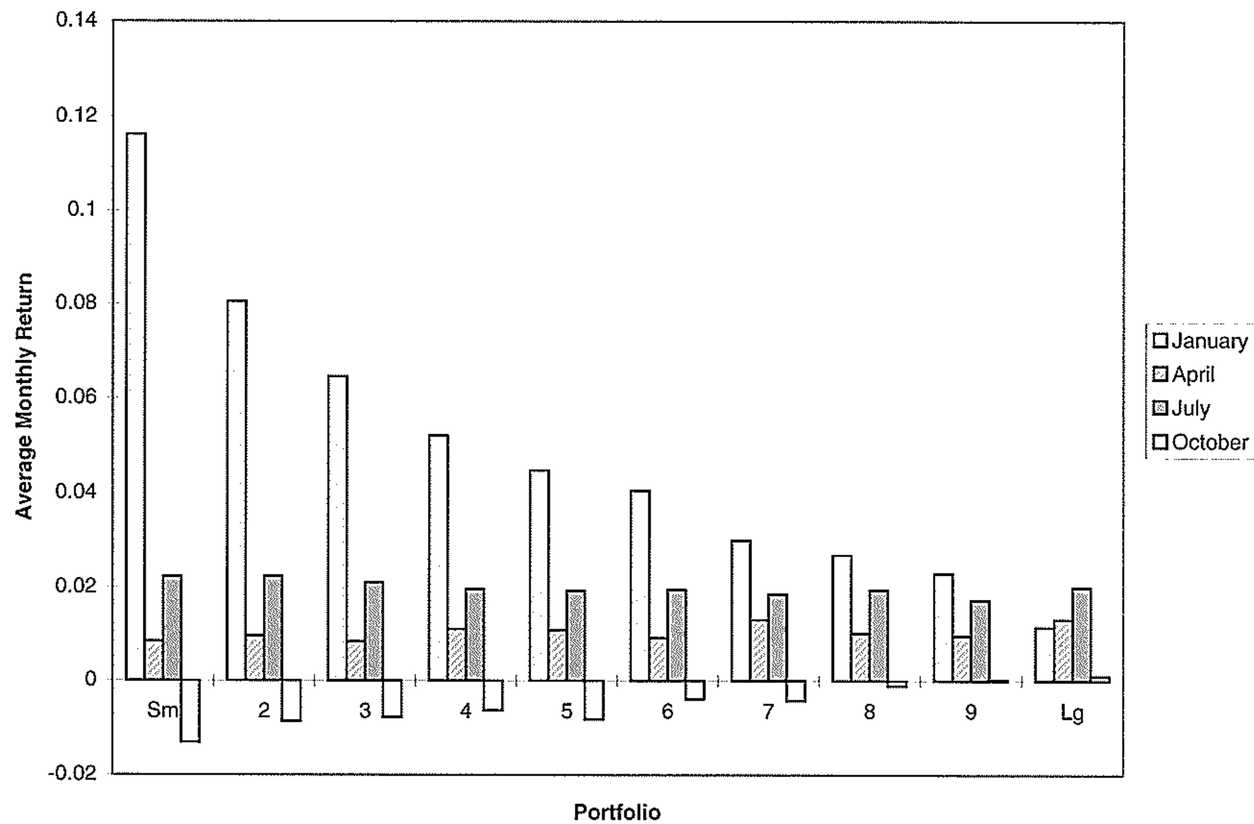

Table 4

Regressions of monthly average stock returns on dummy variables[1] by portfolio to test for differences in mean monthly returns (1926-1992)[2]

Portfolio	Jan (a_1)	Feb (a_2)	Mar (a_3)	Apr (a_4)	May (a_5)	June (a_6)	July (a_7)	Aug (a_8)	Sept (a_9)	Oct (a_{10})	Nov (a_{11})	Dec (a_{12})	R^2	F-stat
Smallest	.1163 (8.92)	-.0981 (-5.32)	-.1171 (-6.35)	-.1078 (-5.85)	-.1093 (-5.93)	-.1074 (-5.83)	-.0932 (-5.06)	-.0984 (-5.34)	-.1172 (-6.36)	-.1294 (-7.02)	-.1046 (-5.68)	-.1073 (-5.82)	.0804	6.299*
2	.0806 (7.12)	-.0645 (-4.03)	-.0747 (-4.67)	-.0710 (-4.44)	-.0749 (-4.68)	-.0725 (-4.53)	-.0575 (-3.59)	-.0613 (-3.83)	-.0925 (-5.78)	-.0893 (-5.58)	-.0653 (-4.08)	-.0759 (-4.74)	.0559	4.267*
3	.0646 (6.32)	-.0503 (-3.48)	-.0628 (-4.35)	-.0562 (-3.89)	-.0588 (-4.06)	-.0586 (-4.05)	-.0428 (-2.96)	-.0462 (-3.20)	-.0766 (-5.30)	-.0723 (-5.00)	-.0483 (-3.35)	-.0527 (-3.65)	.0470	3.549*
4	.0521 (5.51)	-.0392 (-2.93)	-.0473 (-3.53)	-.0409 (-3.06)	-.0446 (-3.34)	-.0431 (-3.22)	-.0316 (-2.36)	-.0352 (-2.63)	-.0599 (-4.48)	-.0584 (-4.37)	-.0364 (-2.72)	-.0398 (-2.97)	.0344	2.567*
5	.0447 (4.99)	-.0340 (-2.68)	-.0414 (-3.26)	-.0339 (-2.67)	-.0384 (-3.03)	-.0351 (-2.77)	-.0245 (-1.93)	-.0246 (-1.94)	-.0527 (-4.16)	-.0529 (-4.18)	-.0258 (-2.03)	-.0292 (-2.30)	.0333	2.477*
6	.0405 (4.65)	-.0293 (-2.38)	-.0362 (-2.94)	-.0313 (-2.54)	-.0361 (-2.93)	-.0298 (-2.42)	.0201 (-1.63)	.0198 (-1.61)	-.0493 (-4.00)	-.0444 (-3.60)	-.0241 (-1.96)	-.0214 (-1.74)	.0297	2.201*
7	.0299 (3.60)	-.0194 (-1.65)	-.0261 (-2.22)	-.0168 (-1.43)	-.0266 (-2.26)	-.0175 (-1.49)	-.0105 (-0.90)	-.0108 (-0.92)	-.0362 (-3.09)	-.0342 (-2.91)	-.0106 (-0.90)	-.0130 (-1.11)	.0223	1.642
8	.0269 (3.46)	-.0187 (-1.70)	-.0220 (-2.00)	-.0166 (-1.52)	-.0250 (-2.27)	-.0163 (-1.49)	-.0068 (-0.62)	-.0103 (-0.94)	-.0356 (-3.24)	-.0280 (-2.55)	-.0099 (-0.90)	-.0087 (-0.79)	.0228	1.678
9	.0230 (3.07)	-.0148 (-1.40)	-.0182 (-1.72)	-.0133 (-1.26)	-.0187 (-1.77)	-.0099 (-0.93)	-.0050 (-0.48)	-.0047 (-0.44)	-.0331 (-3.13)	-.0228 (-2.15)	-.0065 (-0.61)	-.0044 (-0.42)	.0218	1.602
Largest	.0115 (1.78)	-.0063 (-0.69)	-.0071 (-0.78)	.0017 (0.18)	-.0088 (-0.96)	-.0008 (-0.09)	.0091 (1.00)	.0046 (0.51)	-.0218 (-2.39)	-.0105 (-1.15)	.0021 (0.23)	.0049 (0.54)	.0236	1.742
Small-Large	.1048 (11.1)	-.0917 (-6.88)	-.1100 (-8.24)	-.1095 (-8.21)	-.1005 (-7.54)	-.1066 (-7.99)	-.1023 (-7.67)	-.1030 (-7.72)	-.0954 (-7.15)	-.1189 (-8.91)	-.1067 (-8.00)	-.1123 (-8.42)	.1321	10.96*

[1]The dummy variables indicate in which month of the year the average return was observed (D_2 = February, etc.)

[2]The estimated t-ratios are in parentheses.

*Indicates that the F-statistic is significant. The F-statistic tests the hypothesis that a_2 through a_{12} in Equation (1) are zero. At a 5% level of significance, the critical value of

$F_{10,\infty}$ = 1.83.

Table 5

Regressions of monthly average stock returns on dummy variables[1] by portfolio to test for differences in mean monthly returns (1926-1940)[2]

Portfolio	Jan (a_1)	Feb (a_2)	Mar (a_3)	Apr (a_4)	May (a_5)	June (a_6)	July (a_7)	Aug (a_8)	Sept (a_9)	Oct (a_{10})	Nov (a_{11})	Dec (a_{12})	R^2	F-stat
Smallest	.1574 (3.26)	-.0144 (-2.10)	-.2209 (-3.23)	-.1352 (-1.98)	-.1492 (-2.18)	-.1367 (-2.00)	-.1071 (-1.57)	-.1019 (-1.49)	-.1591 (-2.33)	-.1827 (-2.68)	-.1416 (-2.07)	-.1945 (-2.85)	.0798	1.324
2	.1076 (2.53)	-.0861 (-1.43)	-.1505 (-2.50)	-.0842 (-1.40)	-.1056 (-1.76)	-.0876 (-1.46)	-.0648 (-1.08)	-.0416 (-0.69)	-.1440 (-2.40)	-.1340 (-2.23)	-.0945 (-1.61)	-.1511 (-2.52)	.0713	1.173
3	.0778 (2.08)	-.0601 (-1.14)	-.1318 (-2.50)	-.0655 (-1.24)	-.0696 (-1.32)	-.0513 (-0.97)	-.0241 (-0.46)	-.0306 (-0.58)	-.1246 (-2.36)	-.1053 (-1.99)	-.0742 (-1.42)	-.1019 (-1.93)	.0717	1.180
4	.0621 (1.82)	-.0494 (-1.03)	-.1045 (-2.17)	-.0407 (-0.85)	-.0623 (-1.29)	-.0333 (-0.69)	-.0132 (-0.27)	-.0124 (-0.26)	-.0961 (-2.00)	-.0840 (-1.74)	-.0610 (-1.27)	-.0802 (-1.66)	.0623	1.014
5	.0498 (1.55)	-.0382 (-0.84)	-.0958 (-2.11)	-.0226 (-0.50)	-.0614 (-1.35)	-.0176 (-0.39)	-.0017 (-0.04)	.0040 (0.05)	-.0775 (-1.71)	-.0787 (-1.74)	-.0384 (-0.85)	-.0551 (-1.22)	.0674	1.104
6	.0484 (1.57)	-.0334 (-0.77)	-.0862 (-1.97)	-.0281 (-0.64)	-.0655 (-1.50)	-.0118 (-0.27)	.0039 (0.09)	.0073 (0.17)	-.0786 (-1.80)	-.0707 (-1.62)	-.0465 (-1.07)	-.0538 (-1.23)	.0705	1.158
7	.0301 (1.04)	-.0174 (-0.42)	-.0696 (-1.69)	.0021 (0.05)	-.0500 (-1.22)	.0109 (0.26)	.0180 (0.44)	.0188 (0.46)	-.0552 (-1.34)	-.0576 (-1.40)	-.0216 (-0.53)	-.0318 (-0.77)	.0714	1.175
8	.0254 (0.95)	-.0178 (-0.47)	-.0600 (-1.59)	-.0082 (-0.22)	-.0480 (-1.27)	.0098 (0.26)	.0199 (0.53)	.0152 (0.40)	-.0551 (-1.46)	-.0405 (-1.07)	-.0277 (-0.73)	-.0236 (-0.63)	.0653	1.066
9	.0244 (0.94)	-.0112 (-0.31)	-.0584 (-1.60)	-.0070 (-0.19)	-.0438 (-1.20)	.0136 (0.37)	.0187 (0.51)	.0253 (0.69)	-.0559 (-1.53)	-.0444 (-1.22)	-.0223 (-0.61)	-.0247 (-0.68)	.0759	1.255
Largest	.0139 (0.65)	-.0034 (-0.11)	-.0372 (-1.22)	.0018 (0.06)	-.0331 (-1.09)	.0190 (0.63)	.0330 (1.09)	.0311 (1.02)	-.0417 (-1.37)	-.0358 (-1.18)	-.0113 (-0.37)	-.0115 (-0.38)	.0884	1.481
Small-Large	.1435 (4.26)	-.1404 (-2.95)	-.1837 (-3.85)	-.1370 (-2.87)	-.1160 (-2.43)	-.1557 (-3.27)	-.1401 (-2.94)	-.1330 (-2.79)	-.1174 (-2.46)	-.1469 (-3.08)	-.1304 (-2.74)	-.1830 (-3.84)	.1122	1.93*

[1]The dummy variables indicate in which month of the year the average return was observed (D_2 = February, etc.)

[2]The estimated t-ratios are in parentheses.

*Indicates that the F-statistic is significant. The F-statistic tests the hypothesis that a_2 through a_{12} in Equation (1) are zero. At a 5% level of significance, the critical value of

$F_{10,\infty} = 1.83$.

Table 6
Regressions of monthly average stock returns on dummy variables[1] by portfolio to test for differences in mean monthly returns (1941-1975)[2]

Portfolio	Jan (a_1)	Feb (a_2)	Mar (a_3)	Apr (a_4)	May (a_5)	June (a_6)	July (a_7)	Aug (a_8)	Sept (a_9)	Oct (a_{10})	Nov (a_{11})	Dec (a_{12})	R^2	F-stat
Smallest	.1125 (9.25)	-.1002 (-5.82)	-.0985 (-5.73)	-.1075 (-6.25)	-.1093 (-6.35)	-.1134 (-6.59)	-.0932 (-5.42)	-.1089 (-6.33)	-.1091 (-6.35)	-.1063 (-6.18)	-.1124 (-6.53)	-.0894 (-5.2)	.1496	6.53*
2	.0763 (7.66)	-.0691 (-4.91)	-.0571 (-4.05)	-.0748 (-5.30)	-.0739 (-5.24)	-.0787 (-5.58)	-.0587 (-4.17)	-.0728 (-5.17)	-.0786 (-5.58)	-.0656 (-4.65)	-.0682 (-4.84)	-.0585 (-4.15)	.1089	4.54*
3	.0652 (7.00)	-.0579 (-4.40)	-.0486 (-3.69)	-.0611 (-4.64)	-.0644 (-4.89)	-.0721 (-5.48)	-.0511 (-3.88)	-.0597 (-4.53)	-.0642 (-4.87)	-.0532 (-4.04)	-.0528 (-4.01)	-.0436 (-3.31)	.0940	3.85*
4	.0501 (5.71)	-.0428 (-3.45)	-.0328 (-2.64)	-.0463 (-3.73)	-.0452 (-3.64)	-.0545 (-4.39)	-.0370 (-2.98)	-.0468 (-3.77)	-.0484 (-3.90)	-.0390 (-3.15)	-.0368 (-2.97)	-.0292 (-2.36)	.0642	2.54*
5	.0438 (5.30)	-.0390 (-3.33)	-.0268 (-2.29)	-.0429 (-3.66)	-.0393 (-3.36)	-.0490 (-4.19)	-.0315 (-2.69)	-.0375 (-3.21)	-.0438 (-3.75)	-.0367 (-3.14)	-.0280 (-2.39)	-.0218 (-1.87)	.0625	2.47*
6	.0372 (4.54)	-.0314 (-2.71)	-.0218 (-1.88)	-.0358 (-3.09)	-.0318 (-2.74)	-.0407 (-3.51)	-.0253 (-2.19)	-.0297 (-2.57)	-.0368 (-3.18)	-.0249 (-2.15)	-.0218 (-1.88)	-.0123 (-1.07)	.0488	1.90*
7	.0290 (3.63)	-.0228 (-2.03)	-.0125 (-1.10)	-.0241 (-2.13)	-.0230 (-2.04)	-.0322 (-2.86)	-.0168 (-1.49)	-.0226 (-2.01)	-.0279 (-2.48)	-.0170 (-1.51)	-.0114 (-1.01)	-.0057 (-0.51)	.0356	1.37
8	.0264 (3.49)	-.0196 (-1.84)	-.0097 (-0.91)	-.0211 (-1.97)	-.0225 (-2.11)	-.0230 (-2.80)	-.0131 (-1.22)	-.0211 (-1.97)	-.0263 (-2.46)	-.0144 (-1.34)	-.0080 (-0.75)	-.0042 (-0.39)	.0378	1.46
9	.0213 (2.96)	-.0163 (-1.60)	-.0047 (-0.46)	-.0170 (-1.67)	-.0142 (-1.40)	-.0202 (-1.99)	-.0093 (-0.92)	-.0161 (-1.58)	-.0236 (-2.32)	-.0075 (-0.73)	-.0036 (-0.36)	.0040 (0.40)	.0365	1.41
Largest	.0067 (1.06)	-.0035 (-0.39)	.0073 (0.81)	.0033 (0.37)	.0023 (0.26)	-.0041 (-0.45)	.0034 (0.37)	-.0034 (-0.38)	-.0107 (-1.19)	.0081 (0.90)	.0065 (0.72)	.0146 (1.62)	.0299	1.14
Small-Large	.1057 (11.44)	-.0966 (-7.40)	-.1058 (-8.10)	-.1109 (-8.49)	-.1116 (-8.54)	-.1093 (-8.37)	-.0965 (-7.39)	-.1055 (-8.08)	-.0984 (-7.53)	-.1144 (-8.76)	-.1188 (-9.10)	-.1040 (-7.96)	.2391	11.66*

[1]The dummy variables indicate in which month of the year the average return was observed (D_2 = February, etc.)
[2]The estimated t-ratios are in parentheses.
*Indicates that the F-statistic is significant. The F-statistic tests the hypothesis that a_2 through a_{12} in Equation (1) are zero. At a 5% level of significance, the critical value of
$F_{10,\infty} = 1.83$.

Table 7
Regressions of monthly average stock returns on dummy variables[1] by portfolio to test for differences in mean monthly returns (1976-1992)[2]

Portfolio	Jan (a_1)	Feb (a_2)	Mar (a_3)	Apr (a_4)	May (a_5)	June (a_6)	July (a_7)	Aug (a_8)	Sept (a_9)	Oct (a_{10})	Nov (a_{11})	Dec (a_{12})	R^2	F-stat
Smallest	.0877	-.0536	-.0638	-.0843	-.0742	-.0693	-.0810	-.0735	-.0969	-.1298	-.0560	-.0673	.1829	3.91*
	(5.73)	(-2.48)	(-2.95)	(-3.90)	(-3.43)	(-3.20)	(-3.75)	(-3.40)	(-4.48)	(-6.00)	(-2.59)	(-3.11)		
2	.0657	-.0359	-.0440	-.0518	-.0500	-.0466	-.0486	-.0550	-.0758	-.0988	-.0320	-.0454	.1475	3.02*
	(4.83)	(-1.87)	(-2.29)	(-2.70)	(-2.60)	(-2.42)	(-2.53)	(-2.86)	(-3.94)	(-5.14)	(-1.67)	(-2.36)		
3	.0515	-.0259	-.0312	-.0377	-.0376	-.0371	-.0422	-.0324	-.0597	-.0827	-.0163	-.0280	.1207	2.40*
	(3.87)	(-1.38)	(-1.66)	(-2.00)	(-2.00)	(-1.97)	(-2.24)	(-1.72)	(-3.17)	(-4.39)	(-0.87)	(-1.49)		
4	.0472	-.0226	-.0266	-.0301	-.0278	-.0280	-.0366	-.0314	-.0517	-.0757	-.0140	-.0258	.1061	2.07*
	(3.63)	(-1.23)	(-1.45)	(-1.64)	(-1.52)	(-1.53)	(-1.99)	(-1.71)	(-2.82)	(-4.12)	(-0.77)	(-1.41)		
5	.0422	-.0201	-.0232	-.0252	-.0163	-.0220	-.0303	-.0231	-.0492	-.0636	-.0101	-.0214	.0900	1.73
	(3.31)	(-1.11)	(-1.29)	(-1.40)	(-0.90)	(-1.22)	(-1.68)	(-1.28)	(-2.73)	(-3.53)	(-0.56)	(-1.19)		
6	.0404	-.0215	-.0219	-.0248	-.0189	-.0233	-.0305	-.0234	-.0490	-.0613	-.0092	-.0116	.0936	1.80
	(3.26)	(-1.23)	(-1.25)	(-1.41)	(-1.08)	(-1.33)	(-1.74)	(-1.33)	(-2.80)	(-3.50)	(-0.52)	(-0.66)		
7	.0317	-.0139	-.0158	-.0186	-.0132	-.0123	-.0228	-.0126	-.0366	-.0488	.0009	-.0115	.0734	1.38
	(2.67)	(-0.83)	(-0.94)	(-1.11)	(-0.79)	(-0.73)	(-1.36)	(-0.75)	(-2.18)	(-2.91)	(0.05)	(-0.69)		
8	.0293	-.0174	-.0135	-.0149	-.0097	-.0114	-.0174	-.0106	-.0376	-.0451	.0021	-.0048	.0728	1.37
	(2.47)	(-1.04)	(-0.81)	(-0.89)	(-0.58)	(-0.68)	(-1.04)	(-0.63)	(-2.25)	(-2.69)	(0.13)	(-0.29)		
9	.0253	-.0151	-.0104	-.0113	-.0058	-.0094	-.0171	-.0076	-.0326	-.0352	.0015	-.0039	.0544	1.01
	(2.21)	(-0.92)	(-0.64)	(-0.70)	(-0.36)	(-0.58)	(-1.06)	(-0.47)	(-2.01)	(-2.17)	(0.09)	(-0.24)		
Largest	.0191	-.0148	-.0101	-.0019	-.0101	-.0117	-.0001	-.0022	-.0271	-.0264	.0049	-.0005	.0519	0.96
	(1.80)	(-0.98)	(-0.67)	(-0.13)	(-0.67)	(-0.78)	(-0.01)	(-0.15)	(-1.80)	(-1.75)	(0.33)	(-0.03)		
Small-Large	.0686	-.0388	-.0537	-.0824	-.0641	-.0576	-.0809	-.0713	-.0698	-.1033	-.0610	-.0668	.1970	4.28*
	(5.58)	(-2.32)	(-3.09)	(-4.74)	(-3.69)	(-3.31)	(-4.65)	(-4.10)	(-4.01)	(-5.94)	(-3.51)	(-3.84)		

[1]The dummy variables indicate in which month of the year the average return was observed (D_2 = February, etc.)
[2]The estimated t-ratios are in parentheses.
*Indicates that the F-statistic is significant. The F-statistic tests the hypothesis that a_2 through a_{12} in Equation (1) are zero. At a 5% level of significance, the critical value of
$F_{10,\infty} = 1.83$.

Table 8

Regressions of monthly average government bond returns on dummy variables[1] to test for differences in mean monthly returns[2]

Time Period	Jan (a_1)	Feb (a_2)	Mar (a_3)	Apr (a_4)	May (a_5)	June (a_6)	July (a_7)	Aug (a_8)	Sept (a_9)	Oct (a_{10})	Nov (a_{11})	Dec (a_{12})	R^2	F-stat
1926-92	.00178 (0.66)	.00185 (0.49)	.00237 (0.62)	.00152 (0.40)	.00130 (0.34)	.00538 (1.42)	.00056 (0.15)	-.00048 (-0.13)	.00010 (0.03)	.00765 (2.02)	.00601 (1.58)	.00260 (0.69)	.0129	.941
1926-65	.00447 (1.27)	.00168 (0.34)	-.00007 (-0.01)	.00589 (1.18)	-.00203 (-.407)	.00012 (0.02)	.00076 (0.15)	-.00599 (-1.20)	-.00861 (-1.73)	.00323 (0.65)	.00314 (0.63)	-.00188 (-0.38)	.0773	1.28
1966-78	.00214 (0.78)	.00142 (0.37)	.00109 (0.28)	-.00380 (-0.98)	-.00183 (-0.47)	.00130 (0.33)	-.00051 (-0.13)	-.0025 (-0.65)	.00028 (0.07)	.00521 (1.34)	-.00142 (-0.37)	-.00022 (-0.06)	.0187	.705
1979-92	-.00135 (-0.16)	.00287 (0.24)	.00715 (0.60)	.00864 (0.73)	.01068 (0.90)	.01844 (1.56)	.00258 (0.22)	.00855 (0.72)	.0074 (0.62)	.01657 (1.40)	.02384 (2.01)	.01237 (1.05)	.0383	.696

Table 9

Regressions of monthly average high-grade corporate bond returns on dummy variables[1] to test for differences in mean monthly returns[2]

Time Period	Jan (a_1)	Feb (a_2)	Mar (a_3)	Apr (a_4)	May (a_5)	June (a_6)	July (a_7)	Aug (a_8)	Sept (a_9)	Oct (a_{10})	Nov (a_{11})	Dec (a_{12})	R^2	F-stat
1926-92	.00815 (3.33)	-.00674 (-1.94)	-.00550 (-1.59)	-.00654 (-1.89)	-.00356 (-1.03)	-.00300 (-0.87)	-.00468 (-1.35)	-.00468 (-1.35)	-.00403 (-1.16)	.00031 (0.09)	-.00199 (-0.57)	-.00161 (-0.47)	.0124	0.903
1926-65	.01092 (3.47)	-.01105 (-2.48)	-.00467 (-1.05)	-.00769 (-1.73)	-.00335 (-0.75)	-.00441 (-0.99)	-.00645 (-1.45)	-.0072 (-1.62)	-.00403 (-0.91)	-.00615 (-1.38)	-.00927 (-2.08)	-.00520 (-1.17)	.0525	0.846
1966-78	.01025 (4.12)	-.00808 (-2.30)	-.01093 (-3.11)	-.01230 (-3.49)	-.0112 (-3.18)	-.00988 (-2.81)	-.00770 (-2.19)	-.00902 (-2.56)	-.00828 (-2.35)	-.0032 (-0.91)	-.00924 (-2.63)	-.00444 (-1.26)	.0535	2.098 *
1979-92	.00139 (0.18)	-.00016 (-0.01)	.00497 (0.46)	.00633 (0.59)	.01197 (1.11)	.01242 (1.15)	.00311 (0.29)	.00650 (0.60)	.00471 (0.44)	.01326 (1.23)	.01935 (1.79)	.00736 (0.68)	.0318	.574

[1]The dummy variables indicate in which month of the year the average return was observed (D_2 = February, etc.)

[2]The estimated t-ratios are in parentheses.

*Indicates that the F-statistic is significant. The F-statistic tests the hypothesis that a_2 through a_{12} in Equation (1) are zero. At a 5% level of significance, the critical value of

$F_{10,\infty} = 1.83$.

year, and during the 1976-92 period, the four smallest portfolios showed evidence of stock return seasonality. The results of this study suggest that while seasonality in the stock market may have diminished slightly since 1976, it is still present among NYSE stocks.

Bond Return Seasonality

Table 8 presents the results for long-term government bonds. The entire 1926-92 period as well as each of the three sub-periods exhibits small monthly returns. With rare exception, the average monthly return coefficients are insignificant, suggesting that there is no difference between January government bond returns and returns in the remaining eleven months of the year. None of the F-statistics are significant, indicating that the null hypothesis of equal average monthly government bond returns cannot be rejected. Thus, there is no evidence of seasonality in the government bond market between 1926 and 1992. This result is consistent with the findings of Smirlock (1985), Keim and Stambaugh (1986), and Chang and Pinegar (1986) who find no evidence of a January effect in government bonds.

As Table 9 illustrates, the high-grade corporate bond results differ from the government bond results. The average January return for high-grade corporate bonds is small but nonetheless positive and significant for the entire time period (1926-92) as well as the 1926-65 and 1966-78 sub-periods. Furthermore, the remaining eleven months of the year exhibit small but negative returns for these time periods. For the 1966-78 period, a majority of the monthly returns are significant at the 5% level. Thus, the results for high-grade corporate bonds during the 1966-78 sub-period are quite similar to stocks in that the average January return appears to be larger than the average return for any other month. The average January return on corporate bonds during the 1979-92 period is small but positive and insignificant. The remaining eleven months of the year exhibit small returns during the 1979-92 period, and the majority of the coefficients are positive and insignificant at the 5% level.

The F-statistic for high-grade corporate bonds in the 1966-78 sub-period is significant at the 5% level while the F-statistics for the entire time period as well as the other two sub-periods are insignificant. The null hypothesis of equal monthly returns for the 1966-78 time period is, therefore, rejected in favor of the alternative of seasonality. This evidence of seasonality in the high-quality end of the corporate bond market is consistent with Jones and Wilson (1987) who find evidence of seasonality in the corporate bond market during the entire 1857-1987 period as well as the 1871-1914 and 1971-87 sub-periods.

Conclusion

The results of this study provide evidence that seasonality persists in stock returns. Therefore, investors have the potential to earn excess returns by trading on seasonal patterns. At the turn of the year, average returns are high in general and the average return on the stock of small firms is greater than the average return on the stock of large firms. Specifically, the difference between the return on small and large stocks (the observed size premium) is larger for the month of January than any other month of the year. Thus, a large portion of the size effect can be explained by abnormal January returns. Seasonality is most pronounced among the stock of small firms and continues to persist even though investors are aware of the phenomenon and trade on it. The existence of seasonality suggests that the market is not semi-strong form efficient. None of the portfolios of NYSE stocks exhibited seasonality from 1926 to 1940, but from 1941 to 1975 the first six portfolios, including small as well as medium-size stocks, show evidence of seasonality. From 1976 to 1992, the first four portfolios, consisting mainly of small stocks, show evidence of seasonality.

The government bond market shows no evidence of seasonality, possibly because this market is so efficient. Government bond prices depend in large part on interest rates, and there are a plethora of interest rate forecasts available. Consequently, there is little opportunity to earn excess returns on government bonds during any month of the year. There is evidence of seasonality in the high-quality end of the corporate bond market from 1966 to 1978. However, seasonality in high-grade corporate bonds seems to have dissipated in recent years.

The persistence of seasonality in returns, noted predominantly among the stock of small firms, may be due to a combination of the tax-loss selling effect and high trading costs which preclude arbitraging. The market for small firm stocks may also be less efficient than the market for large firm stocks because it is more costly to obtain and process information on small firms. This difference in efficiency may contribute to the persistence of the small firm effect, especially during the month of January. Finally, the effect may be attributed to the inability of current pricing models to capture the risk of small firms. Whatever the cause, empirical tests show that seasonality continues to persist in stock returns, especially small stock returns. Therefore, investors who wish to take advantage of this seasonality are likely to be rewarded if they purchase small company stocks in December and hold them through the month of January.

Suggestions for Future Research

Future research can be pursued in two directions. First, a framework similar to the one used in this paper can be applied to test for seasonality in AMEX and NASDAQ stocks. As more data becomes available, it would be interesting to study the time period from 1993 forward to determine if the technology boom and the increase in the number of internet stocks has impacted the existence of seasonality in the NASDAQ market. It would also be interesting to study whether the existence of seasonality among small firm stocks is impacted by the overall performance of small firm stocks as a market sector. For example, small firm stocks have under-performed large firm stocks for the past few years. Is there a connection between seasonality in small firm stocks and their performance relative to larger stocks? Second, researchers should continue in an attempt to explain why seasonality, particularly January seasonality, exists. Attempting to determine what drives changes in the persistence of seasonality through time is another interesting research avenue.

References

1. Brown, Philip, Donald B. Keim, Allan W. Kleidon, and Terry A. Marsh, " Stock Return Seasonality and the Tax-Loss Selling Hypothesis: Analysis of the Arguments and Australian Evidence," *Journal of Financial Economics*, Vol. 12, No. 1, pp. 105-28, 1983.
2. Chang, Eric C. and J. Michael Pinegar, "Return Seasonality and Tax-Loss Selling the Market for Long-Term Government and Corporate Bonds," *Journal of Financial Economics,* Vol. 17, No.2, pp. 391-425, 1986.
3. Dyl, Edward A. and Edwin D. Maberly, "Odd-Lot Transactions around the Turn of the Year and the January Effect," *Journal of Financial and Quantitative Analysis*, Vol. 27, No. 4, pp. 591-604, 1992.
4. Eakins, Stan and Susan Sewell, "Tax-Loss Selling, Institutional Investors, and the January Effect: A Note," *The Journal of Financial Research,* Vol. 16, No. 4, pp. 377-384, 1993.
5. Ghysels, Eric, "On Seasonality and Business Cycle Durations: A Nonparametric Investigation," *Journal of Econometrics*, Vol. 79, pp. 269-290, 1997.
6. Gultekin, Mustafa N. and N. Bulent Gultekin, "Stock Market Seasonality: International Evidence," *Journal of Financial*

Economics, Vol.12, No.4, pp. 469-481, 1983.

7. Johnston, Ken and Don R. Cox, "The Influence of Tax-Loss Selling by Individual Investors in Explaining the January Effect," *Quarterly Journal of Business and Economics,* Vol. 35, No. 2, pp. 14-20, 1996.
8. Jones, Charles P., Douglas K. Pearce, and Jack W. Wilson, "Can Tax-Loss Selling Explain the January Effect? A Note," *Journal of Finance,* Vol. 42, No. 2, pp. 453-461, 1987.
9. Keim, Donald B., "Size-Related Anomalies and Stock Return Seasonality: Further Empirical Evidence," *Journal of Financial Economics,* Vol. 12, No.1, pp.13-32, 1983.
10. Keim, Donald B., "Trading Patterns, Bid Ask Spreads and Estimated Security Returns: The Case of Common Stocks at Calendar Turning Points," *Journal of Financial Economics*, Vol. 25, No.1, pp. 75-97, 1989.
11. Keim, Donald B. and Robert F. Stambaugh, "Predicting Returns in the Stock and Bond Markets," *Journal of Financial Economics,* Vol. 17, No. 2, pp. 357-390, 1986.
12. Pettengill, Glenn N., "A Non-Tax Cause of the January Effect?" *Quarterly Journal of Business and Economics,* Vol. 25, No. 3, pp. 15-33, 1986.
13. Ritter, Jay R., "The Buying and Selling Behavior of Individual Investors at the Turn of the Year," *Journal of Finance,* Vol. 43, No. 3, pp. 701-717, 1988.
14. Roll, Richard, "Vas Ist Das? The Turn-of-the-Year Effect and the Return Premia of Small Firms," *Journal of Portfolio Management*, Vol. 9, No. 2, pp. 18-28, 1983.
15. Rozeff, Michael S. and William R. Kinney, Jr., "Capital Market Seasonality: The Case of Stock Returns," *Journal of Financial Economics,* Vol. 3, No. 4, pp. 379-402, 1976.
16. Smirlock, Michael, "Seasonality and Bond Market Returns," *Journal of Portfolio Management,* Vol. 11, No. 3, pp. 42-44, 1985.
17. Wachtel, S.B., "Certain Observations on Seasonal Movements in Stock Prices," *Journal of Business,* Vol. 15, pp. 184-193, 1942.
18. Wilson, Jack W. and Charles P. Jones, "Is There a January Effect in Corporate Bond and Paper Returns?" *The Financial Review,* Vol. 25, No. 1, pp. 55-79, 1990.

Notes