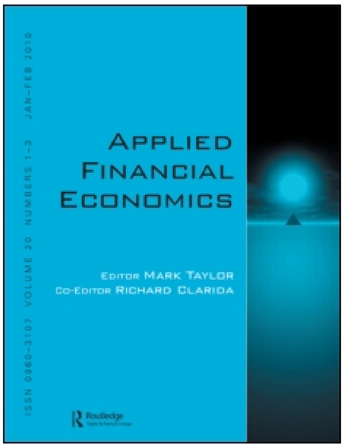

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Monthly and semi-annual seasonality in the Irish equity market 1934–2000

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This paper examines the monthly and semi-annual behaviour of the Irish equity market in the long term. Little has previously been written about the Irish market, and such work as has been undertaken has confined examination to relatively short time spans. The paper finds, over the 1934–2000 period, a strong and persistent monthly effect with a January peak, as well as evidence of April and half-year seasonality.

I. INTRODUCTION

A significant body of literature exists to suggest that, especially for smaller capitalization stocks, returns to equities vary across elements of the calendar, such as the turn of the month (Ariel, 1987), the day of the week (Fields, 1931; French, 1980; Gultekien and Gultekien, 1983; Thaler, 1987; Chang *et al.*, 1993; Lucey, 2000), and also the month of the year. Most typically in the case of the month of the year, the evidence is that high returns can be earned in January, especially the early part of January.[1] Known as the January Effect, evidence presented in Rozeff and Kinney (1976) and Gultekien and Gultekien (1983) indicates a form of the effect in the USA from 1904.[2] Evidence also exists that the effect is international, with significant numbers of papers showing unusually high returns in January in countries other than the USA. Two papers in this regard are Aggarwal and Rivol (1989) and Elyasiani, Perera and Puri (1996). Clearly, a finding that the return of a financial asset varied according to the month of the year would be a direct violation of the EMH. However, a number of possible explanations, with significant explanatory power, are available as potential explanations. These fall into four main categories:

- The January effect is as a consequence of seasonal risk factors; Chang and Pinegar (1989), Chang and Pinegar (1990), and Kramer (1994) find that placing small firms in the Chen–Roll–Ross methodology does provide an explanation that is consistent with market efficiency. However, Sehun (1993), who operates within a Stochastic Dominance framework, provides contradictory evidence as to the role of macroeconomic factors in the January–Small firm effect.
- The January effect is as a consequence of seasonal liquidity factors. This work, Ogden (1990), Chen and Fishe (1994) and Gamble (1993) examines the confluence of the end of year liquidity injection from the Federal Reserve and the treasury management function of companies acting to have large amounts of monies available at the start of the year and start of the month.
- The January effect is a consequence of tax based trading. A direct test of the tax loss selling approach can be taken by examining countries where there is a

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[1] Although this is by no means the case always, as evidence from a number of South East Asian markets as shown in Ho (1990) and Elyasiani *et al.* (1996) and Cheung *et al.* (1994) indicates that January is not always the month with the highest return.

[2] Using Cowles Commission indices.

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January anomaly but the tax year end is not end December and/or there are no capital gains taxes. This can be seen from a number of studies, such as Brown *et al.* (1983), Berges *et al.* (1984), Gultekien and Gultekien (1983), Kato and Schallheim (1985), Tinic *et al.* (1987) and Lee (1992). All of these examine countries where the conditions above hold but there is evidence of a January effect. Prior to 1972, capital gains were not taxed in Canada, and both Berges *et al.* (1984) and Tinic *et al.* (1987) report the existence of a January anomaly in that period. In the case of Hong Kong, where a zero tax rate on capital gains should imply no tax loss selling pressure, Lee (1992) and Cheung *et al.* (1994) both report a January return that is significantly above other months. In the case of the UK, Reinganum and Shapiro (1987), Corhay *et al.* (1987), Gultekien and Gultekien (1983) and Draper and Paudyal (1997) have all found evidence of both a January and April seasonal. The UK tax year ending in April provides some evidence in favour of a tax-based effect for the April seasonal. McKillop and Hutchinson (1989), Donnelly (1991), and Lucey (1994) all find April seasonality in Ireland where again the tax year ends in April.
- The January effect is explainable by agency effects of the remuneration patterns of market managers; Haugen and Lakonishok (1988), Lakonishok and Smidt (1988), Ritter (1988), Athannasakos and Schnabel (1994) and Athannasakos (1997) all hypothesize that as the year progresses managers of pension and investment funds hold progressively lower proportions of risky (usually small) stocks. When the year ends there is a rebalancing by managers towards their desired holdings. The presupposed reason for this is that the typical managerial remuneration package has a substantial element based on calendar year returns. A variant on this is the window dressing hypothesis, which is essentially an institutional version of the tax loss selling approach.

A more recent calendar effect is that described in Bouman and Jacobsen (2002). They find that the return to stocks in 37 countries can be explained almost totally as a result of what they term the *Halloween Indicator*. They find the hypothesis of zero mean return to equities in the months May–October cannot be rejected. Thus, the old stock market adage '*Sell In May And Go Away, Don't Come Back Till St. Leger's Day*', St. Leger's day being 2 October, but with the adage generally being seen as a reference to the running of the St Leger race at Doncaster in late September, would seem to be vindicated. They hypothesize that the cause of this may be the taking, by the general economically active public and the brokerage community, of significant holidays in the summer period. This has the effect of depressing economic and in particular stock market activity in the summer period.

II. THE DATASET

One issue that has arisen frequently in assessing the existence of anomalous calendar results is the charge of data mining (see in particular the discussion in Sullivan *et al.* (2002)). The data used here, we believe, reduce the probability of any results arising from such data snooping. This arises from the nature of the dataset, the construction of which is more fully discussed in Whelan (1999).

From 1934 to 1986 the Central Statistics Office of Ireland published a month end arithmetic value weighted index of all stocks quoted on the Irish stock exchanges. Publication of this index ceased with the introduction of an official set of indices by the stock exchange. The dataset used here consists of this index supplemented from 1986 with the official stock market index, the ISEQ, which is constructed on the same basis as was the CSO but is calculated on a daily basis. This composite dataset, from 1934 to 2000, has not been investigated, although the data from 1951 to 1985 were analysed by Donnelly (1991). Accordingly, the data are essentially clean, virgin, data, previously unmined for anomalies. All data are expressed as percentage change, and in addition to results over the entire period a series of sub samples are also analysed.

III. MONTHLY/HALF YEARLY RESULTS

Examination of the index over the entire sample indicates the presence of significant monthly seasonality. There is evidence both that certain months are significantly difference from others and that, overall, a monthly effect is present in the data. Table 1 shows the first four moments of the index by month.

It is immediately clear that the mean return in a number of months exceeds the average mean return and that this return would not appear to be a reflection of risk as reflected in the standard deviations of monthly returns. It would also appear that the mean return to the top performing months overall, January and April, have increased over the years from 1934 to 2000.

One can test this formally by examining whether there exists a simultaneous month of the year effect in mean returns and in the standard deviation of these returns.

A formal test of the existence of monthly calendar effects in mean returns is given by the ANOVA or Kruskal–Wallis statistics. Let R_j^2 be the average rank of observations (returns to the index in this work) in the jth group (each month of the year) and n_j be the number of observations

Table 1. *Moments of the index, by 12 yearly subperiods*

Statistic	Month	34–45	46–27	58–69	70–81	82–93	94 on	Overall
Mean	Jan	0.46%	0.41%	2.11%	4.25%	4.20%	4.34%	2.50%
	Feb	0.02%	−0.54%	1.64%	1.99%	2.78%	2.92%	1.36%
	March	−0.12%	−0.25%	0.91%	1.20%	1.88%	0.45%	0.70%
	April	0.65%	−0.17%	1.75%	2.69%	2.51%	1.96%	1.53%
	May	0.22%	0.49%	1.16%	−0.40%	1.04%	−3.08%	0.13%
	June	−0.21%	−0.59%	−0.28%	−1.72%	0.20%	1.01%	−0.36%
	July	−0.17%	−0.59%	−0.90%	0.90%	2.85%	2.28%	0.61%
	August	0.16%	−0.64%	0.57%	1.69%	−0.74%	−1.14%	0.07%
	September	−0.39%	−0.01%	1.51%	−1.97%	−1.47%	1.15%	−0.30%
	October	0.42%	0.28%	1.68%	−1.25%	−0.96%	0.64%	0.10%
	November	2.03%	−0.48%	0.89%	−2.56%	−1.88%	2.29%	−0.12%
	December	0.34%	−0.78%	1.71%	1.33%	3.04%	2.96%	1.32%
	Total	0.28%	−0.24%	1.06%	0.51%	1.12%	1.31%	0.63%
Std. Deviation	Jan	0.013	0.022	0.019	0.079	0.061	0.042	0.048
	Feb	0.009	0.018	0.013	0.039	0.076	0.066	0.043
	March	0.016	0.014	0.029	0.050	0.064	0.046	0.040
	April	0.012	0.009	0.026	0.052	0.048	0.038	0.035
	May	0.012	0.014	0.019	0.058	0.063	0.054	0.042
	June	0.024	0.014	0.026	0.054	0.053	0.026	0.036
	July	0.017	0.010	0.028	0.043	0.062	0.050	0.040
	August	0.011	0.014	0.032	0.056	0.071	0.098	0.051
	September	0.031	0.017	0.013	0.080	0.047	0.046	0.045
	October	0.015	0.013	0.033	0.039	0.117	0.043	0.055
	November	0.034	0.012	0.022	0.050	0.081	0.033	0.047
	December	0.011	0.020	0.020	0.057	0.023	0.039	0.033
	Total	0.019	0.015	0.025	0.058	0.068	0.052	0.044
Skewness	Jan	0.305	(2.085)	(0.449)	1.785	(0.072)	(0.201)	1.913
	Feb	(1.521)	(1.081)	1.266	(0.132)	1.124	(0.221)	1.572
	March	(0.763)	(1.724)	(0.548)	1.327	0.396	0.018	1.051
	April	0.669	0.183	1.238	1.614	(0.849)	0.032	1.153
	May	(1.265)	0.464	0.142	0.496	(0.165)	0.282	(0.084)
	June	(2.594)	(0.188)	0.134	(1.186)	0.161	(1.385)	(0.815)
	July	(0.631)	(0.310)	(0.906)	0.662	(0.105)	0.167	0.868
	August	0.106	(0.527)	(2.164)	0.185	(1.445)	(2.185)	(1.874)
	September	(2.750)	0.658	(0.282)	(0.605)	0.222	(0.288)	(1.236)
	October	(1.320)	0.300	0.561	(1.056)	(2.648)	0.847	(4.011)
	November	2.798	0.976	(0.341)	(0.745)	(0.693)	0.384	(1.121)
	December	1.068	(1.878)	(0.571)	1.200	(0.681)	1.233	1.078
	Total	0.214	(0.728)	(0.526)	0.401	(1.201)	(1.131)	(0.640)
Kurtosis	Jan	1.803	6.098	(0.782)	3.798	(1.249)	(1.705)	6.482
	Feb	3.196	0.238	1.639	0.206	0.509	1.210	4.796
	March	0.308	4.227	(1.395)	1.969	(1.134)	(1.198)	1.784
	April	0.060	(0.612)	1.997	1.944	1.778	(0.007)	3.658
	May	1.993	0.729	(0.297)	(0.980)	(0.938)	(2.060)	0.553
	June	8.302	(0.330)	(0.942)	0.816	(1.859)	2.111	2.129
	July	(0.856)	(0.744)	(0.034)	(0.131)	(0.850)	(1.728)	1.045
	August	(0.628)	(0.521)	5.898	(0.367)	1.725	5.080	7.050
	September	8.509	1.679	(1.098)	0.980	(0.535)	(0.901)	4.435
	October	1.225	(0.073)	(1.032)	0.544	8.042	(0.080)	25.620
	November	8.715	1.058	(1.435)	0.121	0.191	(0.952)	4.017
	December	0.196	5.320	(1.326)	0.741	(0.152)	0.502	2.758
	Total	15.674	2.426	1.465	2.580	5.424	4.322	9.298

in the *j*th group. Then with k groups and N observations in total the Kruskal–Wallis H statistic is

$$H = \left(\frac{12}{N(N+1)}\sum_{j=1}^{k}\frac{R_j^2}{n_j}\right) - 3(N+1))$$

distributed as a χ^2 distribution with $N-1$ degrees of freedom.

A formal test for monthly variation in the second moment is given by the Levene test, which tests the following hypotheses:

$$H_0 : \sigma_i = \sigma_j \forall i, j, H_a : \sigma_i \neq \sigma_{j,} \text{at least one } i,\ j \text{ pair}$$

The test statistic is defined as

$$W = \frac{(N-k)\sum_{i=1}^{k} N_i\left(\overline{Z_i} - \overline{Z_j}\right)^2}{(k-1)\sum_{i=1}^{k}\sum_{j=i}^{N}\left(Z_{ij} - \overline{Z_i}\right)^2}$$

where $Z_{ij} = \left|Y_{ij} - \tilde{Y}_i\right|$, $\tilde{Y}_i$ the median of subgroup i.

The Levene test rejects the hypothesis that the variances are homogeneous if $W > F_{(1-\alpha,k-1,N-1)}$ where $F_{(1-\alpha,k-1,N-1)}$ is the upper critical value of the F distribution with $k-1$ and $N-1$ degrees of freedom at a significance level of α.

From Table 2, a number of issues arise. First, while there is a significant rejection of the null of equal means in the overall sample period, both by the parametric F test and the non-parametric Kruskal–Wallis test, this does not follow in the sub-periods. This indicates a certain instability in the data distribution. Second, in all bar the 1958-1969 period the hypothesis of equal risk profiles across the months of the year cannot be rejected.

Table 3 and Table 4 analyse the so-called *Halloween Indicator* of Bouman and Jacobsen (2002). From these, it is clear that the returns in the first half of the year, from November to April, are greater in magnitude to those of the second half of the year. While the Kruskal–Wallis test does not generally indicate that this effect is statistically significant, the ANOVA test does so indicate. This is true

Table 2. *Month of the year effects in the first two moments by sub period*

Period	Kruskal–Wallis test statistic	*p*-value	F statistic	*p*- value	Levene statistic	df1	df2	*p*-value
34–45	9.299	0.59	1.366	0.196	1.031	11	132	0.42
46–27	15.086	0.18	1.005	0.446	0.503	11	132	0.90
58–69	14.064	0.23	1.648	0.092	1.899	11	132	0.04
70–81	14.144	0.23	1.663	0.089	0.836	11	132	0.60
82–93	10.417	0.49	1.096	0.369	1.304	11	132	0.23
94 on	8.431	0.67	1.042	0.420	1.102	11	72	0.37
Overall	23.094	0.02	2.780	0.001	0.512	11	792	0.90

Table 3. *The Halloween indicator in Ireland 1934–2000*

		34–45	46–27	58–69	70–81	82–93	94 on	Overall
Mean	May–October	0.00%	−0.18%	0.62%	−0.46%	0.15%	0.14%	0.14%
	November–April	0.56%	−0.30%	1.50%	1.48%	2.09%	2.49%	2.49%
Std. Deviation	May–October	0.019	0.014	0.027	0.056	0.071	0.056	0.056
	November–April	0.019	0.016	0.022	0.058	0.063	0.044	0.044
Skewness	May–October	(2.643)	0.221	(0.569)	(0.404)	(1.831)	(1.563)	(1.563)
	November–April	3.314	(1.332)	(0.147)	1.173	(0.233)	0.044	0.044
Kurtosis	May–October	10.189	0.524	1.592	1.054	7.503	4.947	4.947
	November–April	20.576	3.326	0.214	3.429	1.180	0.164	0.164

Table 4. *Half-year effects in the first two moments by subperiod*

	Kruskal–Wallis test statistic	*p*-value	F Statistic	*p*-value	Levene statistic	df1	df2	*p*-value
34–45	0.270	0.603	3.158	0.078	0.398	1	142	0.529
46–57	0.031	0.860	0.244	0.622	0.085	1	142	0.771
58–69	4.484	0.034	4.630	0.033	1.389	1	142	0.240
70–81	2.554	0.110	4.180	0.043	0.007	1	142	0.932
82–93	1.824	0.177	2.977	0.087	0.458	1	142	0.500
94 on	2.313	0.128	4.509	0.037	0.990	1	82	0.323
Overall	9.501	0.002	14.622	0.000	0.124	1	803	0.725

in all subperiods and overall, and from the Levene test this would not seem to be a result of differential risk profiles across these periods.

These results are also unlikely to be a result of chance. Drawing six-monthly returns with replacement from the data, over 10,000 repetitions only 584 exceeded the mean November–April return and, coincidentally, 584 were less than the May–October return. Thus one can conclude that the probability of the observed seasonal pattern between the two halves of the year being due to chance is of the order of 6%. For the January return a similar experiment drawing 67 monthly returns with replacement from the pool and repeating 10,000 times did not yield a single instance of a mean return matching or exceeding that of January.

III. CONCLUSIONS

This paper presents three novel facts. First, a clean, heretofore un-examined database of Irish equity prices is provided. This allows one to perform tests for monthly and half-yearly seasonality in the long term for the Irish equity market, free of any charges of data mining. It is found that the Irish market does exhibit, in the long term, a month of the year effect, in common with many other countries. This effect would appear to be a combined December–January and April effect, perhaps reflecting the as yet imperfectly understood January effect and the tax year effect found previously. However, on more detailed examination this effect cannot be detected in individual 12 yearly subsamples. However, while this is the case, one can detect, strongly and over time, the Bouman and Jacobsen (2002) Halloween indicator.

REFERENCES

Aggarwal, R. and Rivol, P. (1989) Seasonal and day-of-the-week effects in four emerging stock markets, *The Financial Review*, **24**, 541–50.

Ariel, R. (1987) A monthly effect in stock returns?, *Journal of Financial Economics*, **18**, 161–74.

Athannasakos, G. and Schnabel, J. (1994) Professional portfolio managers and the January effect, *Review of Financial Economics*, **4**(1), 79–91.

Berges, A., McConnell, J. and Schlarbaum, G. (1984) The turn of the year in Canada, *Journal of Finance*, **39**(1), 185–92.

Bouman, D. and Jacobsen, B. (2002) The Halloween indicator, sell in May and go away, *American Economic Review*, **92**, 1618–35.

Brown, P., Keim, D. Kelidon, W. and Marsh, T. (1983) Stock return seasonalities and the tax loss selling hypothesis: analysis of the arguments and Australian evidence, *Journal of Financial Economics*, **12**(1), 105–23.

Chang, E., Pinegar, J. and Ravichandran, R. (1993) International evidence on the robustness of the day-of-the-week effect, *Journal of Financial and Quantitative Analysis*, **26**, 497–513.

Chang, E. and Pinegar, J. M. (1989) Seasonal fluctuations in industrial production and stock market seasonals, *Journal of Financial and Quantitative Analysis*, **24**(1), 59–74.

Chang, E. and Pinegar, J. M. (1990) Stock market seasonals and prespecified multifactor pricing relationships, *Journal of Financial and Quantitative Analysis*, **25**, 517–33.

Chen, L.-L. and Fishe, R. (1994) Seasonal money movements and the January effect, *Atlanta Economic Journal*, **22**(4), 26–42.

Cheung, Y.-L., Ho, R. and K.-Wong, F. (1994) Risk and return seasonalities in three emerging Asian markets : Hong Kong, Korea and Taiwan, *Journal of International Financial Management and Accounting*, **5**(3), 223–32.

Corhay, A., Hawawini, G. and Michel, P. (1987) Seasonality in the risk-return relationship: international evidence, *Journal of Finance*, **32**(1), 49–68.

Donnelly, R. (1991) Seasonality in the Irish stock market, *Irish Business and Admininstrative Research*, **12**, 39–51.

Draper, P. and Paudyal, K. (1997) Microstructure and seasonality in the UK equity market, *Journal of Business, Finance and Accounting*, **24**, 1177–204.

Elyasiani, E., Perera, P. and Puri, T. (1996) Market efficiency and calendar anomalies in emerging capital markets: evidence from the Colombo Stock Exchange, *Journal of International Financial Markets, Institutions and Money*, **6**(4), 59–77.

Fields, M. (1931) Stock prices: a problem in verification, *Journal of Business*, **October**, 415–18.

French, K. (1980) Stock returns and the weekend effect, *Journal of Financial Economics*, **8**, 55–69.

Gamble, R. (1993) The January effect and intergenerational transfers, *Quarterly Review of Economics and Finance*, **33**, 295–304.

Gultekien, M. and Gultekien, N. (1983) Stock market seasonality: international evidence, *Journal of Financial Economics*, **12**, 469–81.

Haugen, R. and Lakonishok, J. (1988) *The Incredible January Effect: The Stock Markets Unsolved Mystery*, Dow-Jones Irwin, Holmwood, IL.

Ho, Y.-K. (1990) Stock return seasonality in Asia Pacific Markets, *Journal of International Financial Management and Accounting*, **2**(1), 47–77.

Kato, K. and Schallheim, J. (1985) Seasonal and size anomalies in the Japanese stockmarket, *Journal of Financial and Quantitative Analysis*, **20**, 243–60.

Kramer, C. (1994) Macroeconomic seasonality and the January effect, *Journal of Finance*, **49**, 1883–91.

Lakonishok, J. and Smidt, S. (1988) Are seasonal anomalies real ? A ninety year perspective, *Journal of Financial Studies*, **1**, 403–25.

Lee, I. (1992) Stock market seasonality: some evidence from the Pacific Basin countries, *Journal of Business, Finance and Accounting*, **19**, *199–210*.

Lucey, B. (1994) Some empirics of the Iseq index, *Economic and Social Review*, **25**, 157–79.

Lucey, B. (2000) Anomalous daily seasonality in Ireland?, *Applied Economics Letters*, **7**, 637–40.

McKillop, D. and Hutchinson, R. (1989) The small firm effect, seasonality and risk in Irish equities, *Irish Business and Administrative Research*, **9**, 21–9.

Ogden, J. (1990) Turn of the month evaluations of liquid profits and stock returns; a common explanation of the monthly and January effects, *Journal of Finance*, **45**, 1259–72.

Reinganum, M. and Shapiro, A. (1987) Taxes and stock return seasonality: evidence from the London Stock Exchange, *Journal of Business*, **60**, 281–95.

Ritter, J. (1988) The buying and selling behaviour of individual investors at the turn of the year, *Journal of Finance*, **43**, 701–19.

Rozeff, M. and Kinney, W. (1976) Capital market seasonality - the case of stock returns, *Journal of Financial Economics*, **3**, 379–402.

Sehun, H. N. (1993) Can omitted risk factors explain the January effect? A stochastic dominance approach, *Journal of Financial and Quantitative Analysis*, **28**, 195–211.

Sullivan, R., Timmermann, A. and White, H. (2002) Dangers of data mining: the case of calendar effects in stock returns, *Journal of Econometrics*, **105**(1), 249–86.

Thaler, R. (1987) Anomalies; seasonal movements in security prices ii: weekend, holiday, turn of the month and intraday effects, *Economic Perspectives*, **1**(1), 169–77.

Tinic, S., G. Barone-Adesi and West, R. (1987) Seasonality in Canadian stock prices : an investigation of the tax loss selling hypothesis, *Journal of Financial and Quantitative Analysis*, **22**(1), 51–64.

Whelan, S. (1999) *From Canals to Computers: The Friends First Guide to Long Term Investment in Ireland*, Friends First, Dublin.