(56)

THE SMALL FIRM EFFECT, SEASONALITY AND RISK IN IRISH EQUITIES

D.G. McKillop and R.W. Hutchinson*

Introduction

Within the area of financial economics a vast literature has developed around the concept of market efficiency. The pioneering work in this area, of stock price behaviour, is that by Kendall (1953). At it's simplest level efficiency in the stock market suggests that all relevant information regarding a particular stock is reflected in it's market price. This in turn implies that investment analysts who attempt to evaluate the economic worth of securities either through tracking past share price performance (the Chartists) or through the analysis of a company's financial ratios, (the Technical Analysts), will not succeed in detecting bargains in the stock market. The 1980s, however, have been witness to a backlash against the market efficiency hypothesis. Research has increasingly identified investment strategies whereby market participants can earn returns in excess of the market average. For example, Reinganum (1981) and Banz (1981) have identified a "small-firm" effect for the U.S. market. These studies suggest not only that market capitalistion is a significant predictor of average return but also that there is an inverse relationship between return and firm size. Roll (1983) and Corhay et al. (1987) have identified a seasonal effect for U.S. stock market returns, on average, returns are significantly higher in January than during any other month of the year.

The small-firm and seasonal effects are not confined to the U.S. market alone; similar results have been reported by Levis (1985) and Wahlroos (1983) for the U.K., by Brown et al. (1983) for the Australian market, by Berges et al. (1984) for the Canadian stock exchange and by Jaffe et al. (1985) for the Tokyo exchange.

In the light of the above contentions this study investigates, from the perspective of the Irish stock market and at the individual stock level, the following hypotheses. First, is there a correlation between firm size and return and if such a relationship holds can it simply be attributed to differences in the market risk of the various stocks? Secondly, is the Irish equity market dominated by seasonal effects with specific periods being identified when abnormal returns may be earned by investing in equity?

*The authors are, respectively, Lecturer and Senior Lecturer in Economics at the University of Ulster.
IBAR — Irish Business and Administrative Research, Volume 9, 1988, pp 21-29

Data and Methodolgy

The period under consideration is that of May 1979 to May 1986. Data would have enabled a calendar year to year analysis, however, it was deemed prudent to avoid the period leading up to and just following the IR/£ sterling parity break on Ireland's entry into the EMS.

In total some 46 Irish companies operated under the auspices of a full listing at the beginning of May 1986. Of these, almost 40 per cent could be classified as having a non-existent trading pattern and consequently play no further role in the discussion. For the remaining stocks, share price data adjusted for dividends and other equally important factors such as stock splits and the issue of rights is employed in the calculation of share returns and systematic risk factors. The final constituent part of the data input is the J and E Davy market index for Irish equity. The Davy index is based upon market capitalisation weights and it takes account of dividends, rights issues and stock splits.

The measure of return employed in this analysis is that of 'geometric mean rate of return'. This formulation defines the rate of return in any period t as

$$R_t = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}} = \frac{D_t + P_t}{P_{t-1}} - 1$$

where,

R_t = the rate of return in period t
P_t = the share's market price at the end of period t
D_t = the cash dividend received in period t.

For multi-period investments the geometric mean rate of return $\overline{R}$ over n periods is obtained from the equation

$$(1 + \overline{R}) = [(1 + R_1)(1 + R_2) \ldots (1 + R_n)])^{1/n}$$

$R_1, R_2 \ldots R_n$ are the successive single period rates of return.

The major advantage of the geometric mean method of measuring return over traditional methods such as the internal rate of return (IRR) is that while the IRR implicitly assumes reinvestment of dividends at a constant long run rate, the geometric mean rate implicitly assumes reinvestment at the short-term rate prevailing in the market at the time the dividend is received.

The empirical application of the geometric mean formula does, however, require overcoming a number of problems, namely that current dividends plus the change in share prices do not accurately represented the total

return to shareholders due to factors such as stock splits and rights issues. The operational solution is found through the introduction of an index of shares to represent the value of the initial investment. The index is set equal to 100 in the base year and then subsequently adjusted for dividend payments by assuming that these are used to purchase additional shares in the company. Similar adjustments are made when a script issue and/or rights issue occurs.

The adjusted rate of return for any given year, R^*_t, is thus defined as

$$R^*_t = \frac{Vt - V_{t-1}}{V_{t-1}} = \frac{V_t}{V_{t-1}} - 1$$

The market value of the investment, V_t, at the end of year t is calculated by multiplying the index of shares by the market price of a share at the end of the year.

For multiperiod investment the formula becomes

$$1 + R^* = [\frac{V_1}{V_0} \cdot \frac{V_2}{V_1} \cdot \cdots \cdot \frac{V_n}{V_{n-1}}]^{1/n} = \frac{V_n}{V_0}^{1/n}$$

Empirical Analysis

Table 1 presents the single geometric mean rates of return, the multi-period investment (May 1979-May 1986) geometric mean rates of return and initial market capitalisations for active, semi-active and thinly traded equities. A cursory glance at the single period returns provides a degree of support for the maxim 'of not placing all eggs in one basket'. The fact that returns for individual shares oscillate markedly from year to year justifies the concept of risk reduction through portfolio diversification. If, however, investment in equity is viewed from the perspective of a longer time horizon the picture becomes less varied and uncertain. Over the seven year period the geometric mean annual rates of return are positive for all equity with the exception of Ready Mix p.l.c. Furthermore, if the Irish Exchequer Bill rate, with a geometric mean annual rate of 14%, is taken as representative of the risk free rate of interest, 80 per cent of stocks reported yield a positive risk premium over the period May 1979-May 1986.

The geometric mean return data may now be employed to test the a priori notion of an inverse relationship between firm size and performance. To test this hypothesis the Spearman rank correlation coefficient between market capitalisation, as of May 1979, and share return over the whole period is computed. The consequent value of -0.353 which is statistically different from zero at the five per cent level of significance constitutes support for the existence of a "small firm" effect on the Irish stock exchange.

Table 1: *Gross Rates of Return on Active, Semi-active and Thinly Traded Irish Equities*

Company Name*		4/5/79 — 1/5/80	2/5/80 — 10/4/81	1/5/81 — 6/5/82	7/5/82 — 4/5/83	5/5/83 — 3/5/84	3/5/84 — 2/5/85	3/5/85 — 2/5/86	4/5/79 — 2/5/86	Market Capitalisation 4/5/79
Clondalkin Group	(SA)	34.3	25.2	- 37.3	33.6	147.7	35.7	148.9	44.0	6,244
Lyons Irish Holding	(T)	48.4	16.0	- 23.4	20.5	107.0	2.1	111.2	39.5	6,600
Wand R. Jacob	(T)	- 11.6	71.0	59.0	18.6	- 3.7	33.1	196.6	39.3	1,957
Carroll Industries	(A)	10.6	79.4	- 10.2	67.3	18.4	55.0	69.4	39.1	25,200
Abbey	(SA)	- 1.9	83.1	- 12.5	56.4	20.7	12.5	144.1	35.1	8,921
McInerney Properties	(T)	- 38.2	111.8	9.6	108.5	47.3	1.1	59.3	29.3	4,285
The Jones Group	(SA)	9.9	152.9	- 25.3	- 6.1	67.1	24.6	39.3	28.6	5,964
Silvermines	(SA)	232.5	15.8	- 43.3	- 3.1	100.1	71.1	- 33.1	27.5	3,958
Independent News	(SA)	16.2	1.2	- 26.6	58.8	61.8	- 14.7	162.6	28.0	17,673
Edenderry	(T)	- 7.0	2.0	45.0	54.7	44.9	27.4	13.4	26.7	740
James Cream	(T)	- 8.2	31.9	- 11.8	10.3	49.3	42.7	93.7	26.7	10,004
Waterford Glass	(A)	- 20.1	2.7	- 9.9	9.3	149.2	12.2	136.9	26.5	72.481
Jefferson Smurfit	(A)	12.2	16.0	- 29.2	56.6	79.1	- 25.2	109.7	26.4	88.870
Unidare	(T)	31.0	- 10.9	- 42.6	74.8	17.1	22.1	136.5	25.1	9,087
Irish Distillers Group	(A)	- 17.4	- 10.6	- 12.0	107.0	75.7	- 19.5	86.7	22.0	50.662
Sunbeam Wolsley	(T)	- 42.3	27.1	- 11.5	40.6	195.0	- 10.1	33.1	21.2	4,026
Rohan Group	(SA)	40.2	128.6	- 2.3	27.4	32.7	- 18.6	- 25.2	19.3	4,439
The Bank of Ireland	(A)	- 9.3	12.8	- 27.3	46.3	90.9	- 30.2	82.0	18.9	183,120
Allied Irish Banks	(A)	- 8.6	39.7	- 30.0	70.9	60.8	- 40.3	115.4	18.5	138,237
Credit Finance Bank	(T)	- 10.8	18.7	8.8	5.6	131.8	- 26.3	40.9	16.9	1,228
Arnott and Co. Dublin	(T)	0.8	40.2	- 13.0	23.3	33.6	- 16.9	127.5	14.6	17,700
Ryan Hotels	(T)	- 15.2	2.6	- 52.9	28.6	44.8	148.6	42.4	12.7	6,250
Fitzwilton	(SA)	11.1	99.7	- 36.5	- 16.3	198.9	- 11.3	- 0.7	10.8	12,374
Cement Foadstone Holdings	(A)	- 14.6	32.3	- 26.2	- 14.8	43.3	23.7	39.5	6.1	183,659
CPI Holdings	(SA)	- 11.2	36.1	- 11.8	- 15.3	68.9	- 30.1	26.6	4.8	1,162
Ready Mix	(T)	- 20.6	22.9	- 22.9	- 39.6	31.3	- 28.6	31.3	- 13.2	11,114

Trading Category — A: actively traded
SA: semi-actively traded
T: thinly traded

To further judge this relationship rank correlation coefficients are also calculated between each annual series of return observations and the initial market capitalisations for the particular period in question. Negative relationships between return and market capitalisation, statistically significant at the 5 percent level, are found for the periods 1979-80, 1980-81 and 1984-85. For the period 1983-84 the small firm effect held at the ten per cent significance level while for the remaining periods the Spearman rhos are not statistically different from zero at the five nor ten per cent level. partial support for the "small firm" effect is thus forthcoming when analysis is based upon yearly returns. Two points are, however, worthy of note. First, it may not be company size per se which is important, rather company size may merely be indicative of new and burgeoning product markets (Hutchinson et al. 1986). Second, and more importantly, the previous discussion does not consider the relative riskiness of the various stocks. As a means of developing this latter point systematic risk factors are estimated for those companies reported in Table 1.

An individual company's systematic risk is determined by its beta coefficient (β) which measures the correlation between a company's rate of

return and a broadly based index such as the J and E Davy market index. Typically estimates are derived from the simple regression market model (see Sharpe 1963);

$$R_{it} = \alpha_i + \beta_i R_{mt} + E_{it}$$

This relationship states that in period t, the rate of return on the i^{th} stock (R_{it}) is a linear function of the rate of return on a market index (R_{mt}) and a random disturbance term (E_{it}).

From Table 1 it is, however, apparent that the Irish stock exchange has a relatively large proportion of small firms, the shares of which are, in general, thinly traded. Dimson (1979) has demonstrated that if discontinuously traded stocks are used, timing errors occur which cause β estimates of thinly traded stocks to be biased downwards while those relating to active trades tend to be biased upwards. Dimson advocates, as an adjustment technique, running a multiple regression of stock returns against the lagged, matching and leading values of the market index. A consistent estimate is then obtained by aggregating the slope coefficients in the estimated regression. Given that returns are calculated on a four week basis, a one period lead/lag is considered sufficient. Table 2 shows both Ordinary Least Squares betas and Dimson adjusted betas.

The adjusted betas for the semi-active and thin trades are, in general, higher in comparison to the OLS estimates, while, with the exception of Carroll Industries, the adjusted betas for actively traded equities are lower than their OLS counterparts. These findings confirm the suspected bias due to thin trading.

Table 2: Beta Estimates[a]

Company Name	OLS Betas	Dimson Betas
Clondalkin Group	0.483	0.998
	(3.38)*	
Lyons Irish Holding	0.329	0.776
	(2.28)*	
Wand R. Jacob	0.05	0.042
	(0.24)	
Carroll Industries	0.586	0.773
	(5.53)*	
Abbey Ltd.	0.601	0.784
	(3.69)*	
McInerney Properties	0.656	0.927
	(2.60)*	

[a]the t-statistics of the OLS beta estimates are in parentheses
*significant at the 0.05 level.

Table 2: Beta Estimates[a] — Continued

Company Name	OLS Betas	Dimson Betas
The Jones Group	0.467 (2.99)*	0.557
Silvermines	0.547 (2.23)*	0.52
Independent News	0.411 (3.41)*	0.818
Edenderry	− 0.02 (0.09)	0.034
James Crean	0.336 (3.51)*	0.647
Waterford Glass	1.288 (7.90)*	1.249
Jefferson Smurfit	1.377 (8.72)*	1.213
Unidare Ltd.	0.568 (3.31)*	1.19
Irish Distillers Group	1.132 (9.13)*	1.106
Sunbeam Wolsley	0.405 (2.03)*	1.198
Rohan Group	0.505 (2.97)*	0.501
The Bank of Ireland	1.09 (13.46)*	1.082
Allied Irish Banks	1.254 (12.79)*	1.199
Credit Finance Bank	0.366 (1.67)*	0.78
Arnott and Co.	0.586 (4.37)*	0.84
Ryan Hotels	0.064 (0.21)	0.636
Fitzwilton	1.063 (3.99)*	0.656
Cement Roadstone	0.973 (9.27)*	0.875
CPI Holdings	0.48 (2.73)*	0.875
Readymix	0.29 (1.41)	0.534

[a]the t-statistics of the OLS beta estimates are in parentheses
*significant at the 0.05 level.

The beta estimates may now be employed to determine whether the aforementioned negative correlation between firm size and return is spurious and can be accounted for by the fact that small firms are simply more risky than larger companies. Investors must therefore experience a relatively larger risk premium to encourage them to hold small firm shares. Spearman Rank correlation coefficients between the geometric mean returns over the seven year period and both the OLS and Dimson adjusted beta estimates are computed. These coefficients are respectively 0.71 and 0.54, both statistically different from zero at a one per cent level of significance. Although the Dimson adjustment has reduced the degree of positive correlation between firm size and risk, both coefficients nevertheless indicate that the introduction of systematic risk factors into the investment decision causes an accentuation of the return premium available on small firms. This somewhat surprising finding is not, however, unique to the Irish market. Levis (1985) in a risk/return analysis of different size portfolios on the London Exchange (1958-1982) comes to broadly similar conclusions.

A final question to be posed is whether a specific seasonal effect is present on the Irish stock exchange. The most convenient way to answer this queston is through a trend analysis of the seven year monthly returns on the J and E Davy market index. Consistent and positive returns are identified for the months of April and August. Furthermore for both months, as detailed in Table 3a, the mean return is significantly different from zero at the 1 per cent level indicating the existence of two significantly positive seasonal effects in the Irish Stock market mean returns.

A test, based on dummy variables, was designed to determine whether the April and August returns differ significantly from returns during the rest of the year. The test results, Table 3B support the hypothesis that April returns differ from returns during the rest of the year but reject the hypothesis that April returns differ from market returns during the remainder of the year.

As documented earlier seasonality in stock returns is not a new phenomena, with specific positive April premia identified by Corhay et al. (1987) for both the U.K. and Belgian markets. Possible explanations of seasonal effects are usually couched in terms of the tax loss selling hypothesis (Roll, 1983). According to this hypothesis, as the end of the tax year nears, there is downward pressure on shares which have performed poorly during the year with investors selling to realise capital losses which are deductible against taxable income. Once the new fiscal year commences this price pressure is relieved and stocks quickly revert to their equilibrium values.

Table 3: *Seasonal Effects on the Irish Stock Market*[a]

3A

Average returns over:

April	0.054
	(3.177)*
August	0.035
	(3.378)*

(a) t-statistics are in parentheses and are computed as $t(\overline{R}) = \overline{R}/\sigma(R).n^{-1/2}$ where n = sample size.

3B

$$R_t\text{August} = \underset{(1.681)^*}{0.035} - \underset{(1.273)}{0.027}\, D_{1t}$$

$$R_t\text{April} = \underset{(2.701)^*}{0.054} - \underset{(2.325)^*}{0.049}\, D_{2t}$$

D_{1t} = 0 for August return; D_{1t} = 1 otherwise

D_{2t} = 0 for April return; D_{2t} = 1 otherwise

[a]t-statistics are in parentheses
*significant at the 0.05 level

Conclusions

In summary this study suggests that the Irish Equity investor who wishes to maximise return yet minimise risk should construct a portfolio of small-firm stocks. If in the future the investor wishes to increase his liquidity, then equity realisation should take place at some stage after the April return premia has been reaped.

There are, however, factors to consider before embarking upon such an investment path. Firstly, money machines such as those documented in this paper tend to be somewhat ephemeral. Once the existence of profitable investment opportunities are noted arbitrage ensures that they don't last long term. Second, the establishment of an historical relationship is no prerequisite for that relationship holding into the future. Third, a degree of 'survivalship' bias is introduced into the reported results as those firms taken over or liquidated are necessarily omitted from coverage.

REFERENCES

BANZ, R.W. "The Relationship Between Return and Market Value of Common Stocks", Journal of Financial Economics, 9, 1981.

BERGES, A., McCONNELL, J.J. and SCHLARBAUM, G.G. "The Turn-of the Year in Canada", Journal of Finance, 39, 1984.

BROWN, P., KEIM, D.B., KLEIDON, A.W. AND MARCH, T.A. "Stock Return Seasonalities and the Tax-Loss Selling Hypothesis: Analysis of the Arguments and Australian Evidence", Journal of Financial Economics, 12, 1983.

CORHAY, A., HAWAWINI, G. and MICHEL, P. "Seasonality in the Risk-Return Relationship: Some International Evidence", Journal of Finance, 42, 1987.

DIMSON, E, "Risk Measurement when Shares are Subject to Infrequent Trading", Journal of Financial Economics, 7, 1979.

HUTCHINSON, R.W., McKILLOP, D.G. and BURKE, P. "Gross Rates of Return on selected Irish Equities", Irish Banking Review, 1985.

JAFFE, J. and WESTERFIELD, R. "Patterns in Japanese Common Stock Returns: Day of the Week and Turn of the Year Effects", Journal of Financial and Quantitative Analysis, 20, 1985.

LEVIS, M. "Are Small Firms Big Performers", The Investment Analyst, 76, 1985.

REINGANUM, M.R. "Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earning Yields and Market Values", Journal of Financial Economics, 9, 1981.

ROLL, R. "The Turn-of-the-Year Effect and the Return Premia of Small Firms", Journal of Portfolio Management, 9, 1983.

WAHLROOS, B. and BERGHUND T. "The January Effect on a Small Stock Market: Lumpy Information and Tax-loss Selling". Discussion Paper No. 579, Northwestern University, 1983.