Irish Accounting Review (1999), Vol. 6, No. 1, 59–78

MARKET REACTION TO DIRECTORS' SHARE DEALINGS: SOME IRISH EVIDENCE

Philip Hamill and Philip McIlkenny

University of Ulster at Jordanstown

Iain Watson

University of Western Australia

ABSTRACT

This paper examines the market's reaction to directors dealing in the shares of their company on the Dublin Stock Exchange. The traditional event study methodology is employed to test whether or not directors purchasing (selling) equity conveys a significant positive (negative) signal to the market. We find that there is no market reaction to directors' equity purchases but a significant response to directors' equity sales prior to the event. We suggest that these results may be associated with reduced information asymmetry and conjecture that the results reported here may point to the possible existence of an asymmetric market response to positive and negative information signals.

INTRODUCTION

Trading by corporate insiders, particularly by directors of listed companies, has generated a great deal of interest over the past two decades in the USA and more recently in the UK. Early this century, profits from insider trading were looked upon as fair compensation for directors' efforts. Manne (1966, p. 53) writes:

> Prior to the year 1910 no one had ever publicly questioned the morality of corporate officers, directors and employers trading in the shares of corporations. . . Today an announce-

> ment that insiders are dealing in their company's shares is sufficient to cause an almost audible gasp of public indignation.

Since 1910, however, insider trading has been frowned upon. Three main objections to insider trading have been used over time to justify regulation of the practice. First, insiders who take advantage of 'privileged' information are 'unfair' to others not privy to that information. Second, directors' insider trading conflicts with their fiduciary duty to shareholders. Third, some contend that when directors trade on inside information they 'misappropriate' the wealth of others. More recently an article in the *Individual Investor* (February 1998, p. 54) summarises the reason why the interest in insider trading has exploded:

> Company executives and directors know their business more intimately than any Wall Street analyst ever would. They know when a new product is flying out the door, when inventories are piling up, whether profit margins are expanding or whether production costs are rising. . . You always hear about the smart money. Generally, that is the smart money.

The paucity of systematic research into insider trading in Ireland has been largely due to the unavailability of reliable data. This study is the first to investigate directors' share dealing in companies quoted on the Dublin Stock Exchange

The rest of the paper is set out as follows. Prior research in the area is discussed in the next section. Following this, the sample and the sample selection criteria are detailed. The methodology employed is then explained prior to the presentation and discussion of results. The paper concludes with a summary of the findings.

PREVIOUS LITERATURE

The research carried out in both the UK (King and Roell, 1988; Pope, Morris and Peel, 1990; Gregory, Matatko, Tonks and Purkis, 1994; Gregory, Matatko and Tonks, 1997) and the USA (notably Jaffe, 1974;

Finnerty, 1976; Givoly and Palmon, 1985; Seyhun, 1986; Lin and Howe, 1990) shows that insider trading is profitable. Jaffe (1974) is the seminal paper. This paper provides evidence that insiders are able to time their trades, such that purchases (sales) take place after abnormal share price decreases (increases), following which the fortunes of those companies reversed. A later study by Nunn, Madden and Gombola (1983) hypothesised the existence of an information hierarchy whereby corporate officers at the top of the hierarchy (chairmen and directors) have direct access to non-public information relative to those at the bottom of the hierarchy. They found that the performance of trades by chairmen and directors outperforms those made by other corporate insiders such as officers and substantial shareholders. These findings were later corroborated in several studies (e.g. Seyhun, 1986; Lin and Howe, 1990).

Gregory, Matatko and Tonks (1997) employ the most comprehensive UK data set to date for the purpose of analysing the information provided by directors' trades. This study was based on data from January 1986 to December 1990 published in the Stock Exchange Official Weekly Intelligence. The results of this study indicate that significant abnormal returns can be obtained if the appropriate trading strategy, based on the timing of directors' trades, is followed. However, this result does not consider the transaction costs associated with the trades which, if taken into consideration, will dilute the performance. Furthermore, the Gregory et al. (1997) paper emphasises the importance of controlling for size in event studies where cumulative abnormal returns (CARs) are being investigated over a long post-event window and the proportion of small companies in the sample is high. Since the directors are especially well informed about a company's prospects and its present worth, these findings are not surprising.

However, the evidence from other countries on the profitability of directors' share dealings is inconclusive. For instance, a recent study by Eckbo and Smith (1998) shows that insider trading in firms listed on the Oslo Stock Exchange has not been profitable. The Australian evidence on the profitability of directors' share dealings is anomalous. A recent study by Brown and Foo (1998) found that directors' purchases did not appear to be profitable, although their sales were; and there was no systematic relationship between profitability and the size of the directors' trades.

Although the academic research is by no means conclusive, it would appear that there is a significant body of evidence to suggest that insiders do trade and may earn significant returns on the basis of their privileged information. On a more practical level, it would appear that investors believe that insiders have special knowledge which may be exploited by the outsider, and so actively seek to exploit this knowledge. This is evidenced by the sale of such information by private sector organisations and by the recommendations of the financial press (Nuki, 1994).

SAMPLE SELECTION

This study covers the period January 1994 to August 1997 for all companies listed on the Dublin Stock Exchange. The fact that a company has a dual listing on another stock exchange does not prevent it from being included in our sample. The relevant dates of directors' share transactions were obtained from the Financial Times Extel Database whilst the companies' share price data and the ISEQ[1] index data were derived from Datastream. Extel identified a total of 668 directors' share dealings during this period. To be included in the final sample, an event has to satisfy two sets of criteria: the first set is used to identify those directors' share transactions which may contain information, and the second set is used to secure an 'eventless' test period.

In applying the first set of criteria, the following directors' share transactions are deleted from the study:

1. Share bonus entitlement
2. Shares held on appointment
3. Purchase via equity participation plan
4. Rights issue
5. Conversion of warrants
6. Gift to spouse or other family member
7. Transfers to PEP, spouse or other family member
8. Exercise of options on shares
9. 'Bed and breakfast' transactions
10. 'Mixed signal' transactions.

Transactions one to five are usually initiated by the company rather than the director and thus convey no information about the director's beliefs about the future fortunes of the company. Transactions six and seven may act as proxies for a director's belief about his company's future, but that is all they are, proxies. Whilst the exercise of options (transaction eight) will depend on a director's confidence in the company, it is excluded from the sample because of the bargain prices generally associated with these transactions. A 'bed and breakfast' transaction, where a director sells and immediately repurchases shares, is a tax minimisation transaction. Such a transaction conveys no information and is therefore excluded. Similarly, 'mixed signal' transactions, where one director buys and another director sells in the same month (transaction ten), are also excluded because it is difficult to interpret the signal. In applying the above criteria, therefore, this study is examining the market's reaction to the announcement that a director has acquired or disposed of shares in his company.

An event that satisfies the above criteria has then to satisfy a second set of criteria:

- There must not be any major news announcement during the test period. Examples of such announcements include: earnings and/or dividend announcements, management forecasts, expansions and acquisitions, share dividend, share split, litigation, board changes and major share holdings. This ensures an 'eventless' test period.
- Daily share price data must be available for both the estimation period and the test period from Datastream. This ensures all data requirements are satisfied.

Only those events that satisfy both sets of criteria were selected for the final sample and this resulted in 59 buy and 14 sell transactions. The final list of companies employed in the study is detailed in **Appendix 1**. Forty-three per cent of the companies are solely listed on the Dublin Stock Exchange, with the remaining 57 per cent having a dual listing on the London Stock Exchange.

METHODOLOGY

This study examines whether there is an abnormal price response when directors buy or sell equity in their firm. In a strong-form efficient market, the abnormal rate of return on the date of equity purchase (sale) is expected to be zero. In order to test this hypothesis we employ a traditional event study methodology; we adopt the same approach as McIlkenny, Opong and Watson (1996) where further details may be obtained by the interested reader[2].

Fisher (1966) pointed out the problems that are caused by non-synchronous prices in the calculation of returns. This problem is magnified with shorter differencing intervals and thinly traded equities. Murray (1995) identifies the potential for serious estimation inaccuracy in the case of the Dublin Stock Exchange as many of the shares are traded infrequently, while others are traded frequently throughout the day. In order to try and mitigate the problem of infrequent trading we employ the thin trading adjustment suggested by Cohen, Maier, Schwartz and Whitcomb (1986). Their beta estimator is calculated as follows:

$$\beta_{Cohen\ et\ al} = \frac{\left(\sum_{+n=1}^{+N} \beta_i^{+n} + \beta_i^{0} + \sum_{-n=1}^{-N} \beta_i^{-n} \right)}{1 + \sum_{+n=1}^{+N} 2\rho_{+n}} \qquad (1)$$

where:
$+N$ = number of leads in the estimator;
$-N$ = number of lags in the estimator;
β_j^{+n} is the lagged security beta;
β_j^{-n} is the lead security beta; and
ρ_n is the autocorrelation coefficient of the market index.

This approach extends that number of lagged and leading (N) terms, which gives it the advantage that it can account for thin trading to varying degrees. Cohen et al.'s (1986) thin trading adjustment nests the Scholes and Williams (1977) and Fowler and Rorke (1983) approaches, which are applied extensively in the empirical literature. For Scholes and Williams the number of leads/lags is one whereas for Fowler and

Rorke the number of leads/lags is two. Berglund, Liljiblom and Löflund (1989) report that including an excessive number of lagged/leading terms could induce distortions. The need to include an 'excessive' term will be driven by stock market characteristics. Murray (1995) examines the issue of excessive thin trading on the Dublin Stock Exchange and concludes that there is no justification for extending lags and leads excessively since the estimation noise may offset potential benefits. Given this trade off we extend the number of lead and lag terms to five.

In addition, CARs are calculated over various holding periods. The significance of the CARs is tested using Ruback (1982). For a more in-depth discussion of this approach see either Ruback or McIlkenny et al. (1996).

Given the findings of Coutts, Mills and Roberts (1994), mis-specification of the market model may lead to bias. To counter this possibility, in line with the recommendation of Coutts et al., a non-parametric estimation technique is employed. The non-parametric test is based on Efron's (1979) bootstrap method. In the context of regression models, there are two approaches to employing bootstrapping. The first approach involves re-sampling the residuals from the market model (a detailed exposition of this approach can be found in Marias, 1984). Re-sampling the residuals assumes that the distribution of the error terms is the same for all values of the dependant variable. The market model is likely to violate this assumption. Therefore bootstrapping the data vectors is employed in this study, a technique which is explained in detail by Brabazon (1997).

RESULTS

We examined the market's reaction to directors' trades with Cohen et al.'s (1986) thin trading adjustment extended to five lead/lag terms. As the qualitative outcomes did not differ, we report the results for the number of lag/lead terms equal to one (N=1), which is equivalent to Scholes and William's (1977) thin trading adjustment, and two (N=2), which is equivalent to Fowler and Rorke's (1983) thin trading adjustment.

Table 1: Directors' Equity Purchases N = 59

Day	Scholes & Williams mean abnormal return[a]	t-statistic	Fowler & Rorke mean abnormal return[b]	t-statistic
-21	0.009	1.02	0.008	0.86
-20	0.005	0.54	0.006	0.62
-19	0.001	0.09	0.001	0.08
-18	-0.005	-0.59	-0.005	-0.6
-17	0.000	-0.01	0.000	0
-16	0.005	0.53	0.006	0.61
-15	-0.003	-0.38	-0.003	-0.33
-14	0.005	0.54	0.004	0.45
-13	0.000	0.04	0.001	0.07
-12	-0.003	-0.30	-0.005	-0.57
-11	-0.003	-0.30	-0.004	-0.49
-10	0.006	0.68	0.005	0.57
-9	-0.002	-0.20	-0.001	-0.13
-8	-0.005	-0.59	-0.005	-0.54
-7	0.003	0.31	0.003	0.34
-6	0.008	0.93	0.009	0.97
-5	0.001	0.09	0.002	0.22
-4	-0.002	-0.19	-0.001	-0.10
-3	0.002	0.17	0.001	0.15
-2	0.005	0.51	0.004	0.48
-1	0.000	-0.04	-0.001	-0.14
0	0.001	0.08	0.001	0.13
1	0.004	0.45	0.005	0.59
2	0.007	0.79	0.008	0.86
3	0.000	-0.02	-0.001	-0.07
4	0.000	0.02	-0.001	-0.12
5	0.001	0.16	-0.001	-0.10
6	0.001	0.12	0.001	0.10
7	-0.003	-0.30	-0.003	-0.31
8	-0.001	-0.10	-0.003	-0.34
9	-0.003	-0.32	-0.004	-0.42
10	0.008	0.86	0.008	0.87
11	-0.004	-0.41	-0.005	-0.52
12	-0.003	-0.31	-0.004	-0.38
13	0.001	0.14	0.001	0.10
14	0.003	0.33	0.003	0.34
15	0.004	0.49	0.005	0.56
16	-0.008	-0.91	-0.007	-0.78
17	0.003	0.33	0.004	0.42
18	-0.003	-0.32	-0.003	-0.29
19	0.006	0.65	0.007	0.79
20	0.000	0.02	0.000	0.05
21	0.003	0.31	0.004	0.38

Notes: Day is the day around directors' equity purchases, time 0 is the day the trade takes place. [a] is the mean of test period day log transformed returns generated from Scholes and Williams beta estimates. [b] is the mean of test period day log transformed returns generated from Fowler and Rorke beta estimates. None of the t-statistics was significant at normal levels.

Table 2: Bootstrapped Market Model Results for Directors' Equity Purchases

Day	Mean excess return[a]	t-statistic[b]
-21	0.009	1.04
-20	0.004	0.48
-19	0.001	0.14
-18	-0.006	-0.62
-17	0.000	-0.01
-16	0.005	0.51
-15	-0.004	-0.38
-14	0.006	0.62
-13	0.001	0.10
-12	-0.001	-0.14
-11	-0.002	-0.24
-10	0.007	0.77
-9	-0.002	-0.24
-8	-0.005	-0.56
-7	0.003	0.30
-6	0.008	0.90
-5	0.000	0.01
-4	-0.003	-0.28
-3	0.002	0.21
-2	0.005	0.50
-1	0.000	0.02
0	0.000	0.05
1	0.005	0.52
2	0.007	0.79
3	-0.001	-0.07
4	0.001	0.12
5	0.003	0.33
6	0.001	0.15
7	-0.003	-0.27
8	0.001	0.10
9	-0.003	-0.30
10	0.008	0.89
11	-0.003	-0.34
12	-0.003	-0.29
13	0.002	0.18
14	0.003	0.33
15	0.004	0.47
16	-0.008	-0.90
17	0.003	0.29
18	-0.003	-0.32
19	0.006	0.61
20	0.001	0.06
21	0.002	0.26

Notes: Day is the day around directors' equity purchases, time 0 is the day the purchase takes place. [a] is the mean of the test period log transformed returns generated from bootstrapped betas. [b] is the *t*-statistic for the bootstrapped betas with 1000 replications.

None of the statistics was significant at normal levels.

Table 1 presents the results of calculating the mean abnormal returns for those events where directors bought shares. Column one represents the day relative to the day the director acquired the shares. Columns two and four present the mean abnormal returns, computed using their respective thin trading adjustment, for all sampled directors' share acquisitions during the test period. Columns three and five show the t-statistics associated with the values in column two and four. From **Table 1** it can be seen that none of the twenty-one days before (after) the announcement of the director's purchase transaction produced a significant abnormal return. Also, the sign of the mean abnormal returns does not appear to exhibit any discernible pattern, regardless of whatever thin trading adjustment is made. Likewise the results produced from bootstrapping the market model, reported in **Table 2**, are consistent with **Table 1**.

Table 3 presents the results of mean abnormal returns for those events where directors sold shares in their companies. The price reaction on the day a director sells his shares, day 0, is insignificant. However, on days -15, -12 and -11 we find that there is a highly significant market reaction for two out of the three days. Also, the mean abnormal return for each of these days is large relative to the other test period mean abnormal returns. The results derived from applying a bootstrapping methodology (**Table 4**) are qualitatively similar.

Table 3: Directors' Equity Sales N = 14

Day	Scholes & Williams mean abnormal return[a]	t-statistic	Fowler & Rorke mean abnormal return[b]	t-statistic
-21	-0.002	-0.57	-0.003	-0.71
-20	0.001	0.41	0.001	0.39
-19	0.001	0.26	0.000	0.03
-18	0.001	0.29	0.001	0.25
-17	0.002	0.48	0.002	0.47
-16	0.000	0.13	0.001	0.29
-15	-0.012	-3.33**	-0.013	-3.51**
-14	-0.001	-0.40	-0.002	-0.48
-13	-0.003	-0.74	-0.003	-0.91
-12	0.014	3.95***	0.014	3.81**
-11	-0.007	-2.02	-0.008	-2.12*
-10	0.004	1.21	0.005	1.29
-9	0.002	0.55	0.002	0.57
-8	0.000	0.09	0.000	0.12
-7	0.004	1.06	0.004	1.04
-6	-0.005	-1.32	-0.004	-1.20
-5	0.002	0.68	0.002	0.51
-4	-0.002	-0.53	-0.003	-0.84
-3	-0.001	-0.39	-0.003	-0.72
-2	0.000	0.11	0.001	0.23
-1	0.000	-0.06	0.000	0.05
0	0.002	0.48	0.002	0.58
1	-0.001	-0.28	-0.001	-0.20
2	0.001	0.27	0.001	0.28
3	-0.002	-0.44	-0.002	-0.45
4	0.004	1.05	0.004	1.02
5	0.001	0.22	0.000	-0.11
6	-0.001	-0.33	-0.001	-0.31
7	0.000	0.01	0.001	0.15
8	-0.005	-1.46	-0.005	-1.47
9	-0.001	-0.18	0.000	-0.04
10	0.000	0.00	0.001	0.23
11	0.002	0.47	0.001	0.13
12	0.001	0.38	0.002	0.48
13	0.003	0.92	0.003	0.90
14	-0.001	-0.14	0.000	0.01
15	-0.003	-0.70	-0.003	-0.67
16	-0.003	-0.71	-0.003	-0.83
17	0.002	0.46	0.001	0.36
18	0.003	0.87	0.003	0.84
19	0.002	0.51	0.002	0.63
20	0.005	1.49	0.005	1.44
21	0.003	0.75	0.002	0.67

***Significant at the 0.002 level.

**Significant at the 0.01 level.

*Significant at the 0.05 level.

Notes: Day is the day around directors' equity sales, time 0 is the day the trade takes place. [a] is the mean of test period day log transformed returns generated from Scholes and Williams beta estimates. [b] is the mean of test period day log transformed returns generated from Fowler and Rorke beta estimates.

Table 4: Bootstrapped Market Model Results for Directors' Equity Sales

Days	Mean excess return[a]	t-statistic[b]
-21	-0.002	-0.48
-20	0.002	0.41
-19	0.002	0.41
-18	0.002	0.43
-17	0.002	0.47
-16	0.000	0.08
-15	-0.011	-3.13**
-14	-0.001	-0.36
-13	-0.003	-0.71
-12	0.014	3.94***
-11	-0.007	-2.02
-10	0.004	1.23
-9	0.002	0.53
-8	0.000	0.05
-7	0.004	1.11
-6	-0.005	-1.36
-5	0.003	0.69
-4	-0.001	-0.17
-3	-0.001	-0.21
-2	0.001	0.17
-1	0.000	-0.10
0	0.002	0.56
1	-0.001	-0.24
2	0.001	0.33
3	-0.002	-0.47
4	0.004	1.12
5	0.001	0.34
6	-0.001	-0.38
7	0.000	0.04
8	-0.005	-1.39
9	-0.001	-0.19
10	0.000	-0.04
11	0.002	0.50
12	0.002	0.44
13	0.004	0.99
14	0.000	-0.13
15	-0.003	-0.69
16	-0.003	-0.72
17	0.001	0.39
18	0.003	0.75
19	0.002	0.47
20	0.005	1.47
21	0.003	0.85

***Significant at the 0.002 level.

**Significant at the 0.01 level.

Notes: Day is the day around directors' equity sales, time 0 is the day the sale takes place. [a] is the mean of the test period log transformed returns generated from bootstrapped betas. [b] is the *t*-statistic for the bootstrapped betas with 1000 replications.

The results of abnormal returns calculated over three-day holding periods are reported in **Tables 5 and 6.** With regard to the announcement of directors' purchase transactions, no significant abnormal returns are earned in any of the holding periods. Again the results obtained from the bootstrap technique are consistent with those using standard event study methodology.

With regard to the announcement of a director's sell transaction, we find significant abnormal returns are earned over the holding period from day -15 to day -13. The mean abnormal return for this holding period is negative, and is the largest mean abnormal return relative to the other holding periods. The bootstrap technique produces similar results.

Table 5: Holding Period Abnormal Returns Around Directors' Purchases

Returns period (Day K-L)	Scholes & Williams mean abnormal returns[a]	t-statistic	Fowler & Rorke mean abnormal returns[b]	t-statistic
-21, -19	0.015	0.99	0.015	0.99
-18, -16	0.000	-0.03	-0.001	-0.07
-15, -13	0.002	0.12	0.003	0.20
-12, -10	0.001	0.03	0.004	0.23
-9, -7	-0.004	-0.28	-0.005	-0.30
-6, -4	0.008	0.51	0.006	0.38
-3, -1	0.006	0.38	0.007	0.44
0	0.001	0.08	0.000	0.05
1, 3	0.011	0.74	0.011	0.74
4, 6	0.003	0.17	0.005	0.36
7, 9	-0.007	-0.44	-0.004	-0.28
10, 12	0.001	0.08	0.002	0.16
13, 15	0.009	0.58	0.009	0.58
16, 18	-0.008	-0.52	-0.009	-0.56
19, 21	0.009	0.60	0.008	0.55

Notes: [a] is the holding period day log transformed returns generated from Scholes and Williams betas. [b] is the holding period day log transformed returns generated from bootstrapped betas with 1000 replications.

Table 6: Holding Period Abnormal Returns around Directors' Sales

Returns period (Day K-L)	Scholes & Williams mean abnormal returns[a]	t-statistic	Fowler & Rorke mean abnormal returns[b]	t-statistic
-21, -19	0.000	0.05	0.001	0.21
-18, -16	0.003	0.57	0.004	0.60
-15, -13	-0.016	-2.77*	-0.015	-2.59*
-12, -10	0.011	1.95	0.012	1.94
-9, -7	0.006	1.05	0.006	1.04
-6, -4	-0.004	-0.74	-0.003	-0.52
-3, -1	-0.001	-0.22	-0.001	-0.09
0	0.002	0.47	0.002	0.56
1, 3	-0.002	-0.27	-0.001	-0.25
4, 6	0.003	0.57	0.004	0.66
7, 9	-0.006	-1.00	-0.006	-0.96
10, 12	0.003	0.53	0.003	0.54
13, 15	0.000	0.05	0.001	0.10
16, 18	0.002	0.39	0.001	0.24
19, 21	0.010	1.69	0.010	1.71

*Significant at 0.05 level

Notes: [a] is the holding period day log transformed returns generated from Scholes and Williams betas. [b] is the holding period day log transformed returns generated from bootstrapped betas with 1000 replications.

The abnormal returns earned by investors, for a three-day holding period surrounding the day of the transaction, are reported in **Table 7**. No holding period is statistically significant for either directors' equity purchases or sales. **Figure 1** provides a plot of the cumulative abnormal returns for directors' buy and sell transactions over the test period reported in **Tables 1** and **2**. Whilst no discernible pattern emerges for directors' share sales, it would appear that directors purchase prior to a gradual price increase.

These findings suggest that directors' purchasing their own stock on the Dublin Stock Exchange do not convey valuation-relevant information which alters investors' beliefs. This may be explained by the fact that in a small economy, such as the Irish Republic, where the number of firms and investors is small, information asymmetry may not exist to the same degree as would be anticipated in a larger capital market such as the UK. The economy is 'close knit'. Investors do not look toward the financial markets to infer from directors' purchase transactions additional information on potential future firm performance, which they have already evaluated from other non-market sources. Directors

purchasing their own stock may possibly only confirm what analysts already know.

FIGURE 1

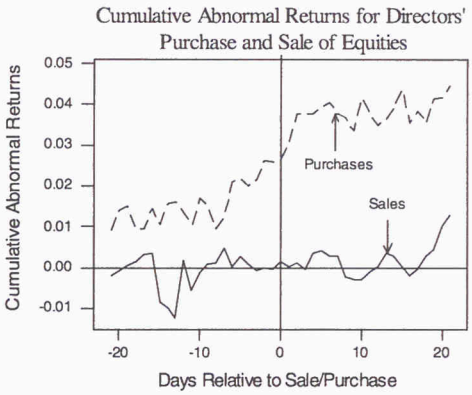

Table 7: Holding Period Abnormal Returns around Directors' Purchases and Sales

Returns period (Day K-L)	Scholes & Williams mean abnormal returns[a]	t-statistic	Fowler & Rourke mean abnormal returns[b]	t-statistic
Directors' Purchases				
-1, 1	0.005	0.30	0.005	0.35
Directors' Sales				
-1, 1	0.001	0.09	0.001	0.13

Notes: [a] is the holding period day log transformed returns generated from Scholes and Williams betas. [b] is the holding period day log transformed returns generated from bootstrapped betas with 1000 replications.

If we apply the same logic to directors' equity sales it would appear that the market has pre-empted directors selling their equity. It could be

argued that this is consistent with our hypothesised relationship. The market participants have already gauged, from non-market sources, 'bad news' which has resulted in significant price response prior to the directors selling their shares. Directors selling their shares only confirms what the market has anticipated, and this may explain the lack of a significant response on the event day.

If we accept this relationship, the results from directors buying and selling shares in their own company would suggest that the Dublin market's reaction to positive and negative signals, in this case directors' trades, is asymmetric. Unfortunately, no data analysis technique can compensate for lack of data to analyse. Therefore, the conclusions drawn with respect to directors selling shares are at best tentative.

A caveat to this study is the possibility that the model employed here is inappropriate for Dublin's capital market[3]. Model mis-specification could potentially render any inferences made invalid. A potentially superior model for a small capital market, such as Dublin's, is that proposed by Maynes and Rumsey (1993). However, due to current data limitations this was not possible to test and may be an avenue for future research.

CONCLUSIONS

This study provides evidence on market reaction to the announcement of directors' share transactions. Utilising the traditional parametric event study methodology there is no reaction to the announcement of a director's equity purchase but a significant reaction prior to directors' equity sales. The results from the bootstrapping technique are consistent with the traditional parametric model. For directors' equity purchases, it would appear that there is a gradual price increase after the announcement. In the context of strong-form market efficiency, the natural conclusion in a large capital market would be that the market is informationally efficient, that is, directors do not appear to be using private information to earn excess returns. However, we argue that the price responses, or lack of, on the Dublin market may be more closely related to reduced information asymmetry. This study also suggests that the Irish Republic's capital market reaction to positive and negative signals is asymmetric. This issue could benefit from further research.

The study does have limitations, the most obvious being the number of sell transactions, 14, based on eight companies. Whilst it could be argued that the sample size could be increased by extending the period before 1994, Extel only records directors' share transactions from 1994 onwards. Examination of the volume of shares traded would also enhance the study; however, such data is not recorded by Datastream for Irish plcs.

NOTES

[1] The ISEQ is a value weighted index comprising all companies listed on the Dublin Stock Exchange.

[2] McIlkenny et al. (1996) employs UK data; as the current study is based on the Dublin Stock Exchange our market index is the ISEQ index. Similarly, we have an estimation period from -150 days to -22 days and a test period from -21 to +21 days.

[3] We are grateful to an anonymous referee for this suggestion and to both referees for their additional constructive comments.

ACKNOWLEDGEMENTS

An earlier version of this paper was presented at the Irish Accounting and Finance Association Annual Conference, University of Ulster at Coleraine, 8/9 April 1998. This paper has benefited from comments by Tony Brabazon, participants at the above conference and from two anonymous referees. All errors and omissions are entirely ours.

APPENDIX 1

List of Companies Employed in the Study

	Stock Exchange where the Company is Listed (London Stock Exchange (LSE), Dublin Stock Exchange (DSE))
Directors' Purchases	
Arnotts	DSE
Ardagh	DSE
CRH	DSE & LSE
Fishers International	DSE & LSE
European Leisure	DSE & LSE
Green Property	DSE & LSE
Golden Vale	DSE
Hibernian Group	DSE
Independent Newspapers	DSE & LSE
Irish Continental Group	DSE & LSE
Irish Permanent	DSE & LSE
IWP International	DSE
Norish	DSE & LSE
Crabtree Group	DSE
United Drug	DSE & LSE
Waterford Wedgewood	DSE & LSE
Readymix	DSE & LSE
Silvermines Group	DSE & LSE
Directors' Sales	
Green Property	DSE & LSE
Grafton Group	DSE
Irish Continental Group	DSE & LSE
Navan Resources	DSE
Readymix	DSE & LSE
United Drug	DSE & LSE
Waterford Foods	DSE & LSE
Unidare	DSE

REFERENCES

Berglund, T., Liljeblom, E. and Löflund, A. (1989). 'Estimating Betas on Daily Data for a Small Stock Market', *Journal of Banking and Finance*, Vol. 13 (March), pp. 41-64.

Brabazon, T. (1997). 'The Bootstrap — Useful for Accounting Researchers?', *Irish Accounting Review*, Vol. 4, No. 2, pp. 1-24.

Brown, B. and Foo, M.S. (1998). 'Insider Trading in Australia: Evidence from Directors' Trades', paper presented at the AAANZ Conference, Adelaide.

Cohen, K.J., Maier, S.F., Schwartz, R.A. and Whitcom, D.K. (1986). *The Microstructure of Securities Market*. New Jersey: Prentice-Hall.

Coutts, J.A., Mills, T.C. and Roberts, J. (1994). 'The Market Model and the Event Study Method: A Synthesis of Econometric Criticisms', *International Review of Financial Analysis*, Vol. 3, No. 2, pp. 149-171.

Eckbo, B.E. and Smith, D.C. (1998). 'The Conditional Performance of Insider Trades', *Journal of Finance*, Vol. 53, pp. 467-498.

Efron, B. (1979). 'Bootstrap Methods: Another Look at the Jackknife', *Annals of Statistics*, Vol. 7, pp. 1-26.

Finnerty, J.E. (1976). 'Insiders and Market Efficiency', *Journal of Finance*, Vol. 31, No. 4, pp. 1141-1148.

Fisher, L. (1966). 'Some New Market Indexes', *Journal of Business*, Vol. 39, No. 1, Pt. 2 (January).

Fowler, D.J., and Rorke, C.H. (1983). 'Risk Measurement when Shares are Subject to Infrequent Trading', *Journal of Financial Economics*, Vol. 12, pp. 279-283.

Givoly, D. and Palmon, D. (1985). 'Insider Trading and the Exploitation of Inside Information: Some Empirical Evidence', *Journal of Business*, Vol. 58, No. 1, pp. 69-87.

Gregory, A., Matatko, J., Tonks, I. and Purkis, R. (1994). 'UK Directors' Trading: The Impact of Dealings in Smaller Firms', *Economic Journal*, Vol. 104, pp. 37-53

Gregory, A., Matatko, J. and Tonks, I. (1997). 'Detecting Information from Directors' Trades: Signal Definition and Variable Size Effects', *Journal of Business Finance & Accounting*, Vol. 17, No. 3, pp. 309-342.

Individual Investor (1998). February edition, p.54.

Jaffe, J. (1974). 'Special Information and Insider Trading', *Journal of Business*, Vol. 47, pp. 410-428.

King, M. and Roell, A. (1988). 'Insider Trading', *Economic Policy*, Vol. 7, pp. 163-193.

Lin, J. and Howe, J.S. (1990). 'Insider Trading in the OTC Market', *Journal of Finance*, pp. 1273-1284.

Manne, H., (1966). 'Insider Trading at the Stock Market', New York: The Free Press.

Marias, M.M. (1984). 'An Application of the Bootstrap Method to the Analysis of Squared Standardised Market Model Prediction Errors', *Journal of Accounting Research*, Vol. 22, pp. 34-54.

Maynes, E., and Rumsey, J. (1993). 'Conducting Event Studies with Thinly Traded Stocks', *Journal of Banking and Finance*, Vol. 17, pp. 145-157.

McIlkenny, P., Opong, K.K., and Watson, I.D. (1996). 'Changes in FTSE 100 Index and Shareholders' Returns', *Irish Accounting Review*, Vol. 3, No. 1, pp. 91-110.

Murray, L. (1995). 'An Examination of Beta Estimation Using Daily Irish Data', *Journal of Business, Finance & Accounting*, Vol. 22, No. 6, pp. 893-906.

Nuki, P. (1994). 'Follow Insiders to Best Shares', *The Sunday Times*, 25 September.

Nunn, K.P., Madden, G.P. and Gombola, M.J. (1983). 'Are Some Insiders More Inside than Others?', *Journal of Portfolio Management*, Vol. 9, pp. 18-22.

Pope, P.F., Morris R.C. and Peel D.A. (1990). 'Insider Trading: Some Evidence on Market Efficiency and Directors' Share Dealings in Great Britain', *Journal of Business Finance & Accounting*, Vol. 17, No. 3, pp. 359-380.

Ruback, R. (1982). 'The Effect of Discretionary Price Control Decisions on Equity Value', *Journal of Financial Economics*, Vol. 10, pp. 46-60.

Seyhun, H. N. (1986). 'Insiders' Profits, Costs of Trading, and Market Efficiency', *Journal of Financial Economics*, Vol. 16, pp. 189-212.

Scholes, M. and Williams, J. (1977). 'Estimating Betas from Nonsynchronous Data', *Journal of Financial Economics*, Vol. 5, pp. 309-327.