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Asset Price Effects Arising from Sports Results and Investor Mood: The Case of a Homogenous Fan Base Area.

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Abstract:
This paper contributes to the behavioural finance literature that examines the asset pricing impact of mood altering events such as sports results, sunshine levels, daylight hours, public holidays, temperature etc. Specifically, we investigate whether variations in investor mood arising from wins and losses in major sporting events have an impact on stock market returns. We examine the case of Ireland. Ireland is an interesting case because its people are passionate about sport, the domestic population is relatively homogenous (rather than divided) in terms of support for Irish competitors in international competition and domestic investors comprise a large proportion of owners of Irish stocks – all factors which suggest that if a mood effect exists it should show up in this case. Generally, we do not find a strong link between sport results and stock market returns. Initial results do suggest that in events of particularly high importance, such as the knock-out stages of major competitions, losses are associated with negative returns. However, on controlling for indirect economic effects of sporting wins and losses such as on tourism and travel we find the mood effect is no longer significant.

Keywords : investor mood, stock returns, behavioural finance

JEL Classification: G10, G14.

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1. Introduction

This paper investigates whether there is a relationship between stock market returns and sporting results where the latter may influence investor mood and behaviour. We examine this in the case of Ireland, a country whose people are passionate about sport. This study forms part of a wider literature that examines the asset pricing impact of behavioural biases documented in psychology. In addition to the mood altering effect of sporting results, the possible behavioural impact on the stock market of sunshine, the number of daylight hours, nonsecular holidays, temperature and lunar cycles have also been examined (Kamstra, Kramer and Levi 2000, Frieder and Subrahmanyam 2004, Saunders 1993, Hirshleifer and Shumway 2003 and Cao and Wei 2005). The link between stock market returns and investor mood following sporting results in particular is examined by Edmans, Garcia and Norli (2007) who hypothesise, citing much supporting evidence from psychology literature, that sporting results affect investor optimism and pessimism, self esteem and positive or negative feelings about life in general which in turn impacts investors' views about future stock prices.

More formally, Edmans, Garcia and Norli (2007) argue that in investigating the link between investor mood and market returns, the mood variable must satisfy three criteria. First, the variable must influence mood in a significant and unambiguous way, second it must impact a large proportion of the population and third it must be positively correlated across the majority of the (investor) population. This makes Ireland an interesting case study: the small Irish population, passionate about sport, are homogenous in their reaction to major sporting results, therefore the mood effect has a greater chance of showing up in asset prices.

The sporting events in our sample include 95 Republic of Ireland competitive international soccer wins or losses and 200 international rugby wins or losses. As Irish people's sporting interests are varied we also include a further 21 major Irish sporting achievements and disappointments at international level including in golf, athletics, boxing, snooker, swimming and horse racing. This also allows us to increase our sample size leading to the improved statistical reliability of findings. We choose (i) international and (ii) competitive fixtures to ensure a stronger homogenous reaction among the domestic population while the 'home-bias' widely documented in the finance literature, e.g., French and Poterba (1991), then suggests that the investment decisions of domestic investors could influence market movements. Between 2001 – 2008, the period for which data are available, approx 30% of ISEQ stocks (by market capitalization) were owned by domestic investors – certainly enough at the margin to

influence market movements[1]. Finally, we examine a sample period of over 24 years between January 1989 and June 2012.

Investigating a possible link between investor mood and stock market movements is of interest for a number of reasons. First, if it is found to exist it implies that investors may be forewarned of the timing of a market movement either up or down as the sporting event itself is entirely predictable. Of course, the direction of the stock market move depends on the outcome of the sporting event. Second, an established link would also enable the stock market and sporting betting markets to be used as possible hedging instruments. Third, the study is relevant to researchers investigating anomalies in financial markets as sporting events are not typically captured in the extant models of equilibrium security returns. Fourthly, it serves as a reminder to market practitioners to become self-aware of any biases that may creep into their decision-making process. Finally, the results should be of interest to international investors in the Irish market who may need to concern themselves with studying the sporting form of Irish competitors as part of their short term investment decisions.

Methodologically, the asset price impact of sporting results, or mood altering events generally, is typically examined using either an event study or continuous variable approach. We favour the continuous variable approach as its main advantage is that it uses the full set of observations to estimate our security returns model. Ideally, in an event study one should estimate the return model using only the observations up to each event which in our case potentially skews a comparison of over 300 events over a long sample period of 24 years. The continuous variable approach better facilitates a comparison (over so many events) of the extent of the mood impact on stock markets across different sports over time generally rather than comparing individual once-off sporting events. The former is likely to be of more interest to investors. For example, a finding that soccer results generally have a greater stock market impact than, say, rugby throughout the sample period is a more useful predictor than knowing, say, that the 1990 soccer world cup had a greater impact than, say, the 1999 rugby world cup.

The remainder of the paper proceeds as follows: the next section briefly outlines some of the key findings from previous studies, section 3 describes the methodology and data set used in this study, section 4 describes our empirical findings

[1] We are grateful to Davy Stockbrokers for providing these data

and section 5 concludes.

2. A Review of the Literature

A recent and growing literature has documented a link between mood and stock market returns, where in turn mood is hypothesised to be affected by factors such as sports results, sunshine, daylight hours (causing a change to sleep patterns), nonsecular holidays, temperature and lunar cycles. For example, Kamstra et al (2000) report a loss effect in the stock market following the daylight saving clock change, which it is hypothesised negatively affects sleep patterns. The paper finds that the average Friday-to-Monday stock return on daylight saving weekends was even more negative than that of the 'weekend-effect' anomaly and was associated with a one-day loss of US$31 billion on the NYSE, AMEX and NASDAQ markets alone. The weekend effect itself may also be attributable to a mood factor as traders' 'good mood' fades between a Friday and Monday[2]. The findings of Kamstra et al (2000) hold not only in the United States and Canada, where the transition to and from daylight saving is broadly similar, but also in the United Kingdom, where patterns differ from that in North America, and to a lesser extent also in Germany. Hirshleifer and Shumway (2003) confirm the intuition that sunny weather is associated with upbeat mood. The authors examine the relationship between morning sunshine at a country's leading stock exchange and market stock returns that day for 26 countries and report a strong positive correlation suggesting it may be possible to trade profitably on the weather. Interestingly, there is an asymmetry – other weather conditions such as rain and snow are found to be unrelated to returns. Frieder and Subrahmanyam (2004) report mixed results for a mood effect associated with religious holidays where abnormal positive returns are found around Yom Kippur and St. Patrick's Day but negative returns around Rosh Hashanah. Hirshleifer (2001), Shiller (2000) and Lucy and Dowling (2005) provide comprehensive reviews of the literature on the asset price impact of behavioural issues in psychology[3].

[2] Of course, a number of alternative hypotheses have been put forward to explain the weekend-effect anomaly including increased short selling as well as a possible greater tendency for companies to release bad news on Fridays after markets close.

[3] There is a series of related literature on the stock market impact of commercial news around sport announcements such as the Olympic games (Berman et al 2000, Veraros et al 2003) and one may also test for effects around sponsorship deals, TV rights etc. However, these test for a rational discounting by the market of an economic dividend accruing from the event. This is somewhat tangential to our aim here which is to test for mood related effects.

Turning in particular to the mood effect associated with sports results, there is much psychological evidence showing that the latter has a significant impact on the former. Wann et al (1994) confirm that fans experience a strong positive (negative) reaction when their teams perform well (badly). According to the authors, "*such reactions were documented to lead to increased or decreased self-esteem and to positive or negative feelings about life in general*." (Wann et al 1994, p.347). Schwartz et al (1987) find that the performance of the German football team in the 1982 World Cup significantly changed fans' feelings of well being and opinions on national issues. Sporting results have also been found to be positively associated with the sales of lottery tickets, Arkes et al (1988); with health issues such as heart attacks, Carroll et al (2002); rioting, Wann et al (2001); homicides, White (1989) and suicides, (Trovato (1998). Given the evidence from this literature that sporting results impact on people's feelings of well being, on optimism and pessimism and on their views of their own abilities, it seems reasonable to hypothesise that this 'feel-good' factor could also apply to sentiment on domestic economic and company performance and stock market returns. As noted by Shiller et al (1984): "*Stock prices are likely to be among the prices that are relatively vulnerable to purely social movements because there is no accepted theory by which to understand the worth of stocks and no clearly predictable consequences to changing one's investments. Since investors lack any clear sense of objective evidence regarding prices of speculative assets, the process by which their opinions are derived may be especially social*." (Shiller et al 1984, p. 465).

Edmans et al (2007) is a comprehensive international study of the impact on stock market returns of sporting performance and investor mood. This study concentrates for the most part on international soccer results but also looks at results in cricket, rugby, ice hockey and basketball. Edmans et al apply a continuous variable methodology to the sporting events and national stock indices of a cross-section of 39 countries between 1973 and 2004. The authors find, for example, that losses in international soccer matches are associated with significant losses in the losing country's stock market on the next trading day. This finding also extends to rugby, cricket and basketball. However, asymmetrically, no evidence of a positive stock market reaction is found following wins in any of the sports examined. Such asymmetric findings are consistent with prospect theory, central to which is an asymmetry where given the same variation in absolute value there is a bigger utility impact from losses than from gains, i.e., a loss aversion.

Using the alternative event study approach, Ashton, Gerrard and Hudson (2003) investigate if the English national football team's success has any impact on the London Stock Exchange. Football is used because of its historic importance in England and also because the national team is continuously involved in a cycle of qualifying stages, competitions and friendly matches. Based on daily data between 1984 and 2002, the authors test whether the return on the trading day following a particular game differs from the unconditional mean return on all trading days and conclude that wins are associated with positive returns and losses with negative returns.

Boyle and Walter (2003) examine whether the performances of the New Zealand national rugby team is related to fluctuations in equity pricing on the New Zealand stock exchange. New Zealand is an interesting case - a small country with a single dominant sport whose primary contests are international in nature. It is found that stock return behaviour is independent of the success of the premier national sports team. However, Boyle and Walter use monthly returns which may disguise a short-term influence of investor mood following a contest. Nevertheless, the paper shows that irrational investor responses to sporting contest results would be transitory at best.

We now proceed to outline the methodology and data to be used in this study.

3. Methodology and Data

In order to investigate a possible mood/stock return relationship we employ the continuous variable approach broadly similar to that of Edmans et al (2007). At the heart of this approach is a relatively simple dummy variable specification around sporting events in a model of stock market returns to measure changes in mood. Specifically, the procedure first involves estimating a stock market return model of the form

(1) $$R_t = \gamma_0 + \gamma_1 R_m + \gamma_2 R_{mt-1} + \gamma_3 D_t + \varepsilon_t$$

where R_t is the return on the Irish stock market at time *t*, R_{mt} is the return on an index of world stocks, R_{mt} is specified here to control for outside events affecting global stock market movements in order to isolate market variation more unique to factors

affecting Ireland including, it is hypothesised, mood. Here, R_{mt} is the returns on the All Country World Index from Morgan Stanley Capital International (MSCI) available from Datastream. This is a market capitalization weighted index that is designed to measure the equity market performance of developed and emerging markets. As of June 2012 the index consisted of 45 country indices. This variable may also be specified in (1) with a lag as the world index is calculated on calendar dates where constituents are in different time zones[4]. Indeed, we do not constrain the model to just one lag but run tests of several lags of R_{mt} to capture longer length serial correlation and follow a general-to-specific approach using the SIC to identify the appropriate lag length. In robustness tests, as an alternative we also employ the returns on the FTSE All Share index as R_{mt} in order to control for more local factors closer to Ireland causing stock market fluctuation. D_t is a dummy variable to allow for day of the week effects observed in many stock market returns, e.g., the most common being a Monday effect. However, here we include four day of the week dummy variables following findings in the literature of other daily effects, Alexakis and Xanthakis (1995), Mills et al (2000).

Denoting $\hat{\varepsilon}_t$ as the residuals from regression (1), we examine the effect of the sporting event by estimating

(2) $$\hat{\varepsilon}_t = \beta_0 + \beta_1 W_t + \beta_2 L_t + \mu_t$$

where W_t and L_t are dummy variables set equal to one on day *t* where *t* is the next trading day following a sporting win or loss respectively and equal to zero otherwise.

Under the null hypothesis, $H_0 : \beta_1 = \beta_2 = 0$, the mood variable surrounding sporting wins and losses involving Irish teams and competitors has no effect on stock returns. Under $H_{A1} : \beta_1 > 0, H_{A2} : \beta_2 < 0$, wins (losses) lead to a positive (negative) reaction in the stock market. In addition to this baseline model in (2), we expand the model to test a number of interactive effects using an interactive dummy variable framework. For example, we examine whether an away-win and a home-loss have extra significance. We also construct interactive dummy variables for wins and losses

[4] Edmans et al (2007) estimate (1) simultaneously for 39 countries and specify R_{mt} to control for common shocks to stock returns across different countries where return observations on events would not be independent.

at group and knock-out stages of competitions where it might reasonably be hypothesised that results may have a greater impact on mood compared to fixtures at qualifying stages of competitions[5].

However, a finding that the stock market reacts to sporting successes and failures may not be related to mood but may instead be a rational discounting by the market of indirect economic effects on sport related industries such as tourism, travel, merchandise sales, advertising and wider consumer expenditure. We control for this possibility in two ways. First, in Equation (2) we specify returns on an Irish Tourism and Travel industry index as a control variable in the regression[6]. Second, we also investigate the mood effect on returns of a small cap stock index, rather than a broad market index. Since small stocks are held in higher proportion by domestic investors, they are more likely to be subject to a mood effect.

Data: Descriptions and Sources

We examine daily returns between the 5th January 1989 to 19th June 2012. Irish stock returns are calculated from the ISEQ index, the benchmark national stock market index. The world stock index is the Morgan Stanley Capital International (MSCI) All Country World Index (ACWI). The FTSE All Share Index is also used in some robustness tests. We also study an Irish Small Cap Index. Here, we use the MSCI Small Cap Index for Ireland. Finally, we include returns on a Tourism and Travel index. All data are taken from Datastream. The small cap returns exists daily from 4th May 1993 while the Tourism and Travel returns exist from 10th January 1995.

Our data set includes a total of 295 competitive international sporting events. The sporting events include 95 Republic of Ireland competitive international soccer wins or losses and 200 international rugby wins or losses. Soccer events include qualifier, group and knock-out stages of World Cup and European Championship competitions while Rugby events include similar stages of the Five/Six Nations and World Cup competitions. We also include a further 21 major Irish sporting achievements and disappointments at international level including in golf, athletics, boxing, snooker, swimming and horse racing. These events are not a complete list of wins and losses involving Irish sports men and women over the period but do represent

[5] We are grateful to a referee for prompting this investigation.
[6] The Tourism & Travel industry is the most closely related industry for which daily returns are available in order to examine this possible indirect economic effect.

some of the most significant sporting events and allow us to broaden the sample size and analysis. Table 1 lists these additional sporting events.

[Table 1 about here]

4. Empirical Results

In this section we present the empirical results of the sports results/stock return analysis implementing the methodology outlined in section 3. We estimate Equations (1) and (2) by OLS and report Newey-West serial correlation and heteroscedasticity adjusted t-statistics to test the statistical significance of estimated coefficients. Table 2 presents selected representative results for the broad measure of Irish stock returns, i.e., daily returns on the benchmark ISEQ index. The upper panel shows the coefficient estimates for alternative forms of Equation (1) as indicated in columns with adjusted t-statistics in parentheses. For example, the column denoted "(1)" is the baseline full specification model with the contemporaneous and lagged returns of the world stock market index and day of the week dummy variables where subscripts denote Monday to Thursday. The lower panel (in the same column) reports the corresponding estimates of Equation (2), i.e., where the dependent variable is the estimated residuals from Equation (1). Similarly, Newey-West serial correlation and heteroscedasticity adjusted t-statistics are shown in parentheses. SW_t, SL_t, RW_t, RL_t, OW_t, OL_t are dummy variables for soccer wins/losses, rugby wins/losses and other wins/losses respectively. SWA_t, SLH_t, RWA_t, RLH_t are dummy variables for soccer wins away, soccer losses at home, rugby wins away and rugby losses at home respectively. SWG_t, SLG_t, RWG_t, RLG_t are dummy variables to denote soccer wins and losses and rugby wins and losses at the group stage of competitions while SWk/o_t, SLk/o_t, RWk/o_t, RLk/o_t are dummy variables corresponding to soccer and rugby wins and losses at the knock-out stage of competitions. Also shown are the adjusted R^2 and the Schwartz Information Criterion (SIC) for each model estimated. The SIC trades off a reduction in a model's residual sum of squares for a more parsimonious best-fit model, the lowest SIC value indicates the most parsimonious fit.

[Table 2 about here]

From Table 2, in the upper panel column (1), we begin by reporting results for the estimation of Equation (1) with up to 5 lags of world returns and 4 days of the week dummy variables. From the t-statistics shown in parentheses, the world returns variable

and its values lagged one period are statistically significant at the 5% level. This is a robust finding across all models, columns (1) to (8). However, from column (1) there is little evidence supporting lag lengths greater than 1. In numerous additional tests (not reported) we tested up to lag lengths of 10 but results consistently show that lag length of 1 is sufficient. In robustness checks we also employ FTSE All Share returns as an alternative to the MSCI All Country World index returns to capture more local stock market influences as discussed previously. These results are reported in column 4 but are qualitatively very similar. Interestingly, the dummy variables for Monday, Tuesday and Wednesday initially appear significant in column (1). However, in column (2) where we drop the insignificant lagged world returns, the dummy variables for Wednesday and Thursday become insignificant while in column (3) to column (8) when we then drop the Wednesday and Thursday dummy variables only the Monday dummy variable is consistently statistically significant at the 5% level. We note also that the models in column (3) to column (7) have the lowest SIC values. The adjusted R^2 values range from 0.309 to 0.433 across models. This shows that a considerable amount of variation in Irish stock returns remains unexplained leaving scope for the sports event dummies to explain at least some of this unexplained variation.

The lower panel of Table 2 tests the hypothesis of a sports results induced mood effect on stock returns. The t-statistics in columns (1) to (4) indicate that Irish soccer wins and losses, rugby wins and losses and other (sporting events) wins and losses had no significant impact on Irish stock returns. In column (5) we refine the hypothesis somewhat and examine whether away-wins and home-losses in both soccer and rugby may have a more significant impact on mood and stock returns than results generally. However, once again based on the t-statistics there is no evidence in support of this. In a similar refinement of the hypothesis we investigate whether wins and losses at the group and knock-out stages of competitions in soccer and rugby may be of more significance compared to those at qualifying stages. Column (6) and column (7) present results for the group and knock-out stages respectively[7]. Group stage matches are not found to be significant. However, interestingly from column (7) losses at the knock-out stage of competitions in both soccer and rugby are shown to cause a statistically significant negative effect on stock returns. Soccer wins at knock-out stage do not have a significant impact on returns while there are no rugby wins at knock-out stage in our sample.

[7] As all soccer and rugby matches in our analysis are at either qualifying, group or knock-out stages we have only two dummy variables here and use qualifying stages as our base category.

This is quite an intuitive finding. First, sports results generally do not induce a sufficiently strong mood effect in people as to influence otherwise rational investment behaviour unless and until the sporting event is of more extreme or acute significance (here, at the knock-out stage of a major international tournament in soccer or rugby) where the impact on mood may then be sufficient so as to affect behaviour, including investor behaviour. Second, we find that only sporting losses (but not wins) affect stock returns and this may be related to the loss aversion hypothesis of Kahneman and Tversky and is consistent with the findings of Edmans et al (2007).

However, this finding of a negative relationship between sporting losses and stock returns may not be related to mood but may instead be a rational discounting by the market of indirect economic effects on industries which may be related to sport such as tourism, travel, advertising and wider consumer expenditure. In Table 2 column (8), we examine this possibility by adding the returns on our Tourism and Travel index to the regression in Equation (2)[8]. We now see that the soccer and rugby losses effect is no longer significant. This is an important result: rather than pointing to a behavioural influence, it suggests instead that the market is acting rationally based on economic fundamentals.

To examine this further we repeat the above tests on an index of Irish small stocks rather than the broad ISEQ index. The 30% ownership of ISEQ stocks by domestic investors, although sizeable, may be too small for a mood effect to appear. We might expect small stocks to be held in even higher proportion by domestic investors. We report these results in Table 3. Results are presented similarly to those in Table 2 except the dependent variable in Equation (1) is now returns on the MSCI Irish small cap index. Newey-West serial correlation and heteroscedasticity adjusted t-statistics are again shown in parentheses. Due to data availability constraints these results relate to the slightly shorter period 4th May 1993 to 19th June 2012.

[Table 3 about here]

In the upper panel of Table 3, we find again that the world stock returns (as well as their lagged values) are consistently statistically significant in explaining daily movements in Irish small stock returns at 5% significance across each model. In this case lagged returns up to 4 periods are significant. From column (1) we find that only

[8] Due to data availability constraints in the Tourism and Travel index this regression is run from 10th January 1995.

the Tuesday dummy variable is significant but in further model estimations, in particular columns (2) and (3), we find this is not a robust finding. This would suggest that the Monday effect found in Table 2 for the broad ISEQ returns is driven by larger more internationally traded stocks.

In the lower panel of Table 3 we initially find slightly stronger evidence of a relationship between sporting results and returns among small stocks than in Table 2. Specifically, from columns (1) and (2) we report that soccer losses have a significant negative effect on returns at 5% significance. However, once again when we control for indirect economic effects such as on travel and tourism, in column (3), the significance of sporting events disappears. From column (5) and column (6) soccer wins at group stage and soccer losses at knock-out stage appear significant at the 5% level respectively. However, again (in results not shown) when we add the Tourism and Travel variable to these regressions the significance of the sporting events disappears.

5. Conclusion

We test the hypothesis that sporting victories and defeats engender positive and negative moods sufficient to alter behaviour, including investor behaviour, which in turn has a short term impact on the stock market. We examine the case of Ireland which we argue is a particularly applicable case study. We apply a continuous variable approach to testing the asset pricing/sports results link and examine soccer, rugby and an 'other' category of sports events which includes boxing, athletics, horse-racing, golf, swimming and snooker. Overall, we do not find a strong link between sport results and stock market returns. However, in the case of events of more extreme or acute significance we initially find that soccer losses are significantly negatively related to stock market return on the trading day following the event. This is an asymmetric findings in that wins are not found to have an effect. These findings are generally echoed for an index of small stocks. However, when we control for the possibility that rather than a mood effect the stock market may instead be rationally discounting indirect economic effects on sports related industries, we find that sporting events are no longer statistically significant.

Table 1: Sporting Events in Athletics, Golf, Swimming, Snooker, Boxing and Horse racing*

Athletics	**Aug 23, 1993** – Sonia O Sullivan wins silver in the 1500m World Championships **Aug 11, 1994** – Sonia O' Sullivan wins gold in European Championships in Helsinki **Aug 14, 1995** – Sonia O' Sullivan wins gold at the world championships in Gothenburg **July 29, 1996** – Sonia O' Sullivan disappoints in the 5000m due to an upset stomach **Aug 19 & 23 1998** – Sonia O' Sullivan wins gold in 10000m and 5000m European Championships **Sept 25, 2000** – Sonia O' Sullivan wins silver at the Sydney Olympics
Golf	**July 22, 2007** – Padraig Harrington wins golf's British Open. **July 20, 2008** – Padraig Harrington successfully defends his British Open title. **August 10, 2008** – Padraig Harrington wins the USA PGA Championship
Swimming	**July 21, 1996** – Michelle Smith wins a gold medal in the 400-metre individual medley at the Olympic Games. **July 23, 1996** – Michelle Smith wins a second gold medal in the 400-metre freestyle at the Olympic Games. **August 6, 1998** – Olympic gold Medalist Michelle de Bruin is banned from competition for four years for allegedly tampering with a drug test.
Snooker:	**May 5, 1997** – Ken Doherty becomes the World Snooker Champion
Boxing:	**Aug 8, 1992** – Michael Carruth wins a gold medal and Wayne McCullough takes silver for Ireland at the Olympic Games in Barcelona. It is Ireland's first Olympic gold in 36 years. **March 19, 1995** – Dublin boxer Stephen Collins beats world champion Chris Eubank to win the WBO super middleweight championship title. **Jan 12, 1997** – Wayne McCullough becomes world super bantam weight champion in Las Vegas Aug 25, 2007 - Bernard Dunne is sensationally stopped after just 86 seconds of the first round in his European Super-Bantamweight Championship bout.
Horse Racing	**March 10-13, 2009 –** Ruby Walsh rides a record-breaking 7 winners over the 4 days festival

*Dates shown are the actual dates that the events took place and not the trading days following the event.

Table 2: Relation Between Sporting Results and ISEQ Returns

Table 2 presents results from the OLS estimation of Equations (1) and (2) where the dependent variable in (1) is the ISEQ broad measure of Irish stock returns. The upper panel shows the coefficient estimates for alternative forms of (1) as indicated while the lower panel reports the corresponding estimates of (2). Newey-West serial correlation and heteroscedasticity adjusted t-statistics are shown in parentheses. R_{mt} are the returns on the Morgan Stanley Capital International (MSCI) All Country World Index. In robustness checks we also employ FTSE All Share returns as an alternative proxy for R_{mt}. D_t is a dummy for day of the week effects – subscripts denote Monday, Tuesday, Wednesday and Thursday. SW_t, SL_t, RW_t, RL_t, OW_t, OL_t are dummy variables for soccer wins/losses, rugby wins/losses and other wins/losses respectively. SWA_t, SLH_t, RWA_t, RLH_t are dummy variables for soccer wins away, soccer losses at home, rugby wins away and rugby losses at home respectively. SWG_t, SLG_t, RWG_t, RLG_t are dummy variables to denote soccer and rugby wins and losses at group stage while SWk/o_t, SLk/o_t, RWk/o_t, RLk/o_t similarly denote matches at knock-out stages of competitions. T&T denotes returns on a travel and tourism industry index. Also shown are the adjusted R^2 and the Schwartz Information Criterion (SIC) for each model. The SIC trades off a reduction in a model's residual sum of squares for a parsimonious best-fit model.

Equation (1) $R_t = \gamma_0 + \gamma_1 R_{mt} + \gamma_2 R_{mt-1} + \gamma_3 D_t + \varepsilon_t$

Model	(1)	(2)	(3)	(4)*	(5)	(6)	(7)	(8)
Intercept	0.072 (2.633)	0.074 (2.72)	0.019 (1.295)	0.014 (1.083)	0.019 (1.308)	0.019 (1.308)	0.019 (1.308)	0.018 (1.035)
Rm_t	0.665 (24.777)	0.665 (24.144)	0.664 (24.079)	0.769 (37.123)	0.664 (24.075)	0.664 (24.075)	0.664 (24.075)	0.712 (22.790)
Rm_{t-1}	0.214 (8.573)	0.211 (8.452)	0.211 (8.447)	0.125 (7.073)	0.211 (8.441)	0.211 (8.441)	0.211 (8.441)	0.215 (7.597)
Rm_{t-2}	-0.0155 (-0.728)							
Rm_{t-3}	0.021 (0.925)							
Rm_{t-5}	0.034 (1.642)							
D_M	-0.133 (-3.330)	-0.132 (-3.277)	-0.076 (-2.324)	-0.077 (-2.609)	-0.075 (-2.299)	-0.075 (-2.299)	-0.075 (-2.299)	-0.088 (-2.233)
D_T	-0.092 (-2.213)	-0.089 (-2.129)	-0.045 (-1.261)					
D_W	-0.080 (-1.96)	-0.077 (-1.901)						
D_T	-0.055 (-1.420)	-0.055 (-1.412)						
Model Selection Criteria								
Adj R^2	0.313	0.310	0.310	0.433	0.309	0.309	0.309	0.309
SIC	0.075	0.068	0.065	-0.133	0.063	0.063	0.063	0.063

Equation (2) $\hat{\varepsilon}_t = \beta_0 + \beta_1 W_t + \beta_2 L_t + \mu_t$

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.001 (0.059)	0.011 (0.077)	0.001 (0.080)	-0.001 (-0.009)	-0.001 (-0.083)	0.001 (0.025)	0.001 (0.036)	-0.002 (-0.175)
SW_t	0.005 (0.417)	-0.012 (-0.097)	-0.014 (-0.115)	-0.050 (-0.461)				
SL_t	-0.027 (-0.176)	-0.017 (-0.114)	-0.015 (-0.102)	-0.156 (-0.952)				
RW_t	-0.044 (-0.351)	-0.048 (-0.379)	-0.048 (-0.379)	-0.009 (-0.083)				
RL_t	-0.045 (-0.615)	-0.040 (0.543)	-0.039 (-0.539)	0.044 (0.693)				
OW_t	0.171 (0.581)	0.130 (0.436)	0.126 (0.419)	0.177 (0.697)				
OL_t	0.334 (1.508)	0.335 (1.521)	0.319 (1.413)	0.372 (1.278)				

SWA_t					0.295 (1.248)			
SLH_t					-0.067 (-0.145)			
RWA_t					0.095 (0.480)			
RLH_t					-0.084 (-0.823)			
SWG_t						0.014 (0.033)		
SLG_t						0.096 (0.256)		
RWG_t						-1.191 (-0.581)		
RLG_t						0.065 (0.389)		
SWk/o_t							-0.118 (-0.115)	
SLk/o_t							-0.284 (-2.155)	-0.589 (-1.565)
RWk/o_t								
RLk/o_t							-0.230 (-3.400)	-0.267 (-1.573)
T&T								0.722 (5.291)

* This model uses the FTSE All Share Index as R_{mt} instead of the MSCI ALL Country World Index.

Table 3: Relation Between Sporting Results and Irish Small Cap Returns

Table 3 presents results from the OLS estimation of Equations (1) and (2) where the dependent variable in (1) is the Irish small cap index. The upper panel shows the coefficient estimates for alternative forms of (1) as indicated while the lower panel reports the corresponding estimates of (2). Newey-West serial correlation and heteroscedasticity adjusted t-statistics are shown in parentheses. R_{mt} are the returns on the Morgan Stanley Capital International (MSCI) All Country World Index. D_t is a dummy for day of the week effects – subscripts denote Monday, Tuesday, Wednesday and Thursday. SW_t, SL_t, RW_t, RL_t, OW_t, OL_t are dummy variables for soccer wins/losses, rugby wins/losses and other wins/losses respectively. SWA_t, SLH_t, RWA_t, RLH_t are dummy variables for soccer wins away, soccer losses at home, rugby wins away and rugby losses at home respectively. SWG_t, SLG_t, RWG_t, RLG_t are dummy variables to denote soccer and rugby wins and losses at group stage while SWk/o_t, SLk/o_t, RWk/o_t, RLk/o_t similarly denote matches at knock-out stages of competitions. T&T denotes returns on a travel and tourism industry index. Also shown are the adjusted R^2 and the Schwartz Information Criterion (SIC) for each model. The SIC trades off a reduction in a model's residual sum of squares for a parsimonious best-fit model.

Equation (1) $R_t = \gamma_0 + \gamma_1 R_m + \gamma_2 R_{mt-1} + \gamma_3 D_t + \varepsilon_t$

Model	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.108 (3.263)	0.051 (2.346)	0.041 (1.432)	0.042 (2.269)	0.030 (1.801)	0.030 (1.801)
Rm_t	0.511 (18.735)	0.511 (18.725)	0.556 (17.892)	0.511 (18.742)	0.511 (18.694)	0.511 (18.694)
Rm_{t-1}	0.199 (7.743)	0.199 (7.727)	0.201 (6.870)	0.199 (7.733)	0.199 (7.746)	0.199 (7.746)
Rm_{t-2}	0.057 (2.360)	0.057 (2.353)	0.060 (2.166)	0.057 (2.354)	0.057 (2.357)	0.057 (2.357)
Rm_{t-3}	0.042 (1.594)	0.043 (1.610)	0.035 (1.167)	0.043 (1.610)	0.043 (1.608)	0.043 (1.608)
Rm_{t-4}	0.073	0.073	0.071	0.073	0.073	0.073

	(2.850)	(2.841)	(2.383)	(2.835)	(2.834)	(2.834)
D_M	-0.0931 (-1.935)	-0.036 (-0.878)	-0.032 (-0.587)			
D_T	-0.127 (-2.542)	-0.070 (-1.627)	-0.041 (-0.731)	-0.061 (-1.465)		
D_W	-0.092 (-1.872)					
D_T	-0.078 (-1.496)					
Adj R^2	0.194	0.194	0.220	0.194	0.194	0.194
SIC	0.325	0.323	0.516	0.321	0.320	0.321

Equation (2) $\hat{\varepsilon}_t = \beta_0 + \beta_1 W_t + \beta_2 L_t + \mu_t$

Model	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.002 (0.149)	0.002 (0.159)	-0.002 (-0.092)	0.001 (0.073)	0.001 (0.008)	0.001 (0.059)
SW_t	-0.026 (-0.139)	-0.039 (-0.208)	-0.075 (-0.290)			
SL_t	-0.390 (-1.992)	-0.395 (-2.012)	-0.424 (-1.372)			
RW_t	0.030 (0.266)	0.030 (0.268)	0.042 (0.316)			
RL_t	-0.070 (-0.526)	-0.070 (-0.522)	-0.056 (-0.312)			
OW_t	0.090 (0.321)	0.085 (0.303)	0.562 (1.098)			
OL_t	-0.026 (-0.068)	-0.032 (-0.084)	-0.041 (-0.089)			
T&T			0.095 (5.943)			
SWA_t				0.115 (0.801)		
SLH_t				-0.722 (-1.004)		
RWA_t				-0.105 (-0.439)		
RLH_t				-0.072 (-0.330)		
SWG_t					0.977 (3.958)	
SLG_t					-0.496 (-1.689)	
RWG_t					-0.169 (-0.532)	
RLG_t					0.261 (0.904)	
SWk/o_t						
SLk/o_t						-0.692 (-2.010)
RWk/o_t						
RLk/o_t						-0.368 (-1.262)

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