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A RATIONAL ASYMMETRIC REACTION TO NEWS: EVIDENCE FROM ENGLISH FOOTBALL CLUBS

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JEL Classification: G14 and Z23

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1. Introduction

Disentangling the impact of emotions and fundamentals on stock returns is an empirical question that, to date has remained unanswered. Nowhere else do these two influences seem more obvious than the post-match share-price reactions of publicly-traded sports clubs. Since the seminal paper of Brown and Hartzell (2001), many papers have examined sports club post-match stock performance with a general consensus that the market reaction to winning and losing is asymmetric, with a stronger reaction to losing (see Table 1 for a summary of the findings in this literature). The asymmetric reaction could be the result of either emotions, fundamentals, or both. This paper delves deeper into this question to better examine if investors are caught up in emotions or if fundamentals offer insight into the asymmetric reaction in stock returns to match outcomes.

Several analysts suggest that the stocks of publicly-traded sports clubs are more susceptible to investor sentiment and often fail to respond to changes in financial fundamentals because fans have an emotional rather than just a financial stake in the company. Bernile and Lyandres (2011) argue the asymmetric reaction is the result of investors having an *ex ante* expectation that the club will win. That is, any changes in stock prices tied to winning and losing is solely the result of changes in investor sentiment about their team as fans rather than as investors. The argument put forth by Palomino et al. (2009) is similar, but they argue that investor sentiment influences how news is absorbed by investors. Renneboog and Vanbrabant (2000) find that most publicly-traded clubs underperform the market index and that many investors are `investor-fans' (Zuber et al., 2005) who hold shares as a way of supporting their club.

If investors hold the stocks of sports teams as a measure of support for the club and not as investments then the stock prices should reflect only investor sentiment and not financial

fundamentals. To test this hypothesis, this paper is the first to relate actual reported operating income, as gathered from the financial statements of British publicly-traded football clubs, to the club's recent on-field performance. We show that the fundamentals of the team are related to club's on-field performance. Specifically we find losing is a stronger signal of future performance and has a larger impact on a club's financial performance than winning. It is because of these findings that it can be argued that the asymmetric reaction to winning and losing is not just explained by behavioral factors.

While previous papers have looked at the stock reaction of winning and losing, we are the first to look at the simultaneous reaction of the winning and losing club's stock price. Our unique dataset looks at matches where both club's stocks are publicly-traded. Our examination of this more direct test of market reaction to winning and losing still shows a small asymmetric reaction significant only on the fifth day after the match, consistent with Hong et al. (2000) and Chan (2003) who find that markets react slower to the negative information than positive information.

This paper is the first to document that: (i) football match outcomes forecast fundamentals as measured by the club's operating income, (ii) the relationship between on-field performance and financial performance differs across elite and non-elite clubs, (iii) a simultaneous asymmetric reaction to losing, (iv) losing is a better predictor of future performance than winning, and (iv) due to the above offer a rational explanation to the stronger market reaction to losing (a bad outcome) than winning (a good outcome) is efficient and may not just be a behavioral phenomenon.

The first is an important empirical advancement because ownership (and supporter) incentives in English football are often assumed to be motivated by winning for the sake of trophies rather

than profits. Establishing that winning affects financial performance is an important link to explaining why match outcomes would impact stock price beyond purely behavioral or emotional reasons.

Our findings are consistent with noisy rational expectations models in which investors observe information signals related to the fundamental value of an asset (e.g., Grossman and Stiglitz, 1980, and Diamond and Verrecchia, 1981) rather than with behavioral theories that investors are *ex ante* optimistic that the club will win and are thus disappointed *ex post* when it loses (e.g. Renneboog and Vanbrabant, 2000, Palomino et al., 2009, and Bernile and Lyandres, 2011). Additionally, our findings are in line with Edmans et al. (2007) who argue that losing in a tournament sends a stronger signal than winning because losing indicates the club is certainly eliminated whereas a win only guarantees a club one more round in the tournament.

Our results also relate to the examination of market efficiency, since a market in which prices always 'fully reflect' available information is considered efficient. We find evidence that the market reacts stronger to the negative information of a loss than to the positive information of a win is consistent with the impact on a club's financial performance and its stronger signal of future match outcomes..

The rest of the paper is organised as follows: In section two we develop our hypotheses. In section three, we discuss the data and in section four we discuss the methodology that will be utilised. Section five provides the empirical results. Lastly, section six concludes the paper.

2. Hypotheses

Most publicly-traded companies release information concerning their financial performance four times a year. These quarterly financial reports often represent the only detailed performance

information available to the public. However, in the case of publicly-traded sports clubs, performance in terms of success or failure on the field of play is reported and discussed on a daily or weekly basis and is therefore easily measured. With the advantage of readily available performance information, investors of a publicly-traded sports club can react immediately to the wins and losses of the club. As a result, publicly-traded sports club data have been utilised in recent years to examine investor sentiment and market efficiency. While the general argument is that stock prices of publicly-traded sport clubs will react positively to a win and negatively to a loss, this will be true whether winning influences a club's profitability or winning influences the sentiment and emotion of shareholders.

The expectation is that winning should improve a club's financial performance; as a club wins more matches its potential for advancing into the playoffs or other non-league tournaments increases, which, in turn, further increases its ability to generate revenues and hence profits, conditional on players' salaries. To the extent that success (reflected in winning matches) allows the club more exposure to potential fans and increases the club's revenue through increased attendance, memorabilia sales, and sponsorship contracts, a club's success should be positively correlated with its stock price.

Supporting the intuition that better on-field performance improves a club's financial performance is the total revenues earned by the various leagues in England. The English Premier League (EPL) is the pinnacle, highest level, for English football followed by the Championship League. During the 2011-2012 season, the EPL split £2.48 billion in revenue between 20 clubs, £124m on average, while the Football League Championship (Championship League) split £476 million between 24 clubs, £19.8m on average (Wilson, 2015). During the 2013-14 season the revenues to these two leagues rose to £3.26 billion and £492 million, respectively (Wilson, 2015). Thus,

there is a large difference in the financial benefits available in the various levels, suggesting that winning, i.e. staying in the top league, has significant direct financial benefits.

Returning to the basics, a stock's price should reflect the present value of all future expected cash flows. Thus for a fundamental explanation of stock price reactions to on-field performance, it is pivotal to show that a club's on-field performance has an impact on its financial performance. Without this evidence it is virtually impossible to show a fundamental explanation of stock performance via on-field performance, rather one would appeal to several behavioral finance explanations such as investor sentiment.

The seminal paper by Brown and Hartzell (2001) shows a relationship between a single club's operating income and its recent winning percentage. They use the reported financials of the Boston Celtics, as it was the only (actively) publicly-traded sports club in North America, and *Financial World*'s annual estimations of operating income of the three top professional North America sports leagues' clubs. While they provide evidence that on-field performance impacts the financial performance of the Celtics, they admit that their results might not be externally valid. They posit that some clubs do not maximise profits by fielding a winning team but do so by fielding a "fairly competitive but less expensive team."

For sports clubs almost all of their revenue is generated through the operations of matches being played. The operations of these matches generate revenue from ticket sales, concession, broadcast rights, merchandise, and sponsorship deals. As a club performs better, all else equal, a club tends to generate greater revenues because of increased attendance, increased television appearances, increased opportunities for international tournament play and so forth. Pinnuck and Potter (2006) document a positive relationship between on-field performance and financial

performance of Australian Football League teams; however their focus is on attendance and revenue.

While there has been some examination of on-field performance and financial performance of sports clubs, we take the important step of looking at the financial impacts of losing and winning. This is important as to examine if the impact is symmetric. If losing has a more detrimental impact than winning has beneficial impact, this could help explain the markets asymmetric reaction to the two.

Brown and Hartzell (2001) make an important but often ignored point: not all sports clubs maximise profits by winning as many matches as possible. This is especially true in North American sports leagues where clubs do not face relegation to a lower division for poor performance. In fact, in many instances poor performance is rewarded with better draft picks and increased revenue sharing, giving such clubs access to the top amateur talent for next season. In the case of English football clubs, some poor performing clubs may find financial success not in winning trophies and tournaments, but rather by organizing a club to stay just competitive enough to avoid relegation and to attract enough fans to stay profitable.

To test this hypothesis we divide the clubs in our sample into two types: elite and non-elite. We use international play to quantify "elite" as the top three to four clubs in the EPL participate in one of the international tournaments the following season. International competitions, including the Winners' Cup, Union of European Football Association (UEFA) Cup, or Champions League, are viewed as the highest level of European football as only the top clubs from each country compete in these tournaments, with the Champions League being the pinnacle. The clubs that participate in each tournament are determined based on the previous year's performance and the

strength of the league as a whole. We find a natural break in international play and define elite clubs as those that participated in international play at least six of the 16 years in our data; the remaining clubs are classified as non-elite.[1]

While we could have used relegation, or lack thereof, as the measure of elite play we believe international play is a better measure as not only do clubs that participate in international competitions entitled to money pooled in the EPL but also in the international tournaments themselves. In 2013-14 the Europa League paid €1.3 million to each participating team with additional payouts ranging from €0.38 million to €14.6 million depending on the club's performance, while the Champions League paid €8.6 million to each participating team with additional payouts ranging from €11.12 million to €57.4 million depending on the club's performance (UEFA, 2015).

The expectation is that on-field performance impacts the financials for elite clubs. For non-elite clubs the impact of on-field performance on financials is unclear. An argument can be made that winning helps these clubs be promoted to or remain in the EPL, maintain or grow its fan base, and share in lucrative EPL sponsorship and media deals. On the other hand, it can be argued that non-elite clubs do not have large enough fan bases to experience a net improvement in team financials from winning.

The data analyzed here is also unique in that it includes match outcomes between two publicly-traded clubs to better assess the simultaneous market reaction to a win and a loss. We also deviate from other research in that we look at two types of matches: (1) regular season matches

[1] While 37.5% international participation rate might seem arbitrary, it is a clear break in the number of seasons of international play, with all elite clubs participating in at least 6 years of international play, while Tottenham, the non-elite club with the highest amount of international play, only had three seasons where they qualified for international play. Additionally, none of the elite clubs were relegated from the EPL; the only other club not relegated during the sample period is Tottenham, who has never been relegated from the EPL.

and (2) tournament matches which are usually a one-and-done style competition. While we believe both types of matches should impact a club's financial performance, tournament matches are expected to have a larger impact on a club's financials. This is because tournament matches have more media coverage leading to more exposure to new fans.

If a relationship to on-field performance and a club's financial performance is established, it is important to determine whether the magnitude of the signals is equal, i.e. losing and winning are both strongly related to future performance. As a result, we look at clubs current performance and how it relates to future performance by collecting outcomes of all matches played by the 17 publicly-traded clubs (while publicly-traded) to test whether current performance is related to performance in upcoming matches.

In addition, we start by reexamine stock price reactions to match outcomes, to verify that the asymmetric reaction still persists in our dataset. It is our expectation that our findings will be consistent with the previous literature and we will find a stronger stock reaction to losing than winning. While we look at the reaction of winning and losing separately, similar to previous literature, we also investigate the simultaneous reaction of the stock prices of both clubs involved.

3. **Data**

From 1992-2008 there were a total of 17 English football clubs which competed for at least one year in the English Premier League (EPL) and whose stocks were traded on the London Stock Exchange (LSE), the Alternative Investment Market (AIM), or the PLUS Market Group (PZ).[2]

[2] The PZ is a London-based security exchange formerly known as OFEX, which is a less liquid market of the three exchanges. The AIM is a part of the LSE, but is designed for small and growing companies, which results in the AIM having less restrictive listing requirements than LSE.

We start the sample period in 1992 because that is the year that the English Football League restructured the various leagues to that which still exists today.[3] The sample period ends with the 2007-2008 season, when only six clubs were still publicly traded, and three of these clubs went private within the year.

3.1 Match Level Data

Match level data were gathered for all matches between *two* publicly-traded English football clubs from 1992 through 2008. These match outcomes span multiple leagues and expand our understanding of how stock markets react to match outcomes for elite clubs, that is, clubs that regularly compete in international tournaments, and non-elite clubs, that is, clubs that do not regularly compete internationally. These data facilitate a natural test of simultaneous market reaction to winning and losing: the test focuses on how the market responds to a single event that impacts two stocks simultaneously but in opposite ways.

The match-level data were collected for an initial sample of 1,327 matches. Matches where the two clubs' stocks were not traded on similar days around the match are discarded, leaving 1,267 matches.[4] Additionally, 316 matches ended in a draw. Because a draw does not result in a clear signal of good news or bad news for either team, they are also removed. The final sample is comprised of 951 matches.

The time and date of each match was collected from statto.com and confirmed by BetExplorer and ESPN. Since the time of the match, be it early in the season or late in the season, might influence the reaction to wins or loses, the index *MONTH* takes a value of one if the match is

[3] The Football League was restructured to allow the English Premier League (EPL) clubs to compete more effectively against the other elite clubs in Europe. The restructuring also allowed the EPL to negotiate its own broadcast and sponsorship agreements.

[4] This is primarily the result of the PZ not always operating on the same days as the other markets, primarily the result of holidays.

played in August (first month of the season), two if match is played in September (second month of the season), and so on, up to ten, which represents a match played in May, the last month of the season.

Each match was categorized as one of five match types. The first two types are regular season matches with the first being between two EPL clubs, and the second being between two clubs in the Football League Championship, formally Division One (*D1*). The third type of match is a playoff match (*PLAYOFF*); only D1 clubs have the possibility of competing in playoff matches, which are used to select the third club to be promoted to the EPL the following season from among the clubs that finished between third and sixth in the D1 standings. The fourth type of match is a tournament match (*FAL*), which is played in one of the two national tournaments, League Cup (FL Cup) and Football Association Cup (FA Cup). The last type of match is the Community Shield (*SHIELD*) which is played annually between the champion of the EPL and the FA Cup winner but has no bearing on a club's standings.

Each club's ranking in their division is measured after each match, as well as the number of goals scored by each club. A ranking of one indicates the club is in first place, i.e. lower ranked clubs have better records at any given point in the season. Betting odds from BetExplorer were collected for each match to control for expectations of the match's outcome. Betting odds are only reported in 703 of the 951 matches in the sample. Until the start of the 1998-1999 season, no betting data were available on regular season matches, and not until October 2004 are betting data available for all remaining types of matches; although all *SHIELD* and *PLAYOFF* matches in the data are before October 2004. The betting odds are converted to the subjective probabilities using the approach employed by Sauer (2005).

Table II provides variable descriptions while Table III offers summary statistics on the matches. During the sample period, 405 matches, over 60% of the sample, were won by the home club. Similarly, over 86% of the sample matches are EPL matches with just over ten percent being D1 matches and a little less than one percent being domestic cup matches. On average the winner's rank is lower than the loser's rank, which implies the better club tends to win on average. The betting odds imply the winning club was expected to win, as calculated from the subjective probability: the *ex ante* probability is over 44%.[5] For the period investigated, daily closing stock prices were collected from Bloomberg. In addition, information concerning dividends, splits, issuance, or reverse-splits was also collected for the sample period and used to calculate the club's stock reaction to each match outcome. Interestingly, daily returns and cumulative returns tend to be non-negative on average, although the standard deviation clearly makes a zero daily return and cumulative return common.

All but two football clubs (Arsenal and Manchester United) are considered small stocks with market capitalizations below £400 million. Arsenal is slightly above the upper echelon of small cap stocks with a market capitalization as high as £650.2 million in 2007. With only a few hundred shares outstanding each share is worth in excess of one million British pounds. Manchester United is the only club in the sample to exceed the classification of a small cap firm with a market capitalization that peaked at £1,071.5 million in 2000. Since previous work has noted that asymmetric market reaction to news is most pronounced in small stocks (see Chan (2003) and Depken (2001)), these data describe firms that are strong candidates to exhibit asymmetric reaction to good news and bad news.

[5] One might define expectation of winning to hold if prob(win)>0.50 but this would ignore the possibility of a draw. As approximately one fourth of all matches end in a draw, the 44% indicates the club that is expected to win does so, on average.

3.2 Season-Level Data

The data used to investigate the financial implications of on-field performance were obtained from the annual reports of 16 of the 17 publicly-traded EPL clubs from 1992-2008.[6] Operating income for each club was gathered from Bloomberg along with the annual UK Consumer Price Index (CPI). Operating income is used instead of net income, since the latter is affected by the club's financial leverage. Unlike Pinnuck and Potter (2006), we do not use revenue as investors are more interested in the operating income because additional revenues are commonly tied to additional expenses. For each match, the result, type, and location were obtained from ESPN.com and statto.com.[7] All 16 clubs included in the analysis have fiscal years that end between May and July, after the football season ends. Thus, each football season is encompassed in each team's annual report; all 16 clubs are listed in Table IV.

We distinguish between regular season matches (EPL and Football League Championship) and matches associated with the Football League Cup (FL Cup), Football Association Cup (FA Cup), Community Shield, Anglo-Italian Cup, Winners' Cup, Union of European Football Association (UEFA) Cup, Super Cup, or Champions League.[8] We further distinguish between international and domestic matches. Appendix A provides a description of international and domestic cups. For each season, the total number of matches played, matches won, lost, and drawn for each type of match were collected. In addition, each club's longest losing streak during the regular season, where a draw or a win broke the losing streak, was recorded. A club's losing streak is collected

[6] Birmingham City Football Club (FC) was omitted from the analysis because their annual report ends on August 31st which causes the first month of one season and nine months of another season to be combined in each annual report, which in turn could bias the results.

[7] Data were collected from ESPN going back to the 2004-05 season. This data was used to confirm the validity of statto.com. Statto.com is then used to get match results from 1992-93 to 2003-04.

[8] The EPL is the premier football league in England while the Football League Championship is the second-best football league in England, followed by Football League Two.

because fans might become less interested in a club if it continues to lose consecutive matches.[9] Additional data include the total number of international matches played and the total number of home matches played during the season, excluding "friendly" matches for which data were not readily available.[10]

Table V provides descriptions and summary statistics of the variables for elite and non-elite clubs. We provide separate statistics as we run our models for these clubs separately, in line with Brown and Hartzell's (2001) argument that not all clubs may maximise shareholders wealth in similar fashions. While many of the summary statistics are as expected it is important to point out a few things. First, is operating income adjusted for inflation, where the minimum earnings for elite and non-elite clubs are similar while the elite maximum is £38.417 million and the non-elite maximum is £28.146 million.[11] More telling is the means as the elite mean is £3.065 million and the non-elite mean is -£2.147 million, indicating on average the elite clubs make money every year while the non-elite clubs do not. Our other control variables are dummy variables for promotion and relegation, which take a value of one if the club gets promoted or relegated the following year. For elite clubs these variables take a value of zero for all observations as these clubs have never been relegated from the EPL. Non-elite clubs have an average value of 0.137 (0.116) for promotion (relegation). EPL is a dummy variable that takes a value of one if the club played the season in the EPL and a zero otherwise. For elite clubs every

[9] This is closely related to the uncertainty of outcome hypothesis (UOH) that argues that fans receive higher utility from matches where the clubs are closely balanced. Thus, a club that continues to lose will likely have less fans attending or interested in the club, which will reduce the club's financial performance. In other words, the more uncertain the outcome, the higher the expected attendance will be. Jennett (1984), Peel and Thomas (1988), and Forrest and Simmons (2002) all looked at the UOH as it relates to football and conclude that football supporters appear to prefer well-balanced matches.

[10] A "friendly" match is one where the outcome does not count towards the standings of the two clubs involved, commonly referred to as an exhibition match.

[11] Operating income is adjusted by the UK CPI to control for inflation, so all figures are in terms of 2010 British pounds.

observation is equal to one as noted above these clubs were never related from the EPL. As for non-elite clubs the mean is 0.537, indicating 51 of the 95 seasons observed were played in the EPL. Looking at losing streaks it is not surprising that on average the non-elite clubs lose one more game than elite clubs in their longest losing streaks in the season. This is likely the case of some larger losing streaks observed in the non-elite subsample as their longest losing streak is 15 compared to the longest losing streak of elite clubs of just five. Now we turn our focus onto on-field performance. It is important to note we separate the matches in the regular season into two halves. The first half runs from August to December while the second half is January to May. As the number of games in each season are not always symmetric between halves we look at the percentage of matches won and lost of the half. In the first half the non-elite clubs on average win slightly higher percent of matches, winning 53.7% of the matches compared to the elite club's winning 47.9% of the matches. However, the non-elite clubs also lose a higher percentage of games in the first half as they lose 37.4% of the games compared to the elite losing 25.7%.[12] The second half tells a relatively similar story except for the fact that non-elite clubs win a lower percentage of matches in the second half. Non-elite clubs win 36.3% of their second half games while the elite clubs win 50.0% of their second half matches. As for second-half loss, non-elite clubs lose 36.0% of the second-half matches while elite clubs only lose 23.5% of their second-half matches. The remaining summary statistics on winning and losing are for international play and domestic cups. Since both types of matches are knockout tournaments we just observe the number of matches played in a season, as the higher the number the more success a club had allowing the club to advance further into the tournament. For international play it is not surprising that elite clubs average 6.541 matches a season while non-elite clubs only average

[12] This is the result of there being three possible outcomes in a football match; win, lose, or draw (tie).

0.494 matches a season. Skewing these results in the non-elite favor is the fact that during the start of our dataset there was the Anglo-Italian Cup which was an international competition between clubs not in the premier level of play in their home country. The Anglo-Italian Cup ended in 1996. Lastly, there are two domestic cups each year that all English clubs participate in, the FA Cup and the FL Cup. Elite clubs on average play in 7.131 domestic cup matches while non-elite clubs on average play 6.326 domestic cup matches.

4. Methodology

4.1 Market Reaction to Match Outcomes

To confirm the existence of the asymmetric market reaction observation to winning and losing we examine club stock performance to match outcomes. Similar to previous literature, daily abnormal returns (AR) and cumulative abnormal returns (CAR) are calculated for each club after each match. Using the Capital Asset Pricing Model (CAPM) we calculate the AR on the stock for a one-day horizon as:

$$AR_{i,T} = r_{i,1} - \left[r_f + \beta_{i,1}\left(r_m - r_f\right)\right], \tag{2}$$

Where $\beta_{i,1}$ is the one year beta calculated daily and the actual return ($r_{i,1}$) is:

$$r_{i,1} = \frac{P_{i,1} - P_{i,0} + D_{i,1}}{P_{i,0}}, \tag{3}$$

where $P_{i,1}$ is the closing price of stock i on day 1, $P_{i,0}$ is the closing price of the stock on day 0, and $D_{i,1}$ is the dividend paid on stock i over the one-day time horizon. The CARs are calculated in a similar fashion as the AR but for a T-day horizon.

To test whether the market rewards winning or punishes losing, we estimate the following model separately for match winners and match losers:

$$DEP_i = \beta_0 + \beta_1 HOME_i + \beta_2 GOALDIFF_i + \beta_3 MONTH_i + \beta_4 WELITE_i + \beta_5 WRANK_i + \beta_6 WPROB_i + \beta_7 LELITE_i + \beta_8 LRANK_i + \beta_9 DPROB_i + \beta_{10} EPL_i + \beta_{11} FAL_i + \nu_i, \quad (4)$$

where *DEP* is alternatively the *AR* or the *CAR*, *HOME* is a dummy variable that takes the value of one if the winning club is also the home club and a zero otherwise; *GOALDIFF* is the goals scored by the winning club minus the goals scored by the losing club; *MONTH* is the month of the season; *WELITE* (*LELITE*) represents if the winning (losing) club is an elite club and a zero otherwise; *WRANK* (*LRANK*) is the ranking of the winning (losing) club in their league as a result of the outcome of the match; *WPROB* is the *ex ante* probability of the winning club winning the match derived from the pre-match betting odds; *DPROB* is the *ex ante* probability of the match ending in a draw derived from the pre-match betting odds; υ is a zero-mean error term; and *i* indexes matches.[13] The remaining variables (*EPL* and *FAL*) are dummy variables that take a value of one if the match is an EPL match or a domestic tournament match and zero otherwise; D1 matches are used as the omitted category.

To utilise the unique dataset we have we also look at the simultaneous reaction to the winning and losing club's stock after a match. To test if market reaction to winning and losing is symmetric, the AR (CAR) of the losing club is added to the AR (CAR) of the winning club (*DIFFAR*) and used as the regressand in the following model:

$$DIFFAR_i = \delta_0 + \delta_1 HOME_i + \delta_2 GOALDIFF_i + \delta_3 MONTH_i + \delta_4 WELITE_i + \delta_5 WRANK_i + \delta_6 WPROB_i + \delta_7 LELITE_i + \delta_8 LRANK_i + \delta_9 DPROB_i + \delta_{10} EPL_i + \delta_{11} FAL_i + u_i, \quad (5)$$

Previous research has never looked at the simultaneous reaction to these club's stock prices. As a result, we are not only extending the literature but also developing a stronger test for

[13] Betting data are used to measure the expected outcome of the match.

asymmetric reaction as we examine the simultaneous reaction to the good news of a win and bad news of a loss.

4.2 The Impact of Match Outcome on Club Financials

To look at the impact of on-field performance to a club's financial performance the clubs are separated into two types, elite and non-elite. We run our models for these clubs separately as Brown and Hartzell (2001) point out clubs may maximise profits differently. Thus winning may not be linked to on-field performance for all clubs or as strongly for specific clubs.

As the data cover the period 1992-2008, operating incomes were adjusted for inflation using the UK CPI (2010 as the base year), yielding the variable *ADJOI*, which is used as the dependent variable in the following empirical model:

$$ADJOI_{it} = \alpha_0 + \alpha_1 WP1_{it} + \alpha_2 LP1_{it} + \alpha_3 WP2_{it} + \alpha_4 LP2_{it} + \alpha_5 IG_{it} + \alpha_6 DG_{it} + \alpha_7 PROMOTION_{it} + \alpha_8 RELEGATION_{it} + \alpha_9 EPL_{it} + \alpha_{10} LSTREAK_{it} + \varepsilon_{it}, \quad (6)$$

where the α's are parameters to be estimated, index *i* denotes the club, index *t* denotes the year, and ε_{it} is a composite error term with a club specific effect, c_i, and an independently and identically distributed two-sided error term, u_{it}.

The explanatory variables are designed to test how winning affects financial performance of the club, specifically whether all clubs are identical in this aspect and whether matches earlier or later in the season influence clubs' financial performance differently. A club's regular season matches are divided into two halves.[14] To separate the financial impact of wins and losses we look at them separately, instead of looking at a club's winning percentage. As the number of

[14] The first half includes league matches played from August to December while the second half includes league matches played from January to May.

matches played in a half varies over seasons we examine the percentage of matches won in a half (*WP1* and *WP2*) and percentage of matches lost in a half (*LP1* and *LP2*). This allows for a direct test to see if the club's operating income reacts differently to wins and losses. The number of matches played internationally (*IG*) and the number of matches played in domestic cups (*DG)* are included to test for differences across these types of matches. Number of matches instead of winning percentage is used for international and domestic cup matches as both are knockout tournaments, indicating more matches imply success in earlier rounds.

The following variables are included as general control variables: *PROMOTION* (*RELEGATION*) is a dummy variable that takes the value of one if the club is promoted (relegated) the following year and a zero otherwise; *EPL* is a dummy variable that takes the value of one if the club competes in the EPL that year and a zero otherwise; *LSTREAK* is the club's longest losing streak excluding non-regular season matches for the season. It is important to note that for elite clubs the only control variable is LSTREAK as all elite clubs played all their seasons in the EPL, thus they were never relegated or promoted during our dataset.

There are six measures of performance for elite and non-elite clubs: first-half percentage of wins, first-half percentage of losses, second-half percentage of wins, second-half percentage of losses, number of international matches played, and number of domestic matches. It is expected that each performance measure will have a non-negative relationship with adjusted operating income, that is, $\alpha_i \geq 0$ for i=1...6, except for α_2 and α_4 where the expectation is the value will be non-positive. To see if the reaction is symmetric to winning and losing we test if *LPi=WPi*. Although all matches are equally weighted in the league standings, as the season unfolds, some matches may be viewed by fans and shareholders alike as more significant, especially when clubs are jockeying for final position to qualify for international play or to avoid relegation to a

lower division the following year.[15] This suggests that the impact of first-half success on operating income might differ from that of second-half success. It is anticipated that winning is more important for elite clubs early in the season as they are competing for championships and to play internationally more regularly. On the other hand, for non-elite clubs the second half of the season might be more important as these clubs fight for promotion and against relegation.

5. Empirical Results

5.1 The Influence of Match Outcomes on Stock Performance

The impact of match outcomes on stock prices is obtained by estimating Equation (4) separately for winners and losers using a sample of 951 matches from 1992-2008 for the first stage and 703 matches for the second stage. The second stage includes fewer matches because we use betting data to control for expectations but these data are only available back to the 1998-99 season. Table VI reports the second-stage output for the AR and CAR for winners.[16] Winning at home results in a higher five-day CAR for the winner indicating the market reacts stronger to a home win. Otherwise, there are only a few variables of significance when looking at the AR. The variables *EPL*, *FAL*, and *WELITE* are all significant at the 1% level for the second and third day AR, whereas *FAL* is only significant at the 5% level for the second day; all are positive on the second day and then are negative on the third day. This implies the market overreacts on the second day to EPL and tournament matches as well as to matches where an elite club wins.

[15] May 13, 2012 was the last day of the 2011-12 EPL season and was arguably the most exciting final day of the EPL. Going into the last day the championship was still undecided between Manchester City or Manchester United. The third position in the standings, the last guaranteed spot to play in the Champions League the following season, was also undecided among three clubs: Arsenal, Tottenham, and Newcastle. Arsenal won third place over Tottenham by just one point. As for the bottom of the EPL, while Blackburn Rovers and Wolverhampton Wolves were guaranteed to be relegated heading into the last day, the third club to be relegated was still undecided between Aston Villa, Bolton Wanderers, and Queens Park Rangers (QPR). Ultimately, Bolton was relegated by ending up one point behind QPR. This is just an example of the possible importance of the final matches of the season.

[16] We do not report the 4-day CAR for brevity as there is no significance in club's 4-day CAR in any cases after including our control variables.

From Panels B through D of Table VI it seems that when an elite club wins in the EPL it takes the market two days to show a significant positive reaction but when a non-elite club wins in the EPL or D1 it is not until the third day that the market shows a significant positive reaction to the win. As for FAL matches there is no positive significant reaction, consistent with Edmans et al. (2007). As for the CAR we see a similar reaction to D1 matches as in the AR but now it is the two day and five-day CAR that are significant.

Table VII reports the estimation results using the AR and CAR of losing clubs. For losers it seems the lower the losing club's ranking, the stronger the market reacts to the loss. This is likely the result of the increased odds of the club being relegated the next year and the potential fall in the club's operating income. Similarly, the market reacts more negatively to a D1 loss than an EPL loss for the first and fifth day AR. This negative reaction is persistent as it is documented in all CARs as well. The AR also reacts negatively and significantly to LRANK for the first and second day after the loss, while it is only significant in the two-day CAR. This finding seems to confirm that losing for a club closer to relegation is more detrimental then losing for other clubs. Lastly, when elite clubs lose, the market reaction is slower than for non-elite clubs but is ultimately a stronger negative reaction.

Panel B of Table VII reports results for how a losing club's stock performs. For all matches the first day AR is negative and significant at the 1% level and carries on for the second day for non-elite losers in EPL and D1 matches. This evidence is consistent with previous findings that the market reacts faster to losing, bad news, than winning, good news, as it takes until the second or third day for the market to react to winning. This continuation of negative abnormal returns for non-elite clubs is likely the result of each loss leading to the possibility of the club being relegated. Additionally the market has a second dip on the fifth day for all matches. This is

consistent with Hong et al. (2000) and Chan (2003) who find that markets react slower to the negative information than positive information.

The CAR for all losing clubs is significant for all horizons for DI matches and elite losers in the EPL. Tournament matches (FAL) seem to have little impact on the CAR of the losing club. Overall, when looking at winning and losing separately the results suggest the market reacts stronger to a loss, consistent with previous results but there is some evidence that there might be a delay in the market's response to a loss. What has not been investigated directly in the past is whether these two offsetting responses reflect an asymmetric response to winning and losing.

To test for asymmetry, we estimate equation (5) using the same sample of matches. Table VIII provides the estimation results along with several tests for the reaction of AR and CAR to winning and losing, which we interpret as good news and bad news, respectively. The results presented in Panel A indicate that neither *GOALDIFF* nor *WRANK* has a statistically significant relationship with *DIFFAR*, suggesting neither of these variables is a source of asymmetric reaction to winning and losing. However, several other match characteristics are statistically related to *DIFFAR*. Specifically, *LRANK* is significant and negative for the first and second day *DIFFAR*. This implies the lower the quality of the losing club, the stronger the market's reaction against the losing club, i.e., the market response is asymmetric. This is consistent with the intuition that losing for lower ranked clubs may be more costly because they are closer to being relegated to a lower division at the end of the season, leading to less financial success in the future.

The impact of *WELITE* is positive and significant for the first-day *DIFFAR*, at only the 10% level, but is negative and statistically significant for the fifth-day *DIFFAR*. On the other hand,

LELITE is negative and statistically significant for the first and third-day AR and positive and significant for the second-day *DIFFAR*. This suggests that when an elite club loses the market anticipates a relative reduction in the club's financial fundamentals whereas when an elite club wins the market is ambivalent about the club's relative financial fundamentals.

EPL matches have a stronger positive reaction on the first and fifth day, but also have a negative reaction on the fourth day. The coefficients for *WPROB* and *DPROB*, which control for market expectations, are insignificant; except for the fifth day for both and the first day for *DPROB*. The significance of *DPROB* implies the market reacts stronger to the win and/or weaker to the loss when the match is expected to be a draw, i.e., more competitive. On the whole, it seems *ex ante* market expectations of match outcomes provide little explanation to the variation in the market reaction to winning and losing, consistent with Palomino et al. (2009) findings that the market does not react to the release of betting odds

Panels B through D in Table VIII provide results focusing on the net market reaction to good and bad news. There is weak evidence of an asymmetric reaction in the AR as all matches only correspond to an asymmetric reaction in the fifth-day AR. When examining the control variables in the models using CAR there are only minor differences from the models using the AR: *LRANK* is negative and significant for all CAR, implying the first and second day negative AR are not over-reactions. *LELITE* is also negative and significant for all CAR, implying the market punishes these elite clubs for losing more than non-elite clubs. While the elite clubs are punished for loses, the CAR for elite wins (*WELITE*) is only significant for the two-day CAR.

5.2 The Impact of Match Outcome on Firm Fundamentals

The evidence in this paper, while not as strong as previous findings, still finds evidence of an asymmetric market reaction to winning and losing, with a stronger reaction to losing. This reaction when looking at the simultaneous reaction of winning and losing is delayed, showing up in the fifth-day abnormal returns, consistent with the argument that the market reacts slower to bad news. In this section, we examine if winning and losing have similar impacts on a club's financial performance by examining on-field financial performance to the club's operating income. If the impact of winning and losing is not symmetric to the clubs' financial performance it can help explain this asymmetric stock reaction.

Panel A in Table IX reports the empirical results of estimating Equation (6) for elite and non-elite clubs.[17,18] While the models are set up identically for elite and non-elite clubs, the non-elite clubs model has more control variables as clubs were relegated to the lower divisions and also promoted to the EPL, while all elite clubs played all their seasons in the EPL.

The only control variable for the elite club model is losing streak which is not statistically significant. The only variables that are significant are some of the variables that examine winning and losing, specifically percentage of matches lost in the first-half, percentage of matches lost in the second-half, and number of international matches played, all statistically significant at the five percent level. While the elite clubs percent of wins is not significant, its percent of losses for both halves is significant. For the first half each additional loss equates to about a £1.030 to £1.316 loss to the club's operating profit on average, depending on the number of games played in the first half. The second half loss leads to a decrease in the operating profit

[17] We also estimated the season-level model substituting first and second half performance with aggregated seasonal performance measured in total season wins and losses. Wins were not statistically related to adjusted operating income whereas season losses were negatively and statistically related to the same. For non-elite clubs season losses were not as expensive as for elite clubs but winning was no more or less valuable to non-elite clubs. Full results of this estimation are available upon request.

[18] Results are similar for raw returns.

of about £1.335 to £1.649 per match on average, depending on the number of matches played in the second half. Even more important than the significance of percentage of loss, is the fact that the percentage of lose has a statistically larger impact on the club's operating income than the percentage of win for both halves, which can be observed from the tests in Panel B in Table IX. As for international matches each additional match increases the club's operating income on average by £0.721. All international matches are played in a home and home tournament format indicating to advance you need to beat the other club.[19] Thus losing leads to less matches while winning leads to more matches. Here we are not able to directly look if there is an asymmetric reaction to winning, but we do document winning and losing international matches has a clear impact on a club's operating income. As for domestic cups, elite clubs' financial performance is not significantly affected by their performance in these cups, which may provide support to Manchester United's controversial withdraw from the FA Cup in the 1999-2000 season. The same is not true for non-elite clubs, where any additional exposure to fans seems to be financially beneficial.

Turning our attention to non-elite clubs, where there are additional control variables. EPL is the only control variable that is not statistically significant, although the coefficient is positive as expected.[20] Clubs that are relegated experience an increase in operating income of £4.85 million in the season they are relegated; the impact is significant at the 1% level. This can arise by either supply or demand side influences. On the demand side, once a club is likely to be relegated fans might attend the remaining matches in greater numbers because the expected competition in the

[19] Winning both matches guarantees advancement. However, if the series is split with a win by each club the club that advances is the one that scored more goals. If the number of goals is the same or both matches ended in a tie penalty kicks is used to determine the club who advances.

[20] There was no statistically significant difference between the impact of EPL percentage of wins and losses and the Football League Championship percentage of wins and loses on a club's operating income.

next season will be weaker. On the supply side, a club being relegated might intentionally have lower club salary and therefore generate higher operating income (see Noll (2002) for further discussion about the impact of relegation on club profit).

On the other hand, being promoted the following year is significant at the 5% level and generates a loss of £4.18 million in operating income, on average. This negative relationship supports the argument that a club's higher payroll more than offsets any increase in revenue generated by dominating play in the current (lower) level. Additionally, some fans may decide not to attend matches at the end of the season and instead wait to attend matches the following season when the club is promoted to a better league and matches will be more competitive, consistent with findings from the uncertainty of outcome hypothesis (UOH) literature.[21]

The last control variable, looking at the length of the longest losing streak is negative and statistically significant at the ten-percent level. This finding indicates that the more losses in a losing streak the more detrimental it is to the club financially, which is in line with Jennett (1984), Peel and Thomas (1988), and Forrest and Simmons (2002) who all find football fans prefer well-balanced matches.

Focusing on the on-field performance of non-elite clubs only second-half percentage of wins and number of international matches are statistically significant. Second-half percentage of wins is only significant at the ten-percent level, and from looking at panel B of Table IX it is observed to not be significantly different from the second-half percentage of losses.

Each additional international matches on average increases a non-elite club's operating income by £1.820 million and is statistically significant at the one-percent level. While non-elite clubs

[21] See footnote 7 for a discussion on the UOH.

do not compete often in international tournaments it seems they can lead to huge financial benefits to the club. It seems that there is a larger financial benefit to non-elite clubs participating in international play than elite clubs. This is likely the result of the non-elite clubs' low payroll, which allows them to reap large financial gains from participating in international play.

Overall, there is clear evidence that international play has a financial impact for all clubs, elite or not. As for regular season play elite clubs clearly display an asymmetric impact on a club's financial performance in line with the asymmetric stock reaction, both in favor of a larger impact to losing. This asymmetric reaction is not found for non-elite clubs, where there seems to be little financial impact in match outcome, with any findings indicating winning in the second-half may have the most impact. Lastly, there was no evidence of any impact for match outcomes resulting from the two domestic cups.

Overall, there is some evidence presented here to help offer the explanation that the signals of winning and losing may not carry similar strengthens. To look at this from another point of view, the next section examines the power of winning and losing to predict future performance.

5.3 Winning and Losing as Signals of Future Performance

The previous literature has assumed the signal of winning and losing is symmetric. However, this does not have to be the case, as Edmans et al. (2007) argue that in tournaments losing can be interpreted as a stronger signal than winning.

If the future performance of the club is asymmetrically related to present performance this might explain why the market seems to penalise losing more than rewarding winning. Commentators on football often refer to recent performance commonly as many as five matches back, as an

indicator of expected performance in upcoming matches. To examine if current and recent-past winning and losing have the same relationship with future performance, all matches played by the 17 publicly-traded clubs (while publicly-traded) were collected to test whether current performance is related to recent performance. A total of 8,740 matches from 1992-2008 were gathered, but the first two matches of each season have incomplete lags, so only 8,364 matches have data for two lags. For each club, matches were sorted by individual seasons and each match's outcome (win, lose, or draw) was coded as a dummy variable that takes a value of one if that outcome occurred and zero otherwise. Additionally a restricted sample of 8,277 matches where the last match was no more than seven days before the match is utilised, since the closer games are played the more likely recent performance will impact current performance. We then estimated the following probit models:

$$LOSE_{it} \; or \; WIN_{it} = \gamma_0 + \gamma_1 LOSE_{it-1} + \gamma_2 WIN_{it-1} + \gamma_3 LOSE_{it-2} + \gamma_4 WIN_{it-2} + \omega_{it} \quad (6)$$

A random effects model is utilised with standard errors clustered by club to test if recent losing or recent winning has any explanatory power concerning current performance.

The results of winning and losing's strength of signal is reported in Table X. Panel A reports the results of using the dummy variable for losing as the dependent variable for both the full and restricted samples of matches. In neither case does winning help predict losing and in both cases losing predicts losing. Examining the results from Panel B, where winning is the dependent variable, there is no effect of previous wins on winning the current match in either case, while losing the two matches before is significant and negative in both cases, implying losing reduces the chances of winning future matches.

Both models suggest that losing is a stronger predictor of future performance than winning.[22] This provides evidence why the market reacts stronger to bad news. Winning (losing) has been shown to be positively (negatively) related to operating income. Thus, because winning does not predict winning as much as losing predicts losing, a loss suggests that a club's future performance is more likely to involve more losses. This, in turn, would correspond with lower operating income which, in turn, causes a larger negative impact on the club's stock price. On the other hand, winning does not predict winning in the future and therefore a win does not send as strong a signal about future operating income; hence the relatively benign response by the market after a win.

While Bernile and Lyndres (2011) argue that investors overestimate the probability of winning and thus over-react when the club loses, the evidence presented here suggests that the market may react to a stronger signal sent by losing rather than just overestimating the odds that any particular club would win the match. This finding that losing is a stronger signal can explain why we do not see the asymmetric reaction in favor of good news that has been found in previous literature.

6. Conclusion

Market efficiency tests look at the incorporation of information into prices. Pritamani and Singal (2001) discuss three important characteristics of information signals: magnitude, precision, and dissemination. Magnitude is a measure of the signal's importance; Blume et al. (1994) suggest that price change is a good proxy for a signal's magnitude. Precision refers to the signal's validity; often trading volume is used as a proxy to measure precision (see, for example, Vega,

[22] We also used probit-based seemingly unrelated regression estimation with which we tested cross-equation equality of the impact of past wins and losses. We reject the null hypothesis that the impacts of previous wins and losses are equal across the two outcomes.

2006). Dissemination refers to the extent that the signal is received, e.g., the percentage of traders who receive the signal. The more widespread a given signal of a given precision and magnitude, the less trading the signal generates because of a smaller divergence in opinion (Pritamani and Singal, 2001). One concern with dissemination is the leaking of information to insiders before public announcements.

We show that the financial performance of English football clubs is influenced by match outcomes, providing evidence that match outcomes have high magnitude as signals. Additionally, there has rarely, if ever, been false reporting of match outcomes indicating high precision. The complexity of early release of information does not exist in the case of sporting events, since the matches are highly publicised events and the results are displayed in real time to all interested parties. As a result, match outcomes are unique events that result simultaneously in high magnitude, precision, and dissemination. In addition, market expectations are revealed to shareholders through the sports betting market. All of these characteristics suggest that these events are ideal information signals with which to examine market reaction to good news and bad news.

Having established an asymmetric market reaction to winning and losing for publicly-traded football clubs, similar to previous findings, we examine fundamental reasons for these potential findings, as behavioral theory has been used to explain this phenomenon. We use a unique dataset of matches played between two publicly-traded clubs that allows us to more directly test the market reaction to winning and losing, by examining the simultaneous market reaction to winning and losing. The evidence of this direct simultaneous test of asymmetric reaction is weaker than previous research as it only appears in the fifth-day abnormal returns.

This paper fills a gap in the literature by explicitly linking on-field performance to financial performance of publicly-traded football clubs. The evidence shows that for elite clubs operating income is impacted most by all regular season losses. This finding is an important input to differentiating why investors might turn negative on a club's stock after a loss. Rather than reflecting a feeling of fan negativity toward the losing club, a loss reflects lower operating income and thus club financials can motivate investors to turn negative on a club's stock after a loss. This is directly seen via elite clubs strong negative impact to losses and by the signal strength of the club's future on-field performance.

Our empirical evidence offers a financial explanation for asymmetric market reaction to losing which complements the behavioral explanations of the same phenomenon documented by Brown and Hartzell (2001), Edmans et al. (2007), Benkraiem et al. (2009), and Bernile and Lyndres (2011). Lastly, our results are consistent with Hong et al. (2000) and Chan (2003) in that the market seems to respond slower to bad news than to good news.

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Table I Summary of Previous Literature on Sports Match Outcome

This table provides a summary of previous literature that examines the market reaction of a sports club's stock to on-field performance. In all studies listed below betting market expectations were used to control for expected match outcome.

			Stock Reaction to			
Paper	Sports Club(s)	Data	Win	Lose	Draw	Explanation to Reaction
Brown & Hartzell (2001)	Boston Celtics (NBA), basketball	1/1/87 - 5/31/90	Regular season none; playoffs positive	Negative for regular season & playoffs	N/A	No explanation is offered
Renneboog and Vanbrabant (2000)	17 British & Scotish football clubs	8/95 - 5/98	Positive	Negative	Negative	Argue investors are fans that hold shares to support the club and view the return as a bonus
Zuber et al. (2005)	10 EPL clubs, football	8/97 - 7/00	None	None	None	Argue investor of football club shares are fans of the club that likely get value from shear ownership
Stadtmann (2006)	Borussia Dortmund (Bundeslinga), football	11/00 - 9/04	Positive	Negative	N/A	No explanation is offered
Edmans et al. (2007)*	National soccer, rugby, ice hockey, basketball, and cricket	1/73 - 12/04	None	Negative	Negative	Result of investor mood. Also note that losing yields elimination while a win will only result in an additional game
Benkraiem et al. (2009)	17 European football clubs	7/13/06 - 7/10/07	None	Negative	Negative	Supporter investors who hold a large portion of stock shares expect club to win, thus the maket expects win and does not reward the win as it is the expected outcome
Palomino et al. (2009)	20 UK football clubs	8/99 - 5/02	Positive	Negative	Negative	Conclude that investor sentiment influences news absorption by stock market investors.
Bernile and Lyandres (2011)	20 European football clubs (international play only)	8/00 - 5/06	None	Negative	Negative	Investors' biased ex ante beliefs can account for the asymmetric reaction

* The Edmans et al. (2007) study looks at the overall stock performance after national team performance.

Table II: Match Variables Description

This table provides descriptions on match variables used in analysis.

Variable	Description
HOME	Takes a value of 1 if the winning club is also the home club and azero otherwise.
GOALDIFF	The goals scored by the winning club minus the goals scored by the losing club
MONTH	Is the month in the season with August being 1, Septemberbeing 2, etc, up to May, the last month of the season, being 10.
WARNK	The rank of the winning club in their league as a result of the outcome of the match.
LRANK	The rank of the losing club in their league as a result of the outcome of the match.
WELITE	Takes the value of one if the winning club is an elite club and is zero otherwise
LELITE	Takes the value of one if the losing club is an elite club and is zero otherwise
EPL	Takes a value of 1 if the match is an EPL match
D1	Takes a value of 1 if the match is an Division 1 (D1) match
FAL	Takes a value of 1 if the match is an domestic cup (FAL) match
WPROB	The ex ante probability of the winning club winning derived from the pre-match betting market
DPROB	The ex ante probability of the match eding in a draw derived from the pre-match betting market
AR	The abnormal return using the CAPM model
CAR	The cumulative abnormal return using the CAPM model

Table III: Match Variables Summary Statistics

This table has summary statistics on matches used in analysis. Panel A includes all matches while Panel B removes matches that had a club whose stock was traded on the PZ.

PANEL A: All Data

	Day 1		Day 2		Day 3		Day 4		Day 5	
Variable	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
HOME	0.609	0.488	0.607	0.489	0.594	0.492	0.644	0.480	0.644	0.480
GOALDIFF	1.803	1.027	1.806	1.021	1.827	1.033	1.808	1.051	1.814	1.078
MONTH	6.685	3.904	6.616	3.907	6.419	3.884	6.425	3.830	6.345	3.867
WARNK	6.263	4.810	6.292	4.844	6.439	4.986	6.928	5.027	7.053	5.182
LRANK	11.894	5.739	11.851	5.749	11.800	5.588	11.946	5.569	11.920	5.561
WELITE	0.552	0.498	0.549	0.498	0.531	0.500	0.476	0.500	0.470	0.500
LELITE	0.332	0.471	0.330	0.470	0.333	0.472	0.311	0.464	0.322	0.468
EPL	0.867	0.340	0.864	0.343	0.882	0.323	0.895	0.307	0.902	0.299
D1	0.114	0.318	0.116	0.321	0.099	0.299	0.099	0.299	0.091	0.288
FAL	0.019	0.136	0.019	0.138	0.020	0.139	0.006	0.077	0.008	0.087
WPROB	0.444	0.150	0.443	0.149	0.437	0.151	0.435	0.147	0.433	0.147
DPROB	0.274	0.035	0.274	0.035	0.275	0.035	0.276	0.034	0.276	0.035
AR	0.002	0.051	-0.001	0.037	-0.001	0.037	-0.003	0.041	-0.002	0.041
CAR*			0.000	0.065	-0.002	0.085	-0.005	0.093	-0.006	0.099
Observations	639		619		456		334		264	

PANEL B: Without PZ

	Day 1		Day 2		Day 3		Day 4		Day 5	
Variable	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
HOME	0.606	0.489	0.604	0.490	0.574	0.495	0.614	0.488	0.606	0.490
GOALDIFF	1.746	0.967	1.743	0.954	1.776	0.979	1.769	0.999	1.780	1.019
MONTH	6.571	3.910	6.519	3.915	6.404	3.890	6.498	3.814	6.385	3.847
WARNK	6.732	4.827	6.795	4.862	6.773	4.940	7.282	4.979	7.381	5.119
LRANK	12.221	5.429	12.158	5.423	12.309	5.461	12.386	5.490	12.252	5.528
WELITE	0.523	0.500	0.519	0.500	0.500	0.501	0.444	0.498	0.445	0.498
LELITE	0.324	0.468	0.322	0.468	0.325	0.469	0.307	0.462	0.312	0.464
EPL	0.907	0.290	0.907	0.291	0.913	0.283	0.931	0.253	0.945	0.229
D1	0.078	0.269	0.079	0.270	0.071	0.257	0.065	0.247	0.050	0.219
FAL	0.014	0.118	0.015	0.120	0.016	0.127	0.004	0.060	0.005	0.068
WPROB	0.435	0.146	0.433	0.145	0.427	0.145	0.423	0.142	0.419	0.142
DPROB	0.277	0.033	0.277	0.033	0.278	0.032	0.279	0.031	0.279	0.032
AR	0.002	0.053	-0.001	0.040	-0.002	0.039	-0.005	0.042	-0.002	0.044
CAR*			0.001	0.068	-0.002	0.089	-0.006	0.097	-0.007	0.104
Observations	497		482		366		277		218	

* Cumulative Abnormal Returns have fewer observations than what is listed because of stock market discrempencies.

Table IV: EPL Publicly-Traded Clubs

This table provides information on the 16 EPL clubs. For each club the following information is provided: club's ticker symbol, years of available financials, years of international play between the 1992-93 season and the 2007-08 season, and club type.

Club	Ticker	Yrs of Available Financial Reports	Yrs of Int'l Play	Club Type
Arsenal	AFC PZ	1998-2008	14	Elite
Aston Villa	ASV LN	1996-2006	6	Elite
Chelsea	387382Q LN	1996-2002	12	Elite
Charlton	CLO LN	1997-2004	2**	Non-Elite
Leeds United	LUFC LN	1993-1995 & 1997-2003	7	Elite
Leicester City	LCC LN	1998-2001	4**	Non-Elite
Manchester United	MNU LN	1993-2004	16	Elite
Manchester City	MANV PZ	1998-2006	1	Non-Elite
Newcastle United	NCU LN	1996-2005	10*	Elite
Nottingham Forrest	NGF LN	1998-2000	2*	Non-Elite
Sheffield United	SUT LN	1993-2008	1*	Non-Elite
Southampton	SOO LN	1996-2005 & 2007-2008	1	Non-Elite
Sunderland	SUA LN	1996-2005	2**	Non-Elite
Tottenham	TTNM LN	1992-2008	3	Non-Elite
Watford	WFC LN	2001-2008	2**	Non-Elite
West Bromwich	WBA LN	1996-2004	2**	Non-Elite

* Indicates one year of international play was competed in the Anglo-Italian Cup which is not included when determining if a club is elite.

Table V: Seasonal Variables Summary Statistics

This table reports variables definitions, mean, standard deviation, minimum, and maximum observation.

		Elite Clubs				Non-Elite Clubs			
Variable	Definition	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max
OIADJ	Operating income adjusted for inflation	3.0655	12.3372	-21.8558	38.4172	-2.1474	5.9691	-20.5280	28.1455
WP1	Percentage of first-half matches won by the club	0.4785	0.1375	0.2500	0.7895	0.5368	0.5013	0.0000	1.0000
LP1	Percentage of first-half matches lost by the club	0.2570	0.1246	0.0000	0.5000	0.3745	0.1310	0.0526	0.6667
WP2	Percentage of second-half matches won by the club	0.4998	0.1609	0.2222	0.8333	0.3628	0.1222	0.1481	0.6316
LP2	Percentage of second-half matches lost by the club	0.2353	0.1376	0.0000	0.5556	0.3596	0.1413	0.0000	0.8000
IG	Number of international games played	6.5410	5.6762	0.0000	18.0000	0.4947	1.8035	0.0000	10.0000
DG	Number of games played in the FL Cup and FA Cup	7.1311	3.1542	1.0000	16.0000	6.3263	2.6953	2.0000	15.0000
PROMOTION	Dummy variable that takes the value of 1 if club is promoted the following year	0.0000	0.0000	0.0000	0.0000	0.1368	0.3455	0.0000	1.0000
RELEGATION	Dummy variable that takes the value of 1 if club is relegated the following year	0.0000	0.0000	0.0000	0.0000	0.1158	0.3217	0.0000	1.0000
EPL	Dummy variable that takes the value of 1 if club played in the EPL that season and zero otherwise	1.0000	0.0000	1.0000	1.0000	0.5368	0.5013	0.0000	1.0000
LSTREAK	Number of consecutive league games lost	2.4262	1.0872	0.0000	5.0000	3.3789	2.0221	1.0000	15.0000

Table VI: Abnormal Returns and Cumulative Abnormal Returns for Winners

Below is the output from the second stage regression where Abnormal Returns (AR) or Cumulative Abnormal Returns (CAR) is the dependent variable while Panel B, C, and D provide the AR of the winner for an EPL match, D1 match, and a tournament match (FA Cup or FL Cup) after controlling for match characteristics.

PANEL A: 2nd Stage Coefficients

	Abnormal Returns					Cumulative Abnormal Returns		
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	2-DAY	3-DAY	5-DAY
HOME	0.0009	0.0000	0.0004	0.0014	0.0018	0.0019 *	0.0020	0.0074 **
GOALDIFF	0.0000	0.0000	-0.0001	-0.0001	-0.0006	0.0000	-0.0001	-0.0010
MONTH	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0001	0.0000	-0.0001
WRANK	0.0001	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0005 *
LRANK	0.0000	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000	0.0000
EPL	0.0008	0.0012 ***	-0.0024 ***	-0.0015	0.0021	0.0026 **	0.0038	-0.0018
FAL	0.0000	0.0012 **	-0.0028 ***	0.0032	0.0043	0.0012	0.0017	0.0083
WELITE	-0.0006	0.0009 ***	-0.0016 ***	-0.0008	0.0010	0.0021 **	-0.0019	-0.0012
LELITE	-0.0007	-0.0001	-0.0004	-0.0008	-0.0018	-0.0011	-0.0018	-0.0071 ***
WPROB	-0.0045	-0.0002	-0.0034 *	-0.0030	-0.0025	-0.0087	-0.0086	-0.0233
DPROB	0.0256 **	0.0007	-0.0008	-0.0077	0.0147	0.0279 **	0.0308	0.0637
CONSTANT	0.0001	0.0002	0.0059 ***	0.0042	-0.0056	-0.0011	0.0036	0.0004
F-STAT	4.26 ***	7.37 ***	13.98 ***	2.02 **	0.57	2.57 **	1.53	4.18 ***
ADJUSTED R^2	0.0523	0.1002	0.2368	0.0323	-0.0181	0.0267	0.0124	0.1159
# OF OBS	650	630	461	338	269	631	463	268

PANEL B: EPL MATCHES

	WINNER	LOSER	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	2-DAY	3-DAY	5-DAY
$\beta_0=0$	Non-Elite	Non-Elite	0.0010	0.0014	0.0035 *	0.0027	-0.0035	0.0015	0.0074	-0.0014
$\beta_0+\beta_4=0$	Elite	Non-Elite	0.0004	0.0023 *	0.0019	0.0020	-0.0025	0.0036	0.0055	-0.0025
$\beta_0+\beta_7=0$	Non-Elite	Elite	0.0003	0.0013	0.0031 *	0.0020	-0.0053	0.0004	0.0056	-0.0085
$\beta_0+\beta_4+\beta_7=0$	Elite	Elite	-0.0003	0.0022 *	0.0015	0.0012	-0.0042	0.0025	0.0037	-0.0097

PANEL C: D1 MATCHES

$\beta_0+\beta_{10}=0$	Non-Elite	Non-Elite	0.0001	0.0002	0.0059 ***	0.0042	-0.0056	-0.0011	0.0036	0.0004

PANEL D: FAL MATCHES

$\beta_0+\beta_{11}=0$	Non-Elite	Non-Elite	0.0001	0.0014	0.0031	0.0074	-0.0012	0.0002	0.0052	0.0087
$\beta_0+\beta_4+\beta_{11}=0$	Elite	Non-Elite	-0.0005	0.0023	0.0015	0.0066	-0.0002	0.0022	0.0033	0.0075
$\beta_0+\beta_7+\beta_{11}=0$	Non-Elite	Elite	-0.0005	0.0013	0.0027	0.0066	-0.0030	-0.0010	0.0034	0.0016
$\beta_0+\beta_4+\beta_7+\beta_{11}=0$	Elite	Elite	-0.001	0.002	0.001	0.006	-0.002	0.000	0.002	0.000

*, **, and *** indicates statistically significant from null at 10%, 5%, and 1% level.

Table VII: Abnormal Returns and Cumulative Abnormal Returns for Losers

Below is the output from the second stage regression where Abnormal Returns (AR) or Cumulative Abnormal Returns (CAR) is the dependent variable while Panel B, C, and D provide the AR of the winner for an EPL match, D1 match, and a tournament match (FA Cup or FL Cup) after controlling for match characteristics.

PANEL A: 2nd Stage Coefficients

	Abnormal Returns					Cumulative Abnormal Returns		
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	2-DAY	3-DAY	5-DAY
HOME	-0.0003	0.0000	0.0000	0.0000	-0.0009	-0.0004	-0.0001	0.0002
GOALDIFF	0.0001	0.0000	0.0001	-0.0005	-0.0005	0.0000	0.0002	-0.0008
MONTH	0.0000	0.0000	-0.0002 **	-0.0001	-0.0002	-0.0001	-0.0002	-0.0003
WRANK	0.0000	0.0000	0.0000	0.0000	0.0002 **	0.0000	0.0000	0.0002
LRANK	-0.0001 **	-0.0001 *	0.0000	0.0001	-0.0001	-0.0001 ***	-0.0001	-0.0003
EPL	0.0021 ***	0.0007	0.0009	-0.0014	0.0041 ***	0.0033 ***	0.0040 **	0.0065 **
FAL	0.0027 **	0.0021 *	0.0009	-0.0017	0.0057	0.0047 ***	0.0081 **	0.0100
WELITE	0.0005	-0.0002	0.0004	0.0003	0.0003	0.0004	0.0003	0.0029
LELITE	0.0004	0.0013 ***	-0.0035 ***	-0.0017 **	0.0010	0.0009 *	-0.0042 ***	-0.0061 ***
WPROB	0.0023	0.0026	-0.0032	-0.0058	0.0151 **	0.0052	0.0011	0.0018
DPROB	0.0099	0.0039	-0.0017	-0.0090	0.0445 ***	0.0150 *	0.0069	0.0442
CONSTANT	-0.0116 ***	-0.0045 **	0.0015	0.0068	-0.0214 ***	-0.0163 ***	-0.0136 **	-0.0271 **
F-STAT	3.30 ***	4.13 ***	4.87 ***	1.59	2.37 ***	5.75 ***	2.41 ***	1.94 **
ADJUSTED R^2	0.0376	0.0520	0.0844	0.0189	0.0540	0.0767	0.0326	0.0375
# OF OBS	650	629	463	336	266	630	461	266

PANEL B: EPL MATCHES

	WINNER	LOSER	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	2-DAY	3-DAY	5-DAY
$\beta_0=0$	Non-Elite	Non-Elite	-0.0095 ***	-0.0039 **	0.0024	0.0053	-0.0173 ***	-0.0130 ***	-0.0096	-0.0206 *
$\beta_0+\beta_4=0$	Elite	Non-Elite	-0.0090 ***	-0.0041 **	0.0029	0.0056	-0.0171 ***	-0.0126 ***	-0.0093	-0.0177
$\beta_0+\beta_7=0$	Non-Elite	Elite	-0.0091 ***	-0.0026	-0.0010	0.0036	-0.0163 ***	-0.0121 ***	-0.0138 **	-0.0267 **
$\beta_0+\beta_4+\beta_7=0$	Elite	Elite	-0.0086 ***	-0.0027	-0.0006	0.0039	-0.0161 ***	-0.0117 ***	-0.0135 **	-0.0237 *

PANEL C: D1 MATCHES

$\beta_0+\beta_{10}=0$	Non-Elite	Non-Elite	-0.0116 ***	-0.0045 **	0.0015	0.0068	-0.0214 ***	-0.0163 ***	-0.0136 **	-0.0271 **

PANEL D: FAL MATCHES

$\beta_0+\beta_{11}=0$	Non-Elite	Non-Elite	-0.0089 ***	-0.0025	0.0024	0.0050	-0.0157 **	-0.0116 ***	-0.0055	-0.0172
$\beta_0+\beta_4+\beta_{11}=0$	Elite	Non-Elite	-0.0084 ***	-0.0027	0.0028	0.0053	-0.0154 **	-0.0112 ***	-0.0052	-0.0142
$\beta_0+\beta_7+\beta_{11}=0$	Non-Elite	Elite	-0.0085 ***	-0.0011	-0.0011	0.0033	-0.0147 **	-0.0107 ***	-0.0097	-0.0232
$\beta_0+\beta_4+\beta_7+\beta_{11}=0$	Elite	Elite	-0.0080 ***	-0.0013	-0.0007	0.0035	-0.0144 *	-0.0104 ***	-0.0093	-0.0203

*, **, and *** indicates statistically significant from null at 10%, 5%, and 1% level.

Table VIII: Abnormal Returns and Cumulative Abnormal Returns for Combination of Winners and Losers

Below is the output from the second stage regression where Abnormal Returns (AR) or Cumulative Abnormal Returns (CAR) is the dependent variable while Panel B, C, and D provide the AR of the winner for an EPL match, D1 match, and a tournament match (FA Cup or FL Cup) after controlling for match characteristics.

PANEL A: 2nd Stage Coefficients

	Abnormal Returns					Cumulative Abnormal Returns		
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	2-DAY	3-DAY	5-DAY
HOME	0.0007	-0.0015 **	-0.0008	-0.0019	0.0002	0.0004	-0.0037	-0.0087
GOALDIFF	0.0000	0.0000	0.0002	-0.0004	-0.0008	0.0000	0.0004	0.0009
MONTH	-0.0001	0.0000	-0.0002 *	-0.0002	-0.0003	0.0000	-0.0005	-0.0015 *
WRANK	0.0001	0.0000	0.0001	-0.0001	0.0003	0.0002	0.0002	0.0008
LRANK	-0.0002 ***	-0.0001 **	0.0000	-0.0001	-0.0003	-0.0004 ***	-0.0008 ***	-0.0024 ***
EPL	0.0061 ***	0.0008	-0.0011	-0.0053 ***	0.0088 ***	0.0080 ***	0.0168 ***	0.0100
FAL	0.0074 **	0.0027	-0.0001	-0.0040	0.0098	0.0098 **	0.0227 ***	0.0240
WELITE	0.0019 *	0.0004	0.0006	-0.0008	-0.0060 ***	0.0047 ***	-0.0035	-0.0067
LELITE	-0.0040 ***	0.0040 ***	-0.0044 ***	-0.0018	-0.0009	-0.0043 ***	-0.0111 ***	-0.0229 ***
WPROB	-0.0061	0.0063	0.0022	0.0070	0.0283 **	-0.0037	0.0183	0.0338
DPROB	0.0283 *	-0.0086	-0.0089	-0.0257	0.0941 ***	0.0240	0.0101	-0.0029
CONSTANT	-0.0074	-0.0014	0.0043	0.0133	-0.0408 ***	-0.0101	-0.0082	0.0206
F-STAT	5.15 ***	7.61 ***	5.14 ***	2.20 ***	3.40 ***	5.07 ***	3.24 ***	3.86 ***
ADJUSTED R^2	0.0668	0.1052	0.0910	0.0381	0.0911	0.0675	0.0514	0.1083
# OF OBS	639	619	456	334	264	620	456	263

PANEL B: EPL MATCHES

	WINNER	LOSER	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	2-DAY	3-DAY	5-DAY
$\beta_0=0$	Non-Elite	Non-Elite	-0.0012	-0.0006	0.0033	0.0080	-0.0320 ***	0.0020	0.0085	0.0307
$\beta_0+\beta_4=0$	Elite	Non-Elite	0.0007	-0.0002	0.0039	0.0072	-0.0380 ***	0.0026	0.0050	0.0239
$\beta_0+\beta_7=0$	Non-Elite	Elite	-0.0052	0.0034	-0.0011	0.0062	-0.0328 ***	-0.0063	-0.0025	0.0077
$\beta_0+\beta_4+\beta_7=0$	Elite	Elite	-0.0033	0.0038	-0.0005	0.0063	-0.0389 ***	-0.0016	-0.0060	0.0097

PANEL C: D1 MATCHES

$\beta_0+\beta_{10}=0$	Non-Elite	Non-Elite	-0.0074	-0.0014	0.0043	0.0133	-0.0408 ***	-0.0101	-0.0082	0.0122

PANEL D: FAL MATCHES

$\beta_0+\beta_{11}=0$	Non-Elite	Non-Elite	0.0001	0.0013	0.0043	0.0092	-0.0310 **	-0.0003	0.0145	0.0447
$\beta_0+\beta_4+\beta_{11}=0$	Elite	Non-Elite	0.0020	0.0017	0.0049	0.0084	-0.0370 ***	0.0044	0.0110	0.0379
$\beta_0+\beta_7+\beta_{11}=0$	Non-Elite	Elite	-0.0039	0.0055	-0.0001	0.0074	-0.0318 **	-0.0046	0.0034	0.0217
$\beta_0+\beta_4+\beta_7+\beta_{11}$	Elite	Elite	-0.0020	0.0057	0.0005	0.0066	-0.0379 ***	0.0001	-0.0001	0.0150

*, **, and *** indicates statistically significant from null at 10%, 5%, and 1% level.

Table IX: Season Level Model Results

Panel A reports the results from a random effects regression with adjusted operating income as the dependent variable and robust standard errors. The dependent variable is adjusted operating income. Panel B: The first two rows are the results of the Hausman test and the Breusch and Pagan test. The next two test whether the winning percentage coefficients are statistically different from each other. The remaining tests look at the significance of non-elite clubs' field performances on adjusted operating income, which requires joint tests.

Panel A: Model Results

	Elite			Non-Elite		
Variable	Coefficient	Z	p-value	Coefficient	Z	p-value
WP1	22.8363	1.50	0.1330	-2.2569	-0.45	0.654
LP1	-23.6832 **	-2.47	0.0140	-0.7584	-0.18	0.861
WP2	-3.7602	-0.34	0.7340	8.5287 *	1.86	0.062
LP2	-28.0354 **	-2.34	0.0200	0.4279	0.10	0.924
IG	0.7207 **	2.54	0.0110	1.8203 **	2.91	0.004
DG	0.5599	1.30	0.1930	0.4204	1.63	0.104
LSTREAK	2.3969	1.33	0.1840	-0.7441 *	-1.66	0.098
EPL				1.6369	1.45	0.148
RELEGATION				2.5381 **	2.46	0.014
PROMOTION				-3.1109	-1.80	0.072
Intercept	-7.821466	-0.83	0.405	-6.0455 *	-1.67	0.094
R-Squared (Overall)	0.5202			0.4479		
Observations	61			95		

Panel B: Tests for Statistical Significance

Test	$\chi 2$		p-value	$\chi 2$	p-value
WP1-LP1=0	10.42	***	0.0012	0.12	0.7275
WP2-LP2=0	13.44	***	0.0002	1.30	0.2537

*, **, and *** indicates statistically significant from null at 10%, 5%, and 1% levels.

Table X: Explanatory Power of Winning and Losing

Below is the output from random effects model to see if past performance of the last two matches has explanatory power on the outcome of the next match. Clustering is used to control for clubs. Panel A provides for losing while Panel B provides results for winning.

PANEL A: LOSING						
	Coefficient	Z	p-value	Coefficient	Z	p-value
	All Games			Games with Less Than 7-Day Lag		
LAGWIN	-0.0081	-0.64	0.522	-0.0049	-0.39	0.700
LAGLOSE	0.0215	1.59	0.111	0.0227 *	1.67	0.094
LAG2WIN	-0.0056	-0.44	0.658	-0.0054	-0.42	0.671
LAG2LOSE	0.0355 ***	2.63	0.009	0.0358 ***	2.64	0.008
CONSTANT	0.4294 ***	22.91	0.000	0.2995 ***	22.72	0.000
PANEL B: WINNING						
	Coefficient	Z	p-value	Coefficient	Z	p-value
	All Games			Games with Less Than7-Day Lag		
LAGWIN	0.0209	1.55	0.538	0.0184	1.36	0.175
LAGLOSE	-0.0010	-0.07	0.465	-0.0017	-0.12	0.907
LAG2WIN	0.0114	0.85	0.729	0.0105	0.78	0.438
LAG2LOSE	-0.0422 ***	-2.93	0.051	-0.0418 ***	-2.89	0.004
CONSTANT	0.4294 ***	30.68	0.000	0.4294 ***	30.54	0.000

*, **, and *** indicates statistically significant from null at 10%, 5%, and 1% levels.

Appendix A

The FA Cup and the FL Cup are knockout tournaments played in England between EPL clubs and non-EPL English clubs. The FA Cup in recent years has seen a rapid increase in participating clubs with 731 clubs competing in the 2007-08 FA Cup, while the FL Cup has consistently had only the top 92 England clubs. The Community Shield is played annually between the champion of the EPL and the FA Cup winner. The Anglo-Italian Cup was played periodically between 1970 and 1996. In 1992, it became an international competition between second-tier English and Italian clubs, but was stopped due to match conflicts. As a result, Anglo-Italian Cup matches are included as international play, but are not included as international play when considering if a club is an elite club. The Winners' Cup, UEFA Cup, and Champions League are played between the top European clubs – the Champions League being the pinnacle of European football. In the ranking of the international cups, the Champions League is considered the highest level of international play, followed by the Winners' Cup, and then UEFA Cup. The Winners' Cup was abolished to allow the Champions League to expand after the 1998-99 season. The elite European clubs that do not qualify for the Champions League play in the UEFA Cup. Every year at least two of the top EPL clubs qualify for the Champions League the following season. Similar to the Community Shield, the Super Cup is played between the reigning champions of the Champions League and the UEFA Cup.