An Examination of Sports Event Sentiment: Microeconomic Evidence from Borsa Istanbul

Fung, Ka Wai Terence and Demir, Ender and Lau, Marco Chi Keung and Chan, Kwok Ho

April 2013

Reexamining Sports Sentiment Hypothesis: Microeconomic Evidence from Borsa Istanbul

Ka Wai Terence Fung[+]**,**

Ender Demir[¨]

Chi Keung Marco Lau[∃]

And

Kwok Ho Chan[*]

Abstract

This paper examines the impact of international soccer matches on the Turkish stock market using firm level and sorted portfolio data. Applying the Edmans *et al.* (2007) estimation method, we find a significant negative loss effect. However, once using panel data analysis and modeling spatial and temporal effects explicitly, the sport sentiment effect disappeared. The same conclusions are made when replacing win/loss dummies with unexpected win (loss) variable and sorting portfolio returns by market capitalization and past returns. Hence, there is very limited micro-evidence to support the 'overreaction' hypothesis of individual investors using Borsa Istanbul data. However, we found evidence that sporting events have larger impact on stock return volatility for firms with smaller market capitalization and lower past returns.

Keywords: Individual investor sentiment, event study, market efficiency, neuroeconomics, sports economics

JEL Classification: D87, G14, L83

[+] Corresponding author. Division of Business and Management, United International College –Beijing Normal University and Hong Kong Baptist University. B414, 28, Jinfeng Road, Tangjiawan Zhuhai, Guangdong Guangdong Prov. China 519085 China
econfkw@hotmail.com
[¨] Istanbul Medeniyet University, Turkey ender.demir@medeniyet.edu.tr.
[∃] Newcastle Business School, Northumbria Univerisrty, U.K. chi.lau@northumbria.ac.uk
[*] United International College –Beijing Normal University and Hong Kong Baptist University, Zhuhai, China thomaschan@uic.edu.hk

1. Introduction

Economic events, such as stock splits, mergers and acquisitions, are believed to have impact on the value of financial assets[1]. The psychological literature in the past decade shows that even economically-neutral events - including weather (Saunders, 1993; Hirshleifer and Shumway, 2003), the daylight-savings time change (Kamstra *et al.* 2000) and the lunar phases of the moon (Yuan *et al.* 2006) - systematically correlate to variation of asset returns. The basic rationale is that, these economically neutral events have potential repercussions on the 'mood' of an investor, which translates into investment behavior that cannot be explained by the rationality principle.

For instance, Levy and Yagil (2011) examine the relation between air pollution (using Air Quality Index) and the returns of four U.S stock markets. There is scientific evidence that air pollution has negative mood effect. Since mood can lead to biases in investment behavior as documented in the financial economics literature, the authors contend that if a stock exchange is closer to a polluted area, the fluctuation of air quality should have larger impact on market returns. Cao and Wei (2005) argue that lower temperature should be positively related to market returns; while high temperature is liable to magnify market fluctuation. Their key hypothesis is based on the psychological documents that lower temperature leads to aggression which results in lower risk aversion. Gao and Lin (2011) find that government lottery is virtually a substitute to stock trading. They use evidence from Taiwan lottery, showing that once jackpot size exceeds a certain threshold, the trading volume of stocks with high individual trading ratio would drop from six to ten percent. The evidence is confirmed using both firm and aggregate level trading activities.

One strand of the event study literature focuses on the impact of sports events (especially international game results) on asset prices. In fact, motivated by this psychological evidence, relation between sporting results (especially soccer) and stock market returns has developed as an important research field in sports economics (Ashton *et al.* 2011). To our knowledge, one of the earliest studies about the impact of soccer games on stock markets is conducted by Ashton *et al.* (2003) who document a strong association between the performance of the England football team and FTSE 100 index. However, Klein *et al.* (2008) criticized this finding by rejecting the link between sports performance and stock market return. Ashton *et al.* (2011) reconsider this link by using a larger dataset, employing an extended range of tests and allowing for outliers as a

[1] See Eckbo (1983), Asquith and Mullins (1986)

response to Klein *et al.* (2008). It is again documented that national soccer matches affect UK stock market. Edmans *et al.* (2007) is a seminal piece. They use an international soccer sample comprising matches of 39 different countries for the period from 1973 to 2004. Losses of national soccer teams lead to a strong negative stock market reaction and the loss effect is increasing with the importance of games. This loss effect is not due to a reduction in trading volume. In addition to soccer, Edmans *et al.* (2007) also explore the effect of other sports on stock returns. There is a significant but small loss effect for international basketball, rugby, and cricket. There is no win effect for any sports.

Sloan (1979), Hirt *et al.* (1992), and Kerr *et al.* (2005) document that sports games have an important impact on the mood of people. A win of a team may lead to a positive mood change on supporters (in case of national team wins, the mood change can be observed for majority of a country), whereas a loss may lead to a negative mood change; and the changes in emotions and mood following the games can influence the investment decisions. Berument *et al.* (2006 and 2009) examine the impact of European cups wins of three major soccer clubs of Turkey on the Borsa Istanbul - BIST (formerly known as Istanbul Stock Exchange - ISE). It is found that wins of only Besiktas, whose fans have a high rate of fanaticism, lead to an increase in stock market return. Kaplanski and Levy (2010) follow a different approach by focusing on the effect of soccer games on the U.S. market rather than the markets of the two teams that play. It is found that the World Cup effect is significantly negative and it does not depend on the game results. As the aggregate effect is not related to the game result, the investors can exploit this predictable effect. Berument and Ceylan (2012) also show that soccer game results affect stock market returns and stock market return–volatility relationships in Spain, UK, Chile and Turkey. While stock market returns decrease after a loss in Spain and UK, the stock market returns increase after a win in Chile and Turkey.

Some authors analyze how sports events affect trading volume. For instance, Ehrmann and Jansen (2012), by using minute-by-minute trading data of 15 international stock exchanges, examine how the investor attention changes during FIFA 2010 World Cup games. It is shown that the number of transactions and the volume of traded stocks decrease and these impacts are even stronger in the stock markets of two teams that play. Moreover, a goal leads to an additional drop in trading activity. The co-movement of national stock markets with global stock markets declines during the games.

While majority of literature provide supporting evidence on the positive relation between sporting results and stock market returns, some studies present contradictory results. For example, Boyle and Walter (2003) find that stock returns are not associated with sporting results. In this study, we explore the impact of the performance of three big soccer clubs of Turkey namely Besiktas (BJK), Fenerbahce (FB) and Galatasaray (GS) and Turkish National Soccer team on the Borsa Istanbul (BIST). Our focus is on Turkey. There is a problem for study on developed countries. On a particular day, when there are multiple sports events or even multiple matches for the same event, it is difficult to separate the effect of each sports event. There is no such a problem in Turkey as soccer is the most important and dominant sports in the whole country. The games against foreign rivals are considered as a fight of national pride in Turkey. After wins in international games, the people celebrate the victory with night-long street festivities in streets. Berument and Yucel (2005) document a positive relationship between monthly industrial growth rate and the wins of Fenerbahce in European Cup games. This shows that mood of workers are affected by international victories of Fenerbahce. Moreover, Eker *et al.* (2007) also show that win of three big clubs of Turkey affect the TL/USD exchange rate.

Our study differs from the previous literature in six important aspects. (1) The scope of analysis is broader. We consider the impact of not only the soccer clubs but also the Turkish National team. This is important as national teams may affect the mood of a larger population in a country. (2) Our dataset covers only international games against foreign clubs and excludes the domestic games. International games should affect the mood of the supporters of the club team playing and the supporters of other clubs in a similar way due to national pride. In addition, the impact of domestic games can be diluted or eliminated, as the performance of a team will have an opposite effect on other teams' supporters (Eker *et al.* 2007). (3) There is limited microeconomic evidence for the sports sentiment hypothesis. Most of the researches focus on stock market index. Palomino *et al.* (2009) is one of those early attempts; they consider 16 soccer teams only - hardly large-scale microeconomic evidence. To our knowledge, Chang *et al.* (2012) is one of the few large-scale firm level study, covering all firms listed in Nasdaq; however, their analysis is restricted to domestic games. This study examines the impact of international soccer games on all firms in Borsa Istanbul. (4) Our forth contribution is related to methodology. Edmans *et al*. (2007) apply Seemingly Unrelated Regression (SUR) to 39 countries controlling for clustering effect only. Chang et al. (2012) use pooled OLS to estimate the impact of national

football games on individual firms in Nasdaq, neglecting firm-specific factors and autocorrelation. The conclusions of these papers hinge on the significance of the win/loss dummy, which can be a problem if the standard error is not estimated correctly. We explore the impact of game results on stock returns by using firm-level panel data that handle both cross-section and temporal effects simultaneously. (5) We propose a natural experiment to test the investor overreaction hypothesis. Ever since 2006, the share of foreign investors rose to around 70%. Therefore, after 2006 the reaction to game results may dilute or even disappear due to increase in foreign investors. Also, we will introduce a match surprise variable to capture individuals' sentiment (an improvement over Palomino *et al.,* 2009). (6) As far as we know, there is limited study of sporting events on the volatility of stock returns.

Our results indicate weak evidence of sports event sentiment. We demonstrate that, although sports events have no power explaining financial asset returns, it can account for volatility of sorted portfolio returns. The rest of the paper proceeds as follows. The next section delineates the motivation of the paper. The third section describes the data set. Section 4 reports the findings of firm level analysis. Section 5 presents the sorted portfolio analysis results followed by a discussion in section 6.

2. Motivation

Most of the early studies are confined to the impact of sports events on the market indices. Little research effort was directed toward a micro-level examination. There is a related literature, which studies the effect of sports results on the stock returns of publicly traded sports clubs. Palomino *et al.* (2009) find that stock prices are sensitive to the game results of 16 listed British soccer clubs. There is a positive average abnormal return of 53 basis points following a win and a loss leads to a negative average return of 28 basis points. Stadtmann (2006) demonstrates a close relation between game results and stock price of the German soccer team Borussia Dortmund. It is also found that a success of arch-rival of Borussia Dortmund, namely Bayern Munich, negatively affects the stock price. Scholtens and Peenstra (2009) document a positive (negative) stock market reaction after a win (loss) for 8 listed soccer teams in 5 European countries during the sample period of 2000-2004. The reaction to losses is higher than wins indicating an asymmetric market reaction. Boido and Fasano (2007) show that stock prices are sensitive to game results for Italian listed soccer clubs namely Lazio, Roma and Juventus for the

period from January 2005 to June 2006. Demir and Danis (2011) document that there is a negative reaction to a loss whether it is expected or not for Turkish listed soccer clubs. In addition, the stock market reaction to game results depends on corporation structures of those clubs.

Nonetheless, Zuber *et al.* (2005), using the data of 10 listed English soccer clubs, examine the effect of teams' performance on their stock prices in the period 1997-2000. Little or no relationship between stock prices and game-related information was found. Moreover, on-season returns and off-season returns are not statistically different from each other. These findings are interpreted by introducing the notion of "soccer team investors" who are insensitive to traditional financial information. Brown and Hartzell (2001) also show that defeats of Boston Celtics significantly affect the stock price whereas wins do not. The impact of playoff games is higher when compared to regular season games.

One of the drawbacks of these studies is that, the partial effect of investor sentiment cannot be separated from that of change in expected company profit. A win may lead to more prize money, merchandise sales, or advertising income, driving up the stock price. In the meantime, it affects investors' sentiment. Obviously, this stream of research relies on both the rational expectations and investor sentiment hypothesis. The successful clubs are able to generate more revenues; therefore, wins (losses) are expected to increase (decrease) the future cash flows of clubs. Hence, the performance of a team affects its stock price. Wins and losses also change the mood of investors that leads to an increase (decrease) in stock prices of clubs. For the case of relation between national teams' performances and stock market indices, only investor sentiment plays a role, as there is no direct economic impact of national team performances on stock market indices (Gerlach, 2011).

Considering all these, we estimate the sports sentiment effect using all 447 firm (not only soccer clubs) data from the BIST 100, in a bid to provide micro-evidence for the investors' sentiment hypothesis. There is an additional advantage over the Edmans *et al.* (2007) analysis. Strictly speaking, the Edmans *et al.* (2007) study is a multivariate time series model of 39 countries. The estimation method is a Seemingly Unrelated Regression (SUR) adjusting for cross-section clustering effect with no treatment of country-specific factors[2]. In this analysis,

[2] Panel data do not apply in that case due to small number of cross sections relative to time.

there is a large enough cross-section sample to account for unobservable firm factors by panel data.

Meanwhile, a natural experiment can be conducted to test the investors' overreaction hypothesis, which is one of the motivations of this paper. The foreign traders' shares in BIST in terms of market capitalization and transaction volume are shown in figure 1. Foreign investors' penetration into the BIST measured by market capitalization rose from around 41% in 2000 to around 67% in 2010. Domestic individual investors trade more frequently than foreign investors do. In 2010, domestic investors held around 33% of market share but generated 84% of trading volume. On the contrary, foreign investors owning 67% of market share generated only 16% of trading volume in stock exchange. Nonetheless, by both measures, the penetration ratio of foreign investors increased sharply in the second half of 2000's. The recent structural change of the BIST provides fodder to a natural experiment - if the investor's sports sentiment exists, then the impact of sports events (no matter positive win or negative loss) should be stronger in the first half of 2000's when the market influence of domestic investors was relatively high. We will split the panel data (in section 4) into two subsample periods to conduct this natural experiment.

A common problem of the sports event literature is spurious correlation. The market returns variation can be driven by factors other than the one being considered. For instance, Chang *et al.* (2012) argue that smaller firms (measured by capitalization) should have larger sports sentiment effect due to larger share of domestic investors. Nonetheless, there is limited control of market risk (a market index return) and serial correlation (lag firm return). The Edmans et al (2007) procedure is, strictly speaking, a high-dimensional (39 countries) multivariate time series model. The second step is SUR adjusting for clustering effect only due to curse of dimension. As well known in the literature, serial correlation biases the standard error downward, which may lead to incorrect inference; in this particular case, accepting the existence of sports sentiment effect. Kaplanski and Levy (2010) tackle the spurious correlation by different strategies. For instance, an outlier year with bad returns in which World Cup took place, is dropped. Trading days with major events occurred during the World Cup period are eliminated. A June-July monthly dummy is added to handle seasonal effect. Other than manipulating the dataset and varying the independent variables, we tackle the spurious correlation problem by casting the model in a purely time series setting. We propose a direct estimation method. The BIST 100 firm returns are

sorted by market capitalization and past returns into five portfolios. In this way, the temporal effect can be handled directly. The estimation method is described in sections 4 and 5.

3. Data

This paper attempts to evaluate the impact of sports events (through individual investors' sentiment) on the variation of firm stock returns at the Turkish market. The specific sports event under consideration is soccer - the most popular sports in Turkey. There are three major teams; each of them has a large fan base for decades and although there are all Istanbul teams, they have supporters all over the country. Therefore, if the investors' sports event sentiment exists, the team effect should be statistically significant. Only international soccer games by three major teams against foreign soccer clubs are considered to avoid offsetting effect of domestic matches. Precisely, if there is a win of BJK against GS, the fans of the former will react in a positive way, which will be countered by the pessimistic behaviors of the fans of the latter. The current studies of the sports event sentiment on Turkish market include the team effect only[3]. A natural extension is the Turkish national team competition. The impact of performance of Turkish national team on supporters is deemed to be more straightforward and it will affect the mood of all people (even if they are not directly interested in soccer) in the same direction. Wins in those games are considered as a symbol of national pride and will boost the morale of people in Turkey. In our (initial) dataset, there are 128 international matches involving the Turkish National team; most of them are FIFA World Cup and Euro Cup games.

The game results are collected from www.mackolik.com; they are crosschecked from various sources, for example the official website of Turkish Football Federation's website[4]. The first (Besiktas vs. Hapoel Haifa) and last (Besiktas vs. Dynamo Kyiv) match took place on 28 July, 1999 and 24 February, 2011, respectively. The betting odds ratios for the games prior to April 2004 were collected from www.betexplorer.com. The data afterward are collected from www.mackolik.com. Initially, there are 430 international team and national matches over the sample period. It is generally believed that only important events that capture public attention can have repercussion on the stock markets. Some screening procedure has to be implemented. We cull the private games and UEFA Euro Qualifying winding up with 323 matches.

[3] See Kaplanski and Levy (2010).
[4] See www.tff.org.

Most of European Cup games are played on Tuesday, Wednesday, or Thursday evenings; however, the games of national team are more homogenously distributed in a week. The effect of a game result is observed on the first trading day just after the game. Thus, if a match is played on the weekend, the effect will be observed on Monday. Likewise, the impact of weekday games is observed on the next trading day. The impact of a particular game cannot be separated if there are multiple games on the same day. One solution is deleting all sports events of a trading day if there is more than one game (Demir *et al.* 2013). However, this can result in considerable loss of observations. Considering the fact that the number of international games is relatively limited, we adopt a different strategy. On any trading day with multiple matches, if the game results are the same, they are combined as one single match with one single result. Otherwise, all matches will be deleted[5].

After applying these selection criteria, there are 278 matches left. The sports events are 2006 FIFA world cup qualification, 2010 FIFA world cup qualification, 2002 FIFA world cup, champions league, Euro 2000, Euro 2008, UEFA, FIFA confederation cup. This will be referred to as the scenario 1 throughout this paper. Amongst the 278 matches, there were 45 national team matches, 66 for FB, 74 for BJK and 93 for GS. The overall win, draw and loss proportions are 43.5%, 20.5% and 36%, respectively. As a robustness test, we decided to further screen out the sample. A stricter criterion is adopted. The FIFA confederation cup and UEFA matches are dropped. The final sample size is 176. This is referred to scenario 2.

We collect daily stock prices (closing) of 447 Turkish firms listed at Borsa Istanbul from the Wharton Research Data Services (WRDS)[6], to compute the daily returns (dividend adjusted). The sample period is July 1, 1999- June 30, 2011. Discontinuous trading -for example, a company is delisted, stops trading for a certain period or after long holiday - will render the daily returns meaningless. There are various methods to deal with this problem. One can drop observations when they are too far apart or keep the longest trading streak in the sample. The former approach is adopted in this study. We take a stand that if two trading days are more than

[5] An additional criterion can be adopted to eliminate multiple-game effect. First, a cut-off time is set (for instance, 9 a.m). If a match kicks off at 10 am, it will be treated as a match on the next trading day. Let's say trading day t is matched with sporting event on day t-1; and suppose that day t has another sporting event played during its trading hour (of course, this sporting event will be matched with trading day t+1). Then, the pair of trading day t and sporting event on day t-1 will be deleted, because the return on day t will be affected not only by sporting event on day t-1, but also one on day t.

[6] https://wrds-web.wharton.upenn.edu/wrds/

10 days apart, the observation will be deleted, in a bid to minimize the loss of observations. The BIST100 index source is the Borsa Istanbul website[7].

In section 5, sorted portfolios by market capitalization (the product of stock price and number of shares outstanding) and past returns (moving average of last 22 trading days) will be constructed by the daily firm returns. To be specific, on each trading day, the firms are sorted by market capitalization or past returns and volatility and split into quintiles. Then, a value-weighted return will be computed for each quintile. The process is repeated everyday and a portfolio will be formed[8].

Controlling for the outlier effect is necessary in the case of Turkey. Turkey went through three economic crises -1994, 2001, and 2008- after opening up its capital account in 1989 (Rodrik, 2012). The 1994 and 2001 crises were severe and literally dramatic. Although Turkey experienced strong and stable expansion until 2007, the 2008 crisis interrupted the long expansion. There are many ways to deal with outliers. One method is simply dropping the extreme values. The second approach is creating a dummy for the extreme trading days[9]. The first approach is adopted in this study. To minimize the loss of observations, we exclude the highest and lowest (in terms of return) five trading days from the sample. An additional advantage is that, by dropping the extreme values, convergence will be improved for the GARCH-Variance and multivariate GARCH models examined in section 5.

4. Micro-Level Analysis

The first part of our analysis is estimating the sport sentiment effect using Turkish firm level data by Edmans *et al.* (2007) procedure which consists of two steps. There are 39 countries in their sample. The first equation involves the estimation of major market index returns of each country using some market factors as control (for instance, local market index and a world market index). The residuals are then collected for the second step[10] which is essentially SUR adjusting for cross-sectional clustering effect. The key independent variables are win and loss

[7] http://www.borsaistanbul.com/

[8] We intended to construct a portfolio by past turnover-defined as daily trading volume (closing)/shares outstanding. However, there are many missing values of daily trading volume.

[9] For instance, Demir, et al (2013), Kaplanski, and Levy (2010) generate two dummies for ten trading days with highest (lowest) returns.

[10] This is a procedure to purge the systematic market risk. In a purely temporal setting, demeaned or differenced returns may deliver similar results.

dummies of games. One of the problem is that the second step neglects country-specific factors (which can be unobservable) and temporal persistence.

4.1. Edmans *et al.* (2007) Approach

Edmans *et al.* (2007) illustrate a negative loss effect of sports event on major market indexes using data from 39 countries. This section is devoted to exploring the sports sentiment effect with firm level data from BIST100 by the Edmans *et al.* (2007) estimation strategy. The null hypothesis is that the stock return will not be affected by economic neutral events like international sports event results and no exploitable abnormal profits exist assuming that individual investors are rational that their buying and selling positions are based only on fundamentals. The alternative hypothesis is that the game results matter and the stock return variation reflects overreaction of individual investors.

Let R_{it} be the continuously compounded post-dividend daily return of an individual stock i on day t; the first step is estimating the following equation:

$$R_{i,t} = a_i + \beta_{i,1}R_{i,t-1} + \beta_{i,2}W_t + \beta_{i,3}H_t + \beta_{i,4}R_{m,t} + \beta_{i,5}R_{m,t-1} + \varepsilon_{i,t} \quad (1)$$

where i is an index of firms, $R_{m,t}$ is the continuously compounded daily BIST on day t. We include dummy variables for each day of the week to control for the day of the week effect (Berument *et al.* 2007; Ke *et al.* 2007; Aydogan and Booth, 2003). $W_t = \{W_{1t}, W_{2t}, W_{3t}, W_{4t}\}$ are dummy variables for the days of the week: Monday, Tuesday, Wednesday, and Thursday, respectively. $H_t = \{H_{1t}, H_{2t}, H_{3t}, H_{4t}, H_{5t}\}$ are dummy variables for days for which the previous 1 through 5 days are non-weekend holidays. The lagged stock return R_{it-1} is included in specification (1) to account for first-order autocorrelation. The BIST 100 return is also included to control for the correlation between individual stock return and the market index portfolio return attributed to systematic risk that is well documented in the literature[11].

For each company i, equation (1) is estimated by OLS. In the second stage, we extract the estimated residuals from equation (1) which represent abnormal returns that should be the results from football sentiments effects. Instead of using only national team matches like Edmans *et al.* (2007), we collect data of Turkish major soccer teams playing foreign rivals, which significantly increase the effective sample size. The effects of the outcome of international soccer matches on

[11] Instead of a world market index, the Dow Jones Index was used as an international market effect in the preliminary analysis. The key results remain unchanged.

individual stock returns can be estimated using the following regression model:

$$\hat{\varepsilon}_{i,t} = b_0 + b_1 WIN_t + b_2 LOSS_t + b_3 National_t + b_4 FB_t + b_5 BJK_t + b_6 GS_t + b_7 FB_t * WIN_t + b_8 BJK_t * WIN_t + b_9 GS_t * WIN_t + b_{10} FB_t * LOSS_t + b_{11} BJK_t * LOSS_t + b_{12} GS_t * LOSS_t + \nu_{i,t} \quad (2)$$

where $\hat{\varepsilon}_{i,t}$ is the residual from regression (1); win and loss are game result dummies; National denotes a match between two national teams; FB, GS, and BJK are team dummies representing Fenerbahce, Galatasaray, and Besiktas. To control for individual team sentiment, six win and loss interaction terms are added to the model. The standard error in equation (2) is adjusted for heteroskedasticity.

Hypothesis 1*: The sport sentiment effect exists if the win coefficient is positive and /or the loss is negative.*

Table 1 reports the Edmans *et al.* (2007) style results of scenario 1 (278 matches) - the 2006 FIFA world cup qualification, 2010 FIFA world cup qualification, 2002 FIFA world cup, champions' league, Euro 2000, Euro 2008, UEFA, and FIFA confederation cup. Our analysis is based on three sub-sample periods, the right-hand side panel, middle panel, and left-hand side panel reports the estimates for the whole sample (7/1/1999-6/30/2011), pre-2006 (7/1/1999-12/31/2005), and post 2006 period (1/1/2006-6/30/2011), respectively. There are 158 matches in the pre-2006 period and 120 in the post-2006 period. The general findings are in line with the existing literature on sports sentiment and stock market return. The estimated coefficient of loss is negative and statistically significant at the 1% level and 5% level for the whole sample period and pre-period respectively, consistent with the Edmans *et al*. (2007) findings.

As argued in section 2, since the foreign investor ratio increased significantly in 2006 and if the sports sentiment hypothesis is true, the measured sports sentiment effect should be stronger (no matter positive win or negative loss effect) in the pre-2006 period.

Hypothesis 2*: Domestic investors have stronger reactions to national team win or loss, the sport sentiment effect is stronger in the pre-2006 period.*

While the estimated coefficient on the loss dummy variable is -91.6 basis points for the whole period and -95.7 basis points for the pre-2006 period, the loss effect disappear in the post-

2006 period[12] - evidence supporting the sports sentiment hypothesis. The average loss effect of football sentiment on stock market as found in Edmans *et al.* (2007) ranges from -20 basis points to -50 basis points, depending on games at different level of importance. Therefore we can conclude that the football mood in Turkey is stronger than world's average, and the market efficiency is weaker than that of the developed markets. Although the national team dummy is not significant, there is evidence of team effect. For instance, a win of Fenerbahce and Galatasaray over foreign rivals, and a loss of Galatasaray are all significant at 10%.

Table 2 provides the results of scenario 2 -the 2006 FIFA world cup qualification, 2010 FIFA world cup qualification, 2002 FIFA world cup, champions' league, Euro 2000, and Euro 2008- which is an attempt to concentrate on more important games. As we can see from the second panel of Table 2, the result shows a bigger loss effect of -110.5 basis points for the pre-2006 sample period. Not only does this finding support the sports sentiment hypothesis, it also indicates that the magnitude of loss effect is intensified as the game importance increases. For the win effect, the estimated coefficient on the win dummy is positive for the whole period (0.182); however, it is statistically insignificant even at the 10% level. The win effect becomes significant when the data only includes games that are more important. Table 2 shows evidence that the estimated coefficient on the win dummy variable is 61 basis points for the pre-period. As a result, we can conclude that the loss effect is overwhelming in the Turkish stock market[13] following the Edmans *et al.* (2007) procedure.

4.2. Panel Data Analysis

There are two potential drawbacks of the estimation strategy adopted in the previous sub-section. (1) The temporal dependence is not adjusted in the second step possibly rendering the standard error incorrect. (2) There are 447 firms in our sample; the idiosyncratic factors are not modeled at all. Since the number of cross section is larger than that of Edmans et al. (2007) (39 countries), a natural extension is panel data analysis, by which both spatial and temporal effects are modeled. In the following analysis, we will consider Random Effect (RE) correcting the standard error by Newey-West method and the Fixed Effect (FE) analysis using Driscoll and Kraay (1998) standard errors. The error structure is assumed heteroskedastic, autocorrelated up

[12] On the other hand, this may imply that market efficiency has been improved over time.
[13] The low coefficient of variation can be indicators of important firm specific effect justifying the random effect approach in section 4.2.

to two lags and possibly correlated between the firms (panels). The Driscoll and Kraay (1998) correction method is a nonparametric technique of estimating standard error that places no restriction on the limiting behavior of the number of panels. It is suitable for our use since it can handle both balanced and unbalanced panel with missing values. Spatial and temporal dependence may arise in our study because of the complex patterns of mutual dependence between listed companies at a particular time. These unobservable common factors may cause inefficient estimates when we use the conventional covariance matrix estimation technique. Equation (2) is modified as:

$$\hat{\varepsilon}_{i,t} = c_i + b_1 WIN_t + b_2 LOSS_t + b_3 National_t + b_4 FB_t + b_5 BJK_t + b_6 GS_t + b_7 FB_t * WIN_t + b_8 BJK_t * WIN_t + b_9 GS_t * WIN_t + b_{10} FB_t * LOSS_t + b_{11} BJK_t * LOSS_t + b_{12} GS_t * LOSS_t + \nu_{i,t} \quad (3)$$

Write equation (3) in a vector form:

$$\hat{\varepsilon}_{i,t} = x_{i,t}^{'} \beta + \nu_{i,t}$$

where both β and $x_{i,t}$ are (K+1)×1 vector. Let $\hat{h}_{i,t} = x_{i,t}^{'} \nu_{i,t}$

Define $\hat{S}_T$ as the Newey-West adjustment matrix:

$$\hat{S}_T = \hat{\Omega}_0 + \sum_{j=1}^{m(T)} w(j,m)\left[\hat{\Omega}_j + \hat{\Omega}_j^{'}\right]$$

$$\hat{\Omega}_j = \sum_{t=j+1}^{T} \hat{h}_t(\hat{\beta}) \hat{h}_{t-j}^{'}(\hat{\beta})$$

where $m(T)$ is the lag length of autocorrelation (two, in this case), $w(j,m)$ is the modified Bartlett weight and $\hat{h}_t(\hat{\beta})$ the cross-sectional average of $\hat{h}_{i,t}(\hat{\beta})$.

Driscoll and Kraay (1998) standard error is simply the square root of the diagonal elements of the following asymptotic (robust) covariance matrix:

$$Var(\hat{\beta}) = (X^{'}X)\hat{S}_T(X^{'}X)^{-1} \quad (4)$$

where X is the stack of $x_{i,t}$ for $i = 1,...,N$ and $t = 1,...,T$.

Tables 3(a) - 3(c) show the estimated panel data results for the whole sample (7/1/1999-6/30/2011), pre-2006 period (7/1/1999-12/31/2005), and post 2006-period (1/1/2006-6/30/2011) of scenario 1, respectively. The left panel of Table 3 (a) shows weak evidence of sports sentiment effect. The estimated coefficient of loss is negative and statistically significant at 10% level for the whole sample period using the Newey-West standard errors, which are robust to

autocorrelation and heteroskedasticity. An international match loss will lead to a 96 basis points drop in average firm return. However, no national team or soccer club effect is detected. Although the win coefficient of Galatasaray is highly significant, the sign (negative win) is incorrect. The results from the right panel of 3 (a) actually show that either loss effect or win effect is significant after using robust standard errors as proposed by Driscoll and Kraay (1998). From both the pre-2006period (Table 3(b)) and post-2006 period (Table 3(c)) results, we can conclude that neither loss effect nor win effect is significant. Only a mild but inconsistent Galatasaray team effect is found.

As shown in Tables 4 (a) to 4 (c), the estimated results in different time periods remain invariant under the scenario 2, where the FIFA confederation cup and UEFA matches are excluded. Therefore, we can conclude from Tables 2 and 3 that - once the panel estimation method is used and the spatial and temporal dependence structure of the error terms are controlled properly, the football sentiment effect as documented in Edmans *et al.* (2007) and Change *et al.* (2012) was removed from the Turkish stock market.

4.3. How about unexpected match results?

One of the hypotheses of sports sentiment or individual investors' overreaction is that only 'important' matches matter. Unfortunately, there is hardly an objective criterion to measure the importance of a match[14]. A popular ad hoc procedure is using different sports event selection criteria as a robustness check as what we are demonstrating in sections 4.1 and 4.2. Palomino *et al.* (2009) propose an alternative method. The authors argue that 'unexpected' win (loss) should have larger impact on financial asset returns; the odds ratio released from betting companies summarizes the opinion of bookmakers.

There is a fixed odds betting market in Turkey where the odds are posted several days before the games and they are rarely altered by bookmakers after the announcement. For example, on April 25, 2010, Galatasaray played at home against Bursaspor in the Turkish Super League. The odds were 1.55 for a home win, 3.4 for a draw, and 3.8 for an away win. If one person bets 1 euro on home win and if Galatasaray defeats the opponent, then he will win 1.55 euro. If the result is draw or away team win, he loses 1 euro.

[14] See section 6 for a discussion.

Let $\delta_i, i = w,d,l$ be the bookmakers' perceived probability of the outcomes (win, draw and loss), which is the inverse of odds. To convert perceived probabilities to implied probabilities of win, we normalize the former by dividing each odd by the sum:

$$\Delta_w = \frac{\delta_w}{\delta_w + \delta_d + \delta_l}$$

The normalized probability of loss (Δ_l) is defined likewise. Using Δ_w and Δ_l and the difference of these two, Palomino *et al.* (2009) specify four dummy variables, namely strongly expected to win, weakly expected to win, strongly expected to lose and weakly expected to lose. For instance, if the coefficient of strongly expected to win is positive and significant, the authors contend that it is evidence of 'overreaction'. However, *an expected outcome can hardly change the mood of individual investors*. The notion is similar to the monetary economics hypothesis that only unexpected policy shock can have impact on real variables (King and Plosser, 1984; Altig et al. 2004; Clarida *et al.* 2002). Therefore, we deviate from the Palomino *et al.* (2009) by generating an 'unexpected win' and 'unexpected loss' variable.

The average implied win-loss probability differences (Δ_w - Δ_l) are 0.2031, 0.22 and 0.193 for the whole sample, pre-2006 and post-2006 periods, respectively. A match is defined as an 'expected win' if the actual win-loss probability difference is larger than the average. Then an 'unexpected loss' is defined as an interaction term of 'expected win' and 'actual loss'. Similarly, 'unexpected win' is multiplying 'expected loss' by 'actual win'. The bottom line is that only surprising outcome would change investors' mood. We proceed to estimate the following equation in the same way as section 4.2:

$$\begin{aligned}\hat{\varepsilon}_{i,t} = {} & c_i + b_1 Un\exp ectedWin_t + b_2 Un\exp ectedLoss_t + b_3 National_t + b_4 FB_t + b_5 BJK_t + \\ & b_6 GS_t + b_7 FB_t * WIN_t + b_8 BJK_t * WIN_t + b_9 GS_t * WIN_t + b_{10} FB_t * LOSS_t + b_{11} BJK_t * LOSS_t + \\ & b_{12} GS_t * LOSS_t + \nu_{i,t}\end{aligned} \qquad (4)$$

Hypothesis 3*: The coefficients and unexpected win and/or unexpected loss should be significantly positive and negative, respectively. Moreover, the size should be bigger than those of equation (2).*

The results are reported in Tables 5(a)-5(c). No matter using Newey-West or Driscoll and Kraay (1998) correction error, the unexpected outcomes have no impact on firm excess returns in

a panel setting that both spatial and temporal effects are adjusted. The above analysis suggests that there is no micro-evidence of sports sentiment or individual investor overreaction effect once both spatial and temporal correlations are controlled. The modification of the methodology over that of Edmans *et al.* (2007) is the treatment of time series effect. The next section is devoted to multivariate time series models in which two purposes can be achieved. (1) We can demonstrate the existence (or nonexistence) of sports sentiment effect in a purely time-series setting; (2) a couple interesting hypotheses related to investor irrationality will be tested.

5. Sorted Portfolio Analysis

In this section, the estimation is done in a purely time series setting in order to tackle the possible spurious correlation problem. The estimation method in Edmans *et al.* (2007) is a high dimensional (39 countries) multivariate time series model. The curse of dimensionality is solved in this paper by categorizing firm returns into several portfolios. Specifically, the 447 BIST 100 firm returns are sorted by into 5 portfolios. Two sets of results are estimated using different sorting criteria – market capitalization and past returns. With 5 portfolios, the estimation can handle the temporal effect (serial correlation) of the data directly. There are two advantages using sorted portfolios. First, the Capital Asset Pricing Model (CAPM) performs poorly using firm data; but the performance improves significantly when using sorted portfolios. It is possible that the sports sentiment or individual investor overreaction effect can be detected in sorted portfolio, in which idiosyncratic factors are controlled for. Second, a couple testable hypotheses can be proposed to verify the sport sentiment effects.

5.1. Impact on the Mean Equation

The criteria used for sorting the firm-level data into 5 portfolios are market capitalization, and past returns. Market capitalization is defined as the product of stock price and the number of shares outstanding. Past returns were constructed using the moving average of the daily firm returns of last 22 trading days. Specifically, the firms are sorted by returns on each trading day and we split them into quintiles. A value-weighted portfolio return will be computed for each quintile by these two criteria. The process is then repeated everyday and a portfolio is formed. To avoid excess influence of outliers, the smallest and highest 5 trading days are dropped. The series are demeaned to ensure stationarity.

After sorting the firm-level data into five portfolios, results are estimated by GARCH (1, 1) model. The BIST 100 daily and lagged portfolio returns are used as proxy of market factors. The win and loss dummy variables are indicators of sports sentiment effect. Club dummies are used to control for team effect. The implications are the same under different sport selection criteria; we present the results of scenario 2 only.

Hypothesis 4: *With firm-level data sorted into five portfolios according to market capitalization, if the sports sentiment effect truly exists, smaller firms (first quintile) should have larger sports sentiment effect.*

The reason behind is that more local, individual investors should be involved in the stock trading for small firms rather than large firms (Baker and Wurgler, 2006). Table 6a summarizes the results of the sorted portfolio by market capitalization. The first quintile denotes the return of portfolio with smallest market size; the fifth quintile is the highest.

Table 6a shows that the coefficients for BIST100 daily and lagged portfolio returns are significant across all 5 portfolios consistent with the CAPM. The main focus of this paper is the effect of sports events on the returns[15]. We found that with the GARCH model, the effect of sports events (win or loss effect) is mostly insignificant. The win/loss effect is only significant for 4th quintile but the win effect is a negative one. There is not much difference in sports sentiment effect between small firms and large firms since the sports sentiment effect is not significant for most firms. The ARCH and GARCH coefficients are all significant - evidence of strong sorted portfolio return persistence. For robustness check, we sort the portfolios into quarters. As shown in table 6b, the findings remain the same – international soccer matches have no impact on mean returns of portfolios sorted by market capitalization. Hence, there is no evidence for hypothesis 4.

The above analysis ignores correlation across portfolios which may render the standard error inappropriate. To control for this, we use multivariate VAR(1)-GARCH (0,1) with Constant Conditional Correlation (CCC) proposed by Bollerslev (1990), which is a multivariate GARCH model with time-varying conditional variances and covariance but constant conditional correlations. Since convergence is difficult to achieve with all 5 portfolios, we only use the highest and smallest portfolios (1st and 5th quintiles). The estimated system of equations is:

[15] In this set of analysis, the interaction terms of win/loss with the team are not included to improve the convergence property of GARCH model.

$$R_{1,t} = \alpha_{1,0} + \alpha_{1,1}WIN_t + \alpha_{1,2}LOSS_t + \alpha_{1,3}FB_t + \alpha_{1,4}BJK_t + \alpha_{1,5}GS_t + \alpha_{1,6}R_{1,t-1} + \alpha_{1,7}R_{5,t-1} + \upsilon_{1,t}$$
$$R_{5,t} = \alpha_{5,0} + \alpha_{5,1}WIN_t + \alpha_{5,2}LOSS_t + \alpha_{5,3}FB_t + \alpha_{5,4}BJK_t + \alpha_{5,5}GS_t + \alpha_{5,6}R_{1,t-1} + \alpha_{5,7}R_{5,t-1} + \upsilon_{5,t} \quad (5)$$

where $[\upsilon_{1,t}, \upsilon_{5,t}]' = \upsilon_t ; \upsilon_t / F_{t-1} \sim N(0, \Phi_t)$

For simplicity, we assume that the ARCH matrix is diagonal. As shown in Table 6c, all the ARCH and GARCH coefficients are significant indicating strong persistence effect. The estimated cross correlation is 0.507 indicating a positive relation between these portfolios. However, the win and loss coefficients are not significant for either portfolio. No team effect is detected neither.

Next, we sorted the firm-level data into 5 portfolios according to past returns (22-day moving average) of investors. It is expected that firms with higher past returns (5th quintile) are more attractive to small individual investors than firms with smaller past returns (1st quintile).

Hypothesis 5: *With firm-level data sorted into five portfolios according to moving average of 22-day past returns, if the sports sentiment effect truly exists, firms with high profit should have larger sports sentiment effect.*

Thus, the 5th quintile should have larger sports sentiment effect (Chang *et al*., 2012). However, results from GARCH (1, 1) model (as shown in Table 7a) showed very weak evidence in support of significant sports sentiment effect - only the loss coefficient of the 5th quintile is significant. Similarly, using the multivariate GARCH, Table 7c shows mostly insignificant sports sentiment effect.

5.2. Impact on the Variance Equation

Sports events may not affect the mean returns. Is it possible that variance of sorted portfolio returns is affected by international soccer match results? A variance equation is augmented to equation (3). Our first finding is that *the impact of sporting events on stock return variance is stronger for small firms*. From table 6a, the win effect is highest for the second quintile (2.978) and virtually zero for large firms. Similarly, the loss coefficient (3.24) of the variance equation is only significant for the second quintile. Note that some of the parameters are zero which is the value that actually maximizes the log-likelihood[16]. The decreasing pattern of variance effect is

[16] We restrict the variance equation parameters to some fixed values and see what effect it has on the loglikelihood. The loglikelihood for the first quintile is actually at maximum when the parameter on loss is restricted to be zero. When it is

more obvious when we sort the portfolios into quartile, as indicated in table 6b. Small firm has the highest loss effect (2.0) and there is no impact on firms with largest capitalization.

Our second finding is that when firms are sorted into five portfolios according to moving average of 22-day past returns, *firms with lower profit (first quintile) tend to have larger variance after a match.* From Table 7a, the win coefficient is as high as 2.78 for the first quintile, declining gradually to 0.5039 of the forth quintile and eventually disappears for the fifth quintile. There is no loss effect. The result remains the same when we sort the firms into four portfolios as shown in Table 7b.

The win (loss) variable of Tables 6b and 7b is replaced by the unexpected win (unexpected loss) as a final check of robustness. The findings of Tables 8a and 8b is consistent with those of Tables 6b and 7b that sporting events has no impact on the mean equation but significant effect on the variance equation.

6. Discussion

This study re-examines the sports sentiment and investor overreaction hypothesis in the event study literature. Using 447 firm data from Borsa Istanbul from July 1, 1999- June 30, 2011, we do not find evidence for the null hypothesis once spatial and temporal effects are modeled explicitly. Instead of the conventional win/loss variables, two surprise variables are generated to test the overreaction hypothesis, which is rejected overwhelmingly under different criteria. We proceed to investigate the null hypothesis by sorted portfolios - purely time series setting. Economic neutral events like international soccer matches still have no impact on firm return. However, we find evidence that sporting events has significant impact on the variances of firms with smaller market capitalization and lower past returns.

There are a few limitations of this paper. For the estimation of equation (1) and (2), Edmans *et al.* (2007) and Kaplanski and Levy (2010) normalize the stock market returns by GARCH(1,1) volatility because the estimates will be biased downward if the stock returns exhibit time-varying volatilities. First, a GARCH (1, 1) model is estimated using equations (1) and (2). Then, the estimated conditional volatilities will be used to normalize the stock returns to have zero mean and standardized variance. No such adjustment is made in this paper. First, achieving

---

restricted to be some negative numbers, they lead to optimization failures with infeasible initial values; when it is restricted to be small positive numbers, they lead to smaller loglikelihood than when restricted to be zero. So the estimate and standard error on the variance equation parameter are both zero.

convergence of equation (1) for all 447 firms simultaneously is almost impossible. Second, the temporal variation has been modeled by Newey-West, and Driscoll and Kraay (1998) correction error.

The choice of sports event is always subject to controversy. After all, there is no objective measure of match importance. For instance, the FIFA World Cup Qualifying games are not important to Germany or Italy; it can be big news if it is a win for China. A popular strategy is testing robustness by using different sports event choices. While the same strategy is used in this paper, we contribute to the literature by introducing a 'surprise' variable in section 4.3. The idea is that only unexpected outcomes should have impact on investors' sentiment. Unfortunately, there is no evidence to support the investor overreaction hypothesis even using this surprise variable.

A minor concern is the estimation error carried over from equation (1) to equation (2) i.e. the measurement error of residuals from equation (1). As well documented in the literature, unless the measurement error is correlated to the explanatory variables, OLS is asymptotically valid under appropriate homoskedasticity assumptions. It is possible that omitted systematic factors can be correlated to market return in equation (1). With that said, the consequence is only large asymptotic variance, which has been adjusted in the second step estimation.

Our argument in sections 4.2 will be stronger if we can demonstrate the disappearance of the negative loss effect using the original Edmans *et al.* (2007) data[17]. We requested the data from the authors; unfortunately, the original dataset is no longer available. We tried to reinforce our arguments by different sorting criteria. One option is past turnover ratio. However, the analysis is infeasible due to excessive missing values. We also tried sorting by 22-day moving average of past variance. No significant result was found.

[17] A suggestion from anonymous referees.

References

Ashton, J.K., Gerrard, B., and Hudson, R., 2003. Economic impact of national sporting success: evidence from the London stock exchange. *Applied Economics Letters,* 10(12), pp.783-785

Ashton, J.K., Gerrard, B., and Hudson, R., 2011. Do national soccer results really impact on the stock market? *Applied Economics*, 43(26), pp.3709-3717.

Asquith, P. and Mullins, D., 1986. Equity Issues and Offering Dilution. *Journal of Financial Economics,* 15(1-2), pp.61-89.

Altig, D., Chritiano, J., Eichenbaum, M., Linde, J., 2004. Firm Specific Capital, Nominal Rigidities, and the Business Cycle. *Mimeo*, Northwestern University.

Aydogan, K. and Booth, G.G., 2003. Calendar anomalies in the Turkish foreign exchange markets. *Applied Financial Economics*, 13(5), pp.353-360.

Berument, H., Ceylan, N.B., and Ogut-Eker, G., 2009. Soccer, stock returns and fanaticism: Evidence from Turkey. *The Social Science Journal*, 46(3), pp.594–600.

Baker, M. and Wurgler, J., 2006. Investor Sentiment and the Cross-section of Stock Returns. *Journal of Finance*, 61, pp.1645–1680.

Berument, H. Ceylan, N.B., and Gozpinar, E., 2006. Performance of soccer on the stock market: Evidence from Turkey. *The Social Science Journal*, 43(4), pp.695–699.

Berument, H. and Ceylan, N.B., 2012. Effects of soccer on stock markets: The return–volatility Relationship. *The Social Science Journal*, 49(3), pp.368–374.

Berument, H., Coskun, M.N., and Sahin, A., 2007. Day of the week effect on foreign exchange market volatility: Evidence from Turkey. *Research in International Business and Finance*, 21(1), pp.87–97.

Berument, H. and Yucel, E.M., 2005. Long live Fenerbahce: the production boosting effects of football. *Journal of Economic Psychology*, 26(6), pp.842–861.

Boido, C., and A. Fasano. 2007. Football and Mood in Italian Stock Exchange. *The Icfai Journal of Behavioral Finance*, 4(4), pp. 32-50.

Bollerslev, T., 1990. Modeling the Coherence in Short-run Nominal Exchange Rates: A Multivariate Generalized ARCH Model. *The Review of Economics and Statistics,* 72 (3), pp.498–505.

Boyle, G. and Walter, B., 2003. Reflected glory and failure: international sporting success and the stock market. *Applied Financial Economics*, 13(3), pp.225–235.

Brown, G. and Hartzell, J. 2001. Market reaction to public information: The atypical case of the Boston Celtics, *Journal of Financial Economics,* 60(2-3), pp.333-370.

Cao, M. and Wei, J., 2005. Stock market returns: A note on temperature anomaly. *Journal of Banking & Finance*, 29(6), 1559-1573

Chang, S.C., Chen, S.S., Chou, R.K., and LIn, Y.H., 2012. Local Sports Sentiment and Returns of Locally Headquartered Stocks: A Firm-Level Analysis. *Journal of Empirical Finance*, 19(3), 309-318

Clarida, R., Gali, J., Gertler, M., 2002. A Simplified Framework for International Monetary Policy Analysis. *Journal of Monetary Economics,* 49, 879-904.

Demir, E. and Danis, H. 2011. The Effect of Performance of Soccer Clubs on Their Stock Prices: Evidence from Turkey. *Emerging Markets Finance and Trade*, 47(04S4), pp.58-70.

Demir, E., Lau, C.K.M, and Fung, K.W.T, 2013. The Effect of International Soccer Games On Turkish Lira/Euro & Turkish Lira/Us Dollar. *Working paper*.

Driscoll, J.C. and Kraay, A.C., 1998. Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data. *Review of Economics and Statistics,* 80(4), pp.549–560.

Eckbo, B., 1983. Horizontal Mergers, Collusion, and Stockholder Wealth. *Journal of Financial Economics,* 11(1-4), pp.241-276.

Edmans, A., Garcia, D., and Norli, O., 2007. Sports sentiment and stock returns. *Journal of Finance*, 62(4), pp.1967-19998.

Ehrmann, M. and Jansen, D.J., 2012. The Pitch Rather Than the Pit Investor Inattention During Fifa World Cup Matches. *ECB Working Paper Series*, 1424.

Eker, G., Berument, H., and Dogan, B., 2007. Football and Exchange Rates: Empirical Support for Behavioral Economics. *Psychological Reports*, 101(2), pp.643-654.

Gao, X. and Lin, T.-C., 2011. *Do Individual Investors Trade Stocks as Gambling? Evidence from Repeated Natural Experiments*. Working Paper

Gerlach, J.R., 2011. International sports and investor sentiment: do national team matches really affect stock market returns? *Applied Financial Economics*, 21(12), pp.863-880.

Hirshleifer, D. and Shumway, T., 2003. Good day sunshine: stock returns and the weather. *Journal of Finance*, 58(3), 1009–1032.

Hirt, E.R., Zillmann, D., Erickson, G.A., and Kennedy, C., 1992. Costs and benefits of allegiance: Changes in fans' self-ascribed competencies after team victory versus defeat. *Journal of Personality and Social Psychology*, 63(5), pp.724-738.

Kamstra, M.J., Kramer, L.A., and Levi, M.D., 2000. Losing sleep at the market: The daylight-savings anomaly. *American Economic Review*, 90(4), pp.1005–1011

Kaplanski, G. and Levy, H., 2010. Exploitable Predictable Irrationality: The FIFA World Cup Effect on the U.S. Stock Market. *Journal of Financial and Quantitative Analysis*, 45(2), pp.535-553

Ke, M.-C., Chiang, Y.-C., and Liao, T.L., 2007. Day-of-the-week effect in the Taiwan foreign exchange market. *Journal of Banking and Finance*, 31(9), pp.2847-2865

Kerr, J.H., Wilson, G.V., Nakamura, I., and Sudo, Y., 2005. Emotional dynamics of soccer fans at winning and losing games. *Personality and Individual Difference*s, 38(8), pp.1855-1866.

King, R.G., Plosser, C., 1984. Money, Credit, and Prices in a Real Business Cycle. *American Economic Review,* 64, 363-380.

Klein, C., Zwergel, B., and Fock, J.H., 2009. Reconsidering the impact of national soccer results on the FTSE 100. *Applied Economics*, 41(25), pp.3287-3294.

Levy, T. and Yagil, J., 2011. Air pollution and stock returns in the US. *Journal of Economic Psychology*, 32(3), pp.374-383

Palomino, F., Renneboog, L., and Zhang, C., 2009. Information salience, investor sentiment, and stock returns: The case of British soccer betting. *Journal of Corporate Finance*, 15(3), pp.368-387.

Rodrik, D., 2012. The Turkish Economy after the Global Financial Crisis. *Ekonomi-tek Volume*, 1(1), pp.41-61

Saunders, E.M., 1993. Stock prices and Wall Street weather. *American Economic Review*, 83(5), pp.1337–1345.

Scholtens, B. and Peenstra, W., 2009. Scoring on the Stock Exchange? The effect of football matches on stock market returns: An event study. *Applied Economics*, 41(25), pp.3231-3237.

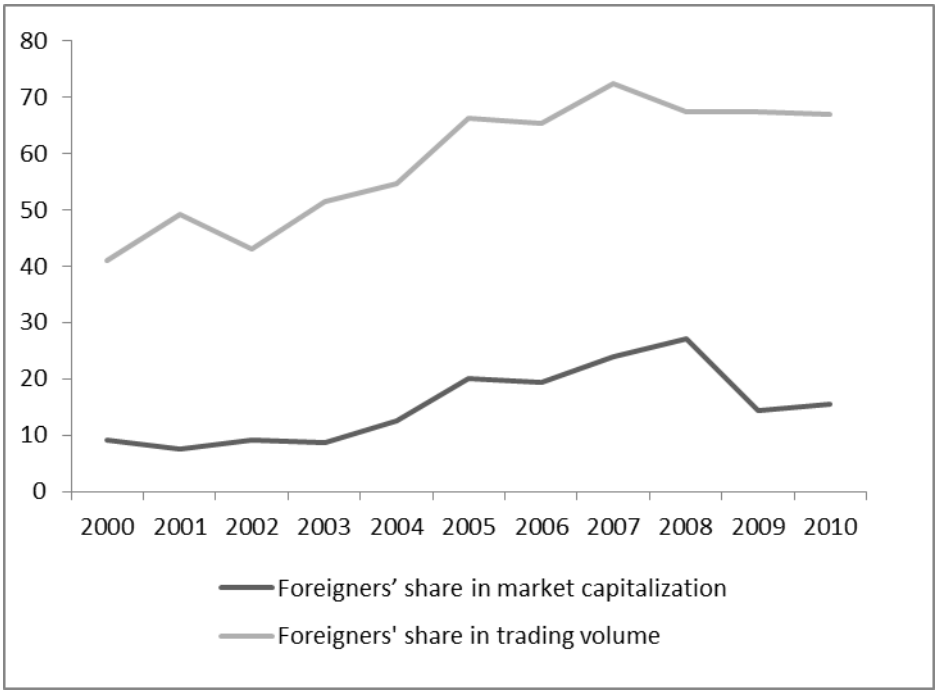
Sloan, L.R., 1979. *The function and impact of sports for fans: A review of theory and contemporary research*. In: J.H. Goldstein (ed.), Sports, games and play: Social and psychological viewpoints. NJ: Lawrence Erlbaum.

Stadtmann, G., 2006. Frequent News and Pure Signals: The Case of a Publicly Traded Football Club. *Scottish Journal of Political Economy*, 53(4), pp.485-504.

Yuan, K., Zheng, L., and Zhu, Q., 2006. Are investors moonstruck? lunar phases and stock returns. *Journal of Empirical Finance,* 13(1), pp.1–23.

Zuber, R. A., Yiu, P., Lamb, R.P. and Gandar, J.M., 2005. Investor-fans? An examination of the performance of publicly traded English Premier League teams. *Applied Financial Economics*, 15(5), pp.305-313.

Figure 1. Foreigners' share in the Istanbul Stock Exchange



Source: Istanbul University SERPAM, Turkish Capital Market Report 2012 and Gedik Yatırım, BIST Equity Market Foreigners' Trade, May 2013.

Table 1. Test of Sport Sentiment Effect by Seemingly Unrelated Regression (Scenario 1)

	7/1/1999-6/30/2011		7/1/1999-12/31/2005		1/1/2006-6/30/2011	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	0.02044	0.0449**	-0.32812	0.1032	0.33079	0.0951*
win	0.286	0.1225	0.7279	0.0128**	-0.36525	0.1033
loss	-0.9167	0.0597*	-0.95748	0.0007***	-0.77927	0.5046
National	-0.10374	0.5611	-0.08834	0.7835	-0.05082	0.8736
FB	0.2347	0.4343	0.16687	0.907	0.00876	0.9668
BJK	0.08777	0.5247	0.32491	0.0875*	0.12865	0.7837
GS	-0.66557	0.0427**	0.50648	0.0011***	-0.0243	0.7801
fbwin	-0.8351	0.088*	-0.65088	0.7367	-0.32009	0.2375
bjkwin	-0.11676	0.6418	-0.71941	0.0224**	0.35893	0.2437
gswin	-1.40082	0.0147**	-2.3987	0.0262**	0.05917	0.8098
fbloss	0.58188	0.1897	0.67332	0.5324	0.79452	0.5759
bjkloss	0.42958	0.0695*	0.59326	0.3986	-0.17756	0.8206
gsloss	0.75916	0.1049	0.00257	0.9986	1.47032	0.1917
R-square	0.000044		0.000035		0.00019	

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 2. Test of Sport Sentiment Effect by Seemingly Unrelated Regression (Scenario 2)

	7/1/1999-6/30/2011		7/1/1999-12/31/2005		1/1/2006-6/30/2011	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	0.01745	0.2155	-0.32132	0.1092	0.31345	0.1198
win	0.18199	0.3779	0.60914	0.0808*	-0.36525	0.1033
loss	-1.21294	0.0409**	-1.10501	0.0006***	-0.77927	0.5046
National	0.03543	0.8458	0.08377	0.8414	-0.03349	0.9171
FB	0.42472	<.0001***	0.82152	0.0001***	0.11497	0.348
BJK	-0.1069	0.7314	-0.35413	0.476	0.64948	0.031**
GS	0.15943	0.2382	0.56275	0.0526*	-0.74736	0.1331
fbwin	-0.82996	0.0001***	-1.17136	0.1913	-0.32002	0.3665
bjkwin	0.17458	0.6194	-0.01306	0.9835	-0.00193	0.9962
gswin	-1.7778	0.0361**	-2.31021	0.0112**	-0.09868	0.769
fbloss	0.3498	0.1841	0.16061	0.7826	0.5484	0.6442
bjkloss	0.57217	0.0761*	0.81844	0.4551	-0.54787	0.5071
gsloss	0.23778	0.7564	0.03674	0.983	1.23555	0.3762
R-square	0.000043		0.000035		0.000187	

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 3(a). Test of Sport Sentiment Effect by Panel Data Analysis- Whole Period (Scenario 1)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
intercept	0.0204404	0.471	0.020453	0.941
win	0.2860001	0.336	0.286143	0.55
loss	-0.9574821	0.085*	-0.95735	0.263
national	-0.1037416	0.688	-0.10394	0.844
fb	0.2347034	0.46	0.234896	0.611
bjk	0.0877686	0.682	0.087343	0.817
gs	-0.0243047	0.891	-0.02506	0.947
fbwin	-0.8351008	0.064*	-0.83528	0.233
bjkwin	-0.1167559	0.763	-0.11614	0.837
gswin	-1.400816	0.002***	-1.40105	0.043**
fbloss	0.5818798	0.384	0.581596	0.558
bjkloss	0.4295844	0.49	0.429967	0.648
gsloss	0.7591642	0.234	0.759383	0.415

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 3(b). Test of Sport Sentiment Effect by Panel Data Analysis (7/1/1999 to 12/31/2005) (Scenario 1)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	-0.32812	0.00***	-0.3289	0.574
win	0.727897	0.106	0.717622	0.376
loss	-0.9167	0.117	-0.94012	0.459
national	-0.08834	0.832	-0.1004	0.919
fb	0.166871	0.907	0.195438	0.812
bjk	0.32491	0.17	0.354492	0.589
gs	0.506478	0.051*	0.544365	0.41
fbwin	-0.65088	0.668	-0.68681	0.517
bjkwin	-0.71941	0.178	-0.74082	0.408
gswin	-2.3987	0.001***	-2.37315	0.023**
fbloss	0.673324	0.666	0.642709	0.665
bjkloss	0.593256	0.403	0.586964	0.664
gsloss	0.00257	0.997	0.017875	0.99

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 3(c). Test of Sport Sentiment Effect by Panel Data Analysis (1/1/2006 afterwards) (Scenario 1)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	0.330788	0.00***	0.330851	0.00***
win	-0.36525	0.357	-0.36472	0.361
loss	-0.77927	0.521	-0.68374	0.46
national	-0.05082	0.863	-0.05585	0.847
fb	0.008756	0.972	0.003479	0.994
bjk	0.128651	0.795	0.135638	0.687
gs	-0.66557	0.00***	-0.67212	0.002***
fbwin	-0.32009	0.51	-0.32161	0.657
bjkwin	0.358933	0.587	0.356574	0.523
gswin	0.05917	0.898	0.060934	0.94
fbloss	0.794522	0.528	0.702699	0.505
bjkloss	-0.17756	0.893	-0.27924	0.798
gsloss	1.470319	0.234	1.374598	0.156

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 4(a). Test of Sport Sentiment Effect by Panel Data Analysis (Whole Period) (Scenario 2)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	0.017446	0.53	0.017475	0.948
win	0.181993	0.57	0.181844	0.733
loss	-1.10501	0.088*	-1.10519	0.27
national	0.035433	0.899	0.035453	0.95
fb	0.424716	0.217	0.425627	0.511
bjk	-0.1069	0.77	-0.10918	0.841
gs	0.159433	0.461	0.157794	0.74
fbwin	-0.82996	0.094*	-0.83034	0.338
bjkwin	0.174579	0.74	0.176306	0.819
gswin	-1.7778	0.006***	-1.77812	0.046**
fbloss	0.349799	0.65	0.348878	0.778
bjkloss	0.572172	0.472	0.574473	0.638
gsloss	0.237777	0.763	0.238237	0.833

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 4(b). Test of Sport Sentiment Effect by Panel Data Analysis (7/1/1999 to 12/31/2005) (Scenario 2)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	-0.32132	0.00***	-0.3224	0.571
win	0.609141	0.264	0.59090	0.585
loss	-1.21294	0.102	-1.2459	0.462
national	0.083774	0.87	0.08147	0.946
fb	0.82152	0.02**	0.7892	0.215
bjk	-0.35413	0.48	-0.1606	0.781
gs	0.562746	0.019**	0.58246	0.398
fbwin	-1.17136	0.108	-1.1343	0.333
bjkwin	-0.01306	0.987	-0.1326	0.912
gswin	-2.31021	0.005***	-2.2705	0.087
fbloss	0.160613	0.856	0.20714	0.908
bjkloss	0.81844	0.466	0.70226	0.7
gsloss	0.036741	0.969	0.08506	0.962

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 4(c). Test of Sport Sentiment Effect by Panel Data Analysis (1/1/2006 afterwards) (Scenario 2)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	0.313454	0.00***	0.3135	0.00***
win	-0.36525	0.357	-0.36474	0.361
loss	-0.77927	0.521	-0.68377	0.46
national	-0.03349	0.91	-0.03818	0.895
fb	0.114972	0.782	0.114285	0.877
bjk	0.649483	0.177	0.644837	0.00***
gs	-0.74736	0.023**	-0.75672	0.00***
fbwin	-0.32002	0.595	-0.3265	0.729
bjkwin	-0.00193	0.998	-0.00341	0.995
gswin	-0.09868	0.86	-0.09855	0.805
fbloss	0.548396	0.676	0.451681	0.714
bjkloss	-0.54787	0.679	-0.64427	0.58
gsloss	1.235548	0.332	1.140466	0.223

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variable is the residuals collected from equation (1). Win and loss are indicators of international soccer match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 5(a). Impact of unexpected Match results (Whole Period)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	0.02044	0.471	0.020454	0.941
unexpectedwin	0.318751	0.563	0.31824	0.681
unexpectedloss	-0.55293	0.318	-0.55346	0.376
national	-0.14234	0.387	-0.14243	0.712
fb	0.234703	0.46	0.234864	0.611
bjk	0.087769	0.682	0.087307	0.817
gs	-0.0243	0.891	-0.02506	0.947
fbwin	-0.5152	0.135	-0.51527	0.332
bjkwin	0.196056	0.438	0.196797	0.522
gswin	-1.10425	0.001***	-1.10439	0.025**
fbloss	-0.22752	0.575	-0.22749	0.653
bjkloss	-0.41495	0.163	-0.4143	0.352
gsloss	-0.08451	0.824	-0.08405	0.843

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variable is the residuals collected from equation (1). Unexpectedwin and Unexpectedloss are indexes measuring surprise match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 5(b). Impact of unexpected Match results (pre-2006)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	-0.32812	0.00***	-0.3289	0.574
unexpectedwin	1.159858	0.357	1.137727	0.45
unexpectedloss	-0.93968	0.27	-0.89929	0.295
national	0.275053	0.267	0.246127	0.74
fb	0.166871	0.907	0.194911	0.812
bjk	0.32491	0.17	0.354275	0.59
gs	0.506478	0.051*	0.544429	0.41
fbwin	0.077016	0.958	0.031284	0.963
bjkwin	0.077208	0.796	0.044297	0.91
gswin	-1.65525	0.003***	-1.64039	0.011**
fbloss	0.010904	0.994	-0.05359	0.944
bjkloss	-0.14764	0.725	-0.18468	0.714
gsloss	-0.73893	0.255	-0.75457	0.249

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variable is the residuals collected from equation (1). Unexpectedwin and Unexpectedloss are indexes measuring surprise match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 5(c). Impact of unexpected Match results (post-2006)

	Newey-West		Driscoll-Kraay	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	0.330788	0.00***	0.330851	0.00***
unexpectedwin	-0.1853	0.677	-0.18645	0.841
unexpectedloss	-0.27129	0.677	-0.28401	0.733
national	-0.36636	0.233	-0.34665	0.194
fb	0.008756	0.972	0.003471	0.994
bjk	0.128651	0.795	0.135655	0.687
gs	-0.66557	0.00***	-0.67213	0.002***
fbwin	-0.70992	0.015**	-0.71107	0.281
bjkwin	-0.02709	0.959	-0.02906	0.943
gswin	-0.3169	0.176	-0.31468	0.648
fbloss	0.08664	0.821	0.093709	0.866
bjkloss	-0.89752	0.103	-0.9009	0.18
gsloss	0.756981	0.009***	0.759885	0.042**

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variable is the residuals collected from equation (1). Unexpectedwin and Unexpectedloss are indexes measuring surprise match results. National, FB, BJK and GS are dummies for national team, Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). The other variables are interaction terms, for instance, fbwin is Fenerbahce multiplying the win parameter.

Table 6a. GARCH(1,1) Estimation of Sorted Portfolios (Quintile) by Market Capitalization

Quintile		Mean Equation								Variance Equation				
		Intercept	IST(t)	LR(t-1)	WIN(t)	LOSS(t)	FB(t)	BJK(t)	GS(t)	ARCH(0)	ARCH(1)	GARCH(1)	WIN(t)	LOSS(t)
1	Estimate	-0.1019	0.5634	-0.498	0.107	0.1934	-0.5901	-0.1739	0.2072	0.4767	0.35	0.6293	0	0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.734	0.5873	0.0772*	0.7011	0.5439	<.0001***	<.0001***	<.0001***	0	0
2	Estimate	-0.0251	0.673	-0.5045	0.527	-0.9214	0.4465	0.2711	0.2319	1.2195	0.318	0.6093	2.978	3.2407
	Pr > |t|	0.5334	<.0001***	<.0001***	0.418	0.1031	0.4599	0.6248	0.724	<.0001***	<.0001***	<.0001***	0.002***	0.0002***
3	Estimate	-0.062	0.5928	-0.5075	0.3341	0.0575	-0.5014	-0.3066	-0.1696	0.067	0.2054	0.815	0.4797	0.015
	Pr > |t|	0.0127**	<.0001***	<.0001***	0.3662	0.8576	0.1218	0.443	0.7072	<.0001***	<.0001***	<.0001***	0.0149**	0.9163
4	Estimate	-0.0422	0.6527	-0.5141	-0.6094	-0.7973	0.009148	0.758	0.8904	0.0794	0.2272	0.7971	1.4899	0
	Pr > |t|	0.1046	<.0001***	<.0001***	0.075*	0.0011***	0.9761	0.0007***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	0
5	Estimate	-0.124	0.8546	-0.4975	0.5335	0.1584	-0.594	-0.1924	-0.2431	0.1161	0.1481	0.8209	0	0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.0905*	0.6415	0.0871*	0.6003	0.4077	<.0001***	<.0001***	<.0001***	0	0

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

The dependent variables are the portfolio returns sorted by market capitalization. The 1st quintile has the smallest market size. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns; LR denotes the lagged portfolio return. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS).

Table 6b. GARCH(1,1) Estimation of Sorted Portfolios (Quartile) by Market Capitalization

Quintile		Mean Equation								Variance Equation				
		Intercept	IST(t)	LR(t-1)	WIN(t)	LOSS(t)	FB(t)	BJK(t)	GS(t)	ARCH(0)	ARCH(1)	GARCH(1)	WIN(t)	LOSS(t)
1	Estimate	-0.0762	0.5943	-0.4729	0.073	-0.224	-0.6329	0.244	0.3986	0.3829	0.2796	0.6837	0.	2.0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.8260	0.5654	0.0786	0.6193	0.2402	<.0001***	<.0001***	<.0001***	0	<.0001***
2	Estimate	-0.05	0.6602	-0.4883	-0.0206	-0.3633	-0.2066	-0.2338	1.2351	0.0779	0.1294	0.8746	0.7693	1.0273
	Pr > |t|	0.1631	<.0001***	<.0001***	0.9712	0.4525	0.6666	0.6774	0.0273	<.0001***	<.0001***	<.0001***	0.0003***	<.0001***
3	Estimate	-0.039	0.6183	-0.5135	-0.0768	-0.0658	-0.3559	-0.1592	-0.1007	0.0555	0.1744	0.8367	0.742	0

	Pr > |t|	0.1312	<.0001***	<.0001***	0.8164	0.8365	0.2964	0.6438	0.7627	<.0001***	<.0001***	<.0001***	<.0001***	0
4	Estimate	-0.1167	0.8187	-0.4958	0.3943	-0.0369	-0.4452	-0.0524	-0.0991	0.091	0.1444	0.8342	0.0823	0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.1967	0.9091	0.1797	0.8848	0.7413	<.0001***	<.0001***	<.0001***	0.5402	0

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variables are the portfolio returns sorted by market capitalization. The 1st quintile has the smallest market size. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns; LR denotes the lagged portfolio return. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS).

Table 6c. Multivariate GARCH Estimation of Sorted Portfolios by Market Capitalization

Quintile		Mean Equation								GARCH Model Parameter Estimates				
1	Estimate	0.60931	0.14603	0.15697	-0.517	-0.1339	0.15678	-0.4698	0.00633	0.50615	2.71415	2.01605	0.664	0.52793
	P value	0.0001***	0.6383	0.6412	0.143	0.7145	0.6173	0.0001***	0.6724	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
5	Estimate	0.90539	0.49666	0.16362	-0.729	-0.2002	-0.3652	-0.0633	-0.4406					
	P value	0.0001***	0.0624*	0.5855	0.021**	0.5436	0.1902	0.0001***	0.0001***					

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variables are the portfolio returns with lowest and highest market capitalization. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). R1(t-1) and R5(t-1) are the lagged returns of portfolios with lowest and highest market size, respectively. CCC represents the constant conditional correlation. GCHC(1,1) and GCHC(2,2) are the diagonal elements of the GARCH components. ARCH (1,1,1) and ARCH(1,2,2) are the diagonal elements of the ARCH components

Table 7a. GARCH(1,1) Estimation of Sorted Portfolios (Quintile) by Past Returns (22-Day Moving Average)

Quintile		Mean Equation								Variance Equation				
		Intercept	IST(t)	LR(t-1)	WIN(t)	LOSS(t)	FB(t)	BJK(t)	GS(t)	ARCH(0)	ARCH(1)	GARCH(1)	WIN(t)	LOSS(t)
1	Estimate	-0.1398	0.6798	-0.4958	-0.0593	0.2443	-0.2182	-0.2596	0.1578	0.4463	0.2577	0.6809	2.7837	0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.8905	0.5498	0.6181	0.5518	0.6949	<.0001***	<.0001***	<.0001***	<.0001***	0
2	Estimate	-0.0869	0.6475	-0.5029	0.2116	0.2292	-0.4375	-0.5752	-0.1461	0.13	0.3255	0.6741	0.5342	0.1029
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.3621	0.3001	0.0489**	0.0243**	0.5693	<.0001***	<.0001***	<.0001***	0.0016***	0.4984

3	Estimate	-0.0653	0.6478	-0.5249	0.2397	-0.0141	-0.3243	-0.1825	-0.0578	0.106	0.2621	0.7261	0.4638	0
	Pr > |t|	0.0022***	<.0001***	<.0001***	0.3191	0.9471	0.1307	0.4859	0.8087	<.0001***	<.0001***	<.0001***	0.0004***	0
4	Estimate	-0.0673	0.6647	-0.5242	0.1457	0.0418	-0.3225	-0.2509	-0.138	0.1012	0.2259	0.7514	0.5039	0
	Pr > |t|	0.0016***	<.0001***	<.0001***	0.5019	0.8485	0.1816	0.3513	0.4643	<.0001***	<.0001***	<.0001***	0.0005***	0
5	Estimate	-0.0298	0.651	-0.4958	-0.038	-0.9596	0.1246	0.4012	0.04	0.0424	0.0732	0.9272	0.003442	0.2745
	Pr > |t|	0.5183	<.0001***	<.0001***	0.9438	0.0463**	0.8334	0.4306	0.9544	<.0001***	<.0001***	<.0001***	0.9922	0.4075

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variables are the portfolio returns sorted by market capitalization. The 1st quintile has the smallest market size. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns; LR denotes the lagged portfolio return. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS).

Table 7b. GARCH(1,1) Estimation of Sorted Portfolios (Quartile) by Past Returns (22-Day Moving Average)

Quintile		Mean Equation								Variance Equation				
		Intercept	IST(t)	LR(t-1)	WIN(t)	LOSS(t)	FB(t)	BJK(t)	GS(t)	ARCH(0)	ARCH(1)	GARCH(1)	WIN(t)	LOSS(t)
1	Estimate	-0.1204	0.653	-0.4991	0.0068	0.266	-0.2827	-0.3928	0.0679	0.3662	0.3023	0.649	2.254	0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.9853	0.4508	0.4582	0.2867	0.8448	<.0001***	<.0001***	<.0001***	<.0001***	0
2	Estimate	-0.0816	0.6487	-0.5044	0.2449	0.1153	-0.2799	-0.4593	-0.134	0.1214	0.3018	0.689	0.6401	0.175
	Pr > |t|	0.0002***	<.0001***	<.0001***	0.3251	0.6368	0.2319	0.0926*	0.632	<.0001***	<.0001***	<.0001***	<.0001***	0.221
3	Estimate	-0.0675	0.6467	-0.5248	0.1418	0.0081	-0.3	-0.2283	-0.0687	0.1084	0.2793	0.7083	0.5361	0
	Pr > |t|	0.001***	<.0001***	<.0001***	0.4664	0.9676	0.1823	0.3588	0.6981	<.0001***	<.0001***	<.0001***	0.0004***	0
4	Estimate	-0.035	0.6594	-0.4952	-0.1207	-0.8568	0.0304	0.3669	0.1022	0.0344	0.0712	0.9282	0.0258	0.1325
	Pr > |t|	0.3869	<.0001***	<.0001***	0.7931	0.0484**	0.9513	0.4222	0.8625	<.0001***	<.0001***	<.0001***	0.9187	0.5939

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
The dependent variables are the portfolio returns sorted by market capitalization. The 1st quintile has the smallest market size. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns; LR denotes the lagged portfolio return. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS).

Table 7c. Multivariate GARCH Estimation of Sorted Portfolios by Past Returns (22-Day Moving Average)

Quintile		Mean Equation								GARCH Model Parameter Estimates				
1	Estimate	0.6850	0.5017	0.6162	-0.7287	-0.5103	-0.2654	-0.4710	-0.0282	0.1472	3.4866	11.6595	0.5009	1.2322
	P value	0.0001***	0.1565	0.1362	0.0764*	0.2578	0.4608	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
5	Estimate	0.7085	-1.2328	-1.7239	0.5965	-1.6981	-3.3436	0.0580	-0.4124					
	P value	0.0001***	0.0679*	0.0102**	0.4436	0.0144**	0.0001***	0.0071***	0.0001***					

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

The dependent variables are the portfolio returns with lowest and highest past return. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS). R1(t-1) and R5(t-1) are the lagged returns of portfolios with lowest and highest past returns, respectively. CCC represents the constant conditional correlation. GCHC(1,1) and GCHC(2,2) are the diagonal elements of the GARCH components. ARCH (1,1,1) and ARCH(1,2,2) are the diagonal elements of the ARCH components

Table 8a. GARCH(1,1) Estimation of Sorted Portfolios (Quartile) by Market Capitalization –Unexpected Match Results

Quintile		Mean Equation								Variance Equation				
		Intercept	IST(t)	LR(t-1)	Unexpected Win(t)	Unexpected Loss(t)	FB(t)	BJK(t)	GS(t)	ARCH(0)	ARCH(1)	GARCH(1)	Unexpected WIN(t)	Unexpected LOSS(t)
1	Estimate	-0.0817	0.5907	-0.471	-0.2	-0.7935	-0.0705	0.1472	0.4146	0.342	0.2695	0.7007	2.5944	11.3408
	Pr > |t|	0.0031***	<.0001***	<.0001***	0.5006	0.5599	0.813	0.6653	0.1055	<.0001***	<.0001***	0	<.0001***	<.0001***
2	Estimate	-0.0409	0.653	-0.4908	1.5005	-0.6309	-0.1273	-0.396	1.1699	0.131	0.1478	0.8569	3.0255	3.2912
	Pr > |t|	0.2631	<.0001***	<.0001***	0.3331	0.5158	0.6534	0.1227	0.0028***	<.0001***	<.0001***	<.0001***	0.0004***	<.0001***
3	Estimate	-0.038	0.6142	-0.5179	-0.8152	-0.1445	-0.3908	-0.1485	-0.1722	0.0614	0.1702	0.8421	0.9879	0
	Pr > |t|	0.1403	<.0001***	<.0001***	0.3052	0.8154	0.0034***	0.418	0.5019	<.0001***	<.0001***	<.0001***	0.1129	0
4	Estimate	-0.1191	0.8206	-0.4955	-0.5633	-0.3108	-0.2556	0.0794	0.0452	0.1056	0.159	0.8186	1.3828	0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.67	0.6434	0.2639	0.7482	0.8502	<.0001***	<.0001***	<.0001***	0.0002***	0

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

The dependent variables are the portfolio returns sorted by market capitalization. The 1st quintile has the smallest market size. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns; LR denotes the lagged portfolio return. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS).

Table 8b. GARCH(1,1) Estimation of Sorted Portfolios (Quartile) by Past Returns –Unexpected Match Results (22-Day Moving Average)

Quintile		Mean Equation								Variance Equation				
		Intercept	IST(t)	LR(t-1)	Unexpected Win(t)	Unexpected Loss(t)	FB(t)	BJK(t)	GS(t)	ARCH(0)	ARCH(1)	GARCH(1)	WIN(t)	LOSS(t)
1	Estimate	-0.1192	0.6581	-0.4964	0.0162	-0.0916	-0.2205	-0.1745	0.1562	0.4289	0.2903	0.6513	2.2897	0
	Pr > |t|	<.0001***	<.0001***	<.0001***	0.9859	0.8955	0.1854	0.4778	0.4184	<.0001***	<.0001***	<.0001***	0.089*	0
2	Estimate	-0.0727	0.6462	-0.505	-0.4909	-0.0839	-0.1686	-0.3593	-0.0378	0.131	0.3049	0.6921	1.3603	0.1306
	Pr > |t|	0.001***	<.0001***	<.0001***	0.0619*	0.8329	0.0611*	0.0155**	0.8502	<.0001***	0	0	0	0.7299
3	Estimate	-0.0654	0.6451	-0.5258	0.3271	-0.4514	-0.1414	-0.1	-0.0097	0.1122	0.2715	0.7172	0.0581	0
	Pr > |t|	0.0016***	<.0001***	<.0001***	0.6318	0.2612	0.2402	0.6009	0.9434	<.0001***	<.0001***	<.0001***	0.8779	0
4	Estimate	-0.0355	0.6597	-0.4946	0.6012	-1.3197	-0.1507	-0.0634	-0.1472	0.0353	0.0708	0.9288	0	0
	Pr > |t|	0.3787	<.0001***	<.0001***	0.6383	0.1608	0.6822	0.8363	0.7825	<.0001***	<.0001***	<.0001***	0	0

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

The dependent variables are the portfolio returns sorted by market capitalization. The 1st quintile has the smallest market size. IST denotes the daily (closing) Istanbul Stock Exchange 100 returns; LR denotes the lagged portfolio return. Win and loss are indicators of international soccer match results. FB, BJK and GS are dummies for Fenerbahce (FB), Besiktas (BJK), and Galatasaray (GS).

are the diagonal elements of the ARCH components.