

MARKET-LEVEL SPORTS SENTIMENT: THE CASE OF THE ROMANIAN FRONTIER STOCK MARKET

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ABSTRACT. In the ongoing quest to better understand investor psychology and behavior, we study the effects of popular sporting events on investor sentiment and, consequently, on market returns in the frontier stock market of Romania. We analyze sporting events that involve teams—football (soccer) and handball—and also ones that center on individuals—tennis. We find some signs that negative outcomes significantly alter post-event investor sentiment, which in turn influences market prices. However, the impact is small from an economic perspective and it is not persistent in time, being reversed in at most three trading days. Overall, we find that investor sports sentiment in Romania is weak.

1. INTRODUCTION

The study of investor sentiment is very important, given its wide implications for the efficiency of financial markets, asset pricing and, ultimately, the success of the economy as a whole. Over the years, several factors have been found to influence investor sentiment and, in general, human mood and emotions. These include the succession of seasons and the associated variability in the amount of daylight (see, e.g. Kamstra et al., 2012), the weather (Goetzmann et al., 2014), religious and/or national holidays (see, e.g., Białkowski et al., 2012), or terrorism activity (Drakos, 2010). Given this trend, the analysis of sports sentiment has recently emerged in the literature to show the complexity of factors that contribute to human emotions and investor decisions.

Several authors have shown that sports fans display significant changes in emotional state after the success or failure of the teams that they support (see, e.g., Jones et al., 2012). When such changes in mood/sentiment affect investors that trade in financial markets, asset prices may also be influenced. Many results point out that this indeed happens. In their landmark study, Edmans et al. (2007) find significant market declines following national team losses in the Football (Soccer) World Cup. Berument and Ceylan (2012) also support the proposition that soccer teams' results in international cups affect stock market returns and the return–volatility relationship in Chile, Spain, Turkey and the United Kingdom. Also, Chang et al. (2012) report results that suggest that the game outcomes of NFL sports teams influence investor sentiment, which significantly affects the returns of locally traded stocks. Further, Berument et al. (2009) find a significant impact of sports sentiment on the Turkish stock market and argue that the effect of soccer wins on returns increases with the fanaticism of the teams' supporters. Bernile and Lyandres (2011) attribute similar results, in part, to a systematic bias in investors' ex ante expectations. Even though contrary evidence exist (see, e.g., Gerlach, 2011), these are rare and

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do not generally invalidate the notion that sports sentiment effects are real and, in some cases, significant.

Why should the stock market react to the outcomes of sporting events? One explanation for sporting clubs listed in the market is that such outcomes have a direct impact on their financial position and performance. The implication is straight-forward and has been confirmed, among others, by Palomino et al. (2009) and Benkraiem et al. (2009), who show that stock prices of soccer clubs listed in European stock markets react strongly to news about game results, generating significant abnormal returns and trading volumes. This effect is present in other types of sports (not just soccer), as shown by Payne et al. (2018) in the case of NFL teams playing the Super Bowl. In the same article, Payne et al. (2018) also show that such effects can generate persistent price drifts in the days prior to the events occurring, not only after them, thus supporting the hypothesis that fans trade in anticipation of the games themselves. Besides the effect on the teams directly implicated in a sporting event, one may argue that having successful athletes has both direct and indirect positive influences on the economy as a whole and, consequently, on the stock market in a country. For example, athletes win money from competitions and can earn foreign sponsorship contracts. When they invest that money in the economy, it can directly increase the local output and, consequently, stock prices. Successful athletes also attract attention. This can constitute an indirect form of marketing for a country and may lead to economic advantages such as increased revenue from tourism or a better social perception from foreigners. In supporting this view, Nicolau (2012) finds that winning the 2010 FIFA World Cup caused a significant increase in the Spanish tourism industry's market value, while Curatola et al. (2016) find that the effect is successfully transmitted to the stock market, even though only firms in the financial sector react to it.

This paper further investigates the topic of sports sentiment affecting the stock market. Our contribution to the literature is twofold. First, we investigate if sports sentiment is a factor that also significantly influences returns in a young and relatively less developed stock market, namely that of Romania, which is characterized as a "frontier" market by MSCI. In effect, we try to investigate if sports sentiment is also present in frontier markets. These type of markets differ from more developed one, as they generally have a higher risk/volatility, a lower liquidity, or a lower market efficiency (see, e.g., Dragotă and Țilică, 2014, and the references therein). Also, local investors can behave differently, this potentially impacting the way human sentiment is transmitted to the stock market in the form of effects in returns. For example, Anusakumar et al. (2017) find substantial country-to-country variations in the influence of market sentiment on returns in their sample of eight emerging Asian markets.

We also contribute by investigating if other sporting events also influence the stock market. The wide majority of studies in the literature are concentrated on soccer events, such as the World Cup. Other competitions have been investigated, such as the NFL (football; Payne et al., 2018) or the NBA (basketball; Akhigbe et al., 2017), but such studies are scarce. In this paper, we also consider women's handball and tennis, which are traditionally popular in Romania and have become even more so given recent significant performances by national athletes. With regards to tennis, Simona Halep has been ranked as a top-10 player by WTA since 2014 and has even hold the world number one position from late 2017 to early 2019. She has also recently won her first Grand Slam title. On the other hand, the Women National Handball Team has qualified for all major championships in the recent years and has even reached the final of the 2016 European Championship. Both are unprecedented performances for this country and, thus, could potentially generate significant sports sentiment effects on stock market returns.

The paper proceeds as follows. Section 2 outlines the data and methodology. Section 3 presents and comments on the main results. Section 4 presents and comments on the results of some robustness tests. Section 5 concludes.

2. DATA AND METHODOLOGY

We employ an event-study type methodology, with the specific approach being based on the local projections method of Jordà (2005) and used, among others, by Jordà et al. (2015) for studying the effects of housing and stock market bubbles on the severity and persistence of economic recessions. The analysis is conducted in event-time. The dependent variable in our model is the cumulative excess market return at h days after a sporting event occurs, while the independent variables are event outcomes (win/draw/loss) and other important features that may be associated with variations in investor sentiment. We construct the data series in our models as follows.

Panel A: Number of Events					
		National Men Football Team	FCSB Men Football Team	National Women Handball Team	Tennis Player-Simona Halep
Date of first event		17.11.2004	27.03.2005	14.10.2008	20.05.2009
Date of last event		20.11.2018	22.12.2018	16.12.2018	25.09.2018
Total events		150	795	175	494
Wins	Total	73	415	98	345
	Surprises	12	24	17	13
Draw	Total	39	206	9	
	Surprises	39	204	9	
Loss	Total	38	174	68	149
	Surprises	9	105	16	48
Panel B: Ex-ante probability associated with final outcomes of sporting events					
		Romanian National Men Football Team	FCSB Men Football Team	Romanian National Women Handball Team	Romanian Tennis Player-Simona Halep
Average		0.4613	0.4484	0.5695	0.6361
Standard Deviation		0.2096	0.2015	0.2555	0.2124
Skewness		0.5875	0.2285	-0.3812	-0.6564
Kurtosis		2.1901	1.7688	1.9823	2.4866

First, we collect sporting events data for the most popular teams/athletes in Romania. Because football (soccer) is the number one sport in the country, by TV ratings and by the number of individuals practicing it¹, we gather data for the National Men Football Team and the FCSB Men Football Team, which is the most popular team in the Romanian Football First Division by the number of declared fans². We also collect data on the National Women Handball Team, which has attracted significant attention and TV ratings following their recent performances in a traditionally popular sport, and also on Simona Halep, the country's most famous tennis player and former world number one in the WTA rankings. All the data is collected from OddsPortal.com (<https://www.oddsportal.com/>) and include the day and time of the event, the competition, the opponent, the result and the ex-ante betting odds associated with each possible outcome (win/draw/loss). The information on odds enables us to compute

¹Data from the Department of Youth and Sports (www.mts.ro) show that at the end of 2016 they were 132 thousand players registered with the National Football federation, which is more than 6 time compared to any other sport in the country (basketball comes second with 21 thousand registered players). Also, anecdotal evidence shows that (<https://www.paginademedia.ro/2018/09/audiente-pro-tv-serbia-romania-nations-league>) the Men's National Football Team produces a TV rating of roughly 30% per match, compared to the usual national average of about 17% (data from the Romanian Association for Audience Measurement, www.arma.org.ro/) for the broadcasting TV station.

²According to an opinion poll conducted by Avangarde (<https://www.grupul-avangarde.ro/>) and reported by in the national sports media (see, e.g., <https://www.fanatik.ro/steaua-este-fcsb-cati-romani-tin-cu-formatia-lui-gigi-becali-17515923>), 34% of football (soccer) fans declared they support FCSB at the end of 2017.

the ex-ante probability assigned by bookies to the final outcome of each event and to incorporate surprises (S) in our analysis, which we do using a dummy variable that is defined as:

$$S_k = 1_{\{\mathbb{P}(k) < 0.33\}} \quad (1)$$

where 1 is the indicator function and $\mathbb{P}(k)$ represents the ex-ante probability of the final outcome for the sporting event k . The 0.33 threshold is set arbitrarily, but we consider it to proxy a “surprise” because it corresponds with betting odds of 3/1 and above. Table 1 reports some summary statistics for the data sample on the sporting events and the ex-ante probabilities associated with their final outcomes.

Second, we collect a sample of stock market trading data from Thomson Reuters Eikon. This consists of daily price information for the Bucharest Stock Exchange Trading (BET) and the MSCI World indices starting January 1, 1998 and ending December 31, 2018. The BET is the main market index in Romania and currently incorporates 13 of the largest, most liquid and most important companies that are listed in the market. The MSCI World Index currently has 1,632 constituents and captures a large and mid-cap representation across 23 international markets. We use the BET index as a proxy for the Romanian market portfolio and the MSCI as the proxy for the global market portfolio. We remove days in which one or both indices are not calculated/reported and we compute log-returns for the remaining days as follows: $r_{index} = \ln(\text{Price}_{index, t}) - \ln(\text{Price}_{index, t-1})$. Similar to the approach of Edmans et al. (2007), we then isolate the idiosyncratic market movements for the Romanian stock portfolio by running the following one-factor regression, which additionally controls for weekday seasonal effects:

$$r_{BET,t} = \beta r_{MSCI,t} + \sum_{i=1}^5 \gamma_i D_{i,t} + \varepsilon_t \quad (2)$$

where β represents the sensitivity of the BET index to movements in the global market portfolio (i.e. the contribution to systematic risk of the Romanian portfolio), D_i , $i = \overline{1, 5}$ are dummies associated to each day of the week, γ_i , $i = \overline{1, 5}$ are their associated coefficients and ε is the error term. The results of estimating equation (2) and the resulting statistical properties of the error term, which captures the idiosyncratic movement of the Romanian market, are reported in Table 2.

Table 2. Market model results							
Panel A: Results of estimating equation (2)							
Variable	Coefficient		Std. Error	t-Statistic	Prob.		
MSCI	0.4201		0.0211	19.87***	0.0000		
Monday	-0.0001		0.0004	-0.36	0.7145		
Tuesday	0.0000		0.0004	0.20	0.8371		
Wednesday	0.0001		0.0004	0.39	0.6944		
Thursday	0.0009		0.0004	2.00**	0.0455		
Friday	0.0008		0.0004	1.76*	0.0773		
Panel B: Statistics for the error term in equation (2)							
Average	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera statistic
0.0000	0.0000	0.1001	-0.1268	0.0153	-0.3925	11.0160	14053.18 (0.0000)
NOTE: R-squared = 0.0715. P-values in round parenthesis. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.							

For each event that occurs at time T , we study the potential impact of investor sports sentiment on cumulative excess market returns for each of the first five trading days after the events occur. We run a linear regression using sporting event data as independent variables on the cumulative excess market return, which is defined as:

$$R_{T+h} = \sum_{i=1}^h \varepsilon_{T+i} \quad (3)$$

The main determinant in the model is the event outcome, which can be a win, a draw or a loss. We define dummy variables for the win (W) and loss (L) events and incorporate a constant term for the benchmark draw event. Each sport has its own competitions and its own peculiarities. Some competitions or some events are more important than others and this may heterogeneously impact investor sports sentiment. Because of this, we also compute and incorporate in our model dummy variables associated with certain important competitions/events. For the National Men Football Team, we define a dummy variable for when the event is an official game (O), these typically corresponding to (World and European) Championship qualifying matches. For the FCSB Men Football team, we define two dummy variables: one for “Derby” events, i.e. official games played against local rivals Dinamo Bucharest and Rapid Bucharest, and another for “International” events, i.e. games played in European competitions organized by UEFA (Champions League and Europa League). For the National Women Handball team, we define a dummy variable for when the event is part of a (World, European and Olympic) Championship match. Finally, for the tennis player we define a dummy variable for when the event is part of a Grand Slam tournament.

The final models incorporate the Win and Loss dummies, either used on their own or in interactions with the other potentially influential variables. For example, in the case of the National Men Football Team, the model to be estimated via OLS is defined as:

$$R_{k,t+h} = \alpha + \beta_1 W_k + \beta_2 L_k + \beta_3 O_k W_k + \beta_4 O_k L_k + \beta_5 S_k W_k + \beta_6 S_k L_k + \beta_7 S_k O_k W_k + \beta_8 S_k O_k L_k + \epsilon_{k,t+h} \quad (4)$$

The models for the FCSB Men Football Team and National Women Handball Team closely resemble equation (4)—they only differ in the interaction terms—, while the model for Simona Halep only incorporates the dummy for losses, as tennis events have only two possible outcomes.

3. RESULTS

The results of estimating equation (4) for the case of the National Men Football Team is reported in Table 3. We find that most estimated coefficients are not statistically significant at any accepted confidence level. Two exceptions exist: the first is the coefficient associated with official match losses 1 day after they occur, and the second is the coefficient associated with wins in any match 2 days after they occur. Because the coefficient for wins has a counterintuitive (negative) sign and is only marginally relevant at the 10% level, we dismiss its economic relevance. However, the coefficient for losses in official matches is fairly significant and points out that the stock market in Romania reacts negatively to this type of events, being consistent with economic intuition and to previous evidence in this regard (see Edmans et al., 2007, and the related literature). In this case, an official match loss of the National Men Football Team leads to an average price decline of -1.22% in the next trading day. Even though the effect does not persist in the following trading days, and surprises do not increase or decrease it, this result constitutes weak evidence that sporting events influence investor sentiment and this, in turn, causes asset prices to change.

Table 3. Estimation Results–National Men Football Team					
Coefficient	h = 1	h = 2	h = 3	h = 4	h = 5
Intercept	0.0018	0.0048	0.0030	0.0019	-0.0001
	[0.69]	[1.40]	[0.73]	[0.37]	[-0.02]
Win	-0.0037	-0.0096	-0.0079	-0.0111	-0.0104
	[-0.92]	[-1.82]*	[-1.25]	[-1.39]	[-1.38]
Loss	-0.0013	-0.0066	-0.0018	-0.0030	-0.0012
	[-0.26]	[-1.01]	[-0.23]	[-0.31]	[-0.13]
Official, Win	0.0019	0.0053	0.0065	0.0080	0.0043
	[0.46]	[0.97]	[0.98]	[0.97]	[0.54]
Official, Loss	-0.0122	-0.0097	-0.0088	-0.0064	-0.0020
	[-2.00]**	[-1.21]	[-0.91]	[-0.53]	[-0.17]
Surprise, Win	-0.0035	-0.0031	-0.0046	-0.0014	-0.0010
	[-0.50]	[-0.34]	[-0.42]	[-0.10]	[-0.07]
Surprise, Loss	0.0084	0.0054	-0.0023	-0.0109	-0.0025
	[0.90]	[0.44]	[-0.16]	[-0.59]	[-0.15]
Surprise, Official, Win	0.0000	-0.0028	0.0010	0.0015	0.0050
	[0.00]	[-0.20]	[0.06]	[0.07]	[0.25]
Surprise, Official, Loss	0.0041	0.0147	0.0206	0.0231	0.0173
	[0.32]	[0.89]	[1.04]	[0.92]	[0.73]
R-squared	0.0634	0.0626	0.0324	0.0234	0.0271
F-statistic	1.1943	1.1778	0.5904	0.4224	0.4926
	(0.3065)	(0.3165)	(0.7845)	(0.9060)	(0.8599)
NOTE: t-statistics in square parenthesis. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significant results at the 10% level are also highlighted in bold text.					

The results of estimating an equivalent model to equation (4) for the FCSB Men Football Team is reported in Table 4. In this case, we find clearer evidence of negative sports sentiment influencing stock market returns. Specifically, a significant negative coefficient of -0.55% is associated with market returns 1 day after a loss occurs. This coefficient remains negative in the following days but turns insignificant. However, losses that occur in derby matches increase the magnitude of negative returns by a statistically significant amount of 1.64 to 2.17 percentage points for up to three days after the event occurs. More intriguing, surprise losses (which have an ex-ante probability of occurrence of less than 33%) reverse this effect in all instances. The results are consistent with the following scenario. Because FCSB is the most popular team in Romania by the number of fans, it attracts the highest attention. Losses and, especially, losses in derby matches, which are fairly expected given ex-ante probabilities of occurrence, have a negative effect on the mood of the fans and they, in turn, transmit this to the stock market in the form of negative returns. On the other hand, losses that are relatively not expected have the opposite effect. This can be caused by an overcompensating positive sports sentiment that rival fans have and transmit to the market. Specifically, surprise losses would negatively affect the fans of the FCSB football team. However, these events constitute surprise wins for rival teams; if their fans react to these positive events and then trade on the market, then they would convert these into significant positive returns. This effect can be amplified by fans of other teams that are not directly interested in the outcome, but have an indirect interest because they may “troll” FCSB fans. Supplementary evidence obtained via more direct tests would help us further investigate this hypothesis. However, this is out of scope for the current paper and should be deferred to future research. Also, regardless of the transmission mechanism, the significant coefficients for derby matches are in accordance with the previous evidence of Berument et al. (2009), being consistent with the hypothesis that soccer event effects on stock returns increases with the fanaticism of the teams’ supporters.

Table 4. Estimation Results—FCSB Men Football Team					
Coefficient	h = 1	h = 2	h = 3	h = 4	h = 5
Intercept	-0.0009	-0.0012	0.0000	-0.0007	-0.0007
	[-1.04]	[-1.20]	[0.04]	[-0.46]	[-0.43]
Win	0.0004	0.0003	-0.0013	-0.0002	-0.0014
	[0.38]	[0.22]	[-0.79]	[-0.13]	[-0.68]
Loss	-0.0055	-0.0016	0.0000	-0.0027	-0.0050
	[-1.76]*	[-0.44]	[0.00]	[-0.51]	[-0.84]
Derby, Win	0.0048	0.0049	0.0047	0.0028	0.0024
	[1.43]	[1.21]	[0.95]	[0.48]	[0.38]
Derby, Loss	-0.0217	-0.0164	-0.0208	-0.0084	-0.0001
	[-3.63]***	[-2.27]**	[-2.33]**	[-0.80]	[-0.01]
International, Win	0.0013	0.0023	0.0033	0.0026	0.0033
	[0.66]	[1.00]	[1.14]	[0.77]	[0.88]
International, Loss	0.0036	-0.0003	-0.0024	0.0026	0.0022
	[1.01]	[-0.07]	[-0.46]	[0.43]	[0.32]
Surprise, Win	0.0000	0.0000	-0.0003	-0.0020	-0.0041
	[0.00]	[-0.01]	[-0.05]	[-0.28]	[-0.52]
Surprise, Loss	0.0079	0.0040	-0.0004	0.0023	0.0034
	[2.41]**	[1.02]	[-0.08]	[0.41]	[0.54]
Surprise, Derby, Win	-0.0017	-0.0055	-0.0017	0.0086	0.0092
	[-0.19]	[-0.50]	[-0.13]	[0.55]	[0.53]
Surprise, Derby, Loss	0.0157	0.0121	0.0200	0.0031	-0.0127
	[2.22]**	[1.42]	[1.89]*	[0.25]	[-0.93]
Surprise, International, Win	-0.0051	-0.0016	-0.0067	-0.0059	0.0029
	[-0.87]	[-0.23]	[-0.76]	[-0.58]	[-0.26]
Surprise, International, Loss	-0.0049	-0.0022	0.0027	-0.0058	-0.0049
	[-0.81]	[-0.30]	[0.29]	[-0.54]	[-0.42]
R-squared	0.0498	0.0183	0.0129	0.0062	0.0090
F-statistic	3.4209	1.2158	0.8533	0.4078	0.5937
	(0.0000)	(0.2671)	(0.5950)	(0.9608)	(0.8483)
NOTE: t-statistics in square parenthesis. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significant results at the 10% level are also highlighted in bold text.					

The results of estimating an equivalent model to equation (4) for the cases of the National Women Handball Team and Simona Halep (Tennis Player) are reported in Tables 5 and 6, respectively. These are generally consistent with our previous findings, but present some anomalies. Specifically, statistically significant coefficients appear the first few days after a negative sporting event outcome, but then turn insignificant by the end of a full trading week. Also, some counterintuitive results are observed. In the case of the National Women Handball Team, a positive and statistically significant coefficient appears 2 days after championship losses. This is surprising given that championship matches should be more important. In the case of Simona Halep, statistically significant coefficients appear up to 3 days after a surprise Grand Slam defeat, but these are positive. Given that Simona Halep tends to advance to higher rounds in such tournaments and has summed up some wins prior to the losses, one possible explanation is that the positive sentiment of these previous wins dominates and appears in the results. However, this explanation is unlikely given that the intercept, which controls for positive event outcomes, tends to be negative and is even statistically significant 5 days after the events occur. Basically, the results show that the effect of sports sentiment on stock prices in the case of relevant handball and tennis events is fairly nonexistent.

Table 5. Estimation Results-National Women Handball Team					
Coefficient	h = 1	h = 2	h = 3	h = 4	h = 5
Intercept	0.0024	0.0017	-0.0011	-0.0043	-0.0052
	[0.73]	[0.38]	[-0.18]	[-0.55]	[-0.56]
Win	-0.0038	0.0004	0.0025	0.0079	0.0058
	[-0.97]	[0.08]	[0.35]	[0.84]	[0.52]
Loss	-0.0072	-0.0100	-0.0097	-0.0103	-0.0096
	[-1.81]*	[-1.90]*	[-1.33]	[-1.08]	[-0.86]
Championship, Win	0.0007	-0.0039	-0.0039	-0.0079	-0.0043
	[0.28]	[-1.19]	[-0.87]	[-1.35]	[-0.62]
Championship, Loss	0.0037	0.0072	0.0077	0.0047	0.0036
	[1.31]	[1.93]*	[1.50]	[0.70]	[0.46]
Surprise, Win	0.0021	-0.0013	0.0015	0.0034	0.0035
	[0.46]	[-0.21]	[0.18]	[0.31]	[0.27]
Surprise, Loss	0.0074	0.0005	-0.0007	-0.0006	-0.0060
	[1.49]	[0.08]	[-0.07]	[-0.05]	[-0.43]
Surprise, Championship, Win	-0.0027	-0.0010	0.0025	0.0045	0.0060
	[-0.48]	[-0.14]	[0.25]	[0.34]	[0.38]
Surprise, Championship, Loss	-0.0053	-0.0013	0.0014	0.0048	0.0088
	[-0.87]	[-0.16]	[0.12]	[0.33]	[0.51]
R-squared	0.0321	0.0538	0.0449	0.0663	0.0519
F-statistic	0.6888	1.1800	0.9768	1.4744	1.1377
	(0.7010)	(0.3139)	(0.4559)	(0.1700)	(0.3406)
NOTE: t-statistics in square parenthesis. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significant results at the 10% level are also highlighted in bold text.					

Overall, the results show some evidence of sports sentiment influencing stock prices, but the effect is weak. There is no evidence for positive sports sentiment, while the few instances when negative sports sentiment appears to have an influence disappear by the end of the trading week. In all cases, all significant coefficients are reversed by the 4th day after events occur, thus showing that its influence does not persist and does not causes systematic mispricings of stock market prices.

Table 6. Estimation Results-Simona Halep Tennis Player					
Coefficient	h = 1	h = 2	h = 3	h = 4	h = 5
Intercept	-0.0011	-0.0011	-0.0015	-0.0013	-0.0019
	[-1.64]	[-1.36]	[-1.59]	[-1.25]	-0.0019
Loss	0.0016	0.0018	0.0022	0.0014	-0.0005
	[1.01]	[0.98]	[1.02]	[0.59]	[-0.20]
Grand Slam, Loss	-0.0059	-0.0041	-0.0061	-0.0057	-0.0036
	[-1.92]*	[-1.12]	[-1.46]	[-1.23]	[-0.70]
Surprise, Loss	-0.0035	-0.0032	-0.0030	-0.0034	0.0001
	[-1.35]	[-1.06]	[-0.85]	[-0.87]	[0.03]
Surprise, Grand Slam, Loss	0.0121	0.0121	0.0128	0.0126	0.0116
	[2.38]**	[2.01]**	[1.84]*	[1.62]	[1.35]
R-squared	0.0123	0.0090	0.0079	0.0056	0.0053
F-statistic	1.5285	1.1217	0.9783	0.6891	0.6587
	(0.1926)	(0.3454)	(0.4189)	(0.5997)	(0.6209)
NOTE: t-statistics in square parenthesis. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significant results at the 10% level are also highlighted in bold text.					

4. ROBUSTNESS ANALYSIS

We perform a robustness check using a model that is defined in calendar time, as opposed to event time. Because this type of model cannot handle cumulative market returns, we incorporate dummy variables for only the first calendar day after relevant sporting events occur. We use the daily excess stock return as the dependent variable and the same set of dummy variables and interaction terms as before as the explanatory ones. We test two alternative specifications: a multivariate linear model and a GARCH model, which accounts for the heteroskedasticity in stock market returns. In the latter model, we also incorporate all the explanatory variables in the variance equation. This enables us to test the effect of sporting events on stock market variance and makes the model resemble a TGARCH. Table 7 reports the results of estimating the two models. The sample starts in 2004 and ends in 2018, having 3765 observations in total. As the number of sporting events is significantly smaller, we expect the models to have very low explanation power. As this is indeed the case, we focus on the signs and the statistical significance of the estimated coefficients.

The results show that a negative sports sentiment effect occurs on the first trading day after relevant events. Specifically, in the return equations, we find significant negative coefficients associated with losses for the FCSB Men Football Team and the National Women Handball Team, and also for official match losses for the National Men Football Team. This implies that stock market returns are significantly negative on the first day following such perceived undesirable events. As before, the only exception to the rule is the significant positive coefficient associated with losses for Simona Halep.

Coefficient	National Men Football Team		FCSB Men Football Team		National Women Handball Team		Simona Halep Tennis Player	
	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH
No. Observations	3765	3765	3765	3765	3765	3765	3765	3765
Panel A: Return Equation								
Intercept	-0.0000	-0.0001	-0.0000	0.0000	-0.0000	0.0000	-0.0001	0.0000
	[-0.28]	[-0.42]	[-0.07]	[0.02]	[-0.39]	[0.08]	[-0.58]	[0.14]
RETURN(-1)	0.0297	0.0408	0.0290	0.0314	0.0307	0.0474	0.0299	0.1189
	[1.82]*	[1.53]	[1.78]*	[0.94]	[1.88]*	[2.80]***	[1.83]*	[5.58]***
Win	-0.0019	-0.0008	-0.0006	-0.0006	0.0003	0.0000		
	[-0.75]	[-0.22]	[-0.76]	[-0.34]	[0.09]	[0.03]		
Loss	0.0006	-0.0007	-0.0087	-0.0087	-0.0065	-0.0001	0.0018	0.0027
	[0.17]	[-0.09]	[-2.58]***	[-0.98]	[-1.92]*	[-0.06]	[0.99]	[2.28]**
Official, Win	0.0020	0.0020						
	[0.57]	[0.51]						
Official, Loss	-0.0122	-0.0085						
	[-2.35]**	[-0.72]						
Derby, Win			0.0051	0.0050				
			[1.31]	[0.83]				
Derby, Loss			-0.0193	-0.0191				
			[-2.91]***	[-1.67]*				
International, Win			0.0027	0.0028				
			[1.23]	[0.71]				
International, Loss			0.0074	0.0074				
			[1.86]*	[0.74]				

Coefficient	National Men Football Team		FCSB Men Football Team		National Women Handball Team		Simona Halep Tennis Player	
	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH
No. Observations	3765	3765	3765	3765	3765	3765	3765	3765
Panel A: Return Equation (continuation)								
Championship, Win					0.0002	0.0005		
					[0.05]	[0.18]		
Championship, Loss					0.0052	-0.0013		
					[1.21]	[-0.43]		
Grand Slam, Loss							-0.0022	-0.0025
							[-0.62]	[-1.65]*
Surprise, Win	-0.0033	-0.0028	0.0012	0.0012	-0.0018	-0.0028		
	[-0.56]	[-0.34]	[0.27]	[0.16]	[-0.23]	[-0.58]		
Surprise, Loss	0.0082	0.0057	0.0099	0.0097	0.0074	-0.0022	-0.0055	-0.0075
	[1.05]	[0.65]	[2.66]***	[1.06]	[0.95]	[-0.44]	[-1.70]*	[-4.11]***
Surprise, Official, Win	-0.0002	-0.0003						
	[-0.02]	[-0.03]						
Surprise, Official, Loss	0.0044	0.0049						
	[0.41]	[0.32]						
Surprise, Derby, Win			-0.0031	-0.0033				
			[-0.31]	[-0.32]				
Surprise, Derby, Loss			0.0142	0.0146				
			[1.79]*	[1.16]				
Surprise, International, Win			-0.0077	-0.0075				
			[-1.18]	[-0.83]				
Surprise, International, Loss			-0.0076	-0.0074				
			[-1.07]	[-0.51]				
Surprise, Championship, Win					0.0004	0.0012		
					[0.05]	[0.22]		
Surprise, Championship, Loss					-0.0061	0.0042		
					[-0.65]	[0.25]		
Surprise, Grand Slam, Loss							0.0092	0.0096
							[1.59]	[3.16]***
NOTE: t-statistics in square parenthesis. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significant results at the 10% level are also highlighted in bold text.								

However, we find negative coefficients associated with some interaction terms that, consistent with expectations, reverses this effect for surprise losses and Grand Slam losses. Significant positive coefficients are also found in the case of losses for the FCSB Men Football Team associated with surprises, international matches or Derby's, this being consistent with our earlier findings and hinting an indirect positive return effect that may be associated with desirable

outcomes for rival team fans. On the other hand, none of the coefficients associated with direct desirable outcomes (wins) are significant, showing that positive sports sentiment does not occur in our sample. Overall, the signs of the estimated coefficients and their statistical significance are largely consistent with our earlier results obtained for the models that have been estimated in event time. This implies that our results and the conclusions are robust to changes in the testing methodology.

Besides this, the results obtained for the variance equation in the GARCH models show that sports sentiment also influence stock market volatility on the first trading day after some relevant events. The variance on such days tends to significantly decrease, even though, surprisingly, this mostly happens for desired sporting outcomes (wins). On the other hand, stock market variance is influenced by negative events only in the case of surprise losses recorded by the National Men Football Team, surprise championship losses recorded by the National Women Handball Team and losses recorded by Simona Halep. Overall, as mostly significant negative coefficients are present, the results show that some sporting events reduce the volatility of stock market returns in the day after they occur. This, coupled with the results obtained for the return equations, constitutes evidence for the presence of sports sentiment in the Romanian stock market and confirms our earlier findings.

Table 7. Time series analysis results								
Coefficient	National Men Football Team		FCSB Men Football Team		National Women Handball Team		Simona Halep Tennis Player	
	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH
No. Observations	3765	3765	3765	3765	3765	3765	3765	3765
Panel B: Variance Equation								
Intercept		0.0001		0.0001		0.0000		0.0000
		[8.88]***		[7.02]***		[8.33]***		[19.51]***
RESID(-1)^2		0.1330		0.1392		0.1457		0.2880
		[8.63]***		[6.08]***		[18.38]***		[17.16]***
GARCH(-1)		0.5043		0.5623		0.8484		0.4334
		[9.62]***		[8.80]***		[118.32]***		[18.87]***
Win		-0.0001		-0.0000		-0.0000		
		[-4.13]***		[-2.32]**		[-0.10]		
Loss		-0.0000		-0.0000		0.0000		-0.0000
		[-0.60]		[-0.37]		[0.14]		[-6.60]***
Official, Win		-0.0000						
		[-2.39]**						
Official, Loss		0.0001						
		[0.91]						
Derby, Win				-0.0001				
				[-0.92]				
Derby, Loss				-0.0000				
				[-0.02]				
International, Win				-0.0001				
				[-1.49]				
International, Loss				-0.0000				
				[-0.38]				
Championship, Win						0.0000		
						[0.38]		

Coefficient	National Men Football Team		FCSB Men Football Team		National Women Handball Team		Simona Halep Tennis Player	
	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH	Linear	TGARCH
No. Observations	3765	3765	3765	3765	3765	3765	3765	3765
Panel B: Variance Equation (continuation)								
Championship, Loss						0.0000		
						[1.48]		
Grand Slam, Loss								-0.0000
								[-0.46]
Surprise, Win		-0.0000		-0.0000		-0.0000		
		[-0.16]		[-0.85]		[-0.06]		
Surprise, Loss		-0.0002		-0.0001		-0.0000		-0.0000
		[-1.85]*		[-0.66]		[-1.15]		[-1.30]
Surprise, Official, Win		0.0000						
		[0.02]						
Surprise, Official, Loss		0.0001						
		[0.69]						
Surprise, Derby, Win				-0.0000				
				[-0.50]				
Surprise, Derby, Loss				-0.0000				
				[-0.28]				
Surprise, International, Win				-0.0000				
				[-0.66]				
Surprise, International, Loss				-0.0000				
				[-0.09]				
Surprise, Championship, Win						-0.0000		
						[-2.03]**		
Surprise, Championship, Loss						0.0003		
						[7.34]***		
Surprise, Grand Slam, Loss								0.0000
								[0.42]
R-squared	0.0043	0.0038	0.0106	0.0106	0.0019	0.0005	0.0018	-0.0063
F-statistic	1.8366		3.1082		0.8328		1.4221	
	(0.0569)		(0.0001)		(0.5857)		(0.2128)	
DW-statistic	2.0010	2.0239	1.9927	1.9978	2.0017	2.0366	2.0015	2.1810
NOTE: t-statistics in square parenthesis. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significant results at the 10% level are also highlighted in bold text.								

5. CONCLUSION

This paper investigates the effect of various possibly relevant sporting events on returns in the frontier stock market of Romania. We analyze sports that involve teams—football (soccer)

and handball—and also ones that center on individuals—tennis. We basically investigate three complementary hypotheses: (1) investors (the market) in Romania are (is) not influenced by sporting events; (2) investor sports sentiment influences asset prices but this is quickly reversed by market participants in a fairly efficient manner; or (3) investor sports sentiment significantly and persistently shifts stock prices. The results support the second hypothesis by showing that negative investor sports sentiment in Romania does appear mainly in the first trading day after some events. The results are stronger for soccer events (more estimated coefficients are significant, and they more closely follow economic intuition) and less so for handball and tennis. This may be due to the fact that soccer is more popular in this country compared to the other investigated sports. Also, we find some hints that club soccer events effects on stock returns increases with the fanaticism of the teams' supporters, which supports the conclusions of Berument et al. (2009). Further, the results are robust, regardless if we define and use models in event time or in calendar time. However, the models in event time show that stock market returns are not influenced in a statistically or economically significant way one week after sporting events involving popular domestic athletes occur. This suggests that any sports sentiment effect is eliminated by the market within one trading week.

Overall, we can conclude that investor sports sentiment in Romania is weak and that stock market returns are not persistently influenced by sporting events involving popular domestic athletes. Although the study of this topic would benefit from a more direct approach (e.g. by investigating sports fans that also participate in the stock market), or can be extended by incorporating events from other relevant sports and/or athletes, the results provide a strong hint that investors cannot systematically earn significant excess returns in the frontier stock market of Romania by trading in the aftermath of sporting event.

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