

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

Are Fan Tokens Fan Tokens?

Ender Demir ^{a,*}, Oguz Ersan ^b, Boris Popesko ^c^a Department of Business Administration, School of Social Sciences, Reykjavik University, Reykjavik, Iceland^b Department of International Trade and Finance, Faculty of Economics, Administrative and Social Sciences, Kadir Has University, Istanbul, Turkey^c Department of Business Administration, Faculty of Management and Economics, Tomas Bata University in Zlin, Zlin, Czech Republic

ARTICLE INFO

Keywords:

Fan tokens
cryptocurrencies
football clubs
asset prices
mood

ABSTRACT

Fan tokens, digital assets providing privileges including rewards and promotions as well as voting rights in polls, recently became highly popular among the football clubs and the (fan) investors. Fan tokens differ from the stocks of football clubs with respect to ownership properties. Fan tokens might be associated with investor mood changes and reaction to match results. This paper aims to explore the impact of football match results on token prices of the clubs. We show that both the losses and wins in the most prestigious European tournament, UEFA Champions League affect the fan token abnormal returns, losses with an effect of a larger magnitude. Domestic matches and Europa League matches are not followed by similar reactions from the investors. Our results are robust to the use of alternative model specifications and various benchmark assets.

1. Introduction

Fan tokens are now the most recent phenomena among football fans and cryptocurrency investors. Fan tokens are digital assets, which provide access to an encrypted ledger of voting and membership rights ownership. Those tokens give owners the opportunity to influence the decision of clubs via interactive polls, to access club-related content, to participate in club-related games and competitions, and to earn rewards such as tickets, digital badges, and club-specific NFTs (non-fundable tokens). It is a connection of the clubs to their fan bases. For example, Apollon FC fans voted to choose the team uniform via fan tokens; Atletico Madrid fans were able to decide among four motivational messages to be displayed in the stadium in period when supporters were not allowed to attend the matches. Now socios.com, most popular hub for sports fans to purchase fan tokens, is launching "I am more than a fan" Visa Debit card to empower and reward sports fans globally. The recent transfer of Lionel Messi to Paris Saint-Germain led to an increase of 43% in PSG fan token price (Marca, 2021). In addition to that, Lionel Messi's wage package includes certain payments with PSG fan tokens. The clubs generate income from fan token offering and can create interactions with their fans.

Tokens of many worldwide famous football clubs (e.g., Barcelona, Paris Saint-Germain, Manchester City, AC Milan, Juventus) and relatively less-popular ones (e.g., Istanbul Başakşehir, Fortuna Sittard, Novara Calcio) have already been traded in the market and more is about to come. As of mid-November, 2021, a total of 40 football clubs have issued fan tokens most of which took place within 2021. Fan tokens are not limited to football clubs but they also exist for national football teams (Spain, Argentina and Portugal), national basketball teams (Turkey), five teams in e-sports, three in racing and two in fighting.¹ Many football clubs and teams such as

* Corresponding author.

E-mail addresses: enderd@ru.is (E. Demir), oguzersan@khas.edu.tr (O. Ersan), popesko@utb.cz (B. Popesko).

¹ The list of fan tokens is gathered from <https://www.coinmarketcap.com/en> 2021 <http://www.coinmarketcap.com> and <https://www.coingecko.com/en> 2021 <http://www.coingecko.com>

<https://doi.org/10.1016/j.frl.2022.102736>

Received 17 September 2021; Received in revised form 8 January 2022; Accepted 13 February 2022

Available online 14 February 2022

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Italian Football Federation, Napoli and Bologna are currently signing with Chiliz to launch their fan tokens on crypto exchanges.² Although there is a rising interest from the users' side (see Figure 1) and many clubs issue fan tokens, literally, we know little about the price dynamics of those tokens.

This paper aims to explore the impact of results in football matches on token prices of the clubs, namely fan tokens. Finance literature extensively analyzes the research question at both club and national level by providing supportive evidence on the impact of game results on stock returns (Edmans et al. 2007; Palomino et al. 2009; Demir and Rigoni, 2017; Galloppo and Boido, 2020). The comprehensive literature analysis of Geyer-Klingeberg et al. (2018) shows that there is an asymmetric effect of game results on stock returns meaning that average returns after losses are almost double in magnitude of those after wins. Edmans et al. (2007) show that for the case of national games, losses are associated with a statistically significant negative effect on the losing country's stock market while no effect is documented for wins. This is named as loss effect, which is also confirmed by several subsequent studies (e.g., Truong et al. 2021). In addition, the literature documents more pronounced effects for important matches. Eren and Mocan (2018) investigate the penalty decisions by the judges in Louisiana at the trials following the matches of the Louisiana State University American football team. The effect following upsetting losses in important matches is 50 additional days of sentencing per trial and it is statistically significant. On the other hand, the effects are insignificant for losses in the remaining matches. Edmans et al. (2007) and Chang et al. (2012), analyzing investment decisions aggregated in the stock market, reach to similar findings regarding the presence and magnitude of the effects in more important matches. They demonstrate that the effects are more pronounced for the important matches.

Why fan token prices should be affected from the game results? When a football club performs in a game, an accompanying stock market reaction is expected with two arguments. Based on a rational argument, the investors are able to observe the performance of clubs (at least through the on-season), receiving new information, which will affect the current, and future cash flow of firms. The second argument is about the impact of performance on the mood of investors, which will then influence the investment decisions.³ Thus, the two mutually reinforcing factors may arise the impact of field performance on stock returns of football clubs (Demir and Rigoni, 2017). For the case of fan tokens, rather than the intrinsic information value, the mood effect might be the dominant factor in the pricing. Fan token holders do not own a share in the football club as stock holders do. Thus, when compared to stock prices, fan token prices are less likely to be explicitly driven by performance related cash flow of football clubs. On the other hand, the performance of sports clubs might significantly affect the mood of fan token investors leading to a reaction in the market.

Working with fan tokens has several advantages over stocks. First, we conjecture that the share of club fans among fan token investors is likely to be higher compared to their share in football club stocks.⁴ Therefore, the impact of mood on their investment decisions can be more visible in token prices. Second, for the stock prices, the impact of games played at the weekend are visible on Monday with a delay.⁵ However, cryptocurrency markets function seven days enabling us to observe the impact without such a delay. Third, fan token market is in the very early stage of development and we may expect relatively higher amount of inefficiency (Urquhart, 2016). Thus, fan tokens might be more prone to the mood effect. Figure 2 plots the fan token price and stock price for Juventus FC, the football club with the earliest date of fan token offering. The price trends in two asset classes are not coinciding, implying that our investigation of fan tokens may shed new light to the literature on the effects of game results on the respective asset prices.⁶

We examine fan token returns of eleven football clubs with sufficiently long price data. We find that game losses can significantly affect fan token prices generating negative abnormal returns. In a further analysis with a focus on the match type (domestic,

² Chiliz is the world's leading blockchain fintech provider for sports and entertainment. Chiliz runs *socios.com* (<https://www.socios.com/en2021http://www.socios.com>) that is the biggest non-exchange blockchain-powered app in the world (<http://www.chiliz.com>).

³ The literature examining the effects of mood changes following sports game results is not limited to the financial market reflections of these effects (e.g., Brown and Hartzell, 2001; Edmans et al., 2007; Palomino et al., 2009; Kaplanski and Levy, 2014) but also demonstrates diverse evidence such as differing voting decisions in the elections (Healy et al., 2010); increased domestic violence rates by men (Card and Dahl, 2011); decrease in the grades of male students due to increased alcohol consumption (Lindo et al., 2012); changes in the rate of asylum grants in US immigration courts (Chen and Spamann, 2014); and altered sentence lengths issued by judges (Eren and Mocan, 2018).

⁴ Reliable overall statistics on the ownership structure of fan tokens are not available. Therefore, we cannot refer to an exact distribution scheme, i.e. among fans and professional investors. Nevertheless, we can make some inferences based on other less direct statistics. First, since fan tokens by definition provide privileges such as voting rights in polls and various rewards and they mainly aim to attract the fans, we expect a significant weight of fans' share in fan tokens. Second, the fact that investing in these assets is extremely simple e.g. over a mobile app like *socios.com* suggests that large number of fans may have purchased fan tokens. Supporting these facts, the interest and potential investments of fans are reflected by the total number of people in the global community of *socios.com*. According to *socios.com* on 14 September 2021, they have a growing global community of 1.3M fans. Finally, as a specific example, the distributed information regarding the Corinthians football club's initial offering gives additional insight. The offering that took place on 02 September 2021 raised a total of \$1.7 million as all of the 850,000 units were sold within the first two hours. Following the first half an hour, the *socios.com* CEO Alexandre Dreyfus announced over twitter that 18,261 different users bought 654,509 units (Dreyfus, 2021). This implies an average investment of 72 dollars per investor. The number of users can be considered as high and we infer that the fans have purchased the asset.

⁵ Weekend games are on Friday, Saturday or Sunday, the stock market reaction is calculated as change in Monday closing price to Friday closing price. There can be other events occurring in this time period which can mitigate or reinforce the reaction. Moreover, mood changes following the games may fully or partially disappear until Monday.

⁶ Figure A1 in Appendix 1 plots returns on the token and stock prices of four clubs in our sample having issued both of the asset types. Fan token returns are associated with substantially higher volatility. The correlation coefficient between two asset types' returns are between -9.8% and 7.8% for these clubs. Standard deviations of token returns are 2.3 to 4.5 times the ones of stock returns.

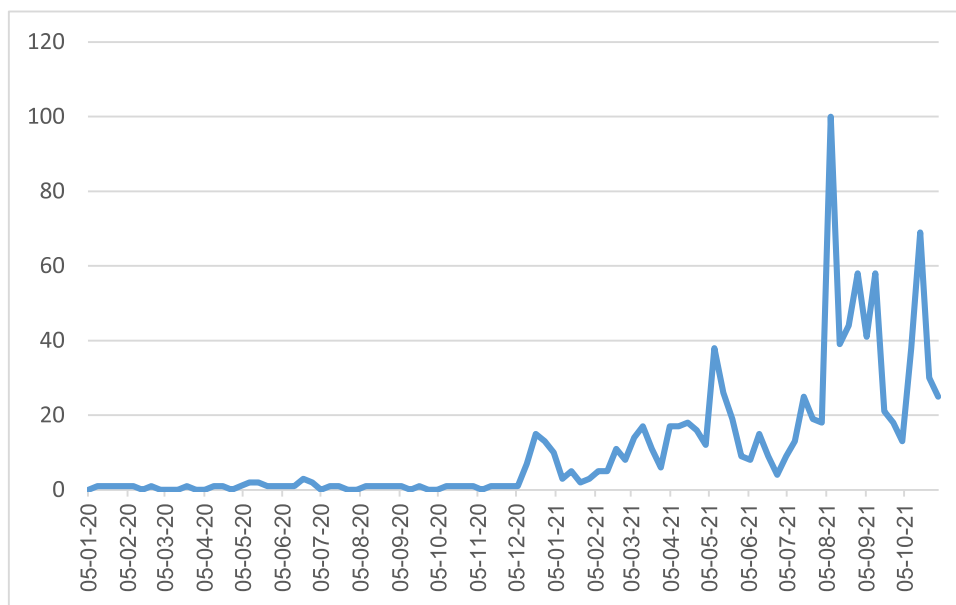


Figure 1. "Fan Token" search results in Google Trends

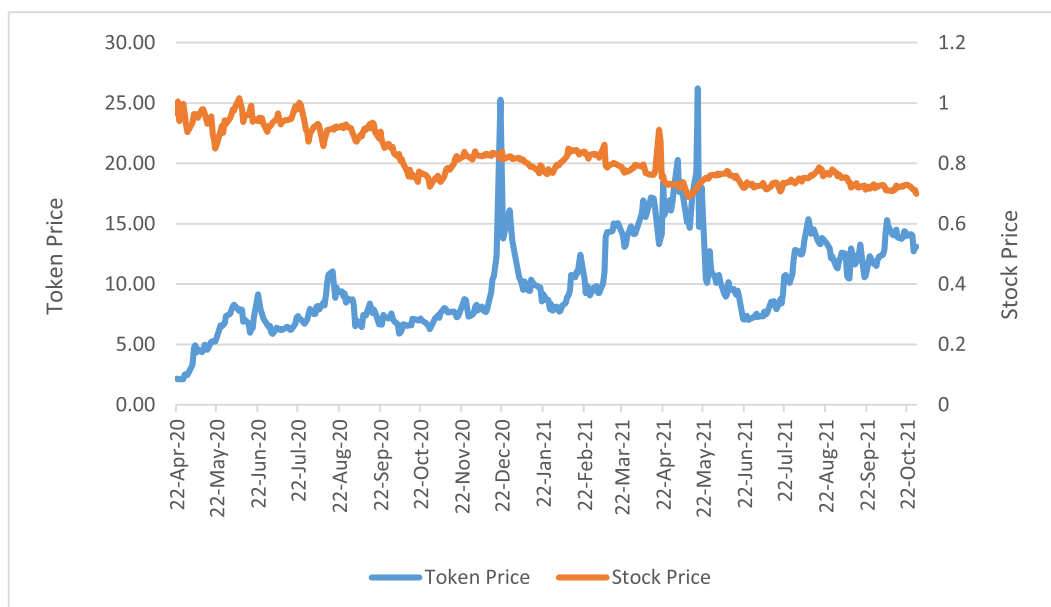


Figure 2. Juventus FC – Token Price and Stock Price

Note: The figure plots the token price and stock price of Juventus as a selected example. Juventus has the longest token price history starting on the 22 April 2020. On the left axis, Juventus Fan Token (JUV) price in US dollars is presented, on the right axis, Juventus stock (JUVE) price in euros is presented.

Champions League or other Europa League) we show that the documented loss effect is special to the Champions League matches. Moreover, game wins in this most prestigious tournament also have an impact on the fan token prices as they lead to positive abnormal returns. Our results are robust to the use of alternative model specifications and various benchmark assets. So far to our knowledge, this is the first study to explore fan tokens, examining the investor reactions to match results in this new asset type. Eventually, our findings also contribute to the behavioral finance literature which documents the reflections of match results in the stock market (e.g., [Edmans et al., 2007](#); [Palomino et al., 2009](#)).

2. Data and Methodology

The sample includes the fan tokens of eleven football clubs: AC Milan (ACM), Galatasaray A.S. (GAL), Atlético de Madrid (ATM), AS Roma (ASR), Paris Saint-Germain (PSG), Juventus FC (JUV), FC Barcelona (BAR), Apollon Limassol (APL), Trabzonspor (TRA), Manchester City (CITY) and Young Boys (YBO). Majority of the currently tradable fan tokens are recently launched disabling their investigation in this study due to limited number of observations both in terms of available price history and match record. As of mid-November 2021, a total of 40 football clubs have issued their fan tokens. Specifically, 24 of these have less than three months of price data (7 clubs with less than three months; 4 clubs with less than two months; 5 clubs with less than one month; and 8 clubs with no price data by 31.10.2021). More importantly, for these clubs, number of international matches is rare since few are big clubs to compete internationally and it is the beginning of the season. Among the remaining 16 clubs with fan tokens, we exclude 4 clubs which do not have any international matches (Istanbul Basaksehir, Sint-Truidense V.V., Goztepe S.K., and Novara Calcio); and we exclude one club with league schedule nonoverlapping with UEFA countries (Atletico Independiente). With the aforementioned two criteria: i) three months of minimum price history; and ii) to compete internationally, we have eleven clubs in our sample. We have one fan token with more than 18 months of data (JUV); five tokens with 16 months (PSG, BAR, GAL, ATM, ASR); two tokens with 11 months (TRA, APL); one with 9 months (YBO); one with 8 months (ACM) and one with 5 months of data (CITY). Juventus FC has the longest price history starting from 22.04.2020. For all assets, the ending date of our data is 31.10.2021. Thus, our data span is between 22.04.2020 and 31.10.2021 for Juventus and shorter for the other clubs. Football clubs generally launch fan tokens via *socios.com* powered by *Chiliz* (CHZ). It is the first and most popular mainstream hub for fans to buy tokenized voting rights in their favorite teams. We collect the publicly available token prices from www.coinmarketcap.com (e.g., [Katsiampa, 2019](#); [Wei, 2018](#)).

First, we implement the following market model to calculate the expected return for each fan token:

$$r_{it} = a_i + \beta_i r_{mt} + \varepsilon_{it} \quad (1)$$

where r_{it} is the log return of fan token of club i on a given day t and ε is the error term. There is no commonly implemented approach for choosing a benchmark for r_{mt} . [Hashemi et al. \(2020\)](#) and [Gerritsen et al. \(2021\)](#) use mean-adjusted returns model in abnormal return calculations with their data sets including Bitcoin. In this study, we use three alternative benchmarks namely Bitcoin, Chiliz, and Cryptoindex CIX100. Bitcoin is the dominant cryptocurrency in the market. Fan tokens are offered via fan token offering (FTO). Fans can purchase the fan tokens which are offered over www.socios.com in exchange of purchased CHZ (Chiliz). Cryptoindex 100 is an index of the top 100 coins that continuously rebalances itself as the cryptocurrency market ebbs and flows. We will be able to test the robustness of our findings by using three different proxies for the benchmark return. Abnormal returns are calculated as follows:

$$AR_{it} = r_{it} - \hat{a}_i - \hat{\beta}_i r_{mt} \quad (2)$$

Football matches are played at least once in a week so it is not possible to use pre-event data as estimation window.⁷ Therefore, we use the full sample period as estimation window in line with the previous studies (e.g., [Palomino et al. 2009](#)).⁸ Calculating the average abnormal returns, we test the significance using the Wilcoxon signed-rank test. We test the market reaction to game results by the following regression model ([Palomino et al. 2009](#); [Demir and Rigoni, 2017](#)) with several control variables:

$$AR = a_0 + \beta_1 \cdot Win + \beta_2 \cdot Loss + \beta \cdot Control\ variables + \varepsilon \quad (3)$$

where control variables are given as *Home* equals one if the game is a home game and zero if it is an away game; *Champions* equals to one if the game is a UEFA (Union of European Football Associations) Champions League game and zero otherwise; *Euro* equals to one if the game is UEFA Europa League game and zero otherwise.⁹ *Win* and *Loss* dummy variables represent the football match outcomes of win and loss, respectively. In line with the similar works studying the impacts of match results on stock returns ([Edmans et al., 2007](#); [Palomino et al., 2009](#)), we keep the draws out of our analyses and focus on wins and losses.¹⁰ In addressing the cross-sectional dependence problem in all regressions, we report and interpret Driscoll-Kraay extension of Newey-West HAC robust standard errors ([Driscoll and Kraay, 1998](#); [Hoechle, 2007](#)).

⁷ European tournament matches are also played within the week. Due to COVID-19 period, sometimes there were more than two matches within a week.

⁸ We do not calculate the cumulative abnormal returns as there can be overlaps due to the tight match fixtures in the pandemic period.

⁹ Clubs may pass from the Champions League to the Europa League during the same season. In data preparation, we considered for such passes. All club-match pairs are placed within the organization (Champions League or Europa League) that actually hosts the match.

¹⁰ While wins and losses can be explicitly associated with positive and negative sentiment and with the reaction of fans and investors, evaluating the impacts of draws is usually not easy. A draw may be considered as a negative outcome due to loss of points. However, it may also be a positive outcome depending on factors such as the opponent strength, league position and time of the season. More importantly, the ex-ante determination of whether a specific draw is more likely to be considered as a negative or a positive outcome for the club may not necessarily reflect the arising reaction from the fans and investors. Therefore, we prefer to keep the draws out of our analyses and focus on wins and losses for which we expect more unambiguous effects on fans.

3. Findings

Table 1 presents the AAR (Average Abnormal Returns) by game outcome and match type.¹¹ Losses in the Champions League are associated with an AAR of -0.0277 when we use the Cryptoindex as benchmark. This is similar with the use of other two benchmarks (0.0314 and 0.0295) and all are statistically significant. Similarly, win results in the same tournament are followed by positive abnormal returns on average. Champions League games are the most prestigious organization of UEFA. There are substantial monetary rewards for the games played and qualification to the next rounds. The Champions League games are followed by large audiences from all over the world.¹² AARs following both the winning and losing games in the Europa League are insignificant though. Domestic (league & national cup) games with both win results and loss results are followed by negative abnormal returns on average, an intriguing finding to be examined further via the regression analyses, controlling for other variables including firm fixed effects.

Table 2 reports the estimation results from the regressions with and without control variables, all models incorporating the team fixed effects. This shows that there is a persistent loss effect both before and after controlling for home-away status and match type. The game losses lead to a decline in the abnormal returns in fan tokens while wins have no statistically significant impact on the abnormal returns. Moreover, based on our analysis, none of the control variables have statistically significant effects on the abnormal returns.

As a further analysis, we explore whether the game results at different organizations (domestic, UEFA Champions League, UEFA Europa League) have heterogeneous effects on fan tokens. The results presented in Table 3 suggest that only the wins and losses in the Champions League affect fan token abnormal returns. A win in the Champions League leads to a positive reaction in the market while a loss in the Champions League leads to a negative reaction. It is noteworthy to mention that the positive effect of Champions League wins is insignificant when we use Cryptoindex as the benchmark. Moreover, the absolute impact of losses in the Champions League is around two-fold the one of wins in the same tournament. Domestic games and games in Europa League do not have any impact on fan token abnormal returns.¹³ This finding implies that fan token investors should carefully follow the field performance of the clubs in the Champions League.

We conduct two robustness checks. First, since we work with an asset type different from equities, availability of club equity shares may be important. Thus, we replicate our analyses in Table 3 by excluding the firm fixed effects and including a 'listing' variable that is equal to one if the club is listed in the stock market, and zero otherwise. Secondly, although we have only two years, i.e. 2020 and 2021, we replicate our analyses in Table 3 by including year fixed effects. In both robustness checks, we obtain qualitatively same results, which are reported in the appendix table, Table A1. The negative effect of Champions League losses remains in all specifications and the positive effect following the wins in the same tournament is observable up to lesser extent and being statistically significant in four over six specifications. Finally, we examine the goal differences rather than the match outcome itself (e.g., Palomino et al., 2009; Demir and Rigoni, 2017), reaching to supporting evidence for our main findings. Replicating our main analyses in Table 3 by replacing the win and loss dummies with goal difference dummies for each match type, we obtain qualitatively similar results, namely positive impact of goal difference on token abnormal returns that is solely observed among the Champions League matches. We do not report the results for the sake of brevity. Goal-difference variable can also represent the rareness in match outcomes (large goal differences are rare, thus probably less expected and more influential). By the use of more detailed datasets, future research may investigate the effects of the surprise component in match results on fan token returns.

We link the findings on the significant and asymmetric effects in the Champions League to the literature that presents extensive evidence on i) the loss effect and ii) the role of match importance. The asymmetry has already been documented in psychology and economics literature with observed consequences such as increased violence and crime, increased alcohol consumption, reduced school performance following losses (e.g., Card and Dahl, 2011; Lindo et al., 2012). Similarly, in finance literature, various studies demonstrate the asymmetric effects in stock markets and even suggest profitable trading strategies in exploiting the observed loss effects in the market (e.g., Brown and Hartzell, 2001; Edmans et al., 2007; Kaplanski and Levy, 2010). Edmans et al. (2007) also associate the asymmetry with the prospect theory of Kahneman and Tversky (1979) since a potential allegiance bias of the fans can make them form biased predictions and expectations prior to the matches leading to false reference points in the utility framework. The fact that we find significant effects in the most prominent tournament, the Champions League, is in line with the studies providing evidence for the exaggerated effects in more important matches (e.g., Edmans et al., 2007; Chang et al., 2012; Eren and Mocan, 2018). Champions League matches being clearly the most important and monitored matches among the fans are candidates for creating such an exaggerated impact on the moods of fans and eventually the fan token prices.

4. Conclusion

Fan tokens are primarily designed for the football club fans, offering privileges for them. However, they do not provide ownership

¹¹ We work with 639 observations among which 526 are domestic league matches and 40 (73) are Europa League (Champions League) matches.

¹² Champions League finals are by estimate followed by several hundred million people worldwide (<https://www.wearemiq.com/blog/what-marketers-can-learn-from-the-champions-league-final/>).

¹³ R-squared values in Tables 2 and 3 are between 2.0% and 3.8%. Relatively low R-squared values are in line with similar studies conducting analysis with clubs' stock data (e.g., 4.5% in Palomino et al., 2009; 6-7% in Demir and Rigoni, 2017; 1.9% in Pantzalis and Park, 2014). Moreover, inclusion of the commonly used control variables does not substantially increase the explanatory power in these studies. Our study examines fan token returns that have excess volatility and noise (see Figure A1). Finally, the market is in its infancy and may be associated with high inefficiencies disabling estimations with common risk factors (Urquhart, 2016).

Table 1
Market reactions to game results

		N	Bitcoin	Chiliz	Cryptoindex
Win	Domestic	320	-0.0068***	-0.0061**	-0.0074***
	Champions	36	0.011*	0.012**	0.0107*
	Euro	19	0.0081	-0.0016	0.0039
Loss	Domestic	99	-0.0076***	-0.0095***	-0.0075**
	Champions	28	-0.0314***	-0.0295***	-0.0277***
	Euro	11	0.0111	0	0.0075

Notes: Average abnormal returns estimated with three different benchmarks for r_{mb} , namely the returns on Bitcoin, Chiliz and Cryptoindex are reported in the last three columns. N stands for the number of observations. (*), (**), and (***) represent significance from the nonparametric Wilcoxon signed-rank test at the 10%, 5% and 1% levels, respectively.

Table 2
Regression estimations for market reactions to game results

	(1) Bitcoin	(2) Chiliz	(3) Cryptoindex	(4) Bitcoin	(5) Chiliz	(6) Cryptoindex
Win	-0.003 (0.005)	-0.002 (0.005)	-0.004 (0.005)	-0.002 (0.005)	-0.002 (0.005)	-0.004 (0.005)
Loss	-0.009* (0.005)	-0.011** (0.005)	-0.010* (0.005)	-0.010* (0.005)	-0.012** (0.005)	-0.010** (0.005)
Home				0.001 (0.004)	0 (0.004)	0.001 (0.004)
Champions				0.005 (0.006)	0.007 (0.006)	0.006 (0.006)
Euro				0.007 (0.009)	-0.002 (0.008)	0.005 (0.011)
Number of Obs.	639	639	639	639	639	639
Club fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.021	0.02	0.021	0.023	0.022	0.023

Notes: The dependent variable in all regressions is abnormal returns. First (last) three columns presents results from the regressions utilizing abnormal returns from the model where Bitcoin, Chiliz and Cryptoindex are alternatively used as the market benchmark without (with) control variables. Win (Loss) is a dummy variable that is equal to one for the matches with a win (loss) result, and zero otherwise. Home, Champions and Euro are dummy variables indicating for a home match, Champions League match and Europa League match, respectively. In all regressions, club fixed effects are included. Driscoll-Kraay extension of Newey-West HAC robust standard errors are given in parentheses. (*), (**), and (***) represent significance at the 10%, 5% and 1% levels, respectively.

Table 3
Regression estimations based on the match type

	(1) Bitcoin	(2) Chiliz	(3) Cryptoindex
Win_Domestic	-0.005 (0.005)	-0.004 (0.005)	-0.006 (0.005)
Win_Champions	0.013* (0.007)	0.015** (0.007)	0.012 (0.008)
Win_Euro	0.008 (0.011)	-0.002 (0.01)	0.003 (0.013)
Loss_Domestic	-0.006 (0.006)	-0.008 (0.006)	-0.007 (0.006)
Loss_Champions	-0.028*** (0.009)	-0.025*** (0.009)	-0.024*** (0.009)
Loss_Euro	0.011 (0.014)	0.001 (0.013)	0.007 (0.015)
Home	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)
Club fixed effects	Yes	Yes	Yes
R-squared	0.038	0.033	0.034

Notes: The dependent variable in all regressions is abnormal returns from the model where Bitcoin, Chiliz and Cryptoindex are alternatively used as the market benchmark. Win_Domestic (Loss_Domestic) is one for a game with a win (loss) result on a domestic game, and zero otherwise. Win_Euro (Loss_Euro) is one for a game with a win (loss) result on a Europa League game, and zero otherwise. Win_Champions (Loss_Champions) is one for a game with a win (loss) result on a Champions League game, and zero otherwise. Home is a dummy variable that is one for a home game and zero for an away game. In all regressions, club fixed effects are included. Driscoll-Kraay extension of Newey-West HAC robust standard errors are given in parentheses. (*), (**), and (***) represent significance at the 10%, 5% and 1% levels, respectively.

rights as the common stocks do. Thus, we expect that the fans constitute a large share among fan token investors and there is no direct relationship between the field performance of the clubs and the fan token prices. We investigate whether match results lead to abnormal returns in the fan tokens which may indicate for potential mood effects. With respect to aforementioned characteristics, fan tokens are of a suitable asset class for this analysis. This study, so far to our knowledge, is the first to examine fan tokens and contributes to the behavioral finance literature documenting the reflections of match results in the stock market (e.g., [Edmans et al., 2007](#); [Palomino et al., 2009](#)).

We show that match results may significantly impact the fan token prices. Both the losses and wins in the most prestigious UEFA Champions League tournament are followed by substantial abnormal returns. Losses (wins) negatively (positively) affects the abnormal returns while in absolute terms, losses have a larger impact. Champions League matches are followed by broad audience and considered as the most prominent field of success for the football team and for the fans, explaining this finding and signaling for an evident change in the mood of fans. Domestic matches, large in quantity and diverse in relative importance seem not to generate significant abnormal returns. Similarly, results of the matches in the less prestigious tournaments of UEFA do not affect the abnormal returns in fan tokens.

CRedit authorship contribution statement

Ender Demir: Data curation, Conceptualization, Writing – original draft, Visualization, Methodology, Formal analysis. **Oguz Ersan:** Data curation, Conceptualization, Writing – original draft, Visualization, Methodology, Formal analysis. **Boris Popesko:** Conceptualization, Writing – original draft, Visualization.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.frl.2022.102736](https://doi.org/10.1016/j.frl.2022.102736).

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