Economics Bulletin

Volume 42, Issue 2

Informational efficiency of football transfer market

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Abstract

Semi-strong efficiency in the association football market is examined during the last pre-COVID-19 summer registration period by using a setup introduced in the event studies in finance research. Tests of semi-strong efficiency explore the reaction of asset prices to information-generating events such as public announcements. In this paper, football players are the assets and the player's transfer from one club to another is the event. The findings indicate the overall informational efficiency of the football transfer market, although a number of anomalies (home bias, attention bias, first-mover advantage) as well as the return premium for "undervalued" players are identified.

Citation: Andrei Shynkevich, (2022) "Informational efficiency of football transfer market", *Economics Bulletin*, Volume 42, Issue 2, pages 1032-1039
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Submitted: September 11, 2021. **Published:** June 30, 2022.

1. Introduction

Since Fama (1970) introduced the notion of the efficient market hypothesis, informational efficiency has been tested in every corner of the financial markets throughout the world. In general terms, a market in which prices fully reflect available information is defined as efficient. Tests of weak-form efficiency verify whether historical asset prices can predict the asset's future returns and empirical tests of weak-form efficiency have originally been based on the premise of the random walk model.

Beyond financial markets, testing of the efficient market hypothesis has found a fertile ground in sport betting markets, most notably, in betting on match outcomes in European association football (soccer). The existing literature on the subject focuses on whether the football betting markets are *weak-form efficient* by testing the forecasting performance of betting strategies based on quantitative prediction models (Dixon and Pope, 2004; Goddard and Asimakopoulos, 2004; Goddard, 2005, Vlastakis, Dotsis and Markellos, 2009; Koopman and Lit, 2015; Angelini and De Angelis, 2017; Boshnakov, Kharrat, and McHale, 2017), whether betting odds are affected by the bettors' persistent behavioral biases (Kuypers, 2000; Page, 2009), or exhibit deviations from efficiency due to a favorite-longshot bias (Cain, Law and Peel, 2000; Angelini and De Angelis, 2019).

In contrast, testing of *semi-strong efficiency* determines whether asset prices efficiently adjust to information beyond historical asset prices that is publicly available. An individual test of semi-strong efficiency looks into how asset prices adjust to a certain kind of information-generating event or a public announcement. Event studies, originated by Fama, Fisher, Jensen and Roll (1969), focus on asset returns within a short time window around a specific event that can be precisely dated or timed. Scores of events have been examined including stock splits, dividend initiations, changes and omissions, new issues of common stock, stock repurchases or redemptions via tenders or open-market purchases, announcements of mergers and acquisitions, initial public offerings and seasonal equity offerings, proxy contests, spinoffs, new exchange listings and announcements of additions to or deletions from a popular stock market index. Cumulative abnormal returns (CARs) have become a common approach to probe how asset prices respond to a certain event over a specific time period.

Fama (1998) argues that the cleanest evidence on market efficiency comes from event studies since they come closest to allowing a break between market efficiency and equilibrium-pricing issues for two reasons. First, event studies are capable of producing a clear picture of the asset prices' speed of adjustment to new information when an information event can be dated precisely and the event causes a large effect on the asset prices during a short time span. And second, empirical results and inferences of event studies are largely unaffected by the researcher's choice of equilibrium model for expected asset returns because they do no have a significant effect on the way abnormal returns are measured when short time horizons are considered.

This paper presents a novel idea of testing semi-strong efficiency of the association football (soccer) transfer market. The players are the assets and the player's transfer from one club to another is the event. The rest of the paper proceeds as follows. Section 2 introduces the

notion of the assets, while Section 3 presents the concept of the event. Section 4 describes the data used for the analysis, Section 5 presents the empirical findings and Section 6 concludes.

2. The Assets

Launched in 2015, Football Index (www.footballindex.co.uk) was a UK-based virtual exchange platform licensed and regulated by the Jersey Gambling Commission and the UK Gambling Commission, where one could trade football players for real money. Football Index allowed its users known as "traders" to buy and sell "shares" in football players. A trader who had acquired shares in a player had a chance to earn daily or monthly payouts, aptly called "dividends", when the player performed well on the pitch and for writings about the player in the press.

The expectations about the player's future performance in games as well as expectations about future appearances of his name in press were the primary drivers of demand for and supply of the player shares that determined his market value on the exchange. When a player performed well on the field or was mentioned frequently in the media, he was earning dividends to his share owners. Match day dividends were awarded in accordance with the performance matrix and rewarded top performers on the pitch. Only those playing in Europe's top five leagues (English Premier League, Spanish La Liga, German Bundesliga, Italian Serie A and French Ligue 1), the main two European club football tournaments (UEFA Champions League and UEFA Europa League) and the main two international team competitions (FIFA World Cup and UEFA European Championship, including qualifiers) were eligible to win match day dividends. In-play dividends were earned by players who scored points for certain achievements in games, such as goals (higher payout for defenders and goalkeepers than for forwards and midfielders), assists (same payout for any position) and clean sheets (for starting goalkeepers over the entire match only). In-play dividends were only valid for the first 30 days of the player's "shares" ownership, making it necessary to sell and then repurchase the "shares" in order to continue earning in-play dividends on the same player for longer. Media dividends rewarded players who hit the headlines on a regular basis based on 25 news outlets monitored by the exchange. A player could be removed or delisted from the exchange for a number of pre-specified reasons such as retirement or death. Where any of such pre-specified events occur, all open positions on a player would immediately expire resulting in zero market value of his shares. This implied that, unlike with equities, each asset on the exchange had a terminal value of zero.

The exchange's revenues were primarily generated via transaction fees of 2% charged on its users when they bought or sold shares, gains from the bid-ask spread differential due to acting as a market maker to provide liquidity, and sales of "shares" of newly introduced players to the market via Initial Public Offering (IPO). The exchange's expenses were largely tied to the dividend payouts to its traders as described above as well as administrative and marketing costs. In March 2021, changes that included drastic reductions in dividend payouts were announced in order to ensure the long-term sustainability of the platform, which resulted in the reduction of the value of all open bets that had been purchased at prices based on the higher payouts and led to a dramatic collapse in the players' share values across the entire board. A huge uproar from users who saw their portfolio values crash has followed. Subsequently, Football Index suspended trading on its platform, the company went into administration and had its gambling commission

licenses suspended. The time period selected for this study is not affected by the aforementioned events and developments.

3. The Event

A football transfer is an occasion when a football player changes a club affiliation, his employer. Transfers occur at any time of the year, but most are completed during the months of January (winter window), and July and August (summer window), when the majority of football associations have their registration periods open. While the most common type of transfer is a free one, when a player is out of the old contract and when he is not contractually bound to any former club and no transfer agreement exists, permanent transfers that involve a fee capture most of the media headlines. A permanent transfer with a transfer agreement is when a player is permanently engaged by a new club and a transfer agreement is signed by the new club and the former club. A loan-to-permanent transfer is when the new club, where the player is currently on a loan, signs that player permanently with the agreement of the player's former club.

A transfer fee is the compensation that the player's new club pays to his old club per the transfer agreement between the two clubs in the case of the player's permanent transfer or loan-to-permanent transfer. Transfer fees can include fixed transfer fees, conditional transfer fees and release (buy-out) fees. Fixed transfer fee is the unconditional payment amount for the transfer of the player. Conditional transfer fee is the amount payable by the new club to the former club if certain conditions are fulfilled, e.g., if the player scores a certain number of goals or makes a certain number of first-team appearances. Release (buy-out) fee is the compensation paid in execution of a clause in the player‘s contract with his former club to trigger an early termination of that contract.

Even in the absence of games and playing time between the seasons, transfer rumours could potentially result in a significant price increase of the player's "shares" and earn media dividends for the player in the process due to press coverage. A transfer to a big club and/or a transfer to one of Europe's top five leagues whose players are eligible to earn match day dividends would in all likelihood lead a heftier premium in the player's value on the exchange.

4. Data

Transfers during the summer 2019 window, the period categorized by the historically highest number and value of transfers and the last summer transfer window before COVID-19 wrecked the football calendar and the football club finances, are considered. The data covering the period between July, 1st and September, 2nd, when transfer registration was open in the majority of European football leagues, is obtained from www.transfermarkt.com. Permanent transfers with a fee of at least 15 million euro are considered and the total number of such transfers during the period is 128. In 19 transfers, the player changed clubs following a spell in the new club on a loan from the old club. In two cases, the player was loaned back to the old club following the transfer, and in other two cases, the player was loaned to another club following the permanent change in the club. In 125 transfers, the new club was from Europe, with the other three cases having the new club from China. Out of all occasions when the new club was from Europe, the club was from one of Big 5 countries (England, Spain, Italy, Germany, and France)

in 116 cases. The old club was from Europe in 124 transfers, with 104 cases having the old club from one of Big 5 countries. Teenage players were involved in 10 transfers, players aged 30 or above represented five cases, with the majority of transferred players being between 20 and 25 years old (86 cases). Three transfers were worth at least 100 million euro each and another 12 – at least 50 million euro. The average transfer fee in 127 cases was 30.1 million euro. In almost half of all transfers (57), a forward was involved. 53 transfers were registered on the first day of the transfer window, July 1st, with another 38 transfers taking place during the rest of July, 35 – in August and the remaining two – on September, 2nd.

The data for prices for 127 players involved in those transfers are obtained from footballindex.co.uk, with one player missing from the exchange platform. For each player, the prices are obtained for dates that are 30 days before, seven days before, one day before, one day after, 7 days after and 30 days after the official date of the transfer. This allows to compute longer-term pre-event cumulative abnormal return, CAR(-30,-1), shorter-term pre-event return, CAR(-7,-1), announcement return, CAR(-1,1), shorter-term post-event return, CAR(1,7), and longer-term post-event return, CAR(1,30). Following the convention in the finance literature, returns are defined as first differences of the natural logs of prices.

5. Results

Table I shows means and standard deviations in brackets for the five types of CARs for the full sample as well as for a number of subsamples. Both pre-event CARs are positive and significant for the full sample, while the announcement return is not significantly different from zero, and only the longer-term post-event CAR is positive and significant. Somewhat stronger results for the subsample of incoming transfers to England only compared to the full sample and the subsample of incoming returns limited to the Big 5 (higher average returns given comparable deviations and statistical significance for shorter-term post-event CAR) indicate the presence of the possible "home bias": the Football Index's customer base is in the UK. The home bias is also apparent for outgoing transfers: the shorter-term pre-event CAR is significantly above zero for the subsample of transfers out of any country but England, whereas it is not different from zero for the subsample of transfers out of the Big 5. Forwards tend to earn significantly positive post-event CARs, while post-event returns for players in other positions are not significantly different from zero, which indicates the presence of the "attention bias": more attention received in media and larger fan bases contribute to the forwards' post-event drifts in their prices. Both pre-event and post-event CARs for transfers that occurred on the first day of the registration period are stronger than for transfers that took place afterwards, which may indicate the potential presence of the "first-mover advantage": the opportunity to earn a higher return on a player is stronger for the earliest deals on the transfer market. The results for the subsample of transfers excluding transactions that followed loans between the same pair of clubs, where the transfer may have been due to the activation of a buyout clause or an option to buy following the player's time with the same club on a loan agreement, are not different from those for the full sample, indicating that the transfer-after-loan transactions have not affect on the original findings.

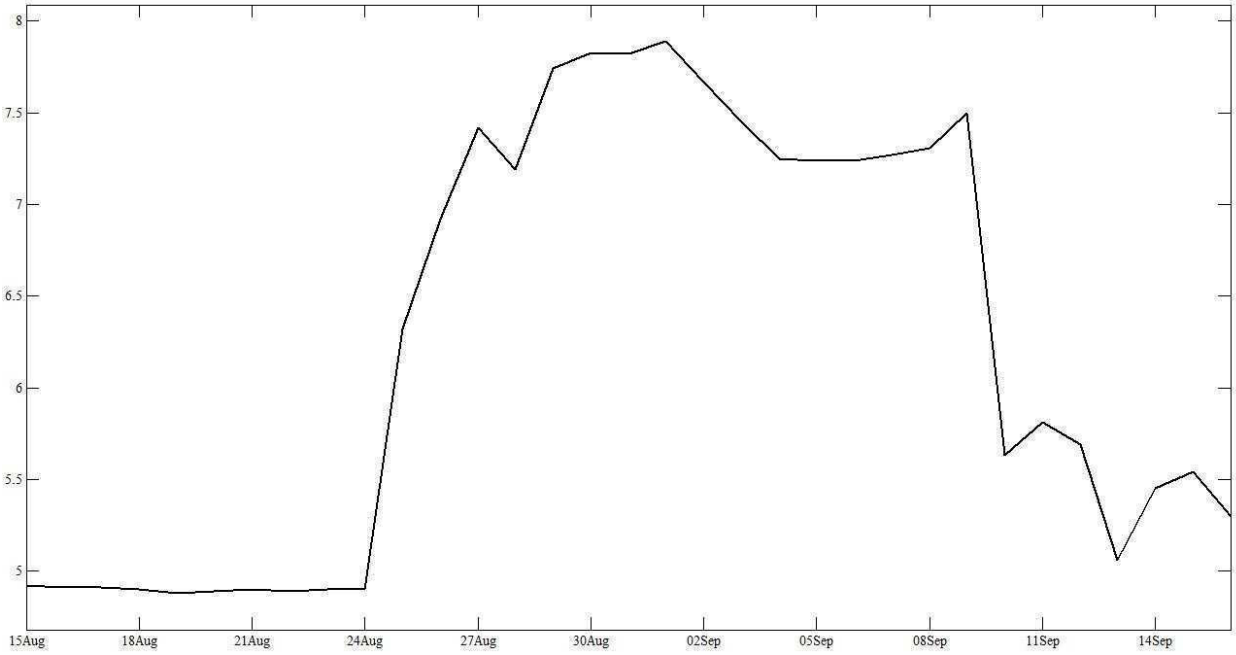
Table I. Means and standard deviations of pre-announcement, announcement and post-announcement cumulative returns

	N	CAR(-30,-1)	CAR(-7,-1)	CAR(-1,1)	CAR(1,7)	CAR(1,30)
Full sample	127	7.99***	1.44**	0.06	0.45	3.36***
		(17.76)	(7.77)	(2.27)	(3.80)	(11.52)
To England only	39	11.84***	3.10***	-0.42	1.31*	4.58**
		(16.60)	(6.56)	(2.21)	(4.72)	(12.72)
To Big 5 only	116	10.48***	2.30***	-0.02	0.56	3.65***
		(15.52)	(6.73)	(2.04)	(3.82)	(11.62)
Out of Big 5 only	105	8.00***	1.05	-0.02	0.32	3.32***
		(18.44)	(7.96)	(2.25)	(3.89)	(11.77)
Out of anywhere except England	102	7.82***	1.68**	0.12	0.29	2.85***
		(16.63)	(6.99)	(2.12)	(3.05)	(10.74)
Forward only	56	6.46***	1.41	0.57	1.50***	5.59***
		(19.15)	(9.11)	(2.65)	(3.73)	(11.95)
Any position other than forward	71	9.21***	1.47*	-0.35	-0.38	1.60
		(16.63)	(6.60)	(1.83)	(3.67)	(10.94)
On the first day of transfer window only	53	9.96***	1.30**	0.17	0.45	4.03***
		(17.14)	(4.05)	(1.85)	(2.85)	(9.25)
After the first day of transfer window	74	6.59**	1.54	-0.02	0.45	2.88*
		(18.18)	(9.62)	(2.53)	(4.37)	(12.95)
Excluding transfers that followed loans	108	7.85***	1.52*	0.02	0.41	3.49***
		(18.29)	(8.28)	(2.37)	(3.85)	(11.95)

* indicates statistical significance at 10 percent level, ** indicates statistical significance at 5 percent level, *** indicates statistical significance at 1 percent level.

In all cases, for the full sample as well as for every considered subsample, the announcement return, CAR(-1,1), is not significantly different from zero, indicating that the official announcement of the transfer is largely anticipated by the time of its release and that it has been largely priced in by the market and is already reflected in the player's market value. The evidence of significantly positive pre-event CARs documents the presence of media-driven drift in the players' prices, when the prospective upcoming transfers are rumored in headlines and all but confirmed before the date of the official such announcement. A prominent example highlighting this phenomenon took place in summer 2020 during the off-season shortened by COVID-19 when Lionel Messi, arguably the best football player in the history of the game, expressed his desire to leave Barcelona, the only club he has ever played for. The official request was send to the club via burofax on August 20, 2020, and this fact was revealed in media on August 25. Figure 1 shows the chart of Messi's price on Football Index since the first day after Barcelona's last competitive match in the 2019-2020 season (loss to Bayern in the UEFA Champions League) and it demonstrates a significant spike in the price on the first day the news appeared in the media. Immediately rumors started to swirl about Messi's transfer identifying England's Manchester City as the most likely destination pushing the price further up. He did not show up for a coronavirus test at Barcelona's training ground on August, 30, which added more fuel to speculations about his transfer. On September 4, Messi announced that he would be staying in his old club after all and on September 7, he reported for training for the first time since requesting to leave the club. The price subsequently tumbled on September 10 and remained below the level seen on August 25 since then.

Figure 1. Price of Lionel Messi's shares after the end of the 2019-2020 season



There are two possible explanations for the significant post-event drift. First, it can be due to players earning match day dividends and in-play dividends following the transfer. And second, it can be due to the continued media coverage after the official completion of the transfer allowing the players earn more media dividends. The latter effect (media-driven) appears more plausible than the former one (play-driven). The results in Table I demonstrate that the players who were transferred on the first day of the registration period experienced a stronger post-event drift than the players who changed clubs after the first day of the transfer window. The transfer window opened on July, 1st, whereas no official matches on the club level took place until at least the early August and there were no significant tournaments on the national team level in summer 2019. The results in Table I also reveal that the post-event drift is much stronger for the players in forward position, whereas it is not statistically different from zero for the players in any other position. Forwards tend to get more media coverage than goalies, defenders or midfielders at any time of the year, while playing in matches or between the seasons, due to having larger fan bases. While rumors about the upcoming transfer must contribute heavily to the significant pre-event drift, revelation of the actual price tag paid for a particular player on the transfer day or shortly after that would result in a fresh wave of media coverage, especially if such price is unexpectedly high, which would likely contribute to the significant post-event drift.

In order to identify which factors or player's characteristics may have explanatory power over the CARs, regression analysis is performed next and its results are presented in Table II. The set of independent variables consists of two dummy variables, one for the forward position and the other for the first day of the transfer window, player's age, the transfer transaction's cost reported by Transfermarkt, the log relative between the reported transfer's cost and the Transfermarkt's player's market value on the date of the transaction, and the player's price on Football Index at the beginning of time period considered for the CAR. Table II presents regression coefficients and t-statistics in brackets for each of five types of CARs. Forward

position and the relative of player's transfer cost to his market value are the only two explanatory variables that have significant explanatory power over multiple CARs, predominantly so for post-transfer returns. The significant influence of the forward position on post-transfer CARs is consistent with the presence of the "attention bias" demonstrated earlier in Table I, and it is also consistent with the above explanation of the post-event drift being media-driven rather than play-driven. Statistically significant positive relationship between CARs and the cost-to-market value can be attributed to the player being relatively "undervalued" on the market at the time of the transfer: when the transfer's transaction cost exceeds the player's market value estimate, the player's price rises to reflect the adjustment of his market valuation upward. It is also consistent with the above explanation of the post-event drift being media-driven due to the new stream of media coverage after the revelation of the unexpectedly high premium paid for the player relative to his estimated market value.

Table II. Regression results for CARs

	CAR(-30,-1)	CAR(-7,-1)	CAR(-1,1)	CAR(1,7)	CAR(1,30)
Constant	23.43	10.32	-2.25	-3.63	-13.68
	(1.56)	(1.53)	(-1.15)	(-1.11)	(-1.36)
Forward position	0.23	0.63	1.13***	2.11***	4.62**
	(0.07)	(0.44)	(2.72)	(3.02)	(2.15)
1st day of window	3.22	0.36	0.17	0.34	1.84
	(1.02)	(0.26)	(0.42)	(0.50)	(0.88)
Player's age	-0.50	-0.38	0.10	0.10	0.52
	(-0.83)	(-1.40)	(1.27)	(0.75)	(1.30)
Transfer cost	0.02	-0.02	-0.01	0.01	0.03
	(0.18)	(-0.36)	(-0.44)	(0.50)	(0.39)
Log(market/cost)	4.70	3.39**	0.40	1.71**	4.91**
	(1.34)	(2.17)	(0.91)	(2.29)	(2.14)
	-6.95*	-0.52	-0.47	0.01	0.20
Player's price	(-1.84)	(-0.31)	(-0.96)	(0.02)	(0.08)

* indicates statistical significance at 10 percent level, ** indicates statistical significance at 5 percent level, *** indicates statistical significance at 1 percent level.

6. Conclusions

The combination of significant pre-event CARs, zero announcement return and insignificant shorter-term post-event CAR points toward the informational efficiency of the association football market during the last pre-COVID-19 summer transfer window. The evidence of significantly positive longer-term post-event CARs as well as of higher CARs for players whose transfers occurred on the first day of the registration period can be characterized as the presence of momentum in a player's price following a transfer to a new club due to continued media coverage, especially when price paid for a particular player was unexpectedly high. The alternative explanation can attribute the presence of post-event drift to the fans' excitement about the approximation of the start of a new season due to cognitive biases such as excessive optimism, irrational exuberance and overreaction that are more prevalent at the beginning of the summer break. Forwards and players who are relatively undervalued on the market at the time of the transfer receive a more significant boost in post-event CARs.

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