

A Financial Instrument Indexed to Football Players Performance

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Abstract

The football industry is increasingly using financial instruments to expand its activities and manage risk. Clubs face difficulties in raising funds for growth, acquisitions and stadium development, making it crucial to study innovative solutions. The success of a team depends on the performance of its players, raising investors' interest in linking financial instruments to their performance. This work proposes the creation of a financial instrument indexed to the performance of a football player. In this regard, it is necessary to develop a composite indicator that considers offensive, defensive and other aspects of performance. The PLS-SEM model was selected for the construction of this indicator, with the aim of maximizing the explanatory power of the model. Based on this indicator, a corporate bond is created, representing an innovative instrument designed to combine performance-related returns with face value protection. The bond enables investors to benefit from the growth of a player's performance over time and to generate returns; simultaneously, it guarantees capital protection in the event of underperformance.

Keywords: Football Analytics, Corporate Bond, Performance Evaluation, Football Finance

1 Introduction

Football is one of the most popular sports in the world [1], and due to its appeal, clubs are increasingly treated as firms; for this reason, decisions about their management are becoming strategic. Additionally, the football industry is beginning to use a wide range of financial instruments to expand its activities for greater competitiveness, financing needs, risk management, and other causes. Football clubs are encountering difficulties in sourcing the necessary funds for growth, player acquisitions, and stadium development. In this context, it becomes important to study and deepen the use of financial instruments applied to the football industry. Their increasing popularity highlights not only the importance of finding innovative solutions to finance ambitious projects but also the need to understand the associated risks and opportunities. The success of the team depends primarily on its performance on the pitch [2]. In turn, the team's performance depends on the performance of its players. Therefore, it becomes interesting, especially for supporters, to invest in the

on-field performance of an individual player. In this work, we address the problem of creating a financial instrument indexed to the performance of a football player. The evaluation of a football player's performance must take into account a variety of factors related to the different characteristics of the player, such as attacking and defensive ability, skills, and others. In order to obtain a comprehensive overview, it is necessary to develop a composite indicator relying on the players' performance and obtained by a Partial Least Squares Structural Equation Model (PLS-SEM) [3]. This is an advanced statistical methodology that enables the analysis of complex relationships between variables in various research contexts [4]. We admit the existence of other approaches, but for this exploratory study, we preferred this modelling approach, which is innovative for football analytics.

2 Linking performance metric to bond pricing

In order to address the possibility of constructing a financial instrument such as a corporate bond, it is first necessary to define a key measure, in this case a composite indicator, that allows us to relate football performances and the corporate bond. The composite indicator is based on data from Sofifa and takes into account six dimensions of performance: attacking, skill, movement, mentality, power, and defending. These data, provided by Electronic Arts (EA) combine the subjective evaluations of over 9,000 scouts, coaches and season-ticket holders into ratings for over 18,000 players. They are freely available on the Kaggle data science platform and used in many other research studies; in this case, they have been used to create some composite indicators to sum up and measure players' performance starting from the 29 Key Performance Indicators (KPIs) for players' movement (1). In addition, these models have been validated by Confirmatory Tetrad Analysis and Confirmatory Composite Analysis. Since these performance data are continuously being updated [5], we computed and saved for our analysis the last composite indicator available before the date of the match for each player.

Once we have a composite performance indicator, which we refer to as CPI, that takes into account the different aspects of a player's performance, we can use it as an index for a financial instrument; in detail, we present a corporate bond, which we call Player Performance Bond (PPB), an innovative instrument designed to combine performance-linked returns with face value protection. It represents a financial instrument that is linked to the performance of a football player and provides a way for football clubs to raise money by leveraging the future performance and market value of their players. This benefits investors seeking alternative assets, as well as clubs that wish to monetize their assets without selling shares. The revaluation of coupons is determined by the composite performance indicator, through the use of an indexation mechanism, based on the one employed for BTP Italia since both share the indexation of the bond to a variable that reflects an economic or performance indicator, ensuring remuneration but also protection for the investor.

Let us consider a schedule with k maturities, $t = t_1, \dots, t_k$, equally spaced from each other. Let t_0 be the date on which the investor purchased the bond, F the face value, and r the

coupon interest rate.

For each maturity, the revaluation of coupons is achieved through the Indexation Coefficient (IC), calculated on the basis of the CPI. This coefficient measures the relative change in the player's performance from the previous period.

The formula for the coefficient at time t is as follows:

$$IC_t = \frac{CPI_t}{CPI_{t-1}}$$

where:

- CPI_t is the Composite Performance Indicator at time t ;
- CPI_{t-1} is the Composite Performance Indicator at time $t - 1$.

In general, the time $t - 1$ refers to the previous coupon payment date; in the case of the initial coupon, when $t = t_1$, given that no prior payments have been made, the Composite Performance Indicator on the date the security is enjoyed is taken into consideration.

The variable amount of the coupon is generally calculated by multiplying the coupon interest rate by the face value. In order to take into account the performance trend and provide protection against performance drops, this value is multiplied by the indexation coefficient modified at the coupon payment date. The modified indexation coefficient is calculated as $Max[IC_t, 1]$. Consequently, if IC_t exceeds 1, the investor is rewarded with a higher coupon than the classic one; if the indexation coefficient is less than 1, the coupon is still based on the nominal value, thereby ensuring a minimum return.

$$C_t = r * F * Max[IC_t, 1]$$

3 Results

In this section, a numerical experiment is presented with the aim of illustrating the implementation and performance evaluation of the proposed Player Performance Bond (PPB). The aim is to demonstrate the indexing mechanism's response to variations in the CPI and to evaluate its impact on bond returns under different performance scenarios. The player's performance, measured through his composite performance indicator, fluctuates across three seasons (2021/22 - 2022/23 - 2023/24). The bond has a face value of €100, and the real annual coupon interest rate is set at 2.5%.

Let p be the player under consideration; the coupon calculated on an annual basis for player p is obtained as follows:

$$C_{t,p} = 0.025 \cdot 100 \cdot \max[IC_{t,p}, 1]$$

Table 1 presents some of the results obtained based on three different scenarios: drop, steady, and rising performance over the three years considered. The results demonstrate how returns on bonds adapt to variations in performance under different scenarios. The indexing mechanism ensures that returns are adjusted upwards during periods of enhanced

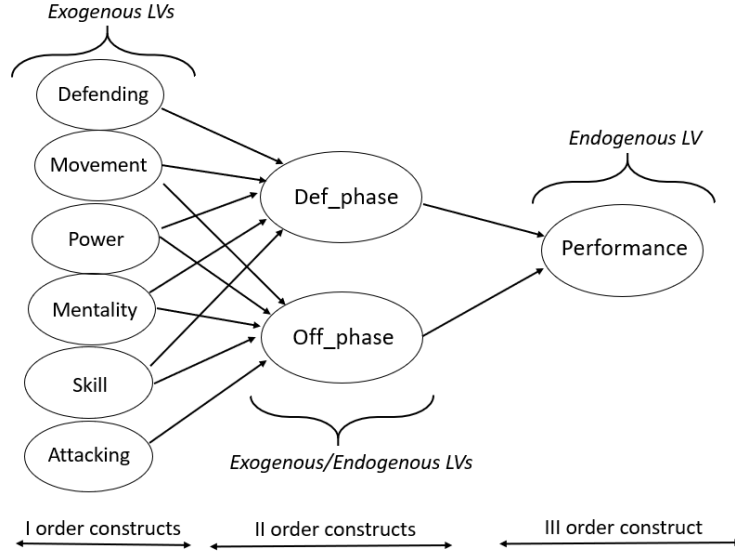


Figure 1: Players' movement inner models used to construct the composite indicator with the PLS-SEM approach

performance while, at the same time, safeguarding the face value against any performance declines. In scenarios where the CPI exhibits a decline over time, as highlighted in the cases of Alex Sandro, Andrea Petagna and Daniele Rugani, the bond guarantees a remuneration equivalent to the real annual coupon interest rate. For steady performances or only slight increases over time, the return is minimal. To illustrate this point, consider the case of Davide Zappacosta, Kevin Bonifazi, and Lorenzo Pellegrini. Finally, increases in the Composite Performance Indicator result in rises in total remuneration. An example is given by players such as Stephan El Shaarawy, Riccardo Orsolini, or Matias Soulé Malvano.

Table 1: Player Performance Bond results

	CPI 2022	CPI 2023	CPI 2024	C 22-23	C 22-24
Alex Sandro	103.18	102.06	98.42	2.50	2.50
Andrea Petagna	82.32	82.01	79.89	2.50	2.50
Daniele Rugani	86.19	84.03	83.75	2.50	2.50
Davide Zappacosta	100.46	100.91	100.79	2.51	2.50
Kevin Bonifazi	77.91	77.44	77.60	2.50	2.50
Lorenzo Pellegrini	93.01	93.66	93.79	2.52	2.50
Matías Soulé Malvano	67.51	90.93	97.24	3.12	2.56
Riccardo Orsolini	82.36	102.64	105.27	3.17	2.54
Stephan El Shaarawy	82.68	104.77	106.33	3.37	2.67

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