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French 75% Tax Rate: An Opportunity to Optimize the Attractiveness of the French Soccer League

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Abstract

This paper analyzes the impact of the French 75% income tax rate on the attractiveness of the French soccer league. The concerns are less about its financial implications for clubs than about the possible decrease in its attractiveness. A classical model of professional team sport leagues is employed to measure the Nash equilibrium competitive balance and the stock of talent to assess the effect of the new taxation. We then propose two hypotheses corresponding to specific situations in the French soccer league: "social and fiscal disparities between clubs" and "sugar daddy" behavior. The new model predicts a polarization of the league and an exodus of talent, which could be mitigated by revenue sharing.

Keywords: sport economics, professional team sports, competitive balance, taxation

Introduction

The European sovereign debt crisis has forced the French national government to find new funding sources; increasing the top marginal tax rate is a means of doing so. Consequently, and given the average salary of soccer players, taxation is an important contingent factor for teams in an international competitive environment. To such an extent that Arsène Wenger, manager of Arsenal FC, predicted that "with the new taxation system ... the domination of the Premier League will go, that is for sure" (*The Sunday Times*, April 25, 2009) when the British government decided to increase the top marginal tax rate from 40% to 50%.[1]

Why was the powerful Premier League so afraid of this marginal change? One reason is the "Bosman ruling" and the ensuing liberalization of the player market. The decision by the European Court of Justice to ban restrictions on foreign EU players has intensified the inter-league competition for players (Gouguet, 2004), especially for the superstars (Gouguet & Primault, 2003). In a market where the players have perfect mobility, taxation is a key criterion in their choice of location (Kleven, Landais, & Saez, 2013). Fluctuation in the top marginal tax rate then has a direct impact on the competitiveness of clubs and leagues.

The French 75% tax rate law, enforced since 2014, acts as a significant fluctuation. The new tax system implies that all incomes of over €1 million per year will be taxed at 75%, and then affects the French championship attractiveness, called Ligue 1 (L1), by changing the allocation of resources intra- and inter-leagues.

This paper is organized as follows. The following section presents the 75% tax rate mechanisms and its direct impact on L1 clubs. A model of sports leagues is used in the next section with revenue function depending on the relative and the aggregate quality of the teams. It allows measuring the Nash equilibrium competitive balance and the stock of talent to assess the effect of the new taxation on the league attractiveness.

Next, we adapt the model to specific situations. First, we analyze a case of social and fiscal imbalance in a national championship. This must reflect the situation of the AS Monaco in L1. Second, we formulate a hypothesis regarding the behavior of club owners: what happens when a club maximizes wins under exogenous soft budget constraint? Finally, we discuss the impact of revenue sharing on competitive balance in relation to the new taxation.

Mechanisms and Direct Impact of the 75% Tax Rate

It is important to first provide an overview of the existing research on tax system changes and regulation of professional leagues before discussing the mechanism of the French tax on high wages and its impact on L1.

Tax System and Professional Sports Leagues

On both sides of the Atlantic, 1995 was a key year in the regulation of professional sports leagues. On one side, the National Hockey League decided to help reduce the economic gap (exchange rate, taxation and social security system, and public assistance) between the Canadian and American franchises by creating two support funds to reduce the differences and keep franchises in Canada (Helleu & Durand, 2006). On the other side, the European Union (EU) implemented the Bosman ruling, which increased competition between clubs and leagues to attract the best players, with no restrictions on foreign EU members. Since 2003, players from countries who signed the Cotonou Treaty (with 79 African, Caribbean, and Pacific countries) and the Malaja ruling (involving countries associated with the EU) also have no restriction to play in Europe. Economists have paid great attention to the European Court of Justice's decision, particularly with regard to transfer fees (Tervio, 2006; Frick, 2007). Kleven et al.'s (2013) research study gives interesting insight into the topic of this paper. Indeed, the originality of their work lies in their focusing on the effects of income tax rates on the international migration of workers. For that purpose, they analyzed the soccer player market in Europe in two steps. First, they performed an analysis of special tax schemes

offering preferential tax rates in specific countries (Spain, Denmark, Belgium, and Greece). Second, they presented a theoretical model showing the relation between taxation and migration for the 15 main European championships.

Since the European soccer player market was liberalized in 1995, there has been a positive and large correlation between tax rates and players' location decisions. Kleven and colleagues note that this effect is reinforced in the case of the most talented workers. This result supports the findings of Gouguet and Primault (2003) concerning the Bosman ruling. Based upon these results, we expect that the French 75% tax rate, which is unique in Europe, will lead to an exodus of the best players from L1 to rival leagues abroad. This is an important issue for L1 attractiveness as there is a growth of televised matches featuring foreign leagues (Solberg & Mehus, 2014), offering substitutes for fans with more aggregate talent.

The French 75% Tax Rate: Mechanisms

During the last presidential election campaign, François Hollande pledged to levy a 75% income tax rate, for a period of two years, on all annual income above €1 million. The proposal was motivated by the necessity to balance the public accounts and by a desire for social justice. However, the Constitutional council of the French Republic struck down this top income tax rate, ruling that it would be applied to individuals rather than households. Consequently, the French government amended the bill to shift the burden from individuals to employers. In other words, this measure increases the employers' contributions for salaries over €1 million per year and thus the total cost of talent for clubs.

The Constitutional council's decision has a threefold impact on French soccer. First, this measure has no direct consequence on players' salary. Second, the tax implies that French soccer clubs will have to pay a higher price in order to maintain the salary level of their players. Unlike Kleven et al. (2013), the adjustment variable in the labor market is no longer the supply (players basing their location decisions according to net earnings), but the player hiring by team owners who must take into account the new budgetary constraints. Third, the AS Monaco (ASM) now benefits from the fiscal arrangements between France and Monaco whereby companies located in the Principality of Monaco are exempt from French taxation laws, whereas French taxpayers are not. Had the Constitutional council not rejected the proposed tax rate, the French players of the ASM paid over €1 million per year would have been subject to the 75% tax rate. However, in order to reduce the financial pressure on French firms, the government decided that the total tax payout would be capped at 5% of a corporation's annual turnover. Despite this concession, the clubs' union has complained that the government has decided to tax businesses that have been in difficulty over the last seasons.[2] The tax system alone is not responsible for the financial difficulties of French clubs, since clubs and the league have long suffered from a weak governance structure (Andreff, 2007).

The French 75% Tax Rate in L1

There were 114 players from 14 L1 clubs that earned salaries of more than €1 million per year in 2013. Even though the bonuses are variable, the aggregate tax cost is estimated by the clubs themselves at €44 million per year.[3] This estimation is questioned by the government. Nevertheless, as there is no other available data, we shall use this

estimate in our analysis of the effects of the French 75% tax rate, which it is not a problem as we focus on theoretical analysis.

According to club owners, this new tax could potentially threaten the viability of the clubs. Table 1 sums up the direct impact of the 75% tax rate for each club. From Table 1, it is possible to categorize the clubs according to the effects of the tax (Table 2). Five categories emerge (Terrien, Durand, Maltese, & Veran, 2014).

Clubs that are not impacted will be the main beneficiaries of the increase of the top marginal tax rate to 75%. As seen in Table 1, five clubs are not concerned by this tax rate as they do not pay any of their players' annual salaries of €1 million or over. Furthermore, Monaco benefits from its registered office being located in the Principality. Moreover, four clubs benefit from a significant tax cost reduction thanks to the implementation of a measure capping the tax at 5% of the clubs' turnover even though those clubs are the most affected by the tax, along with Bordeaux and Rennes. The effect is uncertain for the remaining clubs. The new taxation appears to be an additional cost for clubs. Nevertheless, it could create new sporting opportunities for them thanks to the financial difficulties it will cause to rival clubs.

Table 1. Effect of the French 75% Tax Rate on Soccer Clubs in L1 (2013–2014)

Clubs	Turnover 2012–2013 (in K€)	Number of players	Tax without cap (in K€)	Relative impact of tax without cap (in K€)	Tax with cap (in K€)	Relative impact of tax with cap	Tax reduction with cap (in K€)
Paris	392,892	21	43,565	11,09 %	1,9645	5 %	23,920
Marseille	104,535	17	13,034	12,47 %	5,227	5 %	7,807
Lyon	99,083	14	11,545	11,65 %	4,954	5 %	6,591
Bordeaux	67,766	14	4,151	6,13 %	3,388	5 %	763
Lille	96,255	13	7,696	8,00 %	4,813	5 %	2,883
Saint-Etienne	49,951	9	896	1,79 %	896	1,79 %	0
Rennes	42,036	8	3,316	7,89 %	2,102	5 %	1,214
Toulouse	35,415	7	1,196	3,38 %	1,196	3,38 %	0
Montpellier	74,367	3	356	0,48 %	356	0,48 %	0
Valenciennes	30,257	3	206	0,68 %	206	0,68 %	0
Nice	33,815	2	1,076	3,18 %	1,076	3,18 %	0
Ajaccio	20,381	1	99	0,49 %	99	0,49 %	0
Bastia	24,708	1	178	0,72 %	178	0,72 %	0
Guingamp	22,000	1	9	0,04 %	9	0,04 %	0
Evian	32,300	0	0	0 %	0	0 %	0
Lorient	32,860	0	0	0 %	0	0 %	0
Monaco	130,000	0	0	0 %	0	0 %	0
Nantes	32,000	0	0	0 %	0	0 %	0
Reims	28,581	0	0	0 %	0	0 %	0
Sochaux	30,648	0	0	0 %	0	0 %	0
Sum	**1,379,850**	**114**	**87,323**		**44,145**		**43,178**

Table 2. Typology of French Soccer Clubs Related to 75% Tax Rate Effect

Clubs deeply impacted by the tax and the implementation of the cap		Clubs impacted by the tax (less than 5% of turnover)	
Significant tax reduction (more than 2 M€)	Marginal tax reduction (less than 2 M€)	Significant impact (more than 1% of turnover)	Marginal impact (less than 1% of turnover)*
Paris	Bordeaux	Toulouse	Montpellier
Marseille	Rennes	Saint-Etienne	Guingamp
Lyon		Valenciennes	Ajaccio
Lille		Nice	Bastia

* Six clubs not impacted by the tax: Evian, Lorient, Monaco, Nantes, Reims, and Sochaux

The results shown in Table 1 are calculated for a given payroll. However, clubs have room to maneuver and will implement a strategic response to cope with this new constraint. To estimate the dynamic equilibrium of L1, we use the non-cooperative game theory in our competitive balance model.

Competitive Balance and the 75% Tax Rate

First, a short overview of the competitive balance concept is provided. We then specify our general model. We finally discuss the effect of the 75% tax rate and the consequences of capping the tax at 5% of the company's revenue.

Competitive Balance: What is it About?

There is a common understanding that a sporting competition is more successful when the degree of competitive balance among teams is high. Through the Louis-Schmelling paradox, Neale (1964) shows beyond doubt that competitive balance is essential to professional sports. Thus, much effort is expended to measure it, with a high heterogeneity in the measuring instruments used (Mourão & Cima, 2015). There are two approaches for understanding uncertainty of outcome: competitive intensity, which is related to sporting stakes, and competitive balance (Scelles, Durand, Bonnal, Goyeau, & Andreff, 2013; Terrien, Scelles, & Durand, 2015). Focusing on the latter, three time scales can be considered: a game, a season, or several seasons (Szymanski & Kuypers, 1999). Here, we replicate the model of a league with two clubs inspired by that of El-Hodiri and Quirk (1971). El-Hodiri and Quirk's model provides the first formalization of competitive balance. It is useful for testing the "invariance principle" introduced by Rottenberg (1956) following a Walrasian approach to general equilibrium. This principle states that the elimination of the reserve clause in professional baseball will not cause competitive imbalance in Major League Baseball (MLB). Other policy tools have been tested (e.g., gate revenue sharing, the draft system) and no significant effect on outcome uncertainty has been found (Scully, 1995; Vrooman, 1995). Salary restrictions should theoretically improve competitive balance, even if a non-optimal situation is produced (Késenne, 2000, 2007).

However, the "invariance principle" is situated within the specific context of North American major leagues, which differs from that of European leagues. The former are closed leagues with a limited number of franchises whose objective is to maximize profit. European soccer leagues are open; the promotion and relegation system structures the championships, which impacts owners' behavior. The goal of club owners seems to be more oriented toward win maximization within budget constraints (Davenport, 1969; Sloane, 1971). Indeed, 63% of European soccer clubs in 2011 reported losses (UEFA, 2011), which provides evidence that the majority of the owners are not oriented toward profit. Unlike the North American cooperative franchises, European soccer teams are rivals; the talent supply is no longer exogenously determined but is variable (Andreff, 2009). This leads to a non-cooperative Nash equilibrium model (Szymanski & Késenne 2004).[4]

The General Model

Let us consider a league with only two clubs ($i = 1, 2$) with different revenue functions. We assume this function to be dependent upon the local economic potential, which can be approximated by an exogenous variable: the market size m_i. Here, Team 1 benefits from an asymmetric revenue advantage $m_1 > m_2$. Revenue is also affected by a club's winning percentage w_i. According to the fan preference for competitive balance, reflected by β, the part of the revenue functions depending on relative talent R_i is strictly concave:[5]

$$R_i(w_i) = m_i . w_i - \left(m_i . \frac{w_i^2}{\beta}\right) \quad (1)$$

It is common in the literature to assume that revenues depend only on relative talent. However, consumers' valuation and then teams' incomes may suffer from the new taxation if it implies an exodus of talent, even if the competitive balance improves. Following Madden (2011), we assume that the revenue function $P_i(w_i,T)$ depends also on aggregate talent T with $T = T_i + T_j$. The revenue function is assumed to be homogeneous of degree $\sigma \in [0;1]$ with σ measuring the constant elasticity of revenue with respect to changes in the aggregate team quality. Then, the revenue function depending on relative and absolute talent is:

$$P_i(w_i,T) = T^{\sigma} P_i(w_i,1) = T^{\sigma} R_i(w_i) = T^{\sigma}\left[m_i w_i - m_i \frac{w_i^2}{\beta}\right] \quad (2)$$

We assume that playing talent is perfectly divisible and available on the professional players' labor market at a constant marginal cost of *c*. An exogenous cost pertains to a flexible talent supply (Szymanski, 2004) and implies that clubs are wage takers. This hypothesis is generally accepted even though clubs may exercise enough market power to affect the price levels (Cavagnac & Gouguet, 2008; Madden, 2011).

As the payroll does not differentiate between units of playing talent, the tax burden cannot be applied only on the basis of individual salaries of over €1 million. We therefore assume that the cost will be borne by all individuals on the payroll.[6] Let $d > 0$ be the marginal tax burden added to the constant marginal cost of talent *c*. As Table 1 highlights, weak payrolls are not concerned with the new tax system. Therefore, the parameter *d* is applied from the threshold *L* such that $cT_i > L$. Moreover, the tax

burden of team i will increase with its payroll T_i until the cap becomes effective, with the threshold given by $dT_i > (1\text{-}x)P_i$. The existence of fiscal cap at $(1\text{-}x)$ % of the turnover of Club i means that the tax burden is no longer graduated on T_i, but only depends on P_i. This cap allows reducing the tax cost for Club i. Therefore, after the application of the tax, Club i keeps x% of its turnover P_i.

The expenditure on playing talent is the only club cost and clubs' objective is to maximize wins w_i under a strict seasonal budget constraint that does not allow for losses. The profit functions of teams after the implementation of the new taxation system change according to the value taken by t_i. Then three profit functions are described:

$$\pi_i = P_i - cT_i = 0 \quad \text{if } cT_i \leq L \tag{3A}$$

$$\pi_i = P_i - (c+d)T_i = 0 \quad \text{if } cT_i > L \text{ and } dT_i \leq (1-x)P_i \tag{3B}$$

$$\pi_i = xP_i - cT_i = 0 \text{ if } cT_i > L \text{ and } dT_i > (1-x)P_i \tag{3C}$$

A contest success function depends both on the number of talent units T_i and also on the number of talent units T_j of the competing club. The contest success function is given by:

$$w_i = \frac{T_i}{T_i + T_j} = \frac{T_i}{T} \tag{4}$$

According to this contest success function, the acquisition of an additional unit of playing talent has an external effect on the other club. The teams find themselves in a non-cooperative Nash equilibrium. Simultaneous win maximization (mutual best response with $\pi_i = 0$) for both teams yields the reaction functions. As we use different profit functions (3A, 3B, 3C), we obtain three reaction functions expressed in terms of the aggregate quality of teams as $T = \frac{T_i}{w_i}$:

$$T^B = \left[\frac{m_i - (m_i w_i)/\beta}{c}\right]^{\frac{1}{1-\sigma}} \tag{5A}$$

$$T^C = \left[\frac{m_i - (m_i w_i)/\beta}{c+d}\right]^{\frac{1}{1-\sigma}} \tag{5B}$$

$$T^A = \left[\frac{x[m_i - (m_i w_i)/\beta]}{c}\right]^{\frac{1}{1-\sigma}} \tag{5C}$$

Competitive Balance and Exodus of Talent

Let Club 2 have no player paid over €1 million per year ($ct_2 \leq L$) and Club 1, operating in the largest market, be subject to the 75% tax plus cap regime [$ct_1 > L$ and $dt_1 > (1\text{-}x)P_1$]. To assess the effect of introducing a tax and the advisability of its cap on the league attractiveness, we proposed three equilibria. First, we define competitive balance before the implementation of the tax (A). Assuming the profit function of teams 1 and 2 are respectively (3C) if $x = 1$ (or (3B) if $d = 0$) and (3A) provide the equilibrium B by equalizing the related reaction functions (5C) with $x = 1$ and (5A):

$$w_1^A = \frac{\beta m_1 - (\beta - 1)m_2}{m_1 + m_2} \text{ with } w_1^A \geq w_2^A \text{ if } m_1 \geq m_2 \tag{6A}$$

In the initial situation, the league is naturally imbalanced and outcome uncertainty is not guaranteed. Second, we assess the only tax regime (B): the threshold $dt_1 \leq (1-x)P_1$ in (3B) is removed. Without the governmental concession to cap the tax, this equilibrium C would have prevailed in L1. Profit functions of team 1 and 2 are (3B) and (3A), respectively. By equalizing the reaction functions (5A) and (5B), the only tax regime equilibrium is:

$$w_1^B = \frac{\beta c m_1 - (\beta - 1)(c+d)m_2}{c m_1 + (c+d)m_2} \text{ with } w_1^B \geq w_2^B \text{ if } \frac{m_1}{m_2} \geq \frac{c+d}{c} \quad (6B)$$

Third, we define competitive balance in the tax plus cap regime (C). This configuration is the theoretical one prevailing in L1 (with $x = 0.95$). Profit functions of team 1 and 2 are (3C) and (3A), respectively. By equalizing the related reaction functions (5C and 5A), we obtain the following equilibrium:

$$w_1^C = \frac{\beta x m_1 - (\beta - 1)m_2}{x m_1 + m_2} \text{ with } w_1^C \geq w_2^C \text{ if } \frac{m_1}{m_2} \geq \frac{1}{x} \quad (6C)$$

Those win percentages are not sensitive to the elasticity of revenue with respect to changes in the aggregate team quality. Assuming that the revenue function only depends on relative talent is inconsequential on competitive balance, but not for the stock of talent. It increases when the revenue advantage of team 1 is moderated. From (5C) and (6C) for the tax plus cap equilibrium prevailing in L1:

$$\frac{\delta T^C}{\delta \sigma} > 0 \text{ if } m_2 \leq m_1 \leq \frac{c\beta m_2}{2\beta x m_2 - m_2 x - \beta c x}.$$

The evolution of the attractiveness degree of the league could be assessed thanks to those three equilibria. Notice that $\frac{\delta w_1^B}{\delta d} < 0$ (with $1 \leq \beta \leq 2$) and $w_1^A = w_1^B$ when $d = 0$. Then, the only tax regime that improves the competitive balance compared to the initial configuration is: $w_1^A \geq w_1^B$ if $d \in [0;1]$. Since the league attractiveness also depends on aggregate talent, a comparison between the several levels of talent is necessary. By substituting the win percentage (6B) in the aggregate quality function (5A), the drain grows as d increases since $\frac{\delta T^B}{\delta d}$ has the sign of $\frac{\delta w^B}{\delta d}$. Thanks to $T^A = T^B$ when d = 0, $T^A \geq T^B$ for $d \in [0;1]$.

$\frac{\delta w_1^C}{\delta x} > 0$ (with $1 \leq \beta \leq 2$), $w_1^A = w_1^C$ when $x = 1$. The introduction of the prevailing tax system also improves the competitive balance: $w_1^A \geq w_1^C$ if $x \in [0;1]$. Slackening the cap (increasing x) qualifies this beneficial effect. To assess the league attractiveness, T^A must be compared to T^C. By substituting the win percentage (6C) in the aggregate quality function (5A), we deduce $\frac{\delta T^C}{\delta x}$ has the sign of $\frac{\delta w_1^C}{\delta x}$. As when $x = 1$, the implementation of the tax leads to an exodus of talent: $T^A \geq T^C$ with $x \in [0;1]$. Reducing the tax payable (increasing x) helps limit this migration.

The new tax rate (tax only or tax plus cap regime) helps improve competitive balance of L1 and has the same effect as a salary cap. This is not surprising if we consider Scully's

argument (1995) that a salary cap can act as a tax on superstar salaries. The question remains if it was wise to implement a tax cap by comparing equilibria B and C:

$$w_1^B < w_1^C \text{ if } \frac{c}{c+d} > x \quad \text{for } (1-x)P_1 > dT_1 \tag{7}$$

Despite the new tax that allows reducing the wins gap between the two teams related to the initial equilibrium ($w_1^A > w_1^C$), the implementation of the cap limits this improvement ($w_1^B < w_1^C$). As the winning percentage is inelastic to σ, we conclude that whatever $\sigma \in [0;1]$, $w_1^B < w_1^C < w_1^A$ if $cT_1 > L$, $dT_1 > (1-x)P_1$ and $cT_2 \leq L$. The uncertainty of outcome of L1 is damaged by the implementation of the tax cap. This is the argument used by Frédéric Thiriez, president of the French Professional Soccer League (LFP), to challenge the advisability of the cap: "I am not saying that the outcome is worse than the initial system, but it is really unfair. The reality is that the biggest clubs will benefit from the tax cap. That is to say Paris-SG basically, and to some extent Marseille, Lyon or Lille."[7] Nevertheless, the tax cap has an interest to limit the exodus of talent. From (5A), (6B), and (6C), aggregate quality of teams increases since $T^B \leq T^C$ if $w_1^B \leq w_1^C$. As $T^A \geq T^B$ and $T^A \geq T^C$, the transitive relation $T^B \leq T^C \leq T^A$ is observed, whatever $\sigma \in [0;1]$.

The competition organizer has to solve the dilemma between competitive balance and aggregate quality of teams, as Figure 1 and Table 3 illustrate. The initial situation (equilibrium A) prevails whenever $d = 0$ or $x = 1$. The competitive balance [given by (6A)] and the aggregate talent [given by (6A) and (5A)] are invariable. When $d > 0$ and $x = 1$, only tax regime (B) prevails, leading to an improvement of the competitive balance and an exodus of talent. In Figure 1, lets define points *I*, *II*, and *III*, with *d* positive and constant. In *I*, $x = 0$, whereas $x = c / (c + d)$ in *II*, and $x = 1$ in *III*. From *I* towards *II* in the diagram, nothing changes in terms of competitive balance and stock of talent, as the tax burden of Club 1 is still below the cap. In other words, Club 1 still uses the (3B) profit function (tax only regime). Instead, moving above *II* towards *III* means that Club 1 now benefits from the tax plus cap regime. Equilibrium C now prevails and the aggregate stock of talent is given by (6C) and (5C). As *x* increases, com-

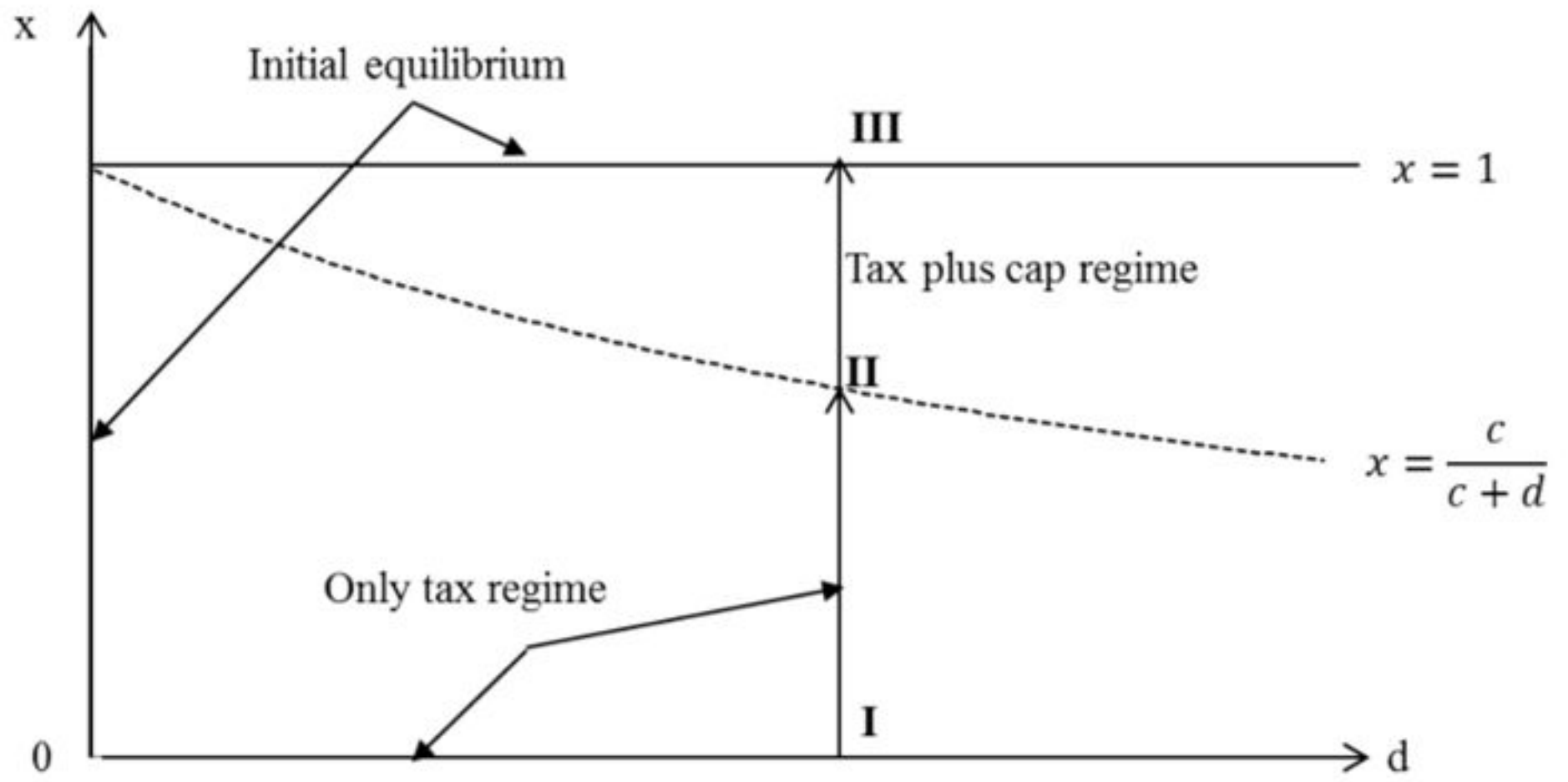

Figure 1. Tax plus cap regime, tax only regime, and initial equilibria.

Table 3. Tax Plus Cap Regime, Tax Only Regime, and Initial Equilibria

		Initial regime	Tax only regime	Tax plus cap regime
General model	Equilibrium	A	B	C
	Transitivity	$w_1^B \leq w_1^C \leq w_1^A$ and $T^B \leq T^C \leq T^A$		
Distortion model	Equilibrium	D	E	F
	Transitivity	$w_1^D \leq w_1^F \leq w_1^E$ and $T^E \leq T^F \leq T^D$		
Sugar Daddy model	Equilibrium	G	H	I
	Transitivity	$w_1^G \leq w_1^I \leq w_1^H$ and $T^H \leq T^I \leq T^G$		

petitive balance is worsened and an influx of talent is observed until $x = 1$, where T and w_1 return to their initial value given by equilibrium A.

The case of French L1 lies between *II* and *III* ($x = 0.95$); *d* was determined by the French government, and the competition organizer has no say on the matter. However, the tax cap was added to mitigate the contestation of the clubs' union. Assuming the total amount of tax revenue collected is deemed sufficient to the French government, this actual equilibrium is optimal only if the primary aim of the league was to maximize the aggregate quality of teams.

Otherwise, as Frédéric Thiriez argued, the system would be suboptimal. This leads us to believe that this intermediary situation could be optimized.

Extension of the Model and Policy Regulation

In this section, both clubs are now assumed to be subject to the 75% tax rate ($cT_i \geq L$). We relax some of the model's hypotheses in reaction functions to be in line with the stylized facts of L1. This suggests that we reverse our argument about the cap advisability.

Social and Fiscal Distortions in a Professional Sports League

The increase of the top marginal tax rate in France has also highlighted the comparative advantage enjoyed by the ASM. As explained previously, due to the terms of the Franco-Monegasque tax convention, Monaco levies no income tax on individuals, the only exception being that French nationals must pay French income tax. As a result, ASM benefits from social and fiscal distortions, compared with other L1 clubs. Given the club's payroll, this advantage is estimated at €70 million per year, divided between social (€50 million for foreign players) and fiscal (€20 million, related to the 75% tax rate) distortions.[8] We assume club 1 to be located in such an area. Its social advantage implies a lower constant marginal cost (c - e) with $e > 0$ leading to a cheaper acquisition of unit of playing talent for team 1 than for team 2. The fiscal distortion implies that the new taxation system does not apply to team 1 whatever T_1 is. Whatever the tax regime is (related to stock of talent T_1), the profit function for team 1 is: $\pi_1 = P_1 - (c - e)T_1 = 0 \text{ for } e > 0 \ \ (\mathbf{2D})$, leading to the reaction function 5D:

$$T = \left[\frac{m_1 - (m_1 w_1)/\beta}{c - e}\right]^{\frac{1}{1-\sigma}} \tag{5D}$$

Club 2 does not benefit from such an advantage. According to T2, the profit functions (2A), (2B), and (2C) are still applied, with the respective function reactions (5A), (5B), and (5C).

We now apply the theoretical framework presented in the previous section to this context to describe three additional equilibria. First, we define the initial situation (D) when club 2 does not suffer from the new tax rate thanks to the reaction functions (5D) and (5A):

$$w_1^D = \frac{\beta c m_1 - (\beta - 1)(c - e)m_2}{c m_1 + (c - e)m_2} \text{ with } w_1^D \geq w_2^D \text{ if } \frac{m_1}{m_2} \geq \frac{c - e}{c} \quad (6D)$$

$e = 0$ means a lack of social dumping from club 1, leading to $w_1^A = w_1^D$. Notice $\frac{\delta w_1^D}{\delta e} > 0$ showing that the competitive balance worsens as the social distortions grow: $w_1{}^D \geq w_1{}^A$. We then determine the only tax (equilibrium E) and the tax plus cap (equilibrium F) equilibria from the equalization of the reaction functions (5B) and (5D), and (5C) and (5D):

$$w_1^E = \frac{\beta(c + d)m_1 - (\beta - 1)(c - e)m_2}{(c+d)m_1 + (c - e)m_2} \text{ with } w_1^E \geq w_2^E \text{ if } \frac{m_1}{m_2} \geq \frac{c - e}{c + d} \quad (6E)$$

$$w_1^F = \frac{\beta c m_1 - x(\beta - 1)(c - e)m_2}{c m_1 + x(c - e)m_2} \text{ with } w_1^F \geq w_2^F \text{ if } \frac{m_1}{m_2} \geq \frac{x(c - e)}{c} \quad (6F)$$

$w_1^D = w_1^E$ for $d = 0$, $\frac{\delta w_1^E}{\delta d} > 0$ and $\frac{\delta T^E}{\delta d}$ has the sign of $\frac{-\delta w_1^E}{\delta d}$. Thus $w_1^D \leq w_1^E$ and $T^D \geq T^E$ if $d \leq 0$. For $x = 1$, $w_1^D = w_1^F$. $\frac{\delta w_1}{\delta x} > 0$ and $\frac{\delta T^F}{\delta x}$ has the sign of $\frac{-\delta w_1^F}{\delta x}$ therefore $w_1^D \leq w_1^F$ and $T^D \geq T^F$ if $x \epsilon [0; 1]$. Then the competitive balance and the aggregate quality of teams worsen due to the new taxation.

Nevertheless, the implementation of the cap allows reducing the competitive imbalance and the exodus of talent, which follow the introduction of the 75% tax rate: whatever $x \epsilon \left[\frac{c}{c+d}; 1\right]$, $w_1^E \geq w_1^F$ and $T^E \leq T^F$. Slackening the cap leads to more outcome uncertainty as the introduction of the tax enhanced the competitive advantage of the ASM head office location. Thus, the French Football Federation (FFF) wanted to introduce a new rule making it a requirement for all L1 clubs to have their head office in France. ASM came to an "illegal" agreement (according to the State Council) with the LFP that guarantees the club's participation in the French championship while maintaining its head office within the Principality. In return, ASM agreed to pay the LFP a single contribution of €50 million.[9]

On the other hand, this distortion turns out to be an opportunity for the league to attract more talent since $\frac{\delta T^F}{\delta e}$ has the sign of $\frac{\delta w_1^F}{\delta e}$. $T^F \geq T^C$. It allows limiting the

exodus of talent implied by the introduction of a tax.

It must also be noted that the degree of imbalance should increase when distortion is combined with an asymmetry of resources. Paris and Monaco together account for 43% of the aggregate income excluding trading of L1 for the 2013–2014 season (DNCG, 2014). This asymmetry calls into question the premise of strict budgetary constraints.

Soft Budget Constraint, 'Sugar Daddies,' and Competitive Imbalance

Private owners do not always seek to achieve a break-even position and can "behave as non-profit-seeking investors, patrons, or tycoons" (Andreff, 2007, p. 6). The concept of soft budget constraints (SBC) pioneered by Kornai (1980) to study socialist economies provides another rational explanation of recurring deficits in the soccer industry. The concept is best understood when contrasted with its counterpart (Storm & Nielsen, 2012). The hard budget constraint, the dominating form of budget constraint in capitalist economies, could be defined as a situation in which "proceeds from sales and costs of input are a question of life and death for the firm" (Kornai, 1980, p. 303).

The SBC syndrome can appear in the context of professional soccer.[10] Soccer teams may benefit from local governments (subsidy, rent facilities at subsidized prices, etc.) or shareholders bail them out. Teams can also influence the tax rules: the Salva Calcio in 2002 (Hamil, Morrow, Idle, Rossi, & Faccendini, 2010), the agreement between Lazio and the Italian government in 2005 (Morrow, 2006), the debt reduction in 1985 and 1992 for Spanish clubs (Barajas & Rodriguez, 2010), or the implementation of a tax cap at 5% of the total revenue. Thus, European professional soccer clubs "operate chronically on the edge of financial collapse" without going out of business (Storm & Nielsen, 2012, p. 183).

However, the limited SBC syndrome is too common a situation to be applied to the particular cases of PSG and ASM. Both clubs have much looser budget constraints than their opponents, which enables them to over-invest in players. We assume that PSG and ASM are not oriented toward win-maximization under strict seasonal budget constraints or limited SBC, but under inelastic SBC. They both want to build competitive teams at the European level in order to perform well in the UEFA Champions League. For this purpose, "sugar daddies" will invest in recruiting as many top players as possible, even if this leads to significant budgetary deficits. Then, team 1 owned by a sugar daddy will invest up to a certain limit to achieve an exogenous stock of talent, noted as $\overline{T}$ whatever the cost is. This stock enables the owner to reach its European sporting goals. The budgetary constraint of the sugar daddy is now endogenous: $SBC(\overline{T}, \pi_1)$. The reaction function of the sugar daddy, whatever the tax regime, is:

$$T = \frac{\overline{T}}{w_1} \tag{5E}$$

By contrast, team 2 is not allowed to generate a deficit.[11] As the sugar daddy investment ensures a sufficient degree of aggregate quality of teams, we assume $\sigma=0$ to focus on relative talent. Equalizing (5A) and (5E) provide the initial equilibrium G:

$$w_1^G = \frac{(1-\beta)m_2 + \sqrt{(\beta m_2 - m_2)^2 + 4\beta c\overline{T} m_2}}{2m_2} \; with \; w_1^G \geq w_2^G \; if \; \overline{T} \geq \frac{m_2}{4\beta c} \tag{6G}$$

Equilibrium H assesses the tax only regime, which allows testing the relevance of the decision to add a cap to the tax system: the threshold $dt_i \leq (1\text{-}x)P_i$ in (3B) is removed. By equalizing the reaction functions (5B) and (5E):

$$w_1^H = \frac{(1-\beta)m_2 + \sqrt{(\beta m_2 - m_2)^2 + 4\beta(c+d)\bar{T}m_2}}{2m_2}$$

$$with\ w_1^H \geq w_2^H\ {}^I_1\ if\ \bar{T} \geq \frac{m_2}{4\beta(c+d)} \qquad (6H)$$

Equalizing (5C) and (5E) provides the tax plus cap regime equilibrium I:

$$w_1^I = \frac{(1-\beta)xm_2 + \sqrt{[xm_2\beta - xm_2]^2 + 4\beta c\bar{T}xm_2}}{2xm_2}\ with\ w_1^I \geq w_2^I\ if\ \bar{T} \geq \frac{xm_2}{4\beta c} \qquad (6I)$$

Competitive balance and exodus of talent worsen with the new taxation in the tax only and the tax plus cap regimes compared to the initial equilibrium: $\frac{\delta w_1^H}{\delta d} > 0$ and $\frac{\delta T^H}{\delta d} < 0$ as it takes the opposite sign of $\frac{\delta w_1^H}{\delta d}$, with $w_1^G = w_1^H$ when d=0, then $w_1^G <= w_1^H$ and $T^G \geq T^H$; $\frac{\delta w_1^I}{\delta x} < 0$, $\frac{\delta T^I}{\delta x}$ takes the sign of $\frac{-\delta w_1^I}{\delta x}$ with $w_1^G = w_1^I$ when x=1, then $w_1^G \leq w_1^I$ and $T^G \geq T^I$. And when comparing (6H) and (6I), $w_1^H \geq w_1^I$ and $T^H \leq T^I$ whatever $x \epsilon \left[\frac{c}{c+d}; 1\right]$. The implementation of the cap allows limiting the exodus of talent and the harm of the competitive balance implied by the introduction of a tax.

The competitive balance also worsens when gap between owners' behavior ($\bar{T}$) increases: $\frac{\delta w_1^I}{\delta \bar{T}} > 0$. $\frac{\delta T^I}{\delta \bar{T}}$ takes the sign of $\frac{\delta w_1^I}{\delta \bar{T}}$, therefore increasing the sugar daddy investment or slackening the cap; both lead to an influx of talent in the league. Imposing the new tax system implies that the uncertainty of outcome will worsen, already threatened by the sugar daddy behavior.

With the social and fiscal distortions, and the sugar daddy behavior assumptions, the conclusions of the previous section are reversed. In Figure 1 and Table 3, we show that the initial situation was the optimal situation. The only tax regime provides the most imbalanced league with the less aggregate team quality. According to these new hypotheses, the decision to add a cap to the tax increases the uncertainty of outcome. As the cap also slows down the exodus of talent, its introduction seems wise.

From those three models, the 75% tax rate reinforces the polarization of the L1 between two dominant clubs funded by sugar daddies on the one hand, and the other clubs struggling to remain solvent. The general model indicates that the 75% tax rate reduces the effect of the revenue advantage of the big clubs in return of an exodus of talent. Capping the tax levy somewhat reduces those effects. However, if we relax two basic hypotheses to obtain more realistic forecasts, two clubs enhance their hegemonic positions in the league. Therefore we recommend income redistribution between teams.

Table 4. Effect of the French 75% Tax Rate in L1 with Revenue Sharing (in K€)

Clubs	Initial situation	Tax plus cap regime		Only tax regime		Only tax regime with revenue sharing	
	Payroll	75% tax rate capped	Residual payroll	75% tax rate without cap	Residual payroll	Revenue sharing	Residual payroll
Paris	239773	19645	220128	43565	196208	2323	198531
Monaco	94581	0	94581	0	94581	0	94581
Marseille	85112	5227	79885	13034	72078	2323	74401
Lyon	82354	4954	77400	11545	70809	2323	73132
Lille	62190	4813	57377	7696	54494	2323	56817
Montpellier	33434	356	33078	356	33078	2323	35401
Bordeaux	55961	3388	52573	4151	51810	2323	54133
Saint-Etienne	40603	896	39707	896	39707	2323	42030
Rennes	41172	2102	39070	3316	37856	2323	40179
Toulouse	29735	1196	28539	1196	28539	2323	30862
Lorient	25898	0	25898	0	25898	2323	28221
Nice	25394	1076	24318	1076	24318	2323	26641
Evian	17901	0	17901	0	17901	2323	20224
Nantes	18706	0	18706	0	18706	2323	21029
Sochaux	21226	0	21226	0	21226	2323	23549
Valenciennes	20275	206	20069	206	20069	2323	22392
Reims	19004	0	19004	0	19004	2323	21327
Bastia	20581	178	20403	178	20403	2323	22726
Guingamp	18609	9	18600	9	18600	2323	20923
Ajaccio	14405	99	14306	99	14306	2323	16629
Standard-Deviation	**50124**		**46033**		**41021**		**40881**
Variation coefficient	**5.18%**		**4.99%**		**4.66%**		**4.43%**
Skewness	**2.99**		**2.92**		**2.79**		**2.81**

For Revenue Sharing

Competitive balance can be seen as a public good (Daly & Moore, 1981). Even if all the members of the league benefit from a well-balanced competition, every club behaves as a free-rider. Therefore an external regulation is necessary to guarantee an optimal solution, and the combination of several regulatory tools is effective (Dietl, Lang, & Rathke, 2011).

The primary objective of the 75% tax rate is to bring down the public deficit and to act as a symbol of solidarity. We assume that the total amount of tax revenue collected in tax plus cap regime is deemed sufficient by the French government. Based on this basic premise, could the new taxation system help improve the attractiveness of L1?

As mentioned previously, Frédéric Thiriez has argued that the system was unfair. The tax cost reduction associated with the implementation of the cap mostly benefits

PSG; 55% of the total savings profit the richest club, which alone represents 31.7% of the aggregate income excluding trading of L1 for the 2013–2014 season. Though the cap was implemented to reduce the budgetary pressure on French clubs, it appears to have a "dead-weight effect for sugar daddy." Instead of creating a cap, we recommend implementing revenue sharing funded by the difference between the total amount of tax revenue collected in the tax plus cap regime and what would have been collected in the only tax regime. This revenue sharing should improve the attractiveness of L1 by maintaining competitive balance and be inconsequential in terms of stock of talent as clubs maximize wins. The revenue sharing must concern all L1 clubs whose head office is located in France. In other words, ASM will not benefit from this measure. In order to ensure that this tax exemption is neutral with regard to the public budget, the total amount of the revenue shared must be equal to the amount of additional tax collected thanks to the removal of the cap on the 75% tax rate (x=1 and d>0). In order to take into account the rent-seeking game played by clubs, this amount will have to be determined once the 75% tax has been collected. The impact of this policy tool with a static payroll is given in Table 4.

We use the coefficient of variation to proxy competitive balance (Daly & Moore, 1981). *In fine*, the variation coefficient between payrolls decreases from 5.18% to 4.43%. The competitive balance is significantly improved at each step of the regulation. Like the implementation of the revenue sharing, the introduction of the 75% tax rate helps optimize outcome uncertainty, but the most important improvement stems from removing the 5% cap on the 75% tax. Using the third statistical moment allows highlighting the polarization of the league. The positive skewness of the payroll distribution points out that the competitive balance is worsened due to a few extremely good teams (Lee, Jang, & Hwang, 2014). As the skewness decreases with the policy tool (from 2.99 to 2.81), the only tax regime with revenue sharing holds back the polarization of L1. The primary aim of the revenue sharing would be to convince the clubs' union, UCPF, to accept the removal of the cap in return for this new tax rebate. Those regulation tools help optimize the attractiveness of L1.

Discussion, Implications, and Avenues

Discussion

As European soccer teams are involved in a competitive environment, talent supply is variable. The welfare of players is not impacted by a change in tax rates as net salary is assumed to be maintained at the same level (c is constant). If French soccer teams are no more able to offer a certain level of salary, players will leave the country to keep the same level of net salary. Regarding club owners, they are assumed to be oriented toward win maximization. The new tax rate has no effect at an aggregated level, as the sum of winning percentages must equal 1. Only the sugar daddy utility may decrease as the introduction of a new tax raises his endogenous SBC. As the new tax rate has no effect on players and clubs (at the league level), social welfare only varies according to fan utility, which is assumed to depend on their preference for outcome uncertainty and the aggregate quality of teams.

The fan preference for competitive balance could be challenged. Borland and MacDonald (2003) list 15 studies dealing with the correlation between competitive

balance and attendance. Only seven among them conclude that competitive balance has, indeed, a positive effect. Yet, if we question the concavity of the revenue function, the general model yields different results (Cavagnac & Gouguet, 2008). Competitive balance appears to be only one of the determinants of a team's revenue function. According to the Yankee/Manchester United paradox (Szymanski, 2001), an unbalanced league could be attractive if teams with the larger fan bases were better than the others. Do those considerations call into question the validity of the results regarding the relevance of the 75% tax rate mechanism?

According to Dietl, Lang, and Werner (2009), a degree of imbalance is necessary to maximize the welfare of sports leagues. Yet, which teams will be the main beneficiaries of the 75% tax rate? The answer is ASM and to a lesser extent PSG. The Principality team does not have the most devoted fan base and has the worst attendance in L1.[12] If PSG is popular, other clubs with large fan bases (e.g., Marseille, Saint-Etienne, Lyon) appear to be the main losers of the new taxation.

Moreover, sugar daddy behavior can be perceived as "financial doping" and harms leagues' attractiveness. "Many fans complain that it is unfair that wealthy owners are able to 'buy' a championship simply by using their financial muscle" (Peeters & Szymanski, 2014, p. 355).

The behavioral asymmetry and the social and fiscal distortions as well as the 75% tax rate widen the gap between PSG and ASM on the one hand and the other clubs on the other. Two teams will be in contention for the title and the other 18 teams will take part in another championship in the league. This "leftward shift of the Diracized subset," since it moves the block of competitively balanced teams toward the bottom, is non-optimal for the attractiveness of the league (Gayant & Le Pape, 2013). This explains why the 75% tax rate causes a non-optimal level of imbalance, and revenue sharing seems necessary.

Another argument challenges this analysis: beyond the dilemma between competitive balance and aggregate quality of teams, competition organizers should help the emergence of domestic elite perform well in European competitions. The stakes are twofold. First, country coefficient rankings are based on the results of each domestic club in the five previous UEFA Champions League and UEFA Europa League seasons. The rankings determine the number of places allotted to a country in forthcoming competitions. Second, the revenue function also depends on a club's performance in the UEFA club championship. Qualifying for European Cup competitions generates prize money estimated to amount to an average of 11% of revenue (UEFA, 2011). On the one hand, LFP wants to maintain competitive balance to increase the attractiveness of L1. On the other hand, the French league needs teams to perform well in European competitions. Thus, French broadcasting rights are shared unequally, in favor of the biggest clubs. LFP should clarify its position. The broadcasting rights sharing suggests that the league wishes to promote the emergence of an elite team. However, Frédéric Thiriez's statement leads us to believe the opposite.

Implications

Contrary to the dominant view, the main threat associated with the 75% tax rate, for the French soccer championship, is not the risk of bankruptcy. It certainly implies a new constraint. However, despite earning high revenues, European soccer clubs expe-

rience financial problems. If enormous revenues are not enough (Solberg & Haugen, 2010), then the nature of the problem must be structural. Several explanations can be advanced. Andreff (2007) blames the problem on a lack of governance, Solberg and Haugen (2010) use a game-theory model in the race for talent, and Szymanski (2012) explains it by negative shocks (productivity and/or demand).

So where does the trouble come from? According to our study, which takes into account situations that are specific to L1 (social and fiscal distortions, and behavior asymmetry), a 75% tax rate harms competitive balance, leads to an exodus of talent, and reinforces L1 polarization. LFP has failed to improve the competitive position of French clubs in the UEFA ranking (sixth, after the Portugal championship). Nevertheless, thanks to the two sugar daddies in L1, the performance of French soccer clubs in European competitions should improve. Moreover, we have explained that the actual degree of imbalance is not optimal. That is why LFP should no longer promote the emergence of an elite, as by doing so, they risk polarizing L1. Nöel Le Graët, chairman of the FFF, underlines this when he stated, "Clubs can see that PSG and Monaco hold the first two places in the championship. Stadiums are being built all over France, but that's to play for the third place, at best. This is cause for concern and questioning."[13] The revenue sharing (and the regularization of the ASM head office location) should help maintain competitive balance.

At present, only the top two teams in L1 are ensured qualification for the lucrative Champions League. This implies that the actual heterogeneity of resources could worsen competitive balance through a cumulative effect.[14] Apart from this "snowball effect," the UEFA Financial Fair Play regulations (FFP) will also ossify the actual hierarchy (Franck, 2014; Sass, 2016). The clubs' payroll will have to be entirely financed by revenues generated by soccer, and injections of "external" money will be forbidden. FFP will act as a barrier to entry and it will become increasingly difficult for a challenger to fill the gap between the best clubs and itself. Even if the 75% tax rate is a temporary measure (by assuming no hysteresis effect), its impact could be sustainable. L1 could be durably polarized and the attractiveness of the French championship diminished.

Avenues

The literature in the economics of sports generally deals with the measure of competitive balance. The non-cooperative model fits well with the theoretical debate. It helps understand the impact of fiscal measures in terms of outcome uncertainty and exodus of talent. However, this model does not take into account specific situations such as fiscal and social distortions or sugar daddy behavior. It therefore seems necessary to use it gingerly because results are hypothesis dependent. An interesting avenue for further research in this area is to challenge the basic premises about a club's revenue function or the behavior of their owners (Cavagnac & Gouguet, 2008). Despite the fact that the general model includes the effect of aggregate talent to the revenue function, the revenue function could also include a trading variable. A club located in a less favorable area may benefit from player transfer fees paid by a richer club. If the new taxation damages the recruitment opportunities of the clubs operating in the bigger markets, this will have negative spillovers on the other club. The impact on competitive balance would then be reduced to some extent and the exodus of the best players would be reinforced.

Moreover, this model does not specify the clubs' adjustment mechanism. We assume the talent supply variable (price) is exogenous. Then the available talent stock T is the adjustment variable. But no more information is given about it. Is it a qualitative (more or less skilled players) or quantitative (size of the squad) adjustment? Kleven et al. (2013) point out that the number of players is not correlated to taxation. This absence of correlation implies a qualitative adjustment, which could impact the attractiveness of L1. This raises another question: Are the best or the weakest players departing from the league (and are substituted by lower-ability players)? Even if the players are the decision-makers for Kleven et al., their results help anticipate the adjustment; the tax rate is negatively correlated to the presence of the best players, but positively to the low-ability players.

If the 75% tax rate leads to an exodus of the superstars, fan interest could decrease exponentially. Indeed, the team attendance and revenue functions of a team could be correlated to the presence of a superstar on the team (Hausman & Leonard, 1997). The net-salary differences with the rival leagues are the main determinant of the exodus of the best French players. The new taxation strengthens those differences while the Premier League's TV deal for 2016–2019 already threatens the attractiveness of the L1 and could raise the marginal cost of talent, which is assumed to be constant in the general model.

The question of the utility function of sugar daddies could be challenged; is the new taxation system disincentive enough for them to give up their investments? The evaluation of the new tax system could also be improved by a three-club model and a clearer definition of the league's priority objective. Much still has to be done about the socially desirable level of imbalance and the specification of the model to come closer to reality.

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Endnotes

[1] The highest British income tax rate is currently 45%. It could explain why the Premier League is still able to recruit the best players in the world.

[2] Aggregate net income is negative in L1 since 2007–2008 (DNCG, 2014).

[3] See http://www.franceinfo.fr/sports/football/article/pourquoi-les-clubs-de-foot-protestent-ils-contre-la-taxe-75-293245. To prove how this new tax rate may threaten the viability of the French championship, clubs made public the data, thanks to the media.

[4] Nash equilibrium could also be applied to closed leagues. For further discussion on this topic, see Madden (2011, 2015), Winfree and Fort (2012), and Winfree (2015).

[5] A strictly concave revenue function implies a quadratic function of wins percentage and to limit β between 1 and 2 because:

$$\frac{\partial R_i}{\partial w_i} > 0 \; for \; \beta > 2w_i; \frac{\partial R_i}{\partial w_i} = 0 \; for \; \beta = 2w_i; \frac{\partial R_i}{\partial w_i} < 0 \; for \; \beta < 2w_i;$$

(Sass, 2016).

[6] This hypothesis seems coherent with the L1 stylized facts as a significant linear correlation appears between payroll and the amount of tax payable (in only tax regime) by the clubs subject to 75% tax rate ($R^2 = 0.92$). From the 14 clubs suffering from the new tax system, we excluded PSG from the sample, considering it as an outlier for its very high payroll.

[7] See http://www.slate.fr/story/78358/plafonnement-taxe-75-bouclier-fiscal-psg-grands-clubs

[8] See http://www.lemonde.fr/sport/article/2013/09/30/regis-juanico-l-as-monaco-a-un-enorme-avantage-fiscal_3486973_3242.html. Data is from a governmental source. To put this amount in perspective, note that it represents the sixth budget of L1.

[9] See http://uk.eurosport.yahoo.com/news/football-monaco-pay-league-68-million-keep-tax-180646621—sow.html. Seven clubs have contested this agreement in the courts, leading to the cancellation of this "illegal" agreement by the French State Council. Since the court decision, no new measures were taken about the ASM head office location.

[10] Limited SBC means an exogenous tolerance for deficit. We assume that owner step as rescuers by paying the open bills to keep π=0. Adding the SBC in the revenue functions does not alter the equilibria defined above, if we assume owners of team 1 and 2 have the same loss tolerance. It only implies more aggregate talent as SBC increases, but the transitivity of $T^C \leq T^A \leq T^B$ and $T^F \leq T^D \leq T^E$ are respected.

[11] As explained previously, assuming a limited SBC does not alter the results.

[12] At the end of the 2013–2014 season; see http://www.lfp.fr/ligue1/affluences/journee

[13] See http://www.lequipe.fr/Football/Actualites/Le-graet-un-accord-un-peu-leger/441057

[14] See Sass (2016) for a dynamic equilibrium of the general model. Pawlowski, Breuer, and Hovemann, (2010) also highlight a significant worsening in competitive balance after the modification of the Champions League payout.

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