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THE IMPACT OF SALARY CAPS IN PROFESSIONAL TEAM SPORTS

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Abstract

In this paper we analyse the impact of a salary cap on a professional team sports league. We concentrate on the competitive balance, on the level and the distribution of player salaries, on owner profits and total league revenue. A simple model shows that a salary cap can improve the competitive balance among clubs as well as the salary distribution among players. We also investigate how the recent individual salary cap in NBA might affect the competitive balance.

I Introduction

The quality of a play or the league championship, which are the products in the professional team sports industry, depends among other things on the competitive balance in the league. Empirical investigations have shown that the uncertainty of outcome of a game or the league championship is a significant factor explaining a club's revenue like gate receipts. (see Noll, 1974; Jennett, 1984; Janssens and Késenne, 1987; Knowles, Sherony and Haupert, 1992). In order to guarantee a more or less balanced competition, sport federations and league authorities have always been trying to regulate the player labour market and to prevent the concentration of all playing talent in the rich big-city clubs that can offer better salaries than the small-town clubs. For that reason many sport leagues, in the US and in Europe, had installed a player reservation system and a transfer market, so that players were not free to change clubs, even at the end of their contract, and that they could be traded by the club owners against a bargained transfer fee. Besides the so-called 'rookie draft', where young players can be selected by clubs in reverse order of their league standing, major league sports in the US like football (NFL) and baseball (MLB) also adopted revenue sharing arrangements to improve the distribution of playing talent among clubs. However, the economic research in the US has shown that, given a number of specific assumptions, these league regulations on the player labour market have little or no impact on the competitive balance in the league, if clubs are profit maximizers. We quote the main conclusion of Fort and Quirk (1995) in their

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well-known revue article in the Journal of Economic Literature:

> The problem of maintaining financial viability for teams located in weak-drawing markets is a major one for sports leagues. The analysis here argues that an enforceable **salary cap** is the only of the cross-subsidization schemes currently in use that can be expected to accomplish this while improving the competitive balance in a league.

In defending salary caps many club owners in the US argue that lower player salaries reduce total cost and therefore also the ticket price for entering the ballpark. However, this argument in defence of salary caps is false. As argued by Scully (1995) and others, a salary cap does not affect the ticket price, because most major league clubs in the US are local monopolists on the product market, so that owners can set prices in order to maximize profits. Because the marginal cost of a spectator is close to zero, i.e. the number of spectators in the stadium does not significantly raise the total cost of a club, the profit maximizing pricing rule turns out to be independent of the player salary level. The optimal ticket price is the same with or without a salary cap.

The introduction of salary caps in the US major leagues had not been without serious problems. Top players don't like salary caps, for obvious reasons. Back in 1993 the Major League Baseball (MLB) season was called off by a player strike following a dispute on salary caps. Also the 1998–99 NBA-season was truncated by a 202-day lock-out following a disagreement between owners and players on the level of the salary cap. Though salary caps are not an issue in European sports so far, they probably will be in the near future as professional sports clubs grow up to commercial profit maximizing businesses, a process that is already underway. One might also consider salary caps as a measure to reduce the financial losses made by many European sports clubs.

In their approach to the impact of a salary cap Quirk and Fort (1992) and Fort and Quirk (1995) consider a combination of a salary cap and a revenue sharing arrangement. This NBA-style salary cap not only imposes a maximum amount but also a minimum amount of money that must be spent on player salaries. It follows that the small clubs need some subsidization from the big clubs so as to be able to pay the salaries. The aim of this paper is to investigate what the impact is of a salary cap 'tout court', i.e. without a payroll minimum or any revenue sharing arrangement. We try to analyse its impact on the competitive balance in a league, the average level and the distribution of player salaries, the profits of both big and small clubs, total league revenue, We make use of a simple Quirk and Fort two-club model, adjusted for two types of players, top players and regular players.

II A Two Club Model

In this model we start from a league with only two clubs, a big-city club X with a high drawing potential for playing talent and spectators and a small-town club Y operating in a small market. The size of the market (M), which cannot be controlled by the club, is one of the major factors that affects a

club's total revenues (R), as shown by many empirical studies in Europe (for a survey see: Cairns, Jennett and Sloane, 1986). The second most important factor determining club revenue is the winning percentage (W). Also in Europe people like to watch winning teams. This winning percentage has a positive but decreasing marginal effect on club revenue because a club that becomes too strong will harm the competitive balance in the league. It is obvious that a reasonable degree of uncertainty of outcome is necessary to keep spectators interested in the championship. So the revenue function can be written as:

$$R = R^0(M, W) \text{ with: } \frac{\partial R^0}{\partial M} > 0 \qquad \frac{\partial R^0}{\partial W} > 0 \qquad \frac{\partial^2 R^0}{\partial W^2} < 0. \tag{1}$$

The winning percentage of a team depends on its playing talent. We distinguish between two types of players: there are top players (L_1) and there are regular players (L_2). The productivity of a regular player, which is the individual contribution of a player to a club's winning percentage, is assumed to be only a fraction (a) of the productivity of a star player. We simplify this relationship to:

$$W = f(L_1 + aL_2) \qquad \text{with } 0 < a < 1 \qquad \text{and} \qquad f' > 0. \tag{2}$$

A team can only have a fixed number of players (L) on the field so a club faces the restriction that:

$$L_1 + L_2 = L. \tag{3}$$

After the substitution of (2) and (3) in revenue function (1) this can be rewritten as:

$$R = R[aL + (1 - a)L_1, M]. \tag{4}$$

On the cost side we assume that a club's total cost C only consists of player salaries. If C_1 is the labour cost or the salary of a top player and C_2 is the unit cost of a regular player, we can write the cost function, given constraint (3), as:

$$C = (C_1 - C_2)L_1 + C_2L. \tag{5}$$

Because the regular players are in excess supply, their salary C_2 is simply a fixed minimum wage. The salary C_1 of the top players, however, is determined by the demand and supply conditions on the player labour market. We assume the supply of top players LS to be independent of the salary level.

The optimal number of top players in a profit maximizing club can now be found where the marginal return (productivity) of top players equals the difference between their market wage and the (minimum) wage of the regular players, i.e.:

$$(1 - a)\frac{\partial R}{\partial W} = C_1 - C_2. \tag{6}$$

Note that the marginal return of top players not only depends on the marginal return of winning, but also on the difference in player productivity $(1-a)$.

If we turn to a simple Quirk and Fort two-club model where the big-city club operates in the market M_x and the small-town club in the market M_y, the equilibrium on a perfectly competitive labour market of top players, given a constant supply of top players, is found where the marginal revenues of both clubs are equal to the salary difference, i.e.:

$$MR_X = C_1 - C_2 = MR_Y. \tag{7}$$

It follows that the big club X will hire more top players than the small club Y because the market size has a positive effect on the marginal revenue. This result can be seen in Figure 1, where the demand curves for top players in the big and the small club, MR_y and MR_x, are drawn as simple linear downward sloping functions with a given supply of top players (LS). The labour market clears at point A where the demand curves of both clubs intersect, indicating the distribution of playing talent on the horizontal axis and the salary distribution on the vertical axis. Because of the higher productivity level of top players in the big club, the big club will hire more top players. The model also shows that the salary difference between the star players and the grass-roots players can be very large if top players are in short supply.

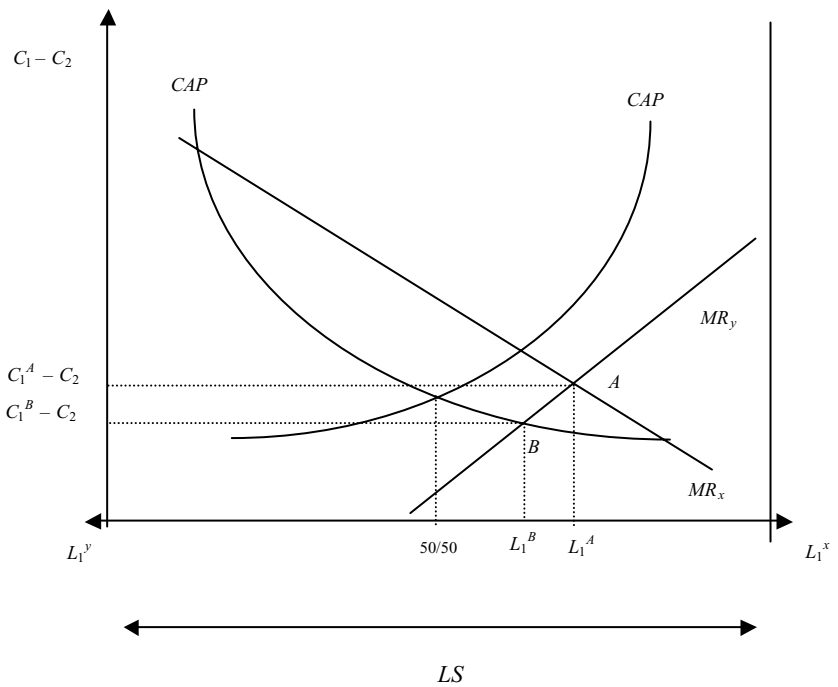

Figure 1. Salary caps and market equilibrium.

III Introducing A Salary Cap

How can a salary cap be introduced in this model? A salary cap, which is in fact a payroll cap, sets a maximum amount of money that a club can spend on player salaries. This maximum amount, which is the same for each club, is fixed year by year as a percentage of the total league revenue in the previous season, divided by the number of teams in the league. As mentioned in the introduction, we do not consider the case where the league is also imposing a minimum amount that must be spent on salaries, because this implies at the same time a subsidization of the small clubs. The assumption we make in this model is that a salary cap is not effective for the small club, so that its demand conditions for top players are unchanged and given by equation (6). The big club, however, has to maximize its profits under the constraint of the salary cap. We only consider the impact of a hard salary cap, although most salary caps are soft caps, meaning that the league allows for exceptions, mainly in order to protect teams from losing star players, like the 'Larry Bird exception' in case a free agent re-signs with his present club. If we call CAP the amount of the hard salary cap, it follows that the demand conditions for the big clubs are given by the hyperbolic function, as can be derived from equation (5):

$$C_1 - C_2 = \frac{CAP - C_2 L}{L_1}. \tag{8}$$

This can be seen in Figure 1. The demand conditions of the big club X are given by the hyperbolic function CAP. The demand conditions of the small club Y are the same as before because the CAP is not effective indicated by the position of the curve above the marginal revenue curve MR_y. The intersection of both curves, which fixes the new labour market equilibrium, is now found at point B. Because the equilibrium point has shifted from A to B, it follows that the competitive balance in a league can indeed be improved by a salary cap, the big club X will hire fewer top players than before. Comparing A and B on the vertical axis, it can be seen that also the salary difference between top players and regular players will be smaller, so that a more equal salary distribution can be expected. Because the salary of the moderate players is the official minimum wage, it follows that also the average level of player salaries will be lowered by the salary cap.

One of the reasons for introducing salary caps in the US major leagues is the guarantee of a reasonable profit rate for club owners after the abolition of the reserve clause. The abolition of the reservation system in the seventies has caused a tremendous rise in the salary level of top players. So it is also worthwhile to investigate how owner profits are affected by a salary cap. For the small club Y the model clearly shows a rise in profits as indicated by the shaded area on the right side of Figure 2. For the big club X which no longer can reach its profit maximizing position, the situation after the salary cap is only slightly more complicated. On the one hand there is an increase in profits as big as the shaded rectangular area on the left side of Figure 2, but there is a loss of profits

indicated by the shaded triangular area in the middle. Comparing the size of both area's it is clear that also the big club's profits go up due to the salary cap.

This finding differs somewhat from the conclusion by Fort and Quirk (1995) that the profits of the big club, before and after the cap, can be lower or higher depending on the level of the cap. The reason is that Fort and Quirk (1995) look at the impact of a combination of a salary cap and a revenue sharing arrangement, as already mentioned in the introduction. A 'pure' salary cap increases the profits of both the big and the small clubs. On average, the players lose and the owners gain by a salary cap, but from this analysis it is clear that the players' losses out-balance the clubs' gains so that total league revenue, ie, the revenue of all clubs together, diminishes. The net loss is as big as the area *ABC* in Figure 2.

If a salary cap is causing a social loss, as the industry moves away from the Pareto optimum, the question arises why it should be imposed. As a matter of fact, a salary cap is not necessarily decreasing total league revenue because the cap can be a correction of a market failure due to a negative externality. The owners of the bigger rich clubs don't take into account in their decision making that strengthening their team might hurt the competitive balance in the league. They are not, or cannot be, fully aware of the fact that the lack of uncertainty of outcome diminishes the public interest in the league championship, keeping people and television away from the ball park. Because of this overestimation of

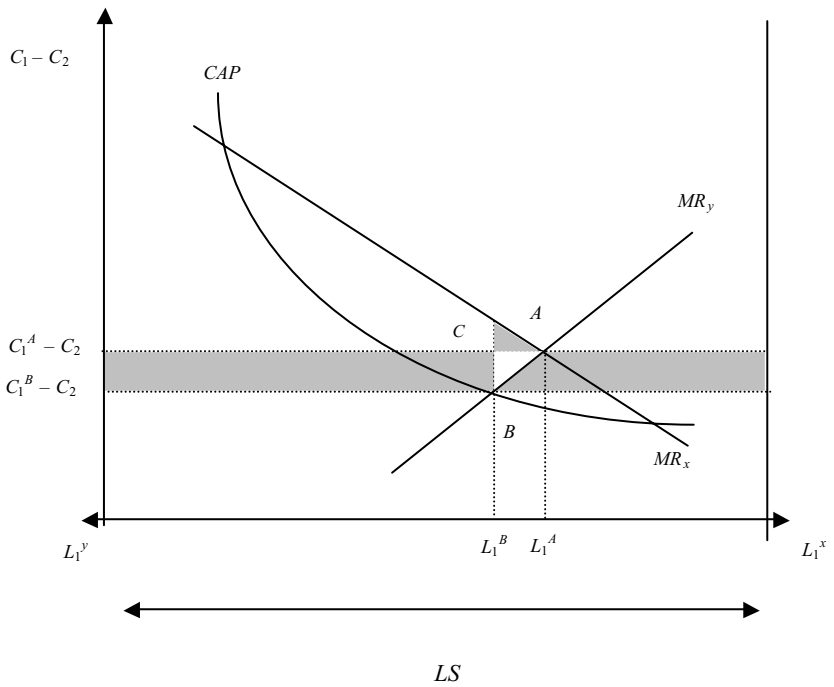

Figure 2. Salary caps and owner profits.

the marginal revenue of playing talent, the Pareto optimum can only be reached by restricting their demand for playing talent. The size of this externality, which can be derived from empirical studies of the impact of the uncertainty of outcome, should be taken into account when determining the level of the cap.

The negotiations during the recent dispute between NBA club owners and players ended, among other regulations and for the first time ever in sports, in the acceptance by the players of an individual cap (see Staudohar, 1999a, 1999b). Not only the total payroll, but also the individual player salaries now face a maximum amount, based on years of service. The question arises if this individual cap is a good idea, can this model reveal anything about the impact of an individual cap? In Figure 3 an individual salary cap can be introduced by drawing a horizontal line on the level of the individual cap, say *CAPi* (in fact the difference between the individual cap and the minimum salary for regular players). It is obvious that, in order to be effective, this individual cap has to be lower than the equilibrium top player salary in point *B*.

One of the consequences of an individual cap on top player salaries is that it creates an excess demand for top players. This rationing of top players results in any equilibrium point somewhere between the points *E* and *F*, the new profit maximizing points for the big and small club respectively. In our opinion the outcome will be closer to *E*, implying that more top players will play for the big team, and for good reasons. Under the free agency system, the top players are

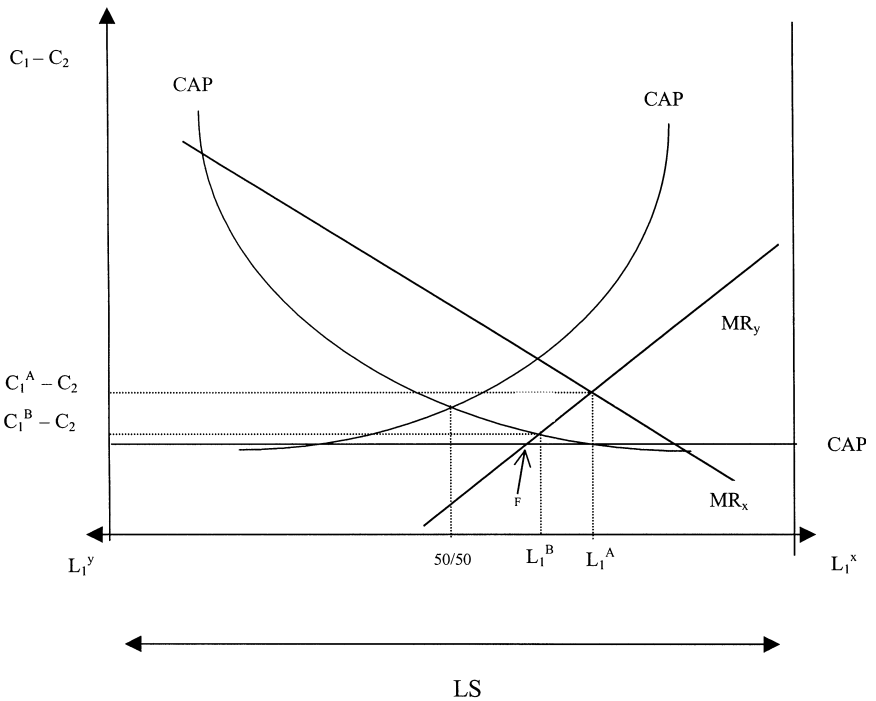

Figure 3. The individual salary cap.

free to choose their club and the expectation is that they will prefer to play for the bigger club and the better team, moreover, the richer club can offer the star players more non-wage or fringe benefits on top of the their salary. If we compare the outcomes with and without the individual cap in the points *E* and *B*, the profit maximizing rich club hires more top players then they would without the individual cap. The small club is rationed and has to fill up its roster with more regular players. Also the big club's profits are higher at point *E* than at point *B*, whereas it is unclear what happens to the profits of the small club.

The result of this individual cap is that the competitive balance becomes more unequal than under a payroll cap, which is probably not what the league wishes. The only positive outcome is that the individual cap further improves the salary distribution between stars and regulars.

IV Conclusion

Apart from the practical enforcement problems of a salary cap, its general impact on the industry of professional team sports will be considered by many as positive. A salary cap improves the competitive balance in a league, it improves the player salary distribution, holding down the excessive top player salaries, it guarantees the club owners of both small and big clubs a reasonable profit rate so that new investments in the industry will not be discouraged. Obviously, most top players won't like it. The only negative aspect of a salary cap is the departure from the Pareto-optimal point so that total league revenues are decreased. However, if the real world of sports would be as perfect and all the agents as well-informed and as rational as in the simplifying model above, salary caps would indeed be superfluous. It is rather the irrational behaviour of owners and managers, who do not realize the negative external effect of an unbalanced competition and who are bidding up top player salaries in a free agency player market, that makes these regulations necessary.

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