Superstars in the National Basketball Association: Economic Value and Policy
Author(s): Jerry A. Hausman and Gregory K. Leonard
Source: *Journal of Labor Economics*, Vol. 15, No. 4 (October 1997), pp. 586-624
Published by: The University of Chicago Press on behalf of the Society of Labor Economists and the NORC at the University of Chicago
Stable URL: http://www.jstor.org/stable/10.1086/209839
Accessed: 06-03-2018 13:38 UTC

Superstars in the National Basketball Association: Economic Value and Policy

Jerry A. Hausman, *Massachusetts Institute of Technology*

Gregory K. Leonard, *Cambridge Economics, Inc.*

An econometric analysis demonstrates that television ratings for NBA games are substantially higher when certain players ("superstars") are involved. Thus, these superstars are quite important for generating revenue, not only for their own teams but for other teams as well. Using the econometric analysis and additional information on attendance and paraphernalia sales, we estimate the value of Michael Jordan to the other NBA teams to be approximately $53 million. The positive externality superstars have on other teams can lead to an inefficient distribution of player talent. We examine several league policies that might be used to address the externality.

I. Introduction

Television has become an increasingly important source of revenues for sports leagues over the last several decades. In the case of the National Basketball Association (NBA), the contribution of "media" (television and radio) to total league revenue increased from 29% during the 1980–

We consulted for Chicago television station WGN and the Chicago Bulls in their antitrust litigation against the National Basketball Association. The issues addressed in this article are not directly related to the issues raised in the litigation. All views expressed are ours and not necessarily those of WGN or the Bulls. We thank Peter Diamond and Jonathan Gruber for helpful comments and Sarah Haag, Karen Hull, Tomomi Kumagai, and Ling Zhang for excellent research assistance.

[*Journal of Labor Economics,* 1997, vol. 15, no. 4]

0734-306X/97/1504-0008$02.50

81 season to 42% during the 1991–92 season.[1] Indeed, each NBA team's financial situation depends significantly on the revenue it generates through its local television contracts and its share of the revenue generated by league national television contracts. Telecasters have been willing to pay high levels of rights fees to televise NBA games because they can charge high advertising rates to advertisers and because, in the case of cable networks, they add incremental subscribers. Advertisers are attracted by sports programming because it provides access to the highly sought after, but otherwise light-viewing, young male demographic category in sizable numbers.

Recent events suggest that the presence of a "superstar" can have a substantial positive effect on the television rating of an NBA game, even when the game might otherwise be expected to receive a high rating (e.g., because the two teams involved are of high quality). The 1993 NBA Finals, which featured Michael Jordan, averaged a 17.9 Nielsen television rating (meaning that an estimated 17.9% of television households watched each game on average). The 1994 Finals, however, averaged only a 12.2 rating despite the presence of the New York Knicks, a team playing in the largest Nielsen market. In 1995, the average rating for the Finals rebounded somewhat to 13.9 with the presence of Shaquille O'Neal. Although the ratings decline in 1994 could be partially attributed to the Knicks' style of play, the absence of a superstar like Michael Jordan or Shaquille O'Neal was certainly a major factor.

The return of Michael Jordan from retirement in March 1995 likewise indicates the ratings power of a superstar. Jordan's first game, which was televised on NBC, generated a rating of 10.9%, the highest NBA regular-season game rating since 1975.[2] Jordan's return also appears to have had an effect on the stock prices of companies for which he serves as a spokesman. Between the time that rumors of his return began to surface and the official announcement of his return, the stock prices of Nike and MacDonald's rose 3.4% and 6.5% respectively.[3] Over the same period, the prices of comparable stocks went up by less. For instance, Reebok's stock price went up by 2.5% and PepsiCo's (Burger King, Taco Bell, Pizza Hut) stock price went up 3.2%.

[1] This information is derived from NBA financial documents produced in the Chicago Bulls and WGN litigation: *Chicago Professional Sports Limited Partnership and WGN Continental Broadcasting Company v. National Basketball Association,* 874 F. Supp. 844 (N.D. Ill. 1995).

[2] The local over-the-air telecaster of the Bulls, WGN, also received very high ratings for its telecasts during the first week after Jordan's comeback. WGN's three telecasts in that week averaged a 28.2 rating in Chicago.

[3] Quaker Oats (Gatorade) is another company for which Jordan is a prominent spokesman. Quaker's stock price actually fell over this period relative to, e.g.,

In this article, using data on the ratings of individual game telecasts, we analyze the factors that influence television ratings for NBA games. One of the factors we examine is the extent to which particular players affect television ratings. We find that games featuring these players, whether televised locally or nationally, have substantially higher ratings than games without these players. We refer to players who have this "incremental" positive effect on television ratings as "superstars." We proceed to demonstrate (though somewhat less formally) the importance of superstars for attendance and NBA paraphernalia sales as well. These findings suggest the existence of a positive externality whereby a team that hires a superstar raises the revenues of other teams in the league. We estimate the magnitude of the increase in revenue to other NBA teams due to Michael Jordan, the biggest superstar in sports. We find that a significant portion of an NBA team's revenue can be traced to Michael Jordan.

The existence of a superstar externality has implications for the economically efficient distribution of player talent across the teams in a league when the teams' local markets vary in size. We construct a simple model of a sports league and show that, as expected, the unconstrained market outcome involves free-riding by small market teams on large market teams so that the talent distribution is too heavily weighted toward the large market teams relative to the efficient distribution. We then examine the distribution of talent that occurs under a salary cap system. Salary cap systems are currently part of the collective bargaining agreements in the NBA and the National Football League (NFL).[4] We show that under a salary cap system where teams are constrained by the cap, talent is distributed too evenly across teams relative to the efficient talent distribution. Thus, the salary cap system is likely to overcorrect for the superstar externality, especially if the externality is relatively small.

A salary cap system therefore appears to be an overkill solution to the superstar externality. Why then have salary cap systems been imple-

---

Pepsi. However, Gatorade is a small part of Quaker's overall business, which includes, among other things, cereals and Snapple beverages.

[4] Our conclusions regarding the economic effects of salary cap systems are similar to the conclusions reached by previous theoretical research on sports leagues, which is nicely summarized and extended in Fort and Quirk (1995). This literature has usually focused on the evaluation of the owners' claim that league labor market restrictions (e.g., free agency restrictions, the draft, and salary caps) are necessary to attain competitive balance (interpreted either as the league revenue maximizing talent distribution or, sometimes, equal quality across teams). This literature has emphasized that only the salary cap system can affect the talent distribution, although Atkinson, Stanley, and Tschirhart (1988) have shown that, under certain assumptions, revenue sharing by the teams can also affect the talent distribution.

mented in the NBA and NFL even though they distort the talent distribution relative to the efficient distribution, an outcome which harms both owners and players? Owners have sought salary caps because they limit player salaries. Thus, caps may provide a "second-best" means by which to alter the split of league rents between owners and players. The owners have stressed the "small-market" problem and the "out-of-control player salaries" problem. These two problems are both results of the same underlying phenomenon: competition for players combined with fixed costs for teams can lead some or all teams to be unprofitable, a situation that can be "corrected" by shifting rents from players to owners.[5]

We conclude by noting that a superior solution to the "small-market team" and "out-of-control player salary" problems exists. In contrast to a cap system, a flat tax on team payroll has no effect on the distribution of player talent in our model. However, player salaries are reduced by the tax, and the proceeds can be redistributed to the small-market teams to improve their profitability. The flat-tax system does not correct for the superstar externality. But, as long as the externality effect is relatively small, the flat-tax system is likely to be a more economically efficient means than the salary cap of improving the profitability of small market teams. The flat-tax approach has not been previously analyzed in the literature, although it has been recently discussed in collective bargaining negotiations for Major League Baseball (MLB) and the National Hockey League (NHL).

II. Background on the NBA

The success of the NBA over the last 15 years has been accompanied by a substantial increase in player salaries. In the 1991–92 season, the average NBA player was paid approximately $1 million, about three times the average salary in the early 1980s. Superstar players, of course, are paid even greater amounts than the average player. When Michael Jordan retired prior to the 1993–94 season, his salary from the Chicago Bulls was about $3 million per season, and his professional earnings, including endorsements, totaled about $35 million. In the last several years, a number of talented young players, like Larry Johnson of the Charlotte Hornets, have received long-term contracts with total payments approaching the $100 million mark.

The collective bargaining agreement between the NBA and the Players' Association allows the league to impose on each NBA team a salary cap that limits the total amount the team can spend on player salaries. In return for this concession, the NBA guaranteed that 53% of gross reve-

[5] The unprofitability claims of owners are typically disputed by players' associations.

nues would go to the players. The NBA's salary cap system has a number of complexities that make it impossible to give a simple description. The most well known of these complexities is that, in spite of the cap, a team can enter contracts with its current players at salary levels that put the team above the cap.[6] Only a "base" amount of a current player's salary counts toward the cap. If, however, a team wants to enter a contract with a free agent (or a draft pick), the full amount of the salary would count toward the cap. Thus, the cap provides disincentives to "raiding" the rosters of other teams. For example, if the Boston Celtics wanted to obtain Shaquille O'Neal's services (assuming he were a free agent), their salary offer would be limited by the cap. The Orlando Magic's ability to meet the Celtics' offer, however, would not be impeded by the cap.[7]

The NBA has argued that the salary cap and the draft are necessary to create competitive balance since teams have revenue streams that differ according to city size and other factors. While the revenues generated by the NBA's national TV contracts are shared equally among the teams, the revenues generated by a team in its local territory, such as live gate, local TV, and local radio, are not shared with the other teams.[8] Thus, teams with large local territories, such as New York, may have higher revenue streams than teams with relatively small local territories, such as Sacramento.[9]

The NBA draft (which is currently limited to two rounds) distributes the best entering talent to teams according to descending order of existing team quality, as measured by win-loss record.[10] Thus, the best players entering the NBA are not allowed to take their services to the highest bidder, a restriction that prevents high revenue teams (which may otherwise have a poor draft position) from buying up the most talented players entering the league. Meanwhile, the salary cap limits the ability of the high-revenue teams from bidding away existing talented players from the low-revenue teams. Thus, the draft and salary cap are thought by the league to help small city teams, which have lower revenue streams, to

[6] Teams have recently attempted to take advantage of this complication using "one year and out" contracts. Under such a contract, a team signs a free agent to a contract (at a salary under the cap) that gives the player the option of free agency after one year. At that time, the team can re-sign the player at a much higher salary, now unrestricted by the cap.

[7] Although, if a team is over the cap, it does not get to increase its payroll the next year by the annual increase in the cap.

[8] Except for a small percentage that is paid to the league office.

[9] Nevertheless, some small city teams like Portland have been quite successful in generating large revenue streams.

[10] However, the exact drafting order of the 11 worst teams depends on the outcome of a "lottery."

obtain and retain talented players which, in turn, allows them to compete on the court with large city teams.

On occasion, the players' associations have argued that the draft can have no effect on competitive balance because the Coase theorem implies that the endowments (i.e., the draft positions) do not affect the final allocation of players. Although this argument may have certain merits when applied to, for example Major League Baseball, its applicability to the NBA and NFL is called into question because the salary cap at least in principle creates a transactions cost (a team's payroll cannot exceed the cap). Thus, the draft combined with the salary cap has the potential to shift the player talent distribution and support small market teams.[11] Whether the complexities of the NBA's salary cap system are such that it is too "soft" to prevent a Coasian result is an empirical question. Some empirical results have suggested that the level of competitive balance in the NBA has been unaffected by the salary cap system (Quirk and Fort 1992). An entirely different question is whether a salary cap that works is the most economically efficient way to support small market teams. We address this question in the last section of this article. In the next two sections, we investigate the magnitude of the superstar effect on league revenues.

III. The Superstar Effect on League Revenues

A superstar can have an effect on the revenues of his own team beyond simply improving team quality. The superstar may have a "personal appeal" that attracts fans even after controlling for his team's (increased) quality. In addition, a superstar will generally increase other teams' revenues as well as his own team's revenues. The effect of the superstar on other teams' revenues is a positive externality in the sense that the other teams receive the benefit but do not contribute toward paying the superstar's salary. In what follows, we attempt to measure the size of the effect superstars have on various sources of team revenue.

Our focus differs from previous literature which has estimated salary models, for example, for the purpose of studying labor market discrimination (Kahn and Sherer 1988). We are not estimating the relationship between a player's characteristics ("statistics") and salary. Instead, we are investigating the effect players have on team revenue.

[11] Note, however, that economic inefficiency results. Michael Jordan's marginal value in Chicago was likely greater than it would have been in Sacramento. If Sacramento had drafted Jordan and the salary cap had prevented Chicago from trading for him, the result might have been a loss in efficiency. Thus, we see that the salary cap is most likely a way to transfer wealth from the players to the owners. These points are also discussed by Quirk and Fort (1992).

A. Superstar Effect on Television Ratings

Certain players, such as Michael Jordan, may create special interest among television viewers, thus raising the television ratings of games in which he appears above the level that would be reached were he not involved. We estimate the effect particular NBA players have on television ratings, holding other factors constant. We refer to this set of players as "superstars" both because their talent level is high and because of the effect they have on fan interest beyond their talent level. Among the factors we attempt to hold constant in the analysis are the qualities of the teams involved in the game, which allows us to compare the relative importance for television ratings of showing a game involving "good" teams versus showing a game involving a superstar.

There are four types of telecasts by which an NBA game can reach television viewers. Two of the telecast types are "national" in nature while the other two are "local." First, the game could be broadcast nationally on the NBA's national over-the-air (OTA) network, which is currently the National Broadcasting Corporation (NBC). Second, the game might be telecast nationally on the NBA's national cable network, which is currently Turner Network Television (TNT). Third, the game might be broadcast locally in the territory of one of the teams involved by a local OTA outlet. Such a broadcast is called a "local OTA telecast."[12] Finally, the game might be telecast locally in the territory of one of the teams involved by a local cable outlet. Such a telecast is called a "local cable telecast."

The NBA, acting as agent for the 27 teams, negotiates the national OTA and national cable packages. The revenues derived from these national network contracts are divided equally among the teams. Each team is responsible for negotiating its own local cable and local OTA packages. Most NBA teams have contracts for both types of television distribution.

The NBA has instituted a number of league rules that restrict the manner in which NBA games can be televised. NBC is given first choice of which games to televise and shows about 20–25 regular season games per season, mostly on weekend afternoons. League rules prohibit the telecast (local or national) of any other NBA game within 2 hours of an NBC telecast. Thus, NBA on NBC telecasts face no competition from other NBA telecasts. TNT is given second choice of games and shows about 51 regular season games per season, mostly on Tuesday and Friday

[12] The Chicago Bulls broadcast locally over WGN, which is also a "superstation." Superstations are local channels whose signal is picked up by a third-party carrier and sent via satellite to local cable systems throughout the United States. Thus, Bulls games shown locally on WGN are transmitted to other parts of the country.

nights. Starting with the 1990–91 season, a league rule was instituted that prohibits superstations from telecasting NBA games on the same night as TNT. However, teams are still allowed to telecast their own games locally, via either OTA or cable, at the same time TNT is televising a game. Thus, TNT is given only limited protection from competing NBA telecasts. Given the selection by NBC, local teams can choose how to allocate their remaining games between their local OTA and cable telecasters. However, a league rule limits the number of games that can be shown over the air to a maximum of 41.

We use TV ratings data to analyze the effect of superstars on the ratings of televised NBA games.[13] For local OTA and local cable telecasts, we have local market-specific (e.g., Nielsen designated market area) ratings data from the 1989–90 and 1991–92 seasons. For national cable telecasts, we have local market-specific ratings data from the 1989–90 seasons. For national OTA, we have national ratings data from the 1990–91 to 1992–93 seasons. In our analysis of the local (OTA and cable) and national cable ratings data, we focus on the three players who are widely believed to be at a level above other players in terms of generating fan interest: Michael Jordan, Larry Bird, and Magic Johnson.[14] In our analysis of the national OTA ratings data, which extends to the 1992–93 season, we expand our set of superstars to include Shaquille O'Neal and Charles Barkley.

1. *Local Over-the-Air Television Ratings*

When a team broadcasts one of its games locally into its Designated Market Area (DMA) using a local broadcast station, the telecast is called a "local over-the-air telecast."[15] An example of a local OTA telecast is the broadcast by Boston independent channel WLVI of the December 5, 1989, Celtics-Charlotte game. A single game may be the source for two local OTA telecasts, one by each team in its respective DMA.[16] In this case, the two telecasts would represent separate OTA telecast observations in the data, each with its own rating. We used ratings data for the 1989–90 and 1991–92 seasons obtained from A. C. Nielsen. For the 1989–90 season, we have data on 598 local OTA telecasts. For the 1991–92 season, we have data on 608 local OTA telecasts. At least one telecast

[13] The ratings data are from A. C. Nielsen.

[14] In a preliminary exploratory analysis, these three were the only players who appeared to have a "superstar" effect as we are defining it.

[15] Designated market areas are defined by Nielsen and generally encompass a city and its environs.

[16] Or, of course, two local cable telecasts, or one local cable and one OTA telecast.

from each NBA team is included in the data, except for the New York Knicks, which had no local OTA telecasts.[17]

We considered the observable factors that might determine the rating received by a game telecast. First, because we have panel data (more than one game for each telecasting team), we include a fixed effect for each telecasting team.[18] Second, because viewer availability can vary depending on when the game is played, we control for day of the week, month, start time of the telecast, and the rating of the half-hour on the telecasting station leading into the game telecast. Start time, in particular, is considered by television programmers to be an important determinant of ratings, with "late starts" getting lower ratings because some viewers may be unwilling to forgo sleep for televised basketball.

Third, we control for the presence of "competing" NBA telecasts. Telecasts of NBA games by national NBA cablecaster TNT or superstations WGN and WTBS can overlap with the local OTA telecast, providing viewers with an alternative NBA telecast. To account for these competing telecasts, we interact the fraction of the OTA telecast that is overlapped by the TNT (or superstation) telecast with the cable penetration of TNT (or the superstation) into the local DMA. Controlling for channel penetration is particularly important for superstations since, for instance, WGN has limited penetration into certain parts of the country such as the northeast.

Fourth, we control for the quality of the telecasting team's opponent by including a variable defined as the number of All-Star players on the opponent's roster.[19] For the 1989–90 model, we also include an indicator variable for whether the opponent is the Detroit Pistons since they were the defending NBA Champions.

Finally, we account for superstar effects by including three indicator variables that indicate whether the opponent's team included Larry Bird, Michael Jordan, or Magic Johnson, respectively. For the 1989–90 model, all three indicator variables can be included in the specification. However, for the 1991–92 model, the Magic Johnson variable is not included because Johnson had retired. Because Johnson had retired and because Bird was troubled by injuries during the 1991–92 season, we are able to some extent to separate their superstar effects from any team effect that might

[17] The Knicks telecast locally over MSG, which is a cable channel.

[18] Because the New York and Los Angeles DMAs each have two teams, the fixed effects are for the telecasting teams, not the DMAs.

[19] We define "All-Stars" for a given season as those players selected to play in that season's All-Star game. We also experimented with controlling for opponent quality with the opponent's season winning percentage, but this variable was less successful looking across all the models.

be present after controlling for number of All-Stars.[20] Table 1 gives the means of the variables used in the models for each season.

The cable household television rating reported by Nielsen is defined as the number of cable TV households with televisions tuned to the game divided by the total number of cable TV households in the DMA. Thus, the rating is bounded between zero and one. In order to account for this characteristic of the left-hand-side variable, we specify the following functional form for the expectation of the television rating R_{ij} of team i's telecast of game j, conditional on X_{ij} and α_i[21]

$$E(R_{ij} \mid X_{ij}, \alpha_i) = F(X_{ij}\beta + \alpha_i), \quad (1)$$

where X_{ij} are the variables that vary across team and game, α_i is the fixed effect for telecasting team i, and $F(\cdot)$ is a cumulative distribution function (c.d.f.). In what follows, we assume the logit c.d.f.[22] We estimate the parameters in specification (1) using quasi-maximum likelihood where the likelihood for an observation is specified as the Bernoulli likelihood

$$L_i = [F(X_{ij}\beta + \alpha_i)]^{R_{ij}}[1 - F(X_{ij}\beta + \alpha_i)]^{1-R_{ij}}. \quad (2)$$

The quasi-maximum likelihood estimates (QMLE) of β and the α_i are consistent as long as the conditional expectation (1) is correctly specified even if the Bernoulli specification (2) is incorrect.[23] The asymptotic variance-covariance matrix of the QMLE estimates is estimated maintaining only first-moment assumptions (1) without any additional second moment assumptions.

a. The 1989–90 local OTA results.—For reasons discussed further below, we estimate separate models for the two seasons for which we have data. The estimated coefficients for the 1989–90 season are provided in table 2. The estimated coefficient on the number of All-Star players on the opponent team is negative, though not statistically significantly different than zero. The Pistons indicator is positive and significantly different than zero, implying that the Pistons generated about 17% higher ratings than other teams. Thus, the results appear to imply that, aside from the

[20] We are still unable to identify the superstar effects separately from a team/year effect (e.g., a Celtics/1991–92 effect) that might be present after controlling for the number of All-Stars.

[21] See Papke and Wooldridge (1996) for more details regarding this approach.

[22] The use of the normal c.d.f. leads, of course, to similar results.

[23] There is no incidental parameters problem with fixed effects here because the number of teams is assumed fixed while the number of observations per team is assumed to go to infinity.

Table 1
Means of the Variables in the Local OTA Data

Variable	1989–90 Season	1991–92 Season
Rating	.062	.066
Teams:		
Atlanta	.041	.067
Boston	.064	.063
Charlotte	.016	.035
Chicago	.041	.049
Cleveland	.015	.015
Dallas	.036	.044
Denver	.069	.038
Detroit	.061	.028
Golden State	.065	.067
Houston	.065	.067
Indiana	.038	.038
LA Clippers	.039	.051
LA Lakers	.064	.049
Miami	.049	.049
Milwaukee	.034	.036
Minnesota	.041	.041
New Jersey	.010	.003
New York	. . .	. . .
Orlando	.016	.013
Philadelphia	.065	.012
Phoenix	.041	.051
Portland	.008	.021
Sacramento	.005	.033
San Antonio	.049	.049
Seattle	.016	.025
Utah	.005	.008
Washington	.046	.046
Start time:		
Before 5 P.M.	.075	.048
5 P.M.–7 P.M.	.227	.237
7 P.M.–9 P.M.	.591	.613
After 9 P.M.	.106	.102
Month:		
November	.175	.197
December	.173	.146
January	.180	.184
February	.170	.168
March	.164	.184
April	.137	.120
Day of week:		
Monday	.056	.071
Tuesday	.214	.194
Wednesday	.167	.146
Thursday	.105	.118
Friday	.205	.212
Saturday	.196	.191
Sunday	.057	.067
Competing local NBA telecast	.316	.412
Lead-in rating	.040	.045
No. of All-Star players in opponent team	1.057	1.067
Superstar effects:		
Bulls/Jordan	.049	.059
Celtics/Bird	.051	.043
Lakers/Johnson	.056	. . .
Pistons/Thomas	.051	. . .
No. of observations	611	608

Table 2
1989–90 Local OTA Results: Quasi-maximum Likelihood Estimation of Specification (1)

Variable	Coefficient Estimate (SE)
Constant	−4.050
	(.125)
Start time:	
Before 5 P.M.	.109
	(.089)
5 P.M–7 P.M.	.072
	(.061)
7 P.M.–9 P.M.	.176
	(.051)
After 9 P.M.	. . .
Month:	
November	.194
	(.046)
December	. . .
January	.066
	(.043)
February	.090
	(.046)
March	.024
	(.046)
April	.059
	(.050)
Day of week:	
Monday	.081
	(.094)
Tuesday	.049
	(.083)
Wednesday	.070
	(.080)
Thursday	.057
	(.085)
Friday	.049
	(.085)
Saturday	−.075
	(.085)
Sunday	. . .
Competing NBA telecast	−.073
	(.038)
Lead-in rating	.036
	(.005)
No. of All-Star players in opponent team	−.033
	(.025)
Superstar effects:	
Bulls/Jordan	.294
	(.061)
Celtics/Bird	.290
	(.094)
Lakers/Johnson	.381
	(.092)
Pistons/Thomas	.177
	(.087)
χ^2 statistic	201.860
df	22
p-value	<.001

NOTE.—Fixed effects for telecasting teams were also included in the specification. The χ^2 statistic is for testing the null hypothesis that all the coefficients except the fixed effects for telecasting teams are zero.

superstar effects discussed below and the Pistons effect, the quality of the opponent had little effect on ratings during the 1989–90 season.[24]

The superstar effects, in contrast, are quite important determinants of ratings.[25] The coefficients on a superstar team indicator variable measure the superstar's effect on ratings beyond the effect generated by his All-Star status. In all three cases, the superstar effects are estimated to be positive and large and are estimated with a high degree of precision. A superstar's total incremental effect on ratings is a function of both the superstar indicator variable coefficient and the All-Star coefficient (since each of the superstars is also an All-Star). Using the coefficient estimates and the underlying data, we estimated each superstar's total effect on ratings. Michael Jordan and Larry Bird increase ratings by 28% and 27%, respectively. Magic Johnson has the largest total effect on ratings, raising them by 31%. This result is not surprising given Magic's exciting passing, his fast-break style of basketball ("Showtime"), and his ability to post "triple doubles." Note also that as of this moment in time, Magic had won a championship while Jordan had yet to win his first.

The other variables in the model generally have an effect on ratings consistent with the beliefs commonly held by participants in the sports telecasting industry. Late starts do poorly relative to earlier starts, with a 7:00–7:30 start receiving the best ratings on average. Telecasts in November (the opening month of the season) receive the highest ratings, while telecasts in December receive the lowest ratings. The day of the week variables do not have very precisely estimated effects on ratings, although the result for Saturday is consistent with the view that Saturday is a poor night for television ratings generally and sports telecasts in particular.

b. The 1991–92 local OTA results.—The 1991–92 OTA results are given in table 3. In some ways, these results are similar to the 1989–90 results. The 7:00–7:30 start time again receives the highest ratings among start times, November telecasts receive higher ratings than other months, and Saturday is not a particularly strong night for ratings. However, the opponent's number of All-Stars now has a small, but precisely estimated positive effect on ratings. At the mean of the data, a telecast of a game

[24] As discussed below, the 1991–92 results suggest that team quality does have a positive effect on ratings.

[25] As with the attendance superstar effects, we examined whether increased viewing of games with superstars simply came at the expense of adjacent telecasts. For all four types of telecasts (local OTA, local cable, TNT, and NBC), the results do not support the hypothesis that higher ratings for superstar games were associated with a decrease in the ratings of adjacent games. Indeed, in some instances, the results suggest that superstar game telecasts may be associated with increased ratings of adjacent games.

Table 3
1991–92 Local OTA Results: Quasi-maximum Likelihood Estimation of Specification (1)

Variable	Coefficient Estimate (SE)
Constant	−4.215 (.103)
Start time:	
Before 5 P.M.	−.033 (.096)
5 P.M–7 P.M	.035 (.057)
7 P.M.–9 P.M.	.145 (.050)
After 9 P.M.	. . .
Month:	
November	.127 (.040)
December	. . .
January	.060 (.037)
February	−.081 (.042)
March	−.081 (.039)
April	−.146 (.044)
Day of week:	
Monday	.166 (.064)
Tuesday	.105 (.060)
Wednesday	.094 (.060)
Thursday	.084 (.060)
Friday	.042 (.060)
Saturday	−.040 (.058)
Sunday	. . .
Competing NBA telecast	−.060 (.033)
Lead-in rating	.022 (.005)
No. of All-Star players in opponent team	.046 (.015)
Superstar effects:	
Bulls/Jordan	.388 (.053)
Celtics/Bird	−.034 (.062)
χ^2 statistic	273.410
df	20
p-value	<.001

NOTE.—Fixed effects for telecasting teams were also included in the specification. χ^2 statistic is for testing the null hypothesis that all the coefficients except the fixed effects for telecasting teams are zero.

against an opponent with one All-Star player has a 5% higher rating than a game against an opponent with no All-Stars. Thus, the opponent's quality appears to have been a more important determinant of ratings during the 1991–92 season than the 1989–90 season.

The Jordan/Bulls indicator variable coefficient is estimated to be large and positive, while the Bird/Celtics indicator variable coefficient is now estimated to be negative, though the hypothesis that it is zero is not rejected. Likewise, when an indicator variable for the Lakers was included in the specification, the results (not reported) were consistent with no special effect for the Lakers. The explanation for the difference between seasons for the Celtics and Lakers effects is that Magic Johnson had retired and Larry Bird played in only 45 of 82 games in the 1991–92 season. When he did play, it was usually in great pain and with lessened effectiveness. Thus, the Celtics and Lakers played the 1991–92 season essentially without their superstars, which reduced their viability as television attractions. Thus, we are able to some extent to separate these superstars' effects from their teams' effects. Using the estimated Jordan/Bulls and All-Star coefficients, we estimate the total Michael Jordan effect for the 1991–92 season to be even higher than for the 1989–90 season, with games where the Bulls are the opponent receiving 50% higher ratings than otherwise equivalent games. We estimate the total Larry Bird effect to be small and positive (the negative Bird/Celtics coefficient is offset by the positive All-Star coefficient).

The 1989–90 results and the Bulls 1991–92 result suggest the existence of a powerful effect on ratings by particular players, even controlling for their teams' quality. We note that the estimated superstar effect is the effect on the local OTA ratings of teams other than the superstar's. Since a team's local TV revenues are not shared with the other teams,[26] and television revenues depend crucially on season average ratings, teams with superstars produce a large positive externality for teams without superstars.

2. *Local Cable Ratings*

When a team telecasts locally into its DMA using a local cable network (e.g., a regional sports network), the telecast is called a "local cable" telecast. An example of a local cable telecast is the distribution by SportsChannel New England (a regional sports network) in the Boston area of the December 6, 1989, Celtics-Knicks game. As with local OTA, we obtained from Nielsen ratings data for local cable telecasts in the 1989–90 and 1991–92 seasons. For the 1989–90 season, we have 583

[26] Aside from a payment of 6% to the NBA league office.

observations, while for the 1991–92 season, we have 654 observations. Data for 17 of the 27 NBA teams appear in the local cable data set.[27]

As with the local OTA model, the conditional expectation for the local cable rating is specified according to equation (1). The specification includes fixed effects for the telecasting teams; variables for day of week, month, start time, and rating of the lead-in program; controls for competing NBA telecasts; opponent's winning percentage; and the superstar effect variables. Means of the variables used in the model are given in table 4. Note that the average rating of a local cable telecast is well below that of a local OTA telecast (2.9% vs. 6.2% in the 1989–90 season). One reason for the lower rating is that regional sports networks are typically on an upper tier on local cable systems, requiring subscribers to pay an extra fee to receive the service.

a. The 1989–90 local cable results.—The results of the 1989–90 local cable model, given in table 5, differ in several important ways from the local OTA results. In contrast to the local OTA model, a higher-quality opponent, as measured by the opponent's number of All-Stars, has a larger effect on ratings for a local cable telecast than for a local OTA telecast. The estimated effect of the opponent having one All-Star versus zero is to increase the rating by approximately 10%. In contrast, the superstar effects are much less important here than in the local OTA model. In none of the cases is the hypothesis that the coefficient is zero rejected by a statistical test.

b. The 1991–92 local cable results.—The results for the 1991–92 local cable model are given in table 6. The Bulls/Jordan effect is now of fairly large magnitude. The hypothesis that it is zero is rejected at a marginal significance level. The Bulls/Jordan are estimated to increase ratings by 30%. As with the 1991–92 OTA model, the Bird/Celtics effects is estimated to be close to zero. The coefficient on the opponent's number of All-Stars is small and not statistically different from zero, which is in contrast both to the 1989–90 cable results and the 1991–92 OTA results.

The difference in the importance of the superstar effects between OTA and cable may have to do with the characteristics of the potential audiences for the two types of telecasts. The audience for a cable telecast in many cases consists of subscribers to a regional sports network. These viewers may be more sophisticated than the average OTA telecast viewer and therefore less likely to be drawn by a superstar as opposed to a high quality opponent. Although the superstar externality is smaller with regard to local cable ratings, local cable revenues typically make up a

[27] Some NBA teams do not have a local cable contract and thus do not have local cable telecasts.

Table 4
Means of the Variables in the Local Cable Data

Variable	1989–90 Season	1991–92 Season
Rating	.029	.036
Teams:		
Atlanta	. . .	. . .
Boston	.065	.058
Charlotte	. . .	.032
Chicago	.089	.066
Cleveland	.029	.018
Dallas	.060	.054
Denver	.039	.046
Detroit	.063	.032
Golden State	. . .	.054
Houston	.069	.055
Indiana	. . .	.034
LA Clippers	.046	.008
LA Lakers	.060	.057
Miami	.062	.070
Milwaukee	. . .	. . .
Minnesota	. . .	.037
New Jersey	.096	.075
New York	.130	.116
Orlando	.019	.017
Philadelphia	.069	.018
Phoenix	. . .	.020
Portland	. . .	. . .
Sacramento	. . .	. . .
San Antonio	.024	.046
Seattle	.027	.031
Utah	. . .	.012
Washington	.051	.046
Start time:		
Before 5 P.M.	.039	.037
5 P.M.–7 P.M.	.048	.069
7 P.M.–9 P.M.	.864	.849
After 9 P.M.	.048	.046
Month:		
November	.182	.205
December	.158	.148
January	.196	.176
February	.166	.165
March	.190	.182
April	.108	.124
Day of week:		
Monday	.051	.087
Tuesday	.166	.177
Wednesday	.187	.183
Thursday	.108	.115
Friday	.218	.197
Saturday	.177	.171
Sunday	.093	.069
Competing local NBA telecast	.263	.401
Lead-in rating	.007	.006
No. of All-Star players in opponent team	.474	.496
Superstar effects:		
Bulls/Jordan	.036	.026
Celtics/Bird	.043	.041
Lakers/Johnson	.027	. . .
Pistons/Thomas	.039	. . .
No. of observations	583	654

Table 5
1989–90 Local Cable Results: Quasi-maximum Likelihood Estimation of Specification (1)

Variable	Coefficient Estimate (SE)
Constant	−4.308 (.188)
Start time:	
Before 5 P.M.	.011 (.199)
5 P.M.–7 P.M.	.011 (.166)
7 P.M.–9 P.M.	.045 (.137)
After 9 P.M.	. . .
Month:	
November	−.021 (.066)
December	. . .
January	.021 (.054)
February	−.013 (.065)
March	.105 (.058)
April	.078 (.065)
Day of week:	
Monday	.141 (.114)
Tuesday	.137 (.090)
Wednesday	.155 (.088)
Thursday	.063 (.090)
Friday	.051 (.086)
Saturday	−.185 (.095)
Sunday	. . .
Competing NBA telecast	−.051 (.059)
Lead-in rating	.159 (.030)
No. of All-Star players in opponent team	.103 (.032)
Superstar effects:	
Bulls/Jordon	.088 (.126)
Celtics/Bird	−.204 (.141)
Lakers/Johnson	−.151 (.171)
Pistons/Thomas	−.039 (.110)
χ^2 statistic	108.548
df	22
p-value	<.001

NOTE.—Fixed effects for telecasting teams were also included in the specification. The χ^2 statistic is for testing the null hypothesis that all the coefficients except the fixed effects for telecasting teams are zero.

Table 6
1991–92 Local Cable Results: Quasi-maximum Likelihood Estimation of Specification (1)

Variable	Coefficient Estimate (SE)
Constant	−4.412
	(.130)
Start time:	
Before 5 P.M.	−.070
	(.145)
5 P.M.–7 P.M.	−.094
	(.112)
7 P.M.–9 P.M.	.136
	(.088)
After 9 P.M.	. . .
Month:	
November	.028
	(.051)
December	. . .
January	.043
	(.053)
February	−.179
	(.067)
March	−.204
	(.056)
April	−.186
	(.072)
Day of week:	
Monday	.151
	(.087)
Tuesday	.084
	(.085)
Wednesday	.024
	(.075)
Thursday	.012
	(.091)
Friday	−.007
	(.081)
Saturday	−.056
	(.080)
Sunday	. . .
Competing NBA telecast	−.070
	(.053)
Lead-in rating	.049
	(.026)
No. of All-Star players in opponent team	.014
	(.023)
Superstar effects:	
Bulls/Jordan	.300
	(.181)
Celtics/Bird	.063
	(.139)
χ^2 statistic	90.342
df	20
p-value	<.001

NOTE.—Fixed effects for telecasting teams were also included in the specification. The χ^2 statistic is for testing the null hypothesis that all the coefficients except the fixed effects for telecasting teams are zero.

much smaller share of total local TV revenue than local OTA revenues.[28] Thus, the externality demonstrated by the OTA results will have a large effect when overall local TV revenues are considered.

3. *TNT Ratings*

When TNT telecasts an NBA game, it sends the game via satellite to local cable systems throughout the country. Since TNT reaches about 60% of U.S. television households, it is considered a "national" cable network, and its telecasts are thus considered "national." Unlike regional sports networks, TNT is typically available to basic cable subscribers without an additional fee. Data on TNT cable household ratings in the 25 DMAs with NBA teams were obtained from Nielsen. For each DMA, ratings are available for up to 50 TNT regular season telecasts. The total number of observations in the TNT data set is 1,035.

As with the local OTA and cable models, we use equation (1) to specify the conditional expectation of the TNT rating. However, the TNT model differs from the local television models with respect to the included right-hand-side variables. In addition to the day of week, month, start time, and superstar variables, the competing NBA telecast variable is defined somewhat differently and several additional variables were required.[29] With regard to competing NBA telecasts, the most important competing telecasts are local OTA and cable telecasts. If the team associated with a DMA is televising a game locally at the same time TNT is televising a game, TNT's rating in that DMA might be lower since many viewers will prefer to watch their local team over the two teams playing on TNT. The other type of competing telecast to consider is a superstation telecast. Viewers may prefer to watch the Bulls play on WGN rather than the two teams playing on TNT.[30]

Three additional controls are included in the TNT specification. First, an indicator variable is included to account for whether the DMA's team was involved in the TNT game. The TNT rating is likely higher in the DMAs of the two teams playing than elsewhere. Second, an indicator

[28] The exceptions are the New York Knicks, who do not have a local OTA package, and the Los Angeles Lakers, who have an exceptionally lucrative local cable package.

[29] The definition of the superstar effect variables is slightly different for the TNT model. Here, the superstar effect variables are dummy variables set to one if the Celtics, Bulls, Lakers, or Pistons, respectively, were one of the two teams playing in the TNT game. In the local OTA and cable models, the dummy variables are set to one only if the team opposing the local team was one of the above teams.

[30] Competition between superstation telecasts and TNT occurring on the same night has been banned since the 1989–90 season by a league rule that prohibits superstations from telecasting a game the same night that TNT telecasts a game.

Table 7
Summary of 1989–90 TNT Data

Variable	Variable Mean
Rating	.016
Start time:	
5 P.M.–7 P.M.	.281
7 P.M.–9 P.M.	.625
After 9 P.M.	.094
Month:	
November	.232
December	.156
January	.167
February	.252
March	.105
April	.088
Day of week:	
Tuesday	.380
Wednesday	.119
Thursday	.036
Friday	.466
Competing WGN telecast	.042
Competing local cable telecast	.245
Same market dummy	.046
Double header	.263
Lead-in rating	.017
Superstar effects:	
Bulls/Jordan	.188
Celtics/Bird	.196
Lakers/Johnson	.194
Pistons/Thomas	.204
Sum of no. of All-Star players	3.092
No. of observations	1,035

variable is included for whether the TNT game was part of a TNT doubleheader. Third, a variable equal to the total number of All-Stars involved in the game (adding across the two teams) is included to account for the overall quality of the game. Table 7 gives the means of the variables used in the analysis.

The TNT results, given in table 8, demonstrate that the presence of All-Stars has a small, but precisely estimated, effect on TNT ratings. Superstars have an extremely large effect on the TNT rating beyond that generated by their All-Star status. The total Larry Bird effect (combining the Bird/Celtics and All-Star effects) was estimated to be a 21% increase in ratings, and the total Michael Jordan effect was estimated to be a 22% increase in ratings. As with local OTA television, Magic Johnson has the largest estimated effect among the superstars, raising TNT's rating by an estimated 38%. With superstars appearing in 30 of the 51 TNT telecasts during the 1989–90 season, we estimate that superstars accounted for over 19% of total TNT regular season gross ratings points.

With TNT, superstars again exert a large positive externality. The rights

Table 8
1989–90 TNT Results: Quasi-maximum Likelihood Estimation of Specification (1)

Variable	Coefficient Estimate (SE)
Constant	−4.934
	(.141)
Start time:	
5 P.M.–7 P.M.	.631
	(.138)
7 P.M.–9 P.M.	.515
	(.076)
After 9 P.M.	. . .
Month:	
November	−.011
	(.053)
December	. . .
January	−.019
	(.059)
February	−.117
	(.051)
March	.125
	(.058)
April	−.093
	(.067)
Day of week:	
Tuesday	−.045
	(.043)
Wednesday	−.023
	(.050)
Thursday	.086
	(.095)
Friday	. . .
Competing WGN telecast	−.481
	(.121)
Competing local cable telecast	−.536
	(.059)
Double header	.117
	(.060)
Lead-in rating	.101
	(.016)
Superstar effects:	
Bulls/Jordan	.127
	(.055)
Celtics/Bird	.118
	(.084)
Lakers/Johnson	.256
	(.087)
Pistons/Thomas	−.030
	(.084)
Sum of no. of All-Star players	.072
	(.033)
χ^2 statistic	475.699
df	20
p-value	$<.001$

NOTE.—Fixed effects for DMAs were also included in the specification. The χ^2 statistic is for testing the null hypothesis that all the coefficients except the fixed effects for DMAs are zero.

fee paid by TNT to the NBA is split equally among the NBA teams. The size of the rights fee depends in general on the amount of advertising revenue TNT can generate, which in turn depends on the ratings NBA games can deliver on TNT. Thus, when the presence of Michael Jordan produces higher TNT ratings, all NBA teams benefit even though the Bulls are paying his salary.

4. NBC Ratings

NBC is currently the national OTA network of the NBA. We have Nielsen data on the ratings of NBA games on NBC for the 1990–91 through the 1992–93 seasons. Unfortunately, the data here are less rich than the data used in the TNT model in the sense that we have only the overall national rating for each telecast, not the ratings separately for a set of DMAs. However, it is still possible to estimate superstar effects with reasonable precision.

During the three seasons for which we have data, NBC telecast games primarily on weekend afternoons. NBA rules prohibit any other NBA telecasts from competing with the NBA on NBC telecasts. Thus, we again employ the specification given by equation (1). In particular, we control for start time, day of week, month, and season; the presence of NCAA (college basketball) Tournament telecasts; the total number of All-Stars involved in the game (adding across the two teams); and superstar effects for the Bulls, the Celtics (during the 1990–91 and 1991–92 seasons when Bird was still playing), the Lakers (during the 1990–91 season when Johnson was still playing), the Orlando Magic (during the 1992–93 season), and the Phoenix Suns (during the 1992–93 season).[31] The means of the variables are given in table 9.

The results for NBC are given in table 10. The presence of a superstar again appears to lead to a ratings increase greater than that generated by a nonsuperstar All-Star. The total Jordan effect on NBC ratings was an estimated 44% increase. Bird was also a strong draw for viewers, increasing the NBC rating by an estimated 31%. To a lesser extent, the O'Neal and Barkley effects were also estimated to have a positive effect on ratings (12% and 20%, respectively). Magic Johnson's effect is positive (13%) but not different from zero according to a statistical test. We note that when we included a Celtics indicator variable for those seasons when Bird was no longer playing, its coefficient was estimated to be small and not different from zero according to a statistical test, which is somewhat surprising given the nationwide following for the Celtics. Thus, this result

[31] Regular season NCAA basketball telecasts were not found to be an important determinant of NBC ratings and thus were dropped from the analysis.

Table 9
Summary of NBC Data

Variable	Variable Mean
Rating	.045
Season:	
1990–91	.309
1991–92	.338
1992–93	.353
Month:	
November	.015
December	.074
January	.809
February	.015
March	.103
April	.456
Day of week:	
Sunday	.809
Monday	.015
Saturday	.103
Other days	.074
Superstar effects:	
Bulls/Jordan	.309
Celtics/Bird	.176
Lakers/Johnson	.103
Pistons/Thomas	.088
Overlap with NCAA playoff	.069
Sum of no. of All-Star players	2.897
Early game	.459
No. of observations	68

is further evidence of a strong superstar effect on television ratings separate from a team effect.

B. The Superstar Effect on Attendance

We now turn to an analysis of the effect of a superstar on attendance, both that of his own team and that of other teams. Our analysis here is admittedly less formal than the analysis of television ratings. We start by estimating the effect of a superstar on his own team's attendance. This effect can be roughly estimated by comparing the team's home attendance in the season prior to the arrival of the superstar to subsequent seasons (under the assumption that the quality of the other players on the team remains the same).[32] We subsequently estimate the effect a superstar has on other teams' revenues by comparing the other teams' home attendance for games against the superstar's team to their average attendance against

[32] This analysis also does not fully account for any price increases that the teams may be able to charge.

Table 10
1990–93 NBC Results: Quasi-maximum Likelihood Estimation of Specification (1)

Variable	Coefficient Estimate (SE)
Constant	−3.103
	(.094)
Season:	
1990–91	.020
	(.052)
1991–92	−.004
	(.046)
1992–93	...
Month:	
November	...
December	...
January	.333
	(.091)
February	.218
	(.087)
March	−.125
	(.089)
April	.083
	(.067)
Day of week:	
Sunday	−.255
	(.109)
Monday	−.988
	(.123)
Saturday	−.511
	(.118)
Other days	...
Superstar effects:	
Bulls/Jordan	.358
	(.044)
Celtics/Bird	.255
	(.055)
Lakers/Johnson	.100
	(.091)
Orlando/O'Neil	.141
	(.076)
Phoenix/Barkley	.167
	(.041)
Sum of no. of All-Star players	.026
	(.015)
Overlap with NCAA play-off	−.250
	(.076)
Early game	−.153
	(.048)
χ^2 statistic	2,814.067
df	17
p-value	<.001

NOTE.—The χ^2 statistic is for testing the null hypothesis that all the coefficients other than the constant are zero.

other teams. In estimating the superstar effects, we focus on two superstars, Larry Bird and Michael Jordan.

Larry Bird had a substantial effect on the attendance of Celtics games at the Boston Garden after his entrance into the NBA. In the 1978–79 season, a year before Bird's arrival, the average attendance per game was approximately 10,000. Starting in Bird's second season and lasting until his retirement, the Boston Garden was sold out for every game (capacity was about 15,000). Thus, attendance increased by about 50% during the Bird era. In the 1993–94 season, the second season following Bird's retirement, Celtic home games no longer uniformly sold out. These comparisons must be viewed with some degree of caution, however, since the Celtic teams prior to Bird's arrival and after his retirement have been of very different composition, apart from Bird, than the Celtic teams during his career.

Like Larry Bird in Boston, Michael Jordan had a huge effect on attendance at Chicago Stadium. The Bulls average attendance was about 6,000 per game the season before Jordan arrived. Average attendance doubled in his first year, and every game in Chicago Stadium sold out during the six seasons prior to Jordan's first retirement (the old Chicago Stadium held about 18,000). Of course, some of the attendance increase may be due to a "championship" effect since the Bulls were the NBA champions for the three seasons ending with the 1992–93 season. In the 1993–94 season, the first season after Jordan's retirement, home games continued to sell out, but the team was still of high quality and indeed still had Scottie Pippen, who was a Dream Team (Olympic) member and is an All-Star player. Also, to some extent season ticket holders might have been unwilling to give up their seats, suspecting that Jordan might return to the Bulls, as he in fact did. If we conservatively estimate the Jordan attendance effect by the increase of 6,000 per game in Jordan's first year and we assume that the incremental tickets were sold at the average ticket price, Jordan increased the Bulls' gate revenue by about $8.6 million.

The effect of a superstar on the gate attendance of other teams can be measured by comparing the attendance of the superstar's road games to average road attendance. In other words, we ask whether the superstar's team draws better on the road than other teams. Because stadiums have capacity constraints, the observed superstar effect may underestimate the potential superstar effect. Even so, we find the observed superstar effect to be quite large.

Several facts point to the existence of a substantial Michael Jordan effect on road attendance. In the 1989–90 season, all but one Bulls road game was sold out.[33] In the 1990–91 and 1991–92 seasons, every Bulls road

[33] The New Jersey Nets were the single "offender."

Table 11
Paid Attendance and Incremental Revenue: Bulls vs. Other Opponents, 1989–90 Season

Home Team	Average Paid vs. Bulls	Average Paid vs. Other Opponents	No. of Games vs. Bulls	Additional Revenue due to Bulls
Atlanta	15,598	12,885	3	129,925
Boston	15,088	15,060	2	−10,479
Charlotte	22,780	22,904	1	−269
Cleveland	17,499	14,625	2	95,610
Dallas	15,662	15,467	1	2,149
Denver	15,665	10,002	1	96,445
Detroit	19,205	18,940	2	7,440
Golden State	13,756	13,703	1	623
Houston	15,926	14,324	1	20,741
Indiana	15,188	11,184	3	146,537
LA Clippers	14,021	8,767	1	80,035
LA Lakers	16,006	15,850	1	4,956
Miami	14,901	14,809	2	2,722
Milwaukee	18,181	14,381	3	158,315
Minnesota	30,100	22,665	1	46,194
New Jersey	17,167	8,182	2	197,791
New York	17,502	16,949	2	29,486
Orlando	14,074	13,996	2	2,367
Philadelphia	17,151	10,252	2	210,651
Phoenix	13,581	12,920	1	19,576
Portland	12,143	11,823	1	6,010
Sacramento	15,673	15,645	1	−214
San Antonio	14,424	12,505	1	27,214
Seattle	14,072	11,388	1	43,168
Utah	12,223	11,512	1	5,046
Washington	16,862	9,401	2	242,137
Total	424,448	360,139	41	1,564,176
26-team average	16,326	13,852		60,161

game was sold out. Since NBA teams' average attendance is less than full stadium capacity, Jordan was certainly having an effect on other teams' attendance.

We examine more closely the attendance data for the 1989–90 and 1991–92 seasons to estimate the size of the Jordan and Bird effects on attendance and gate revenue. In table 11, we report the average 1989–90 home attendance for games against the Bulls and for games against other teams. The attendance for Bulls games was higher than for non-Bulls games for every team except three (Detroit, Boston, Sacramento) where stadium capacity constraints were binding even for non-Bulls games. For some teams, the increase in the attendance was very large. Washington Bullets attendance almost doubled when playing the Bulls, while the Indiana Pacers and New Jersey Nets attendance went up by about 50% when playing the Bulls. We also report in table 11 an estimate of the incremental revenue due to the

Bulls.[34] Since a team's gate revenue for each game is not shared with the visiting team, the estimated incremental revenue accrued directly to the indicated team. Thus, the New Jersey Nets, a team that during this period did not have a particularly good win-loss record, received over $200,000 incrementally due to having the Bulls and Michael Jordan visit their stadium twice a year. Summing across teams, the incremental revenue due to the Bulls is estimated to be $1.6 million. Table 12 presents similar information for the 1991–92 season. The estimate of incremental revenue for other teams due to the Bulls is $2.5 million. Tables 13 and 14 present information on the Celtics' incremental attendance effects in the 1989–90 and 1991–92 seasons. The incremental revenue effects are estimated to be $1.4 million and $2.1 million, respectively.

C. The Value of Michael Jordan to Other NBA Teams

We now estimate the value of Michael Jordan to NBA teams other than the Chicago Bulls by estimating the incremental revenue he generates for those teams. Four of the largest sources of revenue for NBA teams are gate receipts, local TV contracts, national TV contracts, and NBA Properties (the branch of the NBA that licenses NBA paraphernalia).[35] The revenues from gate receipts and television can be broken down into regular season and playoff components. We base our estimate of Michael Jordan's value on data from the 1991–92 season. Table 15 provides a summary of the results.

We start with Jordan's effect on gate receipt revenue. In Section IIIB above, we estimated the incremental 1991–92 regular season gate revenue due to Jordan to be $2.5 million. During the playoffs, arenas are typically at full capacity for each game. Thus, it is unlikely that Jordan has any effect on attendance of playoff games. Accordingly, we estimate Jordan's effect on playoff gate revenue to be zero.

[34] We have examined the possibility that the increased attendance at Bulls or Celtics games may have come at the expense of attendance at other games. In this case, the increased attendance would not be "incremental" attendance. To test this possibility, we looked at the games adjacent to Celtics or Bulls games to determine whether attendance at these games was lower than at other non-Celtics and non-Bulls games. We found no difference between games adjacent to Celtics games and other non-Celtics games. We found a small difference between games adjacent to Bulls games and other non-Bulls games. Thus, in tables 11 and 12 (mentioned below), we report the incremental revenue results having adjusted for the fraction of the increased attendance that might have been siphoned from adjacent games.

[35] Another important source of revenue is "in arena" revenues, which result from sales of novelties, concessions, and luxury boxes during games. We have no data on "in arena" revenues.

Table 12
Paid Attendance and Incremental Revenue: Bulls vs. Other Opponents, 1991–92 Season

Home Team	Average Paid vs. Bulls	Average Paid vs. Other Opponents	No. of Games vs. Bulls	Additional Revenue due to Bulls
Atlanta	15,242	10,408	3	294,966
Boston	15,078	14,758	2	667
Charlotte	22,659	22,409	2	9,615
Cleveland	16,177	13,745	2	116,947
Dallas	16,004	13,808	1	27,599
Denver	15,673	9,622	1	97,197
Detroit	19,195	18,498	2	22,326
Golden State	13,562	13,532	1	219
Houston	15,640	12,469	1	54,113
Indiana	14,992	10,932	2	147,004
LA Clippers	14,459	8,816	1	121,001
LA Lakers	16,209	15,427	1	25,174
Miami	14,874	14,141	2	24,270
Milwaukee	17,583	12,218	3	273,803
Minnesota	17,220	15,215	1	14,936
New Jersey	18,265	8,100	2	378,102
New York	18,053	15,758	2	122,809
Orlando	14,038	13,808	2	8,201
Philadelphia	17,690	11,483	2	210,766
Phoenix	13,857	13,615	1	7,615
Portland	12,076	12,049	1	329
Sacramento	15,794	15,512	1	3,156
San Antonio	14,349	13,460	1	17,704
Seattle	34,127	12,572	1	142,871
Utah	18,025	17,233	1	26,252
Washington	16,999	10,919	2	364,152
Total	437,840	350,507	41	2,511,794
26-team average	16,840	13,481		96,607

A team's local television revenue derives from its contracts with local OTA and cable telecasters. Its national television revenue derives from the contracts the NBA office negotiates with the national networks. Both local and national contracts are based on the advertising revenue that is expected to be generated by the telecasts of the games. The amount of advertising revenue depends on the numbers of viewers generated by the telecasts.[36] We have developed for each NBA team an estimate of the revenue per viewer delivered by its local OTA and local cable telecasts. The econometric results of the local OTA and local cable models can be used to estimate the incremental number of viewers due to Jordan during

[36] In general, the types of viewers expected to be generated by the telecast will also have an effect on advertising revenue. For instance, telecasts that draw more young males, who are highly valued by advertisers, will in general generate more advertising revenue.

Table 13
Paid Attendance and Incremental Revenue: Celtics vs. Other Opponents, 1989–90 Season

Home Team	Average Paid vs. Celtics	Average Paid vs. Other Opponents	No. of Games vs. Celtics	Additional Revenue due to Celtics
Atlanta	15,664	12,951	2	88,213
Charlotte	22,859	22,902	1	523
Chicago	17,533	16,909	2	20,499
Cleveland	17,283	14,636	2	86,801
Dallas	15,704	15,466	1	2,734
Denver	15,658	10,002	1	94,984
Detroit	19,170	18,942	2	7,046
Golden State	13,743	13,703	1	778
Houston	15,859	14,326	1	19,740
Indiana	15,078	11,292	2	103,370
LA Clippers	14,054	8,766	1	78,861
LA Lakers	16,066	15,849	1	4,792
Miami	14,914	14,805	3	5,487
Milwaukee	13,592	14,714	2	−1,454
Minnesota	30,919	22,645	1	61,159
New Jersey	13,140	8,264	3	192,209
New York	17,484	16,950	2	28,737
Orlando	14,146	13,992	2	7,245
Philadelphia	17,495	10,234	2	218,997
Phoenix	13,564	12,920	1	19,818
Portland	12,133	11,823	1	5,843
Sacramento	15,750	15,643	1	628
San Antonio	14,604	12,501	1	26,083
Seattle	14,064	11,388	1	43,409
Utah	12,220	11,512	1	4,885
Washington	15,024	9,350	3	285,294
Total	417,720	362,485	41	1,406,631
26-team average	16,066	13,942		54,101

the regular season.[37] Assuming that, to first order, the revenue per viewer is roughly constant with respect to the number of viewers, the value of Jordan to each team can be estimated by multiplying its revenue per viewer delivered by the incremental number of viewers drawn by Michael Jordan. We find that, for the 1991–92 season, Jordan's effect on total local OTA revenues is $1.9 million and total local cable revenues is $0.7 million. Since playoff games are not telecasted locally, local TV does not generate any playoff revenue. Thus, Jordan's effect here is zero.

To calculate incremental revenue for NBA teams from TNT and NBC, we must first estimate how much of the total rights fees paid by TNT

[37] This calculation assumes that the Bulls would have the same win/loss percentage without Jordan, which is conservative. It also assumes that the teams cannot replace the "Bulls less Jordan" telecast with a telecast that would yield higher ratings.

Table 14
Paid Attendance and Incremental Revenue: Celtics vs. Other Opponents, 1991–92 Season

Home Team	Average Paid vs. Celtics	Average Paid vs. Other Opponents	No. of Games vs. Celtics	Additional Revenue due to Celtics
Atlanta	15,331	10,528	2	195,795
Charlotte	22,551	22,414	2	6,315
Chicago	17,381	17,175	2	8,967
Cleveland	16,923	13,707	2	138,628
Dallas	16,092	13,806	1	29,439
Denver	15,514	9,626	1	94.969
Detroit	18,972	18,510	2	14,533
Golden State	13,566	13,532	1	627
Houston	15,397	12,475	1	49,226
Indiana	14,957	10,934	2	146,093
LA Clippers	14,206	8,822	1	114,898
LA Lakers	15,942	15,434	1	17,085
Miami	14,849	14,124	3	34,906
Milwaukee	14,552	12,511	2	86,536
Minnesota	17,016	15,220	1	15,869
New Jersey	15,407	8,058	3	416,814
New York	18,134	15,754	2	129,917
Orlando	14,047	13,808	2	8,602
Philadelphia	16,538	11,542	2	183,183
Phoenix	13,656	13,621	1	3,132
Portland	12,103	12,049	1	1,200
Sacramento	15,810	15,511	1	3,356
San Antonio	14,314	13,461	1	17,041
Seattle	36,316	12,517	1	139,330
Utah	17,761	17,239	1	18,198
Washington	15,610	10,990	2	255,464
Total	432,945	353,368	41	2,130,123
26-team average	16,652	13,591		81,928

and NBC are due to the regular season and playoffs, respectively. We have relied here on the opinions of industry participants. We then estimate the regular season revenue per viewer delivered for TNT and NBC. As we did for local TV, we use the econometric results to estimate the increased number of regular season viewers due to Michael Jordan. The product of revenue per viewer and the increased number of viewers gives the total estimated incremental regular season revenue due to Jordan. Finally, we subtract out the $1/27$ share of the incremental revenue that was paid to the Bulls. The resulting TNT and NBC estimates of incremental regular season revenue for other NBA teams were $1.2 million and $9.3 million, respectively.

To estimate the effect of Jordan on TNT and NBC playoff revenues, we assume that the estimated econometric models can be used to consistently estimate the increase in playoff viewers due to Jordan. We then apply the same procedure as that discussed above for regular season TNT and NBC

Table 15
Incremental Revenue for Other NBA Teams due to Michael Jordan

Revenue Source	Incremental Revenue ($)	SE
Regular season:		
Gate	2.5	. . .
Local OTA television	1.9	.3
Local cable television	.7	.4
National cable television (TNT)	1.2	.2
National OTA television (NBC)	9.3	1.1
Total	15.6	
Playoffs:		
Gate	.0	. . .
Local OTA television	.0	. . .
Local cable television	.0	. . .
National cable television (TNT)	3.1	.5
National OTA television (NBC)	19.4	2.3
Total	22.5	
NBA properties	15.1	
Total	53.2	

revenues. We estimate the incremental playoff revenue to other NBA teams to be $3.1 million and $19.4 million for TNT and NBC, respectively.

Finally, we consider the revenue teams receive from NBA Properties. NBA Properties is the part of the NBA that licenses NBA paraphernalia such as clothing and videos. Items associated with Bulls and Michael Jordan have accounted for almost half of NBA Properties revenue. We conservatively estimate the incremental NBA Properties revenue due to Michael Jordan by assuming that, without Jordan, the sales of Bulls items would be only as large as the sales of the second highest team. Under this assumption, we estimate the incremental revenue to other NBA teams to be $15.1 million.

Combining across the categories, we estimate Michael Jordan's total value to other NBA teams to be $53.2 million, which is roughly $2 million per team.

IV. The Superstar Effect and League Policy

The empirical results described above suggest that, in addition to the effects they have on the revenues of their own teams, superstars have a substantial positive effect on the revenues of other teams in the league. Indeed, the empirical results demonstrate that a superstar such as Michael Jordan can generate $50 million per year in an externality that flows to the other NBA teams. This externality arises because teams do not share their local TV and gate revenue, and national TV revenues are shared equally among teams without any adjustment for the possibility that some teams might generate higher viewership than others. We construct a model of a sports league and show that, with an externality of this type, small market teams free-ride off of large market teams, leading to a distribution of player talent that is too heavily weighted toward the large market teams relative to the efficient talent distribution. The observed outcome of bargaining between players and owners in two sports leagues, the NBA and NFL, involve salary cap systems. We show that, in our model, salary cap systems are likely to overcorrect for the superstar externality, making the talent distribution too even relative to the efficient distribution. We discuss the likely reason players and owners have agreed to a system that moves the talent distribution away from the efficient distribution and suggest an alternative system that is likely to be less distorting.

The superstar externality can be formalized by specifying the revenue function for team i to be $R_i(Q_i, Q_{-i}, s_i)$ where Q_i is the quality of team i, Q_{-i} is a vector of the qualities of the other teams in the league, and s_i is a measure of the "size" of the local market of team i. The function $R_i(\ )$ is assumed to have the following properties:

$$\frac{\partial R_i}{\partial Q_i} > 0, \quad \frac{\partial^2 R_i}{\partial Q_i^2} < 0, \quad \frac{\partial^2 R_i}{\partial Q_i \partial s_i} > 0, \quad \frac{\partial R_i}{\partial Q_{-i}} > 0, \quad \frac{\partial^2 R_i}{\partial Q_{-i}^2} < 0. \quad (3)$$

The first two properties state that the revenue of team i is increasing and concave in its own quality. The third property states that team i's marginal revenue with respect to its quality increases with the size of its market. The fourth and fifth properties formalize the superstar externality effect—team i's revenue is increasing in the other teams' qualities for each value of Q_i. This property implies that revenue for team i increases even as the quality disparity between it and its opponent grows—the positive effect of increased opponent quality is always large enough to outweigh the negative effects of the increased quality disparity. This implication seems to be consistent with fan behavior. Given their own team's quality, fans of, for example, the New Jersey Nets, appear to prefer to watch games against the Chicago Bulls over games against the Toronto Raptors, even though the Nets are less likely to beat the Bulls than the Raptors.[38]

With this form of the revenue function, we construct a simple model of a sports league and compare three outcomes: the "unconstrained market" equilibrium where no restrictions are placed on teams' choices of quality, the "efficient" outcome where the distribution of player quality maxi-

[38] A second, less plausible implication of the functional form (3) is that more revenue is generated when team i's opponent is slightly better than team i than when team i's opponent is slightly worse than team i (even though team i's probability of winning is presumably lower in the first instance than the second).

mizes league revenues, and the salary cap equilibrium where teams' payrolls are constrained to be less than a given level (the cap).[39]

A sports league is a group of independently owned teams that compete with each other in some respects (e.g., for players and for fans in two team cities) and cooperate with each other in other respects (e.g., on scheduling and rules of the game). We assume that the league consists of N teams; N is exogenous to the model.[40] Team quality is assumed to be produced using player talent. The inverse production function is

$$Q_i = \alpha + \beta L_i, \tag{4}$$

where L_i is the quantity of player talent required to produce team quality Q_i. Note that the production function exhibits increasing returns (a "minimum" level of player talent is required to achieve $Q_i > 0$).[41] Teams are assumed to be price takers in the player talent market. The price per unit of player talent is W and is determined endogenously. Player talent is assumed to be inelastically supplied at all relevant wage levels. The total supply of player talent is L. Given (4), the total supply of team quality is $Q = N\alpha + \beta L$.

Under these assumptions, profit for team i is

$$\pi_i(Q_i) = R_i(Q_i, Q_{-i}) - W(\alpha + \beta Q_i). \tag{5}$$

Teams choose Q_i to maximize profits, taking as given the quality choices of the other teams.

It is useful to compare the structure of this model to other sports league models. The Fort and Quirk (1995) model specifies team i's revenue for a game with team j as an increasing function of team i's probability of winning, whereas, in our model, team i's revenue increases with team j's quality, even if team i's probability of winning declines.[42] While the Fort

[39] The model is not intended to incorporate every factor that could have some relevance to wage determination and talent distribution in a sports league. Sports leagues have other important features, such as a draft, from which we abstract for the purposes of this analysis. In essence, we are assuming all players are free agents.

[40] This aspect of the model is related to models of imperfect competition with increasing returns to scale. In such models, the number of firms is endogenous, determined by a zero-profit condition. Here, we want to analyze the situation where N is exogenous and some teams may be unprofitable. Note that such a situation is not necessarily economically inefficient since the unprofitable teams might be profitable if player salaries were set at the players' alternative wage.

[41] Other forms of fixed costs could also be introduced.

[42] The Fort and Quirk (1995) model is related to earlier works of El Hodiri and Quirk (1971); and Quirk and El Hodiri (1974).

and Quirk assumption has some appeal as well, it also has two drawbacks for our purposes. First, since team *i*'s fans always prefer a game where the opponent is worse than team *i* to a game where the opponent is better than team *i,* the Fort and Quirk model cannot accommodate the "Michael Jordan effect" we wish to study. Second, since revenue is a function of probability of winning, only relative talent, not absolute talent, matters in the Fort and Quirk model. In spite of these differences, the basic conclusions drawn by Fort and Quirk from their model continue to hold in our model.

The unconstrained market equilibrium of our model is defined as the vector (Q^M, W^M), which satisfies the $N + 1$ equations where the $(N + 1)$th constraint is due to market clearing:

$$\frac{\partial \pi_j}{\partial Q_i} = \frac{\partial R_i}{\partial Q_i} - \beta W = 0, \quad i = 1, \ldots, N,$$

and (6)

$$\sum_{i=1}^{N} Q_i = Q.$$

Given the properties of the revenue function (3), the first-order conditions make it clear that larger market teams have higher-quality teams in equilibrium. Also, teams can be unprofitable if the equilibrium wage is sufficiently high.[43]

We contrast this unconstrained market equilibrium to the "efficient" outcome obtained when player talent is distributed so as to maximize the sum of the teams' revenues subject to the talent supply constraint. This outcome, Q^E, solves

$$\frac{\partial R_i}{\partial Q_i} + \sum_{j \neq i} \frac{\partial R_j}{\partial Q_i} = \lambda, \quad i = 1, \ldots, N,$$

and (7)

$$\sum_{i=1}^{N} Q_i = Q.$$

where λ is the Lagrange multiplier on the talent-supply constraint. The

[43] Because N is exogenous, unprofitable teams do not exit. Whitney (1993) studies a model in which the competitive outcome leads to a league with "have" and "have-not" teams in which the "have-not" teams "exit" the market for superstar players, choosing to employ only low-talent players.

efficient outcome and unconstrained market outcome coincide when no externality exists (i.e., when the second term on the left-hand-side of each of the first N first-order conditions in [7] is zero). However, with the existence of the externality, the efficient outcome requires taking into account the effect of each team's quality on the other teams' revenues. Substituting the talent vector Q^M, which satisfies the first-order condition in (6), into the first-order condition in (7) reveals that the distribution of talent in the unconstrained market outcome is weighted too heavily toward the large market teams. The externality causes the small-market teams to "free ride" off the large market teams. Nevertheless, in general it remains economically efficient for the large market teams to have higher quality than small-market teams as long as the externality is sufficiently small.

We now investigate the effects of a salary cap system on the distribution of talent. If a salary cap is imposed, each team maximizes its profits subject to its total payroll being less than or equal to the cap. Let C be the cap for all teams. The equilibrium under a salary cap, (Q^C, W^C), satisfies

$$\frac{\partial R_i}{\partial Q_i} - (1 + \lambda_i)\beta W = 0, \quad i = 1, \ldots, N,$$
$$\lambda_i[C - W(\alpha + \beta Q_i)] = 0, \quad i = 1, \ldots, N, \tag{8}$$

and

$$\sum_{i=1}^{N} Q_i = Q,$$

where λ_i is team i's Lagrange multiplier on the salary cap constraint. The Kuhn-Tucker conditions are imposed because some teams may not be constrained by the cap. Under a salary cap, the Lagrange multipliers differ across teams. Consequently, the salary cap first-order conditions in (8) differ from the unconstrained market equilibrium first-order condition in (6) and the efficient outcome first-order condition in (7). This result implies that the distribution of player talent under the salary cap differs in general from the distributions obtained in the unconstrained market equilibrium and the efficient outcome.

If the cap severely constrains the large market teams so that their Lagrange multipliers are large, the distribution of talent can be greatly affected by the salary cap, leading to substantial economic inefficiency relative to the efficient distribution. Consider the case where the cap is binding for every team, which is a reasonable scenario given the existing caps in the NBA and NFL that are binding for many teams. In this situation, each team has the same level of quality Q^C. As long as local markets vary substantially (so that the efficient distribution calls for widely varying team talent levels), a binding cap will severely distort the talent distribution. The second important result of the cap is that the price of talent W satisfies $W = C/(\alpha + \beta Q^C)$. Because W^C is less than every team's marginal revenue when the cap binds, $W^C < W^M$, that is, player salaries under the salary cap are lower than those under the unconstrained market equilibrium.

A salary cap system that binds on most teams is likely to overcorrect for the superstar externality if the externality is of limited size. Under a binding salary cap system, all teams end up with the same level of quality. Yet, the efficient talent distribution still calls for large market teams to have higher quality than small market teams. Thus, the observed bargaining outcomes in the NFL and NBA which involve salary cap systems cannot be explained as a correction for the superstar externality.

Indeed, if salary caps are economically inefficient relative to the unconstrained market equilibrium, the question arises as to why collective bargaining has led to salary cap systems in the NBA and NFL. In seeking salary caps, the owners have stressed the "small-market team" problem and the "out-of-control player salary" problem. The small-market team problem occurs when certain teams' revenues are not sufficient to cover the their costs, a situation that can arise in the unconstrained market equilibrium due to the increasing returns assumed in (4). The high-salary problem occurs when teams compete so intensely for players that many teams are below the profitability levels "acceptable" to owners. Both of these problems would be "solved" by the owners receiving a sufficiently large share of the rents generated by the league.

In addition to shifting the talent distribution, the other important effect of a binding salary cap system is that it can lead to substantially lower player salaries. Thus, the binding salary cap leads to a shift in rents from players to owners. A salary cap system may then represent a "second-best" method by which the league rents can be split. A first-best method (an efficient collective bargaining agreement), which would result in the efficient talent distribution along with a method by which to split the resulting rents between players and owners, may be impossible as a practical or political matter.

We conclude by noting that there exists a solution to the "small-market team" and "out-of-control player salary" problems that would not cause any distortion in the distribution of player talent relative to the unconstrained market outcome (however, the superstar externality would continue to distort the talent distribution). Under this solution, the substantial distortions of a binding salary cap could be avoided. Suppose a flat tax were imposed on player payrolls at rate τ with the proceeds distributed in a lump sum to the small market teams.[44] Then, the market equilibrium (Q^T, W^T) would satisfy

$$\frac{\partial R_i}{\partial Q_i} - (1 + \tau)\beta W = 0, \quad i = 1, \ldots, N,$$

and (9)

$$\sum_{i=1}^{N} Q_i = Q.$$

Note that the first-order conditions in condition (10) are satisfied by the vector $\{Q^M, [W^M/(1 + \tau)]\}$. Thus, the distribution of talent under a flat payroll tax is the same as the distribution in the market outcome. This result is a consequence of the inelastic supply of talent and the equal tax rates across teams.[45]

Since the market outcome is economically efficient relative to the salary cap outcome when the externality is small, a solution to the small market team and out-of-control player salary problems that does not distort the talent distribution is desirable. The tax rate and resulting lump-sum payments to the league's small market teams could be designed to ensure these teams' profitability.[46] Since wages are reduced from the market outcome by $100 * \tau/(1 + \tau)\%$, the flat tax operates as a transfer from the players to the small market teams. For low tax rates, players would likely prefer the tax system to a cap system.

V. Conclusion

We have demonstrated that certain players, whom we refer to as superstars, are extremely valuable, not only to the teams that employ them, but also to other teams in the league. Superstars like Michael Jordan draw

[44] The same equilibrium would be obtained if the tax were levied on team revenue instead of team payroll. If the tax were levied on team profits, however, the teams would bear the burden of the tax instead of the players (the talent distribution would remain the same). If the players and owners are in fact seeking a means by which to shift some of the league rents from players to owners, a tax on team profits would not achieve this outcome.

[45] If the supply of talent is not inelastic, the flat tax will have an effect on efficiency. However, with players' salaries likely to be well above their alternative wages, the supply elasticity of player talent would be expected to be low.

[46] A number of implementation problems would undoubtedly be encountered. For instance, the definition of "small-market team" may be controversial, and some teams may have their incentives distorted by the possibility of obtaining the lump-sum payment. However, all plans have implementation problems—e.g., the compliance problems faced by salary cap systems.

television viewers in greater numbers than the typical All-Star player. Indeed, we estimate that Michael Jordan is worth over $50 million to the other teams in the NBA.

The superstar externality can lead to an inefficient distribution of player talent as small market teams attempt to free-ride off large market teams. In principle, salary cap systems, which tend to even out the distribution of talent, could improve efficiency. However, salary cap systems that bind on most teams substantially distort the distribution of player talent in the other direction, likely overcorrecting for the superstar externality. Indeed, the model suggests that the talent distributions in leagues with salary cap systems, such as the NBA and NFL, may be too even. The explanation for players and owners agreeing to salary cap systems in collective bargaining is that the cap systems provide a "second-best" solution for splitting the league rents between players and owners. The unconstrained market equilibrium leads to the "small-market team" and "out-of-control player salary" problems that have been stressed by owners. We suggest an alternative flat-tax solution that likely has a smaller distortionary effect than a cap but still shifts rents from the players to the owners.

References

Atkinson, S.; Stanley, L.; and Tschirhart, J. "Revenue Sharing as an Incentive in an Agency Problem: An Example from the National Football League." *Rand Journal of Economics* 19 (Spring 1988): 27–43.

El Hodiri, M., and Quirk, J. "An Economic Model of a Professional Sports League." *Journal of Political Economy* 79 (November/December 1971): 1302–19.

Fort, R., and Quirk, J. "Cross-Subsidization, Incentives, and Outcomes in Professional Team Sports Leagues." *Journal of Economic Literature* 33 (September 1995): 1265–99.

Kahn, L., and Scherer, P. "Racial Differences in Professional Basketball Players' Compensation." *Journal of Labor Economics* 6 (1986): 40–61.

Papke, L., and Wooldridge, J. "Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates." *Journal of Applied Econometrics* 11 (1996): 619–32.

Quirk, J., and El Hodiri, M. "The Economic Theory of a Professional Sports League." In *Government and the Sports Business,* edited by R. Noll, pp. 33–80. Washington, DC: Brookings Institution, 1974.

Quirk, J., and Fort, R. *Pay Dirt.* Princeton, NJ: Princeton University Press, 1992.

Whitney, J. "Bidding Till Bankrupt: Destructive Competition in Professional Team Sports." *Economic Inquiry* 31 (January 1993): 100–115.