It Doesn't Pay to be Young in the NBA

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ABSTRACT

In this paper I show that the 1995 and 1999 collective bargaining agreements in the National Basketball Association (NBA) instituted a system of below market price maximum salaries for first round draft picks in their first four seasons in the league (rookie scale contracts). These rookie scale contracts have reduced the compensation of non-veteran first round picks by half relative to veteran first round picks, resulting in a annual transfer of $200 million from non-veteran to veteran first round picks. The players paying these transfers were not yet part of the NBA at the time of the 1995 and 1999 agreements and thus played no role in the collective bargaining process. I relate this finding to more general collective bargaining outcomes.

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It Doesn't Pay to be Young in the NBA

1. Introduction

Sports economics has long been attractive as a laboratory for examining difficult-to-test hypotheses from a wide variety of economic fields.[1] Part of this attraction comes from the remarkably diverse set of institutions in sports set up to deal with market failures or to increase monopoly profits.[2] But most importantly, sports economics offers an abundance of performance data that allows economists to test hypotheses or ask questions that would be difficult or impossible in other areas of economics. For example, researchers have been able to examine racial differences in sports-league salaries, net of productivity differences – which is difficult to do in other industries.[3] This paper will examine another difficult-to-test economic concept by using the extensive productivity data in the National Basketball Association (NBA) to show that recent collective bargaining agreements have resulted in an annual transfer of $200 million from non-veteran to veteran first round picks. These non-veterans were not part of the NBA at the time the last collective bargaining agreement was agreed to, and so it is not surprising that their rents may have been appropriated by veteran players.

Such rent-seeking by union members at the expense of those not in the union, not yet in the union, or with little representation in the union manifests itself in many ways in the union literature. The trade union literature assumes that a seniority employment rule protects the interests of union members at the expense of non-union members, as well as the most experienced (and presumably most powerful)

[1] Rottenberg (1956), Neale (1964) and Noll (1974) are a few of the early influential works in sports economics.

[2] See Fort and Quirk (1995), Vrooman (1996), and Rosen and Sanderson (2001) for discussions of market failures in sports and reactions to these market failures.

[3] The seminal papers in this area are Gwartney and Haworth (1974) and Scully (1974) for major league baseball and Kahn and Scherer (1988) for professional basketball.

union members at the expense of the less experienced union members (Grossman 1983). The insider-outsider literature argues that no such seniority rule is necessary, because outsiders are imperfect substitutes for insiders (Lindbeck and Snower 1986), which likely is more applicable in this case, where these young player outside the union in 1999 likely were too young to enter the NBA at that time. Moreover, the large literature on the employment effects of unions (see Kaufman 2002 for a review) is, in essence, a story about the extent to which union members appropriate rents from non-union members. Finally, there is also a large literature that argues that within-union dynamics are an important determinant of within-union distributions of rents (Freeman and Medoff 1984, Card 1996, and Hirsch and Schumacher 1998).

In this paper I present evidence from fourteen seasons of player and team data (more data than has previously been used in the NBA literature). For NBA players from the 1988-89 through the 2002-03 seasons (except for the 1989-90 season), I have collected individual and team playing statistics, race, age, height, and place selected in the rookie draft, All-Star votes, average attendance for home games, and annual salary. Using this data I describe how the last two collective bargaining agreements have resulted in an annual transfer of $200 million from non-veteran to veteran first round picks. I find that this transfer cannot be explained by decreasing relative productivity of non-veteran first round picks, as measured by their playing statistics. Nor does decreasing popularity of non-veteran first picks (as measured by All-Star voting or home attendance) explain this result. Thus, it appears that this $200 million simply is a rent transfer from non-veterans to veterans. There also appears to be some evidence of a rent transfer from star players back to the rest of the players. I relate these findings to the union literature.

2. NBA Collective Bargaining Agreements and the Increase of Labor Market Distortions

The labor market for player talent in the NBA is characterized by an incredibly complex web of salary constraints – constraints that stem from a variety of forces. Understanding these forces is important, because they help explain the dynamics within the collective bargaining process. To begin with, as in most professional sports leagues, teams operate as a cartel, henceforth referred to as the League.[4] The League seeks to maximize profits through limiting output (in this case the number of teams) and through reducing costs in markets in which it exercises market power (such as in the market for player talent).[5]

However, the League also faces market imperfections that are rare outside professional sports leagues. As described by Rosen and Sanderson (2001), wins (or championships) are an important product produced by teams, but league-wide the number of wins is fixed. Thus, an investment in winning made by one team generates negative externalities (losses) for other teams. A second but related consideration for the League is competitive balance. Part of the attraction of sporting events is that each contest is an elaborate "resolution of uncertainty." Yet, if "rich" teams from large markets are able to make investments that remove almost all of this uncertainty, then the demand for the NBA product may decline, in particular if the removal of this uncertainty becomes a multi-year proposition for some teams. Because of the negative externalities associated with winning and concerns about competitive balance, most professional sports leagues, including the NBA, have instituted regulations restricting spending on player talent for high-spending teams (salary caps) or have instituted tariffs for spending over a certain amount (luxury taxes) or both (as in the NBA). In addition, the League has

[4] Yet, unlike many cartels, the collusive behavior of teams is largely limited to formal agreements entered into with their respective unions. Outside of these agreements with their unions, collusive behavior between teams generally is prohibited and has resulted in expensive lawsuits in baseball (Scully, 1989).

[5] Another manifestation of this market power is the League's ability to secure public funding for the construction of arenas.

often sought to make it easier for teams to retain their own players in free agency, perhaps due to players' team-specific human capital.

Prior to the formation of the NBPA, the League exercised significant control over player compensation. Players were allocated to teams in a draft based upon the reverse order of team performance and exclusive rights to those players remained with the drafting team until that player was traded, sold, or waived. The formation of a rival league, the American Basketball Association (ABA), in 1967-68 introduced competition for player talent in the NBA, resulting in a dramatic increase in salaries. After the ABA folded in 1976, the NBPA negotiated for a very limited form of free agency for veterans. Since that time, free agency restrictions for veterans have been relaxed, but in their place a variety of salary constraints have been introduced.

These salary constraints have not affected all players equally, and the players who have benefited most are those most heavily represented in the NBPA. The NBPA is comprised of all active players and each player has one vote. In particular, it should be noted that low salary players are an important voting block in the NBPA. In 2002-03 about 23 percent of players earned the minimum salary and the lowest-paid third of players received only six percent of the total player salaries. On the other hand, the highest-paid ten percent of players received 36 percent of total player salaries. For this reason, it typically has been very difficult for the NBPA to resist overtures from the League which offer higher minimum salaries and various concessions to "mid-level" players in return for lower maximum salaries – an outcome that would be predicted by the classic union model presented in Freeman and Medoff (1984).

While an argument can be made that high salary players are underrepresented at the negotiating table, there can be no doubt that *future* NBA players are underrepresented, since future players do not

have a single League or NBPA vote. Consequently, while collective bargaining between the League and NBPA has resulted in greater freedom in free agency among veterans, especially among low and middle salary veterans, players drafted in the first round face unprecedented restrictions in their rights to negotiate their initial contracts. These restrictions are a direct result of the 1995 and 1999 collective bargaining agreements and are described in more detail below.

Prior to these agreements, the NBA in 1983 had been the first sports league to institute a salary cap, which restricts teams from spending over a certain specified amount (usually a function of projected league revenue). However, the NBA's salary cap has always been a "soft cap" with numerous exceptions, which allowed teams to re-sign their own players at any salary (the "Bird" exception) and allowed various exceptions for middle and lower salary players. These exceptions resulted in average salaries increasing by 250 percent between 1987-1988 (prior to the previous agreement) and 1994-1995, while the salary cap (a function of projected league revenue) only increased by 160 percent (Staudohar, 1998). Moreover, with large rookie contracts being signed by Glenn Robinson ($80 million over 11 years) and Jason Kidd ($65 million over 8 years), there was a consensus among owners that player salaries were out of control, especially for rookies.

After tumultuous negotiations, the 1995 collective bargaining agreement granted veteran players greater free agency rights and increased the share of total revenue going to the players. However, there was one group of players who were worse off after this agreement – future rookies. Rookies drafted in the first round of the 1995 draft were restricted to signing three-year guaranteed "rookie scale" contracts with below market maximum salaries. These rookie scale contracts resulted in the first round draft picks in 1995 being paid 15 percent less (adjusting for inflation but not for NBA salary growth) than first round draft picks in 1994 in their respective rookie seasons. In their second seasons, they

were paid about 23 percent less, while the deficit increased to 39 percent in their third seasons.[6] After their third seasons, these first round draft picks were eligible for restricted free agency, i.e. the players' teams retained the right to match offers made by other teams (the right of first refusal).

The 1995 agreement allowed the League to re-open negotiations if the players' share of revenue was greater than 51.8 percent, and their share shot up to 57 percent in 1997-98. After a lockout by the League that resulted in nearly half of the 1998-99 season being lost, the League gained major concessions from the players in the form of an escrow system (that taxed players up to 10 percent of their salary and benefits if total player compensation was greater than 55 percent of revenue) and a luxury tax system (that taxed teams a dollar for every dollar they were over a certain threshold if total player compensation was greater than 61.1 percent of revenue).[7]

Yet, even with these concessions, low and middle income veterans stood to benefit from the agreement with higher minimum salaries, especially for older veterans (including League subsidization of some of these salaries and a new salary cap exception for "mid-level" players. The players that paid the highest price for this agreement were a group of players that has very few votes in the union – high salary and future players. These new provisions were the following.

(a) Four-year rookie scale contracts – Players drafted in the first round were restricted to signing three-year guaranteed "rookie scale" contracts with below market maximum salaries with a fourth year at the team's option (again with a below market price maximum salary) and fifth year restricted free agency.
(b) Maximum salaries for individual players (a first in professional sports history) – The maximum salary for the first season of a new contract could be no more than 25 percent of the salary cap level for players with less than 7 years of NBA experience, no more than 30 percent of the salary cap level for players with 7 to 9 years of NBA experience, and no more than 35 percent for players with 10

[6] Increases in these maximum salaries for later draft years were ten percent or less. These increases were considerably smaller than average salary growth for veterans, resulting in declines in the relative value of these rookie scale contracts over time.

[7] See Rosenbaum (2003b) for more details on the luxury tax.

years or more of NBA experience.[8]

(c) Maximum contract lengths and salary increases – Players signing with their own team were limited to seven-year contracts with annual increases of 12.5 percent of the value of the first year of the contract. Players signing with other teams were limited to six-year contracts with annual increases of 10 percent of the value of the first year of the contract. (In the prior agreement, annual increases were limited to 20 percent of the value of the first year of the contract with the same rules applying to players who signed with their own or other teams.)

As will be discussed in more detail, the rookie scale contracts dramatically reduced relative salaries of non-veteran versus veteran first round picks. The second and third provision have reduced the relative salaries of superstars relative to the rest of the players, although grandfathered contracts have lessened this effect.

3. Data

In order to examine the claims made in the previous section, a unique data set on NBA players has been assmbled. Player salary data from the 1988-1989 and 1990-1991 through 2002-2003 seasons come from a web-site maintained by Patricia Bender (**http://www.dfw.net/~patricia/**). She has meticulously collected player salary data from sources such as the *Dallas Morning News*, checking their annual reports versus multiple sources, while documenting every contract signing over the past decade. Historical information that she has collected on players' heights and ages, as well as All-Star votes, is also used in this paper. The salaries used in this paper are those used for salary cap purposes. Thus, signing bonuses and deferred compensation are spread over the lifetime of the contract.

[8] This provision did not apply to players with existing contracts. Also, players with existing high salary contracts were eligible for five percent increases in their future contracts, even if this exceeded the maximum salary. In 2002-03, the salary cap level was at $40.271 million, so the maximum salary for players with less than seven years of NBA experience was just over $10 million.

Performance data on teams and players for these same seasons is available from a web-site maintained by Doug Steele (**http://www.rmi.net/~doug/**).[9] Historical data on the NBA draft was available from nbadraf.net (**http://www.nbadraft.net**), while Kenn Tomasch was kind enough to provide me with data on home attendance for teams since the beginning of the NBA. Racial, foreign status, age, and height data came from *The NBA Encyclopedia* (2000), *The NBA Register* (various years), Kate Antonovics, and various web-sites.

Overall, the data include 1,348 players from 14 seasons for a total of 6,298 player-seasons. Salary data is missing for less than 5.7 percent of the player-seasons, with many of these missing salary observations being players added to teams after the middle of the season when the salary data was reported.[10] Approximately 7.8 percent of the player-seasons are for players with positive salaries but zero minutes played, generally retired players or players with season-long injuries. Racial or foreign status information is missing for about 2.9 percent of the data.

One of the main advantages of examining labor markets in professional sports leagues is the opportunity to measure worker productivity using performance statistics. Rather than report results for a whole range of statistical categories, I have chosen to create a single productivity index. This approach allows for simple comparisons of overall productivity across groups, which would be difficult with a range of statistics. In addition, for the regression results, using a single index makes it simpler to allow for non-linear effects, which allows the effect of an extra point or rebound to vary for high and low productivity players.

To create this index, I use current season statistics rather than career statistics or previous

[9] The data for the 2002-03 season used in this paper is through the All-Star break.

[10] In the empirical work I assume that the players earned the minimum salary given their seasons of NBA experience.

season statistics. Since my objective is to measure how compensation adjusted for current productivity has varied over time for different types of players, using statistics from previous seasons would not be appropriate. My approach implicitly assumes rational expectations for salary offers, which seems appropriate in light of the huge demand for promising but largely unproven free agents, such as Tracy McGrady and Tim Thomas in the summer of 2000.

My productivity index is motivated by the "efficiency" index described on the NBA's web-site (**http://www.nba.com/statistics/efficiency.html**). I have added personal fouls to the index and made small adjustments to a few of the other statistical categories, resulting in an overall index that summarizes the statistics in the following manner.[11,12]

- Adds 1.5 for each point scored.
- Adds 2 for each steal and subtracts 2 for each turnover.
- Adds 1 for each rebound, assist, and block.
- Subtracts 1 for each personal foul and field goal attempt.
- Subtracts 0.45 for each free throw attempt.

Dividing this index by the number of games played is the standard approach, but in order to account for lower productivity from games missed due to suspensions or injury, I use the average of two indexes,

[11] The main differences between this productivity index and the "efficiency" index are (a) a block plus a rebound changes possession like a steal or turnover, so steals are worth two points and turnovers are worth negative two points, (b) this index gives equal value to two out of six three point shooting and three out of six two point shooting, and (c) it counts personal fouls and the penalty for missed free throws is less severe. Note that a made two point field goal increases this index by two points, just like the "efficiency" index.

[12] Note that I do not use the two-stage Scully (1974) approach, where in the first stage team wins (or team points or runs differential) are regressed onto various baseball statistics to create the appropriate weights for each of the statistics. There are at least two reasons this approach is not an appropriate technique for basketball performance statistics. First, this approach is likely to undervalue assists. Assists typically create an externality in that the player receiving the assist scores two (or three) points and (if the assists are generating high percentage shots) a higher ratio of points to field goal attempts. In the team analysis, assists are a completely superfluous statistic, since its effects are accounted for with the points and field goal attempts statistics. Second, the team analysis will result in weights that undervalue players who generate field goal attempts. These players generally are defended by the other teams' best defenders (a positive externality for their teammates) and generate a disproportionate number of field goal attempts during possessions where a high percentage field goal attempt is not available, such as when possessions are at risk of ending due to the 24-second time limit for possessions.

one where the denominator is games played, the other being the total number of games in the season. Finally, I adjust these index values using a team factor, which accounts for differences across teams in the number of possessions per game and defensive efficiency, and normalize the index value so that it has a standard deviation of one in each season.[13]

Appendix Table 1 reports the top five players in each season according to this productivity index. Selections to the NBA first, second, or third teams are denoted in parentheses. In general, it appears that this productivity index is quite consistent with the All-NBA selections with 70 percent of these top five players being first-team All-NBA.

4. Descriptive Analysis

Table 1 begins the empirical analysis by presenting sample means for four selected seasons: 1988-1989, 1994-1995, 1997-1998, and 2002-2003. These four seasons were not selected randomly; they represent the first and last seasons in this data set, along with the seasons prior to the 1995 and 1999 collective bargaining agreements. The most striking aspect of this table is the greater than 400 percent increase in average salaries from $0.7 million in 1998-89 to $3.6 million in 2002-03 (in December 2002 dollars).[14] Salary growth was the fastest for those in the upper ten percent of the distribution, with the ratio of their salary to that of those in middle third of the distribution rising from 4.6 in 1988-89 to 6.0 in 2002-03. Note, however, that between 1997-1998 and 2002-2003, salaries grew at the *slower* rate for those in the upper 10 percentile than those in any other group.

[13] I need to describe how this team factor is created.

[14] These average salaries differ from what the League reports, because the League's "average salary" is equal to total salaries divided by 12.5 times the number of teams times. I use 15 times the number of teams in the denominator, since that more accurately reflects the number of players teams are usually paying at one given time.

Over time, the fraction of white players in the NBA fell from 26 percent in 1988-1989 to 20 percent in 1997-1998, rising back up to 24 percent in 2002-2003, largely due to the fraction of foreign players increasing from 6 percent to 14 percent between 1997-1998 and 2002-2003. Interestingly, the draft became more efficient over time with the fraction of NBA players being selected in the first round increasing from 53 percent in 1988-1989 to 60 percent in 2002-2003, suggesting that the influx of young players into the NBA has not resulted in a larger fraction of gross mistakes among first round picks. Productivity (as measured by my index) appears to have decreased considerably over time due to lower shooting percentages and fewer possessions per game.

Interestingly, the percentage of players under 23 and over 35 has increased considerably over time, rising from 4.3 percent in 1994-1995 to 11.6 percent in 2002-2003.[15] In particular, the percentage of players under 23 increased more than 200 percent from 1.8 percent to 5.7 percent. On the other hand, seasons of NBA experience has risen steadily over time with the percentage of players with five or more seasons of experience rising from 44 percent in 1988-1989 to 55 percent in 2002-2003.

Table 2 examines the change over time in the salary distribution, split by veteran status and selected in first round status. Non-veteran (in their first four seasons in the NBA) first round draft picks saw their share of total salaries fall from 28 percent in 1988-89 to 11 percent in 2002-2003. In 1994-1995 veteran (in at least their fifth season in the NBA) first round picks earned just twice as much as non-veteran first round picks. By 2002-2003 this ratio had skyrocketed to six times, even though the productivity difference between these two groups increased by just 0.21 standard deviations (a little more than a rebound per game). In fact, by 2002-2003 non-veteran first round picks earned just 58

percent of what veteran non-first round picks earned, even though the non-veteran first round picks were more productive. These dramatic changes are almost entirely the function of the below market value maximum salaries under the four-year rookie scale contracts.

Table 4 shows that the relative deterioration of rookie salaries began after the 1995 collective bargaining agreement.

5. Regression Analysis

Table 2 shows that relative salaries for non-veteran first round picks fell over time, but it is possible that this relative decline could be due to changes over time in relative marginal productivity. Consequently, in Tables 3 and 4, I show that relative marginal productivity simply does not explain these dramatic changes over time. Furthermore, in Tables 5 and 6 I provide suggestive evidence that this growing salary deficit for non-veteran first round picks also does not appear to be related to fan preferences, at least as measured by All-Star voting and home attendance.

The form of the OLS regression equations of logged salary ($LNSAL_i$) onto interactions of veteran status ($NON\text{-}VET_i$ equals one if in first four seasons and VET_i equals one if in season five or later), first round pick status ($1^{st}ROUND_i$ equals one if a first round pick and $NON\text{-}1^{st}ROUND_i$ equals one if a first round pick) , and other controls (X_i) are the following.

$$(5.1) \quad LNSAL_i = \beta_1(NON\text{-}VET_i * 1^{st}ROUND_i) + \beta_2(NON\text{-}VET_i * NON\text{-}1^{st}ROUND_i) + \beta_3(VET_i * NON\text{-}1^{st}ROUND_i) + \gamma X_i + \varepsilon_i$$

Thus, the β coefficients measure log differences in salary between the respective groups and the omitted group, veteran first round picks. In specification (1) in Table 3, the only controls included in X_i are

[15] Age is measured as of January 1st in the given season.

season indicators. Consequently, with no other productivity adjustments, non-veteran first round picks earn about 44 percent less [$100*(e^{-0.573} - 1)$] than veteran first round picks. Non-veteran, non-first round picks earn about 83 percent less.

Adding in controls for race, foreign status, height, and productivity, the relative deficit for non-veteran first round picks shrinks only to 36 percent with the relative deficit for non-veteran, non-first round picks still being greater than 70 percent, even after accounting for productivity. Note that the effect of the productivity index is highly significant and large, implying that moving a player from one standard deviation below the mean in productivity to one standard deviation above the mean would result in his salary increasing by almost 150 percent. Using in specification (3) a more flexible spline function to model the effect of productivity on log salary along with adding a control for fraction of games won has very little effect on the veteran status/draft status differences. Nor does adding other team variables, such as team indicators, team playoff performance, and home attendance in specification (4). Interestingly, the effect of the productivity index on log salary appears to decline as the index increases, although this may be due to the effects of distortions at the top of the salary scale, such as maximum salaries.

However, the regressions in Table 3 tell us whether less experienced players are paid less over the whole period (adjusting for productivity differences), not whether these deficits increased after the 1995 and 1999 collective bargaining agreements. Thus, Table 4 reports regression results for specification (3) run separately for four selected seasons, restricting the effects of the productivity index and fraction of games won to be the same as in the full regression in Table 3. These regressions reveal that the deficit between non-veteran and veteran first round picks decreased a bit between 1988-1989 and 1994-1995, but since the 1995 collective bargaining agreement have increased from 26 percent to

62 percent. In other words, after accounting for productivity, veteran first round picks used to earn 32 percent more than non-veteran first round picks. Since the 1995 agreement, that premium has jumped to 162 percent, a remarkable rent transfer from one group to another. In contrast, non-veteran, non-first round picks have always been grossly underpaid relative to veteran first round picks (and every other group for that matter), but the cause for this deficit occurred prior to the 1995 and 1999 collective bargaining agreements.

6. Accounting for Fan Preferences

So far, this analysis has implicitly assumed that, besides race and foreign status, performance statistics and team performance are the only measures of a player's marginal productivity. Perhaps fans have preferences for veteran players over and above what they produce on the court. I test this hypothesis using data on All-Star voting and home attendance. First, Table 5 presents mixed evidence that fans prefer veterans when voting for All-Stars using data from the last six seasons with an All-Star game.[16] In specification (1) non-veteran first round picks are about four percentage points less likely to be in the top ten in All-Star votes in their conference at their position, accounting for productivity differences. This effect is statistically significant and non-trivial, since it amounts to about a third of the mean probability of being in the top ten. On the other hand, for players in the top ten in All-Star votes in their conference at their position, there is no evidence that veteran first round picks receive more All-Star votes than non-veteran first round picks. Moreover, in specifications (2) and (4) I interact these veteran status/draft status categories with time to see whether these effects have changed over time. The results reveal reasonably strong evidence that preferences for veteran first round picks have grown over

time, at least for non-superstars. Thus, there appears to be some evidence that preference for veteran players have increased over time.

Table 6 presents a similar analysis for home attendance, where the key explanatory variables are the fraction of the teams' productivity that is accounted for players in the various veteran status/draft status categories. Thus, specification (1) implies that a 0.20 increase (about a standard deviation) in the fraction of total productivity due to non-veteran first round picks (and subsequent decrease in this fraction for veteran first round picks) results in home attendance falling by a statistically insignificant and small 155 fans per game. (At $50 of profit per fan for 41 home games, this amounts to $310,000 per season.) Even the slight increase in this effect since the 1995 collective bargaining agreement was signed does not account for the extremely large and growing disparities between veteran and non-veteran first round picks.

On the other hand, these regression results show that increasing a teams' fraction of games won greatly increases home attendance. A one standard deviation increase in the fraction of games won (about 0.16) increases home attendance by about a 1,000 fans per game (or at $50 of profit per fan about $2 million per season). If the common perception that having more veterans helps teams win is true, then perhaps "veteran" effects work through increasing a teams' fraction of games won. Specifications (3) and (4) of Table 6 examine this hypothesis, finding that veteran first round picks are associated with winning. However, this effect is quite small. A one standard deviation increase in the fraction of non-veteran first round picks (about 0.20) decreases the fraction of games won by only about 0.022 (using the parameters for the post-1995 years when the effect is largest), which in turn only reduces home attendance by about 140 fans per game, a fairly small effect.

[16] There was no All-Star game in 1999 when the players were locked out.

Overall, it appears that there is some weak evidence that fans prefer veteran first round picks to non-veteran first round picks, but the estimated magnitude of these preferences is dwarfed by the salary differences of these two groups. Thus, neither productivity differences nor fan preferences seem to explain the huge differences in compensation for veteran first round picks and non-veteran first round picks.

7. Analyzing the Overall Effects

Table 7 presents comparisons between the actual salary distribution and two counterfactuals, one a predicted salary distribution based solely upon productivity and a second based upon productivity and pre-1996 premia for race, veteran status, and draft status.[17] These comparisons make it possible to compare how different groups have fared under the 1995 and 1999 collective bargaining agreements. Overall, these agreements have tended to hurt non-veterans (players in their first four seasons), especially those non-veterans selected in the first round. The primary beneficiaries of these agreements have been veterans selected in the first round.

Prior to the 1995 and 1999 collective bargaining agreements, non-veterans selected in first round were paid between 89 percent and 98 percent of their estimated productivity; by 2002-2003 these players were being paid less than half of their estimated productivity. Non-veterans who were not selected in the first round were also paid less than half of their estimated productivity, but this was not much of a change from what this group was paid prior to the 1995 and 1999 collective bargaining agreements. The group benefited the most from these changes were veterans selected in the first round

[17] The parameters used to predict the salary distributions are calculated using specification (3) in Table 3 with data from only the 1988-1989 through 1994-1995 seasons.

who were paid 123 to 127 percent of their estimated productivity prior to 1995, but were paid 141 of their estimated productivity.

If players were paid based strictly based upon statistical productivity (and race, veteran status, and draft status did not matter), non-veteran first round picks would have been paid $4 million more in 1994-1995 and $191 million more in 2002-2003 (the inflation-adjusted average salary for this group increased by less than one percent over this period). Veteran first round picks would have been paid $71 million less in 1994-1995 and $336 million less in 2002-2003 (the inflation-adjusted average salary for this group increased by more than 150 percent over this period). Altogether the 1995 and 1999 collective bargaining agreements resulted in approximately a $200 million transfer from non-veterans to veterans, mostly from non-veteran first round picks to veteran first round picks.

8. Conclusion[18]

In this paper I describe how the last two collective bargaining agreements have resulted in an annual transfer of $200 million from non-veterans to veterans. Using fourteen seasons worth of data, I find that this transfer cannot be explained by decreasing relative productivity of non-veteran first round picks, as measured by their playing statistics. Nor does decreasing popularity of non-veteran first picks (as measured by All-Star voting or home attendance) explain this result. Thus, it appears that this $200 million simply is a rent transfer from non-veterans to veterans.

Since these first round rookies were not in the NBA at the time the last collective bargaining

[18] I need to expand this conclusion and talk more here and in the previous sections about how high productivity players also have been negatively affected by the 1999 CBA. I then need to relate these findings more specifically to findings in the union and collective bargaining literatures. Finally, I bring the reader very quickly through my empirical results. I probably need to be more deliberate with that discussion in some places.

agreement, it is not surprising that their rents were appropriated by current players. The findings in this paper present evidence relating to many of the arguments made in the union literature (need to expand on this point later and add cites).

There is, however, at least one economic justification for this veteran premium, besides arguing that this premium reflects increases in fans' preferences for veterans (an argument not strongly supported by the evidence in this paper). The League as a whole has a strong incentive to increase the returns to skill production, since higher skills likely would result in higher revenue for the League. Prior to the institution of rookie scale contract, the norm for star players leaving college was to sign long-term guaranteed contracts that covered most of their playing career. These players had very little incentive to invest in skill production. With artificially low rookie scale salaries players now have large incentives to increase their skills so as to increase the value of their post-rookie scale contracts. If this leads to greater skill investment by players, this may increase League revenue. Since players roughly receive a fixed share of League revenue, it may also benefit players as a whole, although high draft picks whose skill production is not large enough to merit large post-rookie scale contracts are hurt by these collective bargaining agreement changes.

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Table 1
Sample Means, Selected Seasons

Variable	1988-89	1994-95	1997-98	2002-03
Salary	$719,247	$1,639,622	$2,249,989	$3,656,021
	($696,099)	($1,623,063)	($3,030,411)	($4,016,945)
Salary in bottom third	$184,787	$278,006	$343,214	$665,426
	($55,401)	($151,261)	($93,717)	($232,904)
Salary in middle third	$515,044	$1,266,016	$1,363,775	$2,222,282
	($110,053)	($362,818)	($464,912)	($822,466)
Salary in top third less the top ten percent	$1,086,711	$2,713,290	$3,470,726	$5,847,522
	($228,877)	($467,780)	($764,042)	($1,544,595)
Salary in top ten percent	$2,356,962	$4,953,547	$8,760,785	$13,291,488
	($856,454)	($2,302,637)	($5,569,075)	($3,574,069)
Productivity index	7.20	6.06	5.67	5.68
	(6.50)	(5.90)	(5.46)	(6.50)
Height in inches	79.17	79.15	79.13	79.32
	(3.87)	(3.94)	(3.84)	(3.82)
White	26.0%	22.4%	20.2%	24.3%
Foreign	3.3%	5.5%	6.1%	13.9%
Selected in first round	53.3%	56.8%	57.2%	60.3%
Selected in second round	22.5%	22.8%	24.6%	23.4%
Undrafted	24.2%	20.4%	18.2%	16.3%
Age 20 or younger	0.0%	0.0%	0.6%	0.7%
Age 21-22	1.1%	1.8%	2.7%	5.0%
Age 23-25	25.3%	21.0%	19.0%	17.4%
Age 26-30	32.7%	33.6%	32.4%	29.7%
Age 30-35	19.2%	23.5%	25.1%	22.3%
Age 36 or older	0.5%	2.5%	4.2%	5.9%
First two seasons	36.5%	28.2%	27.1%	27.5%
Seasons three and four	19.8%	20.6%	19.6%	17.8%
Seasons five through nine	31.6%	34.5%	35.1%	33.0%
Seasons ten and greater	12.1%	16.8%	18.2%	21.7%
Home attendance	14,989	16,712	17,074	16,632
	(3,216)	(3,151)	(3,006)	(2,476)
Sample size	364	447	479	461

Notes : Standard deviations are in parentheses. Dollar amounts are in December 2002 dollars.

Table 2
Changes over Time in the Salary Distribution

Season	Non-Veterans (First Four Seasons) First Round Pick	Non-Veterans (First Four Seasons) Non-First Round Pick	Veterans (Fifth Season and Beyond) First Round Pick	Veterans (Fifth Season and Beyond) Non-First Round Pick
1988-89	$74.1 (28.3%) [n = 95]	$31.5 (12.0%) [n = 110]	$116.7 (44.6%) [n = 99]	$39.5 (15.1%) [n = 60]
1994-95	$192.3 (26.2%) [n = 108]	$50.2 (6.9%) [n = 110]	$383.1 (52.3%) [n = 146]	$107.2 (14.6%) [n = 83]
1997-98	$209.2 (19.4%) [n = 113]	$59.6 (5.5%) [n = 111]	$660.9 (61.3%) [n = 161]	$148.0 (13.7%) [n = 94]
2002-03	$188.6 (11.2%) [n = 105]	$101.4 (6.0%) [n = 104]	$1,150.5 (68.3%) [n = 173]	$245.0 (14.5%) [n = 79]

Notes : All dollar amounts are in millions of December 2002 dollars. In parentheses are the percentages for a given group of total salaries in a given year. In square brackets are the number of players in the given group in the given year.

Table 3
The Effect of NBA Experience and Draft Status on Salaries
OLS Coefficients (Standard Errors)

	Dependent variable = log salary			
Variable	**(1)**	**(2)**	**(3)**	**(4)**
In first four seasons and drafted in first round	-0.573	-0.450	-0.463	-0.460
	(0.027)	(0.022)	(0.022)	(0.022)
In first four seasons and not drafted in first round	-1.788	-1.296	-1.274	-1.267
	(0.026)	(0.024)	(0.024)	(0.024)
In season five or later and not drafted in first round	-0.722	-0.419	-0.425	-0.421
	(0.029)	(0.025)	(0.025)	(0.025)
White		-0.031	-0.027	-0.025
		(0.021)	(0.021)	(0.022)
Foreign		0.053	0.060	0.062
		(0.035)	(0.035)	(0.035)
Height in inches		0.027	0.029	0.029
		(0.002)	(0.002)	(0.002)
Normalized productivity index		0.454	0.739	0.746
[in (3) and (4) when index is less than -0.5]		(0.009)	(0.048)	(0.048)
Normalized productivity index when index is between -0.5 and 0			0.441	0.448
			(0.080)	(0.080)
Normalized productivity index when index is between 0 and 0.5			0.437	0.416
			(0.097)	(0.097)
Normalized productivity index when index is between 0.5 and 1			0.502	0.502
			(0.102)	(0.102)
Normalized productivity index when index is between 1 and 2			0.288	0.293
			(0.061)	(0.061)
Normalized productivity index when index is greater than 2			0.226	0.241
			(0.062)	(0.063)
Winning percentage			-0.012	0.096
			(0.052)	(0.116)
Home attendance in thousands				-0.004
				(0.004)
Include season indicators	Yes	Yes	Yes	Yes
Include playoff performance and team indicators	No	No	No	Yes
Adjusted R^2	0.504	0.654	0.659	0.660
Sample size	6,298	6,298	6,298	6,298

Source: The individual-level data are from the 1988-89 and 1990-91 through 2002-03 seasons.
Controls: Indicators for missing race and missing foreign status are included in specifications (2)-(4). The omitted group is a veteran (in at least fifth season in NBA) drafted in the first round also a native black in specifications (2)-(4).
Notes: The normalized productivity index (with a mean of zero and variance of one in each year) is a function of points, rebounds, assists, steals, blocks, turnovers, fouls, field goal attempts, free throw attempts, and games played. It is modeled with a spline function in specifications (3) and (4). See text for details.

Table 4

Changes over Time in the Effect of NBA Experience and Draft Status on Salaries

OLS Coefficients (Standard Errors)

	Dependent variable = log salary			
Variable	**1988-89**	**1994-95**	**1997-98**	**2002-03**
In first four seasons and drafted in first round	-0.321	-0.279	-0.454	-0.962
	(0.076)	(0.089)	(0.086)	(0.084)
In first four seasons and not drafted in first round	-0.885	-1.351	-1.308	-1.544
	(0.077)	(0.090)	(0.087)	(0.086)
In season five or later and not drafted in first round	-0.323	-0.588	-0.576	-0.447
	(0.087)	(0.097)	(0.091)	(0.092)
White	0.012	-0.210	-0.163	0.040
	(0.067)	(0.083)	(0.084)	(0.081)
Foreign	0.111	0.283	0.267	0.016
	(0.165)	(0.152)	(0.141)	(0.102)
Adjusted R^2	0.636	0.600	0.608	0.609
Sample size	364	447	479	461

Notes : Indicators for season, missing race, and missing foreign status are included. The omitted group is a native black veteran (in at least fifth season in NBA) drafted in the first round. Additional controls are included for height, winning percentage, and a spline for the normalized productivity index, but the coefficients for these variables are restricted to the values in specification (3) of Table 3. See text for details.

Table 5
The Effect of NBA Experience and Draft Status on All-Star Voting
OLS Coefficients (Standard Errors)

Variable	Dependent variable = any All-Star votes		Dependent variable = log All-Star votes	
	(1)	(2)	(3)	(4)
In first four seasons and drafted in first round	-0.043	0.008	0.031	0.059
	(0.013)	(0.018)	(0.083)	(0.108)
In first four seasons and not drafted in first round	-0.061	-0.031	-0.208	0.080
	(0.014)	(0.018)	(0.251)	(0.372)
In season five or later and not drafted in first round	-0.064	-0.035	-0.266	-0.116
	(0.014)	(0.019)	(0.142)	(0.193)
In first four seasons and drafted in first round interacted with 2000-01 season or later		-0.103		-0.053
		(0.025)		(0.158)
In first four seasons and not drafted in first round interacted with 2000-01 season or later		-0.059		-0.511
		(0.025)		(0.502)
In season five or later and not drafted in first round interacted with 2000-01 season or later		-0.058		-0.328
		(0.027)		(0.288)
White	0.009	0.009	-0.370	-0.379
	(0.012)	(0.012)	(0.101)	(0.102)
Foreign	0.081	0.084	0.089	0.094
	(0.018)	(0.018)	(0.115)	(0.116)
Height	0.008	0.008	-0.032	-0.032
	(0.001)	(0.001)	(0.009)	(0.009)
Normalized productivity index when index is less than 0.5	0.049	0.050	0.280	0.248
	(0.010)	(0.010)	(0.150)	(0.155)
Normalized productivity index when index is between 0.5 and 1	0.372	0.370	0.058	0.053
	(0.047)	(0.046)	(0.296)	(0.297)
Normalized productivity index when index is between 1 and 2	0.442	0.439	0.532	0.556
	(0.034)	(0.034)	(0.124)	(0.125)
Normalized productivity index when index is greater than 2	0.160	0.162	0.538	0.534
	(0.036)	(0.036)	(0.101)	(0.101)
Winning percentage	0.102	0.105	1.300	1.289
	(0.029)	(0.029)	(0.247)	(0.248)
Dependent variable mean	0.126	0.126	12.639	12.639
Adjusted R^2	0.441	0.444	0.534	0.533
Sample size	2,866	2,866	360	360

Source: The individual-level data are from the 1996-97 through 1997-98 and 1999-00 through 2002-03 seasons.
Controls: Indicators for season, missing race, and missing foreign status are included. The omitted group is a native black veteran (in at least fifth season in NBA) drafted in the first round.
Notes: The normalized productivity index (with a mean of zero and variance of one in each year) is a function of points, rebounds, assists, steals, blocks, turnovers, fouls, field goal attempts, free throw attempts, and games played. It is modeled with a spline function. See text for details.

Table 6

The Effect of NBA Experience and Draft Status on Home Attendance and Winning Percentage

OLS Coefficients (Standard Errors)

	Dependent variable = home attendance		Dependent variable = winning percentage	
Variable	**(1)**	**(2)**	**(3)**	**(4)**
In first four seasons and drafted in first round	-755	186	-0.066	-0.015
	(676)	(999)	(0.021)	(0.031)
In first four seasons and not drafted in first round	-4,437	-2,892	-0.057	-0.021
	(1,330)	(1,889)	(0.042)	(0.059)
In season five or later and not drafted in first round	-2,391	120	0.006	-0.048
	(1,101)	(1,873)	(0.035)	(0.058)
In first four seasons and drafted in first round		-1,417		-0.095
interacted with 1995-96 season or later		(1,246)		(0.038)
In first four seasons and not drafted in first round		-2,313		-0.084
interacted with 1995-96 season or later		(2,422)		(0.075)
In season five or later and not drafted in first round		-3,580		0.104
interacted with 1995-96 season or later		(2,259)		(0.070)
White	2,586	2,357	0.014	0.023
	(1,084)	(1,095)	(0.034)	(0.034)
Foreign	2,545	2,514	0.057	0.033
	(1,585)	(1,599)	(0.050)	(0.050)
Height	-667	-615	0.015	0.014
	(172)	(174)	(0.005)	(0.005)
Productivity index/10	-443	-430	0.136	0.137
	(271)	(277)	(0.004)	(0.004)
Winning percentage	6,424	6,374		
	(1,703)	(1,740)		
Dependent variable mean	16,479	16,479	0.500	0.500
Adjusted R^2	0.549	0.550	0.850	0.856
Sample size	392	392	392	392

Source: The team-level data are from the 1988-89 and 1990-91 through 2002-03 seasons.

Controls: Indicators for season are included. The omitted group is native black veterans (in at least fifth season in NBA) drafted in the first round.

Notes: The productivity index (with a mean of zero and variance of one in each year) is a function of points, rebounds, assists, steals, blocks, turnovers, fouls, field goal attempts, free throw attempts, and games played. See text for details.

Table 7
Disentangling the Changes over Time in the Salary Distribution

Season	Description	Non-Veterans (First Four Seasons) First Round	Non-Veterans (First Four Seasons) Non-First Round	Veterans (Fifth Season+) First Round	Veterans (Fifth Season+) Non-First Round
1988-89	Actual salary distribution	$74.1 (28.3%)	$31.5 (12.0%)	$116.7 (44.6%)	$39.5 (15.1%)
	Predicted salary distribution based solely upon productivity	$80.3 (30.7%)	$47.6 (18.2%)	$91.7 (35.0%)	$42.2 (16.1%)
	Predicted salary distribution based upon productivity and pre-1996 premia for race, veteran status, and draft status	$83.1 (31.7%) [n = 95]	$25.4 (9.7%) [n = 110]	$115.6 (44.2%) [n = 99]	$37.7 (14.4%) [n = 60]
1994-95	Actual salary distribution	$192.3 (26.2%)	$50.2 (6.9%)	$383.1 (52.3%)	$107.2 (14.6%)
	Predicted salary distribution based solely upon productivity	$196.0 (26.7%)	$111.6 (15.2%)	$312.3 (42.6%)	$113.0 (15.4%)
	Predicted salary distribution based upon productivity and pre-1996 premia for race, veteran status, and draft status	$195.6 (26.7%) [n = 108]	$56.8 (7.8%) [n = 110]	$378.3 (51.6%) [n = 146]	$102.1 (13.9%) [n = 83]
1997-98	Actual salary distribution	$209.2 (19.4%)	$59.6 (5.5%)	$660.9 (61.3%)	$148.0 (13.7%)
	Predicted salary distribution based solely upon productivity	$290.2 (26.9%)	$137.9 (12.8%)	$480.2 (44.6%)	$169.5 (15.7%)
	Predicted salary distribution based upon productivity and pre-1996 premia for race, veteran status, and draft status	$284.3 (26.4%) [n = 113]	$71.2 (6.6%) [n = 111]	$572.0 (53.1%) [n = 161]	$150.1 (13.9%) [n = 94]
2002-03	Actual salary distribution	$188.6 (11.2%)	$101.4 (6.0%)	$1,150.5 (68.3%)	$245.0 (14.5%)
	Predicted salary distribution based solely upon productivity	$379.4 (22.5%)	$248.6 (14.8%)	$814.6 (48.3%)	$242.7 (14.4%)
	Predicted salary distribution based upon productivity and pre-1996 premia for race, veteran status, and draft status	$388.0 (23.0%) [n = 105]	$122.8 (7.3%) [n = 104]	$965.1 (57.3%) [n = 173]	$209.6 (12.4%) [n = 79]

Notes : All dollar amounts are in millions of December 2002 dollars. In parentheses are the percentages for a given group of total salaries in a given year. In square brackets are the number of players in the given group in the given year. Parameters used to predict the salary distributions are calculated using specification (3) in Table 3 with data from only the 1988-89 through 1994-95 seasons.

Appendix Table 1
Five Most Productive Players by Year

1988-89		1990-91		1991-92	
1. Michael Jordan (1)	4.18	1. Michael Jordan (1)	3.85	1. Michael Jordan (1)	3.66
2. Hakeem Olajuwon (1)	3.38	2. David Robinson (1)	3.84	2. David Robinson (1)	3.50
3. Karl Malone (1)	3.27	3. Karl Malone (1)	3.44	3. Karl Malone (1)	3.25
4. Magic Johnson (1)	3.20	4. Magic Johnson (1)	3.03	4. Patrick Ewing (2)	3.17
5. Charles Barkley (1)	3.14	5. Charles Barkley (1)	2.88	5. Dennis Rodman (3)	3.04
1992-93		**1993-94**		**1994-95**	
1. Hakeem Olajuwon (1)	3.81	1. David Robinson (2)	4.37	1. David Robinson (1)	3.96
2. Michael Jordan (1)	3.81	2. Shaquille O'Neal (3)	4.00	2. Karl Malone (1)	3.48
3. Karl Malone (1)	3.40	3. Hakeem Olajuwon (1)	3.67	3. Shaquille O'Neal (2)	3.41
4. David Robinson (3)	3.35	4. Karl Malone (1)	3.31	4. Hakeem Olajuwon (3)	3.09
5. Charles Barkley (1)	3.33	5. Patrick Ewing	3.17	5. Scottie Pippen (1)	3.02
1995-96		**1996-97**		**1997-98**	
1. Michael Jordan (1)	3.81	1. Karl Malone (1)	3.54	1. Karl Malone (1)	3.60
2. David Robinson (1)	3.77	2. Grant Hill (1)	3.35	2. Michael Jordan (1)	3.16
3. Karl Malone (1)	3.42	3. Michael Jordan (1)	3.26	3. Tim Duncan (1)	3.12
4. Grant Hill (2)	3.01	4. Patrick Ewing (2)	2.69	4. David Robinson (2)	3.10
5. Hakeem Olajuwon (2)	2.81	5. Tim Hardaway (1)	2.63	5. Grant Hill (2)	2.82
1998-99		**1999-00**		**2000-01**	
1. Shaquille O'Neal (2)	3.44	1. Shaquille O'Neal (1)	4.70	1. Shaquille O'Neal (1)	3.62
2. Karl Malone (1)	3.22	2. Karl Malone (2)	3.47	2. Tracy McGrady (2)	3.09
3. Tim Duncan (1)	3.07	3. Gary Payton (1)	3.35	3. Tim Duncan (1)	3.00
4. Alonzo Mourning (1)	2.92	4. Kevin Garnett (1)	3.34	4. Kevin Garnett (2)	2.99
5. Jason Kidd (1)	2.90	5. Tim Duncan (1)	3.24	5. Karl Malone (3)	2.85
2001-02		**2002-03**			
1. Tim Duncan (1)	4.09	1. Tim Duncan	3.82		
2. Kevin Garnett (2)	3.30	2. Kevin Garnett	3.80		
3. Shaquille O'Neal (1)	3.22	3. Tracy McGrady	3.55		
4. Tracy McGrady (1)	2.98	4. Kobe Bryant	3.48		
5. Paul Pierce (3)	2.92	5. Dirk Nowitski	3.40		

Notes : The productivity index is a function of points, rebounds, assists, steals, blocks, turnovers, fouls, field goal attempts, free throw attempts, and games played. It is normalized to have a mean of zero and variance of one in each year. First, Second, or Third Team All-NBA selections are denoted in parentheses.