How Young Basketball Players Can Maximize Their Value

Andrew Boothe
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Department of Economics
Stanford University
aboothe@stanford.edu

Advisor: Roger Noll

ABSTRACT:
In the arena of professional sports, identification and preparation of top prospects occurs at increasingly early ages. Therefore, exceptional young players must make crucial decisions early in their careers that will affect their potential value to an NBA team. This paper examines the decisions that many entrants to the NBA labor market face, and the consequences that are related to them. By examining the NBA draft classes from 2000-2009, I find that college choice, subsequent college team success, and experience significantly affects the position that a player is drafted. By examining the non-rookie contracts of the draft classes that these RSCI ranked players would go on to comprise, I find that individual performance in the NBA impacts a player's salary much more than team based metrics.

Keywords: NCAA, College Choice, National Basketball Association (NBA), National Basketball Players Association (NBPA), NBA Draft, RSCI, Compensation

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1 I would like to thank Professor Noll for all of his guidance and assistance throughout the past year. I would also like to thank Professor Rothwell for his assistance as well. Finally, I would like to thank my family and friends for all of their support.
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References
I. Introduction

The goal of this paper is to implement an econometric model of the progression of the career of a professional basketball player. This article first estimates a model of the National Basketball Association (NBA) rookie draft, and then estimates a model of the salary determination process in the NBA. Identification of candidates for a career in professional basketball is starting earlier as the competing firms, the NBA’s thirty teams, try to gain an edge. This early identification requires ever younger players to make decisions that will impact them throughout their career, and affect their probability of success in the industry.

To position themselves for eventual entry into the NBA, skilled young players can take advantage of numerous opportunities to gain training and experience in playing organized basketball. Players as young as eight join Amateur Athletic Union (AAU) teams and travel to compete against other top basketball players in their age groups. For example, national championship tournaments among second graders are drawing teams from across the country as competitors.\(^2\) The idea of New York second-graders playing Kentucky second-graders in a nationally recognized event would have seemed strange fifteen years ago, but now it is accepted as the industry moves toward earlier and earlier identification of prospects.\(^3\) Granted, it would be nearly impossible to look at a group of second graders, even all-star second-graders, and determine with any certainty which of them have NBA potential, but that doesn’t stop scouts and other AAU professionals from trying. Moreover, because

\(^2\) The 2011 AAU 2\(^{nd}\) grade national championship tournament saw over 20 teams from a dozen different states. ([www.aauboysbasketball.org](http://www.aauboysbasketball.org))

\(^3\) George Dohrmann illustrates how youth basketball is fading into today’s ‘corporate sports world’ in his book, *Play Their Hearts Out (2012).*
those players early-identified as all-stars will typically receive more attention and opportunities than those not playing in AAU sanctioned events; these early opportunities in turn increase the player’s likelihood of earning a professional career.⁴

Although players are being identified as candidates for potential NBA careers many years before they even step on a high school court, their choice of high school is also important. Highly skilled players can choose to enroll in a high school based on its reputation for producing NCAA Division I scholarships. Some players, such as Toronto Raptors guard Terrence Ross, moved across the country to attend elite preparatory schools, such as Ross’ Montrose Christian, to enhance their prospects. This is not an isolated instance. More and more high schools have begun to recruit players around the world with the promise of preparation for D1 scholarships.⁵

Since the NBA age rule was passed in 2005,⁶ high school players must wait one year after they graduate to join the NBA. While a few high school players play on amateur or European professional teams after leaving high school, the most common path for the early developing star players is to spend one year in college. Therefore, the elite player, along with all other players who would attend college even without the NBA age-rule, must decide which college to attend before undertaking their prospective NBA career. To make an informed decision, players

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⁴ In his book, Outliers, Malcolm Gladwell notes that the majority of Canadian ice hockey national team members are born in the first few months because the increased opportunities awarded to them made their ascent to the national team more accessible. I believe the same type of phenomenon occurs with basketball players who are afforded more competition at early ages.
⁵ Most notably, 100% of all graduates of Findlay Prep of Las Vegas have been rewarded with D1 scholarships according to NevadaPreps.com
⁶ The rule states that to be automatically eligible for the NBA draft, any domestic player must be at least 19 years old and be one year removed from high school.
must take into account how a college program can influence their basketball careers. One decision that players must make is whether to play for a college that competes in a major conference,\textsuperscript{7} or for a school with a lesser basketball reputation. Each type of college program offers benefits and complications. Players on the most successful teams in major conferences get more exposure through media coverage and televised games, and they are more likely to be followed closely by NBA scouts. However, they also risk facing more competition for playing time than they would at a school with a less successful basketball program. Players at less prestigious basketball schools may have an easier time becoming the on-court leader of their team and thus have greater freedom to develop their own game. In turn, however, they will miss the benefits of higher caliber teammates and opponents who will better prepare them for an NBA career.

Once in college, a player’s control over his career and exposure both become somewhat more limited. This is because he is more likely to be surrounded by players who are closer in skill level, and therefore likely to receive similar levels of attention. Coaches may request that players accept roles that immediately benefit the team, rather than benefit the player in the long run, possibly even harming the player’s development. However, players nonetheless retain control over three main decisions: they decide how much effort they put into their game, they have the ability to request a transfer and therefore change their designation as a major or minor conference player, and they have the ability to leave for the NBA draft after any of their first four seasons. The first is difficult to observe directly. The other two

\textsuperscript{7} These conferences are defined in this paper as the: ACC, Big 12, Big East, Big Ten, PAC 12, and SEC
easily can be measured. As shown below, the more significant decision is how long they should play in college before entering the NBA draft.

During their early years in the NBA, players have relatively little control over their careers. Players are assigned to a team and cannot negotiate their own contracts. Rather, teams retain player-rights for a designated number of years based on the player’s draft position, and a player’s rights and control are minimal. However, once the players have completed their rookie contracts, they can become free agents and thus gain greater control over their future contracts. Players then face a new set of decisions including which team to sign with, and how much money to ask for. A free agent can join a successful team and likely sacrifice maximum money in a bid to become part of a winning team, or a player can instead sign with a less competitive team in an attempt to shine as an individual player while likely maximizing salary. Most players maximize their utility by maximizing their salary, but that is not always the case. Over the past several years, a trend has developed toward forming ‘super teams’ of multiple all-stars who take lower salaries in order to compete for a championship. Because playing careers are finite, players also must maximize their salaries within two major NBA constructs: the salary cap and individual player maximum salaries.

In this paper, I identify the driving factors of players’ salaries. I explore the decisions that players may face on their career path from high school to the NBA, and the variables that frame their outcomes. I do not take into account any decisions before high school as few statistics exist to profile players before that time. I find that with respect to the NBA draft, college team conference affiliation, and team
success significantly improve a player’s draft position. I find that personal
performance indicators influence salaries much more than team indicators, and I
also find that draft position continues to influence salaries long into a player’s
career, which suggests that pre-draft indicators are still valuable later in a player’s
career.

II. Literature Review

The research literature on NCAA basketball performance is sparse. Robert
Brown (1994) found that there are incentives to violate NCAA recruiting rules
because rents to be captured by doing so are substantial. He has also twice
estimated the marginal revenues that star collegiate athletes generate for their
teams. Most recently, Brown and Jewell (2004) estimated that a future NBA draftee
generates roughly $1M in revenues for his college team.

On the professional side, one of the defining factors of sports economics is
the realization that, unlike most labor markets, sports markets require competition
to thrive (Rottenberg 1954). Rottenberg pointed out that in most markets, any firm
would likely prefer monopolistic control; however, in sports markets, if top teams
control too much of the market, lower teams exit and the top teams suffer.
Rottenberg (1954) also surmised that teams in competitive profit-maximizing
leagues prefer to win, but preferably only by margins close enough to keep fans
engaged. Thus, competitive balance is beneficial to teams in a league, and talent
acquisition exhibits diminishing marginal returns after a team passes a talent
threshold.
Rottenberg’s hypothesis that fans prefer a game in which the outcome is at least somewhat uncertain to some extent was dubbed the uncertainty of outcome hypothesis. This hypothesis suggests that to maximize profit, talent must be distributed so as to create uncertainty in the outcome of a game. He adds that talent can be evenly distributed through means other than collusion, as evidenced by processes such as player drafts and policies such as salary caps. However, for policies such as the salary cap to work, players must be trying to maximize their own salaries rather than placing a higher utility on team success, an assumption that seems to be wavering as some of the most highly paid players opt for an increased chance of a championship over additional millions of dollars in salary.

Neale (1964) further analyzed Rottenberg’s claim that teams need each other such that that one team cannot be too far ahead of the others if it wants to maximize its profits in a continuing league. He called this idea the league standing effect and stated that as a leagues’ competitive balance diminishes, fan interest in the weaker teams falls first, followed by falling interest in the stronger teams, until the entire league collapses. Quirk and Fort (1997) attribute the demise of the All American Football Conference to a lack of competitive balance, which culminated with its merger into the National Football Conference.

According to Gould (1983), and as later confirmed by Schmidt and Berri (2003), competitive imbalance is a consequence of limits, whether physical or biomechanical, within the talent pool. Both studies argue that athletes have a varied distribution of skills based on their natural abilities. They argue that early in the history of a professional sport, competition is much more imbalanced because the
talent pool is smaller and has greater skill variation. As a sport grows in size and popularity, the diversity in talent narrows and the standard deviation of performance falls. In short, as greater numbers of players near biomechanical limits, the league should become more competitive.

Berri et al. (2005) applied the work of Gould (1983) specifically to the NBA. They found that the NBA is the most competitively imbalanced major league in North America. They chalk this up to the “short supply of tall people.” Thus, the talent pool in the NBA is comparatively smaller than those of the other major leagues as the NBA is thought to have height ‘necessities’ stemming from the basketball basket’s position, ten feet above the ground. The authors point to the example of Shaquille O’Neal, a 7’1”, 330 pound, fifteen time NBA all-star powerhouse of a center who played in the NBA from 1992 to 2011 and won four NBA championships. According to Berri et al. (2005), O’Neal’s incredible athleticism combined with his massive size led to the employment of players such as 7’1” Vlade Divac who could match O’Neal in height, but little else. The authors argue that teams needed to employ players over seven feet who might not have been athletically suitable to the league had there not been the necessity for such tall players to keep O’Neal’s dominance to a minimum. They state that the limited supply of such tall players increases the standard deviation of talent, thus making competitive balance low due to some teams having tall, athletic, dominant, centers while others do not. Accordingly, height premiums must be taken into account when exploring performance and pay. Due to this, the most reliable designation outside of height is position played. Due to the short supply of tall people, we would expect a premium
to be placed on forwards over guards, and centers over them both. If teams do in fact place a premium on centers, it will add a level of assurance to the claims made by Berri et al. (2005).

In his prime, O’Neal was also commonly labeled a ‘superstar.’ Hausman and Leonard (1997) suggested that a superstar is an externality that works against the idea that decreasing competitive balance decreases profits, and therefore must be included in the discussion of competitive balance and league profitability. The authors argued that a superstar shifted consumer demand, even in the most imbalanced games, thus externally affecting attendance data with regard to the inequality of the teams playing. Berri et al. (2004), however found that while a few superstar players, such as Michael Jordan, did have statistically significant effects on revenue, these effects were minimal compared to the effects of winning.\(^8\) The relative magnitude of the effects is still unresolved as different papers have hypothesized different correlations.

Berri and Schmidt (2006) somewhat mirrored these results when they found that superstars affect road game attendance, although this effect is again greatly outweighed by the effects of the road team’s winning percentages and lagged playoff wins from the previous year. Nonetheless, because it is still debated just how much an all-star can affect revenue, it is still debated what the worth of an all-star is outside of his performance indicators. If an all-star brings more fans, sells more merchandise, or brings in any other extra revenue over an average player simply because of his designation as an all-star, this premium too must be taken into

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\(^8\) Berri et al. (2005) find that a player would need to generate 370,000 all-star votes to accomplish the same increase in revenue that a team sees from one additional win.
account when examining player earnings. Although this effect should be taken into account, maximum salaries and salary caps suppress payments to levels that would not equal the market equilibrium payment in a market free of these restrictions.

Staw and Hoang (1995) found that a sunk cost was associated with each player. Draft order influences minutes and seasons played throughout a player’s career, and the likelihood of that player being traded. This suggests that many teams see their highly drafted players as investments, suggesting that teams will likely pay a small premium to keep a player who they drafted early, and thus draft position should be included in the analysis of player salaries. Initial logic would suggest that a player’s value should come only from their success, but as Staw and Hoang find, even after rookie contracts have run their course, draft order maintains an influence on player salaries and should thus be included for all non-rookie contract analyses.

III. Background

Every five to six years, representatives of the NBA and the National Basketball Players Association (NBPA) meet to negotiate a new collective bargaining agreement (CBA) in an attempt to create a ‘fair’ labor market. The CBA governs relationships between players and teams until it is renegotiated. Two of the document’s major clauses, the salary cap and the maximum salary, are pertinent to this study.\(^9\)

The salary cap is deemed ‘soft’ because teams may pay more salary by utilizing certain exceptions and may even pass the luxury cap threshold if they are

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\(^9\)The salary cap and maximum salary were added to the CBA in 1983 and 1999 respectively.
willing to pay a tax to the league.\textsuperscript{10} For the 2012-2013 season, the penalty for surpassing the luxury cap is one dollar for every dollar by which a team surpasses the luxury cap. The penalty is distributed to the rest of the league.

As El-Hodiri and Quirk (1971) pointed out, teams also face varying economic constraints.\textsuperscript{11} These market distinctions leave open the possibility that teams with more profitable markets could still gain an advantage by being better equipped to pay a luxury tax than a team in a smaller market. Because of this discrepancy, harsher luxury tax penalties will be implemented starting in the 2013-2014 season. These changes most notably include an incremental luxury tax rate ($1.50 per every dollar for the first $5M over, $1.75 on every dollar for the next $5M over, etc.), and a penalty for repeat offenders\textsuperscript{12} that adds an extra $1 penalty for every dollar accrued in the increments above. Thus, the salary cap is considered to be getting stiffer, but teams that believe they obtain a small advantage by excess salaries can still pay for that advantage, and possibly win a championship because of it.\textsuperscript{13}

For the 2012-2013 season, nine teams had to pay a luxury tax, with the Los Angeles Lakers paying roughly $30M in tax to the non-paying teams. If the Lakers kept their payroll next year, and the salary and luxury caps remained the same, the Lakers would be required to pay roughly $145M in taxes. The actual amount paid would likely be less because large increases in league revenues are likely to drive up the salary cap and luxury tax threshold.

\textsuperscript{10} Neither the salary cap nor the luxury cap were increased between the '11-'12 and '12-'13 seasons and are currently set at $58.044M and $70.3M.

\textsuperscript{11} These constraints are based largely on wealth of the ownership and the potential wealth of the home market.

\textsuperscript{12} A repeat offender is a team who has exceeded the luxury cap four of the past five seasons.

\textsuperscript{13} Each of the past four NBA champions (of full 82 game seasons) eclipsed the luxury tax threshold.
The maximum salary for an NBA player is contingent on how many years that player has been in the league. These maximum salaries apply strictly only in the first year of a player’s contract. A player may receive a salary greater than the maximum as long as it is supported by exceptions and legal increases. For example, a player whose contract includes the Larry Bird exception may receive a five-year contract with first year salary 7.5% higher than the last year of the previous contract’s salary. That salary may continue to rise throughout the duration of the contract. To highlight this idea, although the veteran maximum salary is technically $19,136,250 for the 2012-2013 season, six players were paid more than this amount.

These provisions suppress the salaries of the most valuable NBA players. The NBA attempts to minimize dispersal of salaries, unlike the MLB where the highest paying team has a payroll 854% of the lowest paying team. Although there is variability in the payrolls of NBA teams, the highest paid team’s payroll is only 89% higher than the lowest. This again points to suppressed salaries. LeBron James, at least according to himself, is worth $50M a season, roughly the entire ’12-’13 payroll of the Houston Rockets. Alex Rodriguez, in an unregulated sports market, makes $4M more than the entire Houston Astros, so without the salary cap, LeBron’s self-valuation might not be too farfetched.

Although player salaries are suppressed, for the purposes of this study it must be assumed that the suppression is a systematic occurrence that affects all

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14 Tables of maximum and minimum NBA salaries can be seen in Table A
15 Kobe Bryant is the highest paid player for the 2012-2013 season with a salary of $27,849,149.
NBA players. It has been shown that rookie contracts suppress player salaries unequally, with higher picks suffering more salary loss, but for this analysis we must assume that this inequality disappears when players qualify for free agency.\textsuperscript{17} Thus, players without max contracts are paid according to their value in respect to those who do have max contracts.

The salary cap in basketball further demands that players make a conscious decision about how they value salary or team success. The salary cap means that players cannot both achieve their maximum salary and play for a team with multiple other maximum salary players. For example, Ray Allen, Paul Pierce, and Kevin Garnett all took decreases in pay, compared to what they could have received had they stayed with their respective teams, to play together on the Boston Celtics. LeBron James, Dwyane Wade, and Chris Bosh have done the same to play together on the Miami Heat. The reasoning behind this is that these players prefer a perceived better chance at a championship over a higher individual salary. Although individual utility functions cannot be controlled for in regressions, it is important to recognize that they do exist.

\textbf{IV. Collegiate Players and the NBA Draft Model}

I use a log-linear model to examine whether or not there are relationships between certain variables (specifically high school performance, college conference, college conference, 

\textsuperscript{17}Nikhil Joshi (2011): The Market For Talent: Are Top Draft Picks Overpaid?
college team success, and experience) and a player’s draft position. For player i, I estimate:

$$LogPick_i = \alpha + \beta_1 \text{LogRSCI} + \beta_2 \text{Conf} + \beta_3 \text{Tourn} + \beta_4 \text{Season} + K_i^E + \epsilon_i$$

where RSCI is the RSCI ranking of a player, Conf is an indicator variable expressing whether or not the player played in a major conference, Tourn is an indicator variable stating the number of conference tournaments a player won, Season is an indicator variable expressing the number of regular season championships a player’s team won, and $K_i^E$ is a vector of indicator variables based on the player’s experience (freshman, sophomore, junior, or senior). Pick is evaluated in a descending order so that the top pick of the draft is assigned a value of one. Thus, a negative coefficient will produce a higher draft position, the ideal result for a draftee. The results from this model are shown below.$^{18}$

The sample includes 519 players who were drafted between 2000 and 2011.$^{19}$ To qualify for this player pool, the players must have played college basketball in the United States for at least one year. A rule change in the CBA before the 2006 draft made entry into the draft illegal for high school students; this rule is taken into account, but it did not change the outputs significantly.$^{20}$ Either way, one significant determinant of draft position is the college where the draft candidate plays. I only look at drafted players for this regression because those who were not drafted cannot be tracked as easily.$^{21}$

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$^{18}$ Collegiate regression results are displayed in Table C
$^{19}$ The sample breakdown is displayed in Table B
$^{20}$ The significance levels did change slightly as after the age rule was instigated, high school rankings became less significant and experience became more significant.
$^{21}$ Thus, instead of a regression to see who gets drafted, my regression seeks to maximize positioning.
High school basketball players face immense scrutiny leading up to their college decision. Colleges look to recruiting services that attempt to rank those players. However, these rankings usually differ greatly based on exposure and subjective factors such as regional biases. To avoid the many biases and differing opinions, I use the Recruiting Services Consensus Index (RSCI). The RSCI encompasses several of the recruiting experts’ rankings. It assigns each player a point value based on the individual expert’s ranking. Then, the RSCI compiles those rankings and provides a class ranking based on the average score. I looked at the RSCI ranking of all players in my sample to see if their rank had significant impact on draft position. RSCI is factored into the model in a reverse order, so that the top rated player receives a value of 100 while the player ranked 100 receives a value of 1. I then take the natural log of these rankings because the relationship to the log of draft pick is likely not linear. Because of the reversal of values, a negative coefficient is expected; the higher rated a player was in high school, the higher the player was likely drafted into the NBA. As can be seen by the results, this is not the case.

Whether or not a player competed in a major conference is another metric used in this regression. Because for some players, the decision of which conference to play in did not come into play because the player was not offered a scholarship to a major program, only those players who received a scholarship offer from a major conference school are included in the regression.

Despite college choice, players experience varying degrees of team success. Because of this, I wanted to see if there was a significant relationship between regular season championships or tournament championships won, and the draft
position at which a player was selected. If NBA teams believe college team success to be an indicator for NBA success, we would expect to see a significant, and negative, relationship between draft pick and number of championships won in college.

Finally, college players are defined by their age and/or experience. Experience is the variable that prospective players have the most control over. I express experience as a vector of indicator variables. These variables (freshman, sophomore, junior, and senior) illustrate the maximum level of experience achieved by a prospect. Experience can be seen as a choice because after each season, the potential NBA entrant must decide whether another year of experience will increase their utility, and we see time and time again that players make these decisions for varying reasons.²²

Results

The model has a relatively low adjusted R squared value of 0.24. The low adjusted R squared is likely due to the lack of individual metrics used in the regression. I would guess that if an individual metric, such as the player efficiency rating that is used in the NBA, were to be widely used in the NCAA, that statistic would have a better predictive value towards draft position. NBA scouts also likely draft based on their positional needs. Therefore, because the draft is subjective, the adjusted R squared of any model relating to the draft would be deflated. Additional

²²These decisions are also scrutinized and predicted by the media as high profile draft prospects can decide to stay in college, such as Joachim Noah did after winning a national championship with Florida in 2006, or leave after one year having not played an entire season, such as Austin Rivers did this past year when he left Duke.
individual metrics to be included in this regression at a later date could include objective statistics, such as points, rebounds, assists, and minutes, as well as subjective measures such as all-conference selections and All-American selections. Nonetheless, the regression shows significant relationships between a few of the independent variables and the draft position at which a player is chosen.

As hypothesized, attending a major conference has a positive sign associated with its coefficient, meaning that a player should expect to be drafted higher than if they had attended a college in a non-major conference. Both tournament and regular season conference championships also have positive relationships to draft position, with regular season championships having a stronger effect on draft position than tournament championships. However, only regular season championships have a significant relationship. This could be a result of parity in college basketball, because better teams have higher chances of winning a regular season championship than a tournament championship. Surprisingly, the RSCI ranking has a negative relationship to draft position. However, the relationship is minimal and is not significant at the 10% level, but would be at the 15% level.

V. Professional

Model

I again use a log-linear model but instead use the log of average professional salary as the dependent variable. I use the logarithmic form to account for the decreasing number of observations as the average salary increases. Thus, I estimate:

23 The reasoning behind this is that regular season trophies are won by months of success while a tournament trophy might be earned from a few hot games.
LogSalary_{i,t} = \alpha + \gamma YearBefore + \beta \log \text{Pick}_{i,t} + \delta \text{PER}_{i,t} + \theta \text{Wins}_{i,t} + \gamma \text{I}_i^S + \Pi_i^P + \Sigma_i^C + \omega \text{Allstar} + \eta \text{Miss} + \varepsilon_{i,t}

where YearBefore represents the year in his career before which a player signed the contract, LogPick is the logarithmic value of the player’s adjusted pick (pick 1 = 60 and pick 60 = 1), \text{PER}_{i,t} is player i’s PER during year t, \text{Wins}_{i,t} is player i’s wins during year t, \text{I}_i^S is a vector of indicator variables for success in playoffs (playoffs, conference championship, or league championship), \text{I}_i^P is a vector of indicator variables for position (guard, forward, or center), \text{I}_i^C is a vector of indicator variables for contract specifications (player options, team options, early termination options, partial year), \text{Allstar} represents the number of all-star appearances made prior to the contract, and \text{Miss} is a variable representing the number of missed seasons in a player’s career. The results of the regression are listed below in Table D.

First year entrants to the league are subject to rookie contracts that carry set compensation for a maximum of four years. Although they are guaranteed increased salaries each year under a rookie contract, it has been shown that the NBA owners suppress rookie salaries in a surplus maximizing way. Thus, if rookie contracts are mandated and not negotiated, the only control a rookie has over maximizing his value is by making decisions to influence his draft position. As those decisions have been analyzed in the first part of this paper, they are not discussed as post draft data, and therefore rookie contracts are not considered while draft position is. My

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24 Nikhil Joshi (2011): The Market For Talent: Are Top Draft Picks Overpaid?
data pool for the post-draft analysis is 373 player contracts for players who were
drafted between 2003 and 2009, excluding the first NBA contract when a player
enters the league. The cutoff date for 2009 is necessary because many players
drafted during or after that year have not yet entered free agency, are still working
under rookie contracts and are therefore not important to this analysis.

The salary equation contains three types of variables. First is individual
performance. Second is the success of the team. Third are specific contract
provisions such as whether a contract included a team option and/or a player
option.

To evaluate performance and relate it to salary, I use John Hollinger’s
Performance Efficiency Rating (PER), which is a per-minute productivity metric
normalized to 15.00. This valuation takes into account various statistics, both
positive (points, rebounds, assists, etc.) and negative (turnovers, fouls, missed shots,
etc.). It is a per minute measure with a qualifying benchmark set low enough so that
players who’s raw statistics are depressed due to decreased minutes are not
penalized, but high enough so that ‘garbage time’ players do not influence the
valuation. Furthermore, a player’s PER is pace-adjusted to their team. This is to
avoid penalizing a player for having lesser raw statistics due to playing on a slower
paced team. Pace adjusting does have the potential to reward slower paced teams
by indirectly penalizing fast paced players who are told to keep tempo high and
shoot generally more unproductive shots. Despite these potential indirect penalties,
PER is a widely accepted metric of a player’s individual talent.

25 To record a PER, a player must play 6.09 minutes per game over the course of a season.
In addition to PER, I use indicator variables to illustrate a player’s position (guard, forward, or center). All-star appearances are also accounted for in my model. Although all-star selection is a subjective practice, I believe it to be important to control for the effects of an all-star appearance on salary.\footnote{If player compensation is even weakly associated with player value, a player should receive some of the gains that a team receives, directly or indirectly, based on the player’s all-star appearance, such as increased fan loyalty through jersey and ticket sales.} I decided to use an unrestricted variable, instead of an indicator variable, so that I could further separate those players who had multiple all-star appearances from those who may have received a single selection due to ulterior motives beyond their performance such as television ratings, the all-star game being held on their home court, or rewarding team success.

To account for when the contract was signed I include a variable for the year before which the contact was signed. Thus, the ‘year-before’ variable would be 5 after a rookie has completed his four years in the league under the rookie compensation structure. I do this to account for increasing minimum salaries the longer a player has played in the league.

Finally, the last individual metric I account for is the number of missed seasons, whether they are due to injury or inferior performance (defined as performance low enough to not earn a PER rating). Because the missed seasons variable does not differentiate between these two catalysts, I cannot truly extract the effect on salary of one catalyst or the other. I cannot separate the variables because injury reporting is not mandatory, and is thus unreliable.
In this analysis, I include the most observed team metric: wins. To mirror the format by which I observe PER, I use variables for wins achieved during each of the past four years. This served the purpose to determine whether or not teams put more emphasis on recent results, and thus whether players could maximize their value by being more successful and winning more games during the year immediately preceding a contract negotiation.

To account for differing standards of excellence in wins each year, I accounted for playoff appearances. I use three variables to account for different levels of success in the playoffs, and these variables (league championship, conference championship, and playoff appearance) are determined based on how many times a player’s team achieved the specified level of success in the playoffs.27

Additionally, I control for a set of contract specifications by creating indicator variables for each of them. In the NBA, there are clauses that can be added to a contract so that the player or the team can opt in or out of the contract prior to completion. These variables are: a player option, a team option, an early termination option, and a partial year option. A player who exercises a player-option opts to continue on their contract for another year that is compensated by a salary determined by the original contract; conversely, a team that exercises a team-option retains that player for an extra year at a predetermined price. An early termination option gives the player the right to opt out of his contract and become an unrestricted free agent before a designated year, or before multiple years,

27 A player whose team lost in the NBA finals would merit a 0 for playoff appearances, 1 for conference championships, and 0 for league championships.
depending on the option specifications. Finally, teams can offer partial year contracts. These partial year contracts were annualized for inclusion in the dataset.

Results

The model has an adjusted R squared value 0.64. One of the most interesting, although expected, findings was that the effects of PER trumped the effects of wins. PER has a positive influence on salary for all four years included in the model. However, the effect of PER declines as the number of years prior the season increases; the coefficients become less significant as well. This suggests that owners do indeed take into account a player’s history, but that recent performance is a much better indicator of a player’s perceived worth and salary. The position of a player is also significant, with centers earning the highest salary. This is likely due to the short supply of tall people mentioned by Berri et al. (2005), as taller skilled players are more scarce and thus demand a premium salary. One unexpected result is that guards are paid more favorably than forwards. This could be for a number of reasons, including that guards are generally considered more specialized, guards spend the most time in possession of the ball, and guards typically control the tempo of their team’s play.

Also somewhat surprisingly, the variable for all-star appearances has a negative coefficient whereas I initially expected that all stars would command a higher salary. Although the effect is not very large, it is still interesting to note. This observation could be due to a number of reasons as well. Likely it is a direct result of
maximum salary rules inhibiting all-stars from achieving salaries that their statistics and popularity would normally garnish.

The year before a contract was signed also proves to be significant factor of compensation. However, the sign of the effect is negative, although the magnitude is not very large. This leads me to believe that owners actually penalize older players who have the same credentials as younger players because younger players have more career longevity to offer.

The variable denoting missed seasons also has a curious sign as the coefficient associated with the missed seasons variable is positive. I do not have a possible explanation for why this would be the case.

As for playoff successes, none of the benchmarks proved to be significant, but all had positive coefficients, which was to be expected. Conference championships have a slightly more significant relationship, and a larger effect on salaries, than do league championships, while both have more effect than playoff appearances.\(^{28}\)

Player options proved to have a significant relationship to salaries, but the sign was unexpectedly positive. This could be a misrepresentation as there are not many contracts in the sample that include player options.\(^{29}\) It is possible that the sign would be reversed if there were more observations of this specification. Team options did not prove to be significant, but the sign was also not as expected, and had a negative effect on salaries.\(^{30}\) It is also possible that my initial reasoning behind the expected signs is mistaken because teams only afford the player option as an

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\(^{28}\) Both playoff appearances and conference championships would be significant at the 15\% level.

\(^{29}\) Out of the 373 contracts included in the sample, only 14\% had player options included.

\(^{30}\) Only 4\% of the contracts in the sample included a team-option.
extra incentive to the most valuable players, and thus the provision is attached to contracts with higher salaries. Along the same lines, it is possible that teams only negotiate a team option for players that they have reservations about, and the players only accept that provision if they cannot negotiate a better deal elsewhere.\(^3\)

The early termination, like the player option, has a positive coefficient. This suggests that like the player option, the early termination clause is used more as an incentive and would likely be attached to contracts of players with higher salaries who cannot earn a nominal pay increase for any number of reasons. The early termination clause is related to more of an increase in salary than the player option, likely because it is more sought after, as it is an opt-out clause rather than an opt-in clause.

Partial year contracts commanded significantly lower salaries as well for likely the same lines of reasoning. Players who are only skilled enough to earn a partial contract rather than a full-year contract are likely less valued than players with full year contracts, even after annualizing the partial year salary.

Players signing extensions, on the other hand, saw a significant increase in salary. Teams likely must give increased compensation to incentivize players to stay with the team rather than to explore free agency.

\(^3\) Players receiving a player-option were entering their 6\(^{th}\) year on average while players receiving a team-option were entering their 4\(^{th}\) year on average. This suggests that teams reward proven players with player-options but keep reservations over younger players by holding team-options.
VI. Conclusion

Basketball is unlike many markets in that less than three percent of prospective entrants who have played college basketball, and less than one percent of prospective entrants who have played high school basketball will actually earn the ability to enter the labor force that is the NBA Players Association. Players make decisions as early as the high school level that will materially affect their later value. Deciding on which college team to play for is one of the most difficult decisions that faces a young prospect today, and thus is one of the most widely anticipated events in a high school player’s career. More and more often, high caliber players have dozens of colleges competing for the player’s signature of intent. Players should not turn down successful colleges or any college in a major conference in favor of a smaller basketball program. While individual players have individual priorities and their abilities will develop in different ways, it appears that NBA scouts prefer major conference competitors.

The owners have benefitted from the ability to scout players at the college level ever since the inception of the newest age rule in 2005, a rule that made the college decision notably more important. Although the NBA has not changed the rule since that time, there have been reports that David Stern would like to increase the minimum age by another year.\(^{32}\) Then, a player would have to be 20 and have been out of high school for two years to declare for the draft. However, the NBPA has been unwilling to discuss this potential change without receiving something in return from the league. This raises interesting possibilities and discussions.

\(^{32}\) From the ESPN.com article: David Stern Wants to Increase Age Rule
regarding what type of deal could be made. The NBA has seen major profit margin increases in the past decade, and the players association has been negotiating for higher individual salaries. Perhaps, in the next CBA, the players and owners can discuss the possibility of higher salaries and a higher minimum age.

Although the possible salary determinants resulting from this rules change could change as well, the general effects are unlikely to do so. My findings suggest that although a team’s successes in college are important to draft position, and success in the NBA could possibly be taken into account when determining salaries, individual success in the NBA is the most significant factor in a player’s salary. Granted, players do not have much freedom in the NBA to choose their situation. Nonetheless, with knowledge of how best to approach the league, a player could enhance his career and earnings.

Sebastian Telfair admitted to Sports Illustrated that one of his main mistakes was that he did not take the game seriously enough. As he puts it, “I was just playing basketball. I wasn’t thinking about another contract, I wasn’t thinking about any of that stuff. And I think I should have been, as far as the game being a business.” Telfair illustrates one of the most important aspects that young players should realize: first and foremost, the NBA is a business selling a game, rather than a game operated as a business. Players are compensated based on simple practices such as supply and demand. Prospects who recognize this the earliest, and put themselves in a position to succeed in the business, stand a better chance to do so while the current players who recognize their bargaining chips stand a better chance to maximize their salary.


### VII. Appendix

#### Table A

**Minimum Salaries**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$473,604</td>
<td>$473,604</td>
<td>$490,180</td>
<td>$507,336</td>
<td>$525,093</td>
</tr>
<tr>
<td>1</td>
<td>$762,195</td>
<td>$762,195</td>
<td>$788,872</td>
<td>$816,482</td>
<td>$874,636</td>
</tr>
<tr>
<td>2</td>
<td>$854,389</td>
<td>$854,389</td>
<td>$884,293</td>
<td>$915,243</td>
<td>$980,431</td>
</tr>
<tr>
<td>3</td>
<td>$885,120</td>
<td>$885,120</td>
<td>$916,099</td>
<td>$948,163</td>
<td>$981,348</td>
</tr>
<tr>
<td>4</td>
<td>$915,852</td>
<td>$915,852</td>
<td>$947,907</td>
<td>$981,084</td>
<td>$1,015,696</td>
</tr>
<tr>
<td>5</td>
<td>$992,680</td>
<td>$992,680</td>
<td>$1,027,424</td>
<td>$1,063,384</td>
<td>$1,100,602</td>
</tr>
<tr>
<td>6</td>
<td>$1,069,509</td>
<td>$1,069,509</td>
<td>$1,106,942</td>
<td>$1,145,685</td>
<td>$1,185,784</td>
</tr>
<tr>
<td>7</td>
<td>$1,146,337</td>
<td>$1,146,337</td>
<td>$1,186,459</td>
<td>$1,227,985</td>
<td>$1,270,964</td>
</tr>
<tr>
<td>8</td>
<td>$1,223,166</td>
<td>$1,223,166</td>
<td>$1,265,977</td>
<td>$1,310,286</td>
<td>$1,356,146</td>
</tr>
<tr>
<td>9</td>
<td>$1,229,255</td>
<td>$1,229,255</td>
<td>$1,272,279</td>
<td>$1,316,809</td>
<td>$1,362,897</td>
</tr>
<tr>
<td>10+</td>
<td>$1,352,181</td>
<td>$1,352,181</td>
<td>$1,399,507</td>
<td>$1,448,490</td>
<td>$1,499,187</td>
</tr>
</tbody>
</table>

*Source: Hoops World*

#### Maximum Salaries

<table>
<thead>
<tr>
<th>Years in NBA</th>
<th>Defined maximum salary</th>
<th>2011-12</th>
<th>2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 6</td>
<td>25% of cap</td>
<td>$12,922,194</td>
<td>$13,668,750</td>
</tr>
<tr>
<td>7 - 9</td>
<td>30% of cap</td>
<td>$15,506,632</td>
<td>$16,402,500</td>
</tr>
<tr>
<td>10+</td>
<td>35% of cap</td>
<td>$18,091,071</td>
<td>$19,136,250</td>
</tr>
</tbody>
</table>

*Source: cbafaq.com*
Table B  
Collegiate Player Sample Break Down

Panel 1: Breakdown by Class

<table>
<thead>
<tr>
<th>Experience</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>60</td>
<td>12%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>83</td>
<td>16%</td>
</tr>
<tr>
<td>Junior</td>
<td>130</td>
<td>25%</td>
</tr>
<tr>
<td>Senior</td>
<td>246</td>
<td>47%</td>
</tr>
<tr>
<td>Total</td>
<td>519</td>
<td>100%</td>
</tr>
</tbody>
</table>

Panel 2: Breakdown by Tournament Championships

<table>
<thead>
<tr>
<th>Conference Type/Championships</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>258</td>
<td>85</td>
<td>31</td>
<td>20</td>
<td>1</td>
<td>395</td>
</tr>
<tr>
<td>Non-Major</td>
<td>68</td>
<td>30</td>
<td>17</td>
<td>7</td>
<td>2</td>
<td>124</td>
</tr>
<tr>
<td>TOTAL</td>
<td>326</td>
<td>115</td>
<td>48</td>
<td>27</td>
<td>3</td>
<td>519</td>
</tr>
</tbody>
</table>

Panel 3: Breakdown by Regular Season Championships

<table>
<thead>
<tr>
<th>Conference Type/Championships</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>207</td>
<td>114</td>
<td>51</td>
<td>19</td>
<td>4</td>
<td>395</td>
</tr>
<tr>
<td>Non-Major</td>
<td>48</td>
<td>36</td>
<td>22</td>
<td>11</td>
<td>7</td>
<td>124</td>
</tr>
<tr>
<td>TOTAL</td>
<td>255</td>
<td>150</td>
<td>73</td>
<td>30</td>
<td>11</td>
<td>519</td>
</tr>
</tbody>
</table>
### Table C
Collegiate Regression

\[ \text{LogPick}_i = \alpha + \beta_1 \text{LogRSCI} + \beta_2 \text{Conf} + \beta_3 \text{Tourn} + \beta_4 \text{Season} + K_i^E + \epsilon_i \]

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>( \beta_1 ) LogRSCI</th>
<th>0.020 ( (0.020) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_2 ) Conf</td>
<td>-0.086** ( (0.037) )</td>
<td></td>
</tr>
<tr>
<td>( \beta_3 ) Tourn</td>
<td>-0.040** ( (0.021) )</td>
<td></td>
</tr>
<tr>
<td>( \beta_4 ) Season</td>
<td>-0.049* ( (0.018) )</td>
<td></td>
</tr>
<tr>
<td>( K_1 ) Sophomore</td>
<td>0.211*** ( (0.057) )</td>
<td></td>
</tr>
<tr>
<td>( K_2 ) Junior</td>
<td>0.327*** ( (0.055) )</td>
<td></td>
</tr>
<tr>
<td>( K_3 ) Senior</td>
<td>0.574*** ( (0.054) )</td>
<td></td>
</tr>
<tr>
<td>( \alpha ) Constant</td>
<td>1.064 ( (0.059) )</td>
<td></td>
</tr>
</tbody>
</table>

| Observations | 519 |
| Adjusted R-Squared | 0.24 |

**Significance Levels**

* = 10%
** = 5%
*** = 1%
Table D
Professional Regression

\[
\text{LogSalary}_{it} = \alpha + \gamma \text{YearBefore} + \beta \text{LogPick}_i + \delta \text{PER}_{t-1} + \theta \text{Wins}_{t-1} + \text{KI}_i^S + \Pi_i^P + \Sigma_i^C + \omega \text{Allstar} + \eta \text{Miss} + \epsilon_{i,t}
\]

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\gamma) YearBefore</td>
<td>-0.074***</td>
<td>(0.027)</td>
</tr>
<tr>
<td>(\beta) LogPick</td>
<td>0.322**</td>
<td>(0.159)</td>
</tr>
<tr>
<td>(\delta_1) PER_{t-1}</td>
<td>0.073***</td>
<td>(0.009)</td>
</tr>
<tr>
<td>(\delta_2) PER_{t-2}</td>
<td>0.039***</td>
<td>(0.010)</td>
</tr>
<tr>
<td>(\delta_3) PER_{t-3}</td>
<td>0.016</td>
<td>(0.010)</td>
</tr>
<tr>
<td>(\delta_4) PER_{t-4}</td>
<td>0.008</td>
<td>(0.010)</td>
</tr>
<tr>
<td>(\theta_1) Wins_{t-1}</td>
<td>-0.003</td>
<td>(0.003)</td>
</tr>
<tr>
<td>(\theta_2) Wins_{t-2}</td>
<td>-0.002</td>
<td>(0.003)</td>
</tr>
<tr>
<td>(\theta_3) Wins_{t-3}</td>
<td>-0.001</td>
<td>(0.003)</td>
</tr>
</tbody>
</table>
### Table D (Continued)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Value</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\theta_4$</td>
<td>Wins$_{t-4}$</td>
<td>0.001</td>
<td>(0.003)</td>
</tr>
<tr>
<td>$K_1$</td>
<td>Playoff Appearance</td>
<td>0.058</td>
<td>(0.031)</td>
</tr>
<tr>
<td>$K_2$</td>
<td>Conference Championship</td>
<td>0.176</td>
<td>(0.113)</td>
</tr>
<tr>
<td>$K_3$</td>
<td>League Championship</td>
<td>0.099</td>
<td>(0.100)</td>
</tr>
<tr>
<td>$\Pi_1$</td>
<td>Guards</td>
<td>-0.222**</td>
<td>(0.111)</td>
</tr>
<tr>
<td>$\Pi_2$</td>
<td>Forwards</td>
<td>-0.263**</td>
<td>(0.111)</td>
</tr>
<tr>
<td>$\Sigma_1$</td>
<td>Player Option</td>
<td>0.211**</td>
<td>(0.100)</td>
</tr>
<tr>
<td>$\Sigma_2$</td>
<td>Team Option</td>
<td>-0.165</td>
<td>(0.188)</td>
</tr>
<tr>
<td>$\Sigma_3$</td>
<td>Early Termination Option</td>
<td>0.532***</td>
<td>(0.176)</td>
</tr>
<tr>
<td>$\Sigma_4$</td>
<td>Partial Year</td>
<td>-0.630***</td>
<td>(0.116)</td>
</tr>
</tbody>
</table>
Table D (Continued)

| Parameter | Description        | Value  \\
|-----------|---------------------|--------|
| $\omega$  | All-Star            | -0.117**  \\
|           |                     | (0.059) |
| $\eta$   | Miss                | 0.162   \\
|           |                     | (0.101) |
| $\alpha$ | Constant            | 13.343  \\
|           |                     | (0.289) |
| Observations |                  | 373     |
| Adjusted R-Squared |              | 0.6186  |

Significance Levels
* = 10%
** = 5%
*** = 1%
References


