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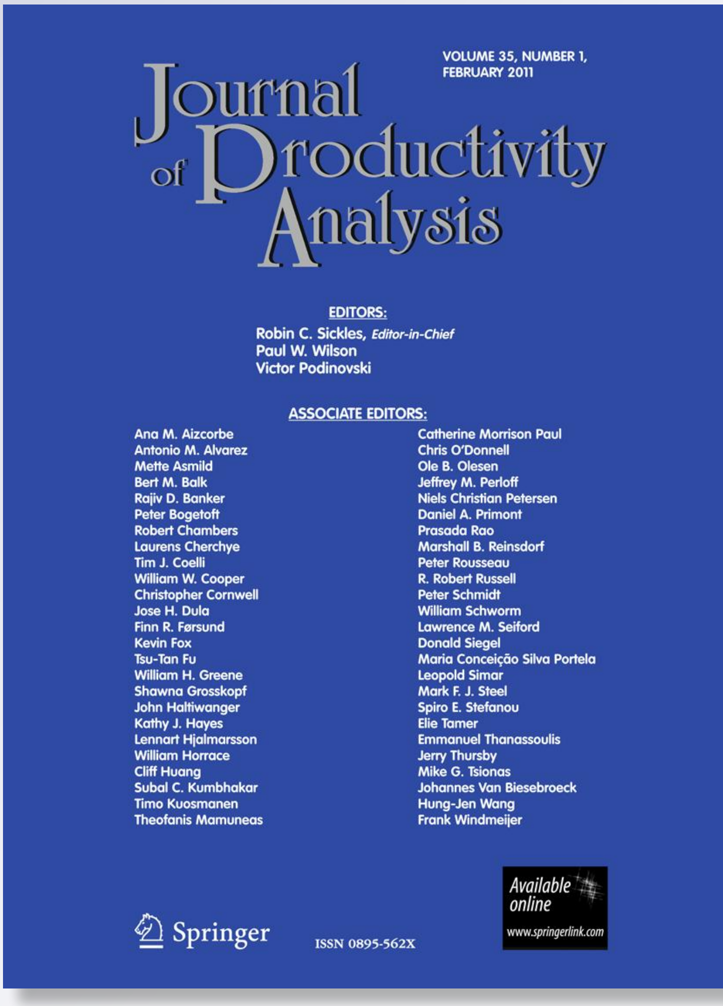
Journal of Productivity Analysis

ISSN 0895-562X
Volume 35
Number 1

J Prod Anal (2010) 35:25-35
DOI 10.1007/s11123-010-0187-x



Springer

J Prod Anal (2011) 35:25–35
DOI 10.1007/s11123-010-0187-x

From college to the pros: predicting the NBA amateur player draft

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Published online: 16 July 2010

Abstract The reverse-order amateur draft is an institution common to each of the major North American professional team sports. The draft is designed to give the weaker teams access to the future stars of the sport. The focus of our inquiry is how information on amateur player performance is employed by decision-makers in one sport, the National Basketball Association. Our analysis will suggest that future NBA players who score in college will see their draft position improved. This focus, though, appears to impair the ability of poor teams to improve.

Keywords Sports economics · Reverse-order drafts · Behavior economics

JEL Classification J44 · L83

1 Introduction

In 1946 the Basketball Association of America (BAA)—the forerunner to the National Basketball Association (NBA)—came into existence. One decision the BAA faced at its inceptions was how to allocate amateur talent.

Major League Baseball (MLB) in 1946 treated amateurs as free agents. Consequently a high school or college player was able to sign with whichever team made the most attractive offer. Like MLB, the National Football League (NFL) also originally employed a free agent market for amateurs. But Bert Bell, the owner of the Philadelphia Eagles, proposed a reverse-order draft after losing a bidding war for the services of Stan Kostka in 1935. Consequently, Bell was able to make the first selection in the NFL's initial amateur draft in 1936.[1]

Eleven years later the BAA followed the lead of the NFL and instituted a reverse-order draft. This choice—as defenders of the draft have argued—is motivated by a desire to promote competitive balance. Specifically, by giving the worst teams access to the best amateur talent, the draft should make the worst teams better and the best teams relatively worse. Critics, though, have noted that it is not clear that the draft actually promotes competitive balance.[2] Furthermore, because the draft reduces the number of

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[1] The story of the birth of the NFL Draft is reported in Quirk and Fort (1992, pp. 187–188). This story was also noted in Leeds and Von Allmen (2008, p. 163), Fort (2006, p. 258), and Quinn (2008).

[2] Grier and Tollison (1994) presented evidence that the draft in the NFL promotes competitive balance. Maxcy (2002) offered evidence that the draft in baseball also promoted competitive balance. However, recent work by Schmidt and Berri (2003), as well as Berri et al. (2005), suggests that drafts have very little impact on competitive balance. These studies note the influence of the size of the underlying population of talent, as opposed to institutions like drafts and payroll caps, as the dominant determinant of a league's level of competitive balance. Quinn (2008) also reviewed research on the impact the draft has had on competitive balance. This research indicates there is little relationship between a reverse order draft and the level of competitive balance.

teams a player can negotiate with to one, this institution should suppress salaries. And indeed, Krautmann et al. (2009) recently demonstrated that younger players in baseball, football, and basketball tend to be underpaid prior to gaining free agent rights.

Although the impact the draft has on salaries is interesting, our focus in this current discussion is on the ability of the worst teams to achieve the competitive aims of the draft defenders. Specifically, can NBA teams identify which amateurs will be the most productive professionals?

Research on the NBA draft has been relatively scarce. Kahn and Sherer (1988) failed to find a statistical relationship between draft position and a player's statistical performance in college. This model, though, included a measure of player compensation in the NBA and college performance data. The former was significant. And since compensation reflects player quality—as the authors noted—it may not be surprising the signal from other measures of player quality was muted.

More recently, Coates and Oguntimein (2010) looked at players drafted from 1987 to 1989. This extensive study of players drafted more than two decades ago showed that points scored is a significant determinant of draft position. But scoring is "relatively weakly related to professional scoring." Other statistics, such as rebounds, blocks, and assists, have a much higher correlation with professional outputs. But as these authors note, these factors are not strongly related to NBA compensation. The Coates and Oguntimein (2010) study echoes some of the findings we will offer.[3]

Beyond the NBA, the research of Massey and Thaler (2010) suggests that problems exist with respect to the NFL draft. Specifically these authors have found that players taken towards the top of the second round offer more value—per dollar spent—than players taken towards the top of the first round. In other words, it is better to pick first in the second round than pick first overall. Such a finding contradicts the expressed purpose of the draft.

Berri and Simmons (2009) also offered a study of the NFL draft, focusing solely on NFL quarterbacks. These authors found a number of factors that impacted where a quarterback was taken (i.e., height, Wonderlic scores, college performance numbers). These same factors, though, were not related to future performance in the NFL.[4]

Inefficiencies have also been found in baseball. Spurr (2000) offered a study of Major League Baseball's draft with the expressed purpose of bettering our understanding of how information is utilized. Spurr's analysis indicated that college experience was initially undervalued by talent evaluators in baseball, although this inefficiency has been eliminated in recent years.

Burger and Walters (2009) also offered a study of the baseball draft. This work estimated the rate of return for players selected out of college versus those selected out of high school. Additionally, these authors also looked at pitchers versus position players. The evidence presented suggested that decision-makers in baseball are more likely to choose high school players and pitchers. Burger and Walters (2009), though, presented evidence that "… the estimated 57 percent annual return on college selections far exceeds the 36 percent yield on high school draftees," and that "…the yield on pitchers is 34 percent versus 52 percent for position players." In sum, the draft preferences of MLB teams are not consistent with the estimated returns.

One issue with respect to both football and baseball is that professional performance—as Berri and Schmidt (2010) illustrated[5]—is difficult to predict. Consequently we should not be surprised when decision-makers have trouble predicting the professional performance of amateurs. Predicting performance in the NBA—again, as Berri and Schmidt (2010) illustrated—is much easier. So we might expect to see fewer problems with respect to the NBA.

There is an issue, though, with how performance is evaluated in basketball. Berri (2005) reviewed eleven studies[6] examining the link in the NBA between a player's race and decisions such as salary and employment. Although conclusions with respect to race varied across these studies, the story told with respect to the perceived value of player scoring was consistent. Specifically, these studies indicated that total points scored were the primary

[3] These are not the only studies of the NBA draft. Both the work of Taylor and Trogdon (2002) and Price et al. (2010) examined the tendency of teams to perform worse than expected towards the end of an NBA season. This tendency reflects the desire of teams to improve their position in the NBA draft.

[4] One should also note the work of Hendricks et al. (2003). These authors also looked at the NFL draft and found that in earlier rounds players from larger schools were taken first. In later rounds, though, players from smaller schools appear to be overvalued relative to similar players from top programs.

[5] Berri and Schmidt (2010) reviewed how much of an NFL player's performance in the current season is explained by what the same player did the previous season. With respect to quarterbacks and running backs in the NFL, explanatory power never exceeded 26%. Bradbury (2008) looked at baseball, and with the exception of strikeouts per nine innings for pitchers, none of the statistics Bradbury examined had an explanatory power that exceeded 45%. In contrast, of the 13 box score statistics examined from the NBA, only field goal percentage had an explanatory power that was less than 50%. And nine of the statistics examined had an explanatory power that exceeded 70%.

[6] These eleven studies included Kahn and Sherer (1988), Koch and Vander Hill (1988), Brown et al. (1991), Dey (1997), Hamilton (1997), Gius and Johnson (1998), Bodvarsson et al. (1998), Bodvarsson and Brastow (1999), Hoang and Rascher (1999), Bodvarsson and Partridge (2001), and McCormick and Tollison (2001). With the exception of Hoang and Racher, who considered employment discrimination, and McCormick and Tollison, who considered the allocation of playing time, each study considered the subject of wage discrimination.

factor NBA teams considered in evaluating playing talent. These studies offered fourteen empirical models, and in thirteen of these points scored was found to be both the expected sign and statistically significant.[7] Of the other factors employed by researchers, only total rebounds[8] and blocked shots were statistically significant more often than not. The significance of assists was evenly split,[9] while field goal percentage was significant in only four of the nine models where it was employed. Every other factor was not significant more than once. In sum, these studies indicated that player evaluation in the NBA appeared to be driven by points scored.

Berri and Schmidt (2010) offered an updated study[10] of free agent salaries. The evidence presented suggests that scoring dominates both the allocation of salaries and voting for the All-Rookie team. In an examination of 337 free agents from 2001–2008, player scoring was found to be the best predictor of the wages received.[11]

Such research tells two stories. Scoring is consistently the factor that dominates the evaluation of playing talent in the NBA. One should note, though, that a player's accumulation of points is dependent on the playing time the player receives and the number of shots taken. Simply staying on the floor and taking a large number of field goal and free throw attempts can lead to the accumulation of lofty point totals. Cleary, efficiency in utilizing shot attempts would also be an indicator of a player's worth to a basketball team. Shooting efficiency, though, is not consistently found to impact the evaluation of playing talent. In other words, the evidence suggests that a player who scores points inefficiently can still be rated highly with respect to salary and post-season awards.

The second story told by this research focuses on the other aspects of player productivity. Hollinger (2003) and Oliver (2004) both argue that wins are determined by a team's ability, relative to its opponent, to elicit points from its possessions. Scoring efficiently does allow one to elicit more points per possession. Still, as Berri (2008) notes, possessions also matter. How does a team gain possession of the ball? The key is rebounding, steals, and turnovers. Yet in the studies of salary and post-season awards we have reviewed, factors associated with gaining possession of the ball were not often found to be statistically significant. Even when a significant relationship was uncovered, the economic significance of these factors was relatively weak.

In this study we wish to see if these stories are also told with respect to the NBA draft. Specifically, we wish to understand which factors dominated the player evaluations revealed in the NBA draft. Furthermore, we wish to understand how the factors emphasized on draft day predict future NBA performance.

2 Modeling the draft

Our study of the NBA draft will not focus on every player selected. The amateurs selected by NBA teams come from three sources: universities who participate in the National Collegiate Athletic Association (NCAA), high schools, and other nations. The latter two are difficult to examine since reliable performance data does not consistently exist for high school and foreign talent. Fortunately, most players taken in the NBA draft have at least some experience playing NCAA Division I basketball.

To emphasize this point, we collected data from 15 years, beginning in 1995 and ending with the 2009 draft. For the 1995 draft, 93% of players taken played at least 1 year of college basketball. As detailed in Table 1, this number declined until the NBA instituted an age limit for drafted players in 2005. Across our entire sample, nearly 80% of all drafted players did play at least 1 year of NCAA basketball.[12]

Given our sample, we are now prepared to model the NBA draft. We begin with our dependent variable, draft position, which for much of our sample numbers from 1 to 58. For the 2004 draft, 59 players were taken while in 2005 the number rose to 60. Given the nature of this dependent

[7] The term statistical significance is open to interpretation. A common rule of thumb is that the t-statistic should be greater than two. Such a rule, though, could be thought of as too restrictive. Consequently, a coefficient was only considered insignificant in Berri's (2005) discussion if its t-statistic falls below 1.5. One should also note that a number of studies considered more than one salary model variation. If one of these models found a statistically significant relationship, then it was reported in Berri (2005) as statistically significant. In sum, Berri (2005) bent the rules of statistical significance in an effort to increase the number of factors that statistically impacted salaries. Even with this effort, most factors—other than scoring—were often found to be statistically insignificant.

[8] Seven models considered total rebounds, while seven others broke total rebounds into offensive and defensive rebounds. Of those that considered the type of rebound, none found offensive rebounds to be statistically significant. Only one study, McCormick and Tollison (2002), found defensive rebounds to be significant.

[9] The ambiguous nature of assists was highlighted in the work of Koch and Vander Hill (1988). These authors found that assists were statistically significant and positive in one regression examining player salary. In another regression, though, assists were statistically significant and negative.

[10] The NBA free agent study reported in Berri and Schmidt (2010) was an updated version of a study originally published in Berri et al. (2007). NBA free agents were also discussed in Berri et al. (2006).

[11] A similar story can be told with respect to the All-Rookie voting. This award is determined via voting by the NBA's head coaches. An analysis of this award—presented in Berri et al. (2007)—revealed that scoring also dominates this player evaluation.

[12] The 2005 Collective Bargaining Agreement imposed an age limit for the NBA, a limit that essentially prevents high school talent from skipping college basketball. With this limit, the number of players playing NCAA basketball increased in the latter part of our sample.

Table 1 College players and the NBA draft

Year	Percentage of drafted players with college experience (%)
2009	78.3
2008	85.0
2007	78.3
2006	75.0
2005	61.7
2004	62.7
2003	58.6
2002	73.7
2001	78.9
2000	81.0
1999	86.2
1998	86.2
1997	86.2
1996	89.7
1995	93.1

variable, a factor that positively impacts draft position will have an estimated negative sign.

The first factor we think would enhance draft position is player performance in college. As noted, the draft is designed to give the worst teams access to the better players. In looking at our sample of college players one might expect the players who are expected to perform well in the NBA to also perform well in college. Although there are notable exceptions to this rule, a relationship between college performance and the draft position of players should exist. In other words, contrary to the work of Kahn and Scherer (1988), we still expect players who play well in college to be drafted higher.

In addition to performance, we expect three additional player characteristics to matter. The first follows from the classic basketball adage: "You can't teach height." As explained in Berri et al. (2005), there is a short supply of tall people in the world. Given the scarcity of tall athletes, we would expect that taller players, all else being equal, will be selected first. Perhaps the most famous example of this rule was the selection of seven foot Sam Bowie over 6′6″ Michael Jordan in the 1984 NBA draft. Jordan went onto become perhaps the greatest player ever, and Bowie, as fans of the NBA know, did not.

We have two ways to think about the impact of the "short supply of tall people." First is to consider position played. This can be captured by including dummy variables, equal to one if the player played center, power forward, shooting guard, or point guard (the omitted condition is small forward) his first year in the NBA. Position played, though, is not the entire story. One might also suspect that being tall for your position might also be considered important by decision-makers. Consequently, we also include a measure of a player's height relative to position played.[13]

The final player characteristic we wish to consider is the player's age. With the influx of ever younger players into the NBA, people have often noted the impact a lack of experience has on a player's NBA performance. An argument has been offered that older players—or players who stay in college longer—learn more of the game's fundamentals, and hence are more likely to be productive NBA players. Given this viewpoint, age and draft position should have a negative relationship (i.e. older players should be picked first). Although the value of experience has been touted in some circles, one should note the incentives players face. Few players who expect to be taken high in a draft will postpone his earnings for one more year of college basketball (where the player is not supposed to be paid). Consequently, a junior or senior in college may be discounted in the draft. After all, if the player was that good he would have declared for the draft before he reached his upper classmen years. Hence, age and draft position could have a positive relationship (i.e., younger players are taken first). Given this discussion, we include as an explanatory variable the age of the player when he is drafted.

Beyond the characteristics of the player, what other factors should influence a player's draft position? Our list of additional regressors begins with the quality of college team played for and competition faced. This can be captured by including a dummy variable for the conference where a player played his college basketball. The conferences considered include the Mountain West, the Western Athletic Conference,[14] the Atlantic 10, the Atlantic Coast Conference, the Big 10, the Big 12, the Big East, Conference USA, the Pacific 10, and the Southeastern Conference. Each of these is considered among the top conferences in college basketball.

In addition to the conference where a player played is his experience in the NCAA post-season basketball tournament. Reaching the Final Four (DFIN4), or better yet, winning the NCAA championship (DCHAMP), should also enhance the exposure any player receives and consequently improve his draft position.

The final factor we will consider we noted at the onset. College players must compete with high school and foreign talent for draft position. The more high school and foreign players available, the lower the number of slots available

[13] Relative height is determined by calculating the average height—in inches—of the drafted players in the sample at each position. The position average is then subtracted from each player's height. The average height in the entire sample is then added back in.

[14] The Mountain West was created in 1999 from teams that were once part of the Western Athletic Conference. Consequently, a dummy variable was created that is equal to one if the player played in either the Mountain West or Western Athletic Conference.

for college players. We measure this by including dummy variables for each draft year in the model.[15]

Given this list of independent variables, Eq. 1 reports the model we employ to explain where a player will be selected in the NBA draft.

$$\begin{aligned}\mathrm{DRAFT}_n =& \beta_0 + \alpha_{\mathrm{N}}\mathrm{PROD} + \beta_1\mathrm{HEIGHT} + \beta_2\mathrm{DFINAL4} \\ &+ \beta_3\mathrm{DCHAMP} + \beta_4\mathrm{AGE} + \beta_5\mathrm{DMTWAC} \\ &+ \beta_6\mathrm{DA10} + \beta_7\mathrm{DACC} + \beta_8\mathrm{DBIG10} \\ &+ \beta_9\mathrm{DBIGEAST} + \beta_{10}\mathrm{DCUSA} \\ &+ \beta_{11}\mathrm{DPAC10} + \beta_{12}\mathrm{DSEC} + \beta_{13}\mathrm{DC} \\ &+ \beta_{14}\mathrm{DPF} + \beta_{15}\mathrm{DSG} + \beta_{16}\mathrm{DPG} \\ &+ \alpha_J\mathrm{DYEAR} + e_{\mathrm{it}} \qquad (1)\end{aligned}$$

where PROD is a collection of player statistics including points, rebounds, stealsblocked shots, assists, turnovers, and measures of shooting efficiency. DYEAR represents 14 dummy variables representing each year from 1996 to 2009.

3 Empirical findings

To estimate Eq. 1 we began with our 15 years of draft data. As noted, across these years, 78% of players selected had some college experience. This percentage across these years translates into a sample of 661 players. Table 2 reports for this sample, values of the descriptive statistics tabulated for the dependent and independent variables we employed.

The first independent variables listed in Table 2 are associated with a player's college performance. The specific statistics employed, each taken for a player's last year in college, follow mostly from the literature, and include points scored, total rebounds, steals, assists, blocked shots, turnovers, points-per-shot,[16] and free throw percentage. A player's accumulation of these statistics tends to depend upon the position played. For example, guards tend not to rebound well and often accumulate large number of turnovers. Power forwards and centers tend to do the opposite. If one does not adjust for such differences across position it may complicate our ability to ascertain the relationship between a player's statistical output and draft position. Given this issue, we adjusted each player's performance during his last college season by position played.[17] This step did not alter the averages reported in Table 2, but did allow us to include players from different positions in the same model.

What other characteristics stand out in Table 2? Beyond performance we should note that the average player in our sample is about 6′6″ tall and is nearly 22 years of age. Furthermore 8% played in the NCAA Final Four while 5% came from the NCAA champion.

With data in hand, we next turn to the estimation of our model. We began with a simple OLS estimation. But given the nature of our dependent variable, we then turned to the Poisson Distribution model. Although we expected the Poisson model to be an improvement on OLS, we switched to a Negative Binomial model given the issue of over-dispersion. We specifically employed a two-step negative binomial quasi-generalized pseudo-maximum likelihood estimator (QMLE) to correct for overdispersion and to generate a robust variance–covariance matrix. The details of this estimator are available in Gourieroux et al. (1984).

Our estimations are reported in Table 3. One should note that the estimated coefficients are not equivalent to an estimated slope. The impact of a one unit change in an independent variable on a player's draft position is given by the corresponding number in the marginal effects column. These marginal effects are computed at the sample means.

What do these results indicate? Our primary interest is in the value of various performance statistics. Before we turn to this issue, though, let's discuss the non-performance factors. First of all, there is evidence that shorter players face some discrimination. Specifically, taller players, even with performance held constant, tend be taken higher in the draft. In addition, shooting guards tend to be taken later in the draft.

Perhaps more interestingly is the impact of appearing in the Final Four. A player who appears in the Final Four the year he is drafted will see his draft position improve by about 12 slots. What is interesting is that a player who appears in the Final Four but returns to school—and then fails to appear again—does not see the Final Four bonus.[18]

[15] In an earlier version of this paper we included in our model the percentage of players selected from college each year. An anonymous referee suggested, though, that a better option is to include simple dummy variables for each year. We thank the referee for this suggestion.

[16] Points-per-shot (Neyer 1995: 322–323) is the number of points a player or team accumulates from its field goal attempts. Its calculation involves subtracting free throws made from total points, and then dividing by field goals attempted. Employing points per shot, rather than field goal percentage, allowed for the impact of three point shooting to be captured more efficiently.

[17] To overcome position bias, we calculated a position adjusted value for each statistic. Specifically we determined each player's per-minute performance with respect to points, rebounds, steals, blocked shots, assists, and turnovers. We then subtracted the average per-minute accumulation at each position in our data set, and then added back the average value of these statistics across all position. Once we took these steps, we then multiplied what we had by 40 (or the length of a college game), to give us a player's per 40 min production of each statistic.

[18] We included in our model a dummy variable equal to one if the player had appeared in a Final 42 seasons before he was drafted. Additional dummies considered an appearance from three seasons and four seasons before the year the player was selected. None of these dummies were statistically significant.

Table 2 Descriptive statistics for dependent and independent variables (1995–2009)

Variables	Label	Mean	SD	Min.	Max.
Dependent variable					
Place take in draft	PICK	29.00	16.96	1.00	60.00
Independent variables					
Performance variables and player characteristics					
Points scored	PTS	20.81	4.11	8.80	40.70
Rebounds	REB	8.53	1.94	3.81	15.32
Assists	AST	3.18	1.25	−1.10	9.67
Steals	STL	1.61	0.58	0.30	4.68
Blocked shots	BLK	1.33	0.97	−0.89	6.80
Personal fouls	PF	3.17	0.78	0.84	9.29
Turnover percentage	TOPER	15.25	3.47	−0.28	29.11
Three point field goal percentage	3FGPER	0.30	0.17	0.00	1.00
Two point field goal percentage	2FGPER	0.53	0.05	0.39	0.73
Free throw percentage	FT	0.72	0.09	0.38	0.97
Relative height, in inches	RELHEIGHT	78.81	1.52	73.86	84.06
Age	AGE	21.79	1.26	19.00	26.00
Dummy variables, equal to one if…					
Player appeared in final four in the year drafted	DFIN4	0.08	0.27	0.00	1.00
Player played on an NCAA champion in year drafted	DCHAMP	0.05	0.23	0.00	1.00
Played in atlantic coast conference	DACC	0.15	0.36	0.00	1.00
Played in pacific-10	DPAC10	0.15	0.35	0.00	1.00
Played in big east	DBIGEAST	0.13	0.33	0.00	1.00
Played in southeastern conference	DSEC	0.11	0.31	0.00	1.00
Played in big 12	DBIG12	0.10	0.31	0.00	1.00
Played in big 10	DBIG10	0.10	0.30	0.00	1.00
Played in conference USA	DCUSA	0.06	0.23	0.00	1.00
Played in mountain west or western athletic conference	DMTWAC	0.05	0.22	0.00	1.00
Played in atlantic ten	DA10	0.03	0.17	0.00	1.00
Played center	DC	0.14	0.35	0.00	1.00
Played power forward	DPF	0.27	0.44	0.00	1.00
Played shooting guard	DSG	0.18	0.39	0.00	1.00
Played point guard	DPG	0.19	0.40	0.00	1.00

Observations: 661

Notes: PTS, REB, AST, STL, BLK, and PF are per 40 min and adjusted for position played. TOPER is also adjusted for position played

Sources: College performance and height data was taken from ESPN.com and Basketball-Reference.com

Consequently, players who appear in the Final Four have an incentive to leave school.

This is not the only factor that leads players to leave school early. We find that each year a player ages he loses nearly six spots in the draft. So a player who returns for 3 years after his freshmen season will see his draft position fall by nearly eighteen spots.

Of course, returning to school can provide the player a benefit. Beyond the benefit of furthering his education, a player can improve his draft status by improving his performance. But which factors should he focus upon? Specifically, accumulating larger scoring totals, shooting efficiently (from two point and three point range), as well as accumulating assists and blocked shots enhance a player's position. Consistent with what we have previously learned about salaries and post-season awards in the NBA, possession variables are not as important. Rebounds and turnovers were all found to have no impact on a player's draft position.[19]

[19] Rebounds per game, rebounds per minutes, and rebound percentage were all examined, and none of these had a statistical link to draft position. Rebound percentage is calculated according to Basketball Reference.com as follows: 100*(total rebounds * (team minutes played/5))/(Minutes played * (team total rebounds + opponents total rebounds)). We wish to thank Dean Oliver for providing us with the additional data on rebounds. For turnovers we considered both

Table 3 Estimation of Eq. 1 (1995–2009)

Variable	OLS		Poisson		Negative binomial	
	Marginal values	*t*-statistic	Marginal values	*z*-statistic	Marginal values	*z*-statistic
PTS	−1.45*	−8.44	−1.40*	−21.00	−1.54*	−8.20
REB	0.07	0.24	−0.08	−0.68	−0.09	−0.28
AST	−1.95*	−3.85	−1.66*	−8.67	−1.75*	−3.26
STL	−1.78	−1.82	−1.83*	−4.78	−2.37**	−2.20
BLK	−3.25*	−5.39	−3.54*	−14.69	−4.07*	−6.11
PF	2.38*	3.19	2.18*	7.93	3.28*	3.93
TOPER	0.17	0.83	0.09	1.24	0.10	0.44
3FGPER	−5.58	−1.47	−6.96*	−4.34	−7.90***	−1.89
2FGPER	−32.06*	−2.73	−29.16*	−6.56	−34.74*	−2.75
FT	−6.00	−0.79	−4.85***	−1.70	−10.46	−1.28
RELHEIGHT	−1.06*	−2.78	−1.00*	−6.83	−1.38*	−3.31
DFIN4	−10.22*	−5.19	−10.83*	−17.32	−11.72*	−8.35
DCHAMP	−7.84*	−3.27	−7.65*	−9.74	−8.07*	−4.11
AGE	4.95*	11.39	4.77*	28.71	5.88*	11.72
DMTWAC	−8.12*	−2.99	−6.46*	−7.89	−6.94*	−3.06
DA10	−5.82***	−1.68	−5.68*	−5.96	−7.42*	−2.73
DACC	−10.54*	−5.05	−8.64*	−14.22	−10.44*	−6.21
DBIG10	−7.18*	−3.12	−5.46*	−7.83	−6.24*	−3.10
DBIG12	−8.24*	−3.69	−6.50*	−9.72	−8.65*	−4.77
DBIGEAST	−9.99*	−4.63	−8.04*	−12.83	−8.97*	−5.06
DCUSA	−7.42*	−2.79	−6.48*	−8.29	−8.55*	−4.13
DPAC10	−9.92*	−4.68	−8.08*	−13.20	−9.08*	−5.17
DSEC	−6.19*	−2.67	−4.93*	−6.89	−5.49*	−2.64
DC	−1.37	−0.70	−1.74**	−2.32	−1.94	−0.95
DPF	0.99	0.62	0.10	0.15	−0.07	−0.04
DSG	3.27**	1.96	3.42*	5.10	4.66**	2.34
DPG	0.01	0.01	0.23	0.36	0.56	0.31

Observations: 661

* Denotes significance at the 1% level

** Denotes significance at the 5% level

*** Denotes significance at the 10% level

Of the performance statistics that were statistically significant, which had the greatest economic significance?[20] To answer this question we went beyond the marginal effects reported in Table 3 and estimated the impact of a one standard deviation increase in each performance variable found to be statistically significant. These impacts are reported in Table 4, where it is revealed that scoring totals are the primary factor players should focus upon.

One should note that shooting efficiency also has a positive impact on where a player is drafted. This suggests a player who seeks to increase his scoring needs to consider more than just taking additional shots. Although a decline in shooting efficiency can negatively impact draft position, this impact is relatively weak. To see this point, consider an NBA prospect that increased his scoring average per 40 min played by 4.07 points (i.e., a one standard deviation increase). Table 4 indicates that this increase will lead to a 6.47 improvement in draft position. Now let's imagine that this same player initially converted 52.5% of his two-point field goal attempts (i.e., the average mark in the sample). To offset the gains from increase in scoring, this same player would need to see his two-point field goal percentage decline to 32.4%, a mark that is well below the lowest mark observed in our sample. More scoring—even if it causes shooting efficiency to decline somewhat—is therefore beneficial to an NBA prospect. In sum, NBA prospects have an incentive to shoot as much as possible in college.

Footnote 19 continued
turnovers per minute and turnover percentage. Turnover percentage—as detailed at basketball-reference.com—is calculated by dividing turnovers by field goal attempts + 0.44*free throw attempts + turnovers. This numbers is then multiplied by 100. Turnover percentage is essentially an estimate of turnovers per possession. The advantage of using this measure is that it is not highly correlated with points scored per game. The inclusion of turnover percentage, though, still indicated that turnovers and draft position are not statistically related.

[20] The importance of economic significance has been highlighted in the work of McCloskey (1998, 2000, 2002).

Table 4 The impact of a one standard deviation increase in statistically significant performance variables (1995–2009)

Variable	How many draft slots a player gains from a one standard deviation increase…
PTS	−6.3
AST	−2.2
STL	−1.4
BLK	−3.9
PF	−2.5
3FGPER	−1.3
2FGPER	−1.9

Observations: 660

4 Performance from college to the pros

We now see the factors that impact where a player is selected in the NBA draft. Our next step is to investigate how the factors that dictate a player's draft position relate to a player's performance in the NBA.

This study begins with a measure of performance. As noted, Berri (2008) details how the box score statistics tabulated by the NBA can be employed to measure a player's Wins Produced. This model explains 94% of the variation in team wins. And unlike other measures of performance, it is relatively stable from season to season.[21] Given the theoretical and empirical characteristics of this model, it seems reasonable to employ this metric as our measure of performance. Specifically, we will consider how each player's Wins Produced per 48 min (WP48)[22] is related to the factors employed in our study of draft position. To assess this relationship, we estimated the following model: [23]

$$\begin{aligned} \mathrm{WP48}_n = & \lambda_0 + v_{\mathrm{N}}\mathrm{PROD} + \lambda_1\mathrm{HEIGHT} + \lambda_2\mathrm{DFINAL4} \\ & + \lambda_3\mathrm{DCHAMP} + \lambda_4\mathrm{AGE} + \lambda_5\mathrm{DMTWAC} \\ & + \lambda_6\mathrm{DA10} + \lambda_7\mathrm{DACC} + \lambda_8\mathrm{DBIG10} \\ & + \lambda_9\mathrm{DBIGEAST} + \lambda_{10}\mathrm{DCUSA} + \lambda_{11}\mathrm{DPAC10} \\ & + \lambda_{12}\mathrm{DSEC} + \lambda_{13}\mathrm{DC} + \lambda_{14}\mathrm{DPF} + \lambda_{15}\mathrm{DSG} \\ & + \lambda_{16}\mathrm{DPG} + e_{\mathrm{it}} \end{aligned} \quad (2)$$

where PROD is a collection of player statistics including points, rebounds, steals, blocked shots, assists, turnovers, and measures of shooting efficiency.

Equation 2 employs many of the same independent variables employed in Eq. 1. These variables, though, are now employed to explain per −48 min productivity in the NBA.

The estimation of Eq. 2 is reported in Table 5. As one can see, the model was estimated with career WP48 marks after two, three, four, and five seasons in the league.[24] Across all four estimations the following performance and player characteristics were statistically significant: points, rebounds, steals, shooting efficiency from two-point range, and playing for an NCAA champion. Surprisingly, both points and DCHAMP have a negative sign. This indicates that scorers in college tend to offer less productivity in the NBA.[25] The same story is told for NCAA champions.

The significance of rebounds is surprising. Looking back at Table 3 we see that rebounds are one of the few performance factors not related to draft position. But rebounds are related to performance in the NBA[26]

The result with respect rebounds are the opposite of what we see with respect to player height, a Final Four appearance, and age. Each of these factors was found to statistically impact where a player was drafted. But a player's relative height and a Final Four appearance were never found to impact performance. And age only has a small statistically significant impact on career performance after a player's fifth season in the league. In essence, much of what NBA decision-makers consider on draft day is unrelated—or has the opposite relationship—to a player's career performance.

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[21] This is an argument advanced in Berri (2010). This working paper considers a variety of different performance metrics. Of those examined, none were found to do a better job of both explaining current wins and exhibiting relative stability from season-to-season.

[22] The data set only includes players who logged an average of 500 min per season. Such a restriction likely overstates the explanatory power of draft position. A player like Jerome Moiso—selected with the 11th pick of the 2000 draft—never averaged 500 min in his career. So this lottery pick is not included in our data set. If such picks were included the link between draft position and performance might be even weaker.

[23] The NBA data required to calculate WP48 can be found at Basketball-Reference.com.

[24] The years considered began with players drafted in 1995 and ended with those drafted in 2006. For the model examining 3 years of experience, the ending year was 2005. And for four and 5 years of experience, the ending year was 2004 and 2003 respectively.

[25] It is not clear why scorers in college offer less in the NBA. One possibility, though, is related to the composition of an NBA roster. Because there is only one ball, an NBA roster is divided between scorers and role players. Of these two groups—and again, because there is only one ball—role players are in the majority. In other words, most NBA players cannot be major scorers. As our analysis indicates, though, to get drafted in the NBA it helps tremendously to be a scorer in college. Those who score the most in college, though, probably have the hardest time adjusting to an NBA life where they are not asked to be the primary option on offense. This might be why college scorers tend to perform worse in the NBA.

[26] The significance of rebounds does not depend upon how performance is measured. Employing other measures—such as the NBA Efficiency measure and John Hollinger's Game Score—also demonstrates that college rebounding is related to NBA performance. The result with respect to scoring, though, is only seen when one used WP48. College scorers do not offer higher levels of performance when performance is measured via NBA Efficiency and Game Score. For the problems with NBA Efficiency and Game Score, one is referred to Berri (2010).

Table 5 How much of career performance—as measured by WP48—can we explain with the factors that explain draft position?

Variable	2nd year		3rd year		4th year		5th year	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic
PTS	−0.006*	−4.731	−0.006*	−4.001	−0.004*	−3.318	−0.005*	−3.160
REB	0.021*	9.078	0.019*	7.769	0.017*	6.947	0.016*	6.587
AST	0.010**	2.528	0.008**	2.039	0.003	0.806	0.006	1.514
STL	0.019*	2.716	0.018**	2.459	0.024*	3.244	0.023*	3.185
BLK	0.005	1.184	0.005	1.297	0.005	1.267	0.006	1.265
PF	−0.014*	−2.907	−0.010**	−2.080	−0.012**	−2.380	−0.006	−1.409
TOPER	−0.002	−1.101	−0.001	−0.547	0.000	0.030	−0.001	−0.396
3FGPER	−0.100*	−3.150	−0.043	−1.135	−0.039	−1.075	−0.052	−1.291
2FGPER	0.376*	3.975	0.295*	3.317	0.217**	2.170	0.285*	2.859
FT	0.111***	1.796	0.063	1.085	0.037	0.656	0.036	0.601
RELHEIGHT	−0.002	−0.684	−0.003	−1.062	0.000	0.082	−0.002	−0.631
DFIN4	−0.009	−0.711	−0.008	−0.704	−0.009	−0.672	−0.017	−1.280
DCHAMP	−0.049*	−3.014	−0.041*	−3.196	−0.028**	−2.229	−0.028**	−2.067
AGE	−0.003	−1.144	−0.005	−1.272	−0.003	−0.993	−0.009**	−2.436
DMTWAC	0.026	1.243	0.017	0.829	0.016	0.801	0.019	0.916
DA10	0.031	1.404	0.035	2.024	0.026	1.609	0.054**	2.402
DACC	0.046*	2.604	0.039**	2.181	0.033**	1.979	0.034**	2.100
DBIG10	0.026	1.415	0.027	1.387	0.024	1.377	0.028	1.523
DBIG12	0.026	1.355	0.032	1.648	0.015	0.777	0.031***	1.759
DBIGEAST	0.038**	2.231	0.035**	2.062	0.031***	1.868	0.027	1.500
DCUSA	0.027	1.132	0.040***	1.893	0.026	1.084	0.031	1.434
DPAC10	0.038**	1.975	0.036**	2.033	0.038**	2.152	0.038**	2.115
DSEC	0.034***	1.712	0.027	1.400	0.008	0.512	0.008	0.480
DC	−0.048*	−3.015	−0.035**	−2.260	−0.028**	−1.943	−0.041*	−2.813
DPF	−0.015	−1.186	−0.003	−0.231	−0.007	−0.525	−0.017	−1.359
DSG	0.011	0.847	0.003	0.242	−0.006	−0.445	−0.022	−1.501
DPG	0.014	1.095	0.020	1.650	0.013	1.137	0.010	0.846
Observations	288		259		232		201	
Adjusted *R*-squared	0.36		0.31		0.30		0.34	

Dependent variable: Log of WP48

* Denotes significance at the 1% level

** Denotes significance at the 5% level

*** Denotes significance at the 10% level

Given these results, we should not be surprised that where a player is drafted does not tell us much about his performance in the NBA. Table 6 notes how much of a player's career WP48—or the same dependent variable employed in Eq. 2—is explained by where a player is drafted. As one can see, less than 5% of a player's career WP48 is explained by where a player is drafted. Explanatory power increases when we turn to Wins Produced, but it is still the case that draft position is not a very good predictor of future performance.[27]

Turning back to Table 5, though, we see that the data tracked in college does a better job of predicting performance than draft position. This result is somewhat odd, since the list of factors employed to explain draft position is incomplete. We can only consider factors that are publicly available and that can be quantified. An NBA scout

[27] A study by Staw and Hoang (1995) and Camerer and Weber (1999) found that minutes-per-game was linked to draft position after a player's first NBA season. This link was uncovered even after each set of authors controlled for performance. Consequently, we should not be surprised that Wins Produced—which includes both WP48 and minutes played—has a stronger correlation with draft position than what we observe when we only consider WP48. In other words, the link between draft position and aggregate performance measures is biased because players chosen earlier will get more minutes independent of their actual productivity levels.

Table 6 How much of career performance—as measured by WP48 and Wins produced—can draft position explain in the NBA?

Year	Observations	WP48	Wins produced
2nd year	288	0.02	0.06
3rd year	259	0.03	0.07
4th year	232	0.01	0.06
5th year	201	0.01	0.05

Dependent Variable: Log WP48 or Log Wins Produced

Independent Variable: Log of Draft Position

can observe the player in person and consider a number of qualitative factors. Despite having more information, though, the smaller list of factors that can be quantified appear to do better than all the factors that are embodied by a player's draft position.

5 Concluding observations

Our study of the NBA draft reveals that this decision may not lead teams to improve as much as defenders of this institution would hope. The problem is not that data is unavailable or that performance is difficult to predict. No, it appears that decision-makers often consider factors—such as Final Four appearances in the year the player is drafted—that are not relevant to future performance.

Furthermore, it appears that we are once again seeing too much emphasis placed on scoring. Prior studies into salary determination, employment discrimination, and post season awards have all highlighted the importance of scoring. Our study of the college draft is consistent with this literature. NBA players who focus on rebounding, accumulating steals, and avoiding turnovers will not secure major paydays nor much consideration for post-season honors.

We see in our study of the draft that this lesson is taught from the onset of a player's career. A college player may not have absolute control over his college choice. He certainly cannot control his height. If he wants to be drafted as high as possible given these restrictions, the evidence presented herein suggests he should focus on scoring as much as his college coach allows. For those who score the most are most likely to score significant dollars on NBA draft night.

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