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Testing the On-Court Efficacy of the NBA's Age Eligibility Rule

Ryan Rodenberg, *Florida State University*
Jun Woo Kim, *Florida State University*

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Abstract

The NBA's age eligibility rule is controversial. To examine the on-court efficacy of the NBA's age eligibility rule, we test the effect of age of entry on NBA career performance. Our data set comprises the 332 players selected in the first round of the NBA draft from 1989 to 2000. Using censored normal regression models, we found that players drafted at a relatively younger age have more successful NBA careers across three different metrics. To explore a beneficial effect of one year in college, group selection bias tests were conducted by comparing differences in career success between "one and done" players and players who entered the NBA straight out of high school. The results were consistent with our main analyses – players who moved into the NBA directly from high school generally perform better than players with a single year of college experience. We find no systematic evidence in support of the on-court efficacy of the NBA's age eligibility rule.

KEYWORDS: NBA, age eligibility rules, censored normal regression

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Introduction

In 1999, National Basketball Association (NBA) commissioner David Stern posited: “We feel we have the right to set an age limit” (Popper, 1999). Six years later, as part of negotiations in furtherance of a new collective bargaining agreement (CBA) between the NBA and its players, a collective group represented by the National Basketball Players Association (NBPA), the league and union bilaterally agreed on a minimum age rule requiring American players to be one year removed from high school and at least 19 years of age by December 31 of the draft year in order to be eligible for that year’s draft.¹ One month before agreeing to the minimum age rule, NBPA executive director Billy Hunter opined: “I’m still strongly philosophically opposed to [a minimum age rule] and I can’t understand why people think one is needed” (Sheridan, 2005).

Since being adopted in 2005, the NBA’s age eligibility rule has proven to be contentious. U.S. Secretary of Education Arne Duncan called the NBA age rule and its impact on “one and done” players in college basketball a “farce” and “intellectually dishonest” (Jackson, 2010). Steve Cohen, a U.S. Representative from Tennessee described the rule as “a vestige of slavery” (Thamel, 2009). Jones (2005), Rossen (2008), Shaffer (2008), and Litman (2010) have all criticized the NBA minimum age rule from a legal perspective. With ample ethical and legal controversy swirling, this article aims to analyze the on-court efficacy of the NBA’s age eligibility rule.² Our use of the phrase “on-court” is deliberate and specific, as the aim here is to focus solely on the metrics pertaining to basketball performance during competition, not (important) off-court issues such as the value of higher education, purported socially irresponsible behavior or criminal activity, and the pecuniary aspects of being a professional athlete.

In addition to being controversial, analyzing the efficacy of the NBA’s age-based eligibility rule is an empirical challenge. The ideal experiment would be one where randomization resulted in a treatment group required to comply with the rule and a control group that had no such mandate. Subsequent player performance could then be compared across the two random samples and the impact of the rule could be evaluated. For a number of overriding legal, ethical, and logistical reasons, such an experimental ideal is impossible. Nevertheless, the nature of rule-making in sports leagues has given rise to a number of “interesting natural experiments that offer opportunities for analysis” (Kahn, 2000, p. 75). Consistent with the general observations of Rosen and Sanderson (2001) regarding sports labor market research, the availability of objective on-court

¹ Non-American players are not required to be at least one year removed from high school.

² The more generalized topic of the interplay between precocity and labor market outcomes in professional basketball was addressed by Rodenberg and Kim (2011).

performance measures at the individual player level further lends itself to the quantitative evaluation of the NBA's age eligibility rule.

Emerging research has pointedly considered the interaction between precocity and performance in sports. Sowell and Mounts (2005) concluded that such interaction is "one of the most basic in all of economics...[i]t is at the foundation of all acts of production or utility creation." Several studies have looked at aging and peak performance in sports (Schulz and Curnow, 1988; Bradbury, 2009; Fried and Tauer, 2011). Specific to the NBA, playing careers have been analyzed vis-à-vis opportunity costs (McCann, 2004), draft order (Staw and Hoang, 1995), college performance (Coates and Oguntimein, 2010; Berri, Brook, and Fenn, 2011), possible exit discrimination (Groothuis and Hill, 2004), internationalization (Eschker, Perez, and Siegler, 2004), and the confluence of unraveling, human capital, and option value (Groothuis, Hill, and Perri, 2007).

The effect of minimum age rules has been investigated outside of sports on a number of occasions. Most recently, Miron and Tetelbaum (2009) evaluated the interaction between traffic fatalities involving underage drivers and an increase in the minimum age required to drink alcohol legally. Rodenberg and Stone (2011) is the most closely related sport-specific paper, which analyzed female professional tennis player career outcomes before and after a minimum age rule was adopted by the governing body of women's professional tennis in 1995 and found such rule to have a largely null effect. This paper adds to the literature by measuring the impact of age of entry on career-level performance and, in turn, tests the on-court efficacy of the NBA's age eligibility rule.

Methodology

Data

As specifically listed in Appendix A, the sample includes all players selected in the first round of the NBA draft from 1989 to 2000. The NBA's reverse-order draft is held annually and currently includes two rounds.³ Barring draft pick trades or other transactions involving draft picks, teams have one pick in each round. There are presently 30 NBA teams, meaning there are 60 draft slots total. We restricted our sample to the first round of NBA draft during the twelve year period from 1989 to 2000 for three reasons. First, detailed career performance statistics and comprehensive biographical information is unavailable for (often obscure) players selected in the second round. Second, previous NBA-NBPA CBAs were structured in such a way that the contracts for second round draft

³ See Zola (2012) for a detailed analysis of the NBA draft and the movement of players from college basketball to professional basketball in the NBA.

selections, if the player and team even agreed upon terms, were not guaranteed for their duration in the same way that all contracts for first round draft picks were.⁴ Accordingly, a non-*de minimus* number of second round draft picks never played in the NBA, opting to instead play overseas where the underlying team contracts had more certainty. Third, as described in detail below, the twelve year period with 1995 as a mid-point was important to our research design given that 1995 was the year that players began entering the draft straight out of high school after a 20 year gap that saw no American players attempt to move directly to the NBA without at least one year of college playing experience.⁵

Data were collected from publicly available resources. NBA.com and Basketball-Reference.com are two examples. Both websites include detailed performance statistics for every player in our data set from the time such player was drafted until 2011. Our regression equation was estimated with the following player-specific independent variables – age of NBA entry (*AGE*),⁶ height (*HT*),⁷ and draft pick slot (*DRFT*).⁸ The following time-constant dummy variables were also included in our estimation – college experience (*CLLGE*),⁹ playing position (*PSTN*),¹⁰ nationality (*NATL*),¹¹ and race (*RACE*).¹² Our variable of interest was *AGE*. The other explanatory variables have been frequently used in the relevant NBA-related literature highlighted above. To test our null hypothesis that age of entry has no effect on NBA careers, we selected three dependent variables given that there is no single definitive measure of basketball career success.¹³

⁴ For example, from 1995 to 2000, the CBA mandated that all initial contracts for first round draft picks be guaranteed for three years.

⁵ Shawn Kemp was drafted in the first round of the NBA draft by the Seattle Supersonics in 1989. Following graduation from high school in 1988, Kemp enrolled at the University of Kentucky before transferring to a junior college. However, Kemp never played in a college basketball game during the one year period between high school and the 1989 NBA draft. As such, it is factually incorrect to label Kemp as a player who moved straight from high school to the NBA.

⁶ *AGE* during the draft year for every player is set forth in Appendix A.

⁷ *HT* is denoted in meters.

⁸ *DRFT* is an ordinal ranking and a reasonable proxy for important, yet unobservable, variables such as ability and talent.

⁹ 1 = some college, 0 = no college.

¹⁰ 1 = primarily a guard, 0 = primarily a forward or center.

¹¹ 1 = American, 0 = non-American.

¹² 1 = black, 0 = non-black.

¹³ We did not include salary as dependent variable for two reasons. First, Groothuis, Hill, and Perri (2007) and Rosenbaum (2003) showed that the CBA severely distorts salary levels at the outset of a player's career and has residual effects throughout. Second, McCann (2006) described a number of nonmonetary reasons why players may enter into a contract with a certain team during free agency.

- (i) Average minutes played per game (*MNT*). Given that players can only (directly) help their team win when actually participating in the game, *MNT* is a reasonable gauge of how valuable the player is to his team.
- (ii) Player efficiency rating (*PER*). As a composite metric, *PER* considers a variety of micro-level player statistics commonly found in a basketball box score. Points, rebounds, assists, turnovers, and fouls are all examples.¹⁴
- (iii) All-star game appearances (*A-S*). All-star game appearances are a subjective measure of macro-level career outcomes that result from league, coach, media, peer, and fan input.

Summary statistics for our full sample (all players 1989 to 2000 inclusive) are set forth in Table 1.

Empirical Strategy

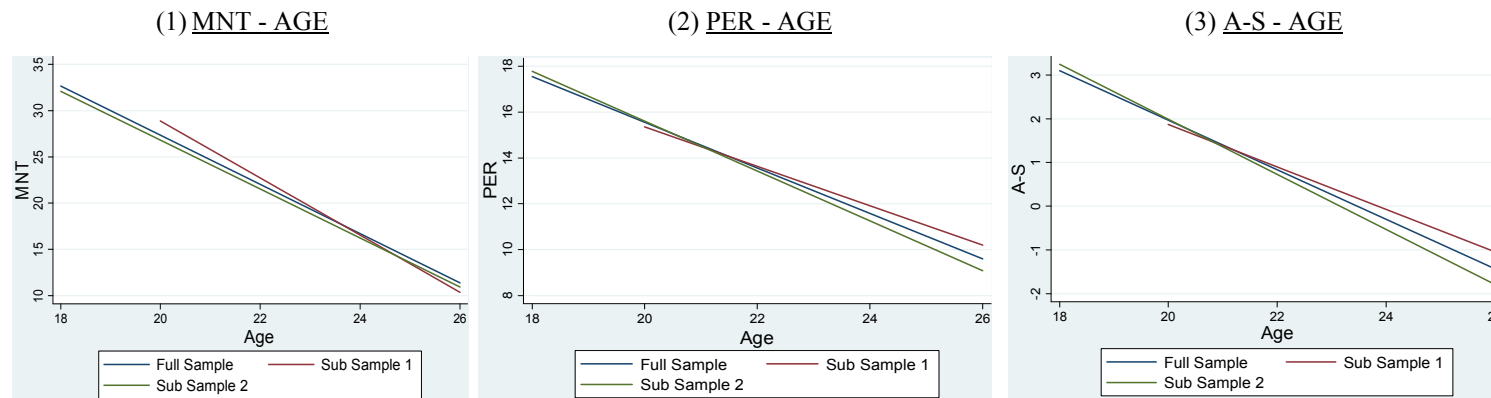
Each of our dependent variables was modeled using a censored normal regression estimator. Using ordinary least squares regression with partially censored dependent variables would have been problematic. When an observed dependent variable is censored, “variation in the observed dependent variable will understate the effect of the regressors on the true dependent variable” (Chay & Powell, 2001, p. 29). Accordingly, standard ordinary least squares regression using censored data will typically result in a violation of assumptions related to homoskedasticity and normality. Through the use of a censored normal regression model, the empirical analysis can forecast the dependent variables even though the full range of values is not observed. Here, 55 players in our full sample ($N=332$) were still active as of the end of the 2011 season. Applying the censored normal regression model addresses such data censoring (Wooldridge, 2009, p. 600). Kennedy (2008, p. 270) makes clear that the “estimated coefficients from censored and truncated models must be interpreted with care.” Even though only 16.57% (55 of 332) of the subjects in our data set are censored, coefficient estimates would differ, by moving towards zero, if we were to (incorrectly) apply ordinary least squares regression and treat all data points as being uncensored.

¹⁴ A detailed discussion regarding the calculation of *PER* is set forth in Hollinger (2011).

Table 1. Summary Statistics

Variable	Full Sample (1989-2000)					Sub Sample 1 (1989-1994)					Sub Sample 2 (1995-2000)				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
AGE	332	22.03	1.27	18	26	161	22.36	0.96	20	26	171	21.71	1.43	18	26
DRFT	332	14.40	8.07	1	29	161	13.93	7.79	1	27	171	14.83	8.33	1	29
CLLGE	332	0.94	0.24	0	1	161	0.99	0.08	0	1	171	0.88	0.32	0	1
PSTN	332	0.40	0.49	0	1	161	0.45	0.50	0	1	171	0.35	0.48	0	1
HT	332	2.02	0.09	1.78	2.28	161	2.01	0.09	1.78	2.28	171	2.02	0.09	1.78	2.24
NATL	332	0.89	0.32	0	1	161	0.94	0.24	0	1	171	0.84	0.37	0	1
RACE	332	0.79	0.41	0	1	161	0.84	0.36	0	1	171	0.73	0.44	0	1
MNT	332	21.95	8.81	3.10	41.10	161	21.60	8.63	3.10	38.60	171	22.28	8.99	4.10	41.10
PER	332	13.54	3.61	-0.90	26.40	161	13.32	3.30	-0.40	26.40	171	13.74	3.88	-0.90	24.80
A-S	332	0.82	2.33	0	15	161	0.72	2.05	0	15	171	0.91	2.57	0	14

Legend. AGE - age of NBA entry; DRFT - draft pick slot; CLLGE - college experience; PSTN - playing position; HT - height; NATL - nationality; RACE - race; MNT - average minutes played per game; PER - career player efficiency rating; and A-S - all-star game appearances.

Figure 1. Fitted Values of Dependent Variables as a Function of AGE


Note. The fitted values of MNT, PER, and A-S are plotted against AGE, our variable of interest, across each of our samples after fixing all remaining variables at their means. AGE has a negative relationship with each dependent variable, implying that players drafted at a younger age play more minutes, earn higher player efficiency ratings, and appear in more all-star games.

Further, we bifurcated our full sample to more closely capture important year effects as would be done using a regression discontinuity model. In 1995, for the first time in 20 years,¹⁵ a player was drafted straight from high school into the NBA.¹⁶ Over the course of the next ten years (1996 to 2005), dozens of other players with no college-level playing experience were selected by teams in the NBA draft. The bilateral enactment of the minimum age rule in 2005 ended the practice, as the 2006 draft did not include any high school players. In order to replicate the natural experiment approach highlighted by Kahn (2000) and Kennedy (2008), we halved our full sample – 1989-1994 (sub-sample #1) and 1995-2000 (sub-sample #2). This allowed us to further tease out the impact age of entry has on career success. As such, the analytical framework here is most accurately described as an indirect test of the NBA's age rule, with 1995's seminal event serving as a mid-point.¹⁷ Similarly, given the *de facto* age rule that was in place from 1976 to 1994, using 1995 as an equalizing fulcrum for our twelve year sample is intuitive and practical. Summary statistics for sub-sample #1 (1989-1994) and sub-sample #2 (1995-2000) are set forth in Table 1.

To address any issues pertaining to selection bias and contemporaneously account for “one and done” players who leave college for the NBA after one year and are the focus of the aforementioned controversy surrounding the practical effects of the NBA's current age rule, we individually coded players and ran a series of selection bias tests to tease out any beneficial effect of one year in college and the actual age when teenagers are drafted (18 or 19). Our group selection bias tests examined whether players who entered the NBA directly from high school have better on-court performance than players entering the league following one year of college (the aforementioned “one and done” players). To conduct the bias tests, a dummy coded variable for the two groups¹⁸ and the same

¹⁵ Moses Malone was drafted straight out of high school in 1974. Darryl Dawkins and Dave Willoughby both followed suit in 1975. Several years earlier, Spencer Haywood had challenged the NBA's then-restrictive age rule requiring all draft eligible players to be four years removed from high school graduation. Haywood's antitrust challenge to the NBA's rule succeeded after the case reached the U.S. Supreme Court, an event that enabled high school players to bypass college and be eligible for the NBA draft.

¹⁶ Kevin Garnett was drafted fifth overall by the Minnesota Timberwolves.

¹⁷ A direct test of the NBA's current age rule would consider player outcomes among those who entered the league just before and just after the imposition of the age rule following the 2005 draft. In 2012, such a direct test is impractical. Given the relatively short amount of time that has passed since the imposition of the rule and the fact that virtually all of the players remain active in the infancy of their NBA careers, the data would be severely censored. The high degree of statistical noise would cause all standard errors to explode, resulting in an imprecise estimation of our variable of interest (*AGE*) as well as all the other control variables. Given these problems, any inferences from such a direct test would be tenuous and superficial.

¹⁸ 0 = players drafted directly out of high school, 1 = quasi-“one and done” players. For the avoidance of doubt, the three non-American players meeting the aforementioned criteria were

player-specific independent variables used in the main analyses¹⁹ were regressed on our three dependent variables.²⁰ The inclusion of the additional dummy variable allowed us to investigate the beneficial effect of one year in college while controlling for age of entry. A censored normal regression model is used because some of the players in both groups ($N=31$) are still active players so their NBA careers have yet to end. The null hypothesis for the group selection bias models is that there will be no difference in career success between “one and done” players and those who entered the NBA straight out of high school. The results for the group selection bias tests are set forth in Table 3.

Results

Regression results for the full sample, sub-sample #1, and sub-sample #2 are set forth in Table 2, with graphs illustrating the fitted values of our three dependent variables (*MNT*, *PER*, and *A-S*) as a function of our variable of interest (*AGE*) set forth in Figure 1. Players who are drafted at a younger age relative to other draftees have, on average, more successful NBA careers. The importance of such precocity is consistent across all three dependent variables (*MNT*, *PER*, and *A-S*) considered here. Players who enter the NBA at a younger age play more minutes per game, earn a higher player efficiency rating, and appear in more all-star games. These general results are further explained when comparing the age-related coefficients in sub-sample #1 and sub-sample #2. Revealingly, the player-level outcomes in sub-sample #2 (1995-2000) are driving the results for the full sample, evidencing the pronounced impact high school players with no college experience have had. Coefficients for our variable of interest – *AGE* – are statistically significant predictors for each dependent variable at the 1% level for both our full sample and sub-sample #2. In addition to being statistically significant, an interpretation of the regression coefficients reveals that our results are practically significant.

dropped from this analysis. Further, given that our variable of interest is age, we dropped the three American players who were drafted at the age of 19 following one year of college, as such players' ages were indistinguishable from the ages of American players who entered the NBA directly from high school. These players were Stephon Marbury, Larry Hughes, and Ricky Davis.

¹⁹ The *NATL* variable was dropped in this analysis because all players included were an American.

²⁰ Such players are listed in Appendix B, with year drafted and age when drafted included.

Table 2. Censored Normal Regression Results

Variable	Full Sample (1989-2000)			Sub Sample 1 (1989-1994)			Sub Sample 2 (1995-2000)		
	MNT	PER	A-S	MNT	PER	A-S	MNT	PER	A-S
AGE	-1.825*** (0.056)	-0.778*** (0.185)	-0.482*** (0.122)	-0.950 (0.593)	-0.340 (0.274)	-0.234 (0.176)	-2.023*** (0.571)	-0.907*** (0.279)	-0.559*** (0.185)
DRFT	-0.612*** (0.056)	-0.181*** (0.026)	-0.093*** (0.017)	-0.627*** (0.073)	-0.164*** (0.034)	-0.085*** (0.022)	-0.659*** (0.087)	-0.219*** (0.043)	-0.111*** (0.028)
EDUC	-5.320** (2.193)	-3.406*** (1.027)	-2.467*** (0.676)	-22.04*** (7.101)	-6.751** (3.276)	-0.886 (2.113)	-3.357 (2.648)	-3.074** (1.288)	-2.467*** (0.845)
PSTN	2.414* (1.342)	-0.371 (0.629)	0.333 (0.414)	1.336 (1.598)	-0.356 (0.737)	0.069 (0.475)	5.231** (2.290)	-0.004 (1.117)	0.905 (0.741)
HT	-7.980 (7.459)	-6.668* (3.496)	-0.017 (2.304)	-8.057 (9.045)	-4.931 (4.173)	1.038 (2.691)	-0.368 (12.467)	-6.380 (6.077)	0.267 (4.037)
NATL	-0.029 (1.549)	-0.283 (0.721)	-0.399 (0.472)	1.867 (2.343)	-0.073 (1.081)	-0.084 (0.697)	0.148 (2.170)	-0.241 (1.046)	-0.628 (0.685)
RACE	2.473** (1.132)	0.482 (0.531)	0.354 (0.348)	4.928*** (1.490)	0.568 (0.689)	0.106 (0.442)	1.268 (1.753)	0.582 (0.853)	0.581 (0.562)
Constant	90.043 (18.368)	50.377 (8.616)	15.408 (5.705)	83.214 (24.143)	39.616 (11.144)	5.898 (7.181)	78.841 (30.266)	53.089 (14.793)	16.90 (9.883)
Total Observations	332	332	332	161	161	161	171	171	171
Censored Observations	55	55	55	3	3	3	52	52	52
Pseudo R ²	0.09	0.07	0.07	0.08	0.04	0.04	0.10	0.08	0.09

Note. Robust standard errors in parentheses. *, **, and *** denote significance at 10, 5 and 1% levels, respectively. Our regression results evidence that players who enter the NBA at a younger age are expected to play more minutes per game, earn a higher player efficiency rating, and appear in more all-star games. These general results from our full sample are supported by the results derived from sub-sample #2.

Among all players in our full sample (1989-2000), for every year older a player is when he enters the league, we expect that he will play close to two minutes less per game, earn a *PER* that is roughly 0.75 lower, and have about 0.5 less all-star game appearances over the course of his NBA career.²¹ The practical effects of being a year older relative to others is even more pronounced among players in sub-sample #2 (1995-2000). Like age, our estimates similarly reveal that increased education at the university level does not result in better on-court outcomes. Players in our full sample with at least some college experience are expected to play over five minutes less per game, earn a *PER* that is 3.4 lower, and participate in almost 2.5 fewer all-star games. A player's draft position proxies talent and ability, as *DRFT* was significant at the 1% level across every specification.²² The remaining control variables did not hold any systematic predictive power vis-à-vis each dependent variable and the different sample restrictions.

Using a completely censored sample of 13 players drafted from 2007 to 2010, Haberstroh (2011) concluded that players who would have likely entered the NBA straight out of high school but were barred by the 2005 age rule do not seem to have better on-court performance than players who entered the NBA directly from high school before the eligibility rule was imposed. Regression results from our group selection bias tests are in line with Haberstroh. Players who entered the NBA straight out of high school played more minutes per game and appeared in more all-star games than players who entered the NBA after one year of college basketball playing experience. In sum, the results of our group selection bias tests are consistent with the results of the main analyses – players who are drafted at a younger age relative to other draftees have better on-court performance. Likewise, the group selection bias tests reject our narrower null hypothesis and imply that players who entered the NBA directly from high school have more successful NBA careers than “one and done” players. As such, we are on safe ground in concluding that there was no selection bias in our main analyses. Regression results for group selection bias tests are set forth in Table 3.

²¹ As a player-level composite metric that is relative in nature and only intuitively meaningful when compared to other players, we acknowledge that a discussion of the practical significance of age on *PER* is somewhat extenuated.

²² Sunk costs may also play a role in how draft pick slotting impacts on-court performance, a topic explored in-depth by Staw and Hoang (1995).

Table 3. Censored Normal Regression Results (Group Selection Bias Tests)

Variable	MNT	PER	A-S
GROUP	-5.528*** (1.395)	0.126 (0.693)	-3.460*** (0.579)
AGE	-0.329*** (0.081)	-2.095*** (0.039)	-0.230*** (0.032)
DRFT	-0.517*** (0.080)	-0.256*** (0.039)	-0.113*** (0.032)
PSTN	1.947 (1.268)	2.415*** (0.579)	7.335*** (0.432)
HT	-33.015*** (0.762)	5.430*** (0.371)	32.438*** (0.300)
RACE	-64.899*** (1.572)	-30.218*** (0.764)	-25.143*** (0.619)
Constant	179.401 (1.572)	80.646 (0.764)	-29.392 (0.619)
Total Observations	31	31	31
Censored Observations	15	15	15
Pseudo R ²	0.04	0.04	0.08

Note. Robust standard errors in parentheses. *** denotes significance at 1% level. Group selection bias tests were conducted to compare the on-court performance between players who entered the NBA straight out of high school and players who entered the NBA after one year of college. The results of such test indicate that players who enter the NBA directly from high school played more minutes per game and appeared in more all-star games than so-called one-and-done players.

Discussion and Conclusion

Our tests pertaining to the NBA age eligibility rule's efficacy tell a number of interrelated stories, all of which question the justifications for the rule and challenge the necessity of the "one size fits all" policy. First, despite the inability to evaluate young players extensively during college-level competition, NBA teams have repeatedly demonstrated their draft day expertise when selecting young players, especially those moving straight from high school to the NBA.²³ Second, there is no systematic evidence of success among late-blooming NBA players. This indicates that NBA-level professional basketball talent is probably manifested and observable no later than the age of 18. Third, there is no evidence that players who played one year of college basketball, while controlling for other factors, perform better than individuals who moved into the NBA straight from high school.

²³ Groothuis, Hill, and Perri (2009) discussed the difficulty of choosing talent in the NBA draft generally.

Our results and policy-related conclusions are neither surprising nor novel. Even a casual observer of professional basketball would likely posit that some of the best players in the NBA over the course of the past decade entered the league straight out of high school. Examples include Kevin Garnett, Kobe Bryant, LeBron James, and Dwight Howard.²⁴ Nevertheless, there are sample-related limitations to our study,²⁵ the most prominent tied to possible non-random sample selection and self-selection among players who partake in the NBA draft.²⁶ Accordingly, we are cautious in not overstating the inferences from our results and careful not to over-generalize our analysis, as it only pertains to the on-court efficacy of the minimum age policy in basketball.²⁷

The NBA doesn't try to defend its rule on ethical, moral, or educational grounds (Lowe, 2011). Beck (2009) quoted NBA Commissioner David Stern: "This is a business decision by the NBA, which is: We like to see our players in competition after high school." The league has also effectively rebutted criticism by pointing out non-sports examples of age rules being imposed, with the most prominent example being the U.S. Constitution's minimum ages set for representatives, senators, and the presidency. Likewise, other prominent sports governing bodies such as the National Football League (NFL) impose age eligibility rules.²⁸ As explained by Abbott (2010), the NBPA also faces potentially problematic issues related to the age rule. Namely, marginal veteran NBA players (and union members) looking to preserve their lucrative spot at the end of a team's bench have a strong incentive to see better/younger players excluded from the league for as long as possible. NPBA voting membership is limited to current NBA players, not prospective undrafted players.

²⁴ Haberstroh (2011) summarized: "The league was able to convince the masses that high schoolers aren't fit for the big show despite overwhelming evidence to the contrary. Here's the hidden truth about David Stern's NBA: Most of its stars never went to college."

²⁵ Heckman (1979) and its progeny address sample selection issues in detail.

²⁶ As discussed above, our sample: (i) is partially censored; (ii) does not include second round draft picks; (iii) does not include players who were draft-eligible but were not drafted; and (iv) lends itself only to an indirect test of the NBA's age eligibility rule at the present time.

²⁷ Haberstroh (2011) addressed such sample-related issues by using an effective rhetorical argument: "The skeptic will argue, 'Obviously, the high school prospects did better than the guys who weren't good enough to come out early,' *but that's exactly the point. Why are we forbidding the most valuable prospects from the [NBA]?*" (emphasis added)

²⁸ The NFL's minimum age rule was upheld in litigation involving former Ohio State University running back Maurice Clarett.

Weiss (2005) highlighted some of the inherent difficulties in any sport-related age rule policy:

Chronological age is not equivalent to social, emotional, cognitive, and anatomical age. We need age eligibility rules, but we also know that chronological age, while we use it as a main index for classifying athletes, is not reliably associated with these other age or maturity levels. Two adolescents of the same age can be widely different in terms of social and emotional types of maturity (p. 2).

Handling draft eligibility issues on a case-by-case basis in the NBA has been advocated by Vitale (2005) and is employed by other governing bodies such as the Ladies Professional Golf Association (LPGA) Tour. The LPGA Tour requires all full-time playing members to be at least 18, but has a mechanism in place whereby underage players can apply for tour membership earlier (Rodenberg, Gregg, and Fielding, 2009). For example, in 2011 the LPGA Tour allowed 16 year old Lexi Thompson to join the tour following a full vetting of her comprehensive application. In an ironic (and revealing) twist, such a case-by-case evaluation is what resulted following the *Haywood v. NBA* Supreme Court decision, with the NBA required to consider “hardship” waivers for draft eligibility. Absent abolishment of the rule, perhaps a more nuanced and individualized consideration of a prospective player’s draft eligibility would be prudent given the dearth of evidence pointing to any on-court efficacy of the NBA’s age eligibility rule.

Appendix A. Players Included in Data Set

1989		1990		1991	
Name	Age	Name	Age	Name	Age
Pervis Ellison	22	Derrick Coleman	23	Larry Johnson	22
Danny Ferry	23	Gary Payton	22	Kenny Anderson	21
Sean Elliott	23	Mahmoud Abdul-Rauf	21	Billy Owens	22
Glen Rice	22	Dennis Scott	22	Dikembe Mutombo	25
J.R. Reid	21	Kendall Gill	22	Steve Smith	22
Stacey King	22	Felton Spencer	22	Doug Smith	22
George McCloud	22	Lionel Simmons	22	Luc Longley	22
Randy White	22	Bo Kimble	24	Mark Macon	22
Tom Hammonds	22	Willie Burton	22	Stacey Augmon	23
Pooh Richardson	23	Rumeal Robinson	24	Bison Dele	22
Nick Anderson	23	Tyrone Hill	22	Terrell Brandon	21
Mookie Blaylock	22	Alec Kessler	23	Greg Anthony	24
Michael Smith	24	Loy Vaught	22	Dale Davis	22
Tim Hardaway	23	Travis Mays	22	Rich King	22
Todd Lichti	22	Dave Jamerson	23	Anthony Avent	23
Dana Barros	22	Terry Mills	23	Chris Gatling	24
Shawn Kemp	20	Jerrold Mustaf	21	Victor Alexander	22
B.J. Armstrong	22	Duane Causwell	22	Kevin Brooks	22
Kenny Payne	23	Dee Brown	22	LaBradford Smith	22
Jeff Sanders	23	Gerald Glass	23	John Turner	24
Blue Edwards	24	Jayson Williams	22	Eric Murdock	23
Byron Irvin	23	Tate George	22	LeRon Ellis	22
Roy Marble	23	Anthony Bonner	22	Stanley Roberts	21
Anthony Cook	23	Dwayne Schintzius	22	Rick Fox	22
John Morton	22	Alaa Abdelnaby	22	Mark Randall	24
Vlade Divac	21	Lance Blanks	24	Pete Chilcutt	23
Kenny Battle	25	Elden Campbell	22		

Appendix A. Players Included in Data Set (Continued)

1992		1993		1994	
Name	Age	Name	Age	Name	Age
Shaquille O'Neal	20	Chris Webber	22	Glenn Robinson	21
Alonzo Mourning	22	Shawn Bradley	23	Jason Kidd*	21
Christian Laettner	23	Anfernee Hardaway	23	Grant Hill*	22
Jim Jackson	22	Jamal Mashburn	22	Donyell Marshall	21
LaPhonso Ellis	22	Isaiah Rider	21	Juwan Howard*	21
Tom Gugliotta	23	Calbert Cheaney	22	Sharone Wright	21
Walt Williams	22	Bobby Hurley	22	Lamond Murray	21
Todd Day	22	Vin Baker	22	Brian Grant	22
Clarence Weatherspoon	22	Rodney Rogers	22	Eric Montross	23
Adam Keefe	22	Lindsey Hunter	23	Eddie Jones	23
Robert Horry	22	Allan Houston	23	Carlos Rogers	23
Harold Miner	21	George Lynch	22	Khalid Reeves	22
Bryant Stith	22	Terry Dehere	24	Jalen Rose	21
Malik Sealy	22	Scott Haskin	23	Yinka Dare	22
Anthony Peeler	23	Doug Edwards	22	Eric Piatkowski	24
Randy Woods	22	Rex Walters	22	Clifford Rozier	22
Doug Christie	22	Greg Graham	20	Aaron McKie	22
Tracy Murray	21	Luther Wright	22	Eric Mobley	24
Don MacLean	22	Acie Earl	23	Tony Dumas	22
Hubert Davis	22	Scott Burrell	23	B.J. Tyler	23
Jon Barry	23	James Robinson	24	Dickey Simpkins	22
Oliver Miller	22	Chris Mills	23	Bill Curley	22
Lee Mayberry	22	Ervin Johnson	23	Wesley Person	23
Latrell Sprewell	22	Sam Cassell	23	Monty Williams	23
Elmore Spencer	23	Corie Blount	22	Greg Minor	23
Dave Johnson	22	Geert Hammink	21	Charlie Ward	24
Byron Houston	23	Malcolm Mackey	25	Brooks Thompson	24

Note: * denotes players still active.

Appendix A. Players Included in Data Set (Continued)

1995		1996		1997	
Name	Age	Name	Age	Name	Age
Joe Smith	20	Allen Iverson	21	Tim Duncan*	21
Antonio McDyess*	21	Marcus Camby*	22	Keith Van Horn	22
Jerry Stackhouse*	21	Shareef Abdur-Rahim	20	Chauncey Billups*	21
Rasheed Wallace	21	Stephon Marbury	19	Antonio Daniels	22
Kevin Garnett*	19	Ray Allen*	21	Tony Battie*	21
Bryant Reeves	22	Antoine Walker	20	Ron Mercer	21
Damon Stoudamire	22	Lorenzen Wright	21	Tim Thomas	20
Shawn Respert	23	Kerry Kittles	22	Adonal Foyle	22
Ed O'Bannon	23	Samaki Walker	20	Tracy McGrady*	18
Kurt Thomas*	23	Erick Dampier*	21	Danny Fortson	21
Gary Trent	21	Todd Fuller	22	Tariq Abdul-Wahad	23
Cherokee Parks	23	Vitaly Potapenko	21	Austin Croshere	22
Corliss Williamson	22	Kobe Bryant*	18	Derek Anderson	23
Eric Williams	23	Peja Stojakovic*	21	Maurice Taylor	21
Brent Barry	24	Steve Nash*	22	Kelvin Cato	23
Alan Henderson	23	Tony Delk	22	Brevin Knight	22
Bob Sura	22	Jermaine O'Neal*	18	Johnny Taylor	23
Theo Ratliff*	22	John Wallace	22	Chris Anstey	22
Randolph Childress	23	Walter McCarty	22	Scot Pollard	22
Jason Caffey	22	Zydrunas Ilgauskas*	22	Paul Grant	24
Michael Finley	22	Dontae Jones	22	Anthony Parker*	22
George Zidek	22	Roy Rogers	23	Ed Gray	22
Travis Best	23	Efthimis Rentzias	26	Bobby Jackson	24
Loren Meyer	23	Derek Fisher*	22	Rodrick Rhodes	24
David Vaughn	22	Martin Muursepp	22	John Thomas	22
Sherell Ford	23	Jerome Williams	23	Charles Smith	22
Mario Bennett	22	Brian Evans	23	Jacque Vaughn	22
		Priest Lauderdale	23	Keith Booth	23
		Travis Knight	22		

Note: * denotes players still active.

Appendix A. Players Included in Data Set (Continued)

1998		1999		2000	
Name	Age	Name	Age	Name	Age
Michael Olowokandi	23	Elton Brand*	20	Kenyon Martin*	23
Mike Bibby*	20	Steve Francis	22	Stromile Swift	21
Raef LaFrentz	22	Baron Davis*	20	Darius Miles	19
Antawn Jamison*	22	Lamar Odom*	20	Marcus Fizer	22
Vince Carter*	21	Jonathan Bender	18	Mike Miller*	20
Robert Traylor	21	Wally Szczerbiak	22	DerMarr Johnson	20
Jason Williams*	23	Richard Hamilton*	21	Chris Mihm	21
Larry Hughes	19	Andre Miller*	23	Jamal Crawford*	20
Dirk Nowitzki*	20	Shawn Marion*	21	Joel Przybilla*	21
Paul Pierce*	21	Jason Terry*	22	Keyon Dooling*	20
Bonzi Wells	22	Trajan Langdon	23	Jerome Moiso	22
Michael Doleac	21	Aleksandar Radojevic	23	Etan Thomas*	23
Keon Clark	23	Corey Maggette*	20	Courtney Alexander	23
Michael Dickerson	23	William Avery	20	Mateen Cleaves	23
Matt Harpring	25	Ron Artest*	20	Jason Collier	23
Bryce Drew	24	Cal Bowdler	22	Hedo Turkoglu*	21
Rasho Nesterovic	22	James Posey*	22	Desmond Mason	23
Mirsad Turkcan	23	Quincy Lewis	22	Quentin Richardson*	20
Pat Garrity	22	Dion Glover	21	Jamaal Magloire*	22
Roshown McLeod	23	Jeff Foster*	22	Speedy Claxton	23
Ricky Davis	19	Kenny Thomas	22	Morris Peterson*	23
Brian Skinner*	22	Devean George	22	Donnell Harvey	20
Tyronn Lue	21	Andrei Kirilenko*	20	DeShawn Stevenson*	19
Felipe Lopez	24	Tim James	23	Dalibor Bagaric	20
Al Harrington*	18	Vonteego Cummings	23	Jake Tsakalidis	21
Samuel Jacobson	23	Jumaine Jones	20	Mamadou N'Diaye	25
Vladimir Stepania	22	Scott Padgett	23	Primož Brezec	22
Corey Benjamin	20	Leon Smith	21	Erick Barkley	24
Nazr Mohammed*	21			Mark Madsen	24

Note: * denotes players still active.

Appendix B.

Players Used in the Group Selection Bias Test ($N = 31$)

Players entering the NBA out of high school			Quasi-one and done players based on age		
Name	Year Drafted	Age	Name	Year Drafted	Age
Kevin Garnett	1995	19	Shawn Kemp	1989	20
Kobe Bryant	1996	18	Shaquille O'Neal	1992	20
Jermaine O'Neal	1996	18	Chris Webber	1993	20
Tracy McGrady	1997	18	Joe Smith	1995	20
Al Harrington	1998	18	Shareef Abdur-Rahim	1996	20
Jonathan Bender	1999	18	Antoine Walker	1996	20
Darius Miles	2000	19	Samaki Walker	1996	20
DeShawn Stevenson	2000	19	Tim Thomas	1997	20
			Mike Bibby	1998	20
			Corey Benjamin	1998	20
			Elton Brand	1999	20
			Baron Davis	1999	20
			Lamar Odom	1999	20
			Corey Maggette	1999	20
			William Avery	1999	20
			Ron Artest	1999	20
			Jumaine Jones	1999	20
			Mike Miller	2000	20
			DerMarr Johnson	2000	20
			Jamal Crawford	2000	20
			Keyon Dooling	2000	20
			Quentin Richardson	2000	20
			Donnell Harvey	2000	20

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