Rookie-scale extension effects on Team Success Contribution in the NBA

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Theoretical Framework and Motivation

The NBA faces classic moral hazard within the principal-agent framework (Holmström, 1979), despite high visibility of on-court performance. Stiroh (2007) found that players adjust effort throughout the contract cycle, peaking during the contract year and declining afterward. His analysis includes rookies and veteran players. However, it precedes for the most part the current rookie-scale extensions framework introduced in the revisited 1999 Collective Bargaining Agreement. Players drafted in the 1st round and starting their 4th season are eligible to sign the extension,with contracts being effective from season 5.

My analysis examines how rookie-scale extensions influence players' contribution to team success in seasons 4 to 6. Unlike Stiroh, I hypothesize that young players who receive extensions might respond differently than veterans due to their different career stages and aspirations. Younger players arguably experience a shift in incentives — initially motivated to demonstrate individual talent to secure contracts, then shifting focus toward team success once financially secure. The shift is assumed to begin as soon as the extension is signed, rather than when contracts take effect. It could resolve the type of goal conflict that Locke et al. (1994) found to negatively impact performance, as players no longer need to choose between personal showcasing and team contribution.

Data

The sample includes player observations from the top 14 picks drafted between 2007-2015 (9 cohorts): 123 observations in season 4, 115 in season 5, and 105 in season 6. The unit of observation is player-season. Data are collected from websites specialized in NBA (see Table 1). To address endogeneity, I employ a two-stage least squares approach. The first-stage equation is:

$$\textbf{\textit{Extension}}_{\textbf{\textit{i}}} = \boldsymbol{\alpha_1} + \boldsymbol{\beta_1}(\text{Draft Position}_i) + \boldsymbol{\gamma_1 X_i} + \boldsymbol{\delta_{1t}} + \boldsymbol{\eta_{1,\text{team}}} + \boldsymbol{\varepsilon_{1,it}} \quad (1)$$

The second-stage equation is:

$$\boldsymbol{WS_{it}} = \boldsymbol{\alpha_2} + \boldsymbol{\beta_2}(\widehat{\text{Extension}}_i) + \boldsymbol{\gamma_2 X_i} + \boldsymbol{\delta_{2t}} + \boldsymbol{\eta_{2,\text{team}}} + \boldsymbol{\varepsilon_{2,it}} \quad (2)$$

where WS_{it} is the outcome variable Win Shares (WS) measuring player i's contribution to team success in season t, Extension$_i$ is a binary treatment variable indicating whether the player signed a rookie-scale extension, Draft Position$_i$ is the reciprocal of player i's draft pick number, X_i is a set of control variables capturing pre-treatment patterns (seasons 1-3) including performance trends and managerial decisions, δ_t represents draft year fixed effects, and η_{team} accounts for team fixed effects. $\widehat{\text{Extension}}_i$ represents the predicted values from the first stage. All control variables are measured before the extension decision. Detailed variable descriptions are in Table 2.

Identification Strategy

Contracts extensions in professional sports are contingent on player performance, creating reverse causality. Following Angrist and Chen (2011), I exploit draft position as an

instrumental variable. Pick number 1 has a substantially higher extension rate (78%) compared to lower picks, typically around 30%, (see Figure 1) therefore I use the reciprocal of draft position to capture this non-linear relationship.

The decision to extend a player based on their draft position is, in part, influenced by organizational factors such as reputation and image, especially for higher picks.The exclusion restriction requires that draft position affects WS only through extensions. Draft position reflects initial talent projections, but the crucial three-year gap before extension decisions allows teams to observe actual performance, making initial projections outdated and irrelevant to player valuation by the time WS are measured in seasons 4-6. By controlling for performance metrics and organizational factors, I aim to isolate the draft position-extension relationship. However, this identification strategy has limitations, as some organizational factors influencing extension decisions may also affect playing opportunities and consequently WS.

Results

Summary statistics in Table 3 confirm substantial selection bias in extension decisions, with better pre-treatment measures among extended players: higher PER trends (1.20 vs -0.70), increased minutes (1.73 vs -1.39), greater durability (0.87 vs 0.79), and more all-rookie selections (68% vs 34%).

Table 4 presents the results of season 4 IV in three specifications. The extension effect ranges from 6.74 to 5.07 with full controls, all significant at 5% level. The statistical significance confirms a meaningful positive effect despite SE=2.08. First-stage F-statistics decline from 11.11 to 7.38 as controls are added, falling below the conventional threshold of 10. Table 5 shows dynamic effects using my preferred specification with full controls (see Figure 2), which addresses the substantial selection bias evident in Table 3. Seasons 5-6 show no significant effects, with comparable first-stage F-statistics (7.38-8.98).

Players who receive rookie extensions contribute 5.07 more Win Shares in season 4 than they would have without the extension, but this causal effect disappears by season 5 (0.06) and turns slightly negative in season 6 (-0.86). While adding controls weakens my instrument below the conventional threshold of 10, suggesting potential weak instrument concerns, their consistency across seasons (7.38-8.98) suggests that the declining extension effect is not due to changes in instrument strength but could represent a behavioral pattern. The short-lived nature of these effects indicates that while extensions initially resolve goal conflicts as hypothesized, this alignment is temporary as other factors emerge.

Conclusion and Limitations

Player development trajectories and team performance may confound the effects of goal alignment. Win Shares are tied to team wins (max 82 per season), meaning players on successful teams cannot infinitely increase their individual WS even if their contribution improves, potentially explaining the strong season 4 effects followed by declines. The temporary goal alignment during season 4 indicates that financial security initially resolves the conflict between individual showcasing and team contribution, but this alignment diminishes by seasons 5-6. This suggests organizations should implement additional team-oriented performance incentives in later contract years. Additional limitations include the sample's restriction to top 14 picks, reduced statistical power from the small sample, and potential unmeasured confounders that could bias results despite controls.

Appendix

Table 1: Variable Mapping and Data Sources

Variable	Code	Source/Retrieved
Win Shares	WS_num	Basketball Reference (2024)
Extension	rookie_extension_signed_v	RealGM (2024)
Draft Position	draft_value_inverse	Basketball Reference (2024)
Availability/Durability	availability_durability	Basketball Reference (2024)
All-Rookie Team	all_rookie_team_num	Basketball Reference (2024)
PER Trend	PER_trend_pos_adj	Basketball Reference (2024)
Team Success Trend	team_success_index_trend	Land of Basketball (2024)
Minutes Trend	minutes_trend	Basketball Reference (2024)
Team Switched	team_switched_num	Basketball Reference (2024)
GM Change	GM_change_num	Basketball Reference (2024)

Note: Win Shares is the outcome variable; Extension is the treatment variable; Draft Position is the instrumental variable; remaining variables are controls.

Table 2: Variable Descriptions

Variable	Description
Outcome Variable	
Win Shares	A metric to evaluate a player's contribution to team success. WS estimates the number of wins a player contributes to their team, combining offensive efficiency (scoring and involvement) and defensive performance.
Treatment Variable	
Extension	Binary variable indicating whether the player received a rookie-scale extension.
Instrumental Variable	
Draft Position	Reciprocal of player's draft pick number, giving more weight to higher picks. Used as an instrument for extension decisions.
Control Variables	
Availability/Durability	Games played relative to possible games in first three seasons; measures injury risk.
All-Rookie Team	Binary indicator of All-Rookie team selection; signals exceptional early performance.
PER Trend	Position-adjusted efficiency trajectory from seasons 1-3; captures relative skill development.
Team Success Trend	Measures how player's statistical contributions translate to team winning percentage.
Minutes Trend	Change in playing time from seasons 1-3; indicates coach trust evolution.
Team Switched	Binary indicator of whether player changed teams before extension decision.
GM Change	Binary indicator of general manager change since player was drafted.

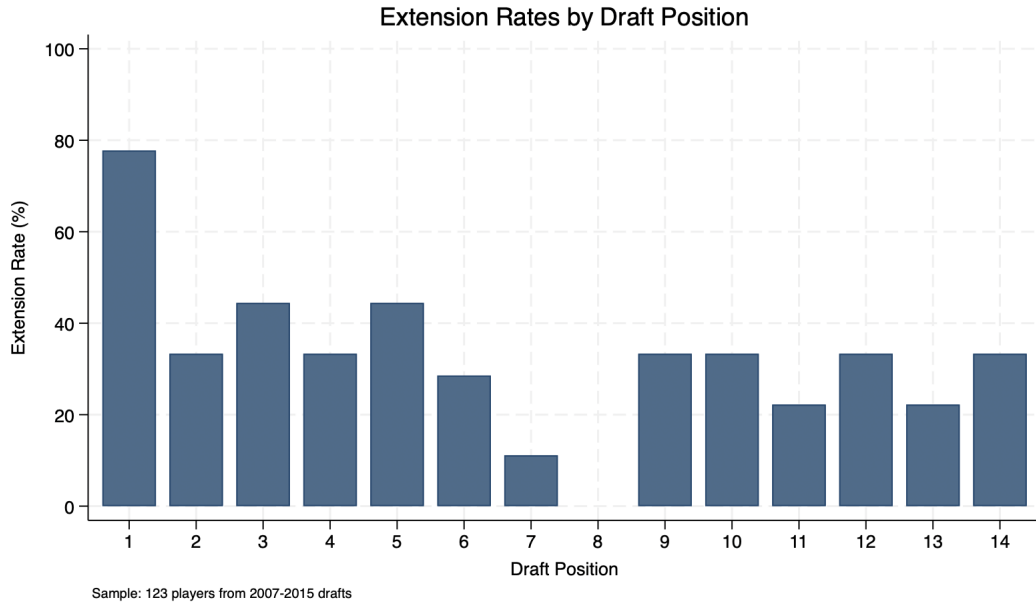Note: All control variables are measured before the extension decision.

Figure 1: Extension Rates by Draft Position

Table 3: Summary Statistics by Extension Status (Season 4)

Variable	Extension	No Extension	Overall
PER trend	1.20	-0.70	-0.08
	(3.12)	(2.62)	(2.92)
Minutes trend	1.73	-1.39	-0.37
	(6.77)	(8.24)	(7.90)
Availability durability	0.87	0.79	0.82
	(0.12)	(0.17)	(0.16)
All-rookie team	0.68	0.34	0.45
	(0.47)	(0.48)	(0.50)
GM change	0.42	0.52	0.49
	(0.50)	(0.50)	(0.50)
Team switched	0.12	0.57	0.42
	(0.33)	(0.50)	(0.50)
Observations	40	83	123

Note: Standard deviations in parentheses.

Table 4: IV Regression Results for Season 4

	(1) No Controls	(2) Fixed Effects	(3) Full Controls
Extension Effect	6.74***	5.52***	5.07**
	(1.99)	(1.49)	(2.08)
First-stage F	11.11	9.52	7.38
R-squared	0.14	0.52	0.59
Fixed Effects	No	Yes	Yes
Control Variables	No	No	Yes
Observations	123	123	123

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Dynamic Extension Effects Across Seasons (Preferred Specification)

	(1) Season 4	(2) Season 5	(3) Season 6
Extension Effect	5.07**	0.06	-0.86
	(2.08)	(1.98)	(2.16)
First-stage F	7.38	8.98	7.61
R-squared	0.59	0.51	0.49
Fixed Effects	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes
Observations	123	116	105

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: All models include team and draft year fixed effects plus control variables
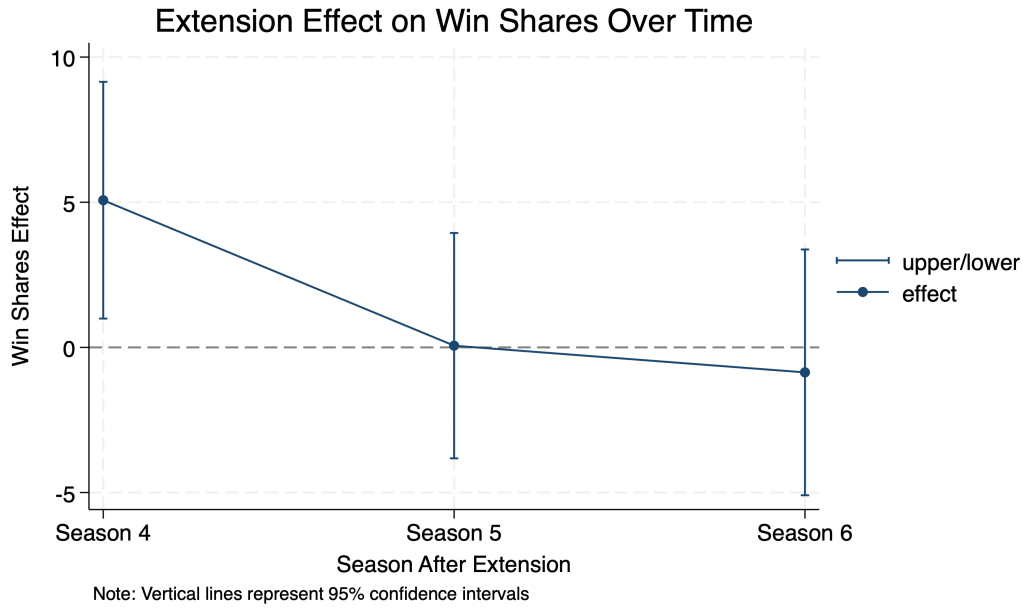for performance trends, durability, team context, and organizational factors.

Figure 2: Extension Effect on Win Shares Over Time

Table 6: First-Stage Regression Results

| | Season 4 | | | Season 5 | Season 6 |
	(1)	(2)	(3)	(3)	(3)
Draft Position	0.533***	0.615***	0.495***	0.618***	0.622***
	(0.160)	(0.202)	(0.185)	(0.209)	(0.229)
Fixed Effects	No	Yes	Yes	Yes	Yes
Control Variables	No	No	Yes	Yes	Yes
F-statistic	11.11	9.52	7.38	8.98	7.61
R-squared	0.078	0.318	0.463	0.474	0.463
Observations	123	123	123	116	105

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

References

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