Losing to Win: Tournament Incentives in the National Basketball Association

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The focus of tournament models has been rank-order compensation schemes whereby participants receive higher payments for higher relative performance, either incrementally or winner-takes-all. Our research focuses on a unique tournament that offers rewards for both winning and losing, specifically the National Basketball Association's regularly scheduled season of games. We examine three NBA seasons to determine whether team performance responded to changes in the underlying tournament incentives provided by the NBA's introduction and restructuring of the lottery system to determine draft order. Our results yield strong evidence that NBA teams are more likely to lose when incentives to lose are present.

> There had been a lot of talk that finishing last in a conference might be incentive enough for a team not to try as hard to win late in the season, and try to finish last. There has never been any evidence of this happening, but with only a one in seven chance to get the first pick, it would remove all possible cause to do that. (Russ Granik, executive vice president, National Basketball Association [DuPree 1985, p. C6])

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I. Introduction

A tournament compensation mechanism is defined as any compensation method with which a principal rewards its agents based solely on the agents' relative performance. In other words, any agent's return from exerting effort (e.g., a wage, payment, or promotion) depends only on that agent's performance relative to that of other tournament competitors; absolute performance does not play a role. The growing theoretical literature on tournament theory recognizes situations in which principals can elicit first-best outcomes with respect to its agents' choices of effort.[1] The literature suggests that, to the extent performance is correlated with effort, as the incentive structure (i.e., reward structure) that defines rewards for finishing with a higher ordinal rank changes, the effort level exerted to achieve a higher rank changes. In particular, as the rewards for finishing with a higher rank increase, tournament theory predicts that the effort devoted to activities that contribute to a higher rank will increase. Again, to the extent that effort and performance are correlated, we would expect to see an improvement in performance.

Our article is unique to the empirical literature that examines the predictions of tournament theory in that it examines a tournament that has explicit rewards for both winning and losing, namely, the National Basketball Association's (NBA) schedule of regular-season games. The sporting environment provides a natural context with which to examine tournament incentives.[2] In our context, the better a basketball team performs during the course of the 82-game season, the more likely the team will advance to the NBA's postseason playoffs. The postseason not only brings with it a greater prestige but also higher revenues generated from the additional games. Relative rank not only determines playoff eligibility in the NBA, but it also determines the quality of the team's opponents in the playoffs (i.e., the team's seeding in the postseason tournament). In the NBA's playoff system, higher-ranked teams are assigned to play inferior (lower relative rank) teams and also play a greater proportion of playoff games at their home venue. There is both an incentive to become a playoff team and, once assured a spot in the playoffs, there may be an incentive to improve performance to attain a better seeding in the postseason playoffs.

[1] See, e.g., Lazear and Rosen (1981), and Green and Stokey (1983). For a concise review of the tournament literature, see Prendergast (1999). More comprehensive reviews can be found in McLaughlin (1988), and Cooper, Graham, and Dyke (1993).

[2] For examples of studies that use sports data to test tournament theory predictions, see Ehrenberg and Bognanno (1990*a*, 1990*b*), Becker and Huselid (1992), Frick and Klaeren (1997), McClure and Spector (1997), and Ferrall and Smith (1999).

On the other hand, teams that perform poorly and, therefore, have relatively low rankings may not qualify for the postseason playoffs. For those teams eliminated from consideration for the playoffs, the NBA has designed a system that may give teams an incentive to exert even less effort than would otherwise be observed, namely, the existence of the NBA draft. The NBA effectively rewards poorly performing teams with better draft selections from the pool of amateur talent. Once teams are eliminated from playoff contention, tournament theory suggests that they should have an incentive to lose in order to obtain higher-quality draft selections. While the allocation of new talent to lower-ranked teams can contribute to overall league parity, the shirking effect can be detrimental to the health of any sports league.[3]

To test the predictions of tournament theory, we use data on the performance of NBA teams from the 1983–84, 1984–85, and 1989–90 regular seasons. In this setting, information on the incentive structures concerning winning and losing (i.e., playoff seeding and draft-choice ordering) are known, as are measures of team performance (i.e., win or lose). Under reasonable assumptions, a team's collective performance in a game can be related to the collective effort exerted, and then predictions on outcomes can be drawn. In addition, data are available to control for factors other than the incentive structure that could conceivably affect performance. These include quality measures of opposing teams and whether a game was played on a team's home court.

In each year of our sample, the NBA employed a different system of allocating better draft choices to nonplayoff teams. In the 1983–84 season, draft order was determined strictly by inverse rank. In this setting, there is a clear incentive for nonplayoff teams to exert less winning effort (more losing effort) in an attempt to obtain a better draft choice. Recognizing the incentives to shirk that the previous system promoted, the NBA established its first version of the NBA draft lottery in 1984–85. In this system, the nonplayoff teams were given equal probabilities of obtaining the top draft choices. Under this scenario, it would seem that teams not making the postseason playoffs no longer had the incentive to lose. Finally, in an effort to improve league parity, the NBA changed the draft lottery in 1989–90 to give teams with worse regular season records a greater probability of obtaining higher draft choices in the lottery. Again, with this change in the incentive structure, we would expect to see nonplayoff teams racing for the bottom of the standings. Our data, therefore, allow us to measure any change in behavior caused by corresponding changes in the underlying incentives.

Section II briefly reviews and discusses the results from the tournament

[3] Fan interest, team revenues, and attendance clearly depend on the outcome of the game being uncertain ex ante.

literature that are important to our study. Section III details the structure of the NBA and gives a brief history of the draft and the draft lottery. We describe our data and discuss our empirical methodology in Section IV, and our results are reported in Section V. We find that, controlling for venue and team quality, nonplayoff teams were approximately 2.5 times more likely to lose in 1983–84 than their playoff-bound counterparts. In 1984–85, the season in which the NBA instituted its equally weighted draft lottery system, we find that nonplayoff teams were no more likely to lose than playoff-bound teams. Finally, when the NBA introduced the weighted draft lottery in 1989–90, nonplayoff teams were approximately 2.2 times more likely to lose than playoff-bound teams. Our results indicate that NBA teams did indeed respond to tournament incentives in a predictable, but potentially undesirable, manner.

II. A Brief Review of Tournament Theory

In their seminal article, Lazear and Rosen (1981) describe the rank-order tournament as a form of labor contract. The obvious benefit of this type of compensation is that output need not be perfectly monitored by the principal. For example, it may be easier to determine if one pile of widgets is bigger than another than to individually count the widgets in each pile. Lazear and Rosen theoretically show that the difference in the wages paid to the "winners" and the "losers" in the tournament can be set to ensure optimal effort from the principal's perspective. In our context, the principal is the NBA, its agents are the teams that make up the league, and the tournament can be thought of as the entire regular season of games.[4]

Rewards are given to relatively good teams in the form of an invitation to the postseason playoffs. In this tournament setting, teams exert effort until the expected marginal benefit of effort is offset by its marginal cost. Under reasonable assumptions, it can be shown that as the difference in rewards from winning and losing increases, the team will exert more winning effort. This effect has been empirically examined by a number of authors. For example, Ehrenberg and Bognanno (1990*a,* 1990*b*) determine that golf players increase efforts (and, therefore, lower scores) as the prize money for which they compete increases. Additionally, because the gains in prize money are convex (the gain is greater when moving from second to first place than when moving from third to second place), they predict and subsequently verify that efforts depend on each player's

[4] Tournament theory has come under some criticism, not the least of which is the tournament's impact on productivity when teamwork is important. See, e.g., Dye (1984), Milgrom and Roberts (1988), Lazear (1989), Drago and Turnbull (1991), and Main, O'Reilly, and Wade (1993). In our context, however, teams are not viewed as inputs that must work together.

starting position. Becker and Huselid (1992) show that higher prizes result in faster (though riskier) driving by professional NASCAR drivers. In a study outside of the sports context, Knoeber (1989) and Knoeber and Thurman (1994) examine the broiler chicken industry and find that the higher prizes awarded by large broiler companies to individual farmers result in better performance.[5]

Relatively bad teams in the NBA, on the other hand, are given rewards in the form of more valuable draft selections. Recall that the NBA explicitly rewards teams with poor tournament showings with better selections from the draft of amateur talent. If we redefine effort from winning effort to losing effort, then it is clear that as the reward for losing increases, teams should exert less winning effort and more losing effort, and performance should decline. Although the empirical evidence in the literature seems to generally support the predictions of tournament theory, none of the tournaments examined thus far have the added dimension of incorporating rewards for those participants who perform relatively poorly. To our knowledge, this study is the first to document these "race-to-the-bottom" incentives.

III. History of the NBA Draft and Draft Lottery

The NBA draft is held annually after the completion of the league's playoffs. During the draft, teams select from eligible college (and more recently, high school) basketball players. The determination of the order of selection has changed throughout the recent history of the NBA.

The NBA is divided into two conferences, the Western Conference and the Eastern Conference (see fig. 1). The top eight teams (in terms of win-loss records) from each conference advance to the league's playoffs. Not only does relative rank determine playoff eligibility, but it also determines a team's position in its conference's playoff bracket. Under NBA rules, within each conference, higher-ranked teams are matched against lower ranked teams.[6] The higher seed in each pairing also has the advantage of playing the majority of its series' games at its home venue. The playoffs, in addition to eventually determining the overall league champion, offer rewards to the owners, coaches, and players of qualifying teams through extra ticket and television revenue, performance bonuses, and negotiation leverage in future contract dealings.

In the first season of our sample, 1983–84, the teams with the worst

[5] For other empirical confirmations of tournament theory, see Drago and Heywood (1991), Main, O'Reilly, and Wade (1993), Main (1994), Ferrall (1996), Frick and Klaeren (1997), Xu (1997), and Eriksson (1999). Some studies have found ambiguous results; see, e.g., Kordana (1995), and McClure and Spector (1997).

[6] The first-place team in the conference plays the eighth-place team, the second-place team plays the seventh-place team, etc. Eventually, the winner of each conference playoff plays in the NBA finals to determine the overall league champion.

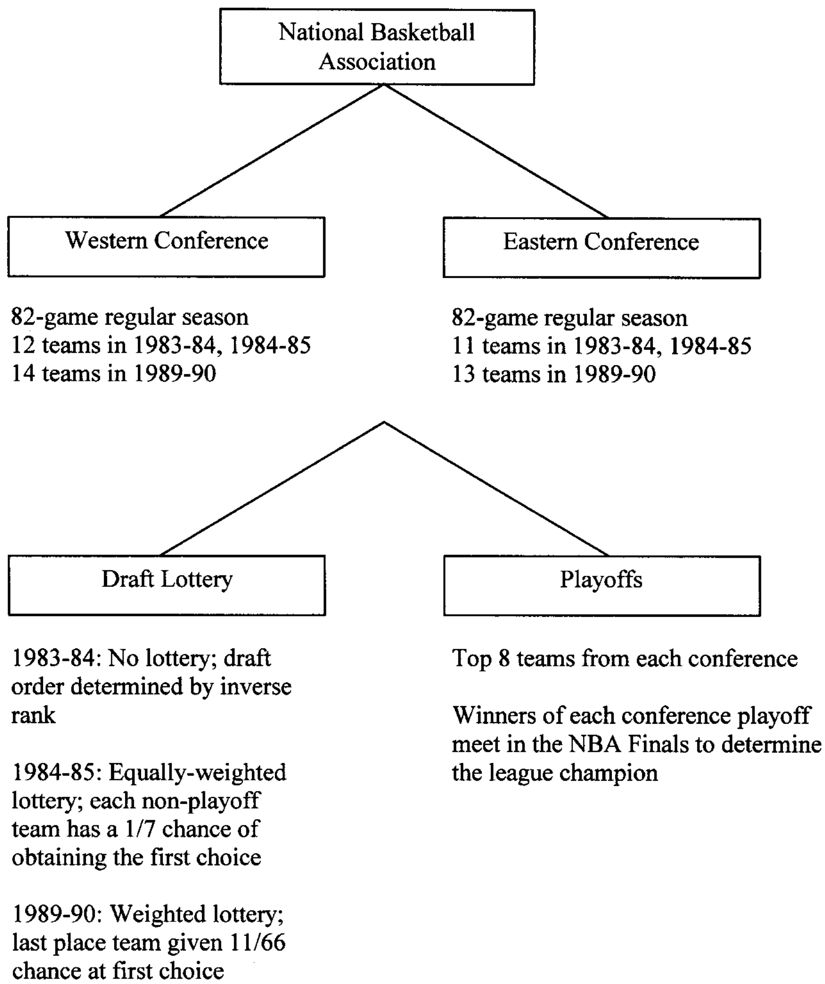

FIG. 1.—Structure of the National Basketball Association, 1983–84, 1984–85, and 1989–90

win-loss record from each conference flipped a coin to determine the first and second draft positions.[7] After these two draft positions were determined, the ordering of subsequent draft positions was determined strictly by overall league rank (from worst to best) as determined by win-loss records. As discussed in the previous section, teams not making the playoffs under this draft scheme have a definite incentive to lose in order to improve their draft order.

Under much scrutiny from the media and fans, the NBA instituted the

[7] This system existed from 1966 to 1984.

draft lottery prior to the 1984–85 season.[8] In this setting, the seven non-playoff teams were each given an equal chance (1/7) of obtaining the first draft position. After the first position was determined, each remaining team had a 1/6 chance of obtaining the second draft pick. This process continued until the first seven draft positions were filled. Under this new lottery system, being the worst team in each conference was no better than being any other nonplayoff team. Therefore, once it was determined that a team would not make the playoffs, the incentives to lose in order to obtain a better draft position disappeared.

Recall that the league instituted the original draft lottery to address the problem of shirking. As a consequence of the equally weighted lottery, however, talent was not always allocated to the teams that needed it most.[9] Second, the league had expanded from 23 teams in 1984–85 to 27 teams in the 1989–90 season. In an effort to design a system that would promote league parity among teams, the NBA changed the draft lottery's structure prior to the 1989–90 season.[10] In this lottery, each of the (now 11) non-playoff teams was assigned a weight that was a function of its league standing. The last place team in the league (with the worst win-loss record) was given an 11/66 (16.67%) chance of obtaining the first selection, the second-to-last team was given a 10/66 (15.15%) chance, and so on. The best nonplayoff team was given a mere 1/66 (1.52%) chance at the first selection. In addition, to ensure that the worst team in the league received some talent, only the first three draft selections were determined by the lottery. After these three positions were drawn, the remaining eight non-playoff teams were assigned draft orders corresponding to their overall win-loss records. While this scheme was likely to allocate talent more efficiently in the sense of worse teams receiving better players, the weighted lottery should have also brought back the incentive to shirk. Again, the lower a team falls in the rankings, the higher is that team's probability of receiving a better draft choice.

We would expect, however, that the incentive to shirk was less under the weighted-lottery scenario used in the 1989–90 season than under the

[8] There was talk of teams losing games on purpose in order to achieve higher draft positions. The reward for gaining the highest draft position in 1984 was Akeem Olajuwon from the University of Houston. The league, in an effort to appease fans and decrease the incentives for its teams to shirk in the future, developed the first version of the draft lottery for the 1985 draft. The prize in the 1985 draft was Patrick Ewing from Georgetown University.

[9] It was now possible for the best nonplayoff team to obtain the first draft pick.

[10] Previously, in 1986, the league limited the lottery to determine only the first three choices in the draft. The rest of the selection order for the remaining four nonplayoff teams was determined by inverse rank order. Therefore, the worst team in the league was guaranteed no worse than the fourth overall selection. The lottery to determine the first three draft choices, however, was still equally weighted.

inverse-rank rule employed in the 1983–84 season. In 1983–84, a team could increase the probability of obtaining a higher draft order if it lost games and successfully moved down in the rankings. Recall that a one-place fall for a team in the rankings gives that team a better draft choice with certainty under the inverse-rank rule. However, under the weighted lottery in 1989–90, a team could increase its probability of obtaining a higher draft choice (specifically, one of the first three selections) by only $(1/66) \approx 0.015$, or 1.5%.[11] Although the incentive to lose was present, it was likely not as strong as in the 1983–84 season.[12]

IV. Data and Empirical Model

As we reviewed in Section II, tournament theory yields testable predictions concerning the behavior of teams as the payoffs from winning and losing vary. In particular, as the prize differential between winning and losing (between losing and winning) increases, the efforts devoted to activities that increase the probability of winning (losing) increase. Our aim is to test these predictions using our data from the NBA. In addition, because the incentives for losing, in particular, changed over the course of several seasons, we specifically test for the influence of these regime shifts on team performance.

In all three seasons of our sample, each team played 82 regular-season games. Details on each of these games were collected from several sources including *USA Today,* the *New York Times,* the *Chicago Tribune,* and the *Los Angeles Times.* If we are to isolate the effects of the tournament incentives, the empirical model must control for factors that could also influence the outcome of any particular game other than the tournament incentives detailed above. The empirical model we estimate can be written

$$\begin{aligned} \mathrm{WIN}_{ijk} = f(&\mathrm{HOME}_{ijk}, \mathrm{NEUTRAL}_{ijk}, \mathrm{WINPCT}_{ijk}, \\ &\mathrm{OWINPCT}_{\mathrm{ijk}}, \mathrm{CLINCH}_{ijk}, \mathrm{OCLINCH}_{ijk}, \\ &\mathrm{ELIM}_{ijk}, \mathrm{OELIM}_{ijk}), \end{aligned} \tag{1}$$

where

WIN = a dummy variable equal to unity if team i won game j in season k;

[11] This marginal benefit from moving down in the league standing is only true for the first draw. The marginal benefits in terms of higher probabilities in the second draw are dependent on the outcome of the first draw. The important point, however, is that a team could increase its probability of obtaining a higher draft selection by only a small amount.

[12] Another effect that may influence the magnitude of the shirking effect is that, ex post, most observers consider the 1990 draft to be inferior with respect to player quality to the 1984 draft. Whether this was true ex ante is uncertain.

HOME = a dummy variable equal to unity if team i played game j at its home court in season k;
NEUTRAL = a dummy variable equal to unity if team i played game j at a neutral site in season k;
WINPCT = the winning percentage (number of wins/games played) of team i at the time of game j in season k;
OWINPCT = team i's opponent's winning percentage at the time of game j in season k;
CLINCH = a dummy variable equal to unity if team i had clinched a playoff spot at the time of game j in season k;
OCLINCH = a dummy variable equal to unity if team i's opponent had clinched a playoff spot at the time of game j in season k;
ELIM = a dummy variable equal to unity if team i had been eliminated from playoff consideration at the time of game j in season k; and
OELIM = a dummy variable equal to unity if team i's opponent had been eliminated from playoff consideration at the time of game j in season k.

The HOME and NEUTRAL variables are included to control for the effect that venue has on the outcome of any particular game. In particular, the estimated coefficients on HOME and NEUTRAL capture the effects that playing either on a team's home court or at a neutral site has on the probability of winning relative to playing on an opponent's home court. We expect the coefficients on both HOME and NEUTRAL to indicate a positive effect on the probability of winning, other things constant.

To control for team quality at the time of any particular game, we include both the team's winning percentage and its opponent's winning percentage.[13] Note that these variables are updated after each game. We expect that, as any team's winning percentage (WINPCT) increases, its probability of winning will increase, other things constant. Similarly, as a team's opponent's winning percentage (OWINPCT) increases, the probability of winning should decrease, other things constant.

Tournament incentives are captured in the variables CLINCH, OCLINCH, ELIM, and OELIM. Near the end of each season, teams may either be statistically guaranteed a playoff spot by clinching a top-eight finish in their respective conference, or by the same token, be sta-

[13] We considered other team quality measures, including conference rank, league rank, and games back from the first place team in either the league or the conference. Each of these variables is highly correlated with winning percentage. It is likely that winning percentage captures most factors that could influence team quality.

tistically eliminated from playoff consideration.[14] If a team has effectively clinched a playoff berth at the time of any particular game, the effect on the outcome of that game may be either positive or negative. Recall that tournament theory predicts that winning effort will be exerted if the rewards to winning are positive. On the one hand, teams can certainly benefit from winning even after they have clinched a playoff spot by moving up in the conference (and league) rankings. Recall that higher rankings bring with them more inferior opponents and home-court advantage in the playoffs. However, counterbalancing this effect is the fact that some teams perform so well that they clinch the top spot in the league or in their respective conference. Once a team has clinched the best win-loss record in the league, it is assured home-court advantage throughout the playoffs. There is clearly no additional incentive to win, and there may even exist an incentive to exert less winning effort in the form of resting key players and trying different game strategies in preparation for the upcoming playoffs.[15] There may be similar effects for clinching the best record in an individual conference. A conference champion may also be the league champion if its win-loss record is better than the champion in the opposing conference. Regardless, a conference champion is guaranteed home-court advantage throughout its conference playoffs. Therefore, the expected signs on the CLINCH and OCLINCH coefficients are ambiguous.

The theoretical considerations discussed in Section II and the details of the draft lottery presented in Section III give clear predictions concerning the effect that being eliminated from playoff consideration has on effort levels and, therefore, the outcome of any particular game. Recall that in the first year in our sample, 1983–84, teams eliminated from the playoffs had the incentive to lose in order to gain positions in the draft order. By moving down one ranking in the standings, teams assured themselves a better draft pick.[16] Therefore, in the 1983–84 season, we expect ELIM (OELIM) to have a negative (positive) effect on the probability of winning any particular game, other things constant. However, in 1984–85, the season in which the NBA established it first equally weighted lottery, once eliminated from the playoffs, teams had no additional incentive to move down in the rankings. There was no additional advantage to being

[14] Statistically, a team has clinched (been eliminated from) a spot in the playoffs if that team could not lose (win) enough of the games remaining to be played to be excluded from (included in) the top eight teams in its conference. For example, if a team had 10 games left to be played but was 12 games out of eighth place in its conference, it would be considered statistically eliminated from playoff consideration.

[15] We found some anecdotal evidence of this as we surveyed game reports.

[16] Actually, the last-place teams in each conference were guaranteed only a 50% chance of obtaining the first pick.

Table 1
Descriptive Statistics

Variable	Mean	SD	Range
WIN	.500	.500	[0, 1]
HOME	.492	.500	[0, 1]
NEUTRAL	.016	.125	[0, 1]
AWAY	.492	.500	[0, 1]
WINPCT	50.069	17.134	[0, 100]
OWINPCT	50.069	17.134	[0, 100]
CLINCH	.075	.263	[0, 1]
OCLINCH	.075	.263	[0, 1]
ELIM-83	.006	.075	[0, 1]
OELIM-83	.006	.075	[0, 1]
ELIM-84	.007	.081	[0, 1]
OELIM-84	.007	.081	[0, 1]
ELIM-89	.019	.135	[0, 1]
OELIM-89	.019	.135	[0, 1]

the last-place team in the league than, say, the best nonplayoff team. We expect, therefore, that being eliminated in the 1984–85 season will have no effect on the probability of winning, other things constant. Finally, the coefficient on the ELIM (OELIM) variable should again be negative (positive) in the 1989–90 season. When the NBA switched from an equally weighted lottery to a weighted lottery that favored teams with worse win-loss records, the incentive to shirk should have reappeared.

Descriptive statistics of the variables in (1) are reported in table 1.[17] We modify (1) slightly by allowing for different elimination effects for each of the three seasons in our sample.[18] This technique allows us to estimate the incentive effects associated with being eliminated for each year of the sample using the panel of all observations. Overall, there are 82 games × 23 teams = 1,886 observations in both the 1983–84 and 1984–85 seasons. With the addition of four teams in 1989–90, we have 82 games × 27 teams = 2,214 observations in the latest season of our sample, for a total of 5,986 observations across all three seasons. An observation is dropped if a team's, or its opponent's, winning percentage is undefined. This occurs only if either team is playing its first game. Our analysis is therefore based on a total of 5,904 observations across all three seasons.

We estimate (1) using the maximum likelihood technique of logistic

[17] There were 33 games played under elimination in the 1983–84 season, 39 games in the 1984–85 season, and 110 games in the 1989–90 season. With respect to games played when at least one of the opposing teams had clinched a playoff spot, there were 130, 169, and 142 such games, respectively, in the three seasons.

[18] The coefficients on all other variables were sufficiently similar across seasons that we estimate only a single intercept and do not break out season effects. The incentive structure associated with the playoff system did not change over the course of our sample period nor did we estimate any statistically significant change in the effect of game venue or team quality over the sample period.

regression. Because our data are constructed longitudinally, we must account for the possibility that team i's error term in game j of season k is correlated with team i's error term in game $j + t, t \neq 0$, in season k. We employ an error-components, random-effects procedure. In this case, (1) can be written

$$\Pr(\mathrm{WIN}_{ijk} = 1) = \mathbf{X}_{ijk}\beta + \nu_{ik} + \varepsilon_{ijk}, \tag{2}$$

where ν_{ik} is the team × season-specific residual, which is allowed to vary across teams in a given season but which is constant for any particular team in that season. The error term ε_{ijk} is assumed to have zero mean; to be uncorrelated with itself, with X, and with ν; and to be homoskedastic. In addition, to account for the presence of any heteroskedasticity, we employ White's (1980) method of calculating robust standard errors. One restriction in using the random-effects estimation procedure is that the team-specific error component must be uncorrelated with the vector of regressors. A Hausman (1978) specification test reveals that the random-effects procedure is justified.[19]

V. Results

Results from the estimation of (2) are reported in table 2. We report not only the Logit coefficients but also the associated marginal effects on the probability of winning and the associated marginal effects on the odds ratio.[20]

With respect to the variables capturing venue effects, teams playing a game on their home court are approximately 4.5 times more likely to win on average than teams playing a game on an opponent's home court, other things constant. In terms of the marginal effect on the probability of winning, playing at home increases the probability of winning by approximately 37.8 percentage points over playing at an opponent's site. Similarly, playing on a neutral court increases the probability of winning

[19] A fixed-effects model similar to (2) was also estimated, where the fixed effects were defined over team × season interactions. The results were qualitatively unchanged from the random-effects specification.

[20] While it is common to write our estimating equation with the dichotomous variable WIN on the left-hand side, the dependent variable in the Logit regression is actually the natural log of the odds ratio, $\ln[P_i/(1 - P_i)]$, where P_i is the probability of success for team i. The marginal effect on the probability of success for a change in the jth independent variable is given by

$$\frac{\partial P_i}{\partial X_j} = \frac{e^{\mathrm{X}\beta}}{1 + e^{\mathrm{X}\beta}2}\beta_j.$$

Finally, the change in the odds ratio given a change in the jth independent variable is simply the antilog of the Logit coefficient, e^{β_j}. For a thorough discussion of logistic regression, see Hosmer and Lemeshow (1989).

Table 2
Random-Effects Logit Estimation Results

Variable	Logit Coefficients (Robust Standard Errors)	Associated Marginal Effect on the Probability of Winning[a]	Associated Marginal Effect on the Odds Ratio[b]
HOME	1.514**	.378	4.545
	(.061)		
NEUTRAL	.710**	.177	2.034
	(.227)		
WINPCT	.017**	.004	1.017
	(.003)		
OWINPCT	−.023**	−.006	.977
	(.002)		
CLINCH	.091	.023	1.095
	(.142)		
OCLINCH	−.184	−.046	.832
	(.140)		
ELIM-83	−.881*	−.220	.414
	(.432)		
OELIM-83	.949*	.237	.583
	(.426)		
ELIM-84	−.277	−.069	.758
	(.409)		
OELIM-84	.374	.093	1.454
	(.407)		
ELIM-89	−.771**	−.192	.463
	(.279)		
OELIM-89	1.011**	.252	2.748
	(.267)		
CONSTANT	−.361*		
	(.183)		
N	5,904		
χ^2	765.75**		

[a] Marginal effects are calculated at the means of the independent variables.
[b] The effect on the odds ratio is simply the antilog of the Logit coefficient.
* Significant at the 5% level (two-tailed test).
** Significant at the 1% level (two-tailed test).

by approximately 17.7 percentage points on average over playing at another team's venue, other things constant. Put differently, a team playing at a neutral site is slightly more than 2 times more likely to win than a team playing at its competitor's site. Both of these effects are statistically significant at better than the 1% significance level.

With respect to team quality, as a team's winning percentage increases by one percentage point (e.g., from 50% to 51%), its probability of winning increases by just under one-half of one percentage point, other things constant. In terms of the effect on the odds ratio, as a team increases its winning percentage by one percentage point, it becomes approximately 1.02 times more likely to win, on average. With respect to the opponent's quality variable, a one percentage point increase in the opponent's winning percentage decreases a team's probability of success by approximately 0.6 percentage points on average. In terms of the odds ratio, a one point increase in an opponent's winning percentage translates into being approximately 1.02 times more likely to lose, other things constant. Each of these quality controls is also statistically significant at better than the 1% significance level.[21]

Our expectations with respect to the tournament incentive variables are also confirmed. The coefficients on the CLINCH and OCLINCH variables are statistically insignificant, possibly reflecting the confounding effects of clinching a playoff invitation. Recall that some teams may have the incentive to win in order to move up the league (or conference) rankings in a desire to capture more favorable venues or more inferior opponents, while others may be inclined to rest key players and exert less winning effort.[22]

The results on the elimination variables confirm our predictions concerning nonplayoff teams' incentives to lose in order to gain higher draft positions. Recall that in the 1983–84 season, the NBA determined the draft selection order using the inverse-rank rule. Thus, once eliminated from contention, teams could do better by decreasing winning effort and moving down in the league standings. Controlling for team quality and venue, teams that were eliminated from the playoffs in 1983–84 were slightly less than 2.5 times more likely on average to lose than their playoff-bound competitors. In other words, eliminated teams' probability

[21] One may wonder how predictive winning percentage is early in the season. By estimating the differential effects of WINPCT and OWINPCT in each week of the season, we found no significant change in their explanatory power after the first week of the season.

[22] In regression results not reported, we specifically broke out the clinch variable into four separate variables that controlled for whether a team (or its opponent) had clinched a playoff spot, its division's best record, its conference's best record, or the league's best record. Unfortunately, none of the coefficients on these variables was statistically significant.

of winning decreased by approximately 22 percentage points in 1983–84. Similarly, teams playing eliminated opponents were slightly more than 2.5 times more likely to win on average.[23] These results are statistically significant at better than the 5% significance level.[24]

The 1984–85 season brought with it the equally weighted lottery to determine draft selection order. Recall that the NBA instituted this new system in an effort to eliminate the incentive to shirk. Our results indicate that this policy was effective. Our results show that teams that were eliminated from the playoffs in 1984–85 were no more likely to lose than noneliminated teams, other things constant. The coefficients on ELIM-84 and OELIM are statistically insignificant at any reasonable significance level.

Finally, recall that the NBA changed the incentives again in the 1989–90 season by giving teams with worse win-loss records greater chances of success of capturing any of the three top draft positions. This was done in an attempt to alter the draft process to one that would promote league parity. Again, however, tournament theory would predict that this increase in the incentive to lose would cause teams that were eliminated from the playoffs to decrease winning effort. Controlling for team quality and venue, teams eliminated from the playoffs in 1989–90 were approximately 2.2 times more likely to lose on average than playoff-bound teams. In other words, being eliminated from the playoffs in 1989–90 decreased a team's probability of winning by approximately 19.2 percentage points, other things constant. Similarly, playing eliminated teams increases the probability of winning by approximately 25.2 percentage points. While the shirking effects in the 1989–90 season are statistically significant at better than the 1% significance level, we cannot statistically distinguish them from the effects in 1983–84.[25]

If teams are forward looking, the elimination effect may exist before teams are statistically eliminated from playoff consideration. If teams are able to take previous performance and predict future performance with some accuracy, teams may begin the losing-to-win process long before elimination is certain. To address this issue, we estimated a model (results

[23] What happens when two eliminated teams play each other? An interaction term defined by the product of the ELIM and OELIM variables in each year reveals no statistically significant effect.

[24] In each of the three seasons in our sample, the elimination effect for a team is statistically no different from the elimination effect for its opponent.

[25] The interpretation of our results would suffer if we found evidence that key player injuries were driving our results. After examining the archives of local sports pages, we found no evidence that this was the case. Even if we had uncovered such facts, one would have to acknowledge that an "injury" could be a strategy consistent with the losing-to-win story. Turning a minor ailment into a season-ending injury is not inconceivable and may provide an easy mechanism for masking a losing-to-win strategy.

not reported for brevity) identical to (2) but that included a variable that captures a team's (and its opponent's) relative playoff likelihood in terms of the future performance needed to prevent elimination. This variable, defined as the number of games behind a team was at game j from the eighth (and final) playoff spot in its conference divided by the number of games left to play in the kth regular season, turned out to be statistically insignificant. This gives some support to our assumption, implicit in the previous estimation, that teams exert winning effort until they are statistically eliminated from the playoffs. It appears, therefore, that, outside of being statistically eliminated, the number of games back a team is out of playoff contention relative to the number of games left to play does not seem to have an impact on the overall probability of winning.[26]

Overall, our results confirm the predictions of tournament theory. We find that NBA teams respond to incentives in predictable ways. While the success of the NBA clearly depends on the parity of performance, those incentive structures studied in this article designed to promote parity between teams in the league have the potentially adverse effect of creating incentives that cause teams to exert less winning effort on the court.[27]

VI. Discussion and Extensions

We have provided substantial evidence that NBA teams do indeed respond to tournament incentives in predictable patterns. By examining game outcomes from seasons over which tournament incentives were changing, we were able to confirm a popular view that NBA teams eliminated from the playoffs lose in order to secure higher draft choices. In particular, in the 1983–84 season, we find that eliminated teams were approximately 2.5 times more likely to lose than noneliminated teams. This is true even when controlling for team quality and venue, two factors that should also influence the outcome of any particular game. This result was expected because the NBA rewarded those teams with lower league rankings with better draft choices. However, in the 1984–85 season, the NBA restructured its draft rules to give any nonplayoff team an equal

[26] An examination of the data reveals that many teams who become eliminated do so in the last 2 weeks of the regular season. Many eliminated teams are legitimate contenders for playoff positions until the last two to three games, with some being eliminated in the last game. It is not surprising, therefore, that such forward-looking behavior is not supported in the results.

[27] While we use the "team" as our unit of analysis in this study, NBA teams are made up of at least three separate entities: players, coaches, and management. The question that addresses which of these is responding to the changes in the tournament incentives is outside the scope of our article. Player performance before and after elimination as well as coaching decisions, such as those that dictate which players are playing in a game, could be examined. A search for editorial opinion on this issue at the time yielded no conclusive evidence.

chance at obtaining the most prized draft selections. We find no statistically significant difference between the behavior of playoff and nonplayoff teams in 1984–85. Finally, when the league introduced its weighted-lottery policy in 1989–90, the incentive to lose returned, and eliminated teams were found to lose approximately twice as often as playoff-bound teams. Our article is the first, to our knowledge, that analyzes the incentive effects from a tournament that offers prizes to both winners and losers.

Finally, this article highlights the importance of "dual" tournaments. Other practical applications of a general dual tournament theory may include the current U.S. welfare system, which rewards performance below a threshold level of income, and international pollution standards, which give countries the incentives to overpollute in order to attract foreign investment.

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