Is The NBA Draft Lottery Fair?

A Monte Carlo Analysis of First Pick Outcomes

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Abstract

We evaluate the statistical fairness of the NBA Draft Lottery for the first overall pick from 1990 to 2025. Using the official league odds, we compute the likelihood of the observed sequence of winners and benchmark it with 100,000 Monte Carlo simulations. The observed joint surprisal yields a p-value of 0.0962, indicating the observed sequence is compatible with randomness under the posted probabilities. We also examine market-size effects by aggregating team odds within large, medium, and small tiers and comparing observed No. 1 picks to their odds-based expectations via a Monte Carlo tier count test. Across tiers, differences fall within chance variation, and we find no statistically reliable over- or under-performance. Overall, first-pick outcomes from 1990–2025 are consistent with the official odds.

1 Introduction

Since its creation in 1985, the NBA Draft Lottery has served as a mechanism to allocate draft order to non-playoff teams while discouraging deliberate losing ("tanking"). From 1985 to 1989, all non-playoff teams had equal odds for the first pick; reforms in 1990 and 1993 introduced weighted probabilities that gave weaker teams a larger chance. The most recent major change in 2019 further flattened the distribution, assigning each of the bottom three teams a 14% chance at the No. 1 pick and limiting the worst team's drop to fifth. On paper, the lottery is a transparent randomized system balancing competitiveness and fairness. In practice, however, its legitimacy remains debated (NBA.com Staff, 2025).

Despite this mathematical transparency, the debate over perceived fairness persists for two main reasons. First, the lottery changes incentives for "tanking," but does not remove them. Price et al. (2010) and Gong et al. (2022) found that losing teams adjust their behavior when stakes are high, including strategic rest. Secondly, even with procedural safeguards (auditors, sealed rooms, published odds) and studies finding no systematic deviation from randomness (Squared, 2020; Forbes, 2025; Sports Illustrated, 2025), rare streaks (e.g. Cleveland's wins in 2011, 2013, and 2014) and unlikely winners (e.g. New Orleans at 6% in 2019, Dallas at 1.8% in 2025) look suspicious to fans and media. Together, these factors keep the question of fairness open.

We test whether first-pick outcomes are consistent with the official odds, or whether some teams systematically exceed expectations. We combine a Monte Carlo joint log-likelihood test with a market-size regression to probe for structural asymmetries.

2 Data and Methods

2.1 Study Period and Data

The first weighted lottery was held in 1990, which makes fairness meaningfully-testable against published odds. We compile annual lottery odds for 1990–2025 from RealGM (nd) and Basketball-Reference (nd). For each year we recorded: (i) the team that won the No. 1 pick, (ii) that team's pre-lottery position, and (iii) its official win probability. Team name changes and relocations were harmonized to maintain consistent identities across years.

2.2 Monte Carlo Simulation and Joint Log-Likelihood

We simulate 100,000 alternate draft histories. In each simulation, exactly one team per year (1990–2025) was drawn as the No. 1 pick according to that year's published probabilities. Let $p_{t,y}$ denote the official probability that team t wins in year y. For a given history, let w_y be the winner in year y and define its joint surprisal (negative log likelihood) as follows:

$$S_{\text{history}} = -\sum_{y=1990}^{2025} \ln(p_{w_y,y}) \tag{1}$$

These values form a simulated distribution of joint surprisal across possible histories. We then compute S_{obs} for the actual history and report a one-sided p-value as the fraction of simulations $S_{\text{history}} \geq S_{\text{obs}}$ (i.e., sequences at least as "unlikely" under the official odds).

2.3 Market Size Analysis

To test for structural patterns, we classify franchises as large, medium, or small markets using Hoop-Social market-size rankings (Hoop-Social, nd). For each year y, define

$$q_{g,y} = \sum_{t \in g} p_{t,y}$$

as the total official probability that tier g wins No. 1. Let $O_g^{(\text{obs})}$ be the observed number of No. 1 picks won by tier g over 1990–2025. Under the null (official odds), O_g^{obs} follows a Poisson-binomial distribution with success probabilities $\{q_{g,y}\}$. We estimate p-values via Monte Carlo by redrawing winners each year under the official odds, tallying O_g in each run, and comparing to O_g^{obs}. For over-performance we report $\Pr(O_g \geq O_g^{obs})$; for under-performance, $\Pr(O_g \leq O_g^{obs})$.

3 Results

3.1 Joint Log-Likelihood Test

Figure 1 shows the simulated distribution of total surprisal (S) to be centered around 77. The dashed line marks the observed $S_{\text{obs}} = 83.18$, which lies in the **right** tail of the distribution. Of the 100,000 simulations, 9,620 included a history at least as surprising as the observed sequence of No1 picks. We therefore *do not* reject the null hypothesis that outcomes follow the official odds at the $\alpha = 0.05$ significance level.

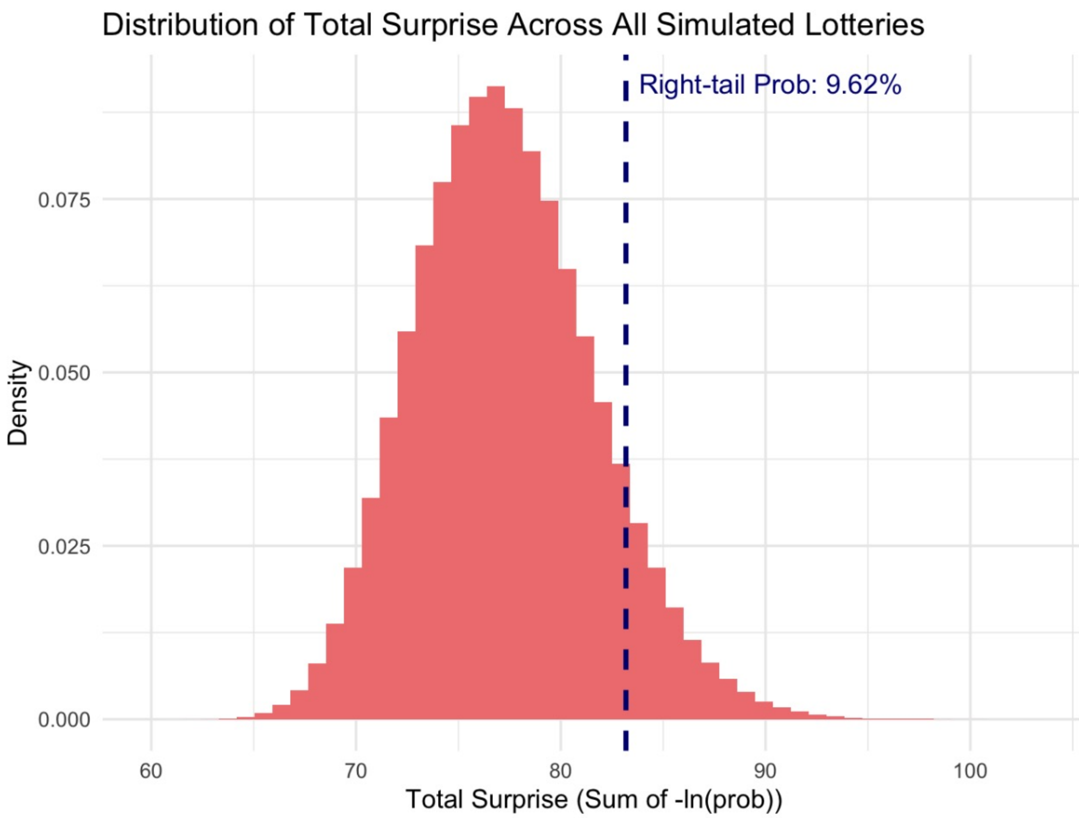

Figure 1: Distribution of total surprise across all simulated lotteries. 9.62% of simulated histories are at least as surprising as the observed one.

3.2 Market Size Analysis

As shown in Table 1, observed counts by market tier are broadly consistent with expectations under the official odds. For the *large* tier, we observe 11 selections versus an expected 12.7, with simulated one-sided probabilities $p_{\text{over}} = 0.789$ and $p_{\text{under}} = 0.336$. The *medium* tier shows the largest positive deviation (14 observed vs. 11.1 expected), but the right-tail probability remains $p_{\text{over}} = 0.175$ (with $p_{\text{under}} = 0.905$), which is not statistically significant at the $\alpha = 0.05$ level. For the *small* tier, we observe 11 vs. an expected 12.2, yielding $p_{\text{over}} = 0.741$ and $p_{\text{under}} = 0.394$. Across tiers, the minimum one-sided p-value is 0.175 (implying even a rough two-sided analogue would still exceed conventional significance thresholds). We therefore *do not* reject the null hypothesis that outcomes align with the official odds across market sizes.

Table 1: Observed vs. expected counts by market tier with one-sided simulation p-values.

Tier	Observed	Expected	Sim p_{over}	Sim p_{under}
Large	11	12.7	0.789	0.336
Medium	14	11.1	0.175	0.905
Small	11	12.2	0.741	0.394

4 Discussion

4.1 Conclusions

Our simulations indicate a lack of evidence against the null hypothesis that first-pick outcomes from 1990–2025 are consistent with the official odds ($p = 0.0962$). Furthermore, our market size count test also found insufficient evidence to suggest meaningful differences from official probabilities. Though there are some discrepancies in both studies, they can be reasonably explained by chance variation.

4.2 Future Directions

Our work focused exclusively on the *first* overall pick, but future analyses could expand these frameworks to analyze additional lottery picks. Additionally, further stratification by policy eras or rule changes may yield different results, and we encourage researchers to explore these avenues.

5 Reproducibility

Our full code and results are public on GitHub for reproducibility.

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