

What Factors Shape the National Basketball Association Free Agent Market?

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May 3rd, 2014

Introduction

- ▶ Landing a marquee free agent is one of a few ways to have an NBA superstar on your team.
- ▶ Knowing the factors that drive where a free agent will sign is important in the hyper-competitive free agency market.

What is a marquee free agent?

- ▶ Looked at 10 highest paid NBA players for each season between 1999-2000 and 2012-2013.
- ▶ If the source of that contract was free agency (rather than an extension) that player was considered a marquee free agent.
- ▶ 33 marquee free agents.
- ▶ Reasoning is that if a player was paid so highly there must have been competition to sign him (otherwise he would have been paid less) and thus, without bias of hindsight, was considered “marquee” by several general managers.

How to answer this question?

- ▶ Whether or not a team signs a marquee free agent can be thought of as a “success” or “fail”.
- ▶ Use logistic regression to estimate the probability that a team successfully signs a marquee free agent.
- ▶ Determine which factors impact this probability by selecting the most appropriate logistic regression model.

Factors Considered

- ▶ How good is the team: historical winning percentage, number of championships, does the team have a championship, previous season's winning percentage, how many all-stars the team had in the previous season.
- ▶ How good is the coach: historical winning percentage, number of championships, does the coach have a championship.
- ▶ Characteristics of the team: position of best player, whether or not the team had a marquee free agent last season.
- ▶ Characteristics of the city: temperature, precipitation, nightlife, cost of living, state income tax, Nielsen Local Television Market, metropolitan area population.
- ▶ Characteristics of free agency class: number of free agents available, age, positions, hometown region, efficiency, years in college, years of experience, years with current team.
- ▶ Characteristics of the league: CBA environment.

Factors Considered: interaction effects.

- ▶ Does the impact of the factors considered differ based on age of free agency class?
- ▶ Does the impact of the factors considered differ based on whether or not a team had a marquee free agent last year?
- ▶ Does the impact of the position of a team's best player differ based on positions of free agency class?
- ▶ Is a marquee free agent more likely to resign post-2005 CBA than pre-2005 CBA?

Which of the factors considered are actually important?

- ▶ With the vast number of factors to consider, determine which of the factors are actually important.
- ▶ Performed two different model selection techniques:
 - ▶ An intelligent backward selection algorithm.
 - ▶ A LASSO/Ridge regression hybrid.

Which of the factors considered are actually important?

- ▶ Factors selected by intelligent backward selection: whether or not the team had a marquee free agent last season, state income tax, Nielsen Local Television Market, historical team winning percentage, previous season's winning percentage, whether or not the team has a championship.
- ▶ Factors selected by lasso/ridge: whether or not the team had a marquee free agent last season, state income tax, Nielsen Local Television Market, nightlife, years with current team, whether or not the team has a championship.
- ▶ Common factors: whether or not the team had a marquee free agent last season, state income tax, Nielsen Local Television Market, whether or not the team has a championship.

Which model?

Consider:

- ▶ Lasso/Ridge Model
- ▶ Backward Selection Model
- ▶ Combination model: a model with the common factors of the above two models.

Which model?

Summed absolute prediction errors:

| Year | Lasso/Ridge | Combination | Backward |
|------|-------------|-------------|----------|
| 1996 | 5.073 | 4.601 | 4.812 |
| 1997 | 0.534 | 0.623 | 0.324 |
| 1998 | 4.494 | 4.074 | 4.109 |
| 1999 | 1.406 | 1.492 | 1.790 |
| 2000 | 2.246 | 2.640 | 2.745 |
| 2001 | 2.123 | 1.850 | 1.373 |
| 2003 | 2.107 | 1.700 | 1.783 |
| 2004 | 2.405 | 1.769 | 4.849 |
| 2005 | 2.001 | 1.626 | 1.898 |
| 2007 | 1.910 | 2.553 | 2.372 |
| 2008 | 2.079 | 2.512 | 1.901 |
| 2010 | 4.854 | 3.578 | 3.588 |
| 2013 | 2.506 | 2.481 | 2.257 |
| Sum | 33.738 | 31.499 | 33.802 |

Which model?

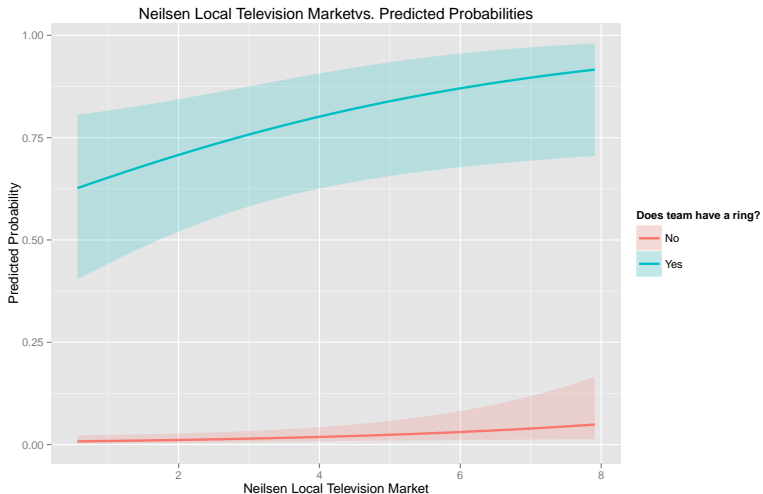
- ▶ Combination Model: whether or not the team had a marquee free agent last season, state income tax, Nielsen Local Television Market, whether or not the team has a championship.
 - ▶ Perform forward selection algorithm on model to ensure no other factors should be considered in the model: no factors should be added.
- ▶ How can a model that incorporates less information have more predictive power? Classic issue of more complicated models over-fitting the data.

Combination Model Interpretation

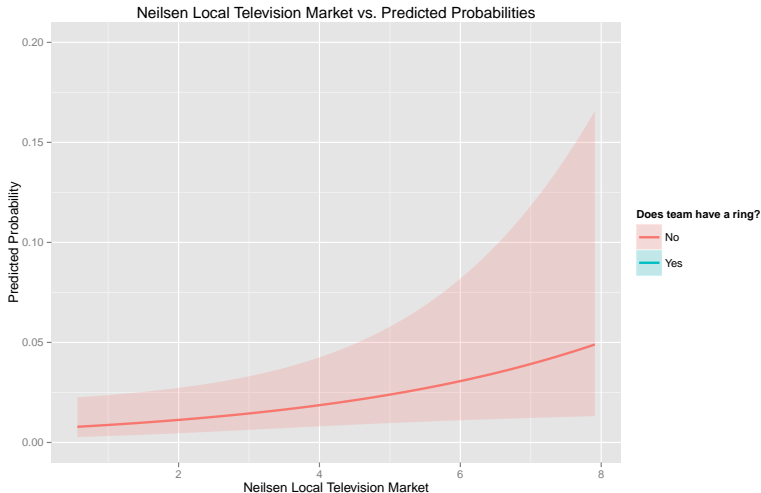
All other factor values being equal,

- ▶ The odds of resigning a marquee free agent are 73.85 times higher than signing one outright
 - ▶ 90% Confidence Interval: (31.726, 188.619)
- ▶ The odds of signing a marquee free agent when your team has at least one championship ring in their history is 2.87 times higher than otherwise
 - ▶ 90% Confidence Interval: (1.219 , 7.303)
- ▶ The odds of signing a marquee free agent is 1.14 times higher with a 1% decrease in state income tax
 - ▶ 90% Confidence Interval: (0.778, 0.988)
- ▶ The odds of signing a marquee free agent is 1.29 times higher with a 1 unit increase in Nielsen Local Television Market
 - ▶ 90% Confidence Interval: (1.017 , 1.633)

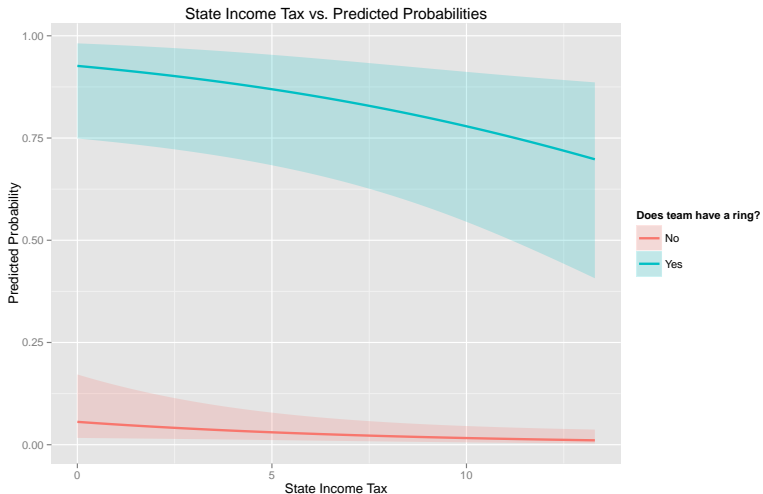
Combination Model Interpretation



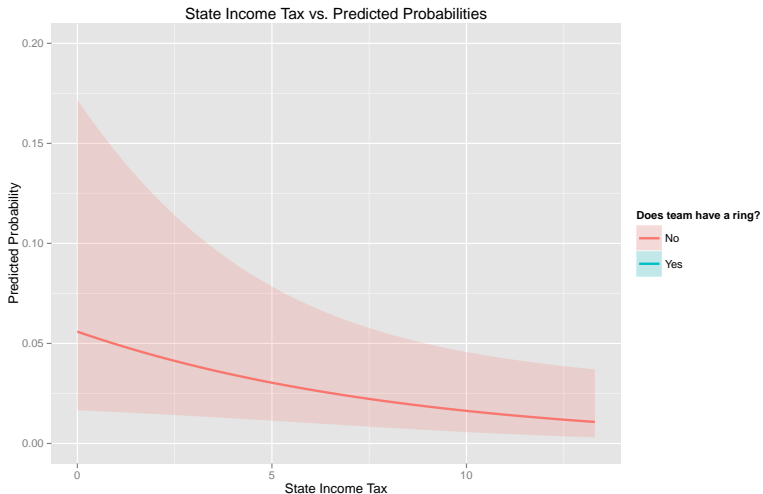
Combination Model Interpretation



Combination Model Interpretation



Combination Model Interpretation



Summer of 2014 Predictions

| Rank | Team | Predicted Probability |
|------|------|-----------------------|
| 1 | DAL | 84.3% |
| 2 | NYK | 83.4% |
| 2 | MIA | 81.1% |
| 3 | HOU | 6.3% |
| 4 | PHI | 5.0% |
| 5 | SAS | 4.7% |
| 6 | CHI | 4.4% |
| 7 | DET | 3.4% |
| 24 | WAS | 0.08% |
| 25 | MIN | 0.08% |
| 26 | NOP | 0.08% |
| 27 | CHA | 0.07% |
| 28 | POR | 0.05% |
| 29 | TOR | 0.05% |
| 30 | SAC | 0.05% |

Top Free Agent Destinations

| Rank | Team | Score | Rank | Team | Score |
|------|------|-------|------|------|-------|
| 1 | DAL | 2.833 | 16 | GSW | 0.535 |
| 2 | NYK | 2.668 | 17 | PHX | 0.491 |
| 3 | HOU | 2.628 | 18 | IND | 0.480 |
| 4 | MIA | 2.308 | 19 | DEN | 0.457 |
| 5 | PHI | 2.090 | 20 | CLE | 0.380 |
| 6 | SAS | 1.970 | 21 | UTH | 0.377 |
| 7 | CHI | 1.865 | 22 | LAC | 0.374 |
| 8 | DET | 1.433 | 23 | OKC | 0.351 |
| 9 | BOS | 1.424 | 24 | WAS | 0.318 |
| 10 | ATL | 1.290 | 25 | MIN | 0.316 |
| 11 | LAL | 1.057 | 26 | NOP | 0.314 |
| 12 | BKN | 0.968 | 27 | CHA | 0.281 |
| 13 | ORL | 0.802 | 28 | POR | 0.215 |
| 14 | MIL | 0.759 | 29 | TOR | 0.197 |
| 15 | MEM | 0.672 | 30 | SAC | 0.146 |

Conclusions

- ▶ Does the impact of the factors considered differ based on age of free agency class? No!
- ▶ Does the impact of the factors considered differ based on whether or not a team had a marquee free agent last year? No!
- ▶ Does the impact of the position of a team's best player differ based on positions of free agency class? No!
- ▶ Is a marquee free agent more likely to resign post-2005 CBA than pre-2005 CBA? No!

Conclusions

- ▶ Whether or not a marquee free agent was on your team in the previous season, whether or not your team has a championship ring, Nielsen Local Television Market, and state income tax contribute to a team's ability to land a franchise-altering free agent.
- ▶ On a case-by-case and year-to-year basis the probability depends on these important factors.
- ▶ We can reasonably expect that in the next five years teams with high free agency destination scores will sign a free agent: DAL, NYK, HOU, MIA, PHI.
- ▶ The only factor a team can control is winning a championship.