Draft Decisions in Uncertain Times: Valuing and Simulating NHL Draft Picks

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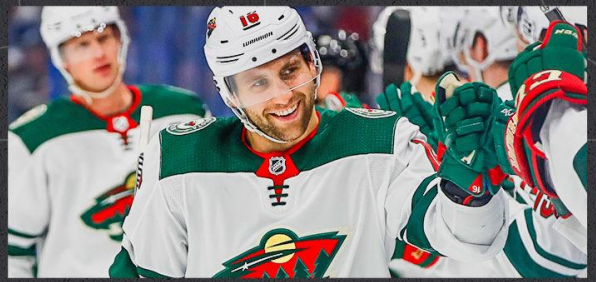
*Zoom

TRADE



PITTSBURGH RECEIVES

- JASON ZUCKER F

MINNESOTA RECEIVES

- ALEX GALCHENYUK F
- CALEN ADDISON D
- CONDITIONAL 2020 FIRST-ROUND PICK

“Conditional 2020 1st Round Pick”

- Condition: ***If Pittsburgh misses the 2019-20 playoffs, they have the option to send their 2021 1st round pick instead***

What is the Draft Lottery?

- Draft lottery format in a normal year
  - **Worst 15** teams that did not qualify for the playoffs are entered into a weighted lottery to determine the draft order
- This year's lottery is different!
  - Pittsburgh has a **⅛ chance** of picking **1st overall** and a **⅞ chance** of picking **15th overall**

Question/Goals

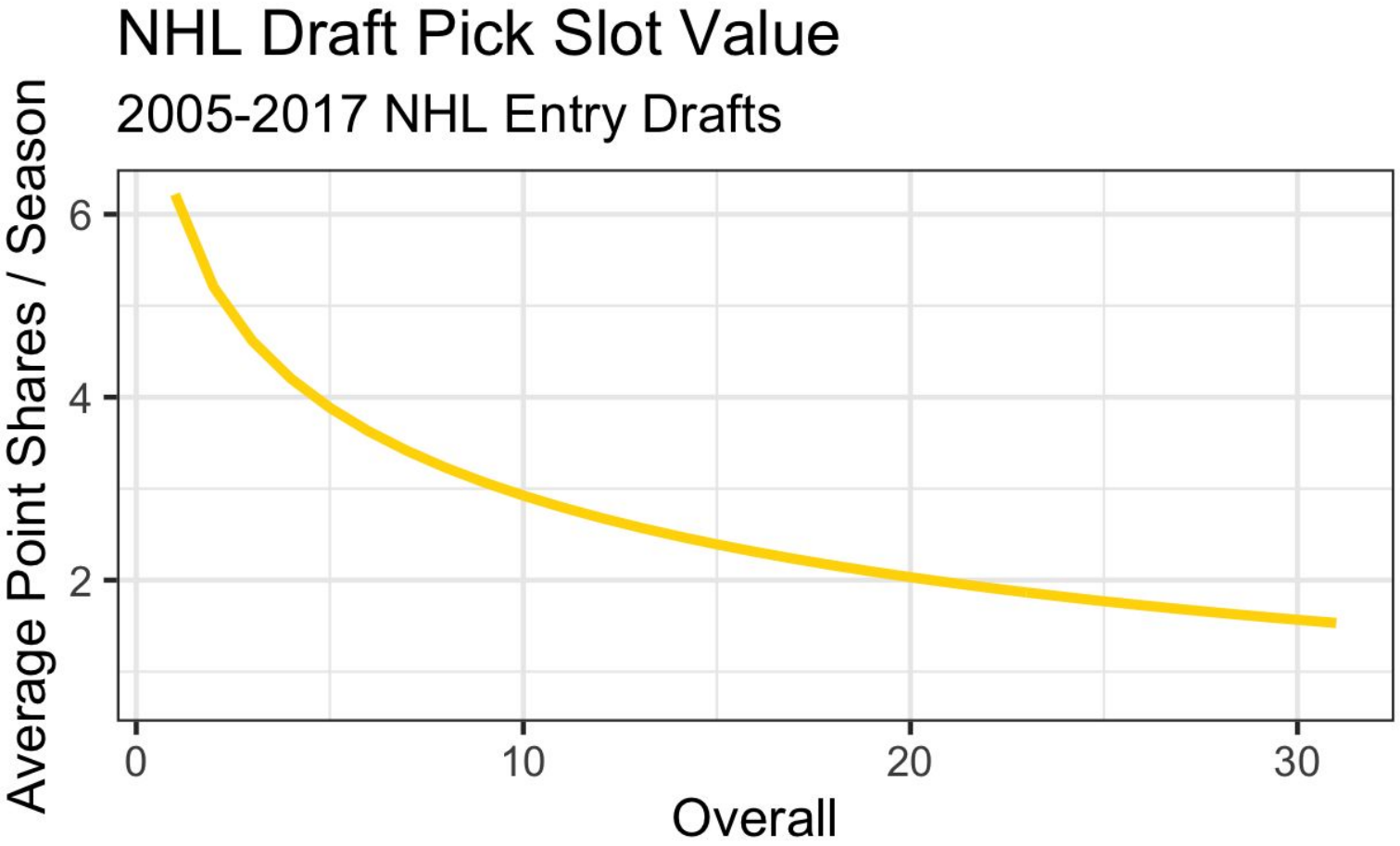
- ***What should the Penguins do with their 1st round pick in the 2020 NHL Draft?***
  - Main options: either keep this year's or defer and send next year's
  - **1st goal**: figure out the value of each 1st round draft slot
  - **2nd goal**: predict where the Penguins will finish in the 2020-2021 season to figure out where they will most likely select in next year's draft

Our Data

- Multiple different data sources, all publicly available
  - Player career statistics from **Hockey Reference**
  - Team level standard and advanced statistics from **Hockey Reference, NHL.com, MoneyPuck.com**
  - Historical draft data from **Wikipedia and Hockey Reference**

Draft Slot Value Curve

- Goal: create a **curve** valuing each 1st round draft slot
- *How do you measure a player's value to a team?*
  - Response variable of choice: **Average Point Shares per Season**
    - Estimates a player's contribution to his team in terms of standings points
    - Based on marginal goals for and marginal goals against
- To create the curve, we used a linear regression model


NHL Draft Pick Slot Value
2005-2017 NHL Entry Drafts
Average Point Shares / Season
6
4
2
0
10
20
30
Overall

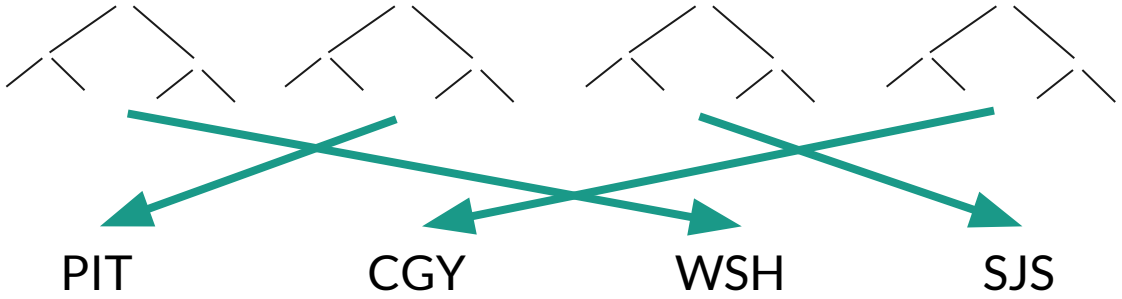
Predicting next season performance

- Using stats in season *n* to predict performance in season *n*+1
- Standings point percentage as a response variable
- Per-game and percentage statistics as predictors
  - xG %, Corsi %, shot attempts per game, etc.

Simulating Season Outcomes

Random Forest model of next year's points %

Randomly select a tree to generate a prediction for teams 1-31

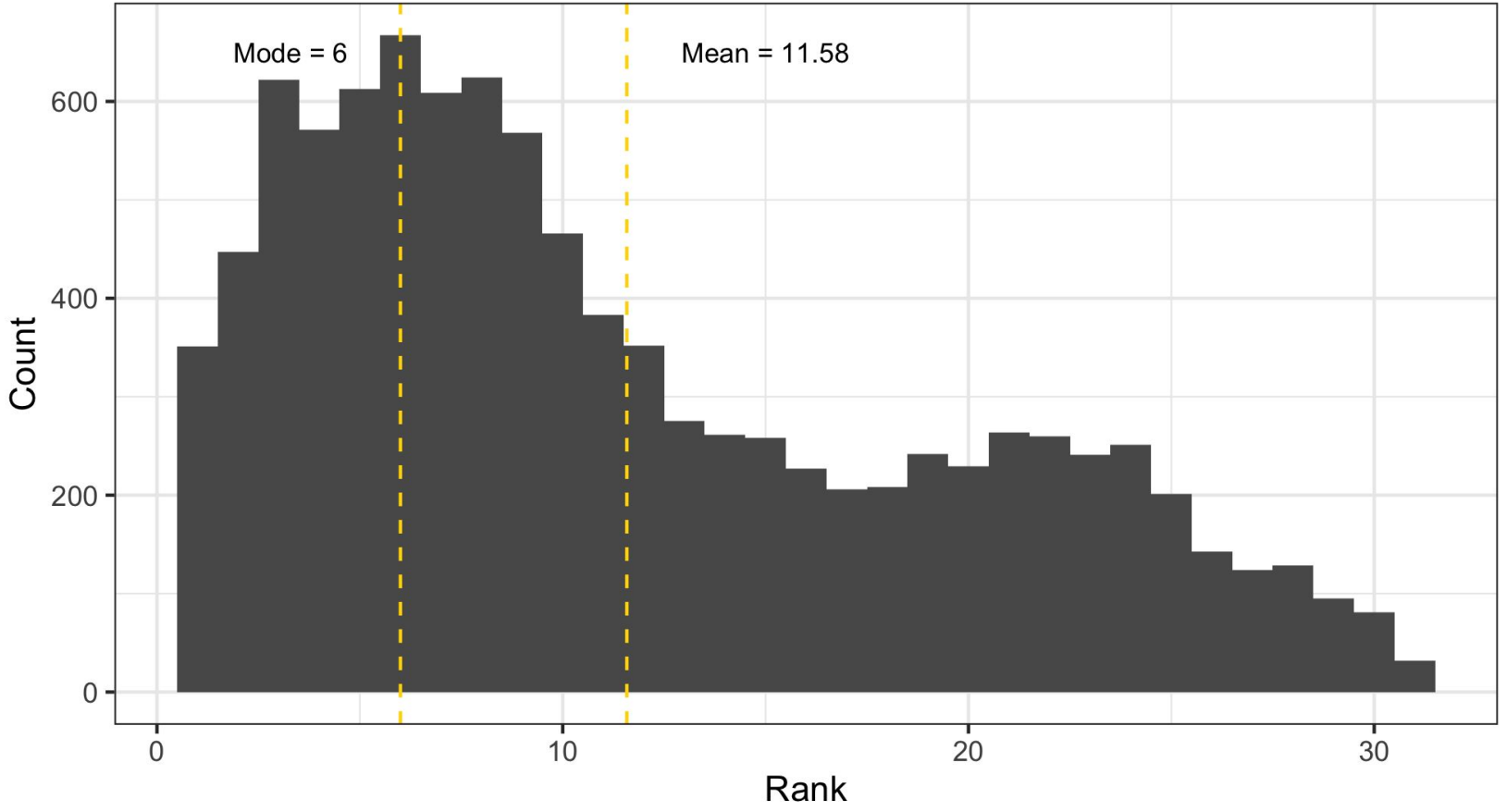


Generate predicted points % for all 31 teams, and rank them

Team	PIT	CGY	WSH	SJS
Points %	0.655	0.476	0.573	0.612
Rank	3	25	20	11

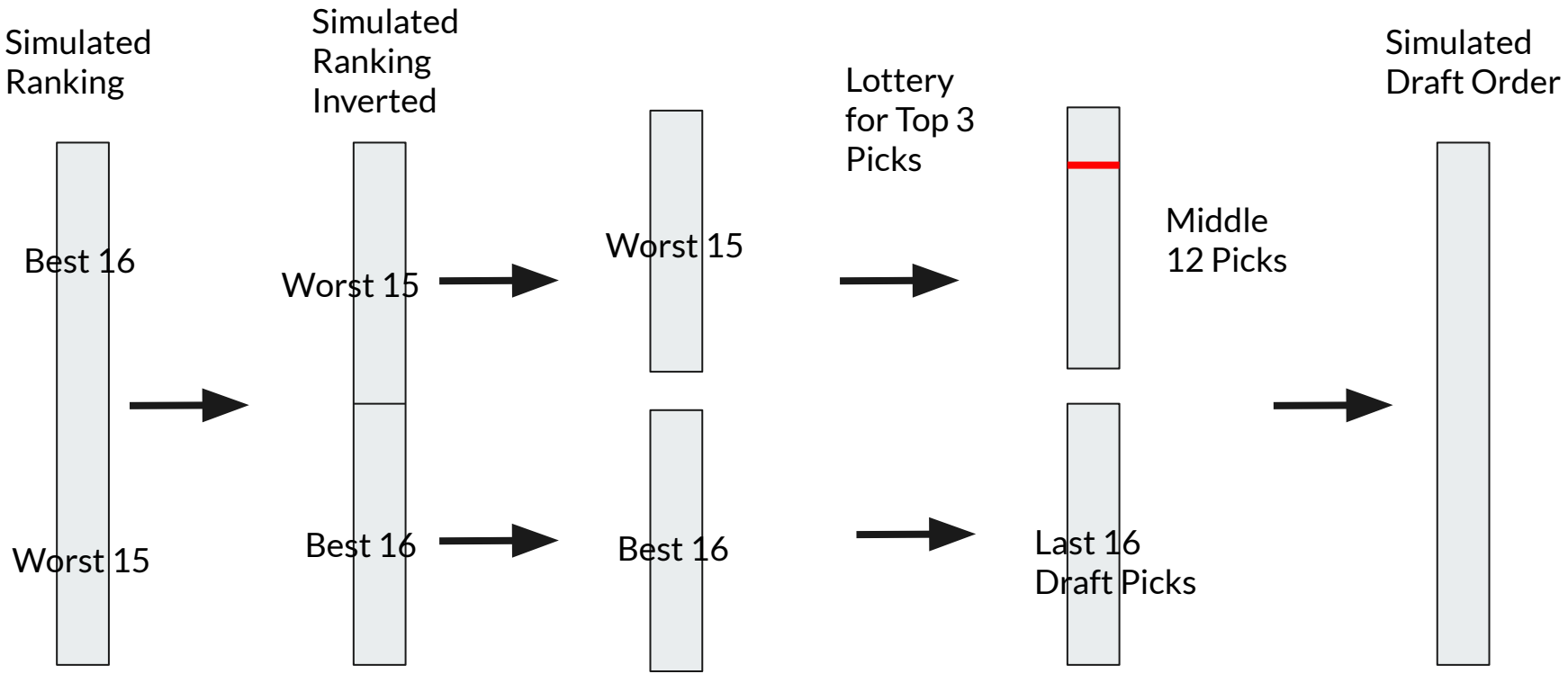
Repeat 10,000 times to get distribution of possible outcomes

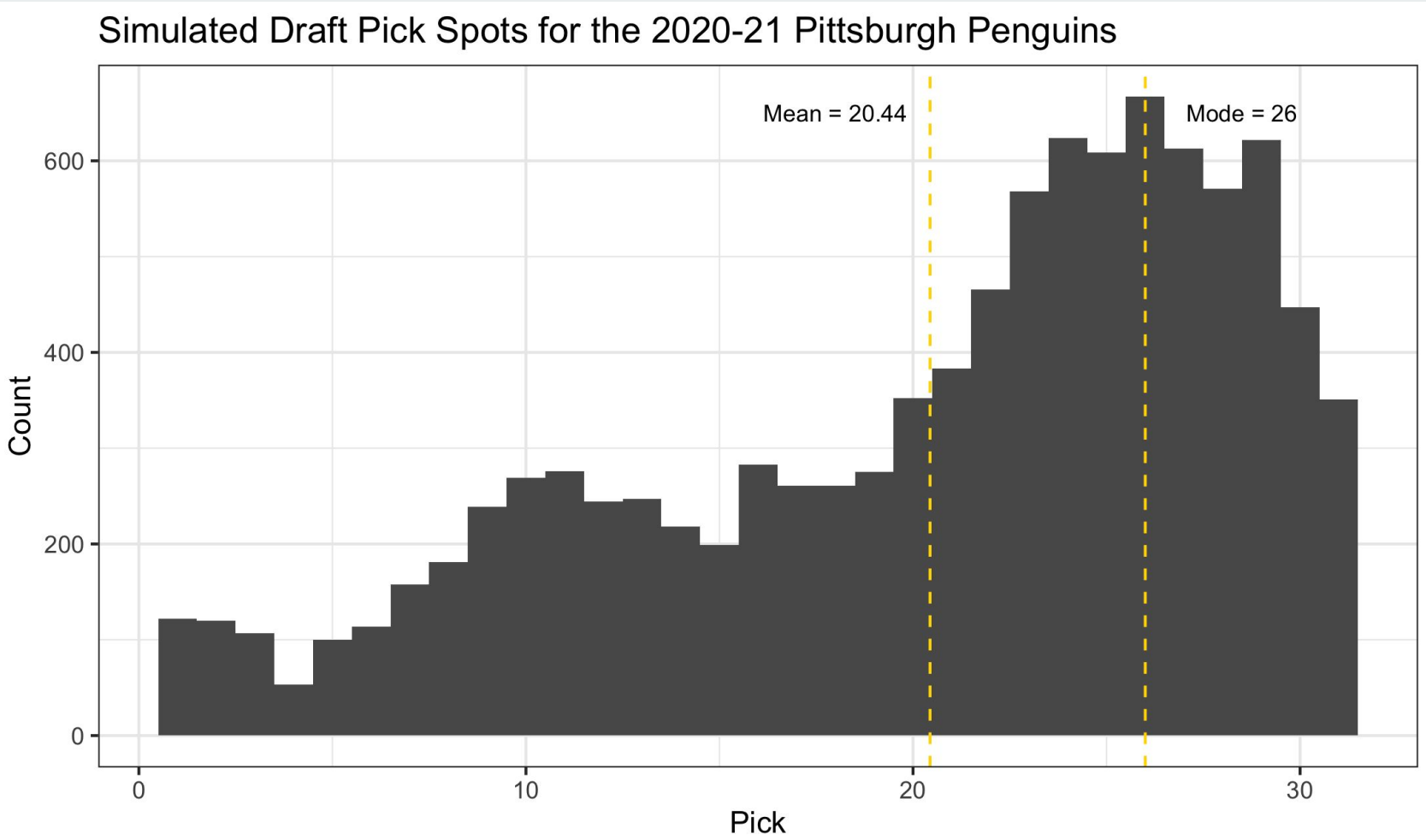
Simulated End-of-Season Ranks for the 2020-21 Pittsburgh Penguins



10,000 simulations using random forest trees

Simulating draft orders





10,000 simulations of the NHL Draft Lottery based on simulated end-of-season ranks

How do the two year's picks compare?

- One-number summary of the value of a first-round pick this year versus next year
  - 2020 = ⅛ * value of 1st overall + ⅞ * value of 15th overall
    - **2.968304**
  - 2021 = sum of (probability of getting that pick * value)
    - **2.212194**
- **Based on this, we believe that the Penguins should keep their 2020 1st round selection**

Future Work

- Incorporate a more precise playoff performance simulation into model
- Consider assessing the strength of each year's draft class we are interested in

Thank you!

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Appendix

Data Sources:

Sports Reference LLC. (2020). NHL Stats and History [Hockey Reference page]. Retrieved from https://www.hockey-reference.com/

Moneypuck. (2020). NHL Team Season Level Data [Moneypuck page]. Retrieved from http://moneypuck.com/data.htm

Wikipedia. (2020). NHL Entry Draft [Wikipedia page]. Retrieved from https://en.wikipedia.org/wiki/NHL_Entry_Draft

National Hockey League. (2020). NHL Team Statistics [NHL page]. Retrieved from http://www.nhl.com/stats/teams

GitHub:

https://github.com/mellingwood/CMSACdraftProject

https://github.com/jillreiner/cmsac-penguins

Appendix

References:

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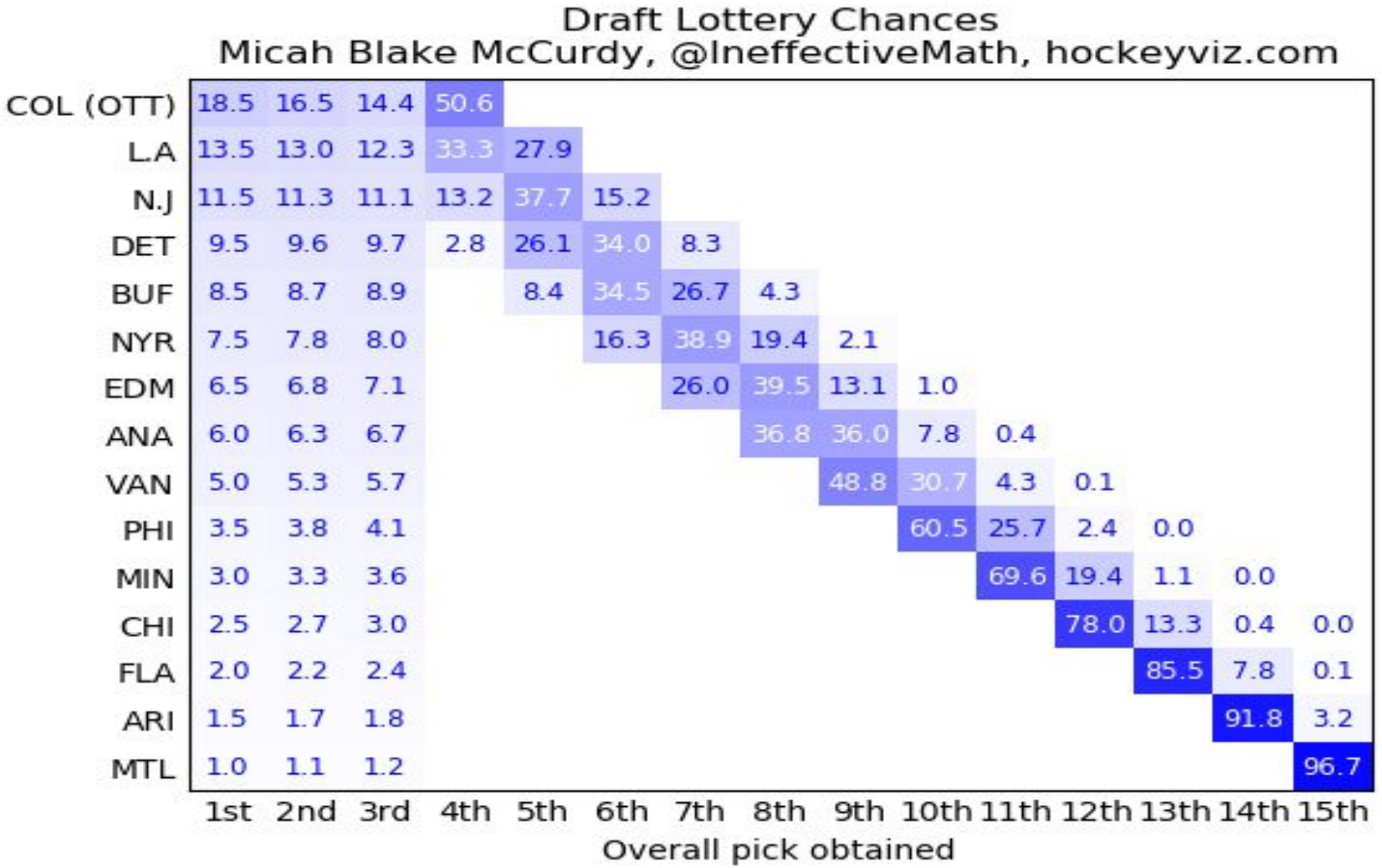
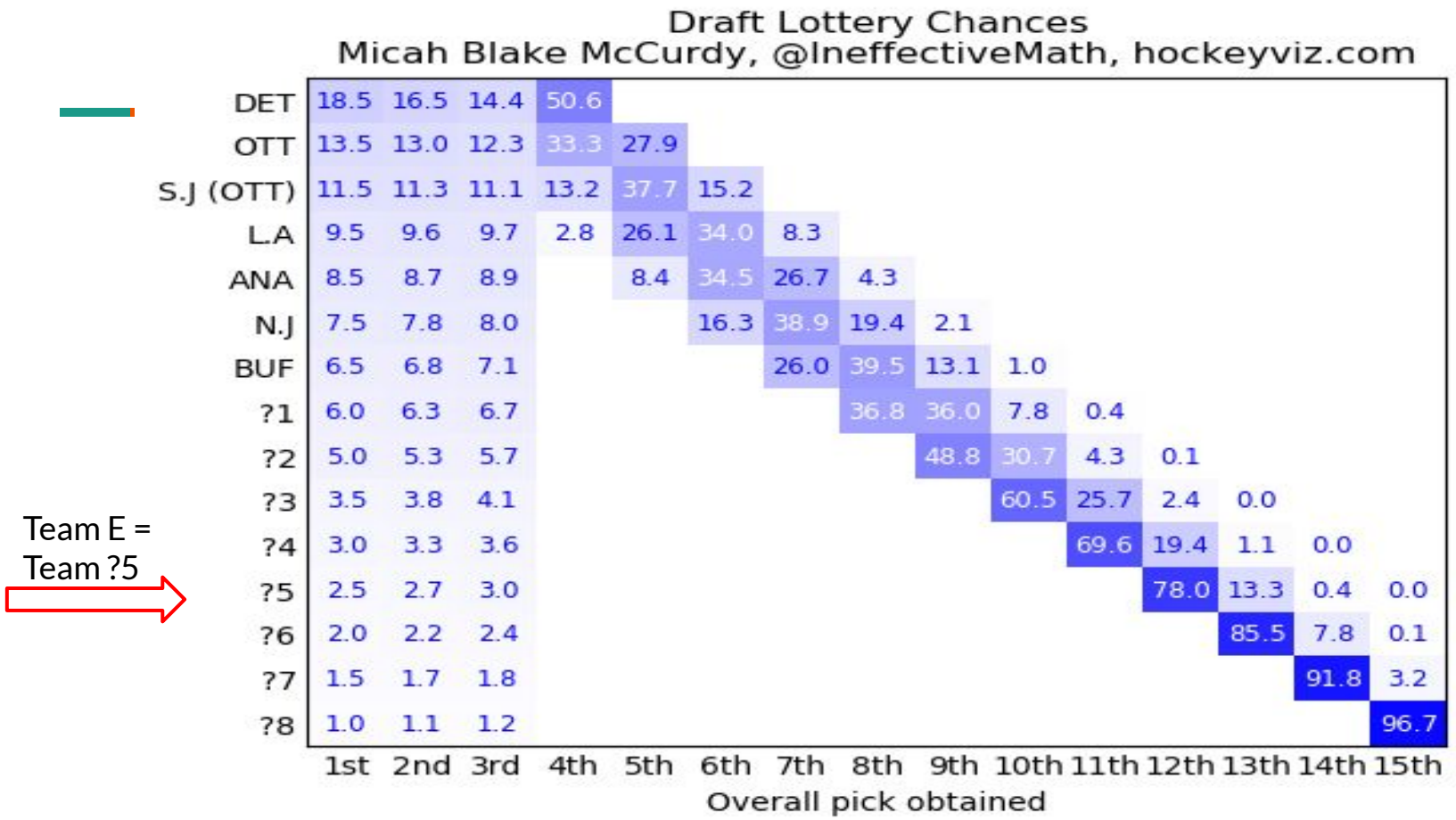
Appendix: Normal year draft lottery odds



Appendix: 2020 draft lottery odds

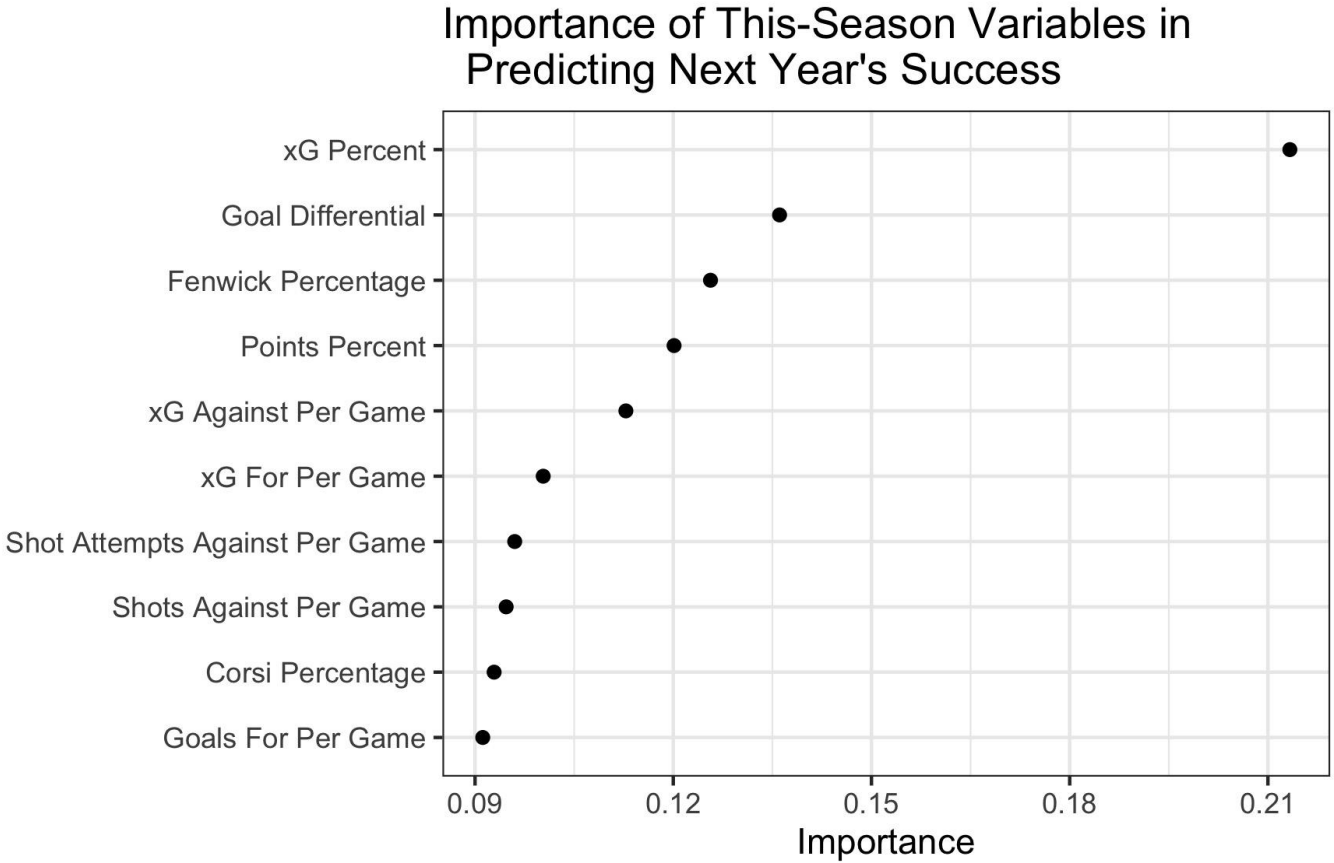


Team E =
Team ?5

2020 NHL Draft Lottery

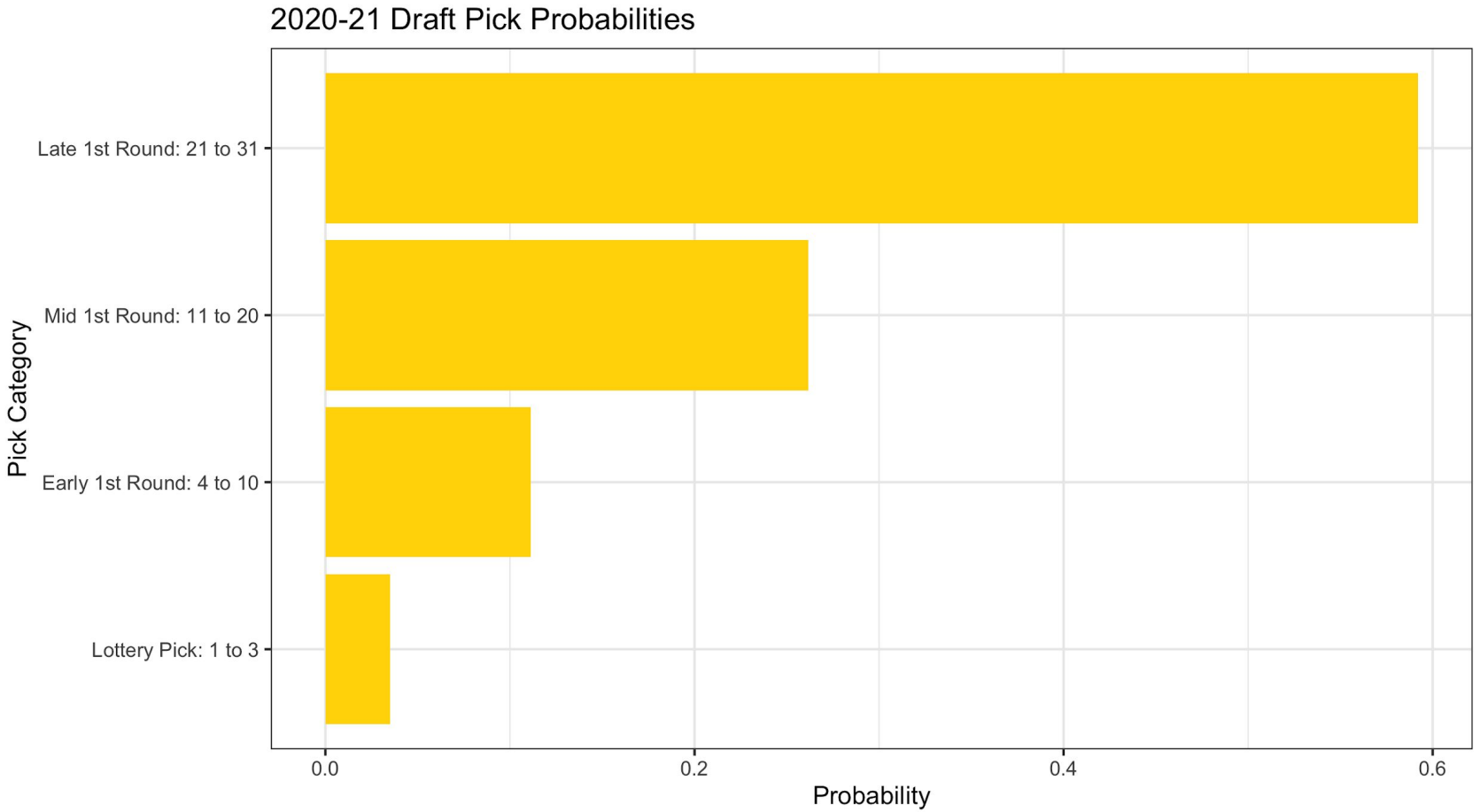
- This year's lottery is different! (took place June 26th)
  - 24 team playoff instead of 16 team playoff
  - Still 15 teams in the lottery
    - 7 teams that did not qualify for the playoffs
    - 8 teams eliminated in the "qualifying round"
      - These are "placeholder" spots in the lottery
  - Placeholder Team E won the lottery (!)
  - This means that the Penguins could get the **1st pick** (⅛) or the **15th pick** (⅞), since they have the highest point percentage of all of the teams in the qualifying round

Appendix: Variables in Next-Year Model



Using a random forest with 500 trees and 3 randomly selected variables

Appendix: Categorized 2021 pick probabilities



What can the Penguins do from here?

- What's a fair trade if the Penguins want to **trade down**?
  - e.g. based on the value curve, pick 17 + a pick in the 2nd round = pick 15
- **Trade up** to have a higher position in the draft
- Trade for a player who can help the Penguins win now
  - Comparable: Dougie Hamilton trade
    - Boston traded defenseman Dougie Hamilton to Calgary for **pick 15** and two picks in the 2nd round