A Non-Standard Basketball Pool: Retrospective and Prospective

Rick Cleary, Babson College

For MAA MathFest 2025

With influence from…

- Peter Staab, Fitchburg State
- Brett Presnell, U. of Florida
- John Trono, St. Michael's College
- Aaron Archer, Google (NYC)
- Robin Lock, St. Lawrence University
- Cliff Stein, Columbia
- Tim Chartier, Davidson

Retrospective…

- Original idea: Encourage people to play in an NCAA pool that was simpler than the classic “fill out the whole bracket.”

Retrospective…

- Original idea: Encourage people to play in an NCAA pool that was simpler than the classic “fill out the whole bracket.”
- Make it fun and interesting both as sports fans and mathematicians, statisticians, programmers.

The Portfolio Pool:

- A classic problem in mathematical finance is *portfolio optimization* …
- Rather than pick every game prior to the tournament in the standard ‘bracket pool’, we developed this alternative:

Portfolio pool…

- Pay a $1 entry fee, invest in $1 worth of teams.

Portfolio pool…

- Pay $1 entry fee, invest in $1 worth of teams.
- Number one seeds cost 25 cents each … number two seeds cost 21 cents each…

The whole price list

Seed	Price	Seed	Price
1	.25	8	.06
2	.21	9	.05
3	.18	10	.04
4	.15	11	.03
5	.12	12	.02
6	.10	13-16	.01
7	.08		

A Player's score is total wins by the teams they choose to purchase…

The whole price list

Seed	Price	Seed	Price
1	.25	8	.06
2	.21	9	.05
3	.18	10	.04
4	.15	11	.03
5	.12	12	.02
6	.10	13-16	.01
7	.08		

A Player's score is total wins by the teams they choose to purchase… high score wins the whole pot (split in case of ties.)

Like in Finance…

- Want to get a large expected return…
- Have to balance quality of a team with quality of opposition and whether they are direct competitors.
- ‘Blue chips’ are expensive but don’t always yield good result, ‘penny stocks’ are tempting but hard to pick!

Different than Finance…

- Because there are many entries, a strategy that is high variance as well as high expectation is best. (Hard for a conservative investor to win in this game.)
- In terms of mathematical modeling: Maximizing P(first place) is not the same as maximizing expected points!

State of the Art, 2001

- With Archer, Lock and Trono we published this paper:

https://www.jstor.org/stable/pdf/25678302.pdf

State of the Art, 2001

- With Archer, Lock and Trono we published this paper:

https://www.jstor.org/stable/pdf/25678302.pdf

A few key points:

-Twelve seeds were historical good investment.

-Probability modeling key to good performance.

-Determining optimal entry after the tournament was a classic knapsack algorithm … greedy algorithm usually wors!

Since 2001…

- Many players got serious about combinatorial optimization and modeling.
- Non-math fans intimidated! Resulted in establishment of alternate prize pools for single entries and multiple entries.
- And of course, many more years of data.

2025 results for this pool…

Unusual year with the four #1 seeds all making it to the Final Four:

SINGLE ENTRIES: 32 players, three tied with 18 wins … not as good as the most conservative strategy of four #1 seeds!

MULTIPLE ENTRIES: 101 entries, winner had 20 of a possible 23 points.

Perfect Hindsight ‘25

School	Cost	Wins	Cents/Win	WIN TOTAL	COST TOTAL
Colorado State	0.02	1	2	1	2
McNeese State	0.02	1	2	2	4
Arkansas	0.04	2	2	4	8
Drake	0.03	1	3	5	11
New Mexico	0.04	1	4	6	15
Florida	0.25	6	4.17	12	40
Baylor	0.05	1	5	13	45
Creighton	0.05	1	5	14	50
BYU	0.1	2	5	16	60
Ole Miss	0.1	2	5	18	70
Houston	0.25	5	5	23	95

So now what?

- Evaluating probability models for P(upset | factor) where factor might be:

So now what?

- Evaluating probability models for P(upset | factor) where factor might be:

-Difference in seeding (i.e 7 vs. 10)

Game level modeling…

- Evaluating probability models for P(upset | factor) where factor might be:

-Difference in seeding (i.e 7 vs. 10)

-Difference in rankings by popular websites (i.e. UCLA 29th vs Utah St. 39th)

-Other factors (recent play, conference, etc.)

Pool level modeling

- As number of entries grows, how much ‘added variance’ might help an entry stand out?
- What total is likely to be needed to win the pool given the optimal outcome?

(Data suggests 6.243 + 0.557 * OPT)

Pool level modeling

- As number of entries grows, how much ‘added variance’ might help an entry stand out?
- What total is likely to be needed to win the pool given the optimal outcome?

(Data suggests 6.243 + 0.557 * OPT)

And …

- Difference in men's and women's tournaments. (Peter Staab has already begun exploring the 'upset history' for both.)

Prospective…

We will be considering:

-Game level: Factors that help predict outcomes of individual games; and

Prospective…

We will be considering:

-Game level: Factors that help predict outcomes of individual games; and…

-Pool level: A ‘field guide’ to playing in an NCAA tournament pool, depending on the rules of the pool, the number of players, and for different tournaments.

Thanks for listening…

- Questions and comments welcome!

- And if you want to play portfolio pool in 2026 write my personal email address:

rickclearystats@gmail.com

(And if you want to start a women's portfolio pool, that would be great!)

References…

-Archer, Cleary, Lock and Trono; Math Horizons Portfolio Pool:

https://www.jstor.org/stable/pdf/25678302.pdf

-Staab and Cleary, basketball score distributions:

https://www.comap.com/membership/member-resources/item/same-score-streaks-in-basketball-and-in-other-sports