MIT 15.S50 Lecture 6
Monday, January 25th, 2016
Independent Chip Model (ICM)
So far, we have always strived to maximize “Chip EV”, ie. the expected number of chips we have.

This is a reasonable assumption in Cash Games, where each chip is equivalent to a dollar.

However, in tournaments, sometimes you want to minimize risk, to stay alive and move up the escalating payouts.
Important Distinction

- We are still maximizing “$EV”; we are not minimizing $-risk.

- We are only minimizing “tournament risk” because that is what maximizes $EV.

- Being overly conservative in a tournament (not only minimizing Chip-risk, but also minimizing $-risk) is unacceptable for professionals.
ICM

- ICM is a way to calculate exactly what your equity in a tournament is.

- Eg. 3 players left:
  - 1st pays $5
  - 2nd pays $3
  - 3rd pays $2

- Statement: “Your chances of winning the tournament is proportional to your % of the total chips”.
Assuming this statement is true...

- We can write calculators to calculate your exact equity!
- Eg. Suppose the chip stacks are A: 5000, B: 3000, C: 2000.
- If you’re person C:
  - Your chances of winning is 20%
  - To calculate your chances of coming 2\textsuperscript{nd}:
    - Conditioned on the fact that A wins (50%), your chances of coming 2\textsuperscript{nd} is $\frac{2000}{5000} = 0.4$
    - Conditioned on the fact that B wins (30%), your chances of coming 2\textsuperscript{nd} is $\frac{2000}{7000} = \frac{2}{7}$
    - Overall, your chances of coming 2\textsuperscript{nd} is $0.4 \times 0.5 + \frac{2}{7} \times 0.3 = \frac{2}{7}$
- Your equity is \$2 + 0.2(\$3) + 0.29(\$1) = \$2.89
ICM Calculators

- If there’s say 7 players left, you have no hope of doing this calculation by hand. (To calculate your chances of coming 6th, you need to sum $5! = 120$ terms.)

- Fortunately, google “ICM calculator” and it will do this for you.
Cases where ICM is easy to calculate

- Cash games: There is no such thing as ICM.
  - Expected # of chips
  - ~expected $, since chips = money.

- Winner–take–all tournaments:
  - Expected # of chips
  - ~ chances of winning tournament
  - ~ expected $

- Two players left in tournament: same situation as a winner–take–all tournament.
Some Mathematical Corollaries of the ICM Formula

- Big stacks have $EV < CEV$, small stacks have $EV > CEV$ (small stacks also have positive CEV in general)

- Early on in a tournament, ICM is irrelevant (just want to accumulate chips)

- ICM is most relevant on the exact payout bubble, and at the final table
You have 1 chip left late in a tournament (when everyone else has thousands of chips); clearly this chip is worth a lot more than its value as a fraction of the chips.

In satellites (flat payout structure), Under-the-Gun is the best position, and sometimes you want to fold AA preflop.
ICM does not say “play tighter”. In fact, it allows you to play looser in certain scenarios, especially with a big stack.

If you know your opponent is rational, you can move all-in on them more aggressively, knowing they are incentivized to fold.

Of course, some opponents are not rational, so it’s a tricky balancing act.

In fact, it is beneficial if you can somehow convince your opponents that you’re not rational.

“Traffic Intersection” Game