

# MIT 15.S50 Lecture 6

Monday, January 25<sup>th</sup>, 2016

# Independent Chip Model (ICM)



# Chip EV

- ▶ 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.
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# 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.
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# ICM

- ▶ ICM is a way to calculate exactly what your equity in a tournament is.
- ▶ Eg. 3 players left:
  - 1<sup>st</sup> pays \$5
  - 2<sup>nd</sup> pays \$3
  - 3<sup>rd</sup> 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<sup>nd</sup>:
    - Conditioned on the fact that A wins (50%), your chances of coming 2<sup>nd</sup> is  $2000/5000 = 0.4$
    - Conditioned on the fact that B wins (30%), your chances of coming 2<sup>nd</sup> is  $2000/7000 = 2/7$
    - Overall, your chances of coming 2<sup>nd</sup> is  $0.4 (0.5) + 2/7 (0.3) = 2/7$
- ▶ 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 6<sup>th</sup>, 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
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# Some More Examples

- ▶ 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.
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# “Traffic Intersection” Game

- ▶ 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.
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