

MIT 15.S50 LECTURE 4

Wednesday, January 25th, 2012

STARTER: DO YOU GO ALL-IN OR FOLD?



ANALYSIS

- Let's suppose the BB calls a “reasonable” range:

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s	S
AKo	KK	KQs	KJs	KTs	K9s	K8s	K7s	K6s	K5s	K4s	K3s	K2s	
AQo	KQo	QQ	QJs	QTs	Q9s	Q8s	Q7s	Q6s	Q5s	Q4s	Q3s	Q2s	
AJo	KJo	QJo	JJ	JTs	J9s	J8s	J7s	J6s	J5s	J4s	J3s	J2s	
ATo	KTo	QTo	JTo	TT	T9s	T8s	T7s	T6s	T5s	T4s	T3s	T2s	
A9o	K9o	Q9o	J9o	T9o	99	98s	97s	96s	95s	94s	93s	92s	
A8o	K8o	Q8o	J8o	T8o	98o	88	87s	86s	85s	84s	83s	82s	
A7o	K7o	Q7o	J7o	T7o	97o	87o	77	76s	75s	74s	73s	72s	
A6o	K6o	Q6o	J6o	T6o	96o	86o	76o	66	65s	64s	63s	62s	
A5o	K5o	Q5o	J5o	T5o	95o	85o	75o	65o	55	54s	53s	52s	♣♣
A4o	K4o	Q4o	J4o	T4o	94o	84o	74o	64o	54o	44	43s	42s	♦♣
A3o	K3o	Q3o	J3o	T3o	93o	83o	73o	63o	53o	43o	33	32s	♥♣
A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62o	52o	42o	32o	22	♠♣

25.2%

- Your equity against this range:

Player 1	R/D	22+, A2s+, K8s+, QTs+, A2o+, KTo+	63.545%
Player 2	R/D	T8o	36.455%



DO THE MATH

- 75% of the time, he folds, and we win 2.5BB's
- 25% of the time, he calls,
 - 36% of the time, we win the all-in and win 16.5BB's
 - 64% of the time, we lose the all-in and lose 14.5BB's
- $0.75(+2.5) + 0.25(0.36(+16.5) + 0.64(-14.5))$
- $=0.75(+2.5) + 0.25(-3.34)$
- Clearly positive.
- $=1.04\text{BB}$
- You're making an entire big blind by shoving instead of folding! We really are maximizing our expected # of chips by shoving!



IF WE HAD THE WORST HAND POSSIBLE...



DO THE MATH AGAIN

- Expectation when he calls:
 - $0.28(+16.5) + 0.72(-14.5) = -5.82$
- Overall expectation:
 - $0.75(+2.5) + 0.25(-5.82)$
- Still positive! This shove is an EXCELLENT play that earns you 0.42BB's, not a “crazy bad” play. We are still earning positive chips/money!



THE POINT?

- If you're only calling this 25% from the Big Blind in this situation, then you're allowing the Small Blind to shove any 2 cards profitably.
- Let's suppose we consider adding QJo to our calling range. We need to call 14BB to win a total pot of 31BB, so we need 45% equity.
- Nonetheless, since most Small Blinds don't shove enough, we might not actually have this!



MORE MATH

- Let's assume that the Small Blind only shoves the top 25% of hands (instead of 100%, which includes 32o).

- Your equity with QJo:

Player 1	$\frac{R}{D}$	66+, A2s+, K6s+, Q8s+, J8s+, T8s+, A7o+	57.774%
Player 2	$\frac{R}{D}$	QJo	42.226%

- You only have 42% equity. Not enough to call the all-in!



So...

- If your Big Blind calling strategy against a Small Blind shove in this situation is to only call 25%, then the optimal strategy for the Small Blind is to go all in with any 2 cards.
- The Big Blind calling strategy I posted is probably similar to what most people do, so I would advise everyone go all in more frequently from the small blind!
- If people start doing this, then I would advise that BB's start calling pre-flop all-ins more.
- Until then, it's okay to keep your "calling only 25% strategy".
- The point of all this mess is that "the current strategies I see are not a Nash Equilibrium".



WHAT ABOUT RAISE-FOLDING?



SOME TERMINOLOGY...

- The first re-raise preflop is usually called a “**3-bet**”.
- The next re-raise preflop is usually called a “**4-bet**”, etc.
- Going all-in is usually called **shoving**.
- When you say something like **3-bet-calling**, it means you’re going to 3-bet with the intention of calling an all-in.
- When you say **4-bet folding**, it means you’re going to 4-bet as a bluff with the intention of folding to an all-in.



BIG ALL-INS FROM THE SMALL BLIND ARE GOOD...

- In general, I said that if you have 15BB's, then you technically could raise to 2BB's, and escape to an all-in.
- However, I advise against it here, because you are out of position the entire hand if he calls you are forced to play the pot postflop! It's a lot better from the BTN.



AN ACTUAL TOURNAMENT...

- Mostly preflop play this time (“turbo”)
- Lots of theory first, then lots of examples
- Will finish this next class
- I will often say “I would go all in with this set of hands in this spot”, without doing the mathematical calculation every time. The hope is that after watching me do this so many times, you build some intuition and save some calculations.
- These are real hands instead of made up hands. I will play through an entire \$109 buy-in online tournament I played this winter while in Canada.
- Starting # of chips = 2000



REMEMBER THE 3 FACTORS OF PREFLOP ANALYSIS

1. My position (how many players behind me)
 2. My stack size (actually, effective stack size)
 3. My cards
-
- The idea is to know what to do in all possibilities of (1,2,3).
 - To do this, you need to learn examples, and extrapolate. To extrapolate well, you need to
 1. Give your self lots of data points by seeing lots of examples.
 2. Understand the theory so that you actually know how to extrapolate.



RE-RAISING PREFLOP



BET SIZING

- If I raise to any reasonable size, say at least 1300, then I've put in almost half of my stack. Since my opponents know I'm never going to fold preflop anyway, I might as well just go all-in preflop and not give them a chance to call profitably with some hand.
- (I happen to have AA here, so they can never call profitably, but if I had AK instead, it would be fatal to raise to 1300 and let them call. I go all-in just to not give away the fact that I have AA.)
- If I want to raise to a size small enough such that I don't announce that I'm "all-in preflop", I'd have to raise to 950, which is way too small (giving them 7-to-1 odds).



WE HAVE FEW ENOUGH CHIPS TO JUST
ALL-IN OR FOLD. DON'T RAISE SMALL!



MY RANGE

- 88+, AJs+, AQo+
- Depends on how frequently I thought the CO was opening, and how frequently the BTN would re-raise preflop without a monster hand.
- If the answer is “frequently” (high % of hands) to both answers above, I could go all-in with hands as weak as A2s, JTs, 22, although in general I would advise against doing this.



WHAT ABOUT CALLING INSTEAD?

- Remember one of the biggest arguments in favor of calling instead of re-raising:
 - You don't give them the opportunity to re-raise again.
- But in this case, when there already is a raise and a re-raise, the CO has the opportunity to re-raise again anyway with a good hand.
- Thus, one of the biggest advantages of calling has dissappeared. By calling, we only deny the BTN the opportunity to re-raise.
- Therefore, in spots like these, with a raise followed by a re-raise, I would very rarely just call. Re-raise or fold!



THE RESULT...I THINK HIS CALL IS CORRECT



NEXT BIG HAND



MY CALLING RANGE HERE

- I would probably call TT+, AQs+, AKo
- Note that in high level tournaments, no one really just “plays around with their stack”. You usually just go all-in or fold.
- “In for a penny in for a pound.” The idea is that when your # of BB’s is not that high, you shouldn’t be putting some BB’s into a pot without putting all of them.
- mohair69’s play is poor



LEAVE TABLE
VIEW LOBBY

PKaiser
\$8033

Brut_kz
\$1442

nicelife
\$1925

master_phil8
\$0

schlizzer
\$1835

MattInDaHat
\$0

mohair69
\$1085

CutiePi314
\$2230

Jack of Spades, 7 of Clubs, 6 of Diamonds, Queen of Clubs, Queen of Spades

\$2900

\$1400

\$4875

Chat Notes Stats Info

Last Action
Dealing River



RE-RAISING PREFLOP BUT NOT ALL-IN



BET SIZING

- Here, we can make it a reasonable size without making it clear that we are not folding pre-flop.
- Try to raise around 2.2x (previously 2.5x) his raise, without putting in 25% (previously 20%) of your effective stack size. These numbers are slightly off from my previous numbers (in parentheses), but those were only guidelines anyway, and bending them a bit is fine as long as you understand the theory.
- We can successfully do this by making it 1500 or so.



WE DO IT



HE GOES ALL-IN...



SKIPPING SOME MATH...

- I would expect his range here to be something like 77+, AJ+, KQ+, with occasional random bluffs.
- Against this range that he goes all-in with, I am profitable to make this play (re-raise to 1555 and call an all-in) with about 99+, AQ+.



GENERAL CALLING VS. RAISING COMPARISON

○ Advantages of Calling

- Don't give him the opportunity to re-raise again preflop.
- You can make good decisions postflop if you're in position and your cards have high postflop playability.
- Don't let him fold hands that you dominate, ie. gives you a chance to hit an Ace-high flop when you have AQ and he has AT.

○ Advantages of Raising

- Gives you a chance to win the pot right there and then. Even if you have a good hand, he could always get lucky on the flop.
- Might make him fold some better hands.
- When you have a really good hand, allows you to build a bigger pot to win.



WHAT ABOUT CALLING INSTEAD?

- On the previous slide, I said that I would only make this play with 99+, AQ+.
- However, if you give yourself 88 in this situation, you will calculate that you still have enough equity to call his all-in – barely.
- Often, when you only barely have enough equity to call his all-in after you re-raise, you are much better off just calling his initial raise instead. Even though calling his all-in at the last stage is “profitable”, it is only so because you already put all those chips in the pot to raise. But you could’ve chose not to put those chips in the pot!



FLAT-CALLING RANGE

- I would just call with hands like 88, 77, AJs, KQs.
- The HJ-1 can have lots of hands that lose to you, like AT, KJ, 66. You can win a lot of money KJ vs KQ on a K-high flop. If you raise, he will fold all of these hands that you beat.
- By raising, I give him an opportunity to go all-in preflop, to which I'm usually folding, and when I do call I'm not happy. Taking the less-risky option of calling and seeing a flop in position is better.



TWO PROBLEMS WITH MY STRATEGY

- Problem 1: Whenever I raise, I always have a good hand, so my opponent can just fold a lot and get away.
- Problem 2: Whenever I call, I can NEVER have a good hand (since I would've raised with 99+, AQ+), so people behind me can re-raise and I will fold.



SOLUTION 1

- Problem 1: Whenever I raise, I always have a good hand, so my opponent can just fold a lot and get away.
- Solution 1: Also raise some hands as bluffs! However, these should not be the hands barely worse than your {99+, AQ+}, like 88/AJ. Raising them and folding them to his all-in is such a “waste” when your hand is this good. You would rather raise your hands even less good, like 66/KJs/JTs, because folding these to his all-in is less of a waste.



THE PARADIGM

- Best hands: (99+, AQ+) Raise and call an all-in.
- Next best hands: (77-88, AJs, KQs) Call.
- Next best hands: (66, AJo, KQo, ATs, JTs) Raise and fold to an all-in.
- Everything else: Fold.



POLARIZATION

- This kind of paradigm is usually called “polarization”. It is different from the equity analysis I told you to do in Lecture 1.
- Polarization is theoretically a good idea. It is less effective than the equity analysis (of just raising if and only if your equity is high) if your opponent is bad and unpredictable.



THIS IS CONSISTENT WITH SOME PARADIGMS WE HAD BEFORE!

- The idea of these paradigms is, **we have a very easy decision if he goes all-in**, since when we raise, our hand is either very good or very bad. If we raised our medium hands, we'd have a tough decision if he went all-in, which is always bad.
- “Raise your good hands, call your medium-strength hands, raise your speculative hands (flush and straight draws), and fold everything else.”
- “Bet for value when you have a strong hand, bet as a bluff when you have a weak hand, and don't bet when you have a medium-strength hand.”



SOLUTION 2

- Problem 2: Whenever I call, I can NEVER have a monster hand (since I would've raised with 99+, AQ+), so people behind me can re-raise and I will fold.
- Solution 2: There really is no great solution. Occasionally you can try to call here with a hand like QQ, but it will suck the times he has JJ and the flop comes Ace-high and you don't get much money from him. It doesn't matter if you NEVER have a monster hand here, if people behind you aren't capable of re-raising a lot to take advantage.



THE RESULT



A FEW HANDS LATER...



SAME THING...

- His stack size is basically the same as last time, and his position is one earlier than last time.
- My play vs. this is very similar:
 - 3-bet-call 99+, AQ+
 - Just call 77-88, AJs
 - 3-bet-fold a few other hands like Ajo, KQs



THE RESULT



BLIND DOWN FOR A BIT... (SOMETIMES, YOU JUST DON'T GET GOOD CARDS, THAT'S OKAY...)



MY RANGE FOR GOING ALL-IN

- Once again, it's all-in or fold
- 88, AJs+
- The limp changes a lot, because the preflop raiser is opening a lot less when there is a limp already. If there was no limp already, I would add hands like 66-77, AJo, KQ to my range



sega1989
\$2821

ERDW
\$12316

CutiePi314
\$0

touchmynuts1
\$15899

equityisneg
\$13370

ABT707
\$16323

Aussie star1
\$20526

schlizzer
\$2156

Community Cards: 5♥, 5♣, K♥, 7♠, 7♥

Pot: \$20104

Chat | Notes | Stats | Info

Last Action
Dealing River



NEXT HAND...



ANALYSIS

- I'm planning on calling his all-in whenever I make this re-raise...I've put in 25% of the effective stack size...
- My range here is maybe A7s+, A9o+, KTs+, KJo+, QJs, 55+
- Note how much wider this is, just because positions are later!



THE RESULT...LUCKY!



A screenshot of a Texas Hold'em poker game interface. The game is in progress on a green felt table. The pot is \$1600. The community cards on the table are the Ace of Hearts (A♥) and the Ace of Spades (A♠). The dealer button is positioned at the top right. The players and their chip counts are as follows:

- lethal stee: \$8362
- brianjk: \$20642
- CutiePi314: \$28030
- equityisneg: \$0
- Aussie_star1: \$35732
- Demoryc: \$38591
- ABT707: \$14703
- touchmynuts1: \$14224
- Princesa: \$8461

The action is currently at Aussie_star1, who has folded. The next player to act is Demoryc. The interface includes a chat window at the bottom left, a stats/info window at the bottom right, and buttons for 'LEAVE TABLE' and 'VIEW LOBBY' at the top right.



MY RANGE

- I would comfortably call this with A5s+, A7o+, K9s+, KTo+, QTs+, QJo, 22+
- Once again, notice how this range is even wider than the last!



THE RESULT

The screenshot shows a Texas Hold'em poker game interface. The community cards on the table are the 10 of Spades, 4 of Hearts, 8 of Diamonds, 7 of Clubs, and 4 of Diamonds. The pot size is \$21628. The player CutiePi314 is the winner, having shown the Ace of Hearts and Ace of Diamonds. The interface includes player names and chip counts around the table, a chat window at the bottom left, and a 'Last Action' log at the bottom right.

Player Chip Counts:

- lethal stee: \$8362
- brianjk: \$20642
- CutiePi314: \$19666
- equityisneg: \$0
- Aussie star1: \$35732
- Demoryc: \$38591
- ABT707: \$14703
- touchmynuts1: \$14224
- Princesa: \$8461

Community Cards: 10♠, 4♥, 8♦, 7♣, 4♦

Pot: \$21628

Winner: CutiePi314 (Two pairs, aces and fours)

Chat:

- CutiePi314: wins 21628 from the main pot with Two pairs, aces and fours
- CutiePi314: wins 21628 from the main pot with Two pairs, aces and fours

Last Action: CutiePi314 shows [Ah;Ad]


Buttons: LEAVE TABLE, VIEW LOBBY


NEXT HAND...



RANGES

- I expect his range to be about

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s	S
AKo	KK	KQs	KJs	KTs	K9s	K8s	K7s	K6s	K5s	K4s	K3s	K2s	
AQo	KQo	QQ	QJs	QTs	Q9s	Q8s	Q7s	Q6s	Q5s	Q4s	Q3s	Q2s	
AJo	KJo	QJo	JJ	JTs	J9s	J8s	J7s	J6s	J5s	J4s	J3s	J2s	
ATo	KTo	QTo	JTo	TT	T9s	T8s	T7s	T6s	T5s	T4s	T3s	T2s	
A9o	K9o	Q9o	J9o	T9o	99	98s	97s	96s	95s	94s	93s	92s	
A8o	K8o	Q8o	J8o	T8o	98o	88	87s	86s	85s	84s	83s	82s	
A7o	K7o	Q7o	J7o	T7o	97o	87o	77	76s	75s	74s	73s	72s	
A6o	K6o	Q6o	J6o	T6o	96o	86o	76o	66	65s	64s	63s	62s	
A5o	K5o	Q5o	J5o	T5o	95o	85o	75o	65o	55	54s	53s	52s	
A4o	K4o	Q4o	J4o	T4o	94o	84o	74o	64o	54o	44	43s	42s	
A3o	K3o	Q3o	J3o	T3o	93o	83o	73o	63o	53o	43o	33	32s	
A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62o	52o	42o	32o	22	


21.3%



CHECK-POINT

- Are you really going all-in frequently enough?
- (I suspect you aren't. Not to offend anyone =P)



MY RANGE

- If you do the math, my profitable calling range against this is something like ATs+, AJo+, 66+
- Note that I did not include KQ! This is because there are so many Ace+random hands in his range.



SOME HANDS WITH POSITIVE EQUITY I MUST FOLD, BECAUSE OF THE 4 PLAYERS BEHIND ME



A POSTFLOP HAND...



ANALYSIS

- Option 1: Fold. My hand is probably too good for this.
- Option 2: All-in. This is good because it may bluff him off a lot of better hands. However, it is unnecessarily risky when Option 3 is so good...
- Option 3: Call. I'm getting good odds, I'm in position postflop, and I have a hand that plays pretty well postflop:
 - I usually have a hand good enough to go all-in when I hit a pair (since stacks aren't that deep and both my cards are high enough). I can make a lot of good bluffs with straight and flush draws.
 - This play would be terrible with 44. But if we had a lot more chips, then "set mining" would be alright.
 - This play is always terrible with a hand like A3o.



HE BETS THE FLOP...



ANALYSIS

- I do hit a pair, but I choose not to raise:
 - The Jack isn't the highest card. I'm losing to a King.
 - Even if my hand is good enough to go all-in, I'm not really scared of too many turn cards. Only a Ace and Queen are truly scary. (Compare this to the flop coming K84 instead of KJ4, then there's a lot more cards that scare me.)



So I CALL



HE CHECKS TURN...



NO NEED TO BET

- Once again:
 - Our hand is really on the border of being good enough to get him to “call with a worse hand”.
 - Overall, I would consider our hand a “medium-strength hand”, so I do not bet.
 - Part of the reason is because he re-raised preflop! So he could have hands like QQ, AJ, etc...hands that will call our bet and beat us.
 - Also, the turn is not scary at all, and there are not that many scary river cards.



HE CHECKS AGAIN



I THINK BETTING WOULD'VE BEEN FINE TOO, BUT VERY BORDERLINE



NO NEED TO WIN EVERY POT...



FOLD.



WE'RE “ESSENTIALLY” ALL-IN PREFLOP...



RANGES

- His range: any pair, any ace, any suited king, K7o+, Q5s+, Q8o+, J8s+, J9o+, T9o, T7s+, 97s+, 87s+, 76s, 65s, 54s?
- My range: any pair, A5s+, A8o+, KTs+, KJo+, QJs
- Once again, I have to be careful of the two players behind.



NOTICE SOMETHING?

- The person who raises all-in (“bluffer”) can have lots of small suited hands in his range, because these hands, while losing to garbage like Q3o, still never do that bad against good hands like AK. They do **similarly well against everything**.
- The person who calls the all-in (“caller”) never has these small suited hands. They usually have hands like A7o, that can be **way ahead or way behind** another hand.



WE PUT IT ALL-IN ON THE TURN (DOESN'T REALLY MATTER WHEN) AND I LOSE.



SOME HANDS LATER...



ANALYSIS

- Rule of thumb: when you have less than 20BB's, a single re-raise (3-bet) will put you all-in
- My range: any pair, A5s+, A8o+, K9s+, KJo+, QJs, JTs



THE RESULT...WIN A 30-70



NEXT HAND (MY RANGE IS BASICALLY THE SAME)



THE RESULT



NEXT HAND



ANALYSIS

- Rule of thumb: When the effective stack size is 10BB or less, you cannot fold to an all-in after you've already raised
- Indeed, I've put in a high enough % of the effective stack for calling the all-in to be positive expectation



RESULT...WIN ANOTHER 30-70 =)



NEXT HAND





REASONS

- Not many scary cards to come, so it's okay if we give them good odds
- Gives them a chance to call with a weak hand or make a random bluff
- Even if they have an Ace, we can still get all their money in by the river!



A screenshot of a Texas Hold'em poker game interface. The game is in progress on a green felt table. The community cards are the 5 of Spades, 8 of Clubs, and Ace of Diamonds. The pot is \$6666. The blinds are \$2 (small blind) and \$4 (big blind). The dealer button is on the left. The players and their stacks are:

- g0rynich: \$90160
- pmahoney22: \$34905
- TiSminghio: \$36517
- Irdml: \$76762
- CutiePi314: \$121651
- SpaceyFCB: \$37051
- mads66: \$66864

The player mads66 has a "Fold" button next to their name. The player CutiePi314 has a "Call" button next to their name. The player pmahoney22 has a "Leave Table" button and a "View Lobby" button next to their name. The player g0rynich has a "D" button next to their name. The player SpaceyFCB has a "Fold" button next to their name. The player TiSminghio has a "Fold" button next to their name. The player Irdml has a "Fold" button next to their name. The player CutiePi314 has a "Call" button next to their name. The player mads66 has a "Fold" button next to their name.

At the bottom, there is a "Chat" window with tabs for "Chat", "Notes", "Stats", and "Info". The "Last Action" window shows "nevs2904 folds".



[illegible]

RESULT



TRYING TO STEAL...



FAILED STEAL...



THAT'S OKAY



MY CALLING RANGE?

- I would've called his all-in with A5s+, A7o+, KTs+, KJo+, QJs, 44+



A FEW HANDS LATER...FAILS AGAIN...WE FOLD



NEXT CLASS

- I will finish the tournament, and play through every hand of the final few tables, even if I fold!

