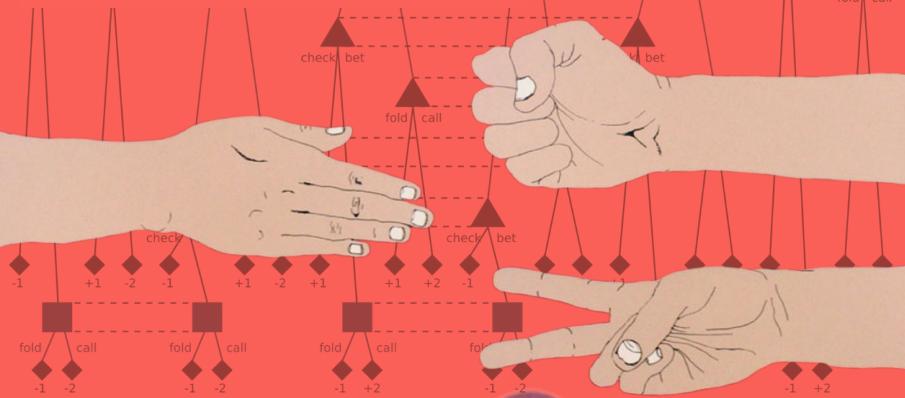


By: Maysa Barandish
& Jones Dickerson



Stat198: Poker Theory & Fundamentals

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

Hosted by
Poker at Berkeley.



Lecture 3: Range Construction & 3-Betting



review:



Review: Opening Ranges

Default RFI Percentages:

UTG: 17.8% of hands

HJ: 22% of hands

CO: 28.8% of hands

BTN: 43.3% of hands

SB: 42.8% of hands

Default Open Raising Sizes:

UTG: 2x

HJ: 2.5x

CO: 2.5x

BTN: 2.5x

SB: 3-4x

Review: What's Wrong with Open Limping?

1. It gives up all **fold equity** and we can't steal the blinds, which as we know, constitutes one of our most stable and essential flows of EV.
2. It seizes no initiative and allows players behind us to raise and gain the initiative instead. This puts them in a situation where they can bet post-flop and apply pressure to win more than their fair share of pots should we both miss the flop.
3. Open limping fails to build a pot for value when we have a strong hand or favorable situation of some sort.
4. Open limping fails to thin the field and invites multiway pots, devaluing our post-flop holdings and making it more difficult to take down pots.



Review: Exploiting Open Limping

Today's lecture will go over a more in-depth process for deciding how to exploit this weakness. For now, here are some initial guidelines:

1. Where Hero has pre-flop or post-flop fold equity (or both) we should **raise a wide range and bet frequently post-flop to pick up this extra dead money.**
2. Hero should look to raise quite a wide range in order to **isolate** the weaker player(s) who limped and ensure we are the beneficiary of any mistakes post-flop.
3. Hero should **occasionally look to limp behind** with hands that want to realize implied odds and see a cheap flop where fold equity is limited. Hero wants to play in a **fit-or-fold** manner in these cases.

Review: Capped vs. Uncapped Ranges

The simplest way to describe a range is in terms of “**capped**” and “**uncapped**”. This gives us an idea of who has the advantage (typically the preflop aggressor), and how we should conduct our play accordingly.

The term “**capped**” simply refers to a range that does not include the strongest hands. For example, a BB calling range usually doesn’t contain premium hands like QQ+ AK, since these hands typically raise preflop. This puts a passive action puts a “cap” on the strength of the range.

Conversely, “**uncapped**” simply means a range that has the strongest hands. A standard opening range should contain all the strongest hands, so it’s therefore uncapped.



Uncapped Range

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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	43o	32o	22

Capped Range

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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
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A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62o	52o	43o	32o	22



Review: Capped Ranges

When playing hands, often the best piece of information we can get is from somebody calling. This could be a player in earlier position limping, the big blind defending, or even someone calling a bet on the flop.

What many of these actions do is **cap your range**. By defending the big blind by calling, and not raising, we have essentially “told” our opponent that we do not have a super strong hand like aces, because we would have raised.

This is what limping in does, as given the option to raise with your hand, you have chosen to call instead.

Opening ranges are “uncapped,” and our goal is to build opening ranges that are difficult to exploit.

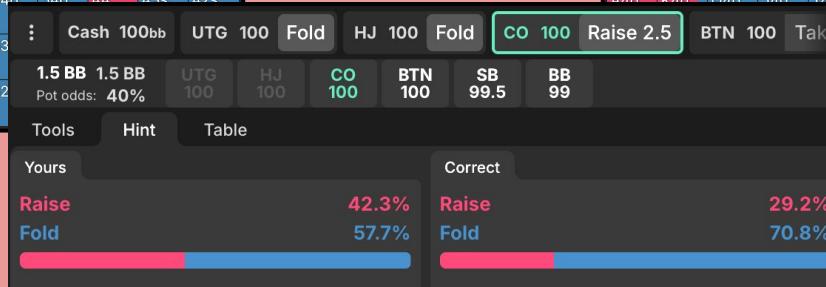


Review: Exploiting Capped Ranges

The key point to understand when dealing with a capped range is that your opponent has a limited set of hands, which means there are certain very strong hands they cannot have. As a result, you can confidently value bet with many of the top hands in your range, knowing your opponent can't have anything stronger to beat you. This is the main problem for your opponent, as it makes your betting and raising ranges appear extremely powerful. The consequence of this is that your opponent will be forced to make tough decisions with hands of medium strength.

Review: Player Types

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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
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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	63				
A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62				



a standard CO RFI (~29%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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	63				
A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62				

a loose player who opens wide in the CO (~42%)

Example: BB Defend vs. BTN 2.5x Open

Villain: BTN (97.5 BB) Hero: BB (99 BB)

Villain RFI on the BTN to 2.5x. SB folds,
Action now on Hero in the BB with 86s.

Do we defend?



BB Defend vs. BTN Open (43.3%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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
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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

Example: BB Defend vs. BTN 2.5x Open

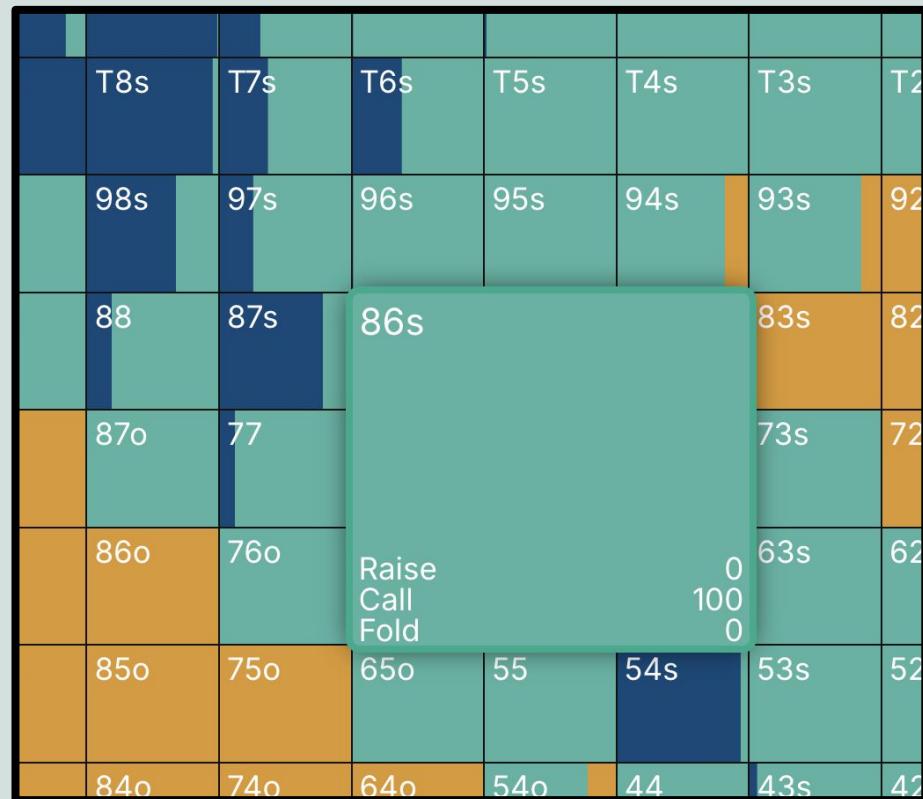
Villain: BTN (97.5 BB) Hero: BB (99 BB)

Villain RFI on the BTN to 2.5x. SB folds,
Action now on Hero in the BB with 86s.

Do we defend?

Yes. Facing a BTN RFI, we defend
our BB with 86s by calling with
100% frequency.

**Hero calls the additional 1.5BB
and closes action.**



Example: BB Defend vs. SB 3.5x Open

Villain: SB (96.5 BB)
BB)

Hero: BB (99

Villain RFI in the SB to 3.5x.

Action now on Hero in the BB with 87o.
Do we defend?



BB Defend vs. SB Open (42.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

Example: BB Defend vs. SB 3.5x Open

Villain: SB (96.5 BB) Hero: BB (99 BB)

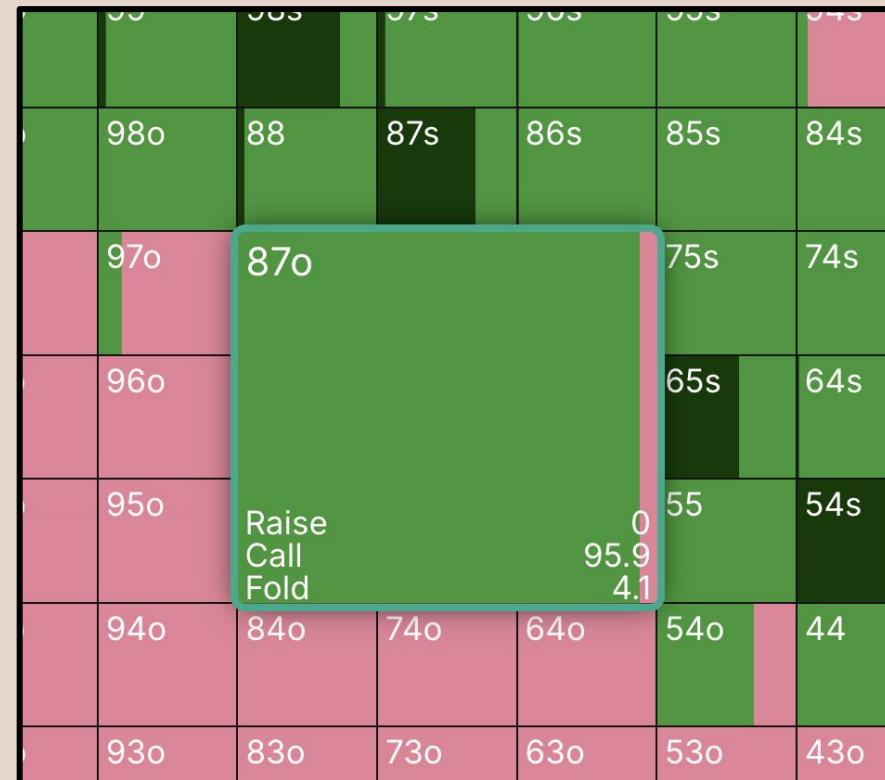
Villain RFI in the SB to 3.5x.

Action now on Hero in the BB with 87o.

Do we defend?

Yes (mostly.) Facing a 3.5x open from the SB we defend with 87o by calling with a 95.9% frequency.

Hero calls the additional 2.5BB and closes action.



Review: Implied Odds

Implied Odds refers to the situation where we stand to win more money if we make a strong hand.

Reverse Implied Odds refers to the situation where we stand to lose more money when we make a hand.

We have **Implied Odds** when we expect our opponents to call large bets when we make a strong pair/straight/flush/etc.

We have **Reverse Implied Odds** when it is often the case that when we make a strong one, our opponent makes a stronger hand and can make us call large bets.



Before We Get into
3-Betting, Some
Important Concepts
We Should Revisit/
Understand:



Expected Value

The currency of poker decision-making is not money. It is EV.

In the real world, if I sell a car for \$5000, I am guaranteed to get exactly \$5000.

In poker, I might make a bet that wins \$20 on average, but lose \$100 due to bad luck. We lost \$100 in real money but gained \$20 in Expected Value.

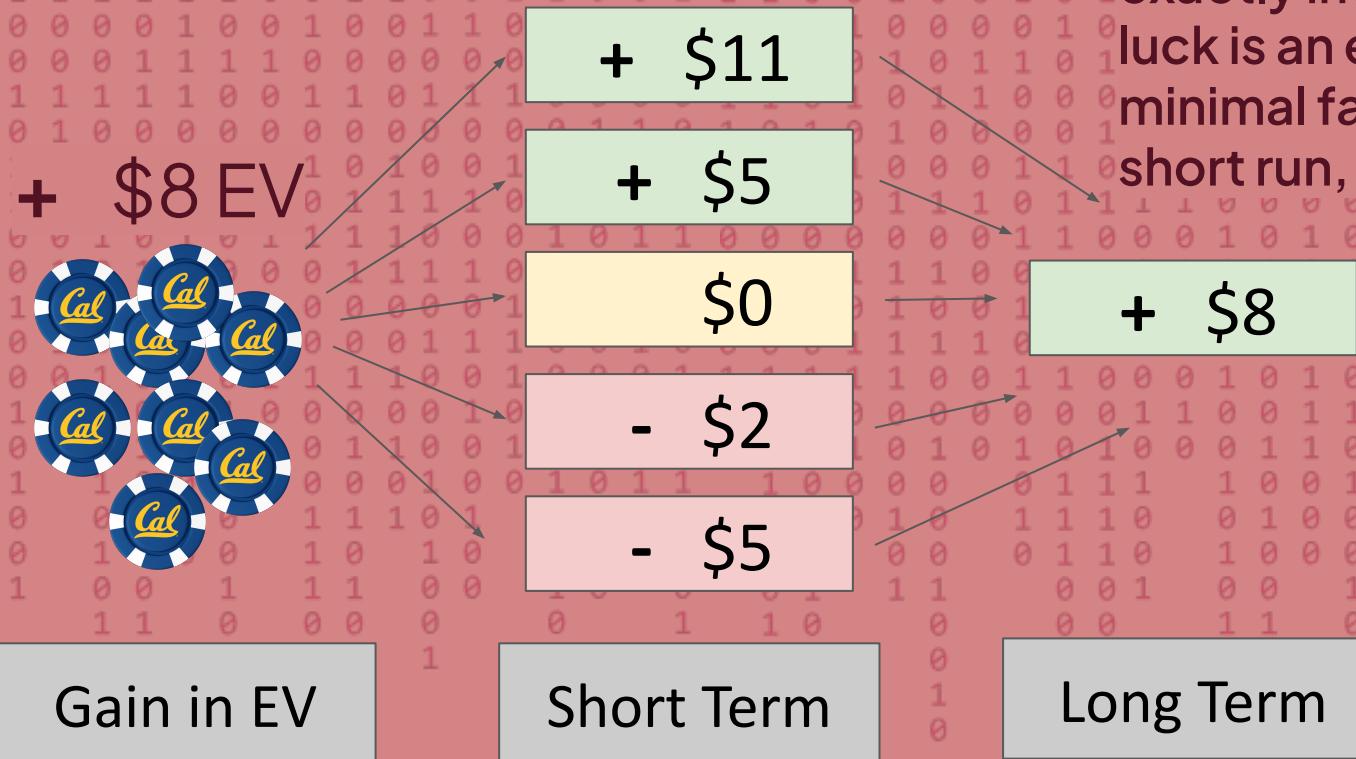
Expected Value, EV for short, is how much money we expect to win on average in the long-term, without luck as a factor.

Plays are considered “+EV” if they win us money on average and “-EV” if they lose us money on average. You will often hear the online pros say things like “that play prints EV”

Every decision we make while playing is to maximize our EV.



EV, Profit Over Time.



Over a long enough span of hands, EV translates exactly into profit and luck is an extremely minimal factor. In the short run, luck is huge.

Equity

Equity/Pot Equity is Hero's share of the pot based on how often their hand will be the best by the river, if there were no further betting.

Essentially, it is the probability we win.

You can think of Equity as the portion of the pot that should belong to us that we are fighting to convert into actual profit.

You should understand that ***Equity ≠ EV***. Though similar, your *Expected Value* combines your *Equity* with the money you could potentially win or lose after making a certain decision.



Equity and EV

Equity and EV are two different ways of quantifying uncertainty in poker, putting a price on a situation where we don't know which cards are going to come or what other actions other players will take.

Raw equity does not translate into hand strength (think $T\heartsuit 9\heartsuit$ vs. $J\heartsuit 6\heartsuit$)

We will talk about equity in depth, specifically how we can sometimes estimate it, in the next lecture.

Review: A Note on Equity

You don't need to have a lot of equity in a hand to have good EV (or +EV in other words).

Equity and EV are not directly proportional.

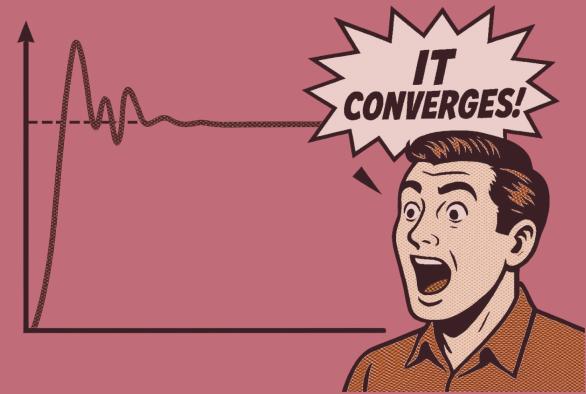
It's true that the more equity you have (the more chance you have of winning) the better, but there will be times where you can have low equity in a hand but a positive expected value (+EV).

Review: Types of Equity Comparisons

Equity comes in many forms. For example, let's say you open AA on the Button and BB calls:

- Hand-vs-hand equity: AA has 77% against 65s
- Hand-vs-range: AA has 83% against BB's overall calling range
- Range-vs-range: BTN's entire range has about 53% against BB's calling range

Since it's very hard to put your opponent on an exact hand, you'll typically use hand-vs-range and range-vs-range equity to inform your decisions.



Fold Equity

Fold Equity refers to the **extra equity** you stand to gain from the likelihood of your opponent folding to a bet. Calculating the fold equity is quite simple, but it is predicated on one key assumption. You must make an educated guess on how often your opponent will fold.

Fold Equity = Probability Villain Folds • Villain's Equity (his range vs your hand equity)

Total Equity = Fold Equity + Hand Equity

Key point: We can win by both making the best hand or getting everyone else to fold.

Therefore, even if our Pot Equity is small, we can often still bet profitably because we can expect our opponents will fold enough of the time to make our bet +EV.

If you remember, one of the reasons we open from BTN is to steal the blinds. As we move to later positions, our Fold Equity increases, so we try to **steal** more.

Pot Odds

We'll talk about Pot Odds in further detail (specifically the role they play in calling when we are on a draw) in our next lecture. Pot odds represent the ratio between what you stand to gain and what you have to risk in order to get it. In other words- the ratio between the total pot size and the bet facing you.

As a ratio: **Pot Odds = Reward : Risk = Pot : Bet**

As a %: **Pot Odds =**
$$\frac{\text{Risk}}{\text{Risk} + \text{Reward}} = \frac{\text{Bet}}{\text{Bet} + \text{Pot}}$$

We compare pot odds to the probability of winning the hand (our equity, or rather the percentage of time we complete our draw) to estimate **the profitability of a call**.

*Note: the "Bet" is the price for **Hero to call**, but the "Pot" itself includes **Villain's bet**.*

Pot Odds

Pot Odds tell us the **Pot Equity** we need to profitably call.

If we call a bet, we want the call to be **at least 0 EV**.

Let **P** be the money in the **pot** and **B** the **bet** we are facing. Then we want:

(Probability we win) • (Money we stand to win) – (Price to Call) ≥ 0

(Probability we win) • ($P + B$) – $B \geq 0$

$$P(\text{win}) \geq \frac{B}{P + B}$$

Note: Pot Odds ignores the effects of Implied Odds/Reverse Implied Odds.

Pot Odds: Worked Example

Ex.) The Pot is \$100, villain goes all in for another \$100



Pot Odds: Worked Example

Ex.) The Pot is \$100, villain goes all in for another \$100

You need to risk \$100 to win \$200 (Villain bet + starting pot)

Pot Odds = 200 : 100 or 2 : 1 as a ratio (reward : risk)

Pot Odds

If we are in the HJ and UTG bets 3BB, our pot odds are $3/3+4.5=40\%$.

If we are in the BB, our pot odds are $2/2+4.5 = 30.7\%$.

This is a pretty big difference.

However, this benefit from the blinds is totally negated by the severe positional disadvantage, so we still need to be quite careful.



3-Betting



POKER AT BERKELEY

3-betting Preflop

The Big Blind is the initial bet that players are forced to play at minimum. When a player raises, they're making another bet on top of this big blind. Thus, why an open raise can also be called a 2-bet. 3-betting is the term for re-raising an open. If the HJ opened to 2bb, and the Button reraised to 7bb, we would say "the BTN 3-bet to 7bb."

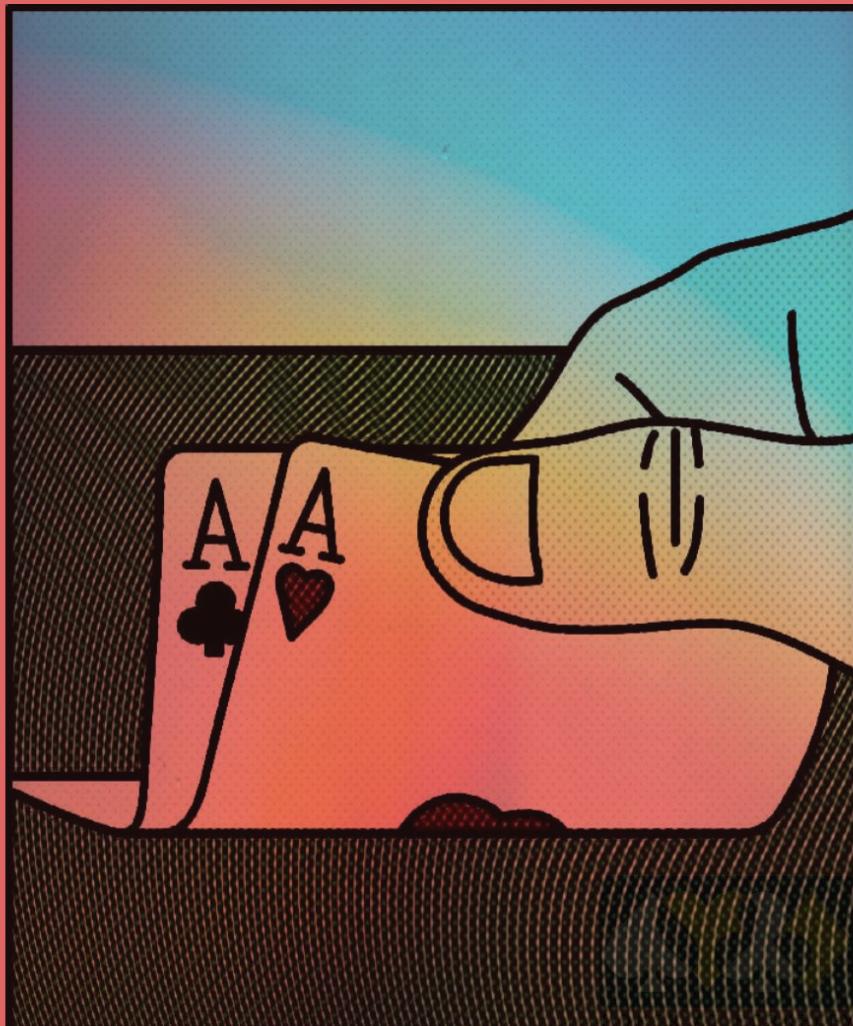
3-betting shows a lot of strength, as beyond having to beat the unknown hands ahead of you, you must also have a stronger range than the initial raiser.



3-betting Preflop

If we're thinking about 3-betting as the CO vs UTG, and UTG only raised 17.8% of hands to begin with, in order to beat that range and still be strong after a call, you're only raising 9.6% of hands.

This means that if UTG opens, unless we're defending from the Big Blind, we'll often be folding more than 9/10 hands!



**what this
looks like.**











3-betting vs. an UTG open



UTG Open (17.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



UTG only opens 17.8% of hands.
UTG plays the strongest range.

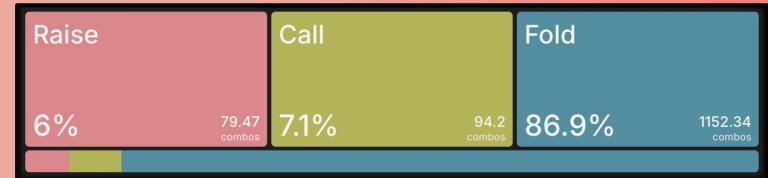
HJ 3–Bet (6%) vs. UTG Open (17.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



CO 3-Bet (6%) vs. UTG Open (17.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



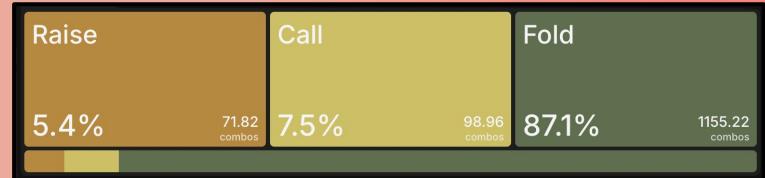
BTN 3-Bet (6.1%) vs. UTG Open (17.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



SB 3-Bet (5.4%) vs. UTG Open (17.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BB 3-Bet (5%) vs. UTG Open (17.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

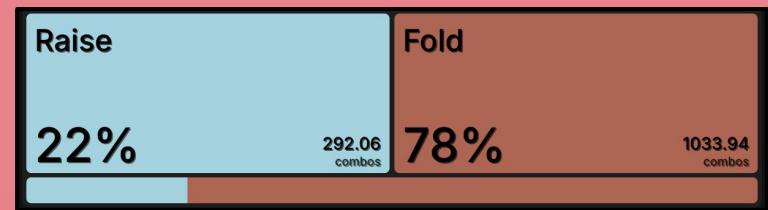


3-betting vs. a HJ open



HJ Open (22%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

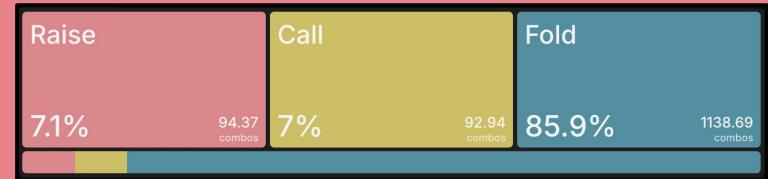


The HJ opens 22% of hands.

Because Hijack is raising slightly wider than UTG, we can 3-bet slightly wider from all positions, but are still up against a strong range.

CO 3-Bet (7.1%) vs. HJ Open (22%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BTN 3-Bet (7.1%) vs. HJ Open (22%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



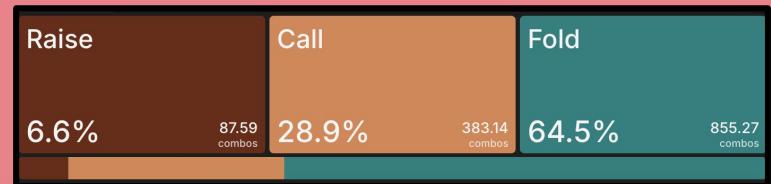
SB 3-Bet (6.9%) vs. HJ Open (22%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BB 3-Bet (6.6%) vs. HJ Open (22%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



3-betting vs. a CO open



CO Open (28.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BTN 3-bet (9.4%) vs. CO open (28.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



SB 3-bet (8.9%) vs. CO open (28.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BB 3-bet (8.5%) vs. CO open (28.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



3-betting vs. a BTN open



BTN Open (43.3%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



The BTN opens 43.3% of hands. The widest open is from the button.

SB 3-Bet (12.6%) vs. BTN open (43.3%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BB 3-Bet (12%) vs. BTN Open (43.3%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



Notice that in the **SB** we are always 3-betting more often than we do in the **BB**, as we have to play out of position postflop. **The Big Blind also 3-bets much less than calling** because it has the option to call for less, so raising must represent more strength.

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

SB 3-Bet (12.6%) vs. BTN open (43.3%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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	88	87s	86s	85s	84s	83s	82s	81s
A7o	K7o	Q7o	J7o	T7o	77	76s	75s	74s	73s	72s	71s	70s
A6o	K6o	Q6o	J6o	T6o	66	65s	64s	63s	62s	61s	60s	59s
A5o	K5o	Q5o	J5o	T5o	55	54s	53s	52s	51s	50s	49s	48s
A4o	K4o	Q4o	J4o	T4o	44	43s	42s	41s	40s	39s	38s	37s
A3o	K3o	Q3o	J3o	T3o	33	32s	31s	30s	29s	28s	27s	26s
A2o	K2o	Q2o	J2o	T2o	22	21s	20s	19s	18s	17s	16s	15s

BB 3-Bet (12%) vs. BTN Open (43.3%)

BB 3-Bet vs. SB Open



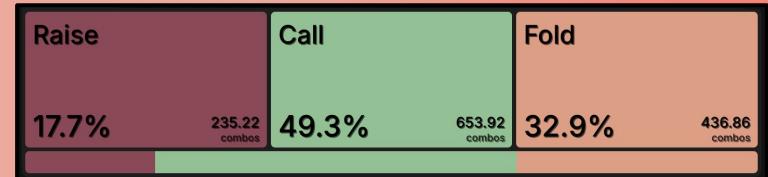
SB Open (42.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BB 3-Bet (49.3%) vs. SB Open (42.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



3-Bet Sizing

Why do we raise slightly larger from the Button and Cutoff than we do HJ or UTG?

Why such a huge 3-bet from the sb or big blind?

These sizes are constructed so that if the initial raiser decides to re-raise again, they're forced to do so with a consistent range (about 3.7% of hands).

Based on position + how many players

For our purposes (this will *slightly* vary from 3bet GTO sizing),

Let **y** be the size of the initial open raise (**usually = 2.5x**), then:

$$3\text{-Bet Sizing} = \boxed{3y} + \boxed{y \text{ per caller}} + \boxed{y \text{ if OOP}}$$

Specifically, If OOP in the SB, add $y + 1BB$
If OOP in the BB, add $y + 2BB$

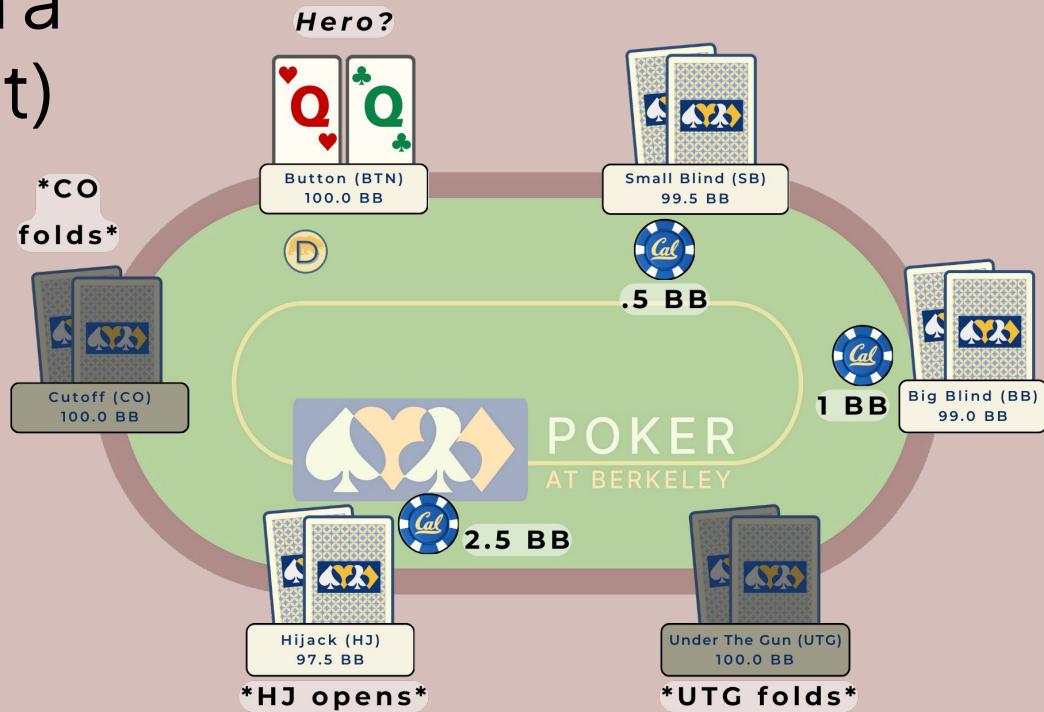
**Let's Look at a
Few Hands Where
You Would Put in
a 3-Bet:**



Example: 3-Betting in a SRP (Single Raised Pot)

Villain (HJ): 97.5 BB
Hero (BTN): 100 BB
SB (SB): 99.5 BB
BB (BB): 99 BB

SB posts .5 BB and BB posts 1 BB, Villain (HJ) open raises to **2.5x BB**, action folds around to Hero (BTN) who is dealt **Q♥Q♣** and now has to make a decision.



Do we 3-bet? If so, what 3-bet sizing do we choose?



3-Betting Example: BTN 3-Bet (7.1%) vs. HJ Open (22%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

SB posts .5 BB and BB posts 1 BB,
 Villain (HJ) open raises to **2.5x BB**,
 action folds around to Hero (BTN) who
 is dealt Q♥Q♣ and now has to make
 a decision.

Recall that
 3-Bet Sizing = **3y**
 + **y per caller**
 + **y if OOP**

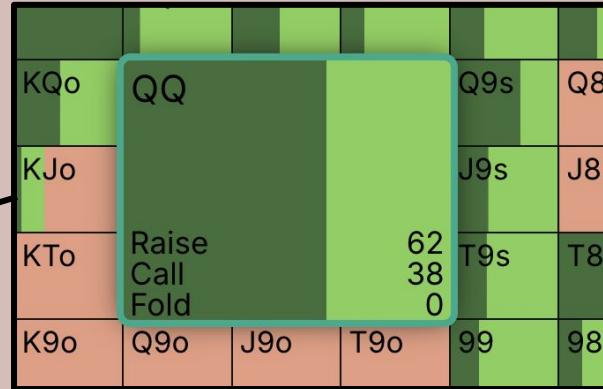
**Do we 3-bet? If so, what 3-bet
 sizing do we choose?**



Example: 3-Betting in a SRP (Single Raised Pot)

BTN 3-Bet vs HJ 2.5x Open:

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



Do we 3-bet? If so, what 3-bet sizing do we choose?

Yes. (mostly.) Queens on the BTN vs. a 2.5x HJ open is usually a 3-bet (**62% frequency**)
For our sizing, we should **3-bet to 7.5x**

Interpreting Solver Outputs

Unlike a human player, solvers will often use a “mixed strategy,” which means it will tell you to call a certain hand x% of the time while betting it x% of the time.

With a mixed strategy used for many poker hands, actually mimicking the results of a poker solve in a real game would be nearly impossible.

However, if you are going to try and play a strategy that resembles GTO, you will need to learn about randomization and mixing it up with certain hands in your range to actually remain balanced. For now, we will focus on a much more simplified strategy and will discuss mixed strategy and range balancing later on in this course.

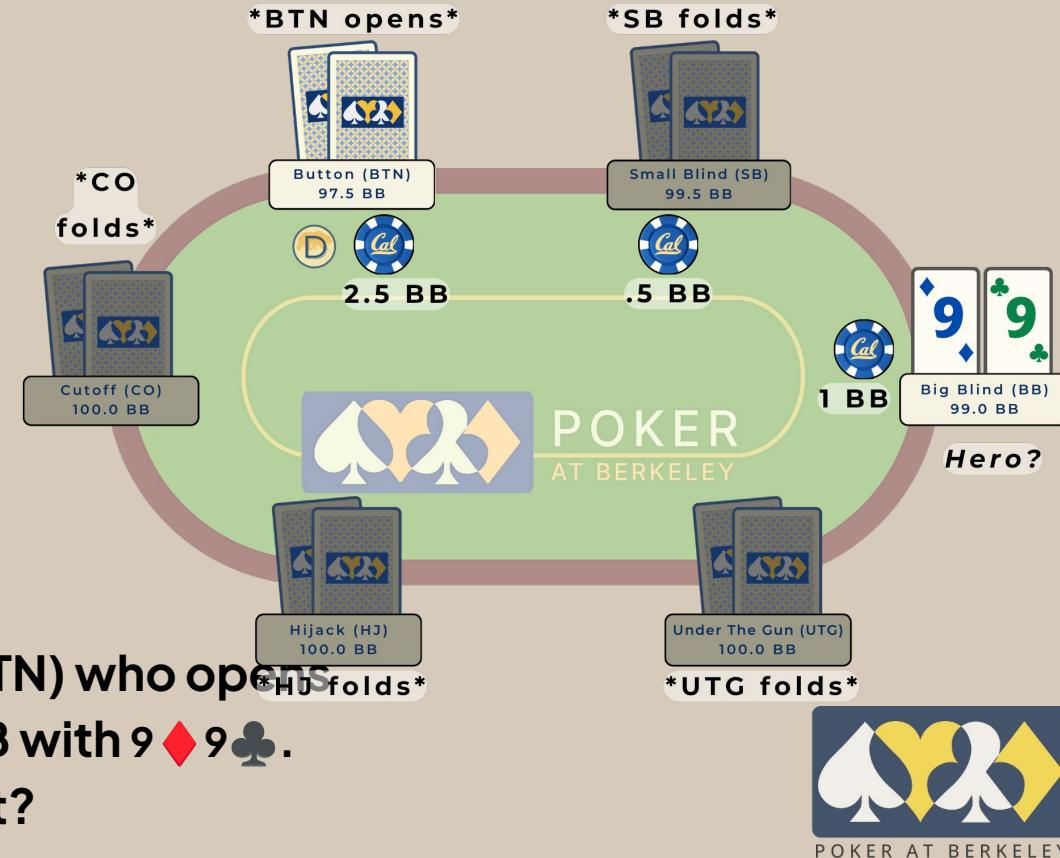


Example: BB Defending in a SRP (Single Raised Pot)

Villain (BTN): 97.5 BB

Hero (BB): 99 BB

SB posts .5 BB and BB posts 1 BB, Villain (BB) open raises to **2.5x BB**, action folds around to Hero (BB)



Action folds around to Villain (BTN) who opens to 2.5x, SB folds. Were in the BB with 9♦9♣.
Do we put in a 3-Bet? Do we flat?

Big Blind Defends (44.9%) vs. BTN Open (43.3%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

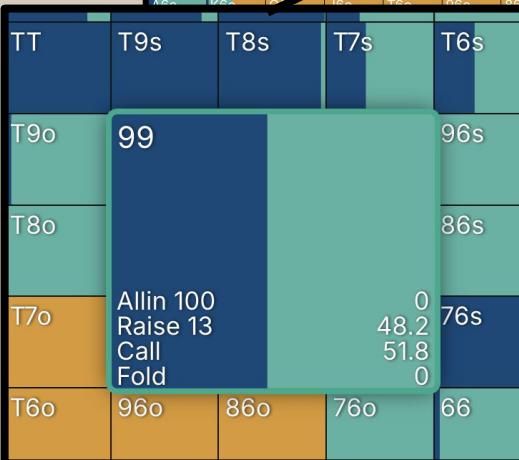
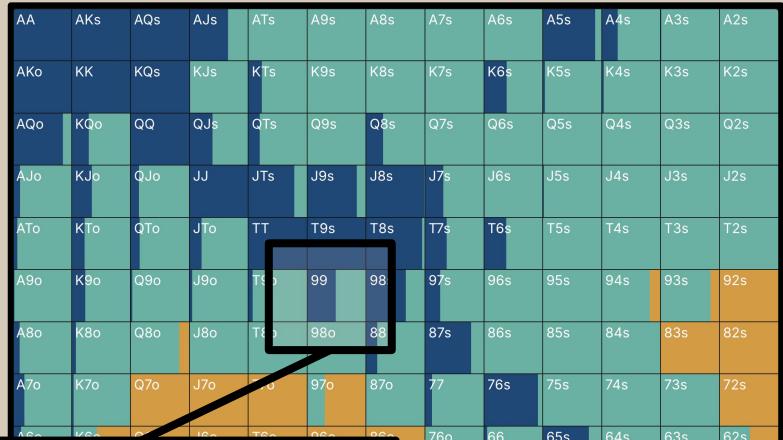
Action folds around to Villain (BTN) who opens to 2.5x, SB folds. Were in the BB with 9♦ 9♣. Do we put in a 3-Bet? Do we flat?

Example: 3–Betting in an SRP (Single Raised Pot)

Action folds around to Villain (BTN) who opens to 2.5x, SB folds. We're in the BB with 9♦ 9♣. Do we put in a 3–Bet? Do we flat?

We **call** with pocket 9's from the BB to a BTN open with **51.8% frequency**

BB Defend vs BTN 2.5x Open:



Defending a 3-Bet



Defending a 3–bet

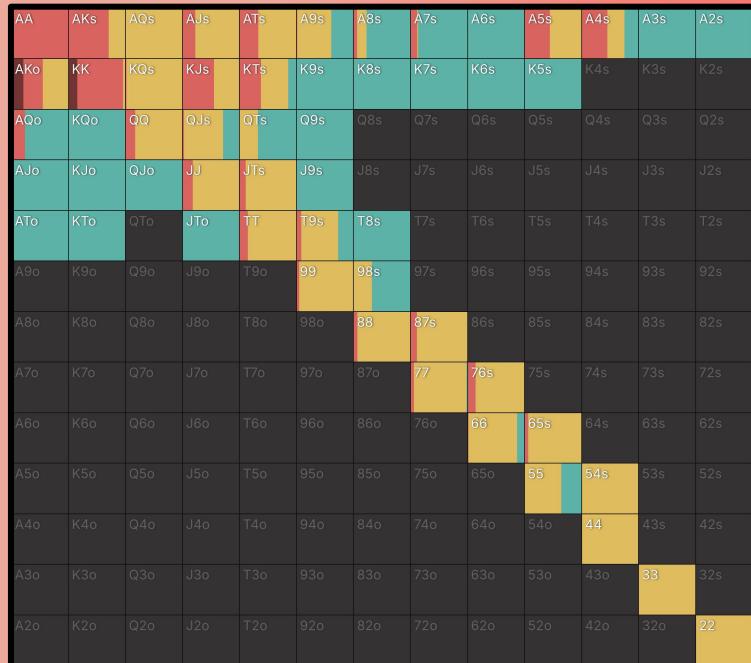
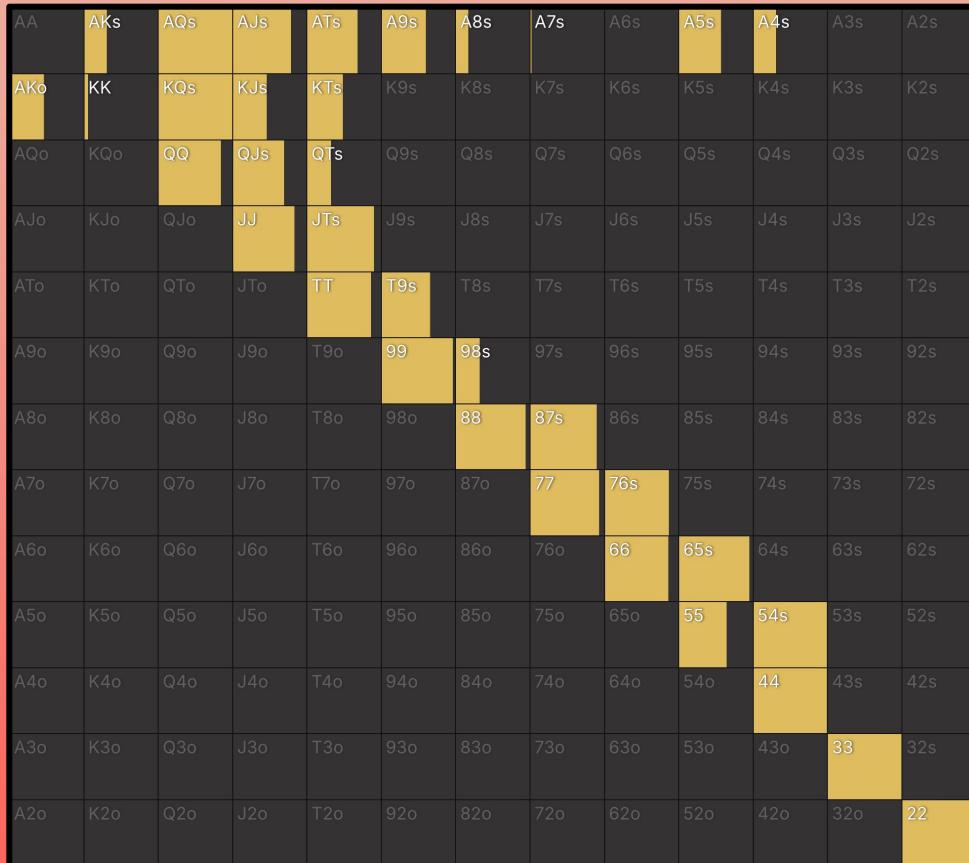
Most standard 3–bet sizes are a little over the size of the pot, so most defends facing a 3–bet fold out a little over half the range, and then raising the 3–bet with a mix of the strongest and weakest hands. This is called polarizing, which puts your opponent in a difficult spot where they have you beat with some middling hands.

Here's what a couple 3–bet defending ranges look like for some of the most common 3–bet defense spots you'll encounter:

UTG vs BTN, UTG vs BB, BTN vs BB, CO vs SB



UTG Defend (39.7%) vs. BTN 3-Bet (6.1%)



UTG Defend (34.3%) vs. BB 3-Bet (5%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



BTN Defend (31.2%) vs. BB 3-Bet (12%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



CO Defend (37%) vs. SB 3-Bet (8.9%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



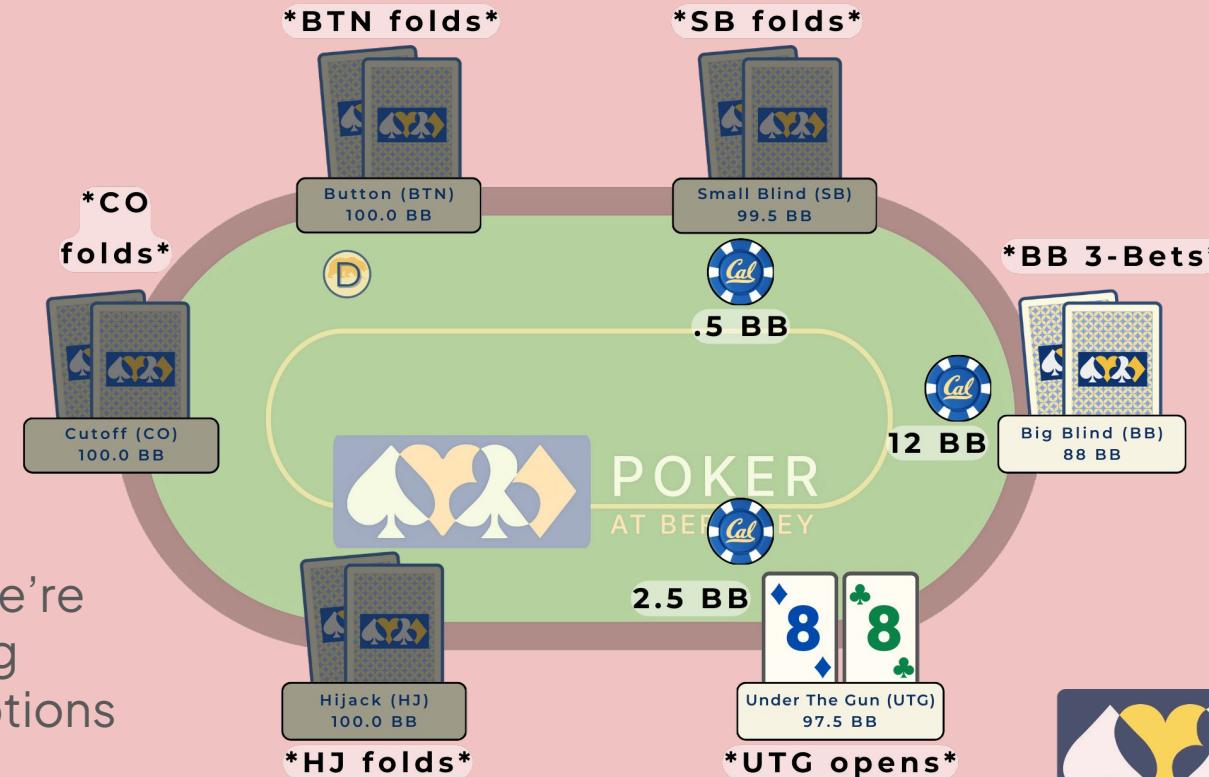
An Example of When We Would Defend a 3-Bet:



Example: Defending a 3-Bet

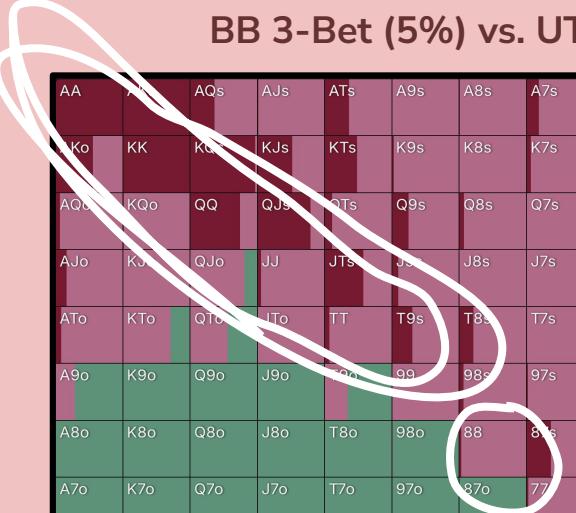
Say Hero opens UTG to 2.5BB. Folds around to the BB who 3-Bets to 12BB. Back on Hero to decide to defend for an additional 9.5BB with Pocket 8's.

Do we defend here? We're Probably not 4-betting here with 8's, so our options are to either call or fold. Let's discuss.



Thinking About it Logically

BB 3-Bet (5%) vs. UTG Open (17.8%)



AA	7s	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
KKo	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	KJ	QJo	JJ	JTs	J9s	J8s	J7s	J6s	J5s	J4s	J3s	J2s
ATo	KTo	QTo	ITo	TT	T9s	T8s	T7s	T6s	T5s	T4s	T3s	T2s
A9o	K9o	Q9o	J9o	99o	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

If BB is 3-betting with TT+ and is only calling with <99 or worse, 88 don't do great against BB's 3-betting range. We defend vs. a BB 3-Bet with a call

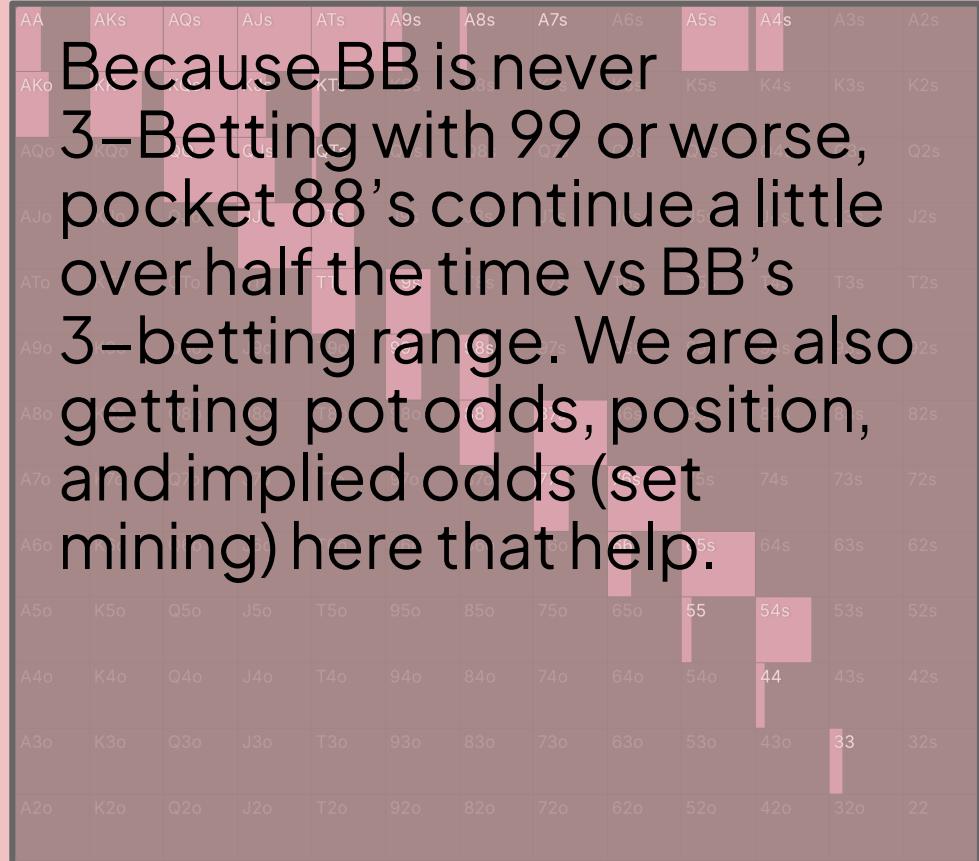
UTG Defend (34.3%) vs. BB 3-Bet (5%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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



Example: Defending a 3-Bet



BB 3-Bet (5%) vs. UTG Open (17.8%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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	T9s	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

UTG Defend (34.3%) vs. BB 3-Bet (5%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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	T9s	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





Choosing the Highest EV Option

Example: Choosing the Highest EV Option

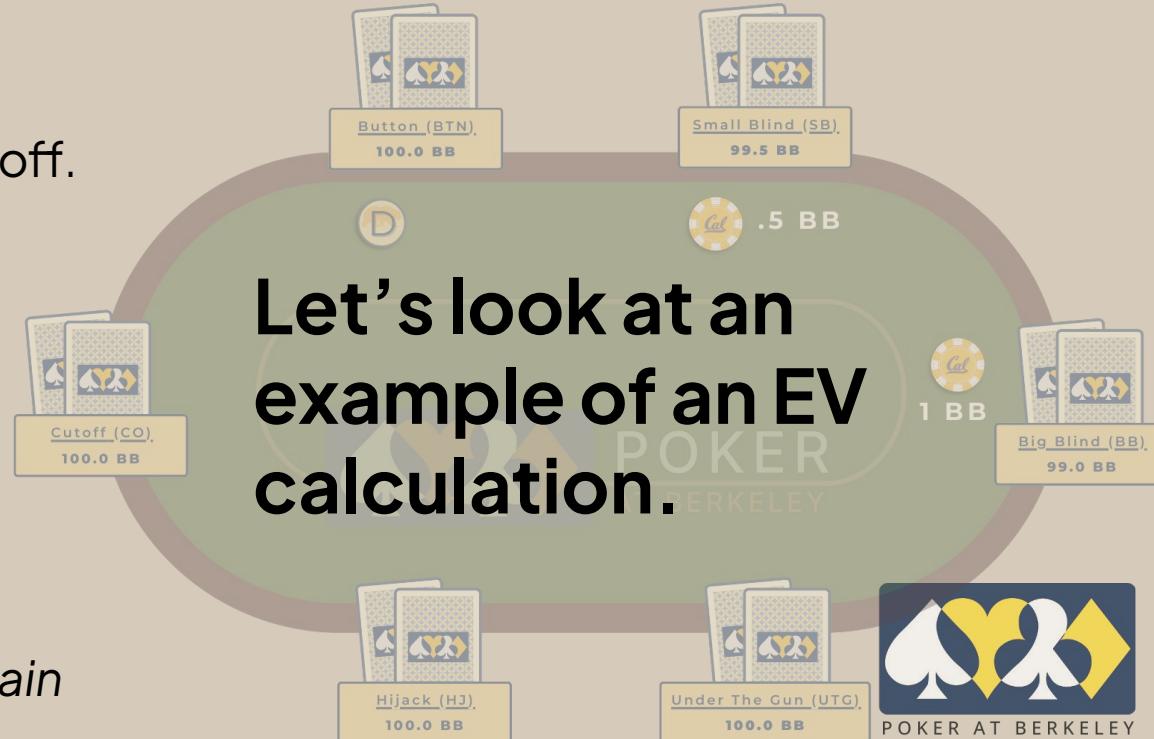
Recall: EV is the sum of the probabilities of each possible outcome multiplied by its payoff.

$$EV = [\%W \times \$W] + [\%L \times \$R]$$

Where:

$\$R$ = how much \$ u must risk

$\$W$ = how much \$ u stand to gain



Example: Choosing the Highest EV Option

Folds around to Hero (BTN) who opens to 2.5x

SB 3-Bets to ? BB

Recall 3-Bet Sizing:

Let y be the size of the initial open raise, then:

3-Bet Sizing =

$3y + y \text{ per caller} + y \text{ if OOP}$

If OOP in the SB, add $y + 1BB$
If OOP in the BB, add $y + 2BB$



Example: Choosing the Highest EV Option

Folds around to Hero (BTN) who opens to 2.5x

SB 3-Bets to **11 BB**.

Action back on Hero.

So, we have **3 options**:

- Call (for an additional 8.5BB)
- Fold
- 4-bet

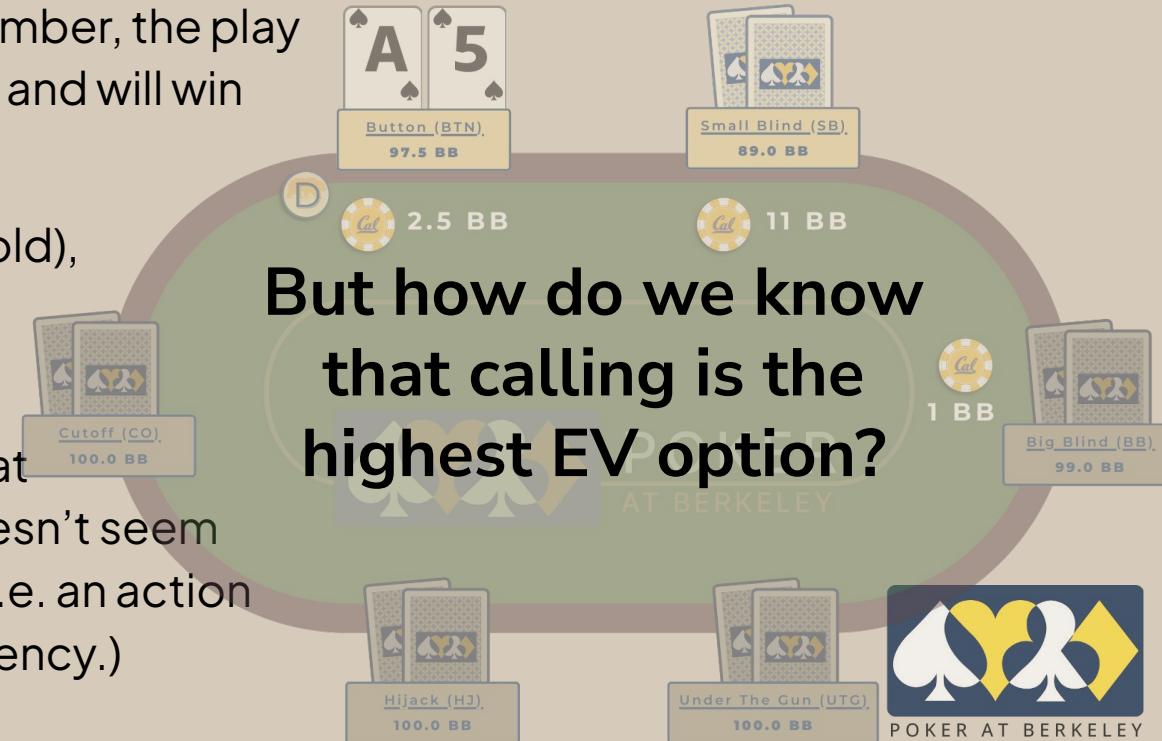


Example: Choosing the Highest EV Option

In terms of EV, if the result of the EV equation of a given action, is a positive number, the play has a positive expectation (+EV) and will win money in the long run.

So if EV(call) > EV(4-bet) > EV(fold),
We would call.

You probably know intuitively
that it's an easy call here, and that
4-betting (for value at least) doesn't seem
like the most conventional line (i.e. an action
we wouldn't take at a high frequency.)



Example: Choosing the Highest EV Option

Recall that a standard **SB 3-Betting range** consists of about ~13% vs. a BTN open (~43%)

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
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

So how exactly does A♠ 5♠ fair against the SB's 3-betting range? To answer this, we'd use an equity calculator to calculate **Hand vs. Range Equity**:

Player	Cards	Range	Win %
<input checked="" type="checkbox"/> Hero	A ♠ 5 ♠	0.0%	38.9%
<input checked="" type="checkbox"/> Villain 1	████████	13.4%	57.6%

We are a ~40% favorite to win.



Example: Choosing the Highest EV Option

So, to calculate the EV of a call,

$$EV(\text{call}) = [\%W \times \$W] + [\%L \times \$R]$$

$$\%W = 39\%$$

$$\begin{aligned} \$W &= 1(\text{the bb}) + 2.5(\text{our open raise}) + 11(\text{villains bet}) = 14.5 \\ \%L &= 1 - \%W = 59\% \end{aligned}$$

$$\$R = 8.5 (\text{to call})$$

All together:

$$EV(\text{call}) = (.39 \times 14.5) - (.59 \times 8.5)$$

$$\underline{EV(\text{call}) = 0.64 \text{ BB}}$$



Example: Choosing the Highest EV Option

EV(call) = 0.64 BB

By definition, the EV of folding is always zero. Once money has been put in the pot it no longer belongs to you. The EV calculation starts from the point you decide your next action. Therefore, as folding does not put any more money at risk:

EV(folding) = 0

EV(call) > EV(folding)



Example: Choosing the Highest EV Option



Dynamic Adjustments: Steals & Required Fold Equity (RFE)



Steals and Required Fold Equity (RFE)

A **Steal** is a preflop raise with the near-sole intention of winning the blinds.

Before we talk more about open raises, 3-bets and steals, we need to cover **RFE**.

RFE is the mathematically required success rate of a steal to break even.

The amount of money we're risking to take down the pot is **R**, for the bet we are risking.

The amount we stand to win if everyone folds is **PG (potential gain)**, the pot.

Then, the Required Fold Equity is $\frac{R}{PG + R}$ **Does this formula look familiar?**

Comes from $PG \bullet RFE - (1 - RFE) \bullet R = 0$

RFE also applies to bluffs!

Factors Affecting Steals

Good Factors

Hand has more GPP, NP, and V

Tight 3-Bettors Ahead

We will have Fold Equity Postflop from Tight players

Villains are Unaware, will not notice we are stealing

Villains are Unskilled

Bad Factors

Hand has less GPP, NP, and V

Light 3-Bettors Ahead

We will have little to no Fold Equity Postflop

Villains are Aware, will notice we are raising a lot

Villains are Skilled

More Good Factors = We can have much lower RFE and still attempt a steal.

More Bad Factors = RFE is a better predictor of the Fold Equity we need for a steal.

Steals

Most common spot we attempt to steal is from the BTN to force the players in the blinds to fold. Stealing the blinds against weak, tight players, prints money and has a significant impact on our winrate. When we attempt a steal, we usually need our success rate (that is, our Fold Equity) to be around Required Fold Equity.

In general, you can open 2.5bb from any position. When making a blind steal, however, you can be a little more creative about your raise sizing because you are considering the tendencies of only one or two players who can act after you.

This does not mean you should be sizing your raises larger with premium hands, as all but the most oblivious of opponents will adjust to this strategy. What it means is that you can tailor your raise size to your opponents.



Steals

When factors are neutral, we can have Fold Equity 5–10% below RFE and still steal profitably, because sometimes when we get called, we will still win.

When factors are very positive, we can go nuts, with huge differences between FE and RFE, and still open profitably.

When factors are very bad, then RFE is accurate, and we need **Fold Equity \geq Required Fold Equity**

We hate getting 3bet when we try to steal, because then we must fold preflop and lose 3BB. We have no opportunity to bluff or make a better hand.



Combined Probability

To approximate the probability of everyone folding, we only need to find the probability that each player folds and multiply them together.

In general, if X and Y are independent events:

$$P(x \text{ and } y) = P(x) \bullet P(y)$$

Here, let's assume **P(player folds)** is 88%.

Then from UTG, everyone folds after we raise: $0.88^5 = 52.8\%$ of the time.

From the BU, everyone folds after we raise: $0.88^2 = 77.4\%$ of the time.

From UTG everyone folds around half of the time, which is enough that it factors into why we choose to raise, but not enough for it to be our main goal.

From BU, everyone folding ~ 4/5 of the time is enough to motivate stealing.

RFE Example

Ex.) Say we are trying to steal from the CO. We know that generally, Open raising (as a steal) to 4BB is too large, and we should prefer open raising to 3–2.5BB. But why? We can check with RFE:

$R = 4$ Hero is risking 4BB to win the pot.

$PG = 1.5$ Hero stands to gain 1.5BB if they win the pot.



RFE Example

Ex.) Say we are trying to steal from the CO. We know that generally, Open raising (as a steal) to 4BB is too large, and we should prefer open raising to 3–2.5BB. But why? We can check with RFE:

$R = 4$ Hero is risking 4BB to win the pot.

$PG = 1.5$ Hero stands to gain 1.5BB if they win the pot.

$$RFE = \frac{R}{PG + R} = \frac{4}{1.5 + 4} = 72.7\%$$

By our previous math on Combined Probability, our Fold Equity is around $(0.88)^3 = 68.1\%$, so we don't have the RFE to make this bet. Raising to 2.5BB has around the same Fold Equity, but a much lower RFE of **62.5%**.

Fold Equity: Worked Example

Ex.) BTN 35bb, BB 15bb

Villain (BTN) RFI to 2.5bb. SB folds. Hero in the BB with **T♦5♣**. We suspect that BTN plays too many hands but tends to give up when facing resistance (loose-passive player)

You would normally fold **T♦5♣** against a normal opponent, but since you believe villain plays a very wide range on the BTN & will not be able to defend wide vs a reraise and would likely overfold if you move all-in in this spot.

How much fold equity do you need to move all-in profitably in this spot?



Fold Equity: Worked Example

How much fold equity do you need to move all-in profitably in this spot?

Like we said, we know our opponent is overly aggressive and plays too many hands but tends to give up when facing resistance. Reasonable for us to guestimate that Villain is opening ~ 60% of hands on the BTN (as opposed to a standard BTN RFI of ~43%) and is calling the BB all-in (15BB) with 25% of hands.

Fold Equity: Worked Example

How much fold equity do you need to move all-in profitably in this spot?

In statistics, the EV of multiple events is:

$EV = [P_1 \bullet X_1] + [P_2 \bullet X_2] + [P_3 \bullet X_3] + \dots + [P_n \bullet X_n]$ where P is the probability of the event and X is value of each event

To find the minimum fold equity required to move all-in profitably in this spot, we know there are only 3 “events” that could happen when an opponent is facing a bet: Villain can fold (P_1), call (P_2), or reraise (P_3):

$$EV = [(\% \text{ Villain Folds}) \times (EV \text{ of Fold})] \rightarrow [P_1 \bullet X_1]$$

$$+ [(\% \text{ Villain Calls}) \times (EV \text{ of Call})] \rightarrow [P_2 \bullet X_2]$$

$$+ [(\% \text{ Villain Reraises}) \times (EV \text{ of Reraise})] \rightarrow [P_3 \bullet X_3]$$

Fold Equity: Worked Example

How much fold equity do you need to move all-in profitably in this spot?

$$EV = [(\% \text{ Villain Folds}) \bullet (EV \text{ of Fold})] + \\ [(\% \text{ Villain Calls}) \bullet (EV \text{ of Call})] + \\ [(\% \text{ Villain Reraises}) \bullet (EV \text{ of Reraise})]$$

Using this, we can set **EV equal to 0** to find the **minimum fold equity required**:

We know $(\% \text{ Villain folds}) = \text{Fold Equity (FE)}$

And $(EV \text{ of Fold}) = \text{Initial Pot} = 1.5\text{bb (blinds)} + 2.5\text{bb (villains raise)} = 4\text{bb}$

Since we are jamming all-in for 15bb effective, Villain can't reraise.

So $(\% \text{ Villain Reraises}) = 0$

$$0 = [FE \times 4\text{bb}] + [(\% \text{ Villain Calls}) \times (EV \text{ of Call})] + [0]$$

Fold Equity: Worked Example

How much fold equity do you need to move all-in profitably in this spot?

$$0 = [FE \times 4bb] + [(\% \text{ Villain Calls}) \times (\text{EV of Call})] + [0]$$

If villain only has 2 options: **to fold or to call**, and $(\% \text{ Villain Folds}) = FE$, then:

$$(\% \text{ Villain Calls}) = 1 - FE$$

$(\text{EV of Call}) = [\text{Our Equity When Called} \times \text{Total Pot}] - \text{Risk}$ → using an equity calculator, we can estimate that our hand has about 31% equity vs. the BTN calling range.

And Total Pot = 1.5bb(blinds) + 2.5bb(villains raise) + 14bb(our 3-bet all-in) + 12.5(villains call) = 30.5bb

$$\text{so: } (\text{EV of call}) = [.31 \times 30.5] - 14 = -4.545$$

putting this all together:

$$0 = [FE \times 4bb] + [(1 - FE) \times (-4.545)]$$

Fold Equity: Worked Example

How much fold equity do you need to move all-in profitably in this spot?

$$0 = [FE \times 4bb] + [(1 - FE) \times (-4.545)]$$

$$0 = 4FE - 4.545 + 4.545 FE$$

$$4.545 = 8.545FE \rightarrow \frac{4.545}{8.545} = FE = \sim 53.19\%$$

You need at least **53% Fold Equity** to go all-in profitably with **T♦ 5♣**

Since we believe villain is opening ~ 60% of hands on the BTN and calling the BB all-in with 29% of hands: We can determine what we think his calling frequency is:

BTN Calling Frequency = calling % / opening % = .28/.60 = **48%**

BTN Folding Frequency = 100% - Calling Frequency = 100% - 48% = **52%**

The minimum fold equity needed is 53.19% to be a profitable shove, but we only have a FE of 52%

Math Meets Reality

Much like Pot Odds, which we will discuss in our next lecture, RFE isn't perfect.

RFE would only be true Required Fold Equity to steal if every single time our opponent didn't fold, we would lose the hand postflop.

It ignores when they call, and we still win the hand. We could still bluff or make a good hand.

Hero is in a much better position than what RFE alone tells us!

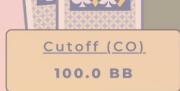
Squeezing: Punishing Late Position Flats

Flatting creates a capped range. Villain is never flatting strong hands like Aces or Kings, or has hands like AKo at a very low frequency.

When we have the option to 3-bet, there are an extra 2–2.5 in the pot to win so we can 3-bet much larger adding fold equity (forcing the opener to fold more often).

Similar to the sizing rules following a limp, our opens can scale an extra size for each flat behind us. **When we squeeze we are 3Betting with a larger size after one or more players have already called an open raise.**

Terminology Review



POKER
AT BERKELEY

Fold Equity

Pot Odds

3-Betting

Flatting

Isolating

Defending

Dominated

Squeezing



Isolating

Steals

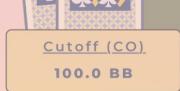
Required Fold Equity

Capped vs. Uncapped Ranges



POKER AT BERKELEY

Playing Session Today



POKER
AT BERKELEY



Think about what the aggressor's range looks like, and how that should influence your decision to call or reraise. If you notice players overcalling or raising too often, try squeezing to pick up the dead money.