

EV of calling a 4-bet from AA**

One of the classic PLO questions is how to calculate whether it is profitable to call a 4-bet from someone who very likely has aces. With three simplifying assumptions, the EV of the call can be calculated precisely. One, assume that all aces hands are included in the 4bet range. This is a very reasonable assumption, given that a) pretty much everyone open-raises all AA** and b) we'll be looking at stack sizes where the 4-bet generates an SPR ~ 1, a situation where most people holding AA72r are going to 4-bet. When we are significantly deeper, this assumption is less accurate - 4-betting ranges should be more balanced at 150+ BB, fewer bad AA**, more non-AA**³⁷ – although some opponents will still be 4-betting if and only if they have AA** at 150BB or 200BB, giving away serious implied odds in the process. The second simplifying assumption is that the player with AA** will shove any flop. This is also largely true with ~100BB but not necessarily when significantly deeper. The third is that we will play perfectly against the shove, calling when we have sufficient equity against a random AA** and folding when we do not. It is impossible to actually play perfectly, but a good place to begin with this kind of calculation is to assume we will and then estimate the drain on our EV that will come from the mistakes we make.

Given these three assumptions, the EV calculation requires three pieces of data: **equity threshold**, **frequency above threshold**, and **average equity when above threshold**. Equity threshold is the equity that will be needed to break even on a flop call and is determined by the pot size and effective stack size, while the last two are determined by the hand's equity distribution versus AA**. It is very important to realize that a hand's preflop equity against AA** is **not** directly relevant. This is a two-street calculation. By calling the 4-bet we put ourselves in the position of facing a flop shove, where we may or may not have enough equity to call, so it is flop equity that matters - how often we have enough equity and what our average equity is when we have enough.

Equity Threshold

The pot size can vary based on several factors – whether there were limpers or cold-callers, whether the raises were all pot-sized or not, and whether one or both of the raisers are in the blinds. Table 5.7a shows one way of consolidating these variables in order to calculate the equity threshold, using the simplest case – a pot-sized open raise from outside the blinds, no callers, a pot-sized 3-bet also from outside the blinds, no callers, followed by a pot-sized 4-bet from the open raiser. At 5/10 the raise sizes would be \$35, \$120, and \$375, leaving the original three-bettor:

Table 5.7a 4-bet pot Equity Threshold

Dead money (D)	\$15
Effective stack (S)	\$1,000
3 bet amount (X)	\$120
4 bet amount (Y)	\$375
Threshold flop equity (T)	31.02%

Dead money is the sum of all the money put into the pot by people who folded. In the example case, this is just the blinds because there were no limpers or callers and neither of the blinds is involved in the hand. **Effective stack** is the starting stack of the shorter-stacked player at the beginning of the hand, and **3-bet amount** and **4-bet amount** are self-explanatory. **Threshold flop equity** is the (effective) size of the flop shove divided by the total pot size if the shove is called. The size of the flop shove is $S - Y$, the amount of money left behind after the 4-bet. The total pot-size if that shove is called will be $2S + D$. In this case, $S - Y = \$1000 - \$375 = \$625$ and $2S + D = 2 * \$1000 + \$15 = \$2015$, so $T = \$625 / \$2015 = 31.02\%$.

³⁷ See the section: "150+ BB Play" in Chapter 9: Preflop Theory for further discussion