# POT LIMIT OMAHA

## FROM SCRATCH!

by Bugs


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# PLO From Scratch

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# Part 1: Introduction

## Introduction

This is part 1 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured way.

In part 1 I will first discuss the background for this series and how it will be structured. Then I'll give an overview of the (in my opinion) best PLO learning material on the market today, and we'll end part 1 with a study plan for learning basic PLO theory from literature and videos. We will then start discussing PLO strategy in part 2.

### The background for this article series

When I started playing poker in the spring of 2005, limit and no-limit Hold'em were the dominating games, and the skills of the average player were low in both games. All you needed in order to climb up from the FL or NL Hold'em low limits to the middle and higher limits was normal intelligence and some dedicated effort.

Armed with this you could climb from the low to the middle limits in a few months and start to make good money. Many winning players learned the necessary skills and strategies strictly "on the job", and did nothing in particular to continue to improve systematically.

These days are mostly over. Limit and no-limit Hold'em have become much tougher games since the golden age of online poker (the years 2003-2006 or thereabouts). There are several reasons for this, but it's beyond doubt that a lot of the average player's improvement stems from the fact that good strategy has become common knowledge through books, forums and coaching videos.

There are many smart people in the online poker player pool, and in the 6 years that have passed since online poker exploded (in 2003), these people have played, analyzed, and discussed optimal strategy. This has lead to a rapid development of FL and NL Hold'em strategy. Today you can easily find low limit tables that play just as tough as the middle limit games did a few years ago. If you want to start at the bottom in Hold'em and work your way up to the middle and high limits, you have to be prepared to work very hard.

So what are the consequences for ambitious players in today's online environment? For starters, you have to be willing to work hard to improve your skills continually and systematically. If you don't, your edge will slowly be reduced as your average opponent continues to improve. Another consequence is that you have to put more effort into game selection, both with regards to the games you play today, and with regards to learning new games to give yourself more good games to play in.

And this brings us to pot-limit Omaha (PLO). For me, PLO sailed under the radar for a long time. I heard a lot of talk about how fun and profitable it was, but I didn't give it a try until 2008, and I played it mostly for variation (I grinded Hold'em at the time). I splashed around without much knowledge about how the game was supposed to be played, but I gradually started to get a feel for the game. I also observed that the average player in this game often made horrible mistakes, and that the skill level of the player pool reminded me of the Hold'em games of old.

This gave me the motivation to learn the game properly. In the autumn of 2009 I therefore decided to start a systematic learning process and teach myself solid PLO strategy from scratch. And since I like writing about poker theory, I decided to simultaneously write an article series for Donkr's micro and low limit players.

In this series I will write about PLO strategies and concepts I have worked with in my own learning process, and my goal is to lay out a theoretical framework for PLO learning, aimed at beginning players. I hope the series will help the readers getting started with PLO, and that they can use it as a starting point both for learning PLO strategy and for learning how to think about PLO (which can be very different from the way we think about Hold'em).

### The plan for the article series

I have previously written an article series ("Poker From Scratch") for limit Hold'em where I discussed basic limit Hold'em

strategy and ran a bankroll building project on the side (grinding up a 1000 BB limit Hold'em bankroll from $0.25-0.50 to $5-10). I plan to use the same form for this series. We will start with preflop strategy and principles of starting hand strength. Then we will move on to postflop play.

Also, the general principles for "big bet poker" (pot-limit and no-limit) will be a common thread throughout the series. Many of the strategic principles of PLO are consequences of the game's *betting structure* (pot-limit) and not of the game type (a flop game where we use starting hands with 4 cards, and we have to use 2 cards from the hand and 3 from the board). Thinking about any poker game as a combination of betting structure and game type makes it easier to understand why proper strategy is the way it is.

We will also include a micro/low limit bankroll building project in this article series, and there are several good reasons for this. The series is aimed at beginners, which means most of the target audience will be playing at the lowest limits. I have never grinded microlimit PLO, so I should ensure that the strategies I discuss are appropriate for the limits the readers are playing. This means I have to gather experience from these limits myself.

A grinding project will also be a source of situations and hands that can be used in the article series. Finally, a grinding project will hopefully give us an indication of the win rates a solid and disciplined player can achieve at the micro and low limits, and how fast he can move up the limits using a sensible bankroll management scheme. This could serve as inspiration for small stakes players new to the game.

So where to begin the grind? I decided to start with an article series bankroll of $250, since my impression is that most micro limit players start with similar bankrolls. The next step is to pick a bankroll management scheme, and I have chosen a scheme I call "50+10". This means playing with a 50 BI minimum bankroll (so we start out at $5PLO), and we can start taking shots at the next limit whenever we have 50 BI for the current limit plus 10 BI for the next limit.

If we lose the shotting capital, we move back down to rebuild and try again (grind in 10 new BI for the next limit and take another shot). So we take shots with 10 BI at a time, and we always move down when the bankroll drops to 50 BI for the previous limit.

The next question is where to end the project. I like a challenge, so I plan to make this article bankroll ready for taking a shot at $200PLO. This means we end the project when we have 50 BI ($5000) for $100PLO plus 10 BI ($2000) for $200PLO. In other words, we will turn our $250 into $7000.

How much time (e.g. how many hands) will we realistically have to use for this project? First we find out how many buy-ins we have to win (minimum) for the different limits:

- **$5PLO to $10PLO:** Grind in 20 BI ($100) at $5PLO and build the roll to 50+10 BI ($350) for a shot at $10PLO.
- **$10PLO to $25PLO:** Grind in 40 BI ($400) at $10PLO and build the roll to 50+10 BI ($750) for a shot at $25PLO.
- **$25PLO to $50PLO:** Grind in 40 BI ($1000) at $25PLO and build the roll to 50+10 BI ($1750) for a shot at $50PLO.
- **$50PLO to $100PLO:** Grind in 35 BI ($1750) at $50PLO and build the roll to 50+10 BI ($3500) for a shot at $100PLO.
- **$100PLO to $200PLO:** Grind in 35 BI ($3500) at $100PLO and build the roll to 50+10 BI ($7000) for a shot at $200PLO.

If all shots succeed at the first try, we have to grind in 20 + 40 + 40 + 35 + 35 = 170 BI. If we (somewhat arbitrarily) assume an average win rate of 7.5 ptBB/100 (ptBB = 2 x big blind), we will make 1.5 BI per 1000 hands on average. So we have to play a minimum of 170/(1.5 per 1000 hands) = 113,000 hands.

Piece of cake for a grinder with a minimum of professional pride. We have made some assumptions here, so take this estimate with a grain of salt. But we are probably close to the realities.

(And by the way ... if I haven't already said so we are playing 6-max in this house. Not, and I repeat not, full ring)

## Learning material and poker tools for PLO

Until recently there was not much to be found for PLO on the book and coaching video market. But in the last couple of years several good books have been published, and most coaching sites have started to produce plenty of high quality PLO videos.

In this section I will give an overview of the best (in my opinion) books, videos and tools for PLO. I will also design a brief study plan for those who want to take up a systematic study of PLO theory and concepts.

### PLO books

Below are short reviews of the best (again, in my opinion) PLO literature on the market today:

**Pot-Limit Omaha Poker - The Big Play Strategy (Hwang 2008)**
As far as I'm concerned, the publish date of this book marks year zero with regards to good PLO literature. The book discusses full ring strategy, and its main theme is to set up profitable situations where we play for deep stacks as a favourite. In order to achieve this, we need to understand starting hand structure, and this is where the book really shines in my opinion.

Regardless of whether we're playing full ring or shorthanded PLO, we need to know what makes a good starting hand. We also need to know which hands are suitable for winning big pots, and which hands are more suitable for winning small pots.

Hwang's discussion of PLO starting hands is the most thorough in print as of today. He classifies starting hands both according to type and according to strength. He also thoroughly explains structural defects, and the consequences of getting involved with hands that have poor structure.

Hwang's main game plan for deep-stacked full ring play is to get involved as a favorite in big pots, and that's why he devotes so much of the book to understanding starting hand strength and structure, and which type of postflop scenarios the different starting hand types prefer.

We will be playing 6-max, but Hwang's discussion of starting hands will be very valuable to us, since we will frequently find ourselves in "big play" situations where our good hand clashes with another good hand in a big pot.

Hwang then moves on to postflop play and discusses the principles of postflop ABC poker in pot-limit Omaha. In addition to playing for stacks with quality hands we also need to be skilled in small pot play, and Hwang discusses both big pot and small pot postflop scenarios.

**Advanced Pot-Limit Omaha - Volume 1: Small Ball and Short-Handed Play (Hwang 2009)**
The is the follow-up to *Pot-Limit Omaha Poker - The Big Play Strategy*, and it's the first book in a planned series of (probably) 3 books on advanced pot-limit Omaha. Hwang assumes that the reader is familiar with the principles laid out in his first book, and he now takes a big leap forward. The book's main theme is utilizing position, and Hwang demonstrates through discussion and hand examples how good use of position gives us new opportunities for profit. It also allows us to loosen up our starting hand requirements, sometimes dramatically.

"The Big Play Strategy" from Hwang's first book is still our core strategy, but by learning to utilize position we will get more opportunities to win small pots in situations where we suspect nobody has much of a hand (this is frequently the case in heads-up and shorthanded pots). Hwang calls this strategy "small ball", and it's his preferred strategy in shorthanded play.

**Secrets of Professional Pot-Limit Omaha (Slotboom 2006)**
A book mainly targeted at full ring players, and it is *the* book for learning the principles of shortstacking (our philosophy is that shortstacking is nothing but an annoyance, but that doesn't mean it isn't profitable). Slotboom explains his (sometimes unconventional) full ring PLO strategies in great detail, both his shortstacking strategies and his strategies for deep stack play. He does not give an integrated game plan like Hwang does, but he explains how he thinks about PLO, and this should give the reader lots of things to think about (at least it did for me).

**Secrets of Short-Handed Pot-Limit Omaha (Slotboom/Hollink 2009)**
Like Hwang, Slotboom followed up his full ring book with a book on shorthanded PLO. He uses a structure similar to the first book, which means he discusses his own strategies, and explains how and why they work for him. His process of moving from full ring to shorthanded games (which became necessary partly because the full ring games got flooded with shortstackers who had read his first book) is described in detail, and he discusses the strategic adjustments he had to make.

The last 1/3 of the book is written by coauthor Rob Hollink (a well known high stakes player). Hollink analyzes 33 PLO hands played by himself at limits ranging from $25-50 to $200-400. Many of the hands involve well known online nicks like durr, Urindanger, OMGClayAiken, etc.

**How Good is Your Pot-Limit Omaha? (Reuben 2003)**
This little gem of a book contains 57 hand quizzes taken from live play. Stewart Reuben is a very loose-aggressive player with a relaxed attitude towards starting hand requirements and such. This works well for him, since he is skilled in live deep stack play. But trying to emulate his play in today's 100 BB buy-in online games will probably lead to bankroll suicide.

But this is not a book you read in order to copy strategies; you read it to train your PLO thought processes. I recommend that you take the quizzes seriously and solve them as best you can before you check the answers. You get a score for each hand, and Reuben does a good job of explaining his recommended strategies.

You can learn a lot from comparing your own thought processes with those of a strong player. You will sometimes discover logical inconsistencies in your own play, and you learn to think about things you previously didn't consider.

## PLO videos

Here are some of my favorites among the coaching videos currently on the market. Note that how much you learn from a particular coach can be a matter of personal preference. Different coaches have different playing styles and teaching styles, and a coach that I learn a lot from does not necessarily have to be the best one for you. That said, here are some good videos from some of the different coaching sites:

**Deucescracked.com**
- The video series *2 X 6* (Vanessa Selbst & Whitelime)

An introductory series in 8 parts where PLO specialist Vanessa Selbst (who also has a WSOP bracelet in PLO) helps NLHE specialist Whitelime making the transition to PLO. Whitelime is good at asking relevant questions, and many interesting topics emerge from the discussions.

- The video series *PLO* (Whitelime & Phil Galfond)

Whitelime continues his PLO education in another 8 part series, this times with the one and only Phil Galfond (OMGClayAiken/Jman28). When you listen to Phil Galfond explaining PLO concepts, your brain will be filled with light.

**Cardrunners.com**
- Everything by Stinger (19 videos).
- Everything by lefty2506 (11 videos)

Stinger is a PLO god, that's it and that's that. He is also very good at explaining his thought processes. Stinger's approach to the game is not the most mathematical, and this makes his explanations easy to follow. He mostly uses sound poker logic and reads, and these are things all players can understand.

Note that Stinger uses a pretty loose preflop style. This is fine for a player of his caliber, but probably not something a beginner should start out with. So don't try to copy everything Stinger does, but pay close attention to his decision making processes.

lefty2506 is a solid TAG player who also explains things very well. Watching a good TAG play makes poker seem simple (and when you play solid poker, things *are* in fact simple most of the time).

**Pokersavvy.com**
- Everything by LearnedFromTV (16 videos)

LearnedFromTV has a very analytical approach to the game, and he is good at explaining theory. I recommend that you start with the two videos *LearnedFromTV #16: PLO Fundamentals - Part 1* and *LearnedFromTV #18: PLO Fundamentals - Part 2* (note that these are not his first videos).

These are theory videos where he explains the most important PLO principles. His live videos are also of high quality with very good explanations of his play.

## Poker tools

We need two things:

**1. Omaha Manager**
Omaha Manager is the Omaha version of HoldemManager, and a licence costs $80 at the time of writing (alternatively, you can purchase a small stakes licence that works for games up to and including $50PLO). This program has established itself

as *the* standard for PLO tracking software, and if you are going to use a tracker (and you should), use this one.

The use of tracking software in online poker should be well known for most of the readers, but we will also get into this in future articles.

**2. ProPokerTools Omaha Simulator**
ProPokerTools Omaha Simulator is an equity calculator that can be used both for particular hands and for hand ranges. You can also use wildcards (e.g. use AA** to run calculations with any aces hand).

This is an indispensable tool for training your understanding of equity with different types of hands in various scenarios. A good way to use this tool is to analyze important hands after each session. For example, you can calculate equities for all the big pots you played (e.g. all the pots where you went all-in at some point in the hand).

**Example**
You are playing $5PLO (blinds $0.02 and $0.05). UTG ($5) raises pot to $0.17, you ($5) 3-bet to $0.40 (a bit less than pot) with 9♠ 8♠ 7♥ 6♥ on the button, the blinds fold, UTG 4-bets pot to $1.27, you call (and you're assuming UTG's 4-bet means he has AAxx almost always).

**Flop:** 3♦ T♣ 6♠ ($2.61)
UTG ($3.73) bets $2.61, you ($3.73) raise all-in, UTG calls with A♠ A♣ K♦ 2♣ (just as you assumed).

**Turn:** 3♦ T♣ 6♠ K♥ ($10.07)

**River:** 3♦ T♣ 6♠ K♥ 4♠ ($10.07)
UTG wins with a pair of aces. You now want to know if your flop raise was correct under the assumption that UTG had aces.

You elected to 3-bet in position with a premium double-suited rundown to get heads-up with position on the raiser. He 4-bet you the maximum. You assumed this meant he had AAxx, and you called, planning to raise his (expected) flop c-bet all-in whenever you flop suffient equity against his assumed hand. You flopped a low pair + inside wrap + backdoor flushdraw, and you raised all-in as planned.

We can now use ProPokerTools to calculate our flop equity versus AAxx:

**Omaha Hi Simulation**
600,000 trials (Randomized)

**board: 3dTc6s**

| Hand | Pot equity | Wins | Ties |
|---|---|---|---|
| 9s8s7h6h | 47.45% | 283,206 | 2,978 |
| AA** | 52.55% | 313,816 | 2,978 |

We are almost a conflip against AAxx on this flop, and since the pot is $2.61 with $3.73 left to play for, we are committed. So we raise all-in. This means we invest $3.73 to win a total pot of $2.61 + 2 x $3.73 = $10.07 (the preflop pot + both remaining stacks), and we have 47.45% equity so our EV of getting all-in on the flop is:

```
EV = 0.4745($10.07) - $3.73 = +$1.05
```

We made $1.05 from getting all-in on the flop. This is better than folding (EV = $0), so raising all-in was a profitable play.

## Study plan
Here is a suggestion for a "PLO curriculum" for those who want to read up on basic PLO strategy:

## 1. Study the book Pot-Limit Omaha Poker - The Big Play Strategy (Hwang)

(You can skip the last two chapters on Omaha hi-lo)

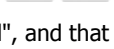
Study chapter 4 (*Starting Hands and Pre-Flop Play*) thoroughly. Hwang first categorizes starting hands according to type:

1. Big cards and ace high Broadway wraps
2. Straight hands
3. Suited ace hands
4. Pair-plus hands
5. AA hands
6. Marginal hands

And then he categorizes them according to quality:

1. Premium
2. Speculative
3. Marginal
4. Trash

Memorize these two classification schemes and all the hands that belong to them. Then you will have a framework for quickly assessing the quality of your starting hands, and you will also have a good understanding of the different conditions that different types of starting hands prefer.

For example, if you are dealt  , you will immediately label this as "Ace high Broadway wrap", and you will know that it's a premium hand that can be played for a raise from any position. But change this hand to  , and you now know that you have a "Suited ace hand", that it falls under the category "Marginal", and that it prefers position.

Note that we're not trying to construct a preflop scheme with these classifications. What we want is "training wheels" that can help us quickly assess the quality and playability of the hands we get dealt.

Also, make sure you understand the principles for ABC postflop play before you put this book down, particularly the difference between big pot situations and small pot situations.

## 2. Study the video series 2 X 6 (Vanessa Selbst & Whitelime) at Deucescracked.com

Vanessa Selbst plays a fundamentally tight and solid style, and she will teach you to avoid trouble hands and trouble situations. This approach is similar to the book you have just studied, and now you have an opportunity to see how the principles from the book can be applied in a 6-max game.

## 3. Play a lot

You have now studied (and hopefully digested) basic PLO strategy and the next step is to implement this strategy in your own play. Sit down and try out the things you have learned. You will probably frequently find yourself in situations where you don't know what to do, and/or where you make big mistakes. This is fine, since it gives you an opportunity to learn and eliminate leaks from your game.

Make a habit out of reviewing your play after each session. Pick a few hands and analyze them methodically (and use ProPokerTools to train your understanding of equities). Think through the strategic concepts involved and, if necessary, return to the previous book and/or video series we studied to see how your own logic in the heat of battle compares to what you learned.

Did you misunderstand, forget, or overlook something? Did you use the wrong concepts for this particular situation? If so, correct your own thinking so that you can avoid making the same mistake in the future.

### 4. Study the book Advanced Pot-Limit Omaha - Volume 1: Small Ball and Short-Handed Play (Hwang)

This is a thick and relatively advanced book, and you will have to spend some time studying the strategies it contains. But you should start working your way through it when you feel comfortable with basic ABC strategy, both preflop and postflop. We will use many of the concepts from this book when we develop our own PLO strategy in future articles and Hwang's small ball strategy will be of particular interest to us.

### 5. Study as many videos as you have time for and play as much as you can

Play, play, play, and use videos to pick up new ideas to work with. When you watch a coach doing something you find interesting, you should take notes to make sure you understand what's going on. This will make it easier to implement the new concept into your own game.

## Summary

We have discussed the background and future plans for the article series "PLO From Scratch", and the learning material and tools we will be using. We have also designed a brief curriculum for introductory PLO study.

In part 2 we will start the process of developing our own PLO strategy. We will start with fundamental PLO principles and principles for starting hand selection and preflop play.

Good luck!
Bugs

# Part 2: Preflop Play I

## 1. Introduction

This is Part 2 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured way.

In Part 2 we start our study of PLO strategy, and we begin at the beginning with starting hands and preflop strategy. PLO preflop strategy is sufficiently complicated that we plan to have at least two articles (Part 2 and Part 3) on this topic.

We begin Part 2 by defining our overall PLO core strategy. The core strategy is a "big picture" idea that tells us what we are trying to accomplish when we decide to play a hand. Next, we will discuss starting hand strength, and the properties that define good PLO starting hands. Then we will define categories of starting hands and classify them according to structure and quality. (We will use the starting hand categories defined by Jeff Hwang in his book *Pot-Limit Omaha Poker: The Big Play Strategy*). Throughout the article we will illustrate the theory with examples.

This systematic treatment of starting hands, together with the overall core strategy, will be our starting point for developing a solid and value based PLO preflop strategy. Later, we will add more advanced preflop concepts (for example, raising speculative hands to isolate, 3-betting, the importance of stack/pot ratios for preflop play, the importance of flop equity distributions for the play of different types of starting hands), and we will discussed these topics in detail in Part 3.

When we are done with the discussion of starting hands, the next step (in Part 3) will be to study the connection between preflop strategy and postflop strategy in more detail, and we shall see that they are strongly correlated. PLO is first and foremost a postflop game, and an important preflop strategy concept is that *the main goal of our preflop strategy is to create profitable postflop scenarios.* This is a very important concept that we will return to again and again in this article series. We will always keep it in mind when we make a preflop decision, and we will make it a habit to start planning ahead before we put the first chip into the pot.

For example, we will not be thinking like this:

*I raise a limper with* J♥ T♥ 9♠ 8♣ *on the button because it's a good hand*

Instead, we will look ahead and think more like this:

*I raise a limper with* J♥ T♥ 9♠ 8♣ *on the button because I want to isolate him and set myself up for playing a heads-up pot with position, and with a good hand that often connects with the flop and gives me a hand good enough to continue with those times I don't win the pot preflop or with a flop c-bet.*

But we start with the simple and memorizable stuff. Our goal for the "technical" work we will do in Part 2 is to get an overview over PLO starting hand structures, and build our understanding of which hands are strong and which hands are weak. We will also define some simple guidelines for how to play different types of starting hands preflop, so that we have a place to start.

In my opinion this theoretical background material is necessary for the understanding of how PLO starting hand strength differs from starting hand strength in other games (e.g. Hold'em), and for understanding what PLO preflop strategy does for us. It's also important for new PLO players to have some concrete guidelines (training wheels) for preflop play while they are building their own understanding of the game. When this simple theoretical framework is in place, we will move on to more advanced preflop concepts in Part 3.

Before we embark on PLO strategy, I want to state a "disclaimer":

*PLO is a game with a lot of room for variation in playing style, as long as the strategies we use are consistent with one another, balanced, and based on sound poker logic. I don't claim that the strategies I present in this article series are the only ones, or that they are necessarily the best, and I don't want to give "cookie cutter advice" for how to play preflop and postflop. My goal for this article series is to describe good thought processes for poker in general and PLO in particular, and I want to show a beginning player what he should be thinking about when he is developing his own game.*

So let's get started:

## 2. Our overall PLO core strategy

Our overall PLO core strategy revolves around two very important concepts that are both based on *what we are trying to*

*accomplish* when we get involved with a hand preflop. PLO is first and foremost a postflop game, and the most important decisions are usually made there.

Simply put, PLO postflop play is mostly about:

- **1.** Betting the nuts for value, and semibluffing strong nut draws
- **2.** Using position to steal pots when the opponents are weak and using position to control pot size when we have a non-nut hand that we want to take to showdown.

From this, it follows that we want to:

- **1.** Start with hands that have the potential to flop the nuts or nut draws
- **2.** Play in position

This is our overall PLO core strategy, distilled down to two sentences. We will be picky about starting hands, and we will be picky about position. The main goal of our core strategy is to build strong hands postflop and win showdowns with them. In addition, we will use position to win small and moderately big pots in a controlled way when nobody has a strong hand. This means using position to control pot size with hands that we can not bet hard for value, as well as stealing pots by bluffing and semibluffing.

Does this sound simple? Effective PLO ABC-poker isn't much more complicated than this, and if you keep these two concepts in mind at all times, you will have an advantage over the majority of your opponents at the lowest limits.

So the first stop on our PLO strategic journey is to learn how to evaluate the quality of PLO starting hands, and most of Part will be devoted to this. We also need a basic understanding of position, and how to exploit it.

Position is always an important part of any Omaha preflop decision. Each player gets dealt 4 cards preflop, and this means that *any player can credibly represent any hand at any time*. Almost regardless of the flop texture, any player (you included) might have hit the flop hard and sit there with the nuts or near-nuts.

This makes it difficult to play non-nut hands out of position. The reason is that there is always a significant chance that someone behind you is sitting there with a monster hand, or planning to *represent* a monster hand and bluff you out of the pot.

When you are sitting out of position with a hand that could be best, but isn't the nuts, you are forced to choose between betting into the opponents' hands (and they could have you beat), or checking and offering them a potentially valuable free card. By checking weak hands out of position, you are also offering the opponents an opportunity for bluffing you out of the pot (since you have revealed weakness by checking).

But in position you can see what the opponents do before you act, which makes it easier to find a good game plan for your non-nut hands. If everybody checks, you can often bet (for value or as a bluff) hands that you would have had to check out of position. When there is a bet in front of you, you now have better control over how fast the pot will grow. You can raise your monster hands, call with hands that prefer to go to showdown in a small or moderatly sized pot, and fold (or bluff) with your weakest hands.

Before we get involved with a hand preflop, we should think about the most likely postflop scenarios we will encounter, and how they typically will play out. Weak starting hands generally hit flops less often and less hard than strong starting hands. Weak starting hands therefore play much better in position than out of position, because position makes it easier to play non-nut hands and draws profitably postflop.

Another reason why weak starting hands benefit from position, is that position gives us better control over how much money goes into the pot preflop. With fewer players left to act after we enter the pot, there is less risk of raising behind us.

Therefore, we can play a wide range of weak starting hands on the button, particularly if it's folded to us. But out of position we should focus on starting hands that can flop the nuts or strong nut draws.

As a warm-up before we start categorizing starting hands, here are two examples of preflop decision making based on starting hand quality and position. Note that in both examples we try to look ahead and tie together preflop play and postflop play. This form of hand planning is something we will return to again and again:

### Example 2.1

You are sitting UTG at a full $5PLO 6-max table, looking down at Q♥ Q♠ 8♦ 2♣. The play has been loose with some preflop raising and 3-betting. Typically, 3 or more players see the flop. You have a 100 BB stack, and the opponents all have 80 BB or more. Should you play this hand or fold it? And why?

This is a starting hand (Category: High pair with poor side cards) which often gets beginners in trouble. Experienced players will usually fold this hand from UTG with little regret. The hand has litle nut potential, since we need to flop top set on an uncoordinated flop (for example, Q♣ 8♦ 3♣) to have the nuts, and this is a rare occurrence.

Let us first list some of the common reasons a new PLO player will have for choosing to get involved with a raise preflop.

- Sometimes we win the blinds, which is fine
- Sometimes we get called preflop, but win the pot with a c-bet on the flop
- We will sometimes flop a set, which will often win a showdown
- Our opponents are loose and deep-stacked, so we can count on sometimes winning a big pot when we flop a set

So our beginner's game plan is to either steal the blinds, steal the pot with a c-bet on the flop, or flop a set and win a big pot at showdown. Below are some of the problems associated with this plan:

- We will rarely pick up the blinds under these conditions, and we will usually get called by one or several opponents
- We might get 3-bet and be forced to fold (we are too weak to call a 3-bet out of position)
- Playing out of position makes it difficult to steal the pot postflop when we miss the flop. It also makes it more difficult to maximize profit those times we make the hand we are hoping to make
- Even when we flop a set, we will often lose in Omaha. This will almost always be costly
- We have a starting hand that usually flops either a set or nothing, and we have no backup strength that can help us. Therefore, we will usually have no hand/no draw on the flop, and no reason to continue with the hand. Since we are out of position, and since this is Omaha (where anyone can have anything at any time), it will be risky to attempt to often steal the pot by c-betting into several opponents (which we expect to get) with a worthless hand

Here is a typical scenario we will find ourselves in if we raise:

**Preflop**

We ($5) raise pot to $0.17 with our Q♥ Q♠ 8♦ 2♣, MP ($6.20) calls, CO ($8.95) calls, button ($5) calls.

**Flop:** 7♠ K♠ 6♣ ($0.75)
Now what?

By raising Q♥ Q♠ 8♦ 2♣ preflop under these conditions, we set ourselves up for playing the flop out of position against several opponents with no hand and no draw, and this is exactly what happened. The only option that makes sense is to check, planning to fold if someone bets (automatically c-betting the flop with no hand/no draw against several opponents is equivalent to burning money).

The problem with Q♥ Q♠ 8♦ 2♣ is that we rarely flop a hand good enough to continue past the flop. So if we expect to have to play make-a-hand-poker in a multiway pot (which we have to expect here) we prefer to see the flop cheaply to preserve implied odds.

Having position will also be a big asset with this kind of hand. Playing in position reduces the risk of facing a raise behind us (since there are fewer opponents left to act), it will be easier to maximize our profit when we make our hand, and we will get more stealing opportunities postflop (those times everyone checks to us). By setting ourselves up for playing a big, multiway pot out of position with this type of hand, we are simply giving the opponents more chips to steal from us postflop. Collectively, they will hit the flop much more often and much harder than us, and most of the time we will simply be check-folding.

So if we're playing this hand mainly for set value, we want to play this hand cheaply preflop and we want to play it in position. For example, if we had been on the button after a limper or two, we could have overlimped for set value with good implied odds. But we could have open-raised from the button if if had been folded to us, since in this case we can count on stealing the pot often, either preflop or with a c-bet on the flop. (It's fine to raise a weak hand if we expect to steal a lot of pots, so that we won't have to extract value solely from playing make-a-hand poker).

As played, the rest of the hand will usually play out more or less like this:

**Flop:** 7♠ K♠ 6♣ ($0.75)
You ($4.83) check, MP ($6.03) checks, CO ($8.78) checks, button ($4.83) bets $0.75, you grudgingly fold, with a sneaking suspicion that you did something incorrect somewhere.

### Example 2.2
You are sitting on the button at a full $5PLO 6-max table. UTG ($5) raises to $0.17, MP ($6.20) calls, CO ($8.95) calls, you ($5) look down at A♠ 9♠ 8♣ 7♥ with great interest. What is your plan?

You have a near-premium starting hand (Category: Suited ace with a rundown) with plenty of nut potential (nutflush/nutstraight), and many flops will give you a hand good enough to continue. You would have had an automatic raise if it had been folded to you, and you would also have had an obvious raise after limpers. But the pot is already raised ahead of you, so your options are calling or 3-betting.

In this scenario, calling seems like a good plan, because:

You are setting yourself up for playing make-a-hand poker with a "nutty" quality hand, position and good implied odds in a multiway pot (always a good scenario). Note that not having the initiative in the hand will make it easier to exploit opponent weakness postflop. If everyone checks to you on the flop, it is more likely that they are genuinely weak than if they had checked to you after a preflop 3-bet from you. This will make it easier for you to identify good stealing opportunities postflop.

The pot is already multiway, so a 3-bet will probably not make it much easier to win without a showdown. You can expect to get called by several opponents preflop, since 3 of them have already gotten involved for a raise.

By calling you are inviting the blinds to call behind you with a wide range of semi-trashy hands (seemingly playable, but very weak and non-nutty hands like K♠ 7♦ 5♠ 4♥) This sets them up for getting into big trouble postflop against quality hands like our hand. They might believe they are getting good pot odds and implied odds on these weak hads, but in reality they are setting themselves up for playing big pots out of position with hands and draws that often end up 2nd best. For example, when they make a non-nut flush, and end up paying off the nut flush.

By 3-betting you are opening yourself up for getting 4-bet by AAxx, which means you will have to fold a hand with a lot of potential. Our hand is not strong enough, and the stacks are not deep enough, to call a pot-sized 4-bet if the raiser probably has AAxx (more about this topic in Part 3).

So we call the preflop raise, planning to mostly play make-a-hand-poker postflop. We might also steal an occasional pot when the opponents tell us that they are weak by checking to us postflop.

The observant readers will have noticed that the preflop betting so far in this example is exactly the same as in Example 2.1. The only difference is that we are now on the button with a quality hand that will hit a lot of flops. So let's re-create the flop scenario in Example 2.1 with these changes. This will be a good illustration of how simple PLO can be with position and a quality starting hand.

**Preflop**
UTG ($5) raises to $0.17, MP ($6.20) calls, CO ($8.95) calls, we ($5) call with our A♠ 9♠ 8♣ 7♥ on the button, the blinds fold, and we see the flop in a 4-way pot:

**Flop:** 7♠ K♠ 6♣ ($0.75)

UTG ($4.83) checks, MP ($6.03) checks, CO ($8.78) checks, you ($4.83) bet $0.75, and everyone folds.

So what happened here? Let us think back to the flop scenario we found ourselves in after raising a trashy hand from UTG in Example 2.1 We got called in 3 places preflop, missed the flop completely, and had to check-fold to a bet from button. But now we are on the button, and our quality hand has hit the flop (as quality hands often do).

We have flopped a fine mix of draws: Pair + nut flush draw + open-ended straight draw. We have also received information from our opponents, and they are telling us that they are too weak to bet. So it's obvious to bet our good draw as a semibluff on the flop. With this stack/pot ratio (more about this in Part 3) we plan to 3-bet all-in if we get check-raised, since we will never be a big underdog to any opponent hand. Everyone folds on the flop, which is fine. Easy game.

## 3. Components of starting hand strength

Before we start classifying PLO starting hands, let us quickly review what starting hand strength is made of. In all poker games, starting hand strength has the following 3 components:

### 3.1 High card strength

High cards build high versions of all poker hands. Most of the time, high card strength builds high one pair hands and two pair hands. Given otherwise similar structure, high cards are better than low cards.

For example, Q♠ J♥ T♦ 8♣ and 7♠ 6♥ 5♦ 3♣ have the same structure, and have about the same chance of winning when they build a straight. But Q♠ J♥ T♦ 8♣ has higher cards, and will win more often with one pair, two pair, trips and full house those times we don't build a straight.

### 3.2 Straight strength (connectedness)

The more connected a hand is, the more and better straights it builds. Below are 3 hands of varying connectedness:

K♦ K♠ 7♠ 2♥

Has no connectedness, and builds no straights.

K♦ 9♠ 5♠ 2♥

Has little connectedness, and only builds 4 straights (the cards we use from our hand are written in bold):

1 nut straight: **5**432**2**A
3 non-nut straights: **K**QJT**9**, **9**876**5**, 6**5**432

T♦ 9♠ 8♠ 7♥

Maximally connected, and build straights in 20 ways:

14 nut straights:

QJ**T9**8, J**T9**87, J**T**9**8**7, JT**98**7, **T9**876, **T**9**8**76, **T**98**7**6, T**98**76, T**9**8**7**6, T9**87**6, **98**765,**9**8**7**65, 9**87**65, **87**654

6 non-nut straights:

KQJ**T9**, QJ**T**9**8**, QJT**98**, J**T**98**7**, JT**9**8**7**, JT9**87**)

### 3.3 Flush strength (suitedness)

Suited hands can build flushes. High suited cards build high flushes, which is obviously better than low flushes. Furthermore, there is a huge difference between the nut flush and non-nut flushes. The nut flush can win big pots, while low flushes often lose big pots (mostly to the nut flush) if we overplay them. The difference between the 2nd and 3rd nut flush with respect to profitability is small, but the difference between the 2nd nut flush and the nut flush is huge.

We also want no more than two cards of a suit on our hand (having our own outs reduces the chance of building a flush). Doubly suited hands are obviously better than singly suited hands. Below are some hands of varying flush strength:

A♥ 9♥ 8♠ 7♣ (a premium or near-premium hand) is far better than K♥ 9♥ 8♠ 7♣ (a speculative hand).

J♣ T♣ 8♥ 7♦ is better than J♣ T♣ 8♣ 7♦

J♣ T♣ 8♥ 7♥ is better than J♣ T♣ 8♠ 7♦

### 3.4 The ability to build the nuts ("nuttiness")

When we are assessing the strength of a PLO starting hand, we start by identifying the hand's strength components, as discussed previously. Then we assess the quality of the individual strength components. The more nut components a hand has, the better. But a hand with several decent non-nut components might be more playable in certain scenarios than a hand with one strong nut component and nothing else.

Whether a hand is "nutty" or "non-nutty" also has consequences for when and how we should play the hand preflop. In general, nutty hands are less sensitive to position postflop (if we have flopped the nuts, we're not worried about the hands behind us), and nutty hands will play well both against few opponents and many opponents, as long as the price to play

preflop is acceptable.

Non-nutty hands generally play better in position (which makes non-nut hands easier to play postflop), and with few opponents (makes is less likely that we clash with the nuts postflop).

### 3.5 What makes a good PLO starting hand?

The best PLO starting hands have all 4 cards woring together, and they can build the nuts, or near-nuts, in multiple ways. Below are a few examples:


(top set, 2 nut flushes, many straights)
(nut flush, non-nut flush, many straights)
(2 high sets, 2 non-nut flushes, 2 nut straights)
(many straights, 2 non-nut flushes)

Starting hands with a "dangler" (a card that does not contribute to any strength component) are always speculative at best, and the same is true for hands that aren't suited. Below are a few examples:

### 3.6 Showdown equity versus steal equity

All starting hands have varying degrees of *showdown equity*. This is the value associated with the hand's ability to build strong hands postflop and win showdowns. For example, the premium hand  builds straights and flushes, and this makes it suitable for winning big pots.

But the value of a starting hand in a given preflop scenario also has a *steal equity* component. Steal equity is a measure of the value we extract by stealing pots preflop or postflop. For example, if you're on the button with a random starting hand xxxx, you will have good steal equity if it gets folded to you preflop and the blinds are tight and straightforward. In this scenario you can steal a lot of pots by raising preflop and c-betting most flops, regardless of your cards.

Showdown equity is mostly dependent on your cards, but will also be a function of position (it's easier to mazimize profit in position when you flop a good hand), the number of opponents, their stack sizes and their tendencies.

Steal equity is independent of your cards, and is a function of position, the number of opponents, their stack sizes, their tendencies, and the history between you (for example, if you try to steal a lot, they wil adapt by calling or raising you more often).

When we choose to get involved with a hand preflop, we should always take both showdown equity and steal equity into consideration. We also need to have a clear idea about which of the two components is more important. Let us clarify this:

In Example 2.1 we had a weak hand (  ) in a preflop scenario with very little steal equity (out of position with a high probability of ending up with a multiway pot). And since our hand did not have much showdown equity (we had to flop a set to have any value postflop), we concluded that the best preflop play was to fold. But if we had been on the button with the same hand, we would have raised if it had been folded to us. In that case we would have had good steal equity with position on only two opponents in the blinds, and this would have changed our preflop play from a fold to a raise.

In Example 2.2 we had a nutty starting hand (  ) with good showdown equity, so we elected to play the hand, based almost solely on showdown equity. In this situation we also had a little steal equity (not preflop, but postflop) because of our position (gives us the opportunity to steal postflop when everyone reveals weakness by checking to us).

You should make it a habit to verbalize your thought processes with regards to showdown equity and steal equity when you play preflop. You already do it on an intuitive level (for example, when you raise a weak hand on the button, hoping to steal the blinds), but by "thinking out loud", you will make the connection between preflop play and postflop play more clear. Then it will be easier for you to make good and consistent game plans that tie together the play on all streets for the hands you play.

If you think most of your profit will come from hitting the flop hard and winning a showdown with a good hand, plan around

maximizing showdown equity (for example, by keeping the pot multiway preflop and playing for implied odds). If you think most of your profit will come from stealing the pot preflop or on the flop, plan around maximizing steal equity (for example, by raising preflop to get heads-up with position).

## 4. Classification of starting hands according to structure

We are now ready to start classifying starting hands. The first thing we will do is to divide them into groups, based on their structure. In this work we will use Hwang's starting hand categories from his book *Pot-Limit Omaha Poker: The Big Play Strategy*. The first step is to categorize the starting hands according to structure, and then we construct another classification scheme based on quality/strength.

Below are Hwang's 6 starting hand categories based on structure:

1. Big cards and ace high Broadway wraps
2. Straight hands
3. Suited ace hands
4. Pair-plus hands
5. Aces
6. Marginal hands

Below are descriptions of each of the 6 categories:

### 4.1 Big cards and Ace high Broadway Wraps

**Description:**
4 cards T and higher, or 4 cards 9 and higher with an ace.

**Examples:**


**Strength component(s):**
High, connected cards that build high pairs, high two pair, high straights, and high flushes when suited.

### 4.2 Straight Hands

**Description:**
4 connected cards with at most two gaps in them

**Examples:**


**Strength component(s):**
These hands are also called "rundowns" or "wraps", and they build straights. The number and quality of the straights we build are very dependent on the the number and location of gaps in the structure.

Hwang divides this category of hands into 2 subcategories:

**Premium Rundowns:**
- Rundowns with no gaps (JT98)
- Rundowns with a single gap at the bottom (JT97)
- Rundowns with a single gap in the middle (JT87)

**Speculative Rundowns:**
- Rundowns with a double gap at the bottom (JT96)
- Rundowns with two single gaps at the bottom (JT86)
- Rundowns with a double gap in the middle (JT76)

Rundowns with the gaps at the bottom are much stronger than similar structures with the gaps at the top when we are playing make-a-hand-poker. Hwang therefore recommends folding hands with gaps at the top, for example J976.

This is good advice to follow when we're first and foremost playing for showdown equity and implied odds, for example if we're in the big blind and face a raise and a few callers. If we now choose to get involved with a hand like T♥ 7♠ 6♠ 5♦ , we are setting ourselves up for postflop trouble, because:

*Straight structures with gaps at the top build a lot of non-nut straights!*

This is obviously a disadvantage in a scenario where our main plan for profit is to flop a straight or straight draw and then win a showdown. If many of the straights we flop or draw to aren't to the nuts, we are setting ourselves up for losing lots of chips to the opponent(s) who build the nut-version of the same straight.

On the other hand, raising a non-nutty rundown like T♥ 7♠ 6♠ 5♦ on the button when it gets folded to us is perfectly fine. In this situation we are not playing solely for showdown equity, and a lot of the hand's value now comes from steal equity. Also, the times we don't succeed in stealing the pot preflop or postflop, there is less risk (because of fewer opponents) of building a non-nut straight and having it clash with the nuts.

Comparing the two scenarios above gives us a nice illustration of the value of planning ahead. We also see that evaluating PLO starting hand strength in a vacuum doesn't make much sense. The value of a PLO starting hand is always very dependent on the type of postflop scenario we are planning around (winning showdowns or stealing), and what we want to accomplish by playing the hand. If we are playing mainly for showdown equity, we prefer a nutty starting hand structure. If we're planning mostly around stealing, for example when we open-raise on the button, we can loosen up our starting hand requirements considerably because of the high value of the steal equity component

## 4.3 Suited Ace Hands

**Description:**
Suited ace with a rundown, a pair, or two Broadway cards

**Examples:**
A♥ 9♠ 8♥ 6♦
A♥ T♦ T♠ 3♥
A♥ K♣ Q♥ 2♦

**Strength component(s):**
The "backbone" of this starting hand structure is the nut flush potential. In addition, the side cards give us various possibilities.

A suited ace + rundown has straight potential to go with the flush potential. To evaluate the quality of the straight component, we use the principles for evaluating straight hands discussed previously. Rundowns with high gaps (for example, A♠ 9♠ 7♥ 6♣) are more speculative than rundowns with low gaps or no gaps.

A suited ace + pair can flop a set. The higher the pair, the better. Also, note that we prefer the pair not to have the same suit as the ace (for example, we prefer A♥ 8♠ 8♣ 2♥ over A♥ 8♥ 8♣ 2♠ ). When the pair is offsuit to the ace, we have a better chance of flopping the nut flush draw when we flop a set (which will give us a monster hand).

A suited ace + 2 Broadway cards has high card strength plus some straight strength to go with the nut flush potential. We can build good top pair and top two pair hands, and some Broadway straights.

## 4.4 Pair-plus Hands

**Description:**
Pairs with suited and connected side cards, or a pair with another pair.

**Examples:**
J♣ J♠ T♥ 9♣
K♠ K♣ 8♥ 8♦

**Strength component(s):**
These hands can flop sets. In addition, the suited/connected side cards provide straight and flush potential; while a second pair doubles the chance of flopping a set (a double paired hand has about 25% chance of flopping a set).

Note that a low pair is a non-nutty strength component (the lower the set we flop, the less often it will win). A hand like 8♥ 7♠ 6♣ 6♥ is made of mostly non-nutty components, and this type of hand is often overvalued by PLO novices. These hands look pretty and playable, but they can be difficult to play well postflop, due to the lack of nut potential, and the relatively low number of flops that they hit hard.

## 4.5 Aces

**Description:**
AAxx. These hands vary in strength from speculative ("dry" AAxx with worthless side cards) to ultra premium (doubly suited AAxx with good side cards).

**Examples:**
A♦ A♠ 7♠ 4♣
A♥ A♣ J♥ 9♣
A♦ A♥ 8♠ 8♣

**Strength component(s):**
AAxx is the nuts preflop, and the AA component gives us a monster hand when we flop top set. AAxx rarely wins showdowns unimproved in multiway pots, but will win some pots by going unimproved to showdown in heads-up pots.

Hwang splits the "Aces" category into 2 subcategories based on the side cards:

**Speculative**
"Dry" aces with worthless side cards, or with one suited ace and little else. For example:

A♠ A♦ 7♣ 3♥
A♠ A♦ K♠ 3♣

**Premium**
Double-suited to both aces, or single-suited with a pair, a connector, or 2 Broadway cards. For example:

A♥ A♣ 9♥ 6♣
A♠ A♣ 7♠ 7♥
A♦ A♠ T♦ 9♣
A♠ A♣ Q♦ J♠

**Magnum**
Double-suited to both aces, and with a high pair, a connector, or 2 Broadway cards. For example:

A♥ A♠ J♥ J♠
A♣ A♦ 7♣ 6♦
A♣ A♠ K♣ Q♠

High quality AAxx hands are the best starting hands in Omaha.

## 4.6 Marginal Hands

**Description:**
A wide category made up of various weak "one-way" hands with only one significant strength component:

- 3 Broadway cards + a dangler
- High pairs with worthless side cards
- Weak suited aces that don't fall under the previous "Suited Ace Hands" category
- Offsuit rundowns

**Examples:**

**Strength component(s):**
What these hands have in common is that they lack nut potential, or have only one significant nut component.

Take a hand like  . The best (and only) we can hope to flop is top set. When this happens, we have a very strong hand, but this is a longshot. So if we play this hand solely for for showdown equity (for example, when we call in the big blind after a raise and a few callers) we don't want to pay a steep price to see the flop. The value of playing this hand strictly for set value is very dependent on seeing the flop cheaply to preserve implied odds.

Similarly, a hand like  does not have many good flops in its future. For this hand's nut component (straight potential) to have value postflop, we need to to flop a straight or a good straight draw on a rainbow flop, so that we are not immediately threatened by flushes or flush draws.

Again, we need to have a plan for the hand when we choose to get involved. If we are playing mainly for showdown equity, we need to see cheap flops, since these hands rarely hit flops hard. We also want position, both to make postflop play easier, and to reduce the risk of unpleasant preflop surprises behind us (playing in position means fewer opponents left to act preflop).

For example, if you have  on the button after a couple of weak limpers, it's perfectly fine to limp in with positon and hope good things will happen postflop. You have a strong nut component and will sometimes flop something strong enough to continue past the flop. And sometimes you will be able to use your position to steal postflop. But if you have the same hand UTG, you should fold. In this case you don't have enough steal equity + showdown equity to take on a field of 5 opponents from out of position.

## 5. Classification of starting hands according to strength

To recap, we have now divided the set of playable PLO starting hands into 6 broad categories:

1. Big cards and ace high Broadway wraps
2. Straight hands
3. Suited ace hands
4. Pair-plus hands
5. Aces
6. Marginal

I recommend that you memorize these categories and the hands belonging to them. This will enable you to quickly classify starting hands without thinking. When we have this classification scheme memorized, we have created order in the chaotic universe of Omaha starting hands. We have separated out the playable hands, grouped them according to structure, and put the rest of the starting hand universe in a separate category labeled "Trash".

The next step is to construct another classification scheme, this time based on strength. We will use Hwang's categories for this process as well.

Hwang uses 4 categories of starting hand strength:

- Premium
- Speculative
- Marginal
- Trash

The hands that fall under each of these categories are as follows:

### 5.1 Premium

**Description:**
- Premium and magnum AAxx

- High double pairs
- 4 cards T and higher, at least single-suited
- 4 cards 9 and higher, at least single-suited
- Premium rundowns, at least single-suited
- High pairs with suited and connected side cards

**Examples:**

In general, premium starting hands can be raised from any position, also after an arbitrary number of limpers. What these hands have in common is good showdown equity and the ability to hit the flop often and hard. So by building the pot preflop, you are setting yourself up for winning big pots postflop when you hit the flop harder than the opposition.

But note that if you are in position versus a raiser, you should not necessarily 3-bet every time you have a premium hand. Whether you should call or 3-bet depends on the plan you have for the hand (calling sets you up for make-a-hand-poker in a multiway pot, 3-betting sets you better up for stealing), and various situational factors like position, the number of opponents, stack sizes and other things.

We will have more to say about 3-betting in Part 3. For now, let's agree that playing a premium hand for a raise (regardless where the raise comes from) will never be wrong (although 3-betting might be more profitable).

## 5.2 Speculative

**Description:**
- Speculative AAxx
- Speculative rundowns, at least single-suited
- Medium pairs with suited and connected side cards
- Suited ace with a rundown
- Suited ace with a pair
- Suited ace with 2 Broadway cards

**Examples:**

In 6-max play we will open-raise most of the "Speculative" hands from all positions when it's folded to us. If there's a raise in front of us, all these hands will be candidates for calling in position. The best speculative hands (for example, a good double-suited rundown) will also be candidates for light 3-betting in a deep-stack scenario where we 3-bet to isolate the raiser and play a heads-up pot with position and initiative (more about this in Part 3).

With limpers in front of us, we usually choose between calling and raising. After just one limper, we will often raise these hands to isolate and set ourselves up for playing a heads-up pot in position (which increases our steal equity). With more than one limper we will have more incentive to overlimp when the decision is close, since we now have less steal equity.

In an overlimp-or-raise scenario we also have to take the nut-potential of our hand into consideration, and whether we want to play against few or many opponents. Speculative hands with one good nut component and nothing else (for

example, A♥ 9♠ 5♥ 4♦ or K♠ K♣ 7♦ 2♥) play well in limped multiway pots. With these hands we are playing to flop a hand that can win large pots against many opponents (nut flush and top set, respectively), so we don't care much about how many opponents we have to beat. By limping in, we are preserving our implied odds.

### 5.3 Marginal

**Description:**
As described previously:

- 3 Broadway cards + a dangler, at least single-suited
- High pairs with worthless side cards
- Weak suited aces that don't fall under the previous "Suited Ace Hands" category
- Offsuit rundowns

**Examples:**


Most of the "Marginal" hands are too weak to raise from early position, and we will fold the weakest of them if there's a raise in front of us, and otherwise call. In position after limpers, we should usually overlimp, but if we think the situation is good for stealing, we can of course raise. What these hands have in common is that they prefer to see the flop cheaply and in position if we're playing them for make-a-hand-poker purposes only.

And of course: If it's folded to us in late position, all the "Marginal" hands are candidates for open-raising. We're now planning around steal equity, and we're setting ourselves up for playing a shorthanded pot in position.

### 5.4 Trash

**Description:**
Everything that does not fall under "Premium", "Speculative" or "Marginal" is "Trash" (as a starting point, anyway).

Here it's important to note that many of the hands that we have thrown in the "Trash" category can be playable for a competent player in position. A good player on the button might be able to play 100% of his hands profitably against weak players in the blinds. So we must not forget that our classification schemes for playable starting hands are conceptual tools, and they should not be followed blindly.

But as a starting point, unless you have a hand that is at least "Marginal" you should have other good reasons before you choose to get involved, like good steal equity (for example, if you're on the button with two tight and passive opponents in the blinds).

Later, when we have gained more experience, we will talk more about splashing around profitably with weak hands in position. How much we can loosen up our late position range will be very dependent on our postflop skills, particlarly how good we are at*stealing*. We will train these skills, but for now we will stick mostly to the playable hand categories defined above, and they will make up the core of our starting hand selection.

## 6. Summary of starting hand classification

Let us pause and recap the work we have done so far in this article:

We began by defining our overall core strategy for PLO, which is to mostly play quality hands, planning around winning pots at showdown, plus doing some preflop and postflop stealing in position.

Then we discussed the different components of starting hand strength (high card strength, straight strength, flush strength), and noted that the value of a starting hand in a given scenario has two components: Showdown equity (the ability to build strong hands and win pots at showdown) and steal equity (the value we can extract by stealing pots preflop or postflop, which is independent of our cards).

Then we constructed two classification schemes for PLO starting hands. First we classified playable hands according to their structural elements and we divided them into 6 categories. Then we classified the playable hands according to strength and

gave some simple guidelines for how to play them preflop.

In the period between Part 2 and Part 3, I recommend that you memorize both these classification schemes until you have them down cold. For example, when you see the hand A♠ 9♥ 8♠ 7♦, your brain should go "ding", and you will immediately identify this hand structure as a "Suited Ace Hand", more specifically a "suited ace with a rundown", and that it belongs to the strength category "Speculative".

When your brain has done this classification of your starting hand, it will also have loaded some information about how to play this type of hand in various preflop scenarios, based on things you have read, videos you have seen and hands you have played. This makes it easier to determine whether the hand is playable in the current scenario or not, and how you should play it if it is

## 7. Some macro principles for preflop play

In addition to the simple guidelines given in the descriptions of the starting hand categories, we will discuss some important macro principles for PLO preflop play to get you started on the right track.

### 7.1 Unless you have a reason to do otherwise, always open the pot for a raise

If it's folded to you and you decide to play, come in for a raise unless you have specific reasons for open-limping. If you think your hand is too weak to raise, playing it for a limp probably won't do you much good.

Note that open-limping a weak hand from out of position sets you up for a postflop scenario where you're playing a weak hand out of position in a multiway pot. These situations won't make your bankroll fat.

### 7.2 Unless you have a reason to do otherwise, bet the pot when you bet and raise preflop

As a default, we will bet the pot preflop, unless we have specific reasons to bet less. Situations where it makes sense to bet less than pot preflop will probably come up later in the article series, and we will discuss these situations then.

### 7.3 Be careful about building big pots out of position, particularly with speculative starting hands

This principle is a corollary of our overall PLO core strategy. Playing in position gives us *options* that we don't have out of position, for example the opportunity to exploit good stealing oportunities when the opponents are weak and tell us so by checking to us postflop. By playing out of position, we hand these options over to the opponents.

And if we also build a big pot when out of position, we are setting ourselves up for making big postflop mistakes. We will make many mistakes when playing out of position, but if the pot is small, these mistakes will be small too. Bloating the pot preflop magnifies any postflop mistake we make later. And all of this will of course be extra bad if we also have a weak starting hand that rarely connects well with the flop.

A common preflop mistake of this type is to overplay weak AAxx hands out of position. For example:

**Preflop**
You are playing $5PLO at a full 6-max table. UTG ($6.70) raises to $0.17, MP (4.50) calls, button ($7.20) calls, you (6.55) 3-bet pot to $0.87 with A♣ A♥ 9♦ 6♠, UTG calls, MP calls, button folds.

**Flop:** Q♠ J♦ 7♦ ($2.80)
Now what?

Here you are on the flop with a weak hand, out of position against two opponents in a big pot. You have a naked overpair and no draws. The flop is pretty coordinated, and probably hit the opposition in some way. There is some possibility that a c-bet will win this pot on the flop, but it will cost you half of your remaining stack to find out. You have no good options other than checking, and if someone bets, you are forced to check-fold. Rats!

But you can thank yourself for this mess. You walked into this situation voluntarily by making a big preflop 3-bet out of position with a weak hand in a multiway pot. And you predictably failed to hit the flop, so you ended up in the most common scenario.

The problem with A♣ A♥ 9♦ 6♠ is that it's a 1-dimensjonal hand which only does one thing well when we play it solely for showdown equity. It flops top set. But this happens only 1 time in 8, or thereabouts, so if you are playing mostly for showdown equity (and this usually the case out of position in a multiway pot), it will be better for you to see the flop

cheaply and preserve implied odds. By calling you also disguise the content of your hand, which will be to your advantage postflop (more about this in Principle 7.5).

### 7.4 Be careful about playing non-nutty starting hands out of position

We have previously discussed the ills of playing non-nut hands out of position postflop, and by playing non-nutty starting hands out of position, this is the scenario you are setting yourself up for.

To illustrate, let is compare two starting hand with seemingly similar structure (high card + rundown, single-suited) and predict how they will play postflop when we open them from UTG.

**Hand 1:** A♠ T♠ 9♦ 8♣
**Hand 2:** K♠ T♠ 8♦ 7♣

Both hands have high flush potential and straight potential. I now postulate that Hand 1 is a near-premium starting hand and an automatic raise from UTG, while Hand 2 is near-trash from UTG. Why is this so?

Well, let's think about what will happen when these two hands flop what we are hoping to flop, namely flushes, straights, or draws to flushes and straights. With Hand 2 we will always build the nut flush, and most of the straights we build will be nut straights as well. This means we are building hands and strong draws that we can bet with confidence from out of position, since we're not too worried about the hands behind us.

But with Hand 2 we will usually build the 2nd nut flush (unless A♠ flops), and many of the straights we build are non-nut because of the top gap in our straight component. This means we will often have hands and draws too weak to bet confidently, *even when we flop what we are hoping to flop*. For example, it's bad play to let big bets go in on the flop, turn and river with non-nut hands, since we often will be paying off the nuts. At the same time, if we play cautiously, we will reduce the profit those times we do have the best hand.

This is the non-nut hand dilemma. Push too hard and you pay off the nuts too much. Push too little, and you don't extract enough value when you are ahead, and you give the opponents cheap opportunities to outdraw you. Nut hands don't have this problem.

So out of position we want to build the nuts postflop, and we set up this scenario by selecting starting hands with nutty structure.

### 7.5 Be careful about making big preflop reraises with AAxx unless you can get a large percentage of your stack into the pot

This principle is related to the principles 7.2 and 74 discussed previously. If we make a big reraise with AAxx, we are telling the world that we have AAxx. To avoid giving good implied odds to the opponents (who now have information about our hand which they can exploit postflop) we want to get so much money into the pot preflop that postflop play becomes a formality. Ideally we want to be able to autobet the flop all-in and be done with it.

This means we want to get more than 1/3 of our stack into the pot when we make a big reraise with AAxx, because then we will have less than a pot-sized bet remaining. For example, if we start with 100 BB and get 35%% into the pot preflop, we will have a 70 BB pot on the flop with 65 BB left to bet. If we can set up this scenario, we have removed most of the implied odds for the opponents and made it harder for them to exploit the information we have given them.

NB! This does not mean we shouldn't 3-bet AAxx. What it means is that we should think twice before we tell the world that we have AAxx in a situation where we are giving them good implied odds, particularly when we are out of position with many opponents, which makes it difficult to win without a showdown.

Below is a heads-up scenario where we elect to not make a big reraise with AAxx to avoid a tough postflop scenario.

You are playing $5PLO at a full 6-max table. It's folded to you, and you ($8.10) raise pot to $0.17 with A♦ A♣ 6♠ 2♥ in CO. Button ($10.20) 3-bets pot to $0.58, and the blinds fold. Button is a good, aggressive player. What is your plan?

Let us think about what is likely to happen if we 4-bet pot. We are about 160 BB deep, and a pot-sized 4-bet will be a total of $1.81, which is 22% of the effective stack ($8.10). This creates a scenario where the button knows what you have, and he can now play the rest of the hand near perfectly. If he also has AAxx, he will 5-bet so that you can get all-in preflop. You probably have a worse AAxx than him, but that's OK, you won't lose much in this scenario.

But if he has 3-bet you with a speculative hand that plays well against aces (as good, aggressive players are prone to do) he can now call your 4-bet with position, good implied odds and information that allows him to play well against you postflop. For example, let's say he has made a light 3-bet with 9♥ 8♥ 7♣ 6♦ . This hand has 46% preflop equity against your A♦ A♣ 6♠ 2♥ (ProPokerTools calculation) and it will hit a lot of flops hard enough to continue, so button isn't making a mistake by 3-betting and calling your 4-bet as a small underdog.

So what will happen on the flop? Well, if you always c-bet pot, he will be able to sit behind you and "cherry pick" flops. He knows what you have most of the time (an overpair without a strong draw), so he also knows how hard he needs to hit the flop in order to raise your c-bet and commit himself profitably. So always c-betting into him gives him good implied odds. On the other hand, if you decide to check every scary-loooking flop, you are giving him lots of opportunities to bluff you out.

Below is one of the postflop scenarios button is hoping for when he calls your 4-bet:

**Flop:** J♥ 7♦ 3♥ ($3.69)

On this flop he has a flushdraw, a gutshot and a low pair. Combined, these draws give him 66% equity against your overpair of aces! (ProPokerTools calculation) If you bet pot, he will raise all-in as a big favorite. You, in turn, will have to decide whether you have enough equity to call off the rest of your stack with a naked overpair. And if you check, he will probably bet as a semibluff, and you will have to fold with a naked overpair and nothing else on a draw-heavy flop.

I hope this example clearly illustrates the problems we are creating for ourselves by building a big pot with AAxx in a situation where we can not commit automatically on the flop, and the opponents know what we have. This problem is particularly difficult out of position, since we have no information whatsoever about whether or not the opponent connected with the flop. And if our AAxx is a very speculative one, our problems get even worse, since few flops will help us.

We conclude that we should not 4-bet our speculative AAxx with this stack size, so we call and hope good things will happen postflop. This scenario isn't particularly rosy either, but it's the lesser of two evils. Note that with a 100 BB stack we could have gotten 36% of the stack in with a pot-sized 4-bet to $1.81. This would have enabled us to push the flop all-in without button having any opportunity to push us around postflop. He will still be able to cherry pick flops, but he no longer has good implied odds. And if we push every flop, we are unbluffable.

### 7.6 After a raise and a reraise, usually fold Axxx type hands.

This is simple logic. When the pot has been raised and reraised, it is very likely that someone has AAxx. If you have an Axxx type hand (for example, A♣ K♦ J♦ 9♠), you will often be dominated. If you choose to get involved, you will effectively be trying to outflop AAxx with a 3-card hand (since an ace on the flop won't help you).

This will not be profitable for you, and you avoid this scenario by folding your Axxx hand preflop, no matter how tempting it looks

### 7.7 Don't be afraid to build big pots with premium starting hands in position

This is the opposite of what we talked about in Principle 7.2. When you have a premium starting hand in position, a raise from you will set the opponents up for playing weaker hands out of position, which is exactly what they don't want. Premium starting hands often flop well, and the times you miss the flop, you will often get opportunities to steal or take a free card, both of which are good for you.

### 7.8 When in doubt, be more inclined to fold when out of position

Sound poker logic. Position makes all hands more profitable and easier to play, so if you are unsure, you can let this be the deciding factor. It's difficult to play too tight out of position in pot-limit Omaha.

### 7.9 When in doubt, remember that the price of folding a playable hand preflop is low

If you have a marginal play/not play decision and you fold a hand you should have played, you will not have given up much profit. So if you are uncertain, and you suspect you won't be able to play the situation profitably, fold without shame or regret. There's always a new hand with new opportunities.

As you get better, you will find more and more profitable situations to get involved in. In the meantime, feel free to play conservatively and stick closely to the overall core strategy (focusing on playing for showdown equity and playing in position).

## 8. Some examples of preflop play

We will now (finally) end Part 2 with a few simple preflop examples where we tie together the theory we have discussed up to this point. In each example I will use a decision making process based on our starting hand classification schemes and an assessment of showdown equity and steal equity.

An experienced PLO player will not think as rigidly as we do here, and he will include many other factors that we ignore here, but the purpose of these examples is to demonstrate how we can capture the essence of solid PLO preflop play using a simple decision making process:

- We assess the quality of our starting hand based on the classification schemes defined previously
- We assess the value components, showdown equity and steal equity, and we determine which one is most important
- We make a plan for the hand

Try to experiment with this type of planning the next time you sit down to play, and verbalize your thinking. Hopefully, you will see that simple and sound poker logic will lead you to simple and good alternatives for most preflop scenarios you encounter (even if more complicated and slightly more profitable alternatives might exist).

### Example 8.1: Open-raising from UTG

You are playing $5PLO at a full 6-max table. You have a $5 stack UTG, and you look down at  . What is your plan?

You have a suited ace + rundown, which according to our hand classification schemes belongs to the "Speculative" strength category. It is one of the best hands in this category, and definitely worth an open-raise from any position. Your standard play with this hand should be to open-raise pot.

Your plan for postflop play is very dependent on what happens behind you. If you end up with a big, multiway pot, you should mostly play fit-or-fold on the flop. With only 1 or 2 opponents, you should be prepared to c-bet many flops when you miss and hope to steal the pot on the flop (but if you get called on the flop, you should shut down unless you improve).

### Example 8.2: 3-betting premium AAxx

You are playing $5PLO at a full 6-max table. It gets folded to CO ($5) who raises pot to $0.17. You ($5) look down at  on the button. What is your plan for the hand?

It's hard to find a more obvious spot for 3-betting than this, and you can reraise pot to $0.58. You have a premium AAxx hand with very good showdown equity against the raiser's range and the two random hands in the blinds. By 3-betting you also improve your steal equity, since you are creating a scenario where you often will play the rest of the hand heads-up and in position against the raiser. This will enable you to win most of the pots where both of you miss the flop.

### Example 8.3: Flat-calling with a speculative AAxx

You are playing $5PLO at a full 6-max table. UTG ($6.70) raises to $0.17, MP ($3.30) calls, CO ($7.50) calls, you ($5.90) look down at  in the big blind. What is your plan?

AAxx again, but this time the speculative variety with poor side cards. Furthermore, this situation is very different from the situation in Example 8.2 where we 3-bet AAxx. There we had position on the raiser with quality aces and a good chance of getting heads-up. In this scenario we are out of position with trashy aces in a multiway pot.

We obviously don't have good steal equity here, and a 3-bet probably won't create any. Most of our opponents have deep stacks, and they will probably call a 3-bet, hoping to outflop our obvious aces (this is the hand they will put you on when you 3-bet out of position in multiway pot).

We don't have good showdown equity either, unless we flop a set or get all-in preflop. But a pot-sized 3-bet will only be to $0.87, which is only 15% of our stack. So a big 3-bet will not make us committed postflop (see also Principle 7.3 and principle 7.5 discussed previously). By 3-betting we are telling the opponents that we have AAxx in a scenario where they are getting implied odds to call, hoping to outflop or oytplay us postflop.

So we should plan around showdown equity by playing for set value. We call the raise, hoping to flop top set and getting paid off. If we miss, we will mostly check-fold.

Note that here we are playing AAxx like we would have played KKxx with poor side cards. We are playing for set value, and little else. Overplaying trashy AAxx out of position is a classic beginner's mistake in PLO.

### Example 8.4: Isolating with a speculative hand

You are playing $5PLO at a full 6-max table. MP ($5), who mostly plays fit-or-fold postflop, limps, you ($5) are looking down at 9♥ 7♠ 6♠ 4♥ on the button. What is your plan?

We start by noting that this starting hand technically belongs to the "Trash" strength category according to our classification scheme. The reason is the top gap (plus a gap at the bottom), which makes the hand less valuable in a multiway make-a-hand-poker scenario.

But in this situation we do a "manual override" of the classification system, because we're not in a situation where we need to plan ariound showdown equity. We have position on a single limper, and we can raise to isolate and play a pot heads-up in position. This will give us good steal equity, particularly against a weak and straightforward player (which MP is).

In addition to steal equity, we have a hand with decent potential, even if a lot of it is non-nut. But non-nuttiness is less of a concern against few (hopefully only one) opponents. Also, having position will make our non-nut hands easier to play postflop.

### Example 8.5: A "no thanks" to a speculative hand in a multiway pot

You are playing $5PLO at a full 6-max table. UTG ($5) raises, button ($6.50) calls, SB ($5.60) calls, you ($6.10) look down at J♥ T♦ 7♠ 6♣ in the big blind. What is your plan?

You have an offsuit rundown with a double gap in the middle. The lack of suits is enough to demote this hand to the "Marginal" category, inependent of the quality of the straight structure, which is speculative. So our showdown equity is quite poor.

Next, we look at the scenario we're in. We are out of position in a multiway pot, and steal equity is non-existing for us. So if we choose to play, we will have to plan around showdown equity. But we have a hand that isn't suitable for playing make-a-hand-poker in a big, multiway pot, so this is an easy fold.

This example and the previous example illustrate how postflop play can dictate preflop play. In the previous example we had an opportunity to plan around stealing, so we raised a speculative hand to isolate. In this example we were forced to plan around showdown equity with our weak hand, and this dictated a fold because of poor showdown equity.

### Example 8.6 Folding a speculative hand to a 3-bet

You are playing $5PLO at a full 6-max table. It gets folded to you, and you ($5) raise pot with K♥ K♠ J♦ 3♣ on the button. SB ($4.30) calls, BB ($5) 3-bets pot to $0.68. What is your plan?

You have a big pair with poor side cards. This is a speculative hand, but it's an automatic button open-raise. You get called by the small blind, and then the big blind 3-bets pot. This indicates great strength, and AAxx will make up a big part of the big blind's range.

You have the worst type of hand structure to play against AAxx, namely a big pair with uncoordinated side cards, and we have only 25% preflop equity against a random AAxx (ProPokerTolls calculation)

Calling the 3-bet is equivalent to playing strictly for showdown equity (set value), since we almost never flop anything else worth continuing with, and since our steal equity is poor with a 3rd player in the pot. The problem with calling for set value is that we're not getting the implied odds we need when 1/7 of our stack goes into the pot before the flop. So we fold to the 3-bet.

This is an example of a situation where beginners call too often without having a plan for the postflop play. They feel their big pair is too good to fold, so they call, hoping to flop a set. By doing this, they are simply setting themselves up for getting pushed out of a big pot postflop most of the time.

A big pair without supporting side cards is the worst hand structure you can have when you suspect you're up against AAxx, and in Part 3 we will study this scenario in detail by looking at so-called flop equity distributions. We will pit AA against various starting hand structures, and investigate which structures can survive a preflop 3-bet, and which structures can only be played against AAxx when they can see the flop cheaply (high pairs with poor side cards definitely prefer the latter).

## 9. Summary

In this article we have laid a foundation for PLO preflop play. We have defined a simple overall core strategy, discussed the various components of starting hand strength, and defined two starting hand classification schemes based on structure and strength.

From the beginning we have stressed the importance of always having *reasons* for every decision, and having an overall game plan that ties together the preflop play and postflop play for the hands we choose to play. We don't need a perfect plan as long as we always have a *reasonable plan* based on sound poker logic.

Armed with the concepts discussed in this article you should be able to navigate PLO preflop scenarios without making many big mistakes. I recommend that you make a habit out of structured thinking while playing. Take your time and verbalize your thoughts ("I call because ... ")

In Part 3 we will continue our discussion of PLO preflop strategy, and we will move on to some more advanced concepts, for example:

- More about the connection between preflop play and postflop play
- 3-betting
- Flop equity distributions and their importance for starting hand playability

Until the next article, play and think, think and play!

Good luck!
Bugs

# Part 3: Preflop Play II

## 1. Introduction

This is Part 3 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

In Part 3 we will continue the discussion of principles for PLO preflop play. My original plan was to let this article be a combination of theory and practical guidelines, focusing on 3-betting, raising to isolate, and overlimping. But as the work progressed it became clear that there was too much material for only one article.

I therefore decided to let Part 3 be a purely theoretical article where we dive deeply into the concept of *playability* of PLO starting hands, both as a function of hand structure and as a function of how much money we put into the pot preflop. Then we will move on to more practical guidelines in Part 4, and use the theory from Part 3 as a tool.

We have previously talked about how PLO preflop and postflop play is closely knit together, and how the goal of our preflop play is to set ourselves up for profitable postflop situations. An extremely important concept that ties together preflop play and postflop play is *flop equity distributions*. This will be a useful tool for us, and we will study flop equity distributions thoroughly so that we can use it in our discussion of preflop play (and later also postflop play).

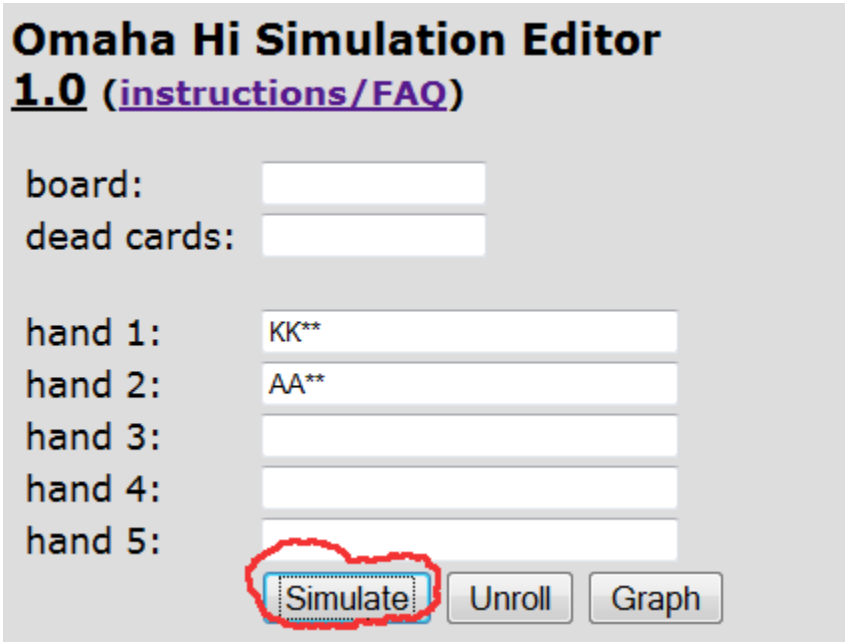
To use flop equity distributions quantitatively, we need some mathematics, and among other things we need to learn how to use *numerical integration* to extract useful data from flop equity distribution curves. But if this sounds Greek to you, don't panic!

Understanding the mathematical details is not necessary to understand what is going on, and the mathematical technicalities have been put in an Appendix. Those with an interest in mathematics can read the Appendix; the others can skip that part and simply use the numerical results.

## 2. An Introduction to Flop Equity Distributions

First, let's get an idea about what a flop equity distribution *is*. We go toProPokerTools.com and enter KKxx vs AAxx as shown below (with KKxx at the top.

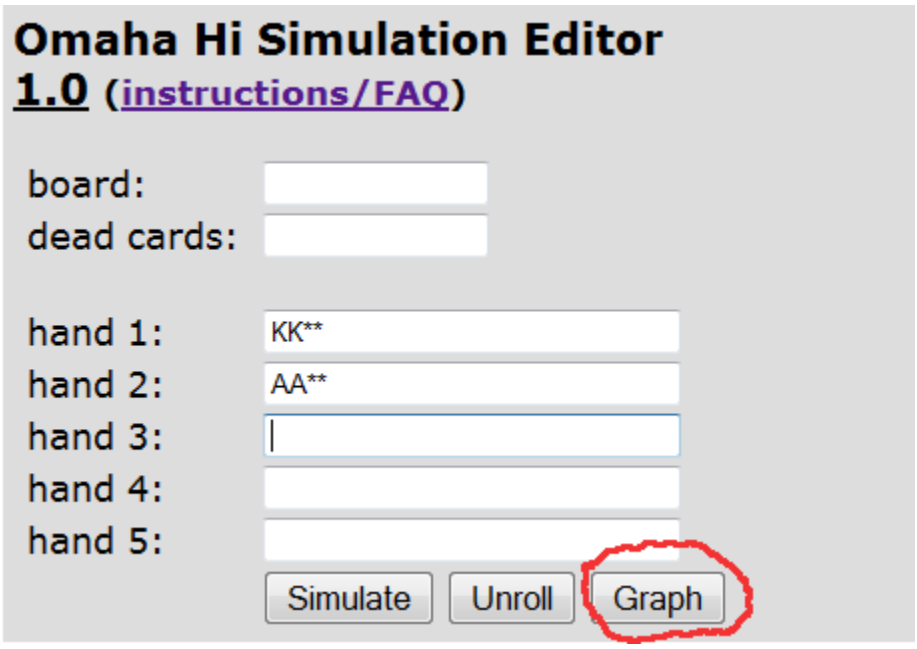
First, we calculate the equity for KKxx vs AAxx the usual way by clicking "Simulate":

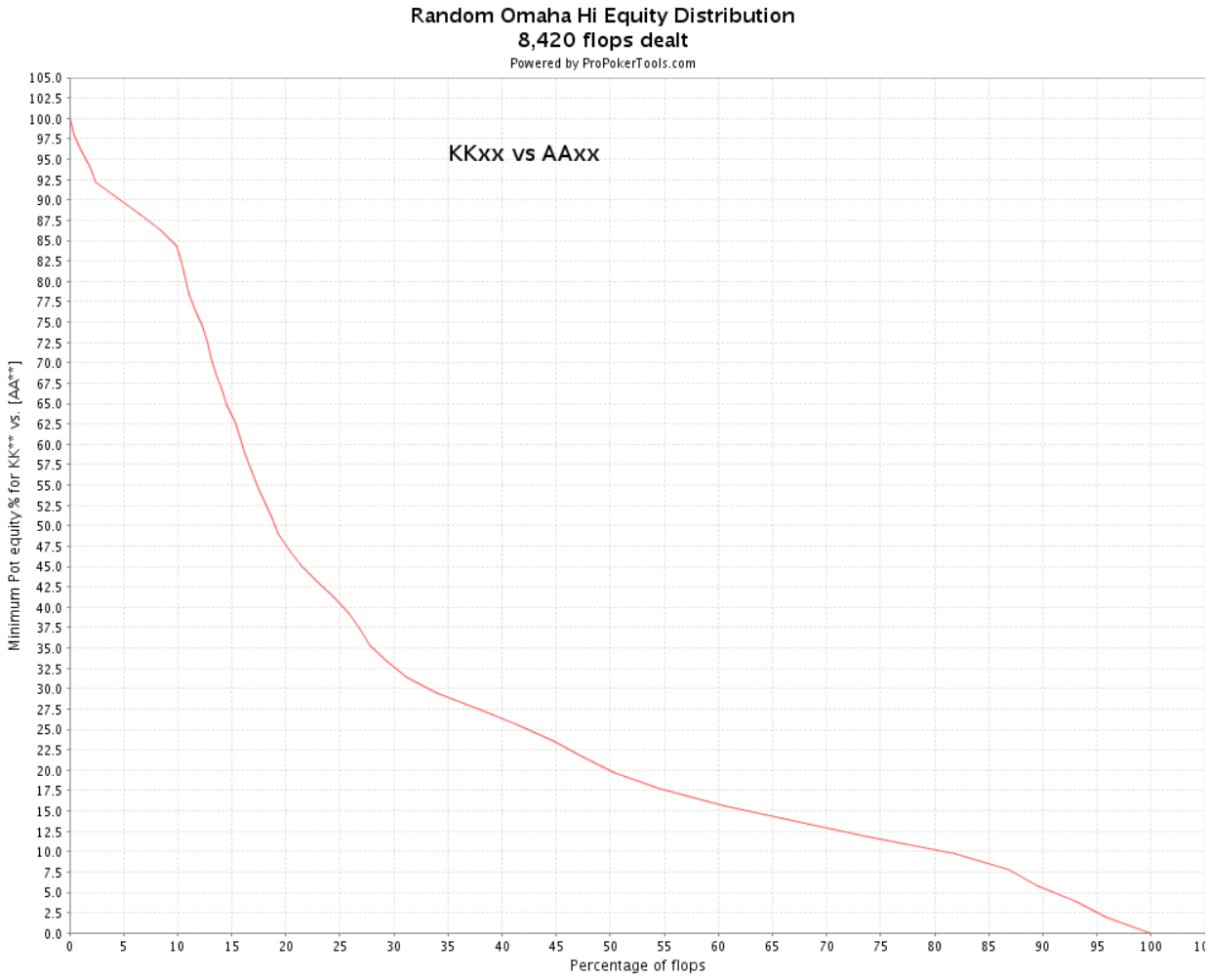


**Omaha Hi Simulation**
600,000 trials (Randomized)

| Hand | Pot equity | Wins | Ties |
|---|---|---|---|
| KK** | ***30.16%*** | 180,324 | 1,275 |
| AA** | ***69.84%*** | 418,401 | 1,275 |

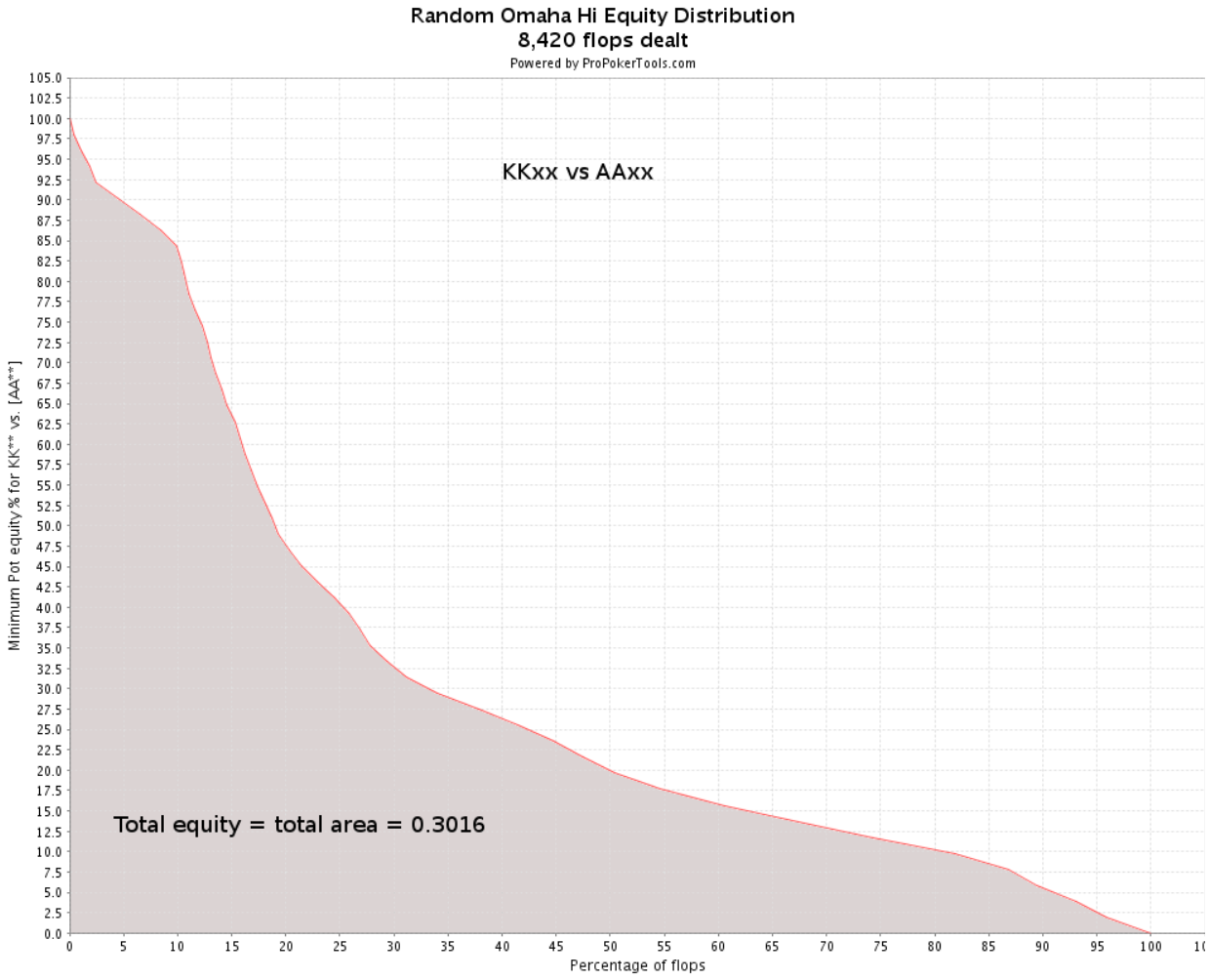
Then we return to start and click "Graph" as shown below. This produces the flop equity distribution curve for KKxx vs AAxx:






(For the rest of the article: Click on all graphs to open them in full size in a separate browser window, so that you can see all the details.)

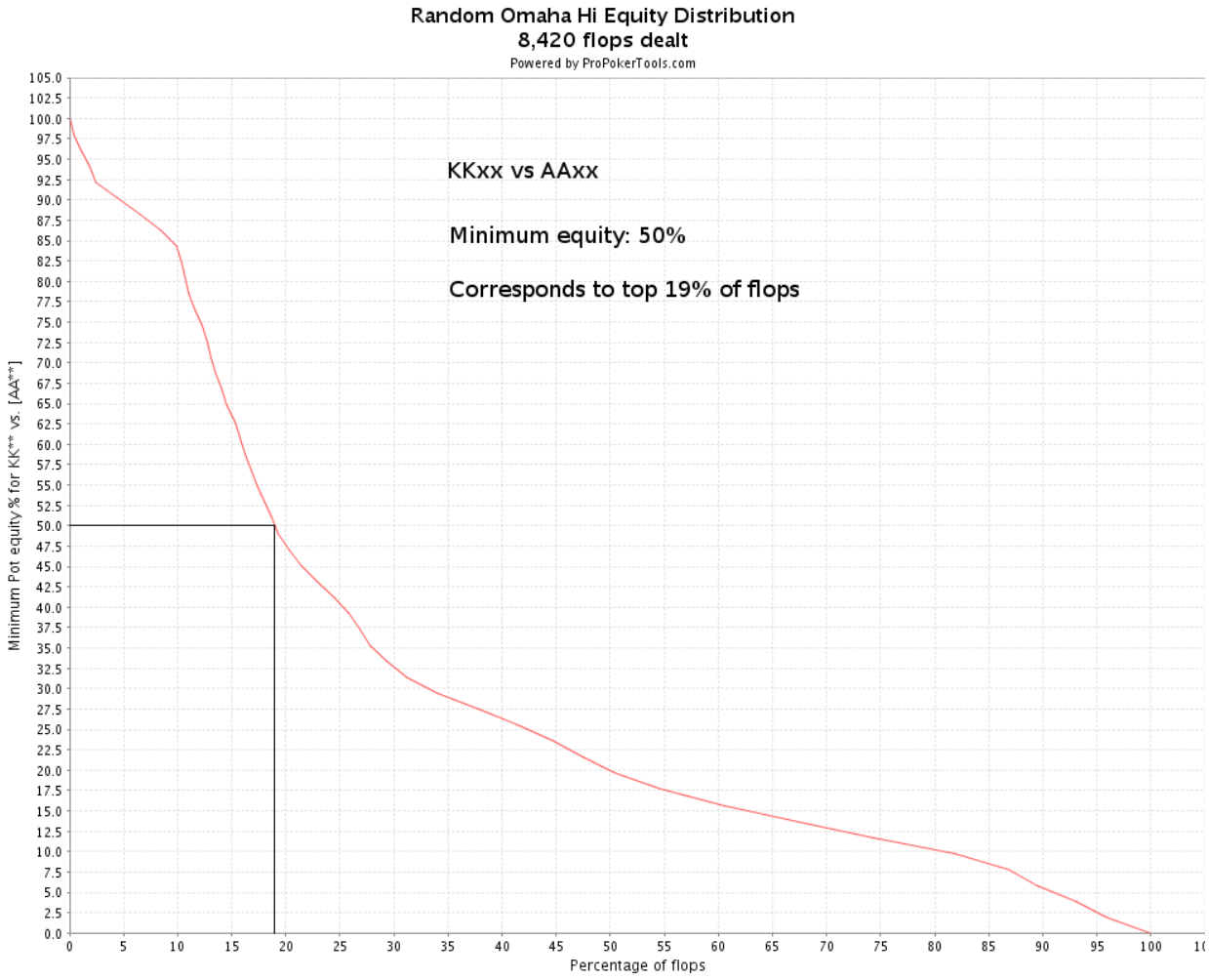
So what is this graph telling us? Simply put, it tells us how often KKxx has a certain minimum flop equity against AAxx (more about this in a moment). Furthermore, the total equity for KKxx vs AAxx equals the *total area under the curve* between 0 and 100% as shown below:




We will now formulate a series of questions and find their answers in order to illustrate how we will be using flop equity distributions in this article.

## 2.1 How often do we have at least x% equity on the flop?

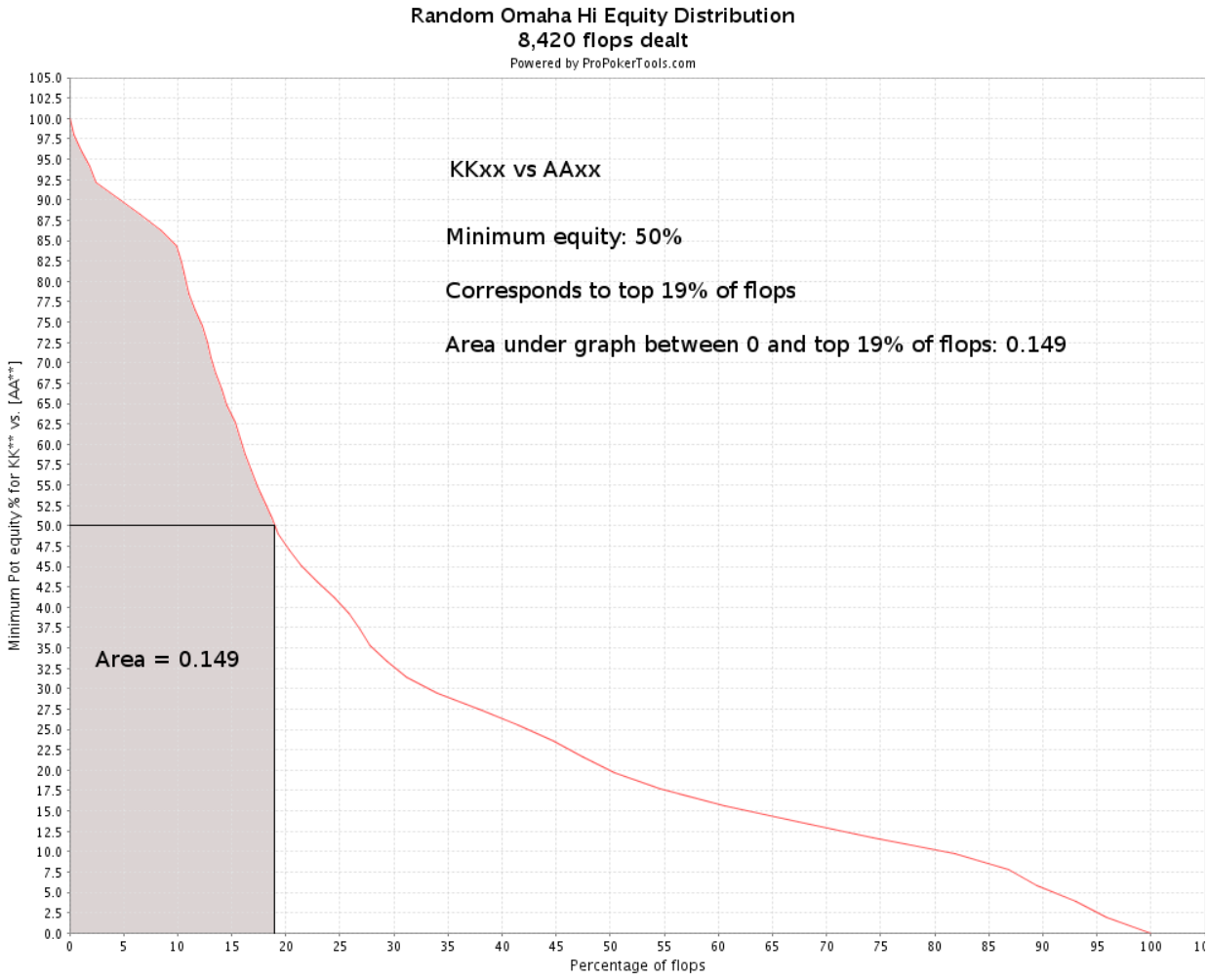
For example, we can ask: *How often does KKxx have at least 50% equity against AAxx?* We find the answer by looking at the graph and finding the point where the graph has the value 50%, as shown below:




We see that KKxx has minimum 50% equity on the top 19% of flops.

## 2.2 What is the total equity on top x% of flops?

For example, how much of the total equity that KKxx has against AAxx can be found between 0 and top 19% of flops? This is equivalent to finding the area below the graph between 0 and top 19% of flops, as shown below (the colored area under the curve):




The answer is that we have 0.149 = 14.9% total equity on the top 19% of flops, which is roughly half of our total 30.16% equity (we can verify this manually by recognizing that the colored area makes up about half of the total area under the graph).

We shall soon see why this number is useful for is, but first: How do we compute this area? ProPokerTools does not give us this number directly, and to compute it we have to resort to a mathematical technique called *numerical integration*.

I'm assuming the details of numerical integration will be a bit too technical for the majority of the readers, so I have put this material in an Appendix. Those who want to see how the calculations are done can read the Appendix and then return here. The rest can move on to the final question:

## 2.3 What is our average equity on the top x% of flops?

We have established that KKxx has minimum 50% equity against AAxx on the top 19% of flops, and that the top 19% of flops contains 14.9% equity in total. The next thing we want to know is: What is our *average equity* on the top 19% of flops? All flops in this region give us at least 50% equity, but how much equity do we have on average when we hit one of them?

The answer is simple:

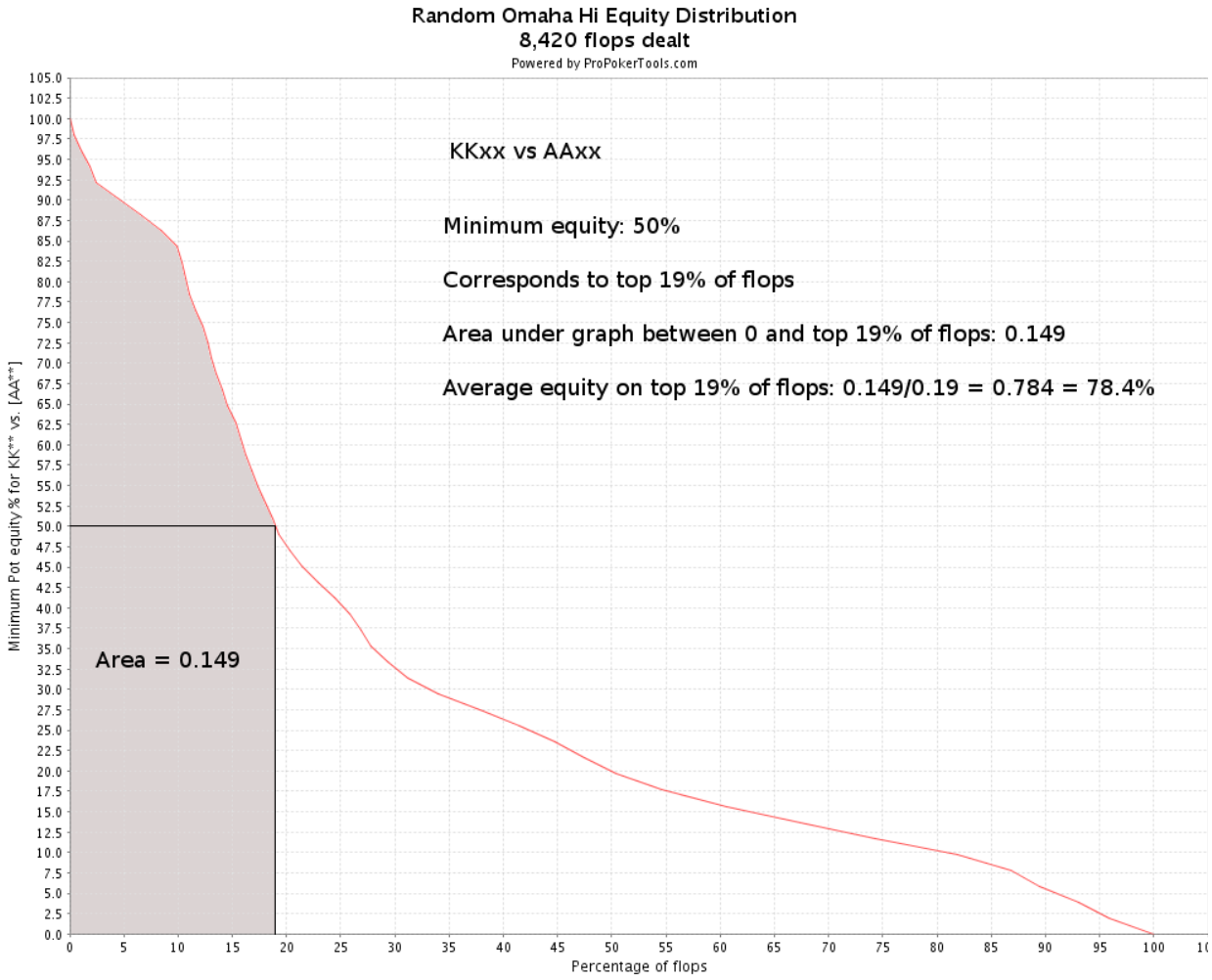
The average equity on top x% of flops equals the total amount of equity that lies in this region (which is equal to the area under the curve in this region) divided by the width of the region (which is x).

So our average equity on the top 19% of flops for KKxx vs AAxx is equal to the area under the curve between 0 and top

19% of flops (which is 0.149) divided by the width of the region (which is 0.19 - 0 = 0.19):

Average equity
= 0.149/0.190
= 0.784
= 78.4%

This is also summarized on the graph below, and from here on we will use notation on this graph on all future graphs where we compute average equity on top x% of flops.




## 2.4 Summary of the interpretation of data from flop equity distributions

We started with an example, KKxx vs AAxx, and learned how to read from the graph the top x% of flops where we have some minimum equity. For example, KKxx has minimumm 50% equity against AAxx on the top 19% of flops.

Then we asked what the total amount of equity was on the top x% of flops. We learned that this was equivalent to finding the area under the flop equity distribution curve between 0 and x% of flops. For example, we found that we had a total amount of equity of 14.9% on the top 19% of flops for KKxx vs AAxx.

Finally, we asked what our average equity was on the top x% of flops. For example, we found that KKxx has 78.4% average equity against AAxx on the top 19% of flops.

So KKxx has minimum 50% equity against AAxx on the top 19% of flops, and the average equity on the top 19% of flops is 78.4%.

This is a calculation we will be using repeatedly throughout this article when studying the playability of various starting hands. So make sure you know what these numbers mean before you move on. For the rest of the article I will simply be presenting these results without detailed calculation, but I wll include graphs where all the numerical data are written down, so that you can verify the calculations if you want to.

## 3. Modelling the Playability of Various Starting Hands Against AAxx

To practice using flop equity distribution data in strategic modelling, we will now do a simple study of the playability of 3 different types of PLO starting hands against AAxx. We will use a simple model where we assume that our opponent is totally committed with AAxx and that he will bet and raise at any opportunity until we are all-in.

The purpose of this study is:

- To learn about the playability of various PLO starting hands as a function of pot size
- To learn about the relation between flop equity distributions and playability
- To learn specifically about playing AAxx and playing against AAxx
- To learn how to use flop equity distributions in strategic modelling

### 3.1 Description of the model

We will study the playability of the following 3 starting hands against AAxx:

- 9♠ 8♥ 7♠ 6♥ (double-suited perfect rundown)
- A♠ K♥ Q♠ T♦ (single-suited Broadway wrap)
- K♠ K♥ 7♦ 2♣ (KK with worthless side cards)

We will let each of these hands meet AAxx in a raised pot, a 3-bet pot and a 4-bet pot with 100 BB starting stacks. Our opponent will be fully committed with AAxx, and he will bet and raise at every opportunity until we are all-in. For each case we will compute the EV of playing our hand from the moment we put the first chip into the pot preflop.

**Villain's strategy**
Villain's strategy is to bet and raise his AAxx hand at every opportunity until we are all-in.

**Our strategy**
We let 1, 2 or 3 pot-sized bets go into the pot preflop. Postflop we commit on the flop whenever we have the minimum equity necessary to do so. The minimum necessary equity is a function of our effective pot-odds for committing on the flop, which is given in the description for each scenario below.

Note that our model makes less sense when the preflop pot is small. Our strategy is to wait for flops good enough to commit fully on, and then we commit all our chips on the flop (meaning there is never any turn or river play). Strictly speaking this strategy only makes sense when there is only 1 or 2 bets left in the stack on the flop, so that we're in a commit-or-fold scenario.

But the purpose of this study is to investigate how different types of starting hands play against AAxx within the framework of a simple model, and we're not trying to model optimal postflop play. So even though our model is not completely realistic for small pots, it's good enough for our purpose.

The 3 scenarios we will study for each hand are:

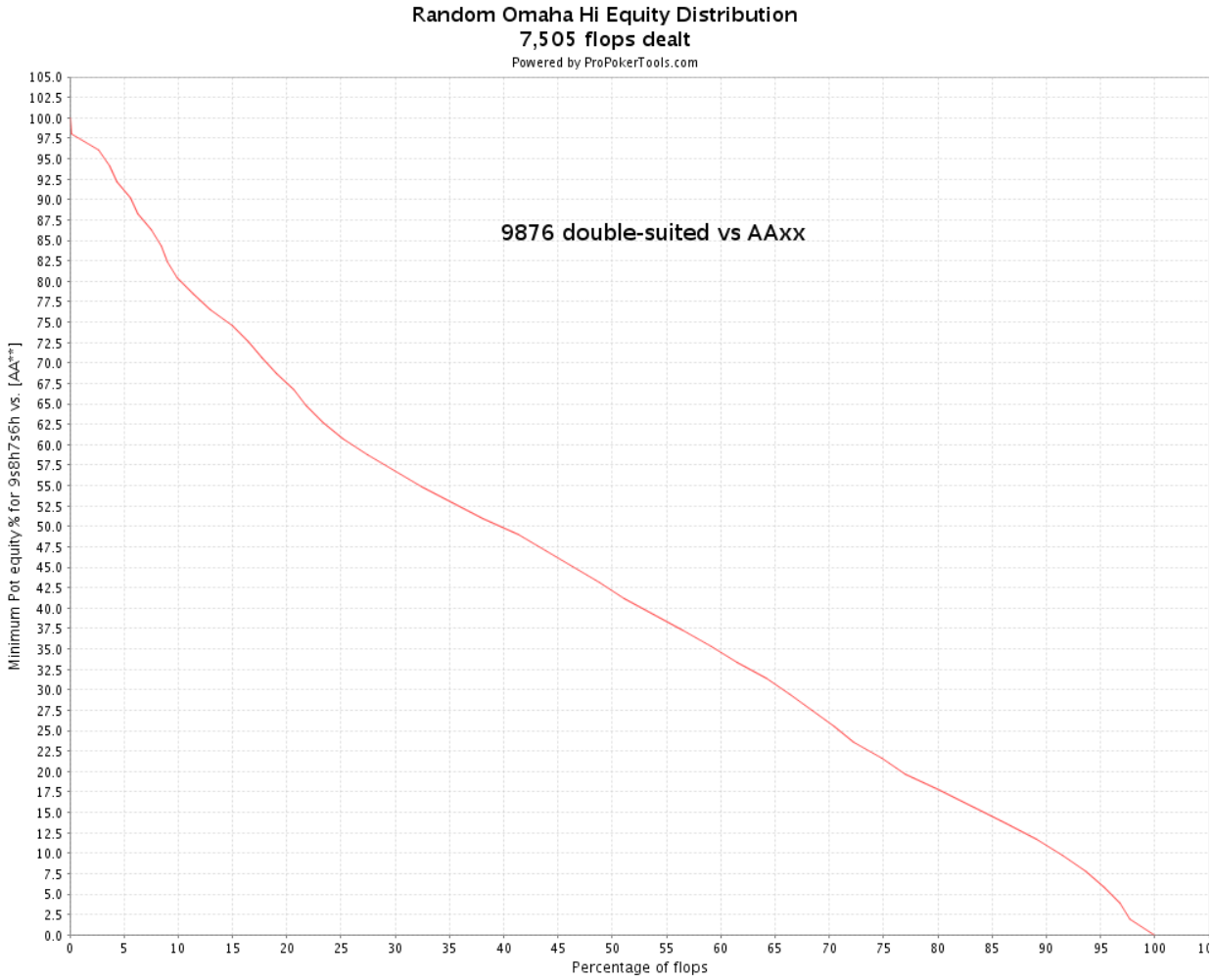
**Raised pot**
- Villain raises pot (3.5 BB), we call.
- Pot on the flop: 8.5 BB
- Stack on the flop: 96.5 BB
- Effective pot-odds for commiting on the flop: (8.5 + 96.5) : 96.5 = 1.09 : 1
- Minimum equity for committing on the flop: 1/(1.09 + 1) = 0.48 = 48%

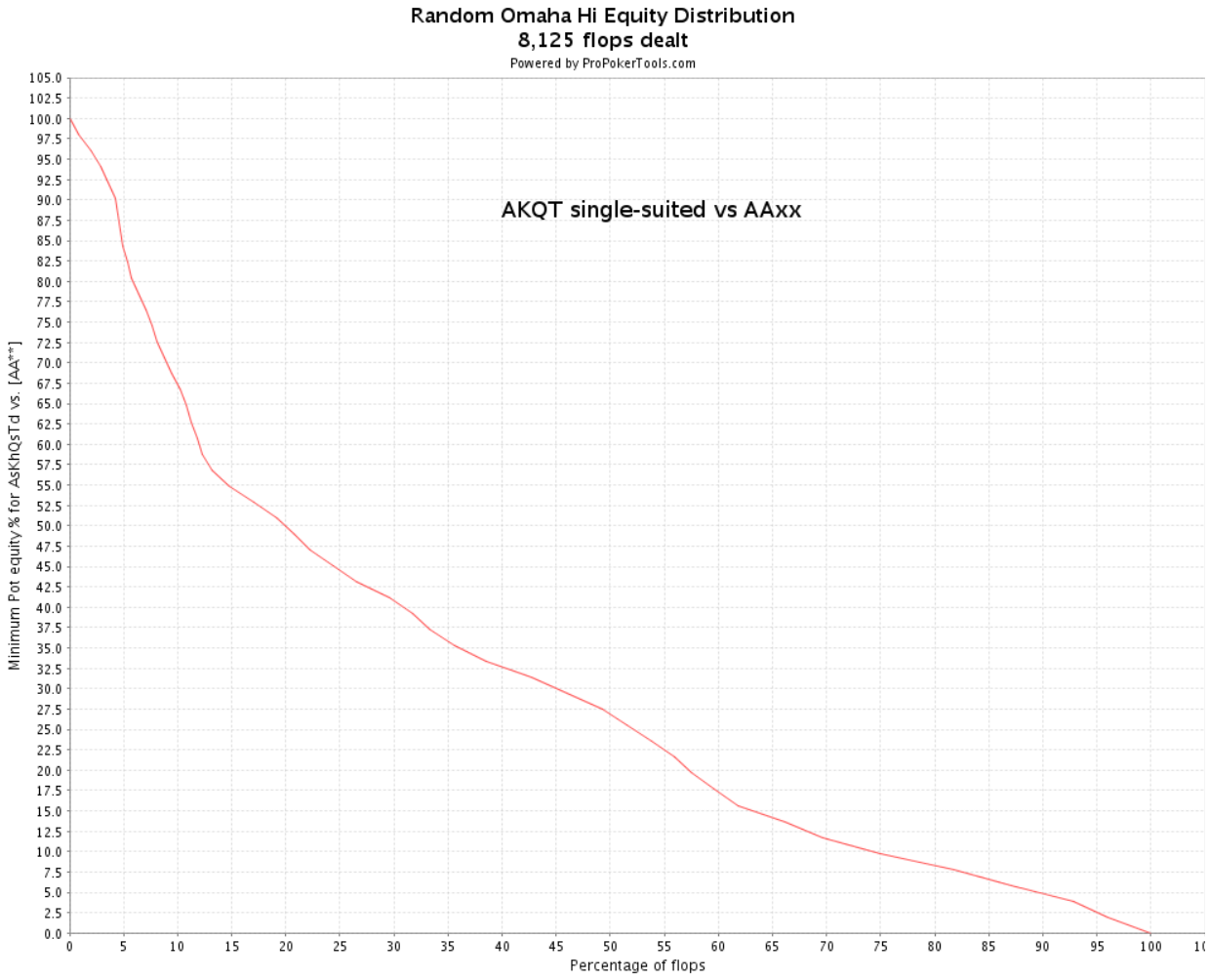
**3-bet pot**
- We raise pot (3.5 BB), Villain 3-bets pot (12 BB), we call
- Pot on the flop: 25.5 BB
- Stack on the flop: 88 BB
- Effective pot-odds for commiting on the flop: (25.5 + 88) : 88 = 1.29 : 1

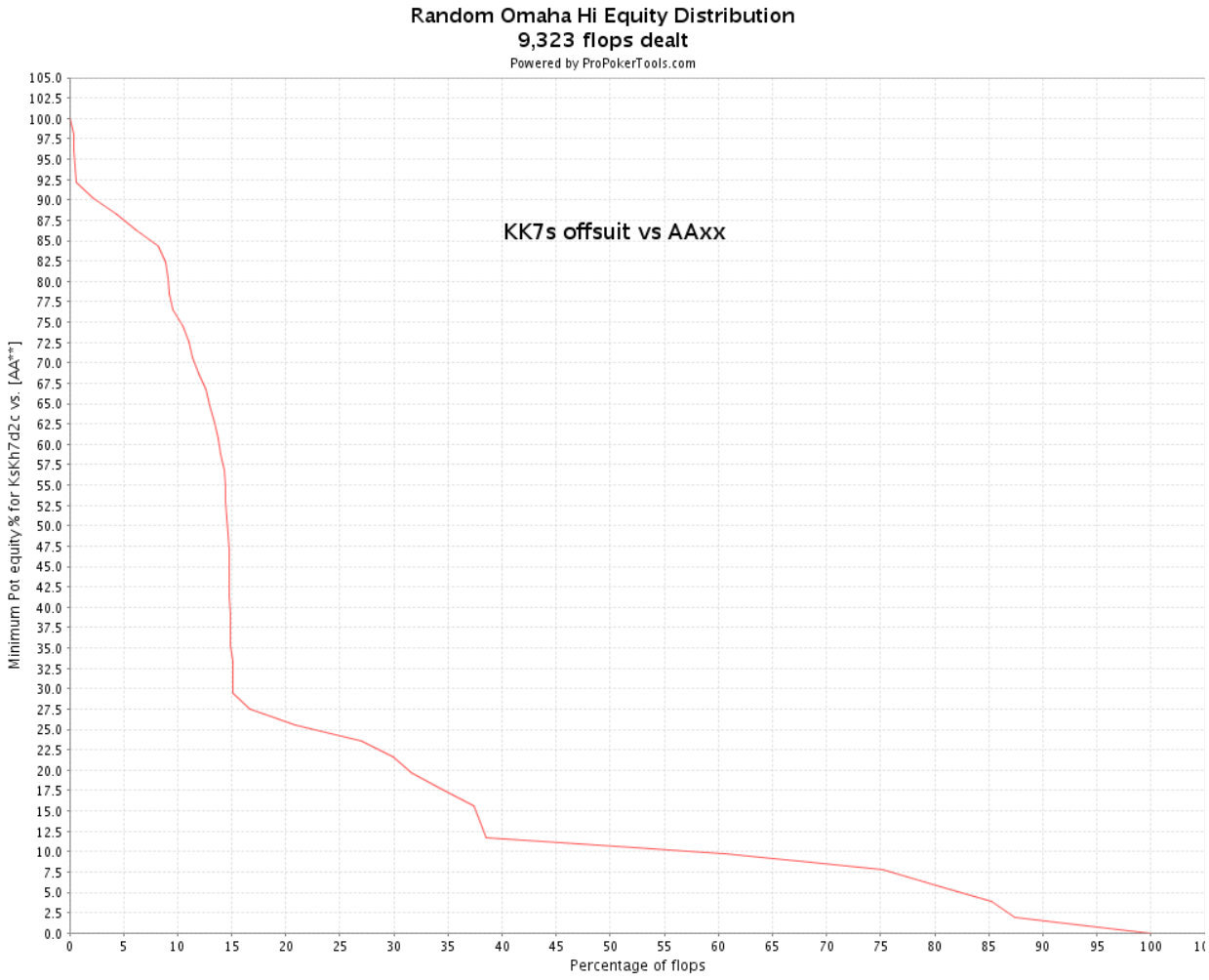
- Minimum equity for committing on the flop: 1/(1.29 + 1) = 0.44 = 44%

**4-bet pot**
- Villain raises pot (3.5 BB), we 3-bet pot (12 BB), Villain 4-bets pot (37.5 BB), we call
- Pot on the flop: 76.5 BB
- Stack on the flop: 62.5 BB
- Effective pot-odds for commiting on the flop: (76.5 + 62.5) : 62.5 = 2.22 : 1
- Minimum equity for committing on the flop: 1/(2.22 + 1) = 0.31 = 31%

**Calculating EV**
We will be using the mathematical techniques we introduced in the discussion of flop equity distributions previously in this article. We start by running over toProPokerTools.com to compute the flop equity distribution graphs for each hand matchup:




Random Omaha Hi Equity Distribution
8,125 flops dealt
Powered by ProPokerTools.com
AKQT single-suited vs AAxx
Minimum Pot equity % for AsKhQsTd vs. [AA**]
Percentage of flops




For each scenario we know the minimum flop equity we need to commit on the flop (we computed these in the description of each scenario above), so we start by asking: *On what top x% of flops do we have the minimum equity or better?* The answer is *top x%* for some value of x that we read from the graph.

Then we ask: *What is the total amount of equity for our hand (e.g. the area under the curve) on the top x% of flops?* We compute this number using numerical integration as described in the Appendix.

Finally, we ask: *What's our average equity on the top x% of flops?* And we compute this number as previously described (total equity on top x% of flops divided by x).

We now have all the data necessary for computing our EV for playing out the scenario. The EV equation is:

```
EV = (1 - top_x)(-pf_bb) + top_x[av_equity(201.5) - 100>
```

where

- top_x = the top x% of flops with the minimum equity for committing
- pf_bb = the number of big blinds that goes into the pot preflop
- av_equity = our average equity on the top x% of flops

The interpretation of the EV equation goes like this:

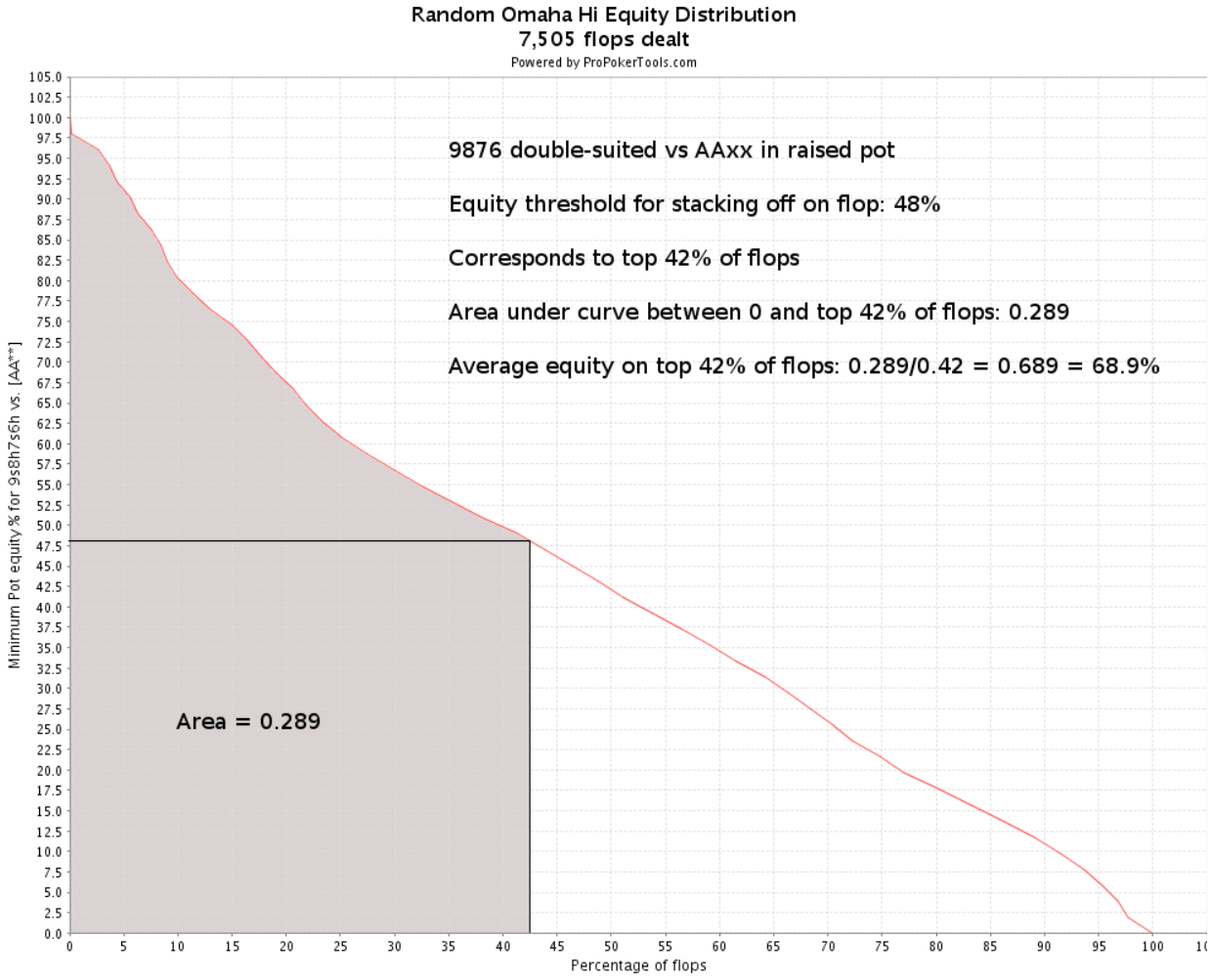
There's a (*1 - top_x*) probability we will have to to check-fold the flop and lose our preflop investment *pf_bb*. The probability

of hitting the flop well enough to commit is *top_x*, and in this case we have an average equity of *av_equity* in a 201.5 BB pot (our stack + Villains stack + the blinds) where we risk a total of 100 BB.

Now over to the simulations. For each scenario we include a graph with all the necessary numerical data written down (click on the graph to open it in full size in a separate browser window), and then we plug the numbers into the EV equation and compute our EV for the scenario. For each hand we find our EV in a raised, 3-bet and 4-bet pot. Finally, we do a summary where we draw conclusions about how the hand plays against AAxx as a function of pot size.

## 3.2 9♠ 8♥ 7♠ 6♥ vs AAxx

**Raised pot**



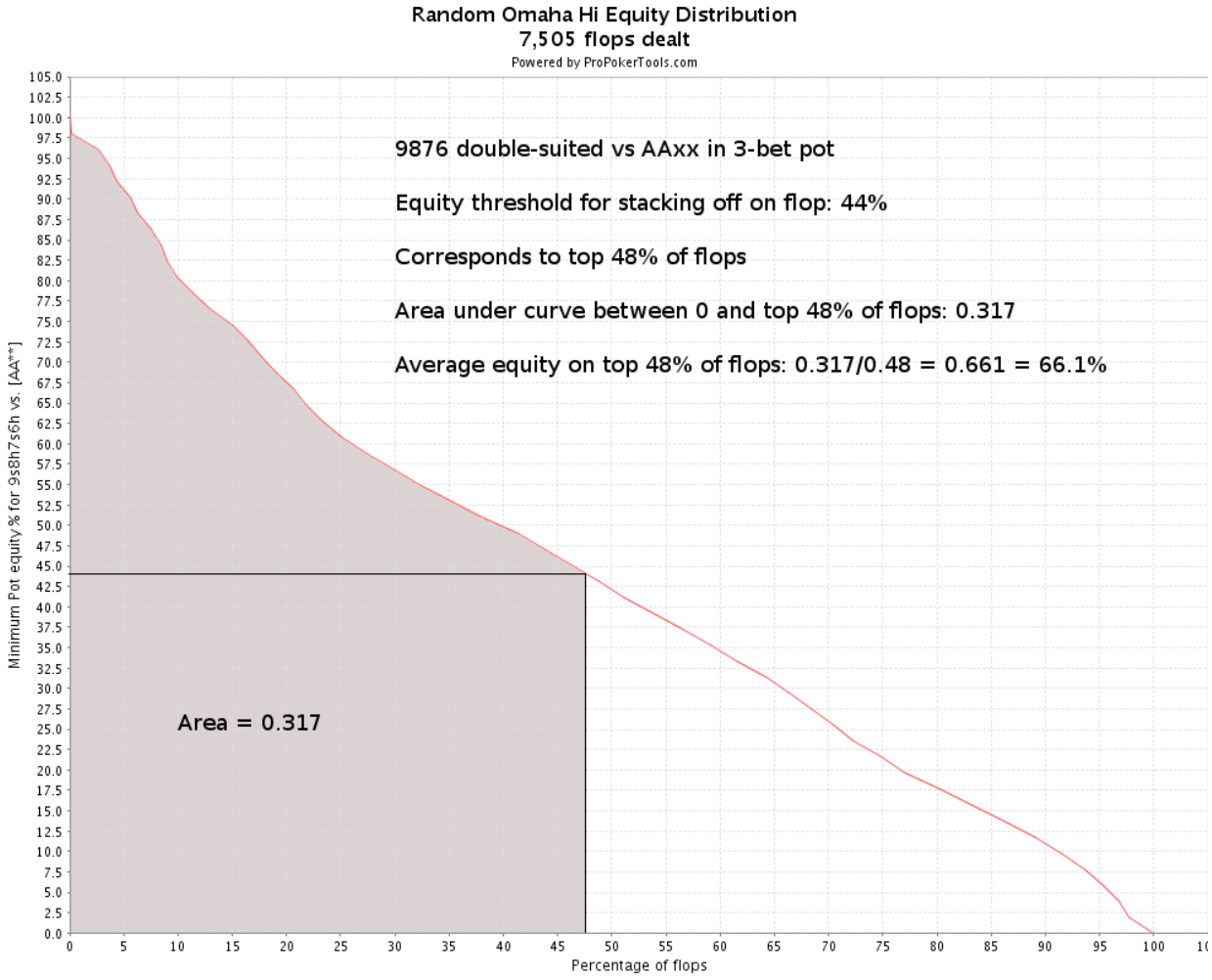

```
top_x = 42%

pf_bb = 3.5

av_equity = 68.9%


EV = (1 - 0.42)(-3.5) + 0.42[0.689(201.5) - 100> = +14.28 BB
```

**3-bet pot**



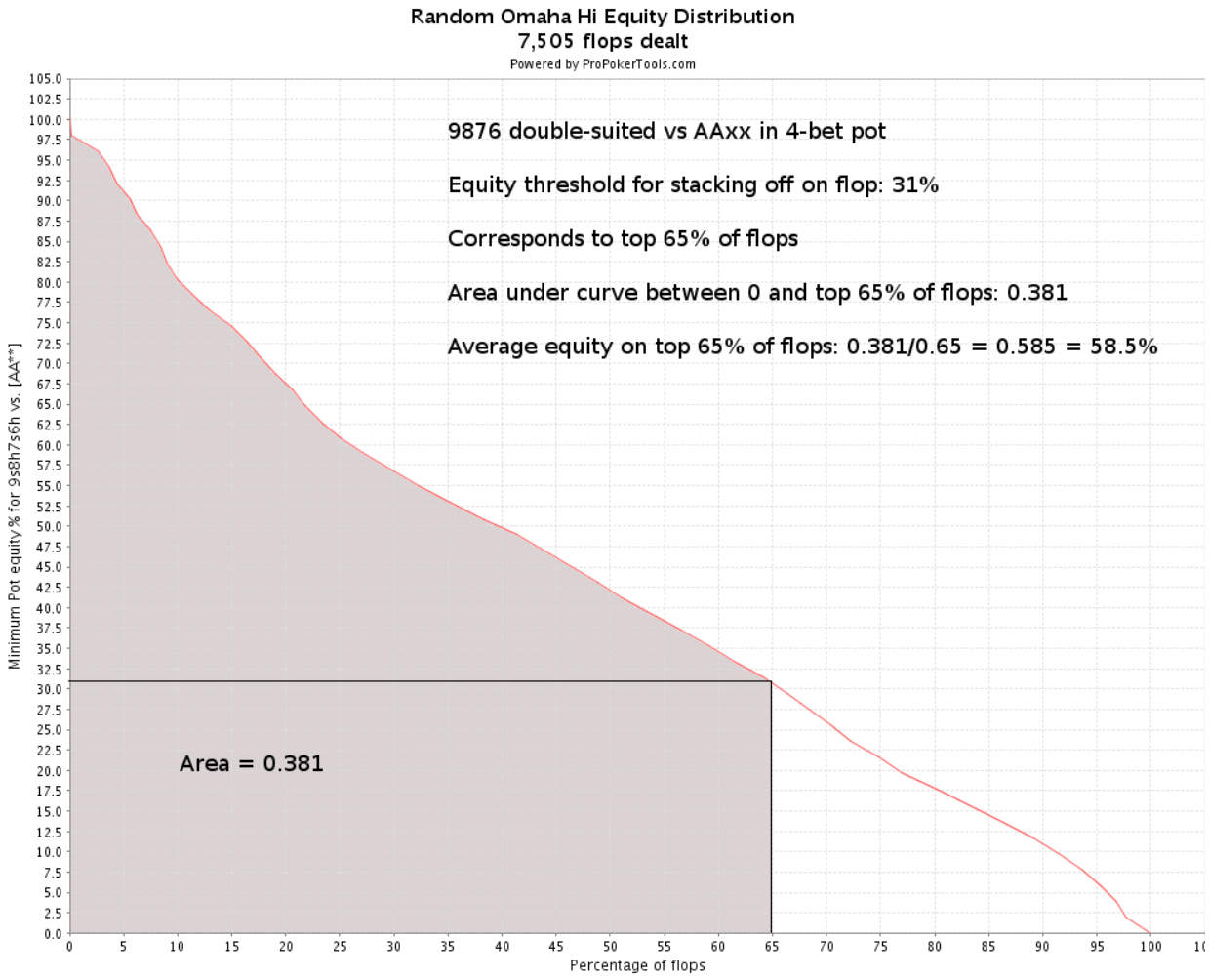

top_x = 48%

pf_bb = 12

av_equity = 66.1%

EV = (1 - 0.48)(-12) + 0.48[0.661(201.5) - 100> = +9.66 BB

**4-bet pot**




```
top_x = 65%

pf_bb = 37.5

av_equity = 58.5%


EV = (1 - 0.65)(-37.5) + 0.65[0.585(201.5) - 100> = -1.46 BB
```

**Summary for 9♠ 8♥ 7♠ 6♥ vs AAxx**

EV (raised pot): +14.28 BB
EV (3-bet pot): +9.66 BB
EV (4-bet pot): -1.46 BB

Before looking at the EV results, we can note that 9♠ 8♥ 7♠ 6♥ has a very smooth flop equity distribution curve with the equity evenly distributed over a wide range of flops.

This kind of curve indicates a hand that often hits the flop fairly well, which is what double-suited quality rundown hands like 9♠ 8♥ 7♠ 6♥ do. We will often flop some combination of made hand + draw that is good enough to continue.

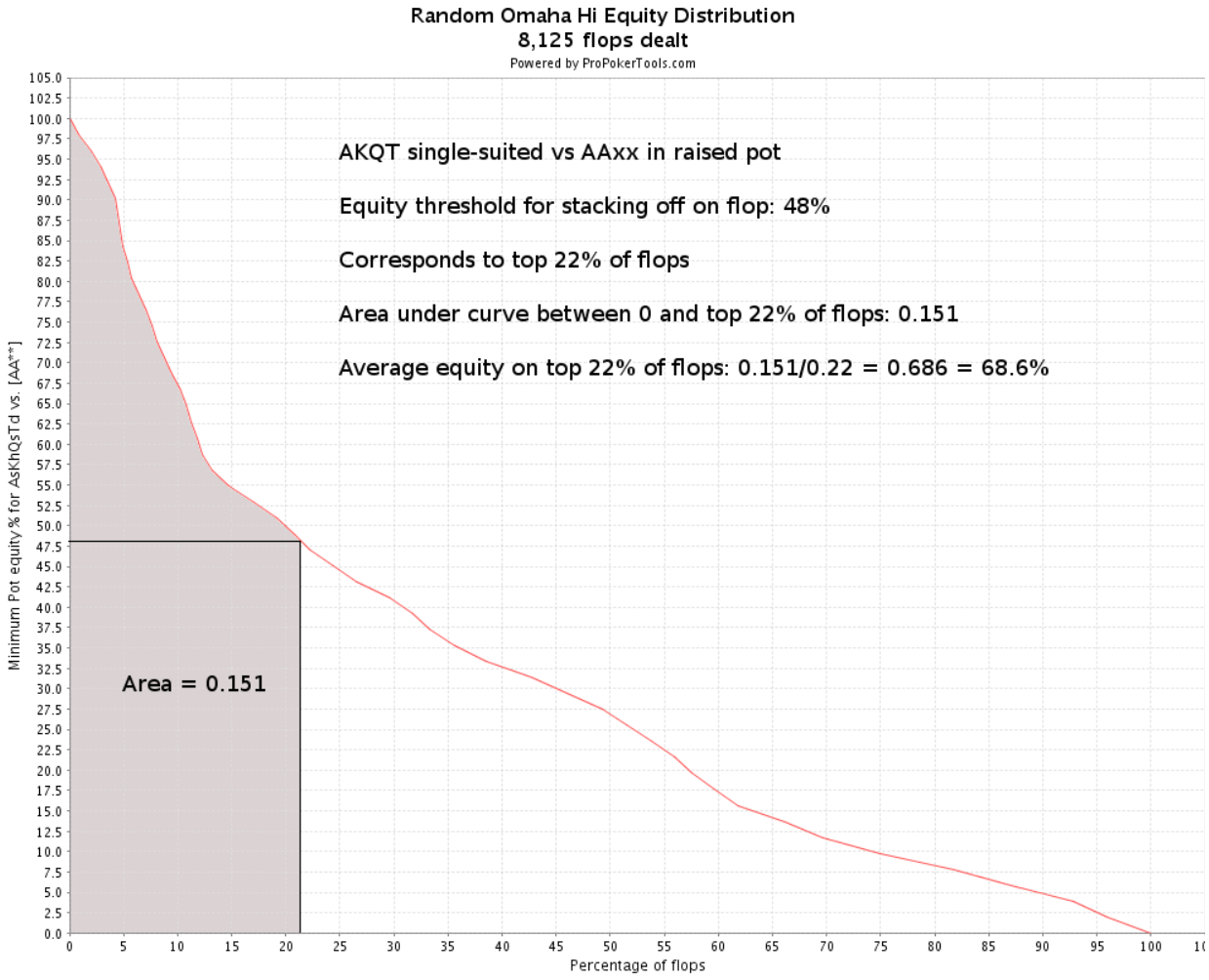
The smooth equity distribution of 9♠ 8♥ 7♠ 6♥ means the hand plays well in big pots against AAxx, simply because we often hit the flop hard enough to commit on the flop and get a return on our preflop investment.

9♠ 8♥ 7♠ 6♥ plays well in raised and 3-bet pots, and we have to go all the way to a 4-bet pot where 37.5% of the stack goes in preflop before the hand becomes unprofitable to play within the framework of our model (and even in this case we're barely below break even)

We will return to the topic of playing quality rundown hands against AAxx in Part 4, but at this point we clearly see why quality rundowns are good 3-betting hands. They play well in big pots, and even if we run into AAxx it's not the end of the world.

## 3.3 A♠ K♥ Q♠ T♦ vs AAxx

**Raised pot**



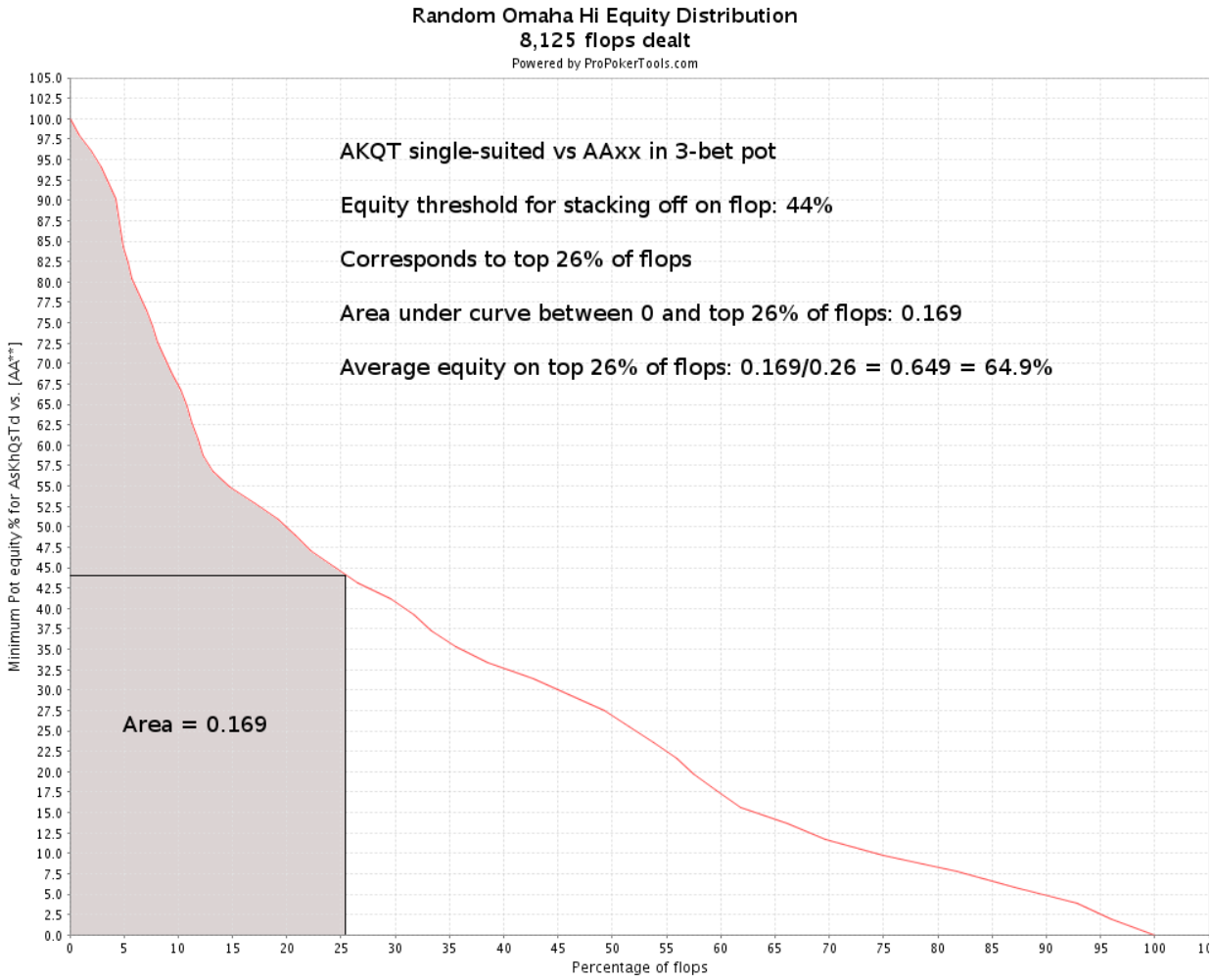

```
top_x = 22%
```

pf_bb = 3.5

av_equity = 68.6%

EV = (1 - 0.22)(-3.5) + 0.22[0.686(201.5) - 100> = +5.67 BB

**3-bet pot**



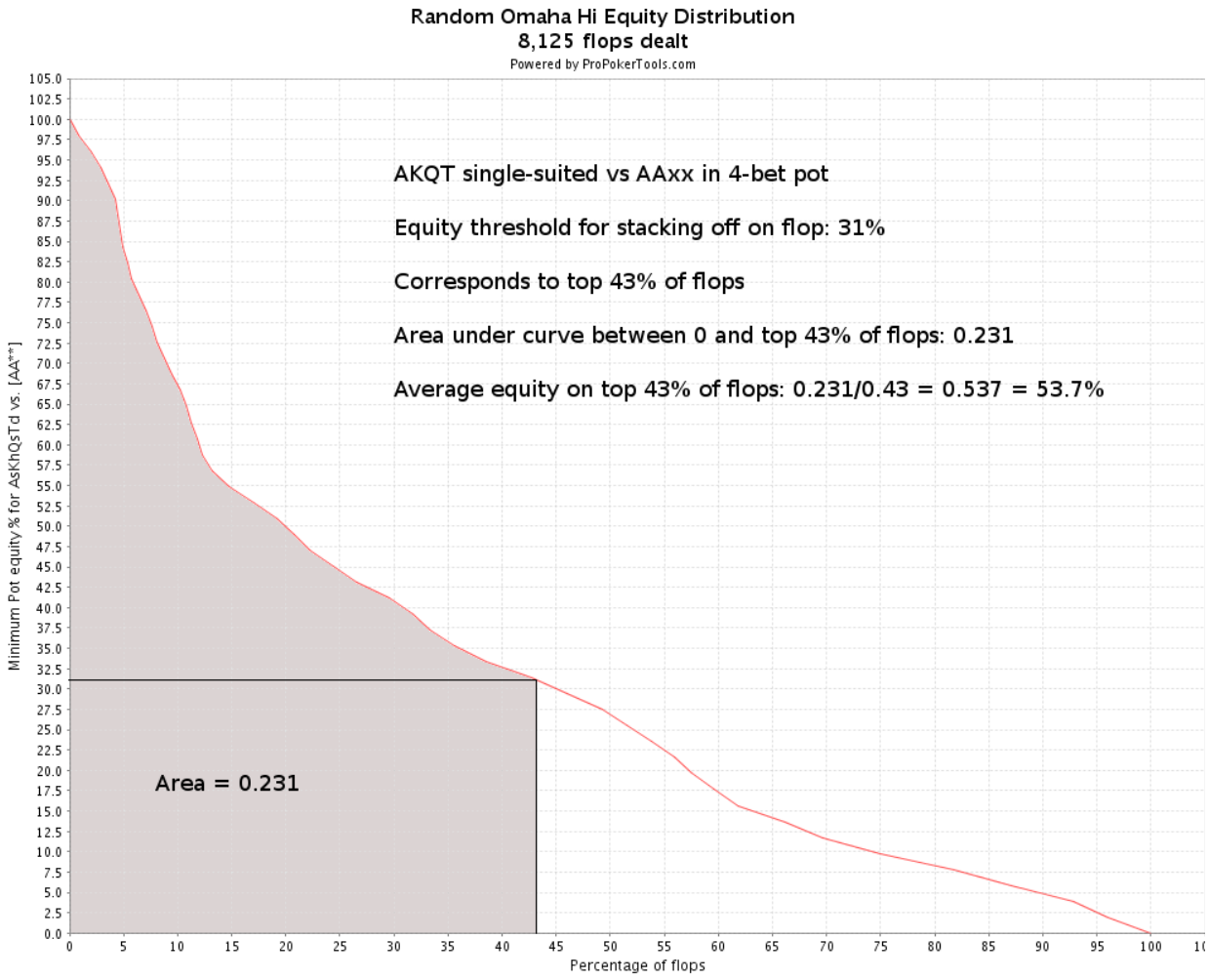

top_x = 26%

pf_bb = 12

av_equity = 64.9%

EV = (1 - 0.26)(-12) + 0.26[0.649(201.5) - 100> = -0.90 BB

**4-bet pot**




```
top_x = 43%

pf_bb = 37.5

av_equity = 53.7%


EV = (1 - 0.43)(-37.5) + 0.43[0.537(201.5) - 100> = -17.88 BB
```

**Summary for A♠ K♥ Q♠ T♦ vs AAxx**

EV (raised pot): +5.67 BB
EV (3-bet pot): -0.90 BB
EV (4-bet pot): -17.88 BB

A♠ K♥ Q♠ T♦ has a fairly smooth flop equity distribution curve, but compared to 9♠ 8♥ 7♠ 6♥ more of the eqity is "crammed together" on fewer flops (to the left of the curve). So A♠ K♥ Q♠ T♦ is more of an "either-or" hand than 9♠ 8♥ 7♠ 6♥.

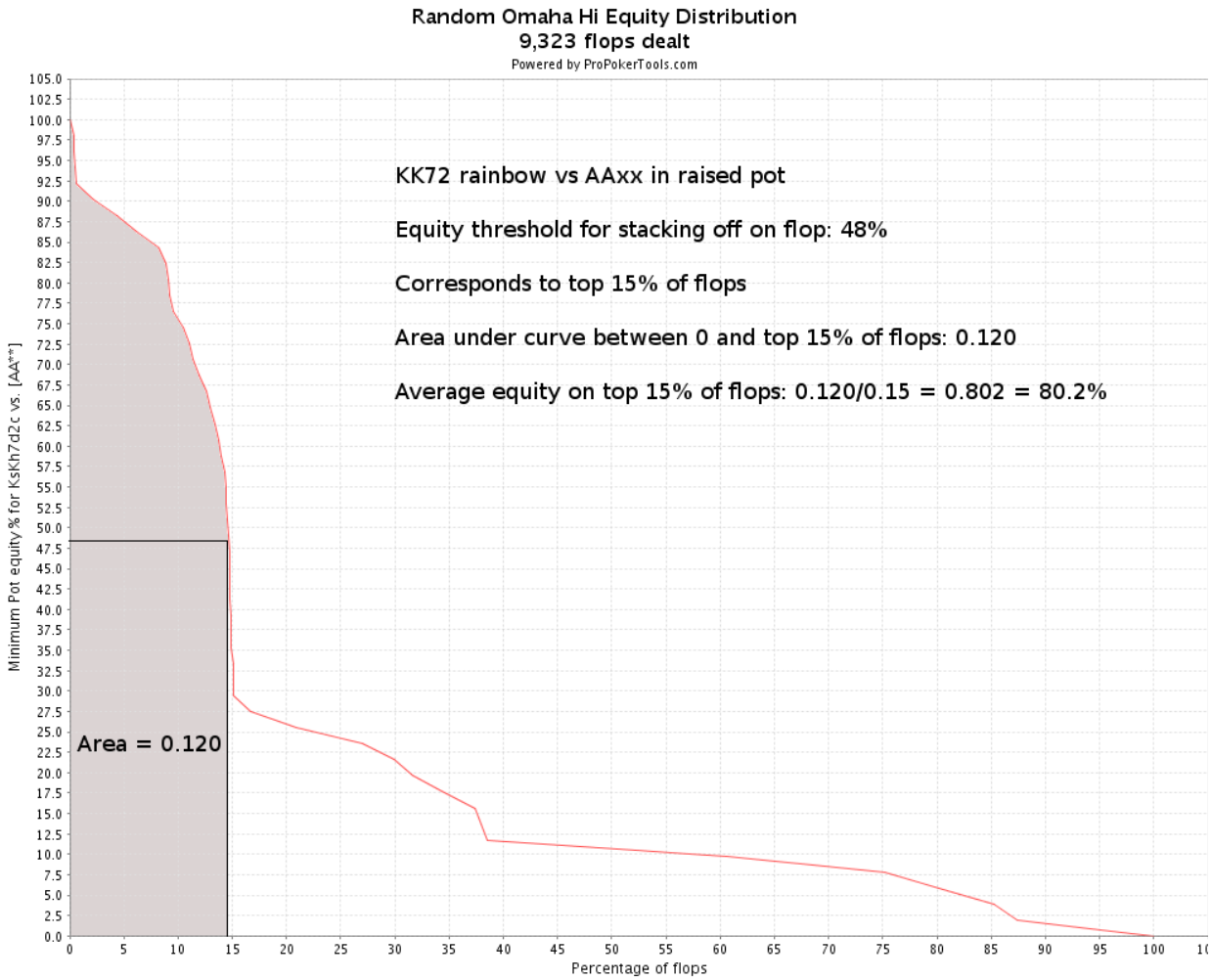
This hand plays fairly well against AAxx in a raised pot, but we run into problems when the pot grows big. The reason for this is that we're effectively playing a "dangler hand" with only 3 playable cards when we're up against AAxx, since the ace on our hand does not do much for us in this case.

The "dangler" in our hand makes it harder to hit flops well enough to continue postflop, and this has consequences as the preflop pot grows bigger. The more chips we put into the pot preflop, the more important it is to hit a lot of flops, so that we won't have to check-fold often and lose our preflop investment. This problem becomes very clear in a 4-bet pot where we lose 18 BB.

From this we can draw an important conclusion: When we're playing an ace high Broadway wrap (4 Broadway cards headed by an ace) and get 4-bet preflop, we have to fold with a 100 BB stack if we suspect we're up against AAxx. To call, we need to be playing much deeper stacks, so that the AAxx hand can not simply push the last pot-sized bet all-in on any flop and be done with the hand. Our hand simply doesn't hit enough flops hard enough to make it profitable for us to call the 4-bet against AAxx in the hands of an opponent who will put in the last bet on any flop.

## 3.4 K♠ K♥ 7♦ 2♣ vs AAxx

**Raised pot**



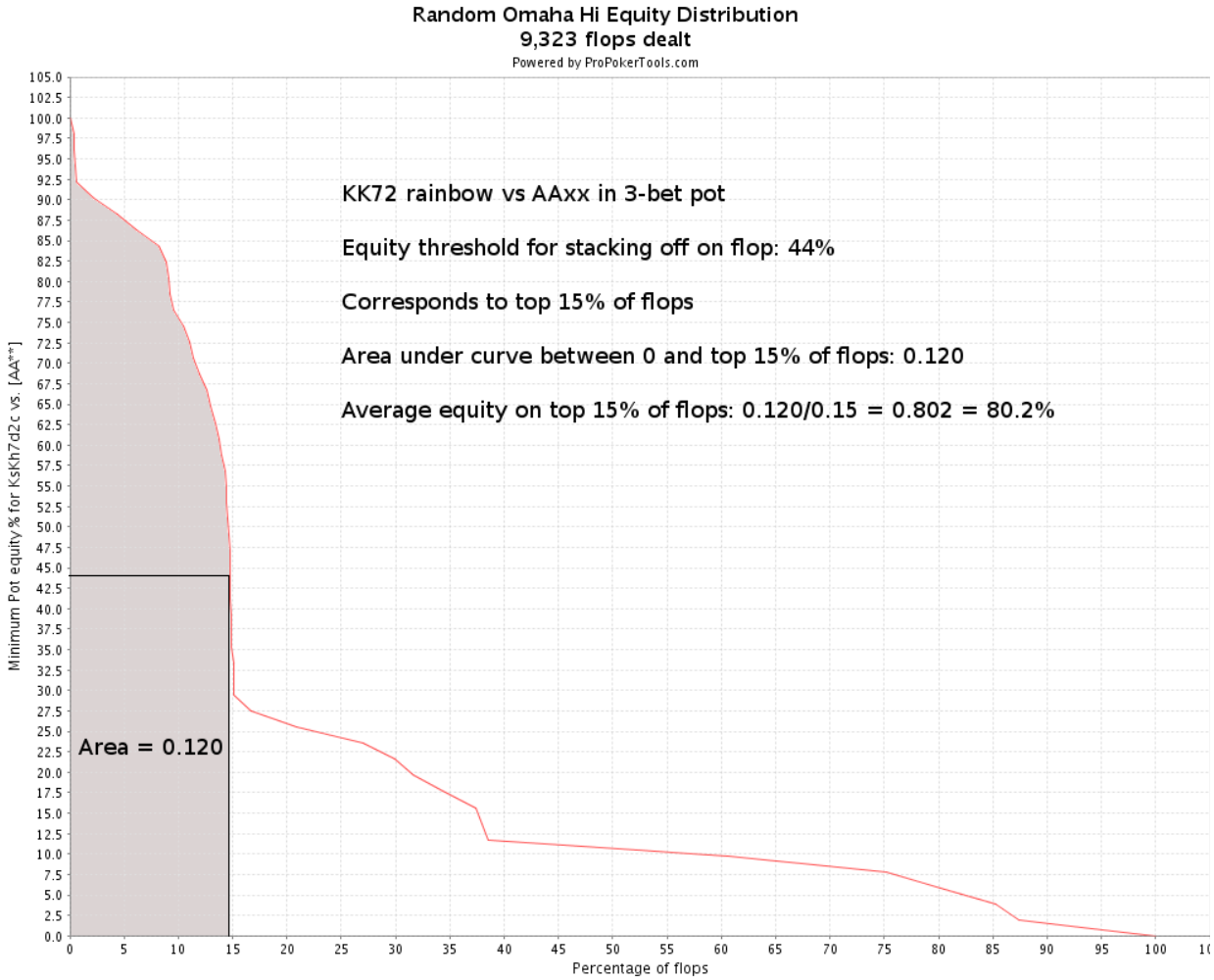
top_x = 15%

pf_bb = 3.5

av_equity = 80.2%

EV = (1 - 0.15)(-3.5) + 0.15[0.802(201.5) - 100> = +6.26 BB

**3-bet pot**



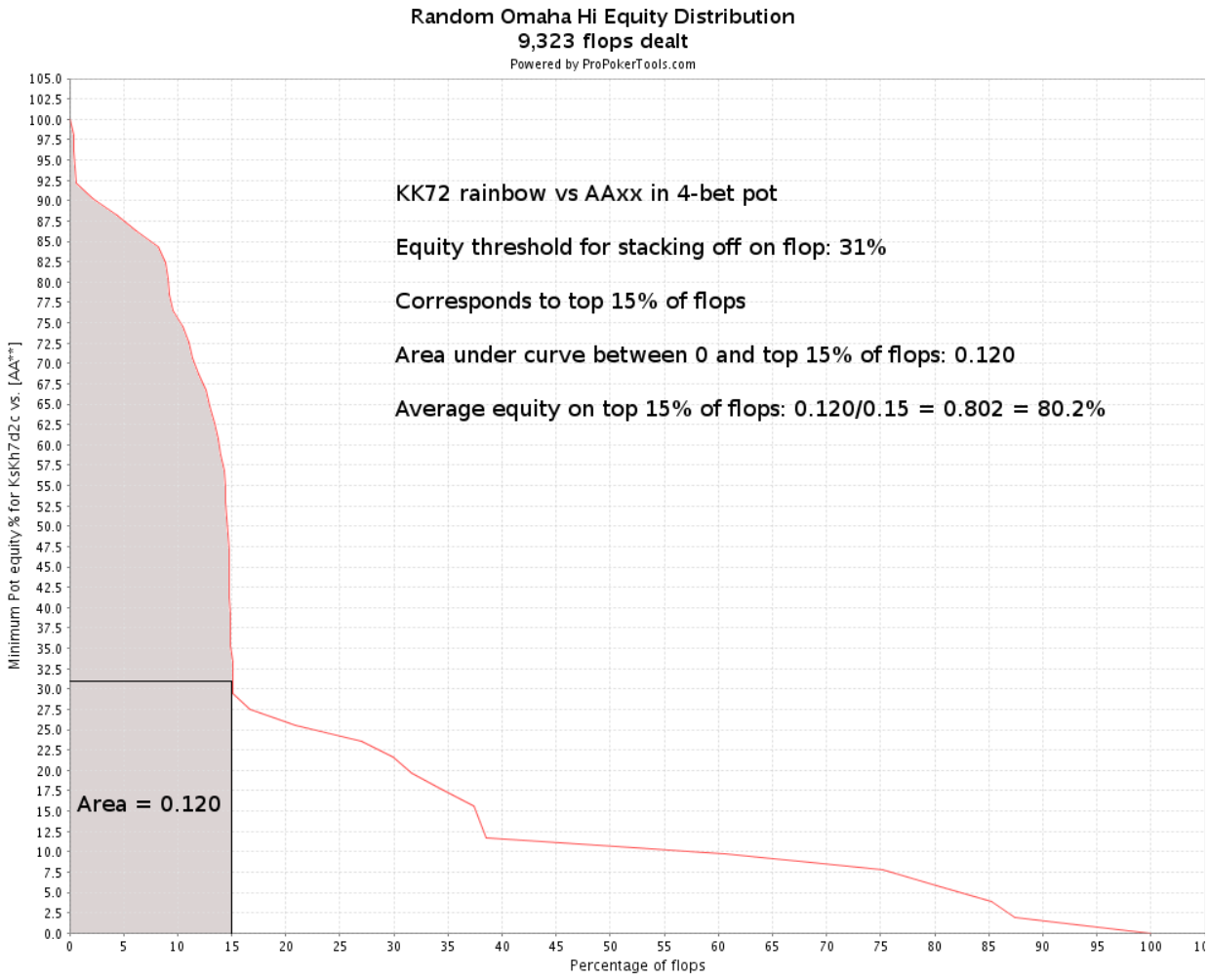

top_x = 15%

pf_bb = 12

av_equity = 80.2%

EV = (1 - 0.15)(-12) + 0.15[0.802(201.5) - 100> = -1.04 BB

**4-bet pot**




```
top_x = 15%

pf_bb = 37.5

av_equity = 80.2%


EV = (1 - 0.15)(-37.5) + 0.15[0.802(201.5) - 100> = -22.93 BB
```

**Summary for K♠ K♥ 7♦ 2♣ vs AAxx**

EV (raised pot): +6.26 BB
EV (3-bet pot): -1.04 BB
EV (4-bet pot): -22.93 BB

K♠ K♥ 7♦ 2♣ has a very "polarized" flop equity distribution curve with most of the equity "crammed together" on a small number of flops. These are mostly the flops where we hit top set, plus the flops where we hit two pair, trips of better with the side cards.

This has two immediate consequences:

- There are few flops where we will be able to commit
- But when we *can* commit, we will have very good equity

So K♠ K♥ 7♦ 2♣ is a hand that plays better in small pots where we have good implied odds. When the pot grows, our problem is that we won't find enough flops to commit on, and having to check-fold most of the flops will hurt us more and more (if you study the graphs you will see that we commit on top 15% of flops in all cases, which means that we don't find any more flops to commit on as we move from a raised pot to a 4-bet pot).

The problem becomes extremely clear in a 4-bet pot where we lose 23 BB. We also lose in a 3-bet pot, but only barely (note that within the framework of our model we have excellent implied odds for set-mining against AAxx, since our opponent will always pay us off when we flop top set).

### 3.5 Summary of our model study of starting hand playability against AAxx

Our main conclusions from the model study were:

- 9♠ 8♥ 7♠ 6♥ plays well against AAxx in raised and 3-bet pots, and is a slight loser in a 4-bet pot
- A♠ K♥ Q♠ T♦ og K♠ K♥ 7♦ 2♣ play well against AAxx in raised pots, are slight losers in 3-bet pots, and are big losers in 4-bet pots.

When drawing conclusions it's important to keep in mind that we have been working with a *model* of reality, not reality itself. In particular, it's important to keep in mind that we calculated EV from the point where the first chip went into the pot preflop. We started by assuming we would be playing against AAxx, so our EV is the EV for choosing to play the hand when we know that we will play it against AAxx in a raised, 3-bet or 4-bet pot.

But in practice we don't know this when the hand starts. For example, if we 3-bet a raiser with 9♠ 8♥ 7♠ 6♥, and we get 4-bet, this does not necessarily mean we will lose money by calling, even if we assume we're always up against AAxx. Because now we have to estimate our EV *from the point we're calling the 4-bet, assuming we're up against AAxx*, not from the point where we put the first chip into the pot (where our opponent will have a much wider range).

And then we have a profitable call with a lot of chips already in the pot, and a hand that is easy to play well in big pots postflop. Our model told us that choosing to play a 4-bet pot with 9♠ 8♥ 7♠ 6♥ against AAxx was a slightly losing play, but in practice we will profit from calling the 4-bet, planning to commit on the flops whenever we hit well enough. We will discuss this scenario in more detail in Part 4.

However, if we get 4-bet with A♠ K♥ Q♠ T♦ or K♠ K♥ 7♦ 2♣ we should fold with 100 BB stacks. These hands were big losers in 4-bet pots within our model, and they will also be losers if we calculate the EV from the point where we get 4-bet.

From the work done in this model study we can conclude that when we get involved in big heads-up pots, we prefer hands that hit a lot of flops fairly well, and not hands that hit a small number of flops hard. The latter category are implied odds hands, and they play much better when we keep the preflop pot small and preserve implied odds.

### 3.6 An important observation concerning the play of AAxx

We will end our model study with an observation concerning the play of AAxx in big pots, and this topic is important enough to warrant its own section:

*If you're playing a heads-up pot with a 100 BB stack and get the opportunity to 4-bet pot after a pot-sized raise and a pot-sized 3-bet, you can then push the remainder of your stack blindly all-in on any flop, and there is nothing your opponent can do to exploit it.*

The Villain in our model used this exact strategy, and we saw that all our hands lost against this strategy in a 4-bet pot, *even when we played perfectly against him* (remember that we committed perfectly on any flop where it was correct

for us to do so).

Even the premium hand 9♠ 8♥ 7♠ 6♥ was a loser in a 4-bet pot within the framework of our model, and *this is one of the hands that performs best against AAxx!* (The hands that perform best against AAxx are double-suited premium rundowns without gaps).

So we have tested the "4-bet and push any flop" strategy against one of the worst hands AAxx can be up against, and with perfect play to boot, and still Villain could push any flop blindly with his AAxx without losing money.

Based on this modely study we can therefore conclude:

*If you can get at least 1/3 of your starting stack into the pot preflop in a heads-up scenario (so that you have at most 1 pot-sized bet left in the stack on the flop), you can push all-in on any flop if you want to, and there is nothing your opponent can do to exploit it.*

For example, let's say you start with 100 BB and raise pot with A♥ A♦ 7♣ 2♥ out of position. Your opponent 3-bets pot, you 4-bet pot, and Villain calls. The flop comes hideous and coordinated T♠ 9♠ 8♣ and you're not sure if you want to push all-in.

You can push anyway. We have shown that pushing the last bet all-in on any flop can not hurt you. There may be a better way to play the hand, but pushing blindly all-in heads-up in a 4-bet pot with a 100 BB starting stack can not be exploited by your opponent.

This is a strategy most PLO players learn early (mostly by hearing about it, and then starting to use it), but now we have used hard methods to demonstrate *why* this is a viable strategy, and by doing so we have made this strategy "our own".

And this is an important point with regards to the modelling work we have done in Part 3. Our focus has been on *developing methods for doing interesting theoretical work* using flop equity distributions, and we have not tried to do new and interesting theoretical studies right off the bat. The conclusions drawn from our modelling work are well known to most experienced PLO players, but it's important to note that we reached these conclusions by employing a *method* and not by guessing, using intuition or relying on experience.

The gist of it is that if we have a method that can confirm results that are already known, then we have reason to believe that the method will be reliable also when we move into unchartered territory and explore the unknown. So the theoretical work in this article has given us a set of tools to be used in future work, and we take these tools with us and move on to Part 4.

## 4. Summary

In this article we started with a thorough study of flop equity distribution curves, and we learned how to extract useful data from them.

Then we did a modelling study where we used flop equity distributions to draw conclusions about the playability of various starting hand types against AAxx. As a result of this we also reached a useful and interesting conclusion concerning the play of AAxx in 4-bet heads-up pots.

The work done in this article was purely theoretical and rather "heavy", but I hope you found it interesting, and that you saw the value of building these theoretical tools for use in strategic modelling. We will use a "lighter" approach in Part 4, and my plan is to discuss concrete guidelines for 3-betting and 4-betting preflop, as well as isolation raising and overlimping. The theoretical tools we built in Part 3 will be included in our arsenal for future use, and we will probably use some of them in Part 4.

Good luck!
Bugs

# Part 4: Preflop Play III

## 1. Introduction

This is Part 4 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

In Part 4 we continue our discussion of principles for PLO preflop play. We will now delve deeper into some topics that we have barely mentioned so far:

- Loose openraising in position
- Playing speculative hands in position after limpers (overlimp or raise to isolate?)
- 3-betting

In Part 2 we first classified Omaha starting hands according to a system of 6 categories, based on structure. From these 6 categories we built another classification scheme with 4 starting hand categories, based on strength and playability (3 playable categories and 1 unplayable):

- Premium
- Speculative
- Marginal
- Trash

We also gave simple guidelines for how to play each of these 4 starting hands categories preflop.

In Part 4 we will extend our preflop core strategy by including more speculative hands in our late position openraising ranges, and by introducing 3-betting. We will also talk more about overlimping versus isolation raising behind limpers. A common theme that runs through this discussion is the connection between preflop play and postflop play. Different hand types are suited for different postflop scenarios, and this has a big impact on preflop strategy.

These topics will be carried over to Part 5, and the discussion of preflop strategy will be concluded there. Then we move on to postflop play, so let us briefly talk about the direction this article series will take from Part 5 and onwards. As we know, preflop play and postflop play are closely interrelated in PLO, and the main goal of our preflop strategy is to set ourselves up for profitable postflop scenarios. This relation is particularly important when we build big pots preflop. When we get involved in a 3-bet or 4-bet pot, it's necessary to have both a hand suitable for the situation and a sound game plan for postflop play.

The discussion of 3-betting/4-betting is therefore a natural transition point when the article series moves from preflop play to postflop play. We will discuss qualitative guidelines for 3-betting in this article (including an introduction to playing against a 4-bet from AAxx), and we will focus on preflop play. In Part 5 we will build on this theory, and do a more systematic and quantitative discussion of 3-betting/playing against a 3-bet/4-betting/playing against a 4-bet, and this time with focus on the postflop scenarios we set up.

This means Part 4 will be a core strategy article with sound qualitative guidelines for loose openraising in position, overlimping, isolation raising and 3-betting with focus on the preflop part of these scenarios. Part 5 will be more general and quantitative, with more thorough analysis based on ranges, equity and flop equity distributions. And in Part 5 we will begin the discussion of postflop play, a topic that has been (intentionally) left out of the discussion so far.

In Part 5 we will also talk specifically about playing AAxx and playing against AAxx in 3-bet and 4-bet pots. These scenarios occur frequently, and it's important to know the proper strategy for them. For this work, we will need theoretical tools developed in our discussion of flop equity distributions in Part 3.

Since we will use 3-betting/4-betting as our transition point to discussing postflop play, it follows that we will talk about big pot postflop scenarios first. Postflop play in big pots is more automatic than play in small pot (at least it should be, when the preflop play leading up to the big pot is fundamentally sound), and most of the big pot postflop decisions will take place on the flop. After discussing 3-bet and 4-bet pots, we move on to postflop play in singly-raised and limped pots as of Part 6.

Without further ado, let's get started with the final round of preflop core strategy. Unless otherwise stated, we are playing with 100 BB stacks.

## 2. Extending the preflop core strategy with loose open-raising in position

In Part 2, we defined a value based preflop core strategy, borrowed from Hwang's preflop strategy presented in his book *Pot-Limit Omaha Poker: The Big Play Strategy*. The preflop core strategy is based on playing quality hands, especially out of position. The resulting preflop strategy is somewhat tight for 6-max play, so let's extend it by loosening up our late position openraising standards.

First, let's briefly repeat our preflop core strategy. We started by classifying the omaha starting hands according to structure, and we defined 6 categories (see Part 2 for detailed desriptions of these categories):

1. Big cards and ace high Broadway wraps
2. Straight hands
3. Suited ace hands
4. Pair-plus hands
5. Aces
6. Marginal hands

Based on this classification system, we defined 4 categories (3 playable, one unplayable) of starting hands, ranked according to strength and playability:

- Premium
- Speculative
- Marginal
- Trash

The definitions of these 4 categories were (see Part 2 for advice on how to play the hands in each category):

### 2.1. Premium

- Premium and magnum AAxx
- High double pairs
- 4 cards T and higher, at least single suited
- 4 cards 9 and higher, at least single suited
- Premium rundowns, at least single suited
- High pairs with suited and connected side cards

**Examples:**

### 2.2 Speculative

- Speculative AAxx
- Speculative rundowns, at least single suited
- Medium pairs with suited and connected side cards
- Suited ace with a rundown
- Suited ace with a pair
- Suited ace with 2 Broadway cards

**Examples:**

## 2.3 Marginal

- 3 Broadway cards + a dangler, at least single suited
- High pairs with worhless side cards
- Weak suited aces that don't fall under the previous "Suited Ace Hands" category
- Offsuit rundowns

**Examples:**

## 2.4 Trash

Everything that doesn't belong to "Premium", "Speculative" or "Marginal" is (as a starting point) "Trash", and therefore unplayable.

## 2.5 But is "Trash" always unplayable?

It's important to understand that Hwang's starting hand categories are designed for playing mostly make-a-hand-poker in deep-stacked full ring PLO games. Hwang's hand selection criteria are therefore weighted towards hands that play well in multiway pots. In other words, hands that are coordinated and nutty.

Sticking to quality hands reduces the likelihood of ending up as an underdog in a big pot confrontation, which is a significant risk if we often splash around with non-nutty hands against many opponents. Therefore, Hwang is picky about starting hand structure. For example, he avoids playing rundowns with gaps at the top (like  ), since these hands build many non-nutty straights.

But in short-handed PLO, the risk of clashing with the nuts is reduced, and hands with non-nutty strength components become more playable. In short-handed play we also get more opportunities to play in position, and this also makes more hands playable. As a result, Hwang's "Trash" category contains many hands that can easily be played profitably in 6-max games, especially when we open-raise from late position. We will also find many candidates for loose isolation raising and loose 3-betting in position.

So let us talk about loosening up our open-raising ranges in position:

## 2.6 Loose openraising in position

Looking at the 3 playable starting hand categories, "Premium", Speculative" and "Marginal", they clearly provide a solid core of starting hands that set us up for often getting on the right side equity-wise when big pots get built. But in 6-max play, many pots play out more or less like this:

UTG folds, MP folds, CO or button openraises, and then the blinds fold or call. In many of these pots, the preflop raiser either wins preflop, or with a c-bet on the flop.

Whenever you find yourself in a situation where you will win many pots without seeing a showdown, it's obvious that you can be less picky about your starting hands. In these situatons, you plan more around steal equity and less around showdown equity. Your cards now work more as a backup plan, in case you have to make a hand to win the pot, and not as the primary reason for getting involved. Therefore, when it's folded to you in late positon, you can play a much wider range of hands than what our previously defined core strategy suggests, particularly on the button.

Here's an example to give you an idea about the degree of looseness we're talking about:

### Example 2.1: Button openraising against weak-tight blinds

UTG folds, MP folds, CO folds, you're on the button with some weak hand xxxx, considering a loose button steal. To your knowledge, the blinds are tight preflop, and they play mostly fit-or-fold out of position postflop.

Here are some hands from the Trash category that can be played in this scenario:

xxxx = 
xxxx = 
xxxx = 
xxxx = 
xxxx = 

In other words: *Any hand with a minimum of coordination (preferably suited) is a candidate for a loose button steal-raise against weak blinds*.

And you can open-raise even weaker hands than these if the blinds are exceptionally weak. Always remember that the combination of position and initiative is an extremely powerful weapon in PLO against opponents that play fit-or-fold postflop and rarely 3-bet preflop. A strong PLO player might be able to profitably open-raise 100% of his hands on the button in this scenario.

**Warning:**
If you want to experiment with a loose button openraising range, keep these things in mind:

- How loose you can steal on the button also depends on how well *you* play postflop
- If you steal extremely loosely on the button, the players in the blinds might change their strategy

In other words, using a very loose preflop strategy in postition requires certain postflop skills on your part, even if the blinds are weak. And even if the blinds let you get away with very loose stealing, it might be better for you in the long run to show some moderation. You don't want them to change strategy and start calling and 3-betting you more. So if you have a very trashy hand, let the blinds get a "walk" every now and then, even if you think you have a profitable steal opportunity.

## 3. Playing speculative hands in position behind limpers

Here is a scenario that occurs frequently:

You have a non-premium, but playable hand (for example  from the "Speculative" starting hand category) behind one or several limpers. You think the hand is strong enough to play, but not necessarily good enough to raise, based on the cards alone (and you would hate to get 3-bet). But you also think a raise will increase your steal equity, and enable you to win more pots without a showdown. So should you raise to put pressure on the players behind you and increase your chances of stealing the pot postflop, even if the hand isn't premium?

In other words, you are thinking about whether you should *raise to isolate the limpers* or whether you should *overlimp*, see a cheap flop, and take it from there. What are the important factors to consider before making this decision?

We start by listing things you should be thinking about, and then we illustrate with examples:

### 3.1 Factors to consider in an isolation raise/overlimp decision

**Your absolute position**
In general, isolate more from CO than from MP, and isolate more from the button than from CO. The fewer players behind you, the more steal equity you buy with an isolation raise, plain and simple.

**Your chance of winning the pot preflop**
Usually zero when someone has limped in, but we include this for the sake of completeness. If you have position on a single limper who will often fold if you raise, this is a strong argument for isolation raising.

**The number of limpers**
The more limpers already in the pot, the more likely it is that the hand will go to showdown, and the less steal equity you have. Therefore, in a multiway pot you should isolation raise less with weak hands. Isolation raising with a lot of weak hands in this scenario sets you up for playing lots of big pots with hands that will often have to fold on the flop (since weak hands, per definition, tend to hit the flop less hard than premium hands).

**The limpers' postflop tendencies**
Isolate more against players who play fit-or-fold postflop. This increases your steal equity by setting you up for winning a lot of pots with a flop c-bet. Against limpers who are very "sticky" postflop and often force you to bluff more than once to steal

pots, isolation raising becomes less attractive.

**The tendencies of the players behind you**
For example, if you are in CO with position on a single limper, you should often try to isolate. But if you have one or more loose players on the button or in the blinds, then your isolation raise will (per definition) succeed less often. If you often get called by the players behind you, you will often find yourself in raised multiway pots, so you should weight your raising range away from weak, speculative hands, and more towards premium hands.

**Assess the type and quality of your starting hand**
We started by assuming we had a speculative or marginal hand that you wanted to play. Then we discussed the most important factors to consider before choosing between isolation raising and overlimping. Now, finally, it's time to have a closer look at our starting hand.

## 3.2 Assessing your starting hand when making an isolation raise/overlimp decision

**Does our hand play better against many opponents or against few opponents**
More precisely, do we prefer many opponents in a limped pot, or few opponents in a raised pot? This leads us to another question:

**Is our hand "nutty" or "non-nutty"?**
Nutty hands have the potential to make the nuts. Therefore they play well in multiway pots, since the nuts will beat 5 opponents as easily as 1. So with a weak, but nutty hand, playing a limped pot in position will generally be a fine preflop scenario for you. Thus, you know that you can always fall back on overlimping. So the question that needs answering is whether or not an isolation raise will be better. If not, you overlimp, plain and simple.

Overlimping is usually the best alternative behind several limpers if you have a weak, nutty hand that rarely hits the flop hard, but when it hits, it hits very hard. For example, "dry" high pairs, weak suited aces, and rainbow rundowns. With these hands you are hoping to flop sets, flushes, and nutstraights on rainbow boards, respectively. This doesn't happen often, but when it does, you have a very strong hand.

Some examples of these types of hands are: K♠ K♦ 8♣ 3♥, A♥ J♠ 6♥ 2♣ and T♥ 9♣ 7♠ 5♦. With these longshot hands it doesn't make much sense to build a big preflop pot, since the really good flops for us are few and far between (but the good flops are really good). Behind several limpers, it's therefore best to overlimp and plan around showdown equity and implied odds with a minimal preflop investment.

Non-nutty hands requires a bit more thinking, since we don't always have a profitable alternative (like overlimping is for the nutty hands) in spots where we can not isolation raise. So instead of choosing between isolation raising and overlimping, we frequently have to choose between isolation raising, overlimping, and folding.

Here I would like to add that the hands from the Speculative and Marginal categories in our preflop core strategy are generally good enough to overlimp in position behind an arbitrary number of limpers. But as we learn to extend our core strategy more and more by loosening up profitably in position, we will get into more spots where we have to choose between isolation raising and folding, with overlimping being the worst of our 3 options.

We start by postulating that non-nutty hands generally play better against few opponents. Therefore, if the conditions seem good for isolating the limper(s), we should look to isolate with our non-nutty hands.

But if the conditions seem poor for isolation raising, we have to plan more around showdown equity, and we should raise less often with weak hands. The choice will then more often be between overlimping and folding. And if our hand is both weak and non-nutty, and therefore plays poorly against many opponents, we might be better off folding than overlimping.

Let's illustrate these principles at work by looking at an isolation raise/overlimp/fold decision for two speculative and non-nutty hands:

**Hand 1:** T♠ 9♥ 8♠ 5♥ (included in our core strategy)
**Hand 2:** Q♠ 9♥ 5♠ 3♥ (not included in our core strategy

Both hands are double-suited, non-premium (according to our starting hand categories) hands, and both have non-nutty strength components (but Hand 1 is clearly more nutty than Hand 2). Assume you're on the button after one or more limpers, and assess your alternatives.

Hand 1 (a double-suited, speculative rundown) is clearly playable here, regardless of the number of limpers. Furthermore,

this is a type of hand that plays well in raised pots. Double-suited rundowns hit a lot of flops (as we saw in Part 3), which means we will often have a hand good enough to continue past the flop. Hands with this property are precisely the kind of hands we want to play in raised pots. Having a hand that can hit a lot of flops fairly well reduces the likelihood of having to give up postflop and abandon a pot where we have made a big preflop investment.

This means Hand 1 is a good hand for isolation raising purposes. A raise thins the field, builds the pot, and gives us the initiative. This does several good things for us:

**1.** Thinning the field makes our hand hold up more often when we hit the flop
**2.** Building the pot preflop makes it easier to profitably maneuver the rest of the stack in postflop when we hit the flop
**3.** Seizing the initiative will frequently cause our opponents to check to us on the flop. This gives us the option to choose between making a c-bet and taking a free card when we miss the flop

With Hand 1 we're not overly concerned with what happens after we raise. If we thin the field, great. Then we can plan more around stealing pots postflop. But if we get many callers and see the flop in a very multiway pot, that's fine too. Then we move our postflop game plan away from stealing and more towards a fit-or-fold strategy. The low stack/pot ratio (more about this in future articles about postflop play) + our position will then make it relatively easy to play the rest of the hand profitably when we connect sufficiently well with the flop.

So we can raise T♠ 9♥ 8♠ 5♥ and similar speculative hands behind limpers. When the raise does not thin the field, there are other benefits to be had from raising, and this type of hand generally plays well in a big pot regardless of what happens after we raise. Note that we're not particularly worried about getting 3-bet, since our hand plays well against AAxx (as demonstrated in Part 3) in a 3-bet or 4-bet pot.

Now, compare Hand 2 with Hand 1. Q♠ 9♥ 5♠ 3♥ is a very weak hand that looks much better (because of the two suits) than it really is. The hand is very uncoordinated and it will never flop wraps. The best we can hope for are open-ended straight draws and straights without redraws to better straights. And when we flop flushes/flushdraws they are almost never to the nuts (the same is true for Hand 1, but Hand 1 has great straight potential, and the flush potential is merely backup).

So playing this trashy hand for a raise behind limpers does *not* set us up for profitably stacking off on a lot of flops, it's quite the opposite. When we hit the flop we will, most of the time, have a weak, non-nutty hand that can not be bet for value in a multiway pot. Also, note that uncoordinated hands benefit less from having the option to take a free card on the flop (when an uncoordinated hand does not connect well with the flop, it's unlikely that the turn card will help much). So an isolation raise will be based almost solely on steal equity, but we don't have much of that either with one or more limpers already in the pot.

So does this mean we should overlimp Hand 2 instead of isolation raising? No. With a hand that has so little postflop potential, it doesn't make much sense to overlimp and get involved voluntarily in a multiway pot, even if it's cheap. We're only setting ourselves up for lots of difficult postflop decisions with negative implied odds and headache. So hands like Hand 2 should be folded preflop in limped pots. You can use them for loose openraising in position when the conditions are good for it, but don't voluntarily get involved in pots where you are forced to see a flop.

### Example 3.1
$10PLO
6-handed

**Preflop**
UTG ($10) limps; you ($10) have K♥ K♠ 9♦ 3♠ in CO. The players behind you are unknown. What is your plan?

An isolation raise seems obvious. You have position on a single limper, and you have a hand that plays well in a raised pot (although you have to fold to a 3-bet), even if you get several callers. If your isolation raise succeeds (and we're assuming our chances are decent), your plan should be to exploit steal equity by c-betting most flops when checked to. You will pick up a lot of these pots on the flop. If you get 3-bet preflop, you should fold your dry pair (and we will explain why when discussing playing against a 3-bet in Part 5).

If you get several callers, your postflop game plan should revolve more around showdown equity and less around steal equity (c-bet less, and play more fit-or-fold). With more than 2 callers, you should definitely play mostly fit-or-fold on the flop, and rarely put more chips into the pot without hitting the flop (we're mostly set mining in a very multiway pot).

### Example 3.2
$10PLO
6-handed

**Preflop**
UTG ($10) limps, MP ($10) limps, you ($10) have K♥ K♠ 9♦ 3♠ on the button. The blinds are unknown. What is your plan?

We have the same hand as in Example 3.1, but in a different scenario. In Example 3.1 we raised to isolate a single limper with assumed decent steal equity. Here we have two limpers in the pot already and therefore much less steal eqity. We have a weak, but nutty hand that plays well in a limped pot against many opponents.

As mentioned in the previous example, K♥ K♠ 9♦ 3♠ also plays well for a single raise, but this does not mean we *should* raise if this does not give us any advantages over overlimping.

With a weak, nutty hand in a situation that seems to head towards a multiway pot no matter what we do, overlimping seems best. We're now playing for showdown equity and implied odds. We're mostly hoping to flop top set, but we will of course also be opportunistic if we're given the chance to steal postflop. If we get raised by one of the blinds, we call and hope to hit top set (KKxx-hands play OK for a single raise, as previously mentioned).

Note that the advantage of sometimes getting a free card on the flop is pretty much nonexistent for an either-or hand like K♥ K♠ 9♦ 3♠. If we don't have a good hand (e.g. top set) on the flop, it's very unlikely that the turn card will improve us. So this advantage from a preflop raise disappears, and raising does not do much extra for us in this scenario, compared to overlimping.

### Example 3.3
$10PLO
6-handed

**Preflop**
UTG ($10) limps; you ($10) have A♣ K♥ Q♣ 6♠ on the button. The blinds are unknown. What is your plan?

You have a speculative hand with good high-card strength, and a nut suit. You're on the button behind a single limper, and this is a good spot for an isolation raise. We hope to get heads-up, but playing a raised, multiway pot is fine too, with a decently strong and nutty hand like this one.

Since our hand is nutty, it obviously also plays well in a limped, multiway pot. But an isolation raise should buy us a lot of steal equity in this scenario, and the aggressive alternative seems clearly better than overlimping.

### Example 3.4
$10PLO
6-handed

UTG ($10) limps, MP ($10) limps, CO ($10) limps, you ($10) have A♥ T♣ 7♣ 4♥ on the button. The blinds are unknown. What is your plan?

Like in Example 3.3 you have a suited ace, and this time you have a 2nd suit to go along with your nut suit. But having an extra non-nut suit does not make this a raising hand behind 3 limpers. The hand lacks coordination, and it doesn't have much going for it other that the suited ace. In other words, this is a scenario where we have a weak, but nutty hand in a very multiway pot. So we overlimp and plan around showdown equity + implied odds (and we might get some postflop steal opportunities in position).

### Example 3.5
$10PLO
6-handed

UTG ($10) limps, MP ($10) limps, you ($10) have J♥ 9♠ 8♥ 6♠ on the button. The blinds are unknown. What is your plan?

Here we can raise to isolate with a double-suited rundown, even if it's a little rough and with a gap at the top. As previously

mentioned, raising with this type of hand has several advantages:

- We thin the field with a non-nutty hand
- We set ourselves up for stacking off profitably with a low stack/pot ratio when we hit the flop well
- We set ourselves up for more options to take a free card on the flop, should we want one

If we get many callers, that's fine. Then we simply steal less postflop, and play more fit-or-fold. And calling a 3-bet is fine, too, since we have a hand that often hits the flop. If we get 3-bet, we call, planning to shove the rest of the stack in on flops where we have hit a sufficiently strong piece (and we will study such scenarios in detail in Part 5)

### Example 3.6
$10PLO
6-handed

**Preflop**
UTG ($10) limps, you have  on the button. The blinds are unknown. What is your plan?

This hand we fold. We have a double-suited, but very uncoordinated hand, which is basically trash. Double-suited trash hands may look pretty, but they play very poorly without preflop steal equity. You could have considered a loose button steal if it had been folded to you, but we don't want to get involved with this hand when we are forced to see a flop.

**Warning:**
Most of you will immediately see that this is not the kind of hand we want to raise behind limpers, but my guess is many of you will still be tempted to overlimp because the hand is double-suited. But double-suited trash is still trash. By overlimping with non-nutty trash hands, we're setting ourselves up for juggling with weak and non-nutty made hands postflop, and in a multiway pot to boot. In other words, we're setting ourselves up for donating implied odds to the nutty hands that are out there. So be disciplined, fold these hands preflop after limpers, and save yourselves mucho postflop grief.

**Tip:**
To see why most postflop scenarios will be difficult for us after overlimping with this kind of hand, think about what our best flops will be. With the rare exception of flopping the nut flush (happens extremely rarely) or various full house/quad combinations (that we can flop with any trash hand), there aren't any made hand/draw combinations that will give us a monster when we hold  .

Note that it isn't fear of losing our preflop investment that stops us, but the fear of losing a lot more postflop when we (unavoidably) find ourselves in tricky spots with negative implied odds.

## 4. Extending the core strategy with 3-betting
So far the discussion of preflop core strategy has revolved around openraising and playing in limped pots (raising premium hands for value, raising to isolate, and overlimping). The next step is to extend our core strategy by adding a strategy for 3-betting. Most of the 3-betting we do will be *based on value* with premium hands that we assume have an equity edge over the raiser's range.

But sometimes we will also make *speculative* 3-bets with weaker hands where we plan more around steal equity and less around showdown equity. And in particularly favorable spots we will also ocasionally make *bluff 3-bets* with very weak hands, where the profitablility of the 3-bet mostly depends on steal equity.

We'll discuss these 3 forms of 3-betting in turn and illustrate with examples. But before we start discussing 3-bet ranges, let's talk briefly about the things we need to think about when deciding whether or not to 3-bet.

### 4.1 Factors to consider when deciding whether or not to 3-bet

**Position**
You can 3-bet more hands when you're in position. Position gives you more options postflop, more control over postflop play, and more opportunities to steal. This increases the profitability of all hands you choose to play, which means you can relax your starting hand standards a bit. Most of our speculative 3-bets will be done in position. For bluff 3-betting we rely strongly on position (plus additional favorable circumstances that we'll talk about in a minute)

Conversely, being out of position reduces the profitability of all hands we play, and we adjust by folding more speculative hands and weighting our range more towards premium hands. Out of position we will for the most part only 3-bet premium hands for value.

**The number of players in the pot**
You should 3-bet more heads-up than in multiway pots. The more opponents you have, the less steal equity you have, and the more you have to plan around showdown equity. This means you should weight your 3-bet range towards premium hands. With more than one player already in the pot, we will usually only 3-bet for value. Heads-up (and in position) we will often get opportunities to make speculative 3-bets.

**The raiser's range**
As a starting point, we 3-bet tighter against a tight raiser. But we might make an exception if he is also tight and predicable postflop, and we have position on him. Then we might 3-bet him with a speculative hand to isolate him, planning to steal a lot of pots postflop. Against a loose raiser we can also get away with more speculative 3-betting, especially if he plays weakly after a 3-bet.

**The raiser's skills**
We will make fewer speculative 3-bets against good players, since these defend themselves better against such attacks. Conversely, against weak players we will 3-bet more hands, particularly in position.

**Your cards**
The more favorable the other factors are, the less important our cards become. For example, with position on a loose raiser who won't play back against frequent 3-betting, we will often 3-bet speculative hands. But if we're in the blinds after a raise and a caller, we will for the most part only 3-bet our most premium hands.

## 4.2 3-betting for value
First, let's agree on the most important rule concerning building big pots preflop:

*Don't build a big preflop pot in situations where you are setting yourself up for often having to fold postflop*

In other words, when you choose to build a big preflop pot, one of the following needs to be true:

**1.** You expect to often flop a hand god enough to continue past the flop
**2.** You expect to often steal the pot postflop

When we 3-bet for value, we focus on the first of these points. 3-betting for value means 3-betting with premium, coordinated hands that often connect with the flop. And when they connect with the flop, they tend to build nutty and dominating hands that can extract value from non-nutty and dominated hands played by our opponents (for example making the nut flush and getting paid off by lower flushes, or flopping the nut straight with redraws and freerolling the nut straight with no redraws). From Part 2 we know that the components of starting hand strength are:

**1.** High card strength
**2.** Connectedness
**3.** Suitedness

So when we 3-bet for value, we want *suited and connected high card hands*. Most of these hands are found in the "Premium" starting hand category defined in part 2. A solid core strategy range for value 3-betting is:

- Premium AAxx, at least single-suited, with a pair, 2 Broadway cards, or a connector
- Premium Broadway wraps, at least single-suited, and preferably with an ace
- Premium KKxx, QQxx, JJxx, at least single-suited, and with connected side cards, or another high pair

In other words, hands like these:

- A♦ A♠ Q♦ Q♣
- A♣ A♥ K♣ J♥
- A♥ A♦ T♠ 9♦
- A♣ Q♠ J♠ T♥
- K♠ Q♥ J♠ T♥
- K♥ K♠ Q♦ J♠
- K♦ Q♦ Q♣ J♠
- Q♥ J♣ J♥ 9♣
- K♠ K♦ Q♠ Q♥

Note that we want at least one suit. For the Broadway hands withour a pair, we prefer hands with an ace, and we prefer the hand to be suited to the ace (nutflush potential is very valuable).

Below is a series of examples where we consider a 3-bet for value with a premium hand, included scenarios where we elect *not* to 3-bet. In all the examples we first assess the situation by thinking about the various factors discussed previously (our position, the number of opponents, etc.), and then we make a decision based on the circumstances and our cards.

### Example 4.1

$10PLO
6-handed

**Preflop**

CO ($10) raises to $0.35, you have Q♦ Q♥ J♦ T♥ on the button. CO is a loose raiser with VP$IP = 48 and PFR% = 29. Small blind ($10) is an unknown, and BB ($10) is a solid TAG. What is your plan?

This is a good scenario for a 3-bet, partly for value and partly to isolate a loose raiser. You have the button with position on a loose raiser, and you have a double-suited premium hand. You expect the blinds to fold to a 3-bet most of the time, so that a 3-bet will set you up for playing a heads-up pot with position on the loose raiser.

A 3-bet in this spot will be both for value (your hand should do well against the raiser's range and the blinds' random hands) and to increase your steal equity (you expect the combination of position and aggression to win a lot of pots for you against a player with a loose range). With both showdown equity and steal equity working for you, this is a good spot for a 3-bet.

### Example 4.2

$10PLO
6-handed

**Preflop**

UTG ($10) raises to $0.35, CO ($10) calls, button ($10) calls, SB ($10) calls, you ($10) have Q♦ Q♥ J♦ T♥ in the big blind. UTG is a 26/17 TAG, the rest of the field is a mix of unknown and loose-passive players. What is your plan?

We have the same hand as in Example 4.1, but the circumstances are different. Here you are out of position in a large pot, and with 4 opponents. Also, even if QQJT double-suited is a premium hand, it isn't necessarily a hand you want to play for a 3-bet out of position against a big field.

You have a high, coordinated pair with two suits, but this hand has less nut potential than premium AAxx and premium KKxx. Having two suits is nice, but you don't have nut suits. And when you flop a set with QQ, sometimes it won't be top set. These are not big problems in a heads-up pot, especially with position. But it's much more diccifult to play non-nutty hands and draws postflop, especially against many oppnents.

By 3-betting here, you are setting yourself up for difficult postflop decisions in a big pot (and tricky decisions is precisely what you *don't* want when you're playing a big pot). Setting yourself up for difficult postflop decisions means you're giving the opposition opportunities to outplay you postflop. This is a serious problem in a big pot. For example, is it correct for you to c-bet all flops where you have an overpair? Is it correct to give up on all flops where you don't flop either an overpair or a strong draw?

The answer is "no" for both these questions, but out of position you'll often have a hard time figuring our when it's correct to continue past the flop and when it's correct to give up. In position you have the luxury of seeing your opponents' actions before you act, but out of position you're forced to guess more. And when you guess in a big pot, you'll unavoidably make costly mistakes.

Your position and the number of opponents are the most important factors here, but we should also note that the raise came from a tight-aggressive player in early position. This means his range is probably weighted heavily towards premium hands. This is different from Example 4.1 where we faced a loose raiser. And of course any one of the coldcallers could have a premium hand as well.

We conclude that in this scenario it makes more sense to call and plan around showdown equity and implied odds. In this scenario you should only 3-bet for value with nutty, ultra-premium hands (Remember: Nuttiness becomes more important out of position). If you choose to only 3-bet with your best AAxx hands (good side cards and at least single-suited), there's nothing wrong with that.

Having an ultra-tight 3-betting range in situations like this one will obviously give away a lot of information about our hand. But as we shall see later in Part 5, this is not necessarily something that is easy for our opponents to exploit. The reason is that premium hands (per definition) often hit the flop hard enough to stack off profitably in big pots (and we can show this using flop equity distributions, as discussed in Part 3).

As a final comment: This example illustrates a general principle, namely that we should be cautious about making big reraises with paired hands (except the highest and most premium/nutty pairs), especially out of position and against many opponents.

A qualitative justification for this rule of thumb is that paired hands hit less flops hard than unpaired hands. They also play poorly against AAxx, and getting 4-bet is problematic. So in scenarios like this example, our best option is often to just call, preserve implied odds, see a flop and take it from there.

### Example 4.3
$10PLO
6-handed

**Preflop**
Button ($10) raises to $0.35, SB folds, you ($10) have  in the big blind. Button is unknown. What is your plan?

This is a standard value 3-bet with a premium, double-suited Broadway hand. You are out of position, but your hand should do well in a 3-bet pot against button's (assumed) loose range.

### Example 4.4
$10PLO
6-handed

**Preflop**
CO ($10) raises to $0.35, button ($10) calls, SB ($10) calls, you have  in the big blind. All opponents are unknown. What is your plan?

An automatic 3-bet for value with a premium AAxx hand. This scenario is similar to Example 4.2 (out of position with a premium pair in a raised, multiway pot) but here we have the nuts preflop, and we have a big equity edge against the field and a hand that will hit a lot of flops hard enough to continue past the flop. Also, we would welcome a 4-bet, since that would allow us to 5-bet all in and realize all our preflop equity.

We expect several callers, but this is not a problem for us with a premium AAxx hand. We will hit a lot of flops hard enough to c-bet and profitably get the rest of the stack in postflop. But we are of course not automatically committed to go with the hand postflop. With many callers, we will consider the flop texture and the number of opponents, and then choose a postflop plan.

But that decision comes later. The preflop 3-bet is automatic, based solely on value.

### Example 4.5
$10PLO
6-handed

**Preflop**
UTG ($10) raises to $0.35, MP ($10), button ($10) calls, you have  in the big blind. The opposition is a mix of tight-aggressive and loose-passive players. What is your plan?

You have a double-suited AAxx hand in a scenario similar to Example 4.2 and Example 4.4. In Example 4.2 we elected to call with a premium, but non-nutty pair. In Example 4.4 we 3-bet for value with a premium AAxx hand. So what is our decision here?

This hand falls somewhere in between Example 4.2 and Example 4.4. We have the nuts preflop plus two nut suits, and this supports a 3-bet. But our side cards are completely uncoordinated, and we don't have anything extra going for us, other than the suits.

This makes A♣ A♥ 8♣ 2♥ less suitable for value 3-betting, since the lack of coordination will be a problem for us when we're looking for flops to profitably stack off on (Remember: When you build a big preflop pot based on value, it's important that you have a hand that often hits the flop well enough to continue).

Therefore, even if having two nut suits makes this a good AAxx hand, the lack of coordination is enough to keep it out of the Premium category. So it seems best to avoid 3-betting in this scenario, out of position against 3 opponents.

Note that if you had been on the button heads-up against a raiser, this would have been a standard 3-bet for value/isolation. In that situation we would move away from our strict core strategy for value 3-betting and more towards speculative 3-betting (although A♣ A♥ 8♣ 2♥ is a near-premium hand).

Remember that the purpose of a core strategy is to provide solid guidelines, designed to keep you out of trouble. You will often find yourself in the "grey area" that the core strategy doesn't discuss in detail. In these scenarios, you have to rely on experience and on-the-spot assessment. This gets easier the more you play.

### Example 4.6
$10PLO
6-handed

**Preflop**
UTG ($10) raises to $0.35, MP ($10) calls, you ($10) have A♠ A♥ 8♣ 3♠ on the button. All opponents are unknown. What is your plan?

This is not a good spot for a 3-bet. The pot is multiway, and you have a trashy AAxx hand that will rarely improve to something worth continuing with on the flop against several opponents. Our best alternative is to call, planning to play mostly fit-or-fold postflop (we're mostly hoping to flop top set). Note that if are faced with a 3-bet from the blinds, we will get the opportunity to 4-bet and get most of our stack in.

Here we have AAxx of such low quality that we choose to play them like we would play dry KKxx. We call to spike top set with good implied odds, and little else. In addition, we will sometimes get the opportunity to 4-bet.

We discussed the ills of 3-betting trashy AAxx out of position in Part 2 (see section 7.6 and Example 8.3). In this example we have position, but the same logic applies.

### Example 4.7
$10PLO
6-handed

**Preflop**
UTG ($10) raises to $0.35, MP ($10) calls, you ($10) have A♠ K♥ K♠ J♥ on the button. UTG is an ultra-tight raiser with VP$IP = 15 and PFR% = 2.1. You have seen him go to showdown twice after raising preflop, and both times he had AAxx. The other players are unknown. What is your plan?

You should expect UTG's raising range to be heavily weighted towards AAxx, and that the quality of his non-AAXX raising hands is comparable to our hand. If this is the case, we don't have much of an equity edge here, and a 3-bet will often get 4-bet. This is something we want to avoid, since our hand plays poorly against a 4-bet from AAxx (we have 34% equity against a random AAxx hand as shown by this ProPokerTools calculation).

Under these assumptions, it seems best to call in position, preserve implied odds, and look for profitable postflop scenarios to present themselves.

### Example 4.8
$10PLO
6-handed

**Preflop**
UTG ($10) raises to $0.35, MP ($10) calls, you ($10) have A♠ K♥ K♠ J♥ on the button. UTG is loose-agggressive with VP$IP = 42 and PFR% = 28. MP is loose-passive. What is your plan?

We have the same starting hand as in Example 4.7, but this time the raiser is very loose-aggressive, and we can assume his

range is wide. We have a premium, double-suited KKxx hand in position against two weak ranges (the raiser's and the caller's), and this seems like a good spot for a 3-bet for value (and also to isolate).

### 4.3 Speculative 3-betting

The principle behind speculative 3-betting is simple:

*In situations where we have good steal equity, we are less dependent on showdown equity. This allows us to relax our starting hand requirements.*

For example, assume you're on the button after a CO raise. You have gathered reads on CO, and you know he raises a wide range from this position. You also know he will play a tight and predictable style after getting 3-bet by a player with position on him:

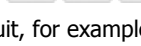
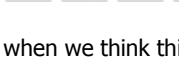
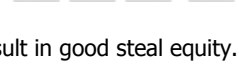
- Postflop he will push AAxx if his 4-bet got called
- With the rest of his hands he plays fit-or-fold on the flop

This predictable strategy can be exploited by 3-betting in position. This forces him to give up a lot of pots, either preflop or on the flop, and the increased steal equity will make it profitable to 3-bet him with a wide range of premium and speculative hands. So which speculative hands should we include? We start with these:

- Good, suited rundowns
- Suited aces with good rundowns

In other words, hands like these:

For both types of hands we prefer rundowns with few gaps. If we have gaps, we prefer them to be at the bottom. We also prefer double-suited hands over single-suited hands and high rundowns over low ones.

The hands we most want to see are hands like  and  . We shy away from the lowest and roughest variations with only one suit, for example  and  .

As a starting point, we only make speculative 3-bets in positon when we think this will result in good steal equity. The perfect scenario for a speculative 3-bet is on the button, behind a loose raiser who plays weak-tight and predictable after a 3-bet. If he only 4-bets AAxx hands, this is perfect (this gives us a lot of informaton about his hand, and is easy to defend against). If he also folds a lot preflop and/or plays fit-or-fold postflop, so much the better.

Here is an example of a speculative 3-bet, followed by an example where we choose not to 3-bet because of unfavorable circumstances:

#### Example 4.9

CO ($10) raises to $0.35, you have  on the button. CO is unknown, and both blinds are tight-aggressive players who play tight out of position. What is your plan?

We know nothing about CO's range and his tendencies, but there are several other factors in favor of a speculative 3-bet. It's also generally a good idea to test the opposition early. All in all this seems like a good spot for a speculative 3-bet with a double-suited premum rundown.

If the blinds fold and CO calls, our plan should be to c-bet most flops. With several callers preflop, we will c-bet less, but we still plan to do some stealing postflop on favorable flop textures.

If we get 4-bet, we call. We will mostly be up against AAxx, and we have a perfect hand (double-suited rundown) for defending against a 4-bet from AAxx. If we see the flop heads-up in a 4-bet pot, our plan is to do "cherry picking" on the flop. This means we call the (expected) c-bet when we have hit the flop sufficiently hard. Since we expect Villain to show us AAxx almost every time, it's relatively easy to estimate our flop equity. The rest is a matter of comparing our equity to the pot-odds we're getting, and then we call or fold.

### Example 4.10

UTG ($10) raises to $0.35, MP ($10) calls, you have A♣ 9♠ 8♣ 7♥ on the button. UTG is a solid TAG who only raises premium hands from UTG. MP is also a TAG, the small blind is unknown, and the big blind is loose-passive. What is your plan?

We have one of the better speculative hands, so we're obviously not folding. Here we're probably up against two solid ranges (a TAG UTG raise plus a TAG MP coldcall), and we have a loose player in the big blind. Most of the time a 3-bet will set us up for playing a big, multiway pot with a speculative hand, since we expect to be called in several spots. This will not do much for us, since:

- We probably have zero steal equity preflop
- We probably have little steal equity postflop
- We probably don't have an equity edge against the ranges we're facing
- There's a significant chance someone has AAxx

Since we probably can not steal this pot, and since we have a hand of the type good-but-not-great, calling seems best. Our plan is to see the flop cheaply with a nutty, speculative hand and good implied odds in a raised, multiway pot. We might also get some steal opportunities postflop. Note that the opposition's postflop checking is more likely to signal weakness when we don't 3-bet preflop (3-bet will often induce our opponents to automatically check to the 3-bettor on the flop).

## 4.4 Bluff-3-betting

3-betting as a bluff is simply pushing the limits for speculative 3-betting in scenarios where a 3-bet will give us very good steal equity. If the conditions are very good, a 3-bet might be profitable based on steal equity alone, and therefore we don't need much of a hand. But we should not go completely over board and 3-bet trash. We can afford to wait for something that resembles a playable hand.

This kind of 3-betting should be done very sparingly, and only under very favorable circumstances. Specifically, we should never bluff 3-bet when:

- We're out of position
- More than one player has entered the pot
- We expect several callers

We also prefer the raiser to be weak, predictable and easy to play against, and we prefer to have the button. Under these circumstances a 3-bet should set us up for seeing a lot of flops heads-up, in position, and with good postflop steal equity.

Here is an example of bluff 3-betting:

### Example 4.11

CO ($10) raises to $0.35, you have Q♠ 9♥ 6♠ 5♣ on the button. What is your plan?

Without more information the answer is a loud "FOLD!", but you can consider a bluff 3-bet when several of the following criteria are met:

- The raiser has a wide range
- He plays tight and predictable after a 3-bet
- He only 4-bets AAxx
- He plays fit-or-fold postflop after calling a 3-bet out of position
- The blinds are not particularly loose
- You have a solid table image

The main idea behind this type of 3-bet is to either win the pot preflop, or steal it with a c-bet on the flop. But we have a litte bit of backup from the cards. Since we don't 3-bet pure trash (we have a suit and some coordination) we will flop something decent every now and then. This will allow us to also win some of the pots Villain won't let us steal.

If we get heads-up and Villain 4-bets, we have to estimate whether or not our hand has enough potential to call profitably. If we choose to call, we do so under the assumption that CO only 4-bets AAxx hands. If this is the case, we can call the 4-bet profitably with a wide range of speculative, unpaired hands, planning to "cherry pick" flops. For this we need a hand with a minimum of coordination and preferably a suit, and here we have both.

We won't make this call/fold decision here, but we will take this example with us to Part 5 and find the answer there. We will use the flop equity distribution of Q♠ 9♥ 6♠ 5♣ against AAxx to decide whether or not it's profitable to call the 4-bet and then go all-in on flops where we have sufficient equity against AAxx.

**Warning:**
Bluff 3-betting should only be done when the circumstances are very favorable. Used sparingly, bluff 3-betting will make you a little more profitable in late position, a little harder to read, and a little tougher to play against.

## 4.5 When you 3-bet and get 4-bet

Our core strategy for playing against a 4-bet is simple:

*When you get 4-bet, assume you're up against AAxx and play accordingly*

It's rare to meet players who 4-bet non-AAxx hands as a default with 100 BB stacks. Good players will adjust to loose 3-betting by loosening up their 4-betting ranges, but not as a standard play against unknowns with 100 BB stacks. If it's a mistake to assume the 4-bettor has AAxx every time, it's a small mistake.

The question is then: How do we play against a 4-bet from AAxx with 100 BB stacks?

In this article we will answer this question qualitatively, and in Part 5 we will dig deeper and study the scenario mathematically. Phrased in simple core strategy terms: With 100 BB stacks, our defense against getting 4-bet by AAxx consists of two parts:

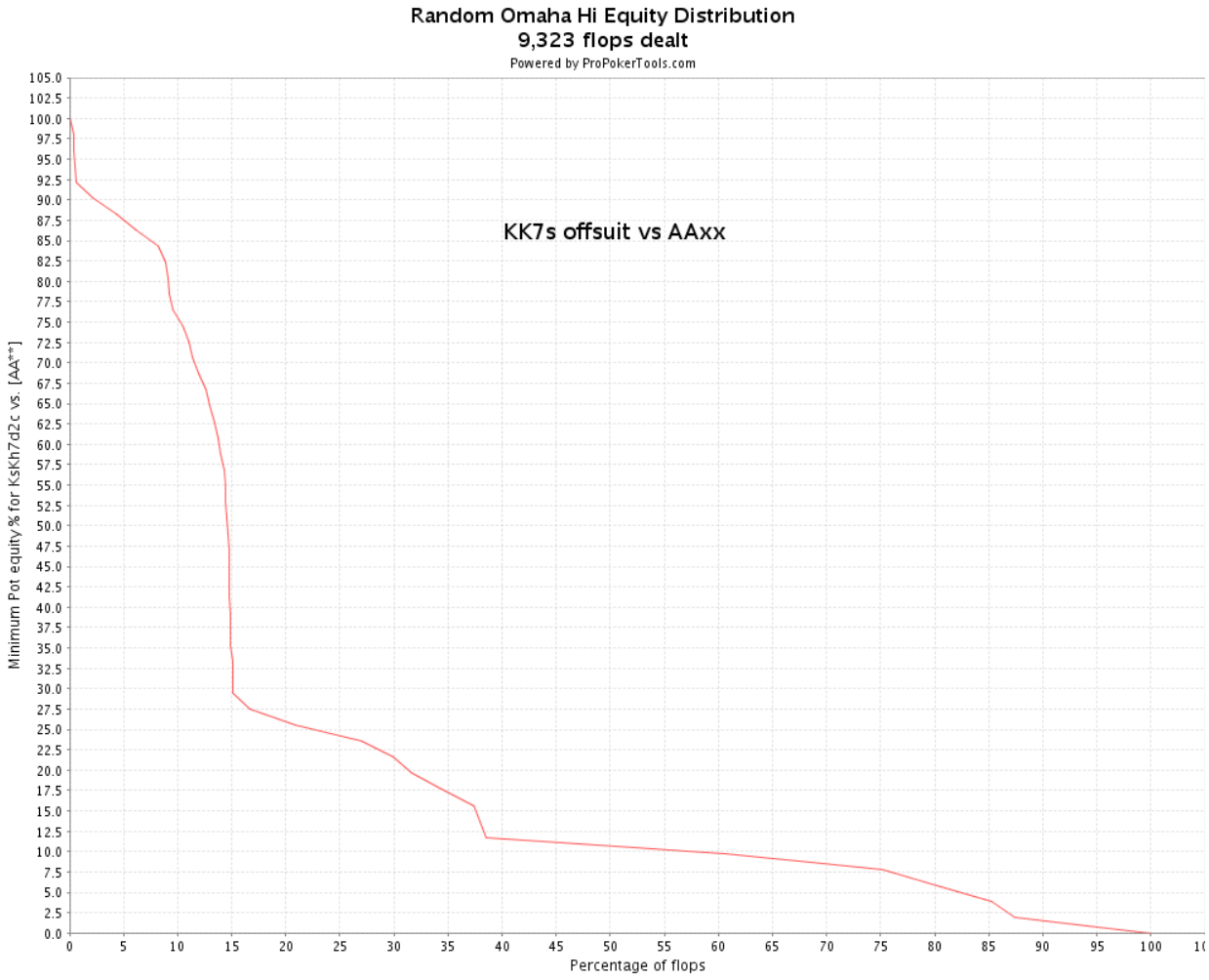
**1.** We 5-bet AAxx all-in.
**2.** We call the 4-bet with hands that are coordinated enough to profitably call and then "cherry pick" flops.

The first part is obvious; the second part is more diffuse. But the main idea is that it will be profitable for many speculative hands to call a preflop 4-bet, planning to call the flop c-bet all-in whenever we have sufficient equity compared to the pot-odds we're getting on the flop. For this to work well, we want the 4-bettor to have AAxx almost always, since this makes it easy to estimate our equity accurately on the flop.

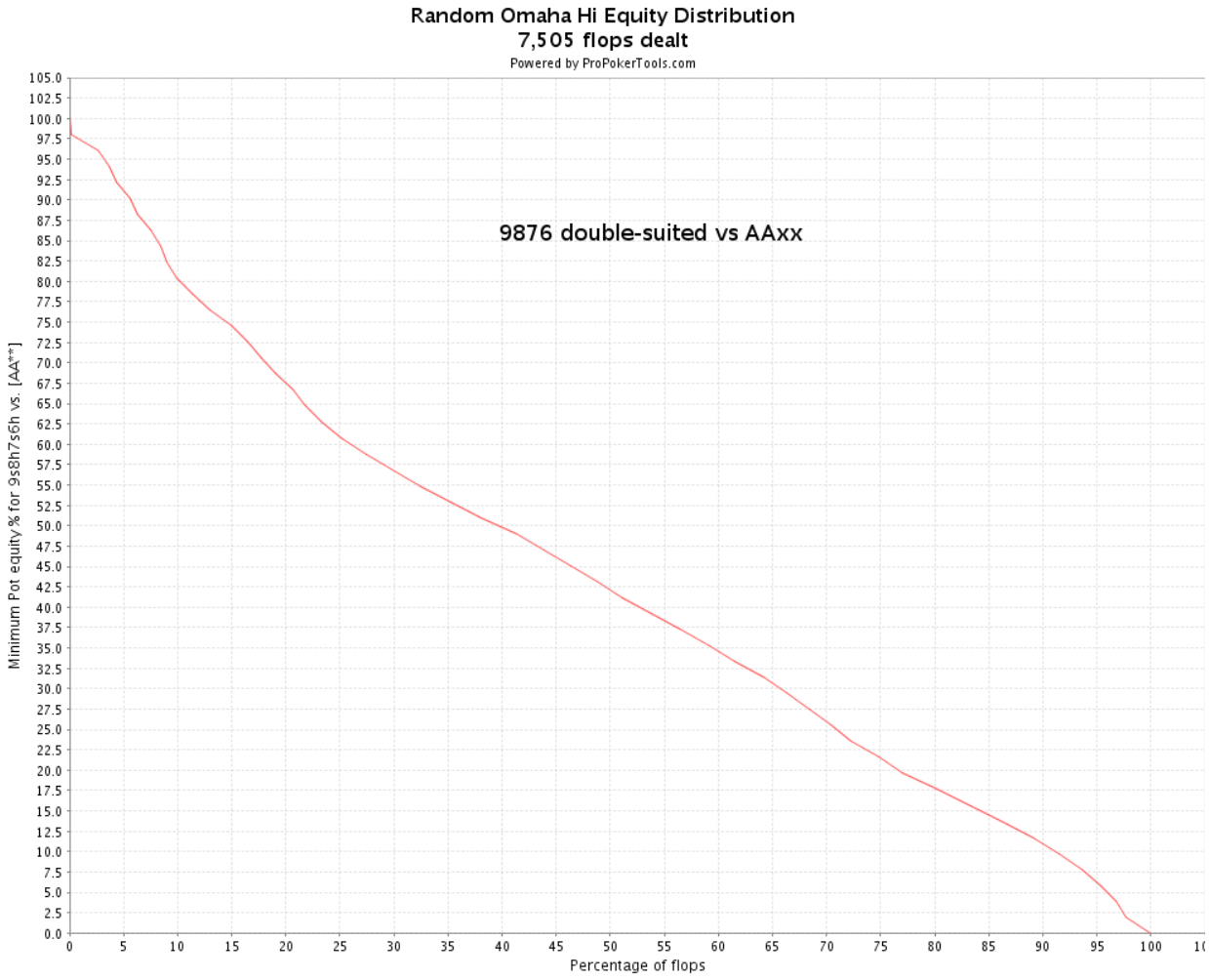
From Part 3 we know that a very uncoordinated hand like K♠ K♥ 7♦ 2♣ has big problems in 3-bet and 4-bet pots, and the reason is that is has so few flops with good equity. Dry pairs have a narrow range of flops with very good equity against AAxx (when we flop a set, trips or two pair), but beyond these miracle flops, there isn't much equity to find.

Therefore, when we get involved in a 4-bet pot with this type of hand, we are setting ourselves up for almost always having to fold to the flop c-bet. This means we don't get a good return on our preflop investment, and we're simply donating chips by calling the 4-bet.

The flop equity distribution graph below illustrates the problem K♠ K♥ 7♦ 2♣ has against AAxx in big pots. Most of our flop equity is "crammed together" on a small number of flops (top 15% of flops, or thereabouts). Outside of these top 15% of flops, our equity is always poor:




In the opposite end of the flop equity distribution spectrum we have premium, double-suited rundowns like 9♠ 8♥ 7♠ 6♥. These hands will often flop a decent combination of made hand + draw that allows us to profitably call an all-in c-bet. From the flop equity distribution graph below we see that our equity now is distributed evenly, and not lumped together on a small top x% number of flops:




This means hands like 9♠ 8♥ 7♠ 6♥ will often flop well enough to profitably go with the hand on the flop. When we call the 4-bettor's expected flop c-bet, we're getting a little more than 2:1, so we need a little less than 33% equity on the flop. The graph above tells us that we have 33% of better on a wide range of flops, approximately top 60% of all flops.

We will not continue this theoretical discussion here, but stick to qualitative guidelines. However, we will use the two flop equity distributions above to illustrate the general principle at work:

*When we defend against a 4-bet from a AAxx hand by calling and then "cherry picking" flops, we want a suited and coordinated hand that often flops decent equity*

Here is an example:

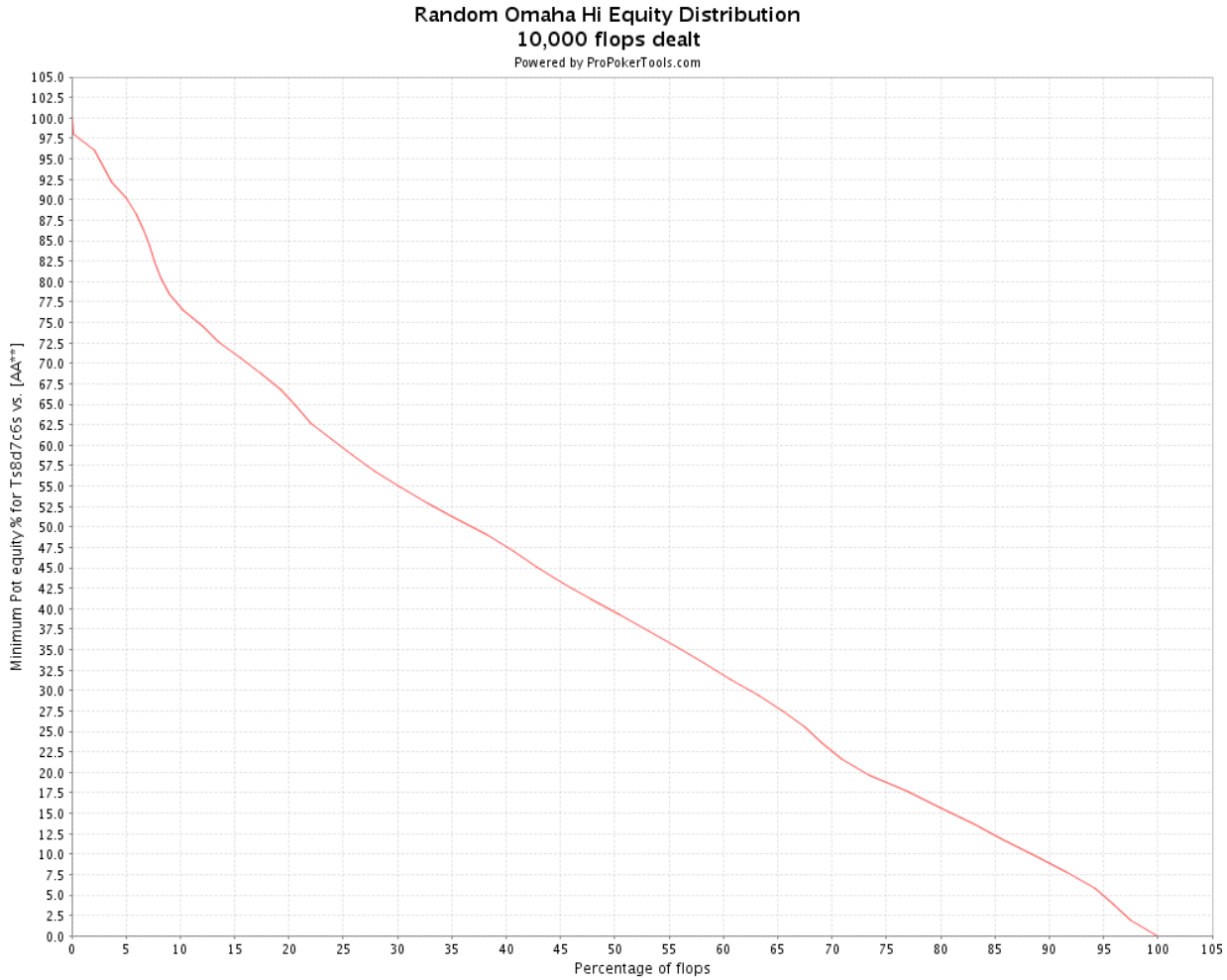
### Example 4.12

$10PLO
6-handed

**Preflop**

CO ($10) raises to $0.35, you ($10) have T♠ 8♦ 7♣ 6♠ on the button. You have reads telling you that CO is a loose raiser who respects 3-bets, and he tends to play tight out of position after getting 3-bet. You have the button and a hand well suited for speculative 3-betting, so you 3-bet pot to $1.20. CO immediately 4-bets pot to $3.75. What is your plan?

Oops! We have to assume we have clashed with AAxx here. But all is not lost, since we have one of the better hands for "cracking" AAxx. We have 41.54% equity preflop (ProPokerTools calculation), and our hand has a very smooth flop equity distribution against AAxx, as shown below:




The pot is $7.65 on the flop with $6.25 stacks remaining. When CO pushes the rest of his stack in on the flop, we're getting pot-odds (7.65 + 6.25):6.25 = 2.22:1. So we need 1/(2.22 + 1) = 0.31 = 31% equity to have a profitable call.

From the graph above we see that we will have minimum 31% equity on more than 60% of all flops. So we will find enough equity to call (and get a return on our preflop investment) more often than we fold. This presupposes that we are able to estimate outs and equity quickly and accurately on the flop. But this is an easy thing to learn.

Here is an example of a flop where we can call profitably:

**Flop:** K♠ 6♦ 4♥ ($7.65)
CO ($6.25) pushes. Does our T♠ 8♦ 7♣ 6♠ have enough equity (minimum 31%) on this flop?

Let's start by counting outs:

- Pair + 3 kickers (2 + 9 = 11 outs)
- Gutshot (4 outs)

- Backdoor flush (1 out)

The gutshot and the backdoor flush draw give us 5 pretty clean outs, and we will also often win when we improve to trips. But our outs to two pair need to be discounted a bit. Whenever we improve to two pair on the turn, CO has 8 outs (2 aces, 3 kings, 3 fours) to top set or a better two pair. 8 outs corresponds to about 1/5 chance. So we discount the two pair-outs from 9 to 9(4/5) = 7.2.

We round this number off to 7. Also, since CO probably has more redraws than this (we don't know his side cards), we subtract one more out, and end up with 6.

So we have:

- Par + 3 kickers (2 + 6 = 8 outs)
- Gutshot (4 outs)
- Backdoor flush (1 out)

This gives us a total of 13 outs against AAxx. This corresponds to 3 x 13 + 9 = 48% equity on the flop (Remember: We use the 4x-rule with 0-9 outs, and the 3x + 9-rule with 10 or more outs). A ProPokerTools calculation tells us our actual equity is 47%, so our estimate was pretty good.

This means we have a clear "cherry picking" call on the flop with god equity. After we call, our job is done, and we take the result as it comes.

**About the profitability of calling a 4-bet from AAxx**
We also discussed playing against AAxx in 4-bet pots in Part 3. There we used a model where our opponent's hand was known from the start, and we chose to play raised, 3-bet and 4-bet pots against him, *even if we knew he had AAxx*.

Not surprisingly we found that even the best "ace cracking" hands (double-suited rundowns) could not be played profitably in 4-bet pots against AAxx with a 100 BB stack. We therefore concluded that 4-betting AAxx with a 100 BB stack is *unexploitable*, even if the caller plays perfectly on the flop. But this doesn't mean that it's unprofitable to call the 4-bet!

In reality, we never know that Villain has AAxx when we 3-bet him (if we knew, we probably wouldn't have 3-bet). So the information about his hand reaches us at a point where the pot has already grown big, and the money we have invested no longer belongs to us (it belongs to the pot).

This means that even if it's unprofitable to build a 4-bet pot against AAxx with a 100 BB stack *if we know we're up against AAxx from the start*, we will often have a profitable call of the 4-bet *at the moment we learn that Villain has AAxx*. We lose money if we count our preflop investment from the moment we put our first chip in the pot. But we make money from the point we call the 4-bet. In other words, even if we lose money on the hand overall, we lose less by calling the 4-bet than by folding.

The types of hands that can profitably call a 4-bet from AAxx will be an important topic in Part 5.

## 5. Summary

We have extended our overall preflop core strategy to include strategies for 3-betting. We have also thoroughly discussed isolation raising versus overlimping in limped pots.

We're now getting close to a complete preflop core strategy, and the remaining part is a more systematic and quantitative discussion of the theory behind 3-betting/playing against a 3-bet/4-betting/playing against a 4-bet. This work will lead us to postflop play in 3-bet and 4-bet pots, and we'll let this be our transition point to the discussion of postflop play.

So our plan is to complete the discussion of preflop play in Part 5, and start discussing postflop play. From Part 6 and onwards, we will mostly talk about postflop play

Good luck!
Bugs

P.S. And remember to 3-bet someone today!

# Part 5: 3-betting and Playing Against a 3-bet

## 1. Introduction

This is Part 5 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

In Part 5 and Part 6 we will conclude the discussion of principles of PLO preflop play, and make the transition to postflop play. In Part 4 we introduced 3-betting into our preflop core strategy, and we also talked briefly about defending against 4-bets. Part 4 focused on the preflop part of these scenarios, and the purpose of this work was to define solid ranges for 3-betting, solid guidelines for how to think about 3-betting, and to give an introduction to defending against 4-bets.

In Part 5 and Part 6 we will delve deeper into 3-bet and 4-bet pots, and at the same time begin talking about postflop play. The purpose of Part 5 and Part 6 is to present a systematic treatment of the *big pot scenarios* 3-bet pot and 4-bet pot where we tie together preflop strategy and postflop strategy. The structuring of Part 5 and Part 6 is:

**Part 5**
- 3-betting
- Playing against a 3-bet

**Part 6**
- 4-betting
- Playing against a 4-bet

(Part 5 and Part 6 were initially planned as one article about 3-betting/4-betting. But the material grew during the writing process, and it became necessary to split it into two articles)

The theory for 3-bet and 4-bet pots will be illustrated with simple examples along the way. We will also end Part 6 with a series of examples where we train sound big pot thought processes, and apply the theory we have learned.

To keep things simple, we will mostly stick to heads-up scenarios with 100 BB stacks in the examples. However, we will return to the topic of 3-bet/4-bet pots in future articles about postflop play (Part 7 and onwards). So we will get plenty of opportunities later in the article series to apply our knowledge to more complicated scenarios with more than one opponent and/or different stack sizes.

The purpose of Part 5 and Part 6 is not to cover every aspect of playing in 3-bet and 4-bet pots (one could write thick books on this topic), but to teach you sound thought processes and solid guidelines for how to play them. Big pots are important pots and big mistakes in big pots are costly mistakes. Therefore, it's important that you learn:

**1.** How to think and plan preflop before you set yourselves up for playing a 3-bet/4-bet pot
**2.** How to think and plan postflop in 3-bet/4-bet pots

So now we dig into the topic of 3-betting/playing against a 3-bet, and in Part 6 we'll do the same for 4-betting/playing against a 4-bet.

## 2. Some macro principles for playing big pots

We kick off this article with some big picture ideas for preflop and postflop strategy in big pots. If we always think about these principles whenever we get involved in a big pot, we'll be on the right track:

### 2.1. "Master plan" for preflop play in big pots

Before you build a big pot by 3-betting or 4-betting preflop, *know why you do it*. Usually, this means thinking about many factors in addition to your 4 cards (and some of the things we should think about before a 3-bet were discussed thoroughly in Part 4).

Specifically, when you 3-bet or 4-bet, it should be because either:

**1.** You have a quality hand that often connects well enough with the flop to continue profitably
**2.** You believe your reraise will increase your steal equity, either preflop of postflop

Both criteria don't have to be satisfied at the same time, but for a 3-bet or 4-bet to make sense, at least one of them has to

be. And if you're weak in of these areas, you need to be strong in the other. For example, if you have a trashy hand, you need good steal equity, either preflop or postflop.

## 2.2. "Master plan" for postflop play in big pots

When you've gotten involved in a 3-bet or 4-bet pot, it's important that you don't give up too easily postflop. One of the biggest mistakes you can make in any form of pot-limit or no-limit poker is to build big pots preflop and then abandon them lightly postflop. Folding when you shouldn't is usually a small mistake in a small pot, but can be a huge mistake in a big pot.

Thus, knowing when to 3-bet and 4-bet preflop does not help you if you frequently screw up postflop. If you are weak postflop, building many big pots preflop could easily be a leak for you, even if your preflop play is technically correct (in isolation).

Sticking to a postflop philosophy where you play cautiously with marginal hands is an OK starting point for limped and singly raised pots. But the bigger the preflop pot, the more important it becomes to play aggressively postflop to get value for your big preflop investment.

Therefore, *in 3-bet and 4-bet pots, we simply can not "nut-peddle"* (i.e. sit patiently and wait for the nuts or something close to the nuts). If you use this strategy in big pots, you will get run over. Correct postflop play in big pots often dictates you stack off lightly, sometimes with as little as top pair or a non-nutty pair + draw combination.

Postflop play in big pots revolves around play on the flop, and the remaining stacks often get pushed in there. The decisions are often dictated by simple mathematics (pot-odds and assumptions about opponent ranges). This means reads, metagame, and planning over several streets become less important the bigger the pot grows preflop. This doesn't necessarily mean postflop decisions are easy in big pots, but the more chips go into the pot preflop, the less variables we have to take into consideration postflop.

Since much of the postflop play in 3-bet and 4-bet pots is automatic and based on math, we will find some "low hanging fruit here" (e.g. strategies that are easy to learn). It's a good starting point to think about postflop strategy in big pots as more of a craft than an art. One reason is that the possibilities for high level thinking (for example, complex multi-street bluffs) are limited when the pot is big relative to the remaining stacks.

A lot of the material in Part 5 and Part 6 is about "the craft of playing big pots". When we know the fundamentals, we will always find spots for artistry here and there. But if we don't know the fundamentals, and we frequently make big mistakes in big pots, occasional outbursts of brilliance won't save us.

We have talked a lot about the connection between preflop play and postflop play in PLO. Therefore, it should not be a surprise to anyone to hear that solid preflop play is an important part of big pot play. What we sow preflop is what we reap postflop. This will become clear in the discussions and examples throughout this article, for example in Section 3.4 where we look at 3-betting heads-up with premium and trashy AAxx hands.

## 2.3. Defining "big pot" and "small pot" using stack-to-pot-ratio (SPR)

To clarify what we mean when we are talking about big pots and small pots, we wil use the conceptual tool stack-to-pot-ratio (SPR). Simply put, this is the ratio between the remaining stack and the pot size on the flop.

For example:

If you raise pot to 3.5 BB from UTG, get 3-bet by a player behind you, and call heads-up, the pot will be 25.5 BB on the flop. If both of you started with 100 BB stacks, you will have 88 BB left to play postflop. The stack-to-pot ratio is then SPR = 88/25.5 = 3.5.

But if the player behind you had called and the blinds had folded, the pot would have been 8.5 BB with 96.5 BB left to play postflop. This gives SPR = 96.5/8.5 = 11.

And if both you and the player behind you had limped, the small blind had folded, and the big blind had checked, the pot would have been 3.5 BB with 99 BB left to play. Now we would have SPR = 99/3.5 = 28.

**Definition**
*When we talk about big pots, we mean pots with a low SPR. When we talk about small pots, we mean pots with a high SPR.*

In other words, how big a pot is depends on how big the pot is on the flop, compared to the remaining stacks. So what is a high SPR value and what is a low SPR value? We will use a simple classification scheme:

- Ultra-low SPR: < 1
- Low SPR: < 4
- Medium SPR: 4-13
- High SPR: > 13

These are not exact definitions, but conceptual tools designed to help us think correctly about play in pots of various sizes. The relation between SPR and postflop play revolves around the following macro principles:

*The lower the SPR, the more hands we should be willing to continue with on the flop, and the less we think about negative implied odds, the risk of clashing with the nuts, and the risk of getting bluffed out on later streets.*

*The higher the SPR, the more cautious we need to be without the nuts, and the more we have to think about negative implied odds, the risk of clashing with the nuts, and the risk of getting bluffed out on later streets.*

As a consequence, when we set ourselves up for playing a pot with low SPR, we should have a starting hand suitable for this purpose. Keep in mind that playing with a high SPR is always an acceptable scenario for any starting hand (we can always fall back on a fit-or-fold/nut-peddling strategy if need be). But the lower the SPR, the more important it becomes to have a hand that often connects with the flop.

Postflop play with ultra-low SPR often comes down to simple pot-odds decisions (call or fold), and this is typical for 4-bet heads-up pots when we start with 100 BB stacks. With an ultra-low SPR we have to be willing to stack off pretty light in heads-up pots.

With a low SPR we are in the raise-or-fold region. If someone has made a bet in front of us, we will often choose between folding and committing fully (often by raising all-in). A 3-bet heads-up pots has a low SPR, assuming 100 BB starting stacks and pot-sized raises. Therefore, we will be doing a lot of raise-or-fold when our opponent bets into us on the flop.

With a medium or high SPR, we have more room for postflop play over several streets. Limped and singly-raised pots with 100 BB stacks lie in these regions. We can also get here in 3-bet or 4-bet pots when we're playing with very deep stacks.

Below are two examples to illustrate sound thought processes in pots with low and high SPR:

### Example 2.1: Playing an overpair with low SPR

$10PLO
6-handed

CO ($2.80) raises to $0.35, you ($10) 3-bet pot to $1.20 with  on the button, the blinds fold, and CO calls.

**Flop:**  ($2.55)
CO ($1.60) pushes the rest of his stack in. What is your plan?

This is a call. The reason is that we're in an ultra-low SPR scenario where we have a simple pot odds decision. The effective stack is $1.60 on the flop, and the pot is $2.55. We have SPR = 1.60/2.55 = 0.6, in other words ultra-low, and this is a big pot-scenario where we must be willing to stack off light.

CO can of course have trips, but he can also easily be bluffing, or pushing for value with some hand that we beat. Using simple logic, his bet makes it look like he wants us out of the pot. There is litle reason for him to push with a monster hand with these stack sizes. There are 3 streets left to play, and CO can get the money in whenever he chooses to. With a strong hand, he should simply check to us and hope we c-bet.

We have a solid hand for an ultra-low SPR scenario, so we should call for the pot odds and see who wins. We're getting pot odds 4.15:1.60 = 2.59:1, so we need 1/(2.59 + 1) = 0.28 = 28% equity to have a profitable call.

If we're behind, we have 2-4 outs (2 outs to a full house, and 2 outs to a backdoor flush or backdoor straight) depending on whether CO has trips or a full house. 2-4 outs give us 8-16% equity. And since we also expect CO to push some hands we beat, including some pure bluffs, this should be a profitable call.

### Example 2.2: Playing an overpair with high SPR

$10PLO
6-handed

You ($26) raise to $0.35 with A♣ A♥ 9♣ 8♠ on the button, big blind ($22.50) calls.

**Flop:** T♠ T♥ 2♣ ($0.75)
Big blind ($22.15) bets $0.50. What is your plan?

The same starting hand and flop as in Example 2.1, but here the pot is singly-raised and not 3-bet. Also, the starting stacks are much deeper. This results in SPR = 22.15/0.75 = 30. In other words, we have a very high SPR, so we're in a small pot scenario.

Being willing to commit ~220 BB postflop with an overpair on a paired flop is suicide. The reason is that we will be crushed against the range of hands Villain is willing to commit his entire stack with. Furthermore, there aren't any worse hands Villain could hold that has a good draw against our hand on this extremely dry board. So there aren't any reasons for us to play aggressively, and our postflop plan should revolve around getting to showdown in a small-to-moderate pot.

But we still haven't decided whether or not we're going to see a showdown. We can start with a call on the flop, but we need to think long and hard about Vilain's range and what to do if he keeps betting. Calling the flop bet and then folding to further betting is a reasonable line to take against an unknown opponent.

The point of the two previous examples is to illustrate that a decision that was trivial in an ultra-low SPR scenario (go with the hand, and that's that) became difficult with a high SPR (we should not commit our whole stack, but we should not fold to a flop bet either, so how far should be willing to go if Villain keeps betting?)

We'll bring the macro principles for playing with low and high SPR with us to the discussion of postflop play in 3-bet and 4-bet pots. We will make a habit out of always thinking about the stack-to-pot-ratio when planning our postflop play on the flop.

## 3. 3-betting

We did a thorough discussion of general principles of 3-betting in Part 4. So we will only briefly repeat them here before we move on to more specific 3-betting scenarios.

For conceptual simplicity, we defined 3 categories of 3-bets:

- Value 3-betting
- Speculative 3-betting
- Bluff 3-betting

These categories overlap somewhat, and we mostly use these definitions as conceptual tools. By thinking about what kind of 3-bet we are making, we also automatically think about our reasons for 3-betting. This makes hand planning easier, since we will know whether we're playing mainly for showdown equity or mainly for steal equity. We will also think about *which postflop scenarios we want to create with our 3-bet*.

### 3.1 Value 3-betting

In Part 4 we defined a core strategy range for value 3-betting:

- Premium AAxx, at least single-suited, with a pair, 2 Broadway cards, or a connector
- Premium Broadway wraps, at least single-suited, and preferably with an ace
- Premium KKxx, QQxx, JJxx, at least single-suited, and with connected side cards, or another high pair

In other words, hands like these:

- A♦ A♠ Q♦ Q♣
- A♣ A♥ K♣ J♥
- A♥ A♦ T♠ 9♦
- A♣ Q♠ J♠ T♥
- K♠ Q♥ J♠ T♥
- K♥ K♠ Q♦ J♠
- K♦ Q♦ Q♣ J♠
- Q♥ J♣ J♥ 9♣
- K♠ K♦ Q♠ Q♥

The only addition we'll make here is that we can also 3-bet *any AAxx* hand (including the trashy ones) heads-up if we can get at least 1/3 of our stack in preflop. From Part 3 we remember that we could 4-bet all AAxx hands with a 100 BB starting stack. The reason was that we then got > 1/3 of our stack in preflop (assuming all raises were pot-sized), so that there was less than 1 pot-sized bet left to play postflop.

With 1 pot-sized bet or less left in the stack on the flop, we can push any flop heads-up with AAxx, and there isn't anything our opponent can do to exploit it (and we did calculations that comfirmed this in Part 3). In SPR terms, we are creating an ultra-low SPR scenario, since we (per definition) have SPR < 1 when there is less than 1 pot-sized bet left to play on the flop.

The same mathematical argument is valid when we 3-bet against shortstacks, when we can maneuver more than 1/3 of the stack in preflop. For example, if a Villain with 30 BB stack raises to 3.5 BB from UTG, and you have a trashy AAxx like A♠ A♥ 9♣ 6♦ in the big blind, you can 3-bet pot to 11 BB and get more than 1/3 of the stack in. When you get called, you simply push the rest in on the flop.

Below are two examples of 3-betting for value, out of position and in position, with postflop play included:

### Example 3.1: Value 3-bet out of position - Top pair + weak draws on the flop against an aggressive opponent

$10PLO
6-handed

Button ($8.50) raises to $0.35, you ($11.20) 3-bet pot to $1.15 with A♣ Q♥ J♣ 9♥ in the small blind, and button calls. You know that button raises a wide range of hands in position. You have also several times seen him raise c-bets heads-up in position on the flop, and he seems to be playing aggressively postflop with marginal hands/draws in big pots.

**Flop:** J♥ 7♠ 3♣ ($2.40)
You ($10.05) bet $2.40, button ($7.35) raises all-in. What is your plan?

Let's first find the SPR value, then we'll evaluate the strength of our hand, and then we'll make a decision. The pot is $2.40 on the flop with $7.35 left to play, so SPR = 7.35/2.40 = 3.1. This is a low SPR, and we should be prepared to commit on the flop with a wide range of made hands and draws. Therefore, when we c-bet the flop with a decent hand against an aggressive opponent, it should be with the intent of calling an all-in raise.

This means calling the raise is something we should plan for *before we c-bet*. But let's evaluate the situation after the raise, using pot-odds and outs, to see why this makes sense.

We flop top pair + 2 backdoor flushdraws (hearts and clubs) + 2 backdoor straight draws (two turn/river combinations, 8/T and T/K give us a straight). So if we're behind when Villain raises, we have the following possible outs (Remember: Backdoor draws count as ~1 out):

- Two pair/trips: 9 + 2 = 11
- BD flush: 1 + 1 = 2
- BD straight: 1 + 1 = 2

So we have up to 11 + 2 + 2 = 15 outs to two pair/trips, flush or straigh when we're behind. Of course, not all of these outs are clean, particularly the two pair/trips outs. For example, if Villain has JT97 for top two pair + gutshot, we have 6 outs (A, Q) to a better two pair, 2 outs (9) to two pair that splits the pot, and 0 outs to trips.

Note that our top pair works as a blocker against top set, and it seems unlikely that Villain should have many 33xx hands in his range. So we're not particularly worried about being crushed by a set. Villain started the hand with a wide range, and we know that he also raises the flop with a wide range. So he doesn't need to have us crushed to raise all-in here, and there is also a significant probability of us being ahead (for example, if Villain has raised with a dominated top pair + draw combination).

But if we're behind, we should have 8-10 outs on average. This is a rough estimate, but it seems reasonable (as seen from counting outs against JT97 above). The backdoor draws alone provide 4 pretty clean outs, so we don't need much else to have what we need.

Villains all-in raise builds the pot to $12.15 with $4.95 to call, so we're getting pot odds 12.15:4.95 = 2.45:1. Thus, we need

1/(2.45 + 1) = 0.29 = 29% equity to call. This corresponds to about 29/4 = 7.2 outs on the flop, if we're always behind.

So it seems we have the equity we need, even if we're always behind. Add the fact that we will sometimes be ahead, given Villain's aggressive tendencies, and we have an easy call.

**Flop:** J♥ 7♠ 3♣ ($2.40)
You ($10.05) bet $2.40, button ($7.35) raises all-in, you call.

**Turn:** J♥ 7♠ 3♣ K♠ ($17.10)

**River:** J♥ 7♠ 3♣ K♠ 7♦ ($17.10)
You win with two pair. Button has Q♠ J♦ T♣ 8♠ for top pair + gutshot + backdoor flush on the flop.

We had a dominating hand preflop, and got our 3-bet in with 60% preflop equity (ProPokerTools calculation). Both had top pair on the flop, but we had a dominating hand, and got the rest of the stack in with 62% equity (ProPokerTools calculation).

### Example 3.2: Value 3-bet in position - Overpair on very coordinated flop against a solid player

$10PLO
6-handed

MP ($11.10) raises to $0.35, you ($15.60) 3-bet pot to $1.20 with A♥ A♠ 6♥ 5♠ on the button , MP calls.

This is a standard 3-bet for value with a premium AAxx hand. MP is a solid TAG, and you assume his range for calling your 3-bet is weighted towards good Broadway hands and good rundowns.

**Flop:** Q♣ T♣ 8♦ ($2.55)
MP ($9.90) checks. What is your plan?

This is just about the worst possible flop for you, both since you missed it completely (we don't even have a backdoor draw), and since it probably connected well with Villain's range. Time to slam on the brakes and save chips.

Technically speaking we will often have the "best hand" on the flop with our naked overpair. But the term "best hand" often makes little sense on a coordinated flop in Omaha. The reason is that draws often have the currently best hand crushed in terms of equity. For example, against A♣ K♦ Q♦ J♥ (top pair + wrap straightdraw + backdoor flushdraw), a hand we technically "beat" on the flop , we have 45% equity (ProPokerTools calculation)

What concerns us the most is the risk of drawing dead against a flopped straight, or drawing close to dead against a combination of a better made hand + a good draw. For example, we have a measly 14% equity (ProPokerTools calculation) against K♣ Q♦ 9♦ 8♣ (two pair + flushdraw + gutshot), and we find many hands like this one in Villain's range.

So we know that:

- We have poor equity against Villain's total range on the flop (since we assume it connects well with this flop)
- We have very poor equity against the part of his range that continues on this flop

So we have to assume that a c-bet will often get called or (more likely) checkraised. And when Villain continues, his range will have has us crushed.

But there is a silver lining. We have position, and Villain has checked, so at least we get a free card. And on a (very) good day the hand will be checked to showdown. At any rate, we check behind, planning to not invest any more chips.

**Flop:** Q♣ T♣ 8♦ ($2.55)
MP ($9.90) checks, you ($14.40) check behind.

**Turn:** Q♣ T♣ 8♦ 4♠ ($2.55)
MP ($9.90) bets ($2.55), you ($14.40) fold.

Villain pots the turn, probably with good equity, and we fold as planned. In spots like this one, where we have a marginal made hand without outs on a very coordinated board, it's important not to be suspicios and stubborn. When the

combination of flop texture and Villains assumed range has us crushed, we simply have to get out of the way and not risk any more chips.

## 3.2 Speculative 3-betting

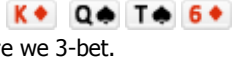
In Part 4 we defined the following core strategy range for speculative 3-betting:

- Good, suited rundowns
- Suited aces with good rundowns

In other words, hands like these:

Note that the border between value 3-betting and speculative 3-betting is "fuzzy". We have chosen to define value 3-betting as 3-betting done with premium suited and coordinated high card hands. But a (according to our definition) speculative 3-betting hand like  can definitely also be classified as premium.

As previously mentioned, this classification of "value 3-betting", "speculative 3-betting" and "bluff 3-betting" is mostly a conceptual tool that we use to facilitate sound thought processes.

With a premium high card hand (for example, a premium AAxx) we more often 3-bet independent of the circumstances. With speculative 3-betting hands (for example,  ) that have less high card strength that hands in the value range, we tend to be more picky about the circumstances before we 3-bet. And with the very speculative bluff 3-betting hands (for example,  ) we always demand favorable conditions (first and foremost position and good steal equity) before we 3-bet.

Below is an example of a speculative 3-bet in position:

### Example 3.3: Speculative 3-bet in position - Marginal pair + draw on the flop

$10PLO
6-handed

UTG ($10) raises to $0.35. UTG is a solid player, but he seems to be playing straightforward when he gets 3-bet. You have  on the button and 3-bet to $1.20. The blinds fold and UTG calls.

**Flop:**  ($2.55)
UTG ($8.80) checks. What is your plan?

You flop 2nd pair + nut gutshot draw + backdoor nutflush draw on a somewhat coordinated board where inside straight wraps and a flushdraw are possible. This is a flop we must assume will connect fairly well with a solid players range for calling a 3-bet out of position (the range should have lots of good high card hands and good rundowns in it). It isn't the world's most coordinated flop, but there should be many plausible combinations of pair + draws in Villain's range. So we have to think about the chance we'll get check-called or check-raised when we c-bet (just as we did in Example 3.2)

It's obvious that we can't continue if we get checkraised. So if we bet, we plan to fold to a checkraise. On the other hand, although our hand isn't great, we do have some equity with outs to two pair, trips, a nut gutshot and a backdoor nutflush draw. This means there are many turn cards that will improve our equity drastically.

So this is a spot where there are good arguments for taking a free card and *preserving our equity*. We can of course also c-

bet, but we must assume Villain has hit a piece of this flop often, and we don't expect to have good equity against the part of his range that doesn't fold. And we can definitely not continue if we get checkraised.

To prevent getting blown off our hand by a checkraise, we can check behind and hope for a favorable turn card before we decide wether or not we want to commit more chips. Note that this type of checking behind (with hands that won't always give up on the turn) will balance the weak checks we make when we flop nothing and give up (like we did in Example 3.2)

The logic is:

Hands that check behind on the flop with decent equity will often improve sufficiently on the turn to call a bet (if Villain should decide to bluff), or bet for value/protection (if Villain checks again). And when we don't improve, we will sometimes get opportunities to bet Villain out of the pot anyway, when he signals weakness by checking for the second time. Balancing our weak flop checks by also checking some hands with good-but-not-great equity *protects us* and makes it dangerous for Villain to autimaticaly bluff the turn every time we check behind on the flop.

An aggressive and unobservant Villain, who doesn't pay attention to our balancing, will often bluff the turn into our improved hands that can't be bluffed out. An observant opponent who notices our balancing will often check honestly on the turn and give us the opportunity to win with a turnbet, or take another free card, should we want one.

Both these scenarios are to our advantage, and they are good examples of the importance of position when playing marginal hands postflop. Note that you don't have to check hands like this one every time. C-betting them can be fine too, but, for balance, you should sometimes check, especially when you have reason to believe Villain will often checkraise.

Having the opportunity to take a free card on the flop is one of the biggest advantages from having position. So you should not automatically bet every flop when you get checked to, even if you put in the last raise preflop, and you are expected to bet a lot.

**Flop:** J♣ 7♦ 4♦ ($2.55)
UTG ($8.80) checks, you ($8.80) check behind.

**Turn:** J♣ 7♦ 4♦ A♥ ($2.55)
UTG ($8.80) checks. What is your plan?

We improved to two pair and Villain checks for the second time. Here we have a classic example of how position allows us to play marginal hands confidently postflop. Our hand is decent, but it's far from great. However, we can be very certain we have the best hand after Villain has checked twice. Now it's almost impossible for him to have a strong hand, unless he is very tricky. He could have a made hand + draw combination with decent equity against our two pair, but he definitely isn't representing a monster hand.

We have now gathered enough information to confidently bet the turn with assumed decent equity. We plan to fold to a checkraise, since we don't expect him to checkraise with any hands we can continue profitably against.

Note that even if we're ahead, we prefer worse hands fold. Even if we make money on the turn by getting called by worse hands, it's probably better if they fold. If they call, we will often have to play the river with a marginal two pair hand on a scary board. Most river cards can beat us, or give Villain an opportunity to *represent* a hand that beats ours. If Villain decides to bluff a scary river card, we will be in a sad situation.

This is an area where PLO is different from NLHE. In NLHE we often find ourselves in situations where we're either far ahead or far behind (for example, when we have KK on an A x x flop). In these spots we tend to check a lot with marginal hands. The logic behind this is that we don't expect better hands to fold or worse hands to call, and we don't expect a free card to change the situation.

This way of thinking does not carry over well to PLO. One reason is that even if a bet won't make worse hands call or better hands fold, *we mostly don't mind that worse hands fold, since they usually have decent equity against our marginal hand, plus the opportunity to outplay us on later streets*. For example, giving a hand with 25% equity against us the choice between making a correct turn fold or an incorrect turn call is generally better for us than letting the hand see the river for free.

So we tend to bet-fold often with marginal hands in PLO heads-up scenarios, rather than trying to sneak cheaply to showdown or inducing bluffs with them. We'll have more to say about this topic in future articles on postflop play.

**Turn:** J♣ 7♦ 4♦ A♥ ($2.55)
UTG ($8.80) checks, you ($8.80) bet $2.55, UTG folds.

Probably the best result for us. Such is the power of position.

## 3.3 Bluff 3-betting

When we push the envelope for 3-betting by including semi-trashy hands like Q♠ T♦ 8♦ 3♠, we have entered the region of bluff 3-betting. This is not more complicated than loosening up our starting hand requirements considerably to exploit a favorable situation where we expect to have good steal equity.

Here is an example:

### Example 3.4: A bluff 3-bet in position - No hand/no draw on a dry flop

$10PLO
6-handed

CO ($14.35) raises to $0.35, you ($12.50) have K♦ J♦ 8♣ 3♣ on the button. CO raises a wide range, and he also calls 3-bets with a wide range, but he plays tight and straightforward after a 3-bet. The players in the blinds seem tight. You decide to make a bluff 3-bet with a very speculative hand, and you 3-bet pot to $1.20. CO calls.

**Flop:** A♠ 7♠ 3♥ ($2.55)
CO ($13.15) checks. What is your plan?

The obvious choice is to c-bet the flop, planning to fold to a checkraise. This scenario is somewhat similar to Example 3.3, in that we have hit a piece of the flop, and we can't call a checkraise. But does this means we should check behind here as well?

No. This makes little sense here, since there aren't any turn cards (except 3♦) that will give us a strong hand or a strong draw on the turn. Therefore, unlike Example 3.3,*checking this flop does not set us up for many profitable turn scenarios*, since there aren't any turn cards that allows us to continue with confidence. Also, getting checkraised out of this pot is not a problem for us when we have this little equity.

If we check behind and improve on the turn, we will mostly have weak two pair hands and gutshots (and note that the 2-flush on the flop makes any improvement weaker than usual). So this is a flop where we have poor equity with little chance of improvement. And since a c-bet should be profitable in itself on this flop texture (it's hard for Villain to continue on an ace high and raggedy flop) we don't have any reason to check behind. If this pot is ours to win on the flop (and we believe it often is) we should simply bet the flop and pick it up.

Folding this hideous hand to a checkraise is not a problem for us, since our equity is very low in this scenario. So we simply bet the flop and fold to a checkraise. The flop texture is ace high and uncoordinated, and we expect Villain to check-fold the majority of his hands.

In other words, we don't care about whatever little equity we have, we simply bet our hand as a pure bluff and most of the time we give up when Villain doesn't fold (on good days he calls, and we improve on the turn, and then he lets us win a showdown with a marginal hand for free). This is different from Example 3.3 where we elected to play our marginal (but considerably better) hand with more focus on showdown equity and less focus on steal equity.

**Turn:** A♠ 7♠ 3♥ ($2.55)
CO ($13.15) checks, you ($11.30) bet $1.75, CO folds.

As expected. Note the bet sizing (about 2/3 pot). On an ace high and uncoordinated flop like this one, Villain will either fold (mostly independent of bet size) or call/checkraise (mostly independent of bet size). So you don't need to bet full pot to make him fold the hands that he *will* fold on this flop.

If you use smaller bets when bluffing at flops like this one, you should balance this by also valuebetting smaller (for example, if you had 3-bet with AAxx and flopped top set here).

## 3.4 The ills of 3-betting trashy AAxx (particularly out of position)

Before we leave the topic of 3-betting, we'll take a closer look at a frequently occuring special case, namely 3-betting with AAxx hands.

Previously in this article series (see Part 2 and Part 4) we have warned against 3-betting bad AAxx hands. Bad AAxx hands are AAxx with no suits, or with one suit and little else. For example:

3-betting bad AAxx hands is particularly problematic out of position. The reason is a *combination of poor average postflop equity + a well-defined hand + putting ourselves in a scenario where we are "forced" to c-bet a lot*.

AAxx is the first hand most opponents will put us on when we 3-bet. And if AA is all we have (meaning, if the xx part of our hand is so bad in can almost be ignored), it will be easy to play a wide range of hands profitably against our 3-bet. This effect is magnified by being out of position, since we now have to c-bet a lot of flops. Since there are lots of bad flops for bad hands, this means we're setting ourselves up for having to bet a lot of flops where we have poor equity. And this, in turn, gives our opponents good implied odds.

When we 3-bet bad AAxx, our opponent knows most of what there is to know about our hand, and his position makes it easier for him to put this information to good use postflop. But when we have good AAxx, the information we send Villain will be less useful to him, and he will make more postflop mistakes, even if he has position.

To illustrate the dramatic difference between 3-betting premium and trashy AAxx hands, we will do a model study, using flop equity distributions. The theory we use (flop equity distributions and numerical integration) was discussed thoroughly in Part 3, so reread this article if necessary.

Our model of this 3-betting scenario is:

- Villain raises pot to 3.5 BB on the button with a range made up of top 50% of hands minus all AAxx hands
- We have either  (premium) or  (trashy) in the big blind, and Villain knows our hand
- We 3-bet pot to 11 BB, planning to c-bet all flops and call an all-in raise
- Villain calls the 3-bet with his entire range
- We c-bet all flops, and Villain raises all-in on all flops where he has sufficient equity, and otherwise he folds

The question we want to answer is this:

*Is it possible for Villain to use his perfect knowledge to make it profitable to raise preflop and then call a 3-bet with a wide range consisting of top 50% of hands (minus all AAxx hands)?*

Note that we have removed the AAxx hands from his range to make things simpler. When Villain has AAxx, the hand will end with a preflop all-in confrontation anyway, and most of these pots will be split. Furthermore, we calculate Villain's EV from the moment he puts the first chips into the pot *knowing that we have AAxx, and that he will get 3-bet*. He then calls our 3-bet under the assumption that we will bet all flops, planning to call a raise.

The pot is 11 + 11 + 0.5 = 22.5 BB on the flop, and there's 89 BB left in the stack for an SPR of 89/22.5 = 4.0 (so we are in the raise-or-fold region). When Villain raises the flop, he is risking 89 BB to win 22.5 + 89 = 111.5 BB. Thus, he is getting effective pot odds 112.5:89 = 1.25:1, and he needs minimum 1/(1.25 + 1) = 0.44 = 44% equity to profitable raise all-in.

So Villain will raise us all-in on his *top_x*% of flops where he has 44% equity or more, and otherwise he will fold and lose his 11 BB preflop investment. When he raises all-in, his average equity is *av_equity*, and he will then be all-in in a 200.5 BB pot where he has invested 100 BB total.

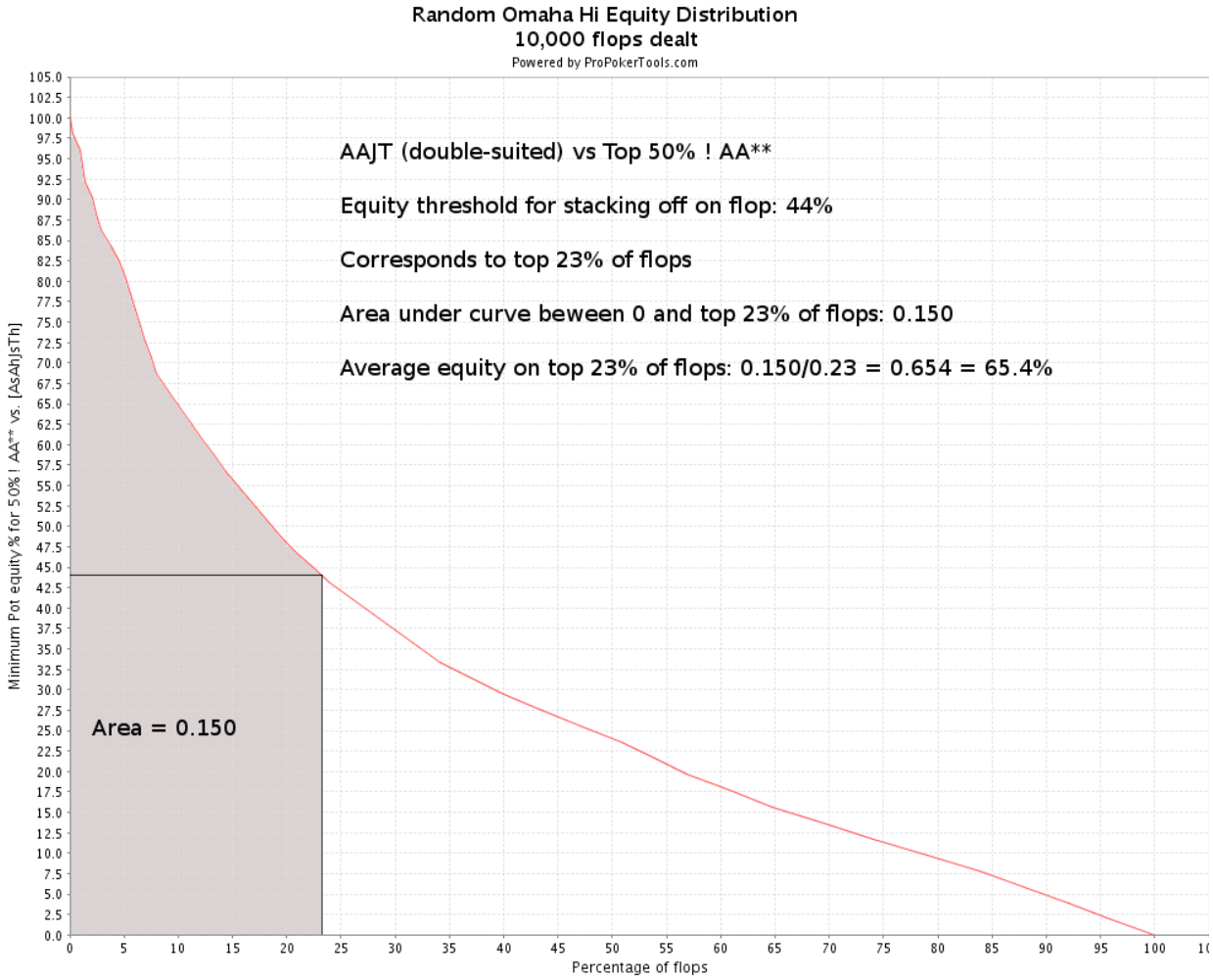
We find both *top_x* and *av_equity* from flop equity distribution graphs. Villain's average total EV for raising on the buton againstg our known AAxx hand is then:

```
EV (total)

= (1 - top_x)(-11 BB) + top_x[av_equity(200.5 BB) - 100 BB]
```

Below are the flop equity distribution graphs and calculations for Villain's top 50% range against our hands A♠ A♥ J♠ T♥ and A♠ A♥ 7♦ 2♣. For both hands we have first calculated the total EV from the moment Villain raises. Then we have also calculated the EV from the moment Villain calls the 3-bet (Villain then risks 7.5 BB preflop and a total of 96.5 BB, since the 3.5 BB raise now belongs to the pot, not to him).

**Top 50% vs AAJT (double-suited)**




EV (total)

= (1 - 0.23)(-11 BB) + 0.23[0.654(200.5 BB) - 100 BB]

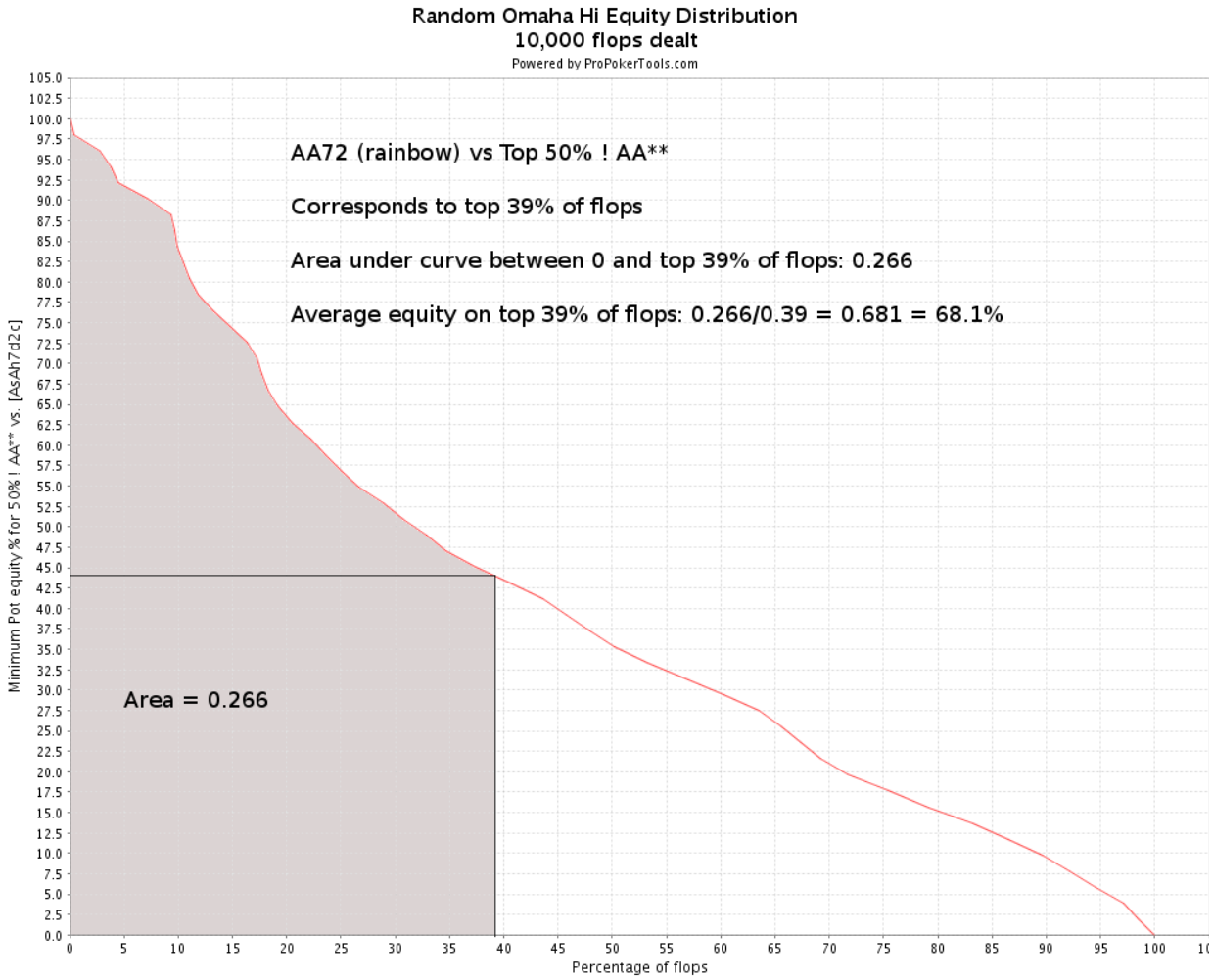
= -1.32 BB

EV (call 3-bet)

= (1 - 0.23)(-7.5 BB) + 0.23[0.654(200.5 BB) - 96.5 BB]

= +2.18 BB

**Top 50% vs AA72 (rainbow)**




EV (total)

= (1 - 0.39)(-11 BB) + 0.39[0.681(200.5 BB) - 100 BB]

= +7.54 BB

EV (call 3-bet)

= (1 - 0.39)(-7.5 BB) + 0.39[0.681(200.5 BB) - 96.5 BB]

= +11.04 BB

**An interesting conclusion**

Our model first tells us that Villain can not profit (overall) by getting involved against our premium A♠ A♥ J♠ T♥. Even with perfect information, perfect flop play, and maximum implied odds he loses -1.32 BB when he chooses to raise against our premium AAxx hand.

But when we 3-bet trashy A♠ A♥ 7♦ 2♣, Villain actually makes +7.54 when he raises, even if he know we have AAxx, and even if he knows he will get 3-bet every time!

We also see that it is profitable for Villain to call the 3-bet against A♠ A♥ J♠ T♥, even if he loses chips overall against this hand. He loses from the moment he raises preflop, but when he has been 3-bet, he loses less by calling and continuing in the hand, than by folding preflop.

What can we conclude from these data?

First of all, it's abundantly clear that the value of premium side cards is huge when we build a big preflop pot with AAxx out of position. We have to keep in mind that when we 3-bet AAxx in the real world, AAxx with unknown (and therefore uninteresting) side cards is the first hand Villain will put us on. Giving away this information hurts us badly when the AA part of our hand is the only part worth anything.

In other words: Playing against our 3-bet as if we only had the two AA cards is a small mistake when the two side cards are bad (e.g. 72 offsuit). But it's a big mistake by Villain to ignore our side cards when they are valuable (e.g. double-suited JT).

Furthermore, we see that setting ourselves up for having to c-bet a lot of flops (which we have to do when we 3-bet heads-up out of position) is a problem for bad AAxx. In reality we will of course not stack off on any flop like we did in the model, but out of position we still have to c-bet a lot of flops, including a lot of flops where we have poor equity.

Being "forced" to c-bet flops out of position is less of a problem with premium AAxx, since these hands often hit a piece of the flop, thus often giving us enough equity to profitably bet and get the rest of the stack in. But with bad side cards, we often have poor equity, and as a result we often have to choose between bet-folding or getting the stack in with insufficient equity.

Finally, we observe that the value of perfect information is huge. Villain played a very wide top 50% range against us, and he still managed to make a solid profit against trashy AAxx. The top 50% range includes a lot of rough hands like   (ProPokerTools calculation), but still it was possible to play the range profitable against trashy AAxx with perfect information. Furthermore, we saw that Villain could call the 3-bet profitably both against premium and trashy AAxx, although he lost overall against  (but he lost less by calling the 3-bet than by folding)

We therefore conclude:

*Habitually 3-betting trashy AAxx hands out of position with 100 BB stacks is not good for you!*

*Telling Villain that you have AAxx out of position makes it easy for him to play wide range of weak hands profitably against you, even if you 3-bet preflop, and even if he is a substantial underdog preflop*

The observant reader will of course see that the problem of having a well defined 3-betting range can be solved by also 3-betting non-AAxx hands. But this does not solve the problem of not finding enough good flops to stack off on when we have AAxx with bad side cards.

Even when we 3-bet a range of hands, Villain will often put us on AAxx anyway (and he ignores the side cards). And when AA with worthless side cards is what we actually have, he will be able to play very well against us postflop.

## 4. Playing against a 3-bet

Until now, we have seen several examples of preflop play and postflop play in pots where *we* 3-bet. Now it's time to turn the tables and study scenarios where we raise and get 3-bet. The first thing we want to know is:

*With which hands should we call a 3-bet?*

With 100 BB stacks, we have already concluded that we can 4-bet all AAxx hands (see the discussion about unexploitable 4-betting with AAxx in Part 3). In Part 6 we will also look at 4-betting with non-AAxx hands against opponents who 3-bet us with a wide range. So what remains are the non-AAxx hands we call and fold with after a 3-bet. This will be the topic for the rest of this article.

We start by looking at two types of hands that should be folded to a 3-bet. Then we shall discuss playing against a tight 3-betting range and against a loose 3-betting range.

### 4.1 Problem hands in 3-bet pots: Dry pairs and speculative Axxx hands

Let's talk about two types of hands that perform poorly when we get 3-bet: Dry pairs and speculative Axxx hands.

Pairs with bad side cards (e.g.  ) and speculative Axxx hands (e.g.  ) don't perform well in 3-bet pots. There are several reasons for this:

- These hands have a hard time finding more good flops to stack off on as the preflop pot grows in size

- They play poorly aainst AAxx, since AA has them dominated
- They also perform poorly in general against other premium 3-betting hands

Remember, the bigger we build the pot preflop, the more important it becomes to find good flops we can profitably continue on. Hands that perform well in big pot scenarios are therefore hands that hit lot of flops fairly well, not hands that hit a few flops hard.

Therefore, when we build big pots, we prefer suited and coordinated hands that often hit a piece of the flop. The hands that perform poorly in big pots are the hands that rely more on implied odds when played for showdown equity. K♠ K♥ 7♦ 2♣ or A♠ T♥ 9♠ 2♦ are examples of such hands.

If we don't have much steal equity (and we usually don't, after we get 3-bet), we need good showdown equity to compensate. And in big pots we want hands that *quickly* make something good enough to continue with. Conversely, we don't want to play 3-bet pots based on showdown equity with either-or hands like dry pairs (usually flops a set or nothing) and speculative aces (mostly flop weak one pair hands and occasionally a flush draw if the ace is suited), since these hands mostly miss the flop.

To illustrate these principles (in case some of you still are tempted to call 3-bets to set-mine with hands like K♠ K♥ 7♦ 2♣) we'll do a model study with flop equity distributions. We assume we raise a dry pair or speculative Axxx and get 3-bet, and then we call to play fit-or-fold on the flop.

Here is our model:

- You raise pot to 3.5 BB with with K♠ K♥ 7♦ 2♣ or A♠ T♥ 9♠ 2♦ in CO
- Button 3-bets pot to 12 BB with AAxx, and the blinds fold
- Can we call profitably for implied odds if we know that button has AAxx and that he will bet-call every flop?

Assume we call the 3-bet (8.50 BB more). The pot is now 25.50 BB on the flop. Both started with a 100 BB stack, and there is 88 BB left to play. We know that button has AAxx, and we also know that he is totally committed postflop. He will c-bet all flops if we check, and then he always call an all-in checkraise.

Our postflop plan is therefore to never bluff, but to checkraise button all-in whenever we flop sufficient equity. We risk 88 BB to win 25.50 BB + Villain's 88 BB = 113.5BB. Effective pot odds are 113.5:88 = 1.29:2, so we need 1/(1.29 + 1) = 0.44 = 44% equity on the flop to profitably checkraise all-in.

So we checkraise all-in on *top_x*% where our average equity is *av_equity*. Then we are all-in in a 201.5 BB pot wher we have invested 8.5 BB + 88 BB = 96.5 BB from the moment we decided to call the 3-bet

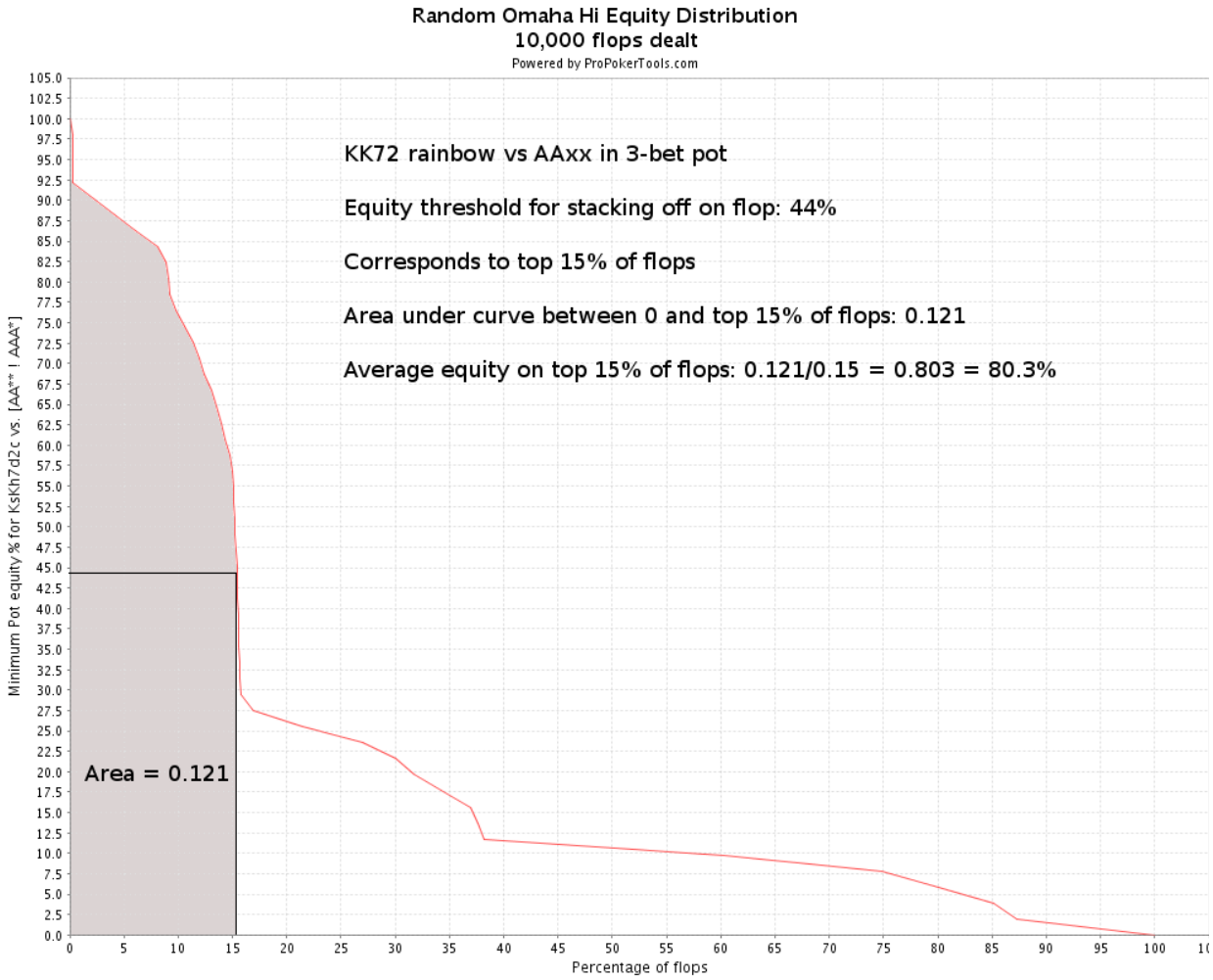
The EV for calling the 3-bet in this model is:

```
EV (call 3-bet)

= (1 - top_x)(-8.5 BB) + top_x[av_equity(201.5 BB) - 96.5 BB]
```

Below are the flop equity distributions and EV calculations for calling a 3-bet with K♠ K♥ 7♦ 2♣ and A♠ T♥ 9♠ 2♦ against AAxx. Note that we use the notation AA** ! AAA* for Villain's hand in the ProPokerTools calculations (this eliminates AAAx hands that Villain would probably not 3-bet):

**KK72 (rainbow) vs AAxx**

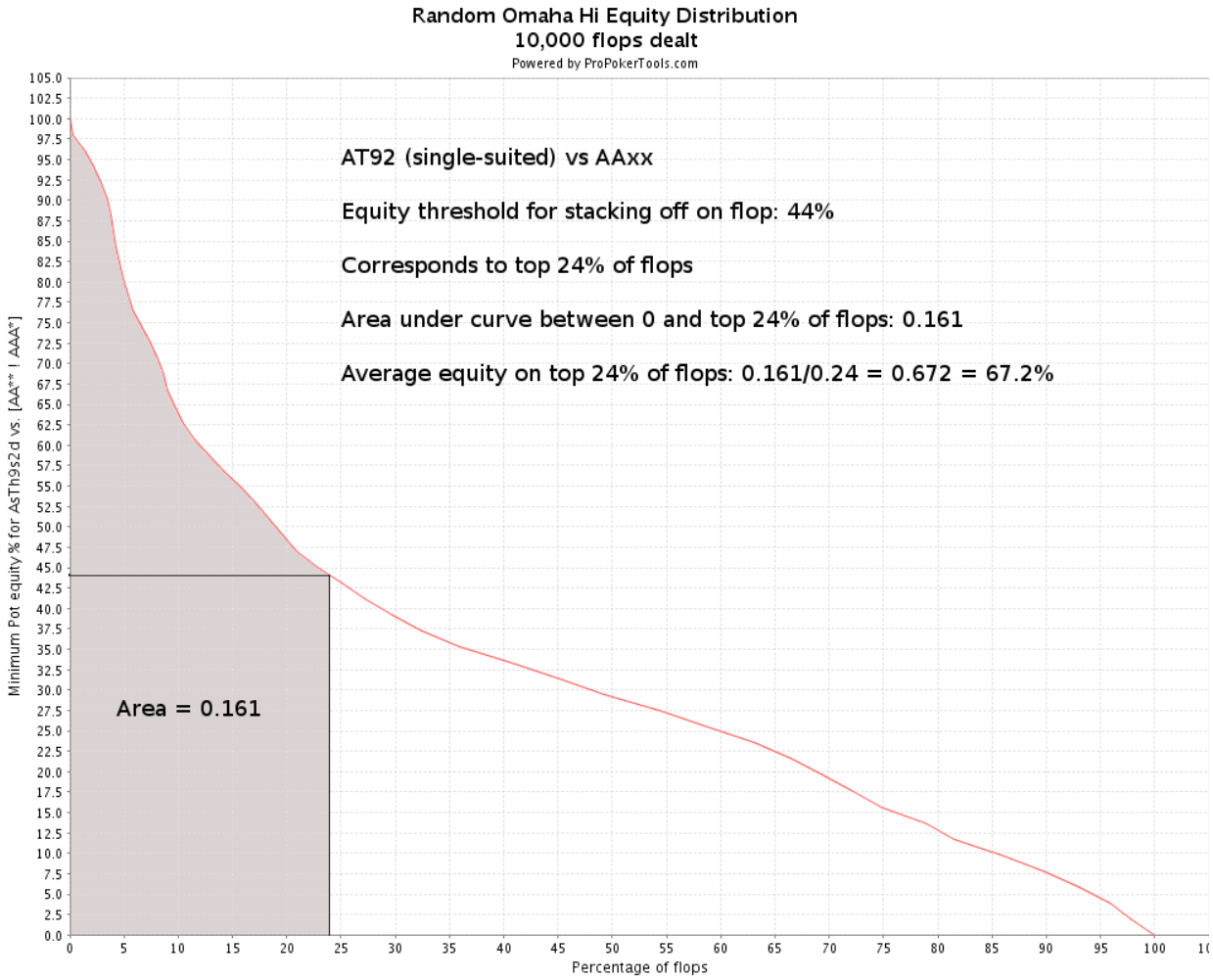



EV (call 3-bet)

= (1 - 0.15)(-8.5 BB) + 0.15[0.803(201.5 BB) - 96.5 BB]

= +2.58 BB

**AT92 (suited ace) vs AAxx**




```
EV (call 3-bet)

= (1 - 0.24)(-8.5 BB) + 0.24[0.672(201.5 BB) - 96.5 BB]
```

= +2.86 BB

**Results from the model study**

We observe that both K♠ K♥ 7♦ 2♣ (+2.58 BB) and A♠ T♥ 9♠ 2♦ (+2.86 BB) can call a 3-bet with marginal profit *under the conditions described in the model*. Does this mean these hands are suitable for calling and playing fit-or-fold on the flop when they get 3-bet?

In reality, no. Some reasons for this are:

- The model presumes perfect information about Villain's range (he only 3-bets AAxx)
- The model presumes maximum implied odds
- The call is only marginally profitable, even under ideal conditions

For example, a competent Villain will sometimes bet-fold his AAxx correctly when you have flopped really well and he has poor equity. If he bets pot on the flop (25.5 BB) and folds to your all-in checkraise, he will escape with more than half of his stack intact. This reduces your implied odds (if Villains bet-folds some flops, he also increases your steal equity, of course, but we're assuming you're using a fit-or-fold strategy here). Other times he will use position, check behind on the flop, and save chips that way.

Another thing this model does not account for is players 3-betting a range of hands. Perfect flop play is only possible with

perfect information. If we can't put Villain on AAxx with a high degree of certainty, we will unavoidably make big postfloph mistakes when we use a fit-or-fold strategy.

For example, we will check-fold a lot of flops where we should have checkraised (for example, with KK72 on an A J 4 flop when Villain 3-bet us with a rundown hand like JT98). We will also sometimes call a 3-bet we should have folded preflop (for example, when we have KK72 and Villain has 3-bet AKKQ and has us totally crushed).

**Conclusion from the model study**
When you raise pairs with bad side cards ( K♥ 7♦ 2♣ , J♠ T♦ T♠ 4♥ , etc), or speculative Axxx hands ( A♠ T♥ 9♠ 2♦ , A♦ K♦ 9♠ 5♥ , etc.), fold these hands to a 3-bet, both on position and out of position.

Continuing to the flop, planning to play fit-or-fold, might be marginally profitable under ideal conditions, but is more likely a big mistake. You will unavoidably set yourself up for a lot of tricky postflop decisions with these problem hands, and when you're forced to think your way out of a tricky spot, you will often make a mistake.

Now that we have gotten these two common fold-scenarios out of the way, let's discuss the decision to call or fold to a 3-bet in more general terms.

## 4.2 Some general principles for calling 3-bets
Before we assess the quality of our hand, we should think about the circumstances surrounding the situation:

**Call more often in position than out of position**
Position increases the profitability of all starting hands. Some calls that are unprofitable out of position will be profitable in position. Some of the reasons for this are:

- It's easier to control pot size in position (and controlling pot size is important for marginal hands). We win more when ahead and lose less when behind.
- Position gives us more and better opportunities to steal the pot

An important concept related to position is the fact that *the 3-bettor out of position is setting himself up for having to blindly c-bet a lot of flops*. This increases the implied odds for the player in position. We touched upon this topic in the model study where we 3-bet premium and trashy AAxx previously in this article.

**Call more often against a bad opponent**
If Villain is a bad player who often makes postflop mistakes; this is an argument for playing more hands against him (and conversely, folding more hands against a competent player). The classic example is a player who overplays bad AAxx hands postflop, and commits way too often with an ovepair and little else.

This was an important part of the model study when we 3-bet trashy AAxx preflop. 3-betting bad AAxx is a mistake in itself, and we compounded the error by committing on all flops. This made it very profitable for Villain to call our 3-bet.

**Call more often against a well-defined 3-betting range**
Reliable information about Villain's range makes it easier to play profitably against him. The extreme case is a player who will only 3-bet AAxx.

This was the most important component of the model study of 3-betting with AAxx. Villain had perfect information about our range (and our range was only one hand), and as a consequence, he was able to play the flop perfectly. This allowed him to call the 3-bet profitably with a very wide range of hands, even when we 3-bet a premium hand. We also observed that giving away information about our hand is a bigger problem for weak hands than for premium hands.

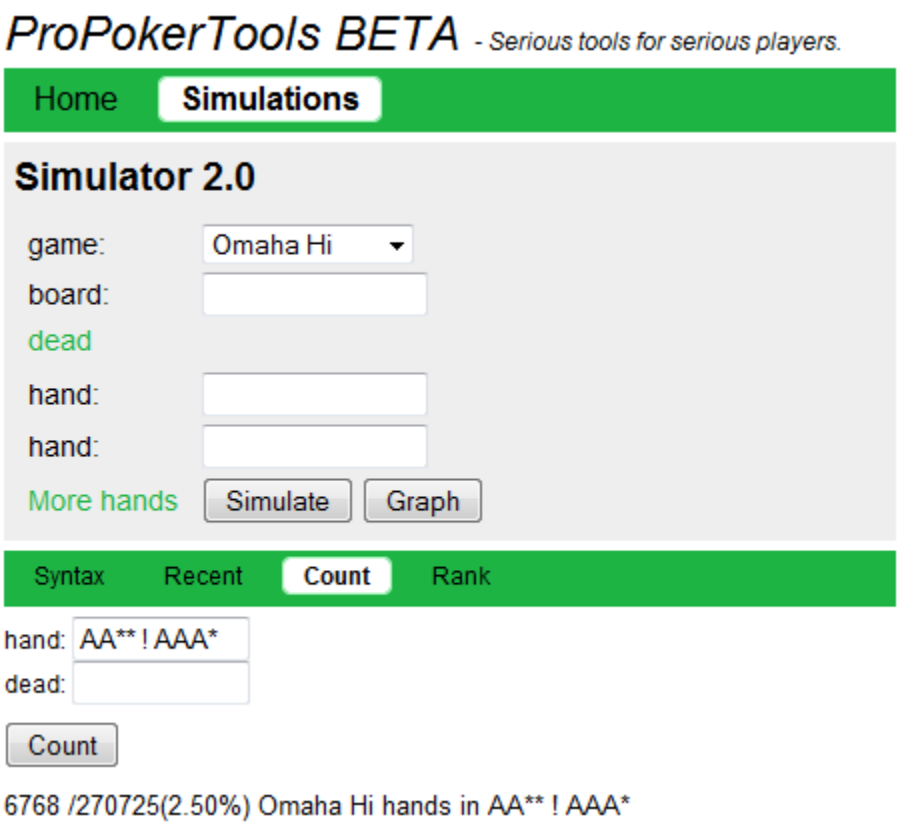
## 4.3 When we get 3-bet by a tight range
By tight range, we mean getting 3-bet by a range weighted heavily towards AAxx hands. Agains a tight 3-bettor our first reaction might be to fold a lot, since his range is strong, but let's think about what tight 3-betting means.

For starters, even if Villain's range is tight, we will still have decent equity with a wide range of weak hands. This is Omaha, not Hold'em, and one starting hand rarely has more than 60% preflop equity against another hand. Also, the most important property of a PLO starting hand isn't all-in preflop equity *but the distribution of equities the hand flops* (i.e. the hand's flop equity distribution graph)

For example, K♠ K♥ 7♦ 2♣ is technically a favorite with 51% preflop equity against J♠ T♥ 9♠ 8♥ (ProPokerTools calculation). But K♠ K♥ 7♦ 2♣ plays poorly in 3-bet pots, while J♠ T♥ 9♠ 8♥ really shines

in heads-up big pot scenarios, since it hits a lot of flops.

Then think about the fact that tight 3-betting gives us *information about Villain's range*. The most extreme case is an opponent who only 3-bets AAxx. The probability of getting dealt any AAxx hand is 2.5%, as shown in the ProPokerTools calculation below (use the beta version of ProPokerTools to get access to the "count" function):




(Note that we have removed the unplayable combinations AAAx and AAAA using the ProPokerTools notation AA** ! AAA*.)

Therefore, against a 3-bet% of 2.5% or lower (and we find this stat in PT3 HUD or HEM HUD) we are very likely to be up against AAxx. This makes it easy to call profitably with a wide range of speculative hands, particularly in position, since this forces Villain to c-bet a lot of flops into us, which gives us implied odds.

As previously mentioned, we fold pairs with poor side cards and speculative Axxx hands to a 3-bet. But beyond these hands we can call tight 3-bets with a wide range of speculative hands when we suspect Villain is only 3-betting AAxx. All suited hands with a minimum of coordination are candidates.

Another way for Villain to be tight is by giving up too easily postflop, and/or having poorly balanced postflop lines. For example, if he checks and gives up on lots of flops when he misses, we will get more opportunities to steal. And he makes it worse for himself by also using poorly balanced lines, we can rob him blind postflop.

For example, playing against a Villain who bets the flop when he thinks he has good equity, and otherwise checks (and almost never checkraises), is like stealing candy from a baby.

**How to plan against a tight 3-bettor**

Against a tight 3-betting range heavily weighted towards AAxx, we can call with a wide rage of speculative hands under the assumption that Villain's well-defined range will be easy to play against postflop (as demonstrated in the model study of 3-betting premium and trashy aces previously in this article).

This is very much the case against a Villain who only 3-bets AAxx, particularly if he also overplays them postflop. Because then we know what we have to beat, and we're getting good implied odds for trying to outflop his aces. We fold bad pairs and bad Axxx hands and call with pretty much all other speculative hands in our range, planning to play mostly fit-or-fold on the flop.

Against a tight 3-bettor who is also tight and easy to read postflop, we have even more reason to call with a lot of weak hands, particularly in position. We can now also plan around steal equity, and not only around playing fit-or-fold. So we call not only to look for good flops, but also to do some bluffing when Villain checks and gives up on the flop. This is obviously easier to pull off in position.

In general, we won't do much bluffing when we miss the pot, particularly out of position. The exception is when Villain plays weakly postflop and gives us opportunities to steal. For example, if we know that he is always weak when he checks, we can bluff a lot when he does. Without this kind of specific information, we mostly give up on the flops where we miss completely.

Below are two examples of calling a 3-bet from a tight 3-bettor who probably has AAxx:

### Example 4.1: Calling a 3-bet in position against likely AAxx - Should we bluff the flop?

$10PLO
6-handed

You ($12.50) raise pot to $0.35 with J♠ 7♠ 6♥ 4♥ on the button, small blind ($9.95) 3-bets pot to $1.15, you call. Small blind has a 3-bet% of 1.8, and you have previously seen him bet-call AAxx on the flop in heads-up pots.

**Flop:** T♠ 2♥ 2♣ ($2.40)
Small blind ($8.85) checks. What is your plan?

The preflop play is straightforward. We suspect small blind to be a member of the group of players who only 3-bet AAxx, and out of position he probably has a premium AAxx hand. But we have a double-suited speculative hand that's rarely dominated by Villain's hand, and we will find plenty of flops where we can commit profitably (and if we want to, we can use flop equity distribution data to "prove" it).

The flop comes dry and rainbow, and small blind checks. We obviously have nothing, but Villain is also signalling weakness. Is this a good spot for a bluff?

Probably not. Villain's check is probably done precisely to induce bluffs. He often has AAxx here, and on this kind of flop he isn't worried about being beat. The flop contains a pair, but it's a low pair, so it's unlikely we flopped trips (there aren't that many 2xxx hands in our range, even if we are raising a wide range on the button). And we rarely have TTxx as well, so Villain should assume he is almost always ahead on this flop.

But he also knows that we will fold most hands to a c-bet. So his check probably means he wants us to bluff, so that he can call (or checkraise) to extract some value from our worthless hands. This is not a bad plan, since there aren't many worse hands we can call with, and since this is one of the few flops where weaker hands are far behind Villain's AAxx.

So if we bluff this flop, we will probably get called. And in a 3-bet pot with 100 BB stacks we have little *leverage* with only 2 bets remaining, and therefore little steal equity. To bluff Villain off an AAxx hand on this flop, we would need deep stacks (it's hard to check-call 3 big bets with unimproved AAxx, even on a safe flop like this one). It would also have helped if the flop had given us a better opportunity to *credibly represent a strong hand* (for example, it would have been easier to represent trips on a T T 2 flop than on a T 2 2 flop).

So we check behind.

**Flop:** T♠ 2♥ 2♣ ($2.40)
Small blind ($8.85) checks, you ($11.35) check.

**Turn:** T♠ 2♥ 2♣ Q♦ ($2.40)
Small blind ($8.85) bets $1.50, you ($11.35) fold.

Nothing changes on the turn. Villain now probably bets his AAxx for value, and we let him pick up the pot.

### Example 4.2: Calling with a speculative hand out of position against likely AAxx - Playing two pair + draw postflop

$10PLO
6-handed

You ($10) raise pot to $0.35 with 9♠ 8♥ 7♦ 5♠ from UTG, CO ($10) 3-bets pot to $1.20. He has a 3-bet% of 2.1%, and he seems to be c-betting every flop heads-up. What is our plan?

We have a good, speculative hand, so we would call regardless. Here we have extra incentive to get involved with a good rundown hand, since we expect Villain to have AAxx most of the time. And our hand plays very well against AAxx. So we call, planning to play mostly fit-or-fold on the flop.

Our read of Villain's c-bet frequency heads-up can come in handy. If we can rely on him betting the flop, we can go for a checkraise, and get all our stack in when we hit the flop (or pick up the pot if he folds to the checkraise). This is good for us, since we then avoid tricky decisions out of position on later streets with chips left to play.

Note that even when we flop a decent hand, we will often find ourselves in tough spots postflop, simply because we're out of position. Heads-up with position we usually get the opportunity to raise c-bets all-in, but out of position, a competent Villain will also frequently check behind.

Having the opportunity to check behind enables Villain to lose less when behind, and he will also set us up for difficult turn decisions with marginal hands. We remember from Example 3.3 that checking behind with a balanced range that includes some decent hands will make Villain tough to play against on the turn, even if he has signalled weakness by checking (we can not bluff every turn with impunity).

At any rate, we call the 3-bet and see a flop heads-up.

**Flop:** K♦ 8♣ 5♦ ($2.55)
What is your plan?

Let's first estimate our equity. We have bottom two pair + a gutshot. If Villain has AAxx, we will usually be ahead with our two pair. Villain then has 5 outs (2 aces, 3 kings) to top set or a better two pair. On a blank turn, he picks up 3 more outs to a better two pair. Also, his side card will provide him with some equity, and if he has a flush draw, he is in good shape.

It's difficult to estimate exactly how much equity we have against random AAxx, but with a decent made hand and a nutty weak draw, we should have solid equity on the flop. A ProPokerTools calculation confirms this, and we have 65% equity on the flop against random AAxx.

We definitely want to get our stack in on this flop, and the question is how to achieve this. In position we could have raised Villain's c-bet all-in or bet when checked to. But out of position we have a decision to make, and we have to choose between betting and checkraising.

Fortunately, we have a read that helps us. We know that Villain can be relied on to c-bet heads-up, so it seems best to check to him and go for a checkraise all-in.

**Flop:** K♦ 8♣ 5♦ ($2.55)
You ($8.80) check, CO (8.80) bets $2, you checkraise pot to $8.55, CO folds.

A nice result, and we're definitely not unhappy about winning the pot on the flop (bottom two pair + a gutshot is not a monster against the hands that call us on a 2-flush board). Villain might have made a mistake if he bet-folded AAxx, since he got almost 2:1 in effective pot odds to get the rest if his stack in. With a little more than 33% equity, he should have called, and we saw that random AAxx had 35% equity on this flop.

### 4.4 When we get 3-bet by a loose range

With loose 3-betting we mean 3-betting with a solid and balanced range of mostly AAxx and other good hands (like our 3-betting range). We then 3-bet a mix of AAxx (but not all AAxx), premium Broadway hands, and good speculative hands (rundowns and suited ace + rundown). And occasionally we 3-bet semi-trash hands, mostly as a bluff.

A solid and balanced 3-betting range is hard to exploit, both because it can hit almost any flop, and because it dominates many of the weak, speculative hands that calls to try and outflop it. A solid and balance 3-betting range in the hands of a competent player can give us serious problems postflop if we call the 3-bet with a very wide and weak range.

For example, against a Villain who only 3-bets AAxx, always c-bets the flop heads-up, and bet-calls too often when he gets raised, you can call the 3-bet with a hand like T♦ 8♠ 7♠ 4♦ , and raise all-in on a flop like J♠ T♠ 6♥ without feeling nauseated when Villain calls. You have 59% equity against random AAxx (PropokerTools calculation), and you expect random AAxx to make up most of Villains range.

But against a competent Villain who 3-bets a balanced range of good AAxx, suited and coordinated high card hands, and premium speculative hands, you will be in much worse shape when he bet-calls your non-nutty hands/draws on this kind of flop.

For one, a competent player will not often bet-call AAxx on draw-heavy flops unless he has something to go along with it. And since he's only 3-betting good aces, he will often have extra pieces of equity in addition to his overpair. And if he bet-calls with a non-AAxx hand on a draw-heavy flop, you can expect him to have hit it at least as well as you.

So compared to a bad opponent with only AAxx in his range, a competent opponent with a solid and balanced 3-betting range will both have better average equity when he c-bets, and better average equity when he calls your all-in raise. This is because:

- A competent Villain is more picky about c-betting flops, and will bet less often with poor equity
- His bet-call range will contain more good speculative hands that have your weak speculative hands dominated, even if your weak speculative hands hand play well against the AAxx part of his range

So against a loose, but solid and balanced 3-betting range, we should tighten up our calling standard somewhat to avoid setting ourselves up for being at the wrong end of postflop coinflips. When we get all-in in a heads-up 3-bet pot, we will mostly find ourselves in coinflip scenarios of the 55/45 kind, or 60/40 if we're lucky.

Often getting the 45 or 40 end of these conflips is costly. To avoid it, we have to cure the problem at its root, and play fewer weak, speculative hands preflop when we suspect we're up against a solid and balanced 3-betting range. Also, as mentioned previously, a competent opponent is another reason to tighten up a bit.

We end Part 5 with two examples where we get 3-bet by a competent Villain with a loose, but assumed solid and balanced range:

#### Example 4.3: Calling with a premium high pair in position against a loose 3-betting range - Playing an overpair + weak draws on the flop

$10PLO
6-handed

You ($10) raise pot to $0.35 with K♦ K♣ Q♦ J♣ on the button, and the big blind ($9.90) 3-bets to $1.10. Villain is a solid, aggressive player with a wide 3-betting range in position, and he also 3-bets premium non-AAxx hands out of position heads-up. What is your plan?

Previously in this article we stated that we should fold bad pairs and speculativce Axxx hands to a 3-bet. Paired hands in general can be difficult to play in 3-bet pots (having a pair in our hand makes it less likely we'll connect with the flop), but here we have a premium pair with suited and connected side cards, and we have position. Furthermore, we know that Villain 3-bets a wide range heads-up, including some speculative hands (like QJT9) that we have good equity against.

So this is definitely not a scenario where we will fold a premium high pair to a 3-bet. Also, against a very wide 3-betting range, good KKxx hands are candidates for light 4-betting (and we'll discuss this in Part 6). But here we make the obvious play, call in position and wait for profitable postflop scenarios to present themselves.

**Flop:** J♠ 6♣ 6♦ ($2.25)
Big blind ($8.90) bets $1. What is your plan?

This is a dry and uncoordinated flop which is good for your overpair *if Villain doesn't have AAxx*. It's also a flop where Villain is expected to c-bet most of his range, so his flop bet doesn't narrow down his range much.

We probably have decent equity against Villain's range (we have an overpair + top pair + 2 backdoor flushdraws + backdoor straight draw) and many turn cards will improve us. But raising probably won't do us much good. After all, Villain's range contains many AAxx hands (which have us crushed), and we can't expect to have good equity against the hands that call our raise. Also, we'll be far ahead of the part of his range that will fold to our raise, so it's not a big problem for us that these hands get to see the turn.

**Flop:** J♠ 6♣ 6♦ ($2.25)
Big blind ($8.90) bets $1, you ($8.90) call.

**Turn:** J♠ 6♣ 6♦ A♦ ($4.25)
Big blind ($7.90) checks. What is your plan?

An interesting turn card, since it both reduced our overpair to an underpair and gave us a flush draw. If Villain is slowplaying AAxx, we're drawing dead. If he is going for pot control with top pair, we probably have 11 outs. If he has anything weaker than top pair, we're far ahead.

This means we're in a scenario where we have good equity against many of Villains hands, but it doesn't make much sense to bet for value (we don't have a strong hand, and if we get called, we're probably beat). It doesn't make much sense to bet as a bluff either since we don't expect better hands to fold and we're far ahead of the hands that would check-fold.

Since there is some risk of Villain slowplaying a monster or going for pot control with a slightly better hand, and since we don't want to get checkraised out of the pot when we have some outs, we can take a free card and then play the river. We don't have any immediate plans to make hero calls on the river, but we might.

**Turn:** J♠ 6♣ 6♦ A♦ ($4.25)
Big blind ($7.90) checks, you ($7.90) check behind.

**River:** J♠ 6♣ 6♦ A♦ 8♦ ($4.25)
Big blind ($7.90) checks. What is your plan?

A very interesting river card. We now have the nutflush on a paired board, and it seems highly unlikely that Villain is slowplaying a full house on both the turn and river. So we are almost always ahead, and we must consider a valuebet.

The value of a river bet depends on one thing: *How often are we ahead when Villain calls?*

We need to win more than 50% of the times we get called to profit from betting. There probably aren't many check-calling hands in Villain's range, but since we're extremely certain we're ahead, we can let Villain worry about finding hands to call us with. We're not worried about bluff checkraising (at least we don't have any reason to be), and a valuebet therefore won't put us in a tough spot.

We make a moderate valuebet to give Villain the chance to snap off a possible bluff with his top pair hands and low flushes.

**River:** J♠ 6♣ 6♦ A♦ 8♦ ($4.25)
Big blind ($7.90) checks, you ($7.90) bet $2, Villain folds.

Oh well, at least we gave him the opportunity to call with something.

### Example 4.4: A very speculative hand OOP against a loose 3-betting range

$10PLO
6-handed

You ($14.70) raise pot to $0.35 with K♦ J♦ 8♠ 7♥ in CO, button ($13.20) 3-bets pot to $1.20. Button is a solid, aggressive player who 3-bets a wide range (including the occasional bluff 3-bet), but most of his 3-bets are premium high card hands and good, speculative hands. What is your plan?

You ventured a loose open-raise in late position, and got 3-bet by a competent player with position on you, so fold this semi-trashy hand right away. You have a suit and some coordination, but you don't have much nut potential. To add to your problems, your hand plays poorly against the AAxx, premium Broadway hands, and premium speculative hands in Villain's range.

Calling to play make-a-hand poker out of position with a weak hand will only set you up for postflop headache. Also, you are starting the hand 130 BB deep, which is another argument for playing tight with weak hands out of position. So concede this pot to Villain, and move on to the next hand.

Note that if Villain often 3-bets your CO raises from the button, you should adjust. You can tighten up your raises, and/or you can start 4-betting more (you start 4-betting with premium non-AAxx hands).

This example provides a convenient transition point to Part 6, where we'll discuss 4-betting against loose 3-bettors with a range of AAxx and premium suited and coordinated Broadway hands (for example, premium AKKx and AQQx). So this is a good place to end Part 5.

## 5. Summary

In this article we have continued our discussion of 3-betting that we started in Part 4, and we have also begun discussing postflop play.

We have now discussed 3-betting thoroughly, and we have defined ranges for 3-betting, and talked about good thought processes for playing 3-bet pots, both preflop and postflop. We have used heads-up scenarios with 100 BB stacks to illustrate important postflop concepts.

In Part 6 we will gve 4-betting and playing against a 4-bet the same systematic treatment. This is a somewhat simpler topic than 3-betting when playing 100 BB stacks, and we shall see that 4-bettting strategy with 100 BB stacks is based mostly on mathematics and assumptions about our opponents range (in other words, it's not an art form, it's something that can be easily taught).

Towards the end of Part 6, we will go through a series of examples with 3-bet and 4-pots to practice using the concepts we have learned.

Good luck!
Bugs

# Part 6: 4-betting and Defending Against a 4-bet

## 1. Introduction

This is Part 6 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

Part 6 is a rather technical article where we'll study a narrow topic thoroughly:

- 4-betting
- Playing against a 4-bet

When we say "technical", we mean that the discussion will revolve around mathematics, flop equity distributions, and simple assumptions about opponent ranges. The reason is that with 100 BB starting stacks, we have 1 pot-sized bet left after a 4-bet (assuming all raises up to this point were pot-sized). So the postflop play (if there is any) comes down to making range/pot odds decisions.

This means two things for us:

**1.** 4-bet pots with 100 BB stacks are big pots, and big pots are important pots
**2.** Correct play in 4-bet pots with 100 BB stacks can be well described by (relatively) simple mathematics

Strategy that is technical and cut-and-dried is easy to learn. Therefore the topic 4-betting/playing against a 4-bet gives us plenty of "low hanging fruit", and leaks in this area (e.g. folding too easily on the flop in heads-up 4-bet pots) are often easy to fix.

We already have the necessary tools (flop equity distributions, pot odds/equity, ProPokerTools), and everything we do in this article have been discussed in previous articles. Those who need to brush up flop equity distributions can reread Part 3.

To keep the discussions simple with focus on the most important concepts, we will assume we're playing with 100 BB stacks throughout this article, and we'll look at play heads-up outside the blinds. In other words, we'll be studying heads-up scenarios where:

- We raise and get 3-bet by a player with position on us
- We 3-bet a raiser we have position on, and he 4-bets us

We discuss 4-betting first, then playing against a 4-bet. We'll illustrate the theory with examples along the way.

## 2. 4-betting

As an introduction to the topic, let's look at an example scenario:

### 2.1 Example of getting 3-bet by a loose range

$10PLO
6-handed

You ($10) rase to 3.5 BB with  in CO, button ($15.20) 3-bets to $1.20 BB, and it's folded to you. You have only played 60 hands against button, but you have already seen him 3-bet 4 times in position with speculative hands that went to showdown. You suspect he has a wide range for speculative 3-betting and bluff 3-betting in position. What is your plan?

First, let's think about how this scenario would have played out against an opponent who only 3-bets AAxx:

Against a Villain who only 3-bets AAxx, we have at most 34% preflop-equity against a random AAxx (ProPokerTools calculation) with a hand that has both a pair and an ace in it. 4-betting is therefore out of the question, since we will get 5-bet and be forced to call off the rest of our stack as a big underdog (we have to call since we'll be getting > 2:1 pot odds as less than a 2:1 underdog)

If Villain 3-bets all AAxx and then overplays them postflop, it will be mathematically possible to play this premium pair profitably by calling and playing fit-or-fold postflop (and we can show this using modelling with flop equity distributions), and we can consider a call in this case. But if Villain only 3-bets good AAxx and plays them well postflop, he will keep our implied odds to a minimum, and we'll have a hard job making this a profitable call for us.

So regardless of how nice our hand looks, we have good arguments for folding it against a competent player who only 3-bets good AAxx, if the alternative is to call and play fit-or-fold out of position. At any rate, if we get 3-bet by AAxx, we have a close and tricky decision with our premium hand, regardless of Villain's tendencies. But what happens when Villain 3-bets a wide range?

Against a Villain who exploits his positional advantage by 3-betting a wide range of non-AAxx hands, we clearly can not fold. We have a hand that dominates a large portion of Villain's hands pretty hard, and we will often flop the best hand, the best draw, or both. So we should at least call.

Is calling the best choice? Not necessarily, since calling sets us up for playing postflop out of position with almost 90% of the stack intact. This gives Villain more opportunities to use his positional advantage postflop.

But what if we 4-bet pot to $3.75? Now we eliminate Villain's implied odds, since a call from him sets us up for flopping at least an overpair in a scenario where we have less than one pot-sized bet left in the stack. Note that we have to call if he 5-bets all-in, since we'll be getting pot odds $13.9:$6.25 = 2.22:1 (we need 31% equity, and we have 34%).

But since Villain has a wide 3-betting range, and since we have an ace in our hand (which reduces the likelihood Villain has AAxx by half), he usually won't have AAxx. In this case he folds or calls. If he folds, great! If he calls, we have the best hand preflop, and we can play the rest of the hand as if we had AAxx. In other words, we can push any flop profitably, and Villain won't be able to do anything about it.

Thus, the most important factors are:

- Villain rarely has AAxx, since he 3-bets a wide range and we have an ace in our hand
- Our KKxx plays almost as well as AAxx against Villain's non-AAxx hands.

**Conclusion:**
We 4-bet pot to $3.75 BB. Villain calls.

**Flop:** T♠ 6♣ 3♥ ($7.50)
You have $6.25 left in the stack. What is your plan?

You have set yourself up for pushing any flop profitably, without Villain being able to exploit it, and this is one of the better flops for you. It's uncoordinated, and you have an overpair + outs to the only bettter pair + two backdoor flush draws and one backdoor straight draw.

**Flop:** T♠ 6♣ 3♥ ($7.50)
You ($6.25) push, button ($11.45) calls.

**Turn:** T♠ 6♣ 3♥ 7♠ ($20.15)

**Turn:** T♠ 6♣ 3♥ 7♠ 2♠ ($20.15)
You win with the nut flush. Button has T♥ 9♦ 8♥ 6♥. He flopped two pair, improved to a straight on the turn, but lost to our runner-runner flush.

Wo-ho! It might appear like we got lucky here, but did we? We had 65% equity preflop(ProPokerTools calculation), and got most of our stack in as a big favorite.

Villain then out-flopped us with top two pair, and the rest of the stack went in on the flop with only 34% equity (ProPokerTools calculation). But our flop play was mathematically correct, and we would have gone all-in even if we had seen Villain's hand, since we got pot odds > 2:1 as less than a 2:1 underdog.

Note that a significant portion of our flop equity (3 backdoor draws = 3 outs) came as a result of us starting with a premium coordinated hand. And it was one of the backdoor draws that saved us this time. For some, this will look like luck, but this is something we expect to happen a lot when we start with premium hands. Premium starting hands often flop extra pieces of equity in addion to the hand's main strength component, and this gives us more flops where we can commit profitably and realize all our equity.

We'll take the insights from this example with us and do a more thorough study of light 4-betting (i.e. 4-betting with non-AAxx hands) against a loose 3-bettor.

## 2.2 What is a loose 3-betting range?

Before we decide which hands to 4-bet against a loose 3-bet, let's first agree on what a loose 3-betting range *is*.

We start by dissecting our own range for 3-betting heads-up in position, and then we assign percentages to the different types of hands in this range. For this task, we use the "Count" function found in the ProPokerTools Beta Version.

From Part 4 we remember that the value part of our core strategy 3-betting range is:

- Premium AAxx, at least single-suited, with a pair, 2 Broadway cards, or a connector
- Premium Broadway wraps, at least single-suited, and preferably with an ace
- Premium KKxx, QQxx, JJxx, at least single-suited, and with connected side cards, or another high pair

For example:

- A♦ A♠ Q♦ Q♣
- A♣ A♥ K♣ J♥
- A♥ A♦ T♠ 9♦
- A♣ Q♠ J♠ T♥
- K♠ Q♥ J♠ T♥
- K♥ K♠ Q♦ J♠
- K♦ Q♦ Q♣ J♠
- Q♥ J♣ J♥ 9♣
- K♠ K♦ Q♠ Q♥

While the speculative 3-betting range is:

- Good, suited rundowns
- Suited aces with good rundowns

For example:

Let us be very specific and define a total 3-betting range, formulated in ProPokerTools notation, based on these definitions. We start by splitting the total range into non-overlapping sub-ranges (non-overlapping = each hand lies in one and only one sub-range).

For each sub-range we count the number of combinations and the percentage of all starting hands they make up (by dividing on the total number of Omaha hands, which is 270725). Finally, we calculate the total 3-bet percentage by summing the percentages for all the sub-ranges (and we can do this summation since the sub-ranges do not overlap).

### 2.2.1. Premium AAxx hands

Our starting point is the range of all AAxx hands (but not AAAx):

AA** ! AAA*
= 6768 /270725 (2.50%)

Then we define the range of premium AAxx hands as the range of all double-suited AAxx, plus all single-suited AAxx with either two Broadway cards, a pair, or a connector/one-gapper down to 76/86:

(AA** &(*s*s*h*h,*s*s*d*d,*s*s*c*c,*h*h*d*d,*h*h*c*c,*d*d*c*c)),
((AABB,AABT,AATT,AA99,AA88,AA77,AA66,AA55,AA44,AA33,AA22,AAT9,
AAJ9,AA98,AAT8,AA87,AA97,AA76,AA86) & (*s*s**,*h*h**,*d*d**,*c*c**))
!AAA*
= 2160 /270725 (0.80%)

under this definition, 2160/6768 = 0.32 = 32% of the AAxx hands are premium.

**2.2.2 Premium Broadway hands**
We define this as the range of any 4 cards T or higher, or any 4 cards 9 or higher with an ace (but not AAxx, TTxx, 99xx, or trips). We write this range as two sub-ranges:

Four cards T or higher:

(BBBB,BBBT) &(*s*s**,*h*h**,*d*d**,*c*c**)
!(AA**,KKK*,QQQ*,JJJ*,TT**)
= 2762 /270725 (1.02%)

Four cards 9 or higher with an ace:

(A9BB,A9BT) &(*s*s**,*h*h**,*d*d**,*c*c**)
!(AA**,TT**)
= 1644 /270725 (0.61%)

Note that these ranges don't overlap, and they also don't overlap with the AAxx range defined previously. You can check this by merging the ranges. You will then see that the merged range contains exactly as many hands as the sum of the number of hands in the sub-ranges.

At any rate, the sub-range of premium Broadway hands makes up 2762 + 1644 = 4406 combinations, and 1.02% + 0.61% = 1.63% of all Omaha hands.

**2.2.3. Speculative hands**
We define the sub-range of good suited rundowns as the range of all rundowns xxx9 down to xxx5, at least single-suited and with at most single gap in the structure:

(QJT9,KJT9,KQT9,KQJ9,JT98,QT98,QJ98,QJT8,T987,J987,JT87,
JT97,9876,T876,T976,T986,8765,9765,9865,9875)
&(*s*s**,*h*h**,*d*d**,*c*c**)
= 4640 /270725 (1.71%)

The range of suited aces with good rundowns is defined as the range of suited aces with rundowns Axx8 down to Axx5 with at most one single gap in the rundown structure:

(AT98,AJ98,AJT8,A987,AT87,AT97,A876,A976,A986,
A765,A865,A875) &(As*s**,Ah*h**,Ad*d**,Ac*c**)
= 1776 /270725 (0.66%)

With these definitions, the sub-range of speculative 3-betting hands makes up 4640 + 1776 = 6416 combination in total, and 1.71% + 0.66% = 2.37% of all Omaha hands.

**2.2.4. Total range**
- Premium AAxx hands: 2160/270725 (0.80%)
- Premium Broadway hands: 4406/270725 (1.63%)
- Speculative hands: 6416/270725 (2.37%)
- Total: 12982 /270725 (4.80%)

So we end up with a 3-bet% of 4.80%. We round this number up to 5%, and use this as a baseline for 3-betting heads-up in position with premium high cards hands and premium speculative hands.

The AAxx/Broadway part of this 3-betting range is 0.80% + 1.63% = 2.43% of all hands. These hands make up 2160/12982 + 4406/12982 = 0.166 + 0.339 = 16.6% + 33.9% = 50.5% of the total 3-betting range. So the 3-betting range is approximately divided 50-50 between premium high cards hands and premium speculative hands (the way we

chose to define these categories) and 1/6 of the range is AAxx hands.

Note that the number of premium AAxx + premium Broaday hands (2.43% of all Omaha hands) is almost equal to the percentage of all AAxx hands (2.50% of all Omaha hands). So if you get 3-bet by a player with a 3-bet% around 2.5%, this does not necessarily mean he is only 3-betting AAxx hands. It can also mean a tight range of premium AAxx and premium Broadway hands. At any rate, this type of tight 3-betting range is not something you want to attack with light 4-betting, even if Villain does not always have AAxx.

Another thing to comment on is this: The 3-betting range we have put together here is approximately the core strategy range we use for 3-betting heads-up in position. But this does not mean we 3-bet all these speculative hands every time the situation comes up (we also have to assess the circumstances, and not only our hand). This means that the distribution of hand types in our range *after we have 3-bet* is not necessarily the same as the distribution of hand types in the range of *possible 3-betting hands*.

At any rate, this range consists of premium suited and coordinated high card hands and speculative hands, that all play well in a 3-bet pot heads-up against the raiser. And we will use the associated 3-bet% of ~5% as a baseline to assess other 3-betting ranges.

We now ask:

*How large does the 3-bet% have to be for us to be sure that Villain is 3-betting a wide range of speculative hands?*

We start by assuming that an aggressive 3-bettor with position on us first will loosen up his 3-betting with AAxx hands. So let's include all AAxx hands in the range and see what we get:

- All AAxx hands: 6768/270725 (2.50%)
- Premium Broadway hands: 4406/270725 (1.63%)
- Speculative hands: 6416/270725 (2.37%)
- Total: 17590/270725 (6.50%)

The 3-bet% increases to 6.5%. Note that the relative percentage of AAxx hands in the range increases to 6768/17590 = 0.385 = 38.5%, so this isn't necessarily a range we want to attack with light 4-betting.

But what we can conclude is this: *When we have counted all AAxx hands plus the best of the rest from the other hand categories, the 3-bet% is still < 7%*.

Now, let's say we encounter a very loose-aggressive player with a 3-bet% of 12% on the button. Based on the range analysis above, *we know that his range has to contain lots of medium/low so-so hands*. For example, rough rundowns like T♣ 8♣ 6♠ 5♠.

So the thing you can take away from this range analysis work is that the threshold for value 3-betting and 3-betting with good speculative hands is somewhere in the region 5-7% (depending on how many AAxx hands we include). We also saw that the threshold for 3-betting with only premium AAxx hands and premium Broadway hands is ~2.5%. Finally, a player who 3-bets all AAxx hands and only AAxx hands, will have a 3-bet% of 2.5%.

Armed with these percentages you can now use player stats + reads + hands seen at showdown to decide whether or not you should counter a 3-bettor with light 4-betting.

"Light 4-betting" here means 4-betting a strong range of all AAxx + selected premium non-AAxx hands. Determining which non-AAxx hands we can 4-bet is the next step of the process.

## 2.3 What is a reasonable core strategy 4-betting range against a loose 3-bettor?

When we go from 4-betting only our AAxx hands to 4-betting a range of AAxx hands and premium non-AAxx hands in a heads-up 3-bet scenario, we base this on the fact that Vilain is 3-betting a wide range. Therefore, he rarely has AAxx, and many of his non-AAxx hands are of dubious quality.

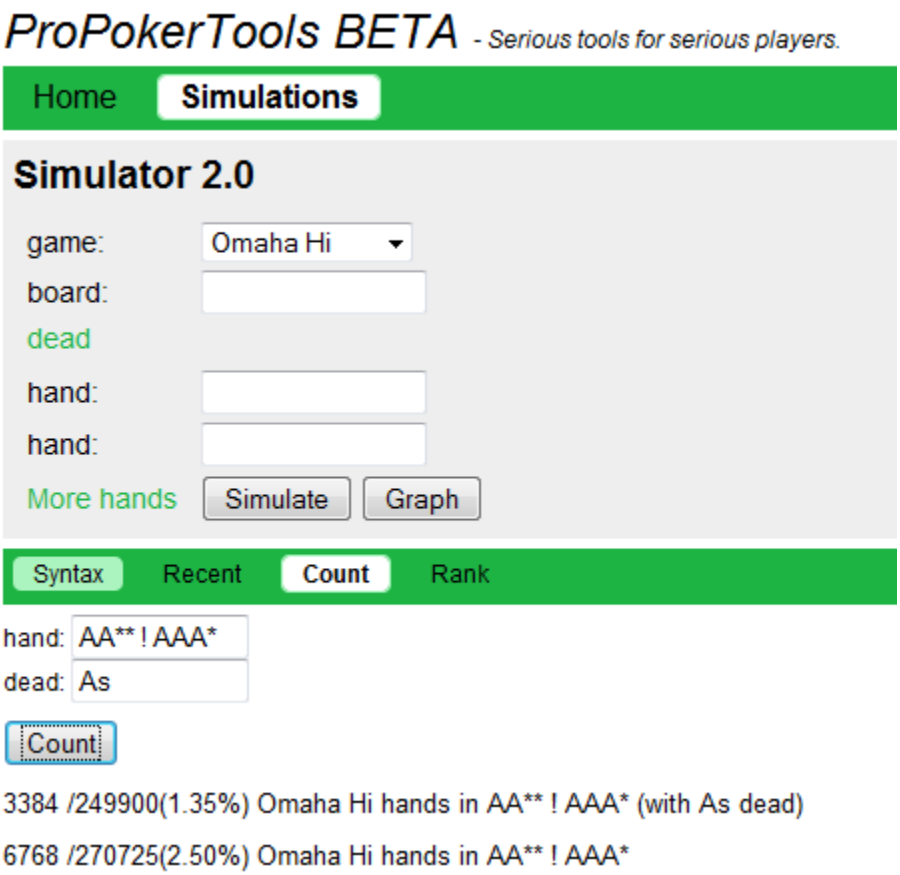
In this case, the equity for premium high cards hands (e.g. K♠ K♥ Q♠ Q♥, A♠ K♦ K♠ J♦, A♠ K♥ Q♠ J♥) will increase for two reasons:

- We're less often up against AAxx
- We have good equity against Villain's non-AAxx hands

The latter is based on the fact that when Villain has some medium/low hand (e.g. 9♠ 8♥ 6♦ 4♠), our high pairs will perform almost as well as AAxx.

For example, against 9♠ 8♥ 6♦ 4♠ we have 40.32% equity with AAxx (ProPokerTools calculation) and 39.84% with KKxx (ProPokerTools calculation), so it doesn't matter much which hand we hold when we 4-bet.

To further decrease the probability that Villain holds AAxx, we can also demand that we hold an ace ourselves. This reduces the chance Villain has AAxx with 50%, as shown below:




We first count all AAxx combinations and then we count all AAxx after removing one ace from the deck. The number of possible AAxx hands is then reduced from 6768 to 3384, which is exactly half.

We now define our premium core strategy 4-betting range as:

- AKKx + AQQx, at least single-suited to the ace and with a Broadway kicker
- AKxx, at least single-suited to the ace and with two Broadway kickers

In other words, hands like these:

- A♠ K♠ K♦ Q♥
- A♠ K♥ Q♠ Q♥
- A♠ K♠ Q♦ T♦

This range is of course not carved in stone, and if we want to, we can include more premium AKKx/AQQx/AKxx hands. For example, we can lift the criterion about suitedness to the ace, and accept any suited combination. We can also add some deception to the range by including the best rundown hands, for example double-suited KQJT, QJT9 and JT98 (these hands perform well against the wide range of rough rundown hands like J976 in a loose 3-bettor's range).

So you can experiment with an even wider 4-betting range against very loose 3-bettors as you gain more experience. But use the range we have defined here as a core strategy component to fall back on when in doubt.

To draw a Hold'em analogue, this 4-betting range corresponds roughly to 4-betting KK, QQ and AK instead of only AA. To find the number of combinations of non-AAxx 4-betting hands, we formulate the range in ProPokerTools notation and count it:

(AKKQ,AKKJ,AKKT,AKQQ,AQQJ,AQQT,AKQJ,AKQT,AKJT)
& (As*s**,Ah*h**,Ad*d**,Ac*c**)
= 804 /270725 (0.30%)

Our total 4-betting range made up of any AAxx plus the AKKx/AQQx hands above then becomes:

(AA** ! AAA*),
((AKKQ,AKKJ,AKKT,AKQQ,AQQJ,AQQT,AKQJ,AKQT,AKJT)
& (As*s**,Ah*h**,Ad*d**,Ac*c**))
= 7572 /270725 (2.80%)

This gives us a 4-betting range of 2.80% of all hands. The range is heavily weighted towards AAxx, but with 804/7572 = 0.11 = 11% premium non-AAxx-hands. However, before we can start using this range, we need to answer one last question:

*How do we play the non-AAxx hands against a 5-bet?*

This is a simple pot-odds question (remember: we're discussing play with 100 BB stacks). Assume we raise to 3.5 BB from CO, Villain 3-bets to 12 BB from the button, we 4-bet to 37.5 BB, and Villain pushes. The pot is now 139 BB with 62.55 BB to us. The pot odds are then 139:62.5 = 2.22:1, and we need 1/(2.22 + 1) = 0.31 = 31% equity to call profitably all-in.

Below are the equities against random AAxx for 3 double-suited versions of AKKx, AQQx, and AKxx from our 4-betting range. The equities for the single-suited versions (we turn the last card into a club) are in parentheses:

- A♠ K♠ K♥ Q♥: 33.99% (29.80%)
- A♠ Q♠ Q♥ J♥: 35.69% (31.62%)
- A♠ K♠ Q♥ J♥: 34.49% (30.64%)

We conclude that the single-suited hands are break even or slightly -EV, while the double-suited hands are slightly +EV. This is a situation where we can't make a big mistake, no matter what we do *if Villain only 5-bets AAxx*.

But note that against a Villain who only 3-bets premium AAxx hands, we have more reason to fold when he 5-bets. The reason is we're now up against a better range of AAxx hands that are also suited and coordinated. To be sure, let's test this by repeating the calculations above where we substitute any AAxx with the premium AAxx range defined previously:

(AA** &(*s*s*h*h,*s*s*d*d,*s*s*c*c,*h*h*d*d,*h*h*c*c,
*d*d*c*c)), ((AABB,AABT,AATT,AA99,AA88,AA77,AA66,AA55,
AA44,AA33,AA22,AAT9, AAJ9,AA98,AAT8,AA87,AA97,AA76,AA86)
& (*s*s**,*h*h**,*d*d**,*c*c**))!AAA*
= 2160 /270725 (0.80%)

- A♠ K♠ K♥ Q♥: 32.36% (28.87%)
- A♠ Q♠ Q♥ J♥: 33.81% (30.37%)
- A♠ K♠ Q♥ J♥: 32.24% (29.00%)

Not a large effect, but all the single-suited hands are now -EV while the double-suited hands are even more marginal.

But it still isn't possible to make a big mistake against a 5-bet from AAxx, no matter what we choose. So if you have reasons to believe Villain can 5-bet non-AAxx hands, by all means call with all of these hands. Making a slightly -EV call can also have a positive effect on your table image. We tell our opponents that we're willing to fight hard for pots where we have made a large investment, and this might cause them to play more straightforward against us (and this is good for us).

## 2.4 The effect of light 4-betting

To illustrate what light 4-betting does for us, let's go through an example where we 4-bet a loose 3-bettor. We let Villain's

hand be known, while our hand is unknown (but we have a known range).

$10PLO
6-handed

You ($10) raise to $0.35 with a wide open-raising range from CO, and button ($10) 3-bets to $1.20 with J♠ 9♥ 7♣ 6♠. You 4-bet to $3.75. Villain now assumes he is up against AAxx, and he has an easy call with a decent suited rundown hand (and later in this article we'll see why this is an automatic call).

**Flop:** K♠ 9♦ 2♣ ($7.50)
You ($6.25) push the rest of the stack in. What should Villain ($6.25) do?

Villain now has a pot odds decision. He's getting 13.75:6.25 = 2.2:1, so he needs 1/(2.2 + 1) = 0.31 = 31% equity.

He has flopped 2nd pair + backdoor flush draw + backdoor straight draw. If you have AAxx (which he assumes), he now has:

- 2 mostly clean outs to trips
- 9 dirty outs to two pair
- 2 mostly clean outs to a backdoor flush or a backdoor straight

Villain decides to count the trips and backdoor outs as clean. The 9 outs to two pair are not all clean, and should be discounted a bit. When Villain makes two pair on the turn, our presumed AAxx hand has 8 outs (2 aces, 3 konger, 3 deuces) to top set or a better two pair.

8 outs on the turn is approximately a 1/5 chance, so Villain reduced his 9 two pair outs to 9(4/5) = 7.2 = 7 outs. Then he conservatively removes 1 more out to account for the fact that our AAxx hand also gets some equity from the side cards. Villain now estimates that he has:

- 2 clean outs to trips
- 6 clean outs to two pair
- 2 clean outs to a backdoor flush or a backdoor straight

The total is 10 clean outs, and therefore 3 x 10 + 9 = 39% equity on the flop. So he has more than the required 31%, and he happily calls our all-in c-bet. To check his math, we do a ProPokerTools calculation, and we see that Villain has 38.91% equity on the flop. His equity estimate was therefore spot on against our presumed hand.

But how is Villain doing against our actual 4-betting range made up of AAxx + premium AKKx, AQQx and AKxx? Not quite as well, since he now has 37.71% equity (ProPokerTools calculation).

Not a dramatic difference, but we definitely have succeeded in reducing the profitability of his call of our 4-bet. We have also "thrown some sand" into the eyes of the opposition by demonstrating a willingness to 4-bet non-AAxx hands. What will come out of this (if anything) in future hands is hard to tell, but whatever adjustments our opponets make will probably be to our advantage.

For example, if they start 5-betting light they will get severely punished, since we have AAxx 8 out of 9 times when we 4-bet (remember: only 11% of our 4-betting hands are non-AAxx hands). Or if they they adjust by 3-betting less (since we now 4-bet them more often) this will also be good for us.

Another advantage we got from the 4-bet was making the hand easier to play. Instead of calling and sitting out of position with $8.80 left in the stack and important postflop decisions to make, we set ourselves up for auto-pushing any flop and thereby making postflop play a formality. This reduced Villain's positional advantage significantly, and this is a factor that should not be underestimated.

Let us end this example by playing out the hand. The turn and river cards are unimportant, since we got all-in on the flop with huge +EV, but let's be nasty and let the turn and river be:

**Turn:** K♠ 9♦ 2♣ Q♠ ($20.15)

**River:** K♠ 9♦ 2♣ Q♠ 2♠ ($20.15)

Villain with his J♠ 9♥ 7♣ 6♠ rejoices over the turn and river cards until he sees your superior A♦ K♦ K♣ J♥. Villain now screams in agony and 3-bets the next 7 hands in rage.

## 3. Defending against a 4-bet from likely AAxx

The last half of this article is about a scenario that occurs more frequently than light 4-betting, namely defending against a 4-bet from likely AAxx.

This is a part of the preflop game that is very important to get right for a player who often exploits his position by making light 3-bets heads-up (which we have discussed thoroughly in Part 4 and Part 5). The more we 3-bet, the more we give AAxx the opportunity to 4-bet, and it's important that we know how to correctly defend against these 4-bets.

### 3.1 Core strategy for defending against a 4-bet

As briefly discussed in Part 4, our core strategy for defending against a 4-bet heads-up with 100 BB stack consists of:

**1.** Assume Villain has AAxx and play accordingly
**2.** 5-bet AAxx all-in
**3.** Call the 4-bet with hands that play sufficiently well against AAxx, and where your postflop plan is to go all-in on flops where you have the minimum required equity

Point 1 usually holds, especially at lower limits, and if you're mistaken, it's usually not by much on average.

Point 2 is obviously correct, since we're now usually coinflipping against another AAxx. We could be an underdog with trashy AAxx (e.g. the trashy A♠ A♥ 7♦ 2♣ is a 41.5% underdog against the premium A♦ A♣ K♦ Q♣ as shown by thisProPokerTools calculation), but the pot is big enough that we don't have to worry about that. Also, note that we rarely 3-bet trashy AAxx anyway, so this scenario is not very likely.

The point that needs work is point 3. We now want to find the answer to the following question:

*Which hands perform well enough against AAxx to call a 4-bet from likely AAxx with 100 BB stacks?*

We made some general comments about this topic in Part 4, and we postulated that we want suited and coordinated hands that often hit a piece of the flop. Hitting lots of flops allows us to often go all-in with +EV on the flop, and thereby get a return on our big preflop investment. Suited rundowns like 9♠ 8♥ 7♠ 6♦ are obviously suitable for this purpose, but what other hands can we play here? And which hands can absolutely *not* call a 4-bet?

To get to the bottom of this, we need to experiment a bit. In previous articles we have done a lot of mathematical modelling using flop equity distributions, and we'll use this "work horse" one more time.

### 3.2 A model for defending against a 4-bet from AAxx with 100 BB stacks

Below is our model:

- Villain raises to 3.5 BB in CO
- We 3-bet to 12 BB on the button
- Villain 4-bets to 37.5 BB with AAxx, and we call
- Villain c-bets all flops all-in
- We call when we have sufficient equity (31%) on the flop

Calling the 4-bet (37.5 BB) costs us 25.5 BB. The pot is now 75 BB on the flop with 62.5 BB remaining stack. Villain now c-bets the last 62.5 BB all-in. Our pot-odds are (75 + 62.5):62.5 = 137.5:62.5 = 2.2:1. We need 1/(2.2 + 1) = 0.31 = 31% equity to call profitably.

Now we determine the EV for calling the preflop 4-bet:

We call Villain's all-in c-bet on some percentage *top_x*% of flops where we have at least 31% equity. Otherwise we fold and lose the amount we called (25.5 BB). When we call all-in, we have flop equity *av_equity* on average in a 201.5 BB pot where we have invested 88 BB as of our call of the 4-bet.

We find *top_x* and *av_equity* from flop equity distribution graphs, and then we calculate the EV for calling the 4-bet from

the following equation:

```
EV (call 4-bet)

= (1 - top_x)(-25.5 BB) + top_x[av_equity(201.5 BB) - 88 BB]
```

We now pick some representative 3-betting hands to use in our model. We remember that our core strategy for 3-betting distinguishes (conceptually) between 3 types of 3-bets:

- Value 3-betting
- Speculative 3-betting
- Bluff 3-betting

### 3.3 When we have 3-bet for for value and get 4-bet by AAxx

Our core strategy for 3-betting for value is:

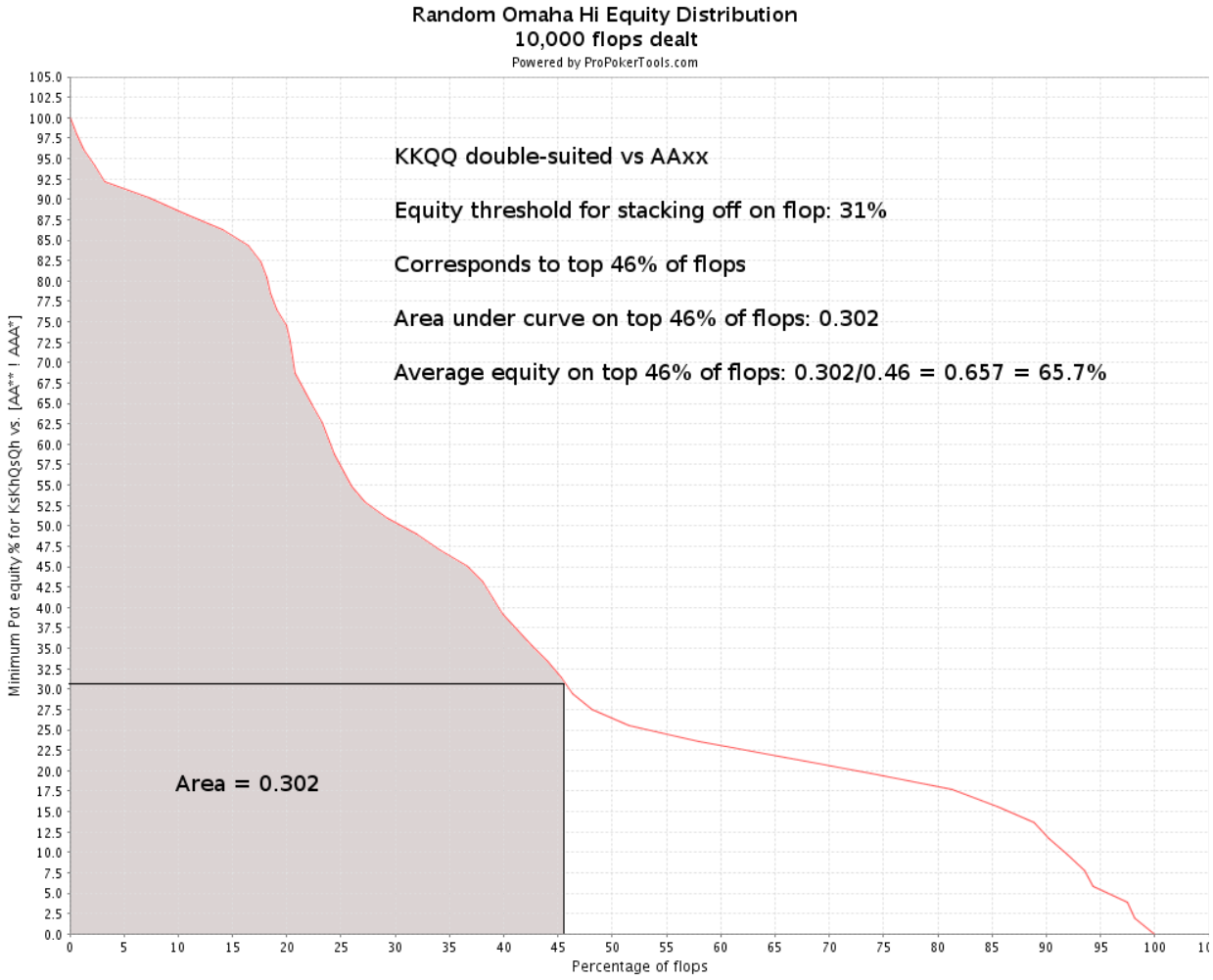
- Premium AAxx, at least single-suited, with a pair, 2 Broadway cards, or a connector
- Premium Broadway wraps, at least single-suited, and preferably with an ace
- Premium KKxx, QQxx, JJxx, at least single-suited, and with connected side cards, or another high pair

With AAxx we 5-bet all-in, so the interesting cases are Broadway wraps and premium pairs. We begin by picking 5 ultra-premium double-suited hands from this category (i.e. a best case scenario for us):

- K♠ K♥ Q♠ Q♥
- K♠ K♥ Q♠ J♥
- Q♠ Q♥ J♠ T♥
- J♠ J♥ T♠ 9♥
- A♠ K♥ Q♠ J♥

Below are the flop equity distributions for each of these hands, plus the calculated EV for calling the 4-bet:

### 3.3.1 Premium double-suited double pair ( K♠ K♥ Q♠ Q♥ ) vs AAxx:

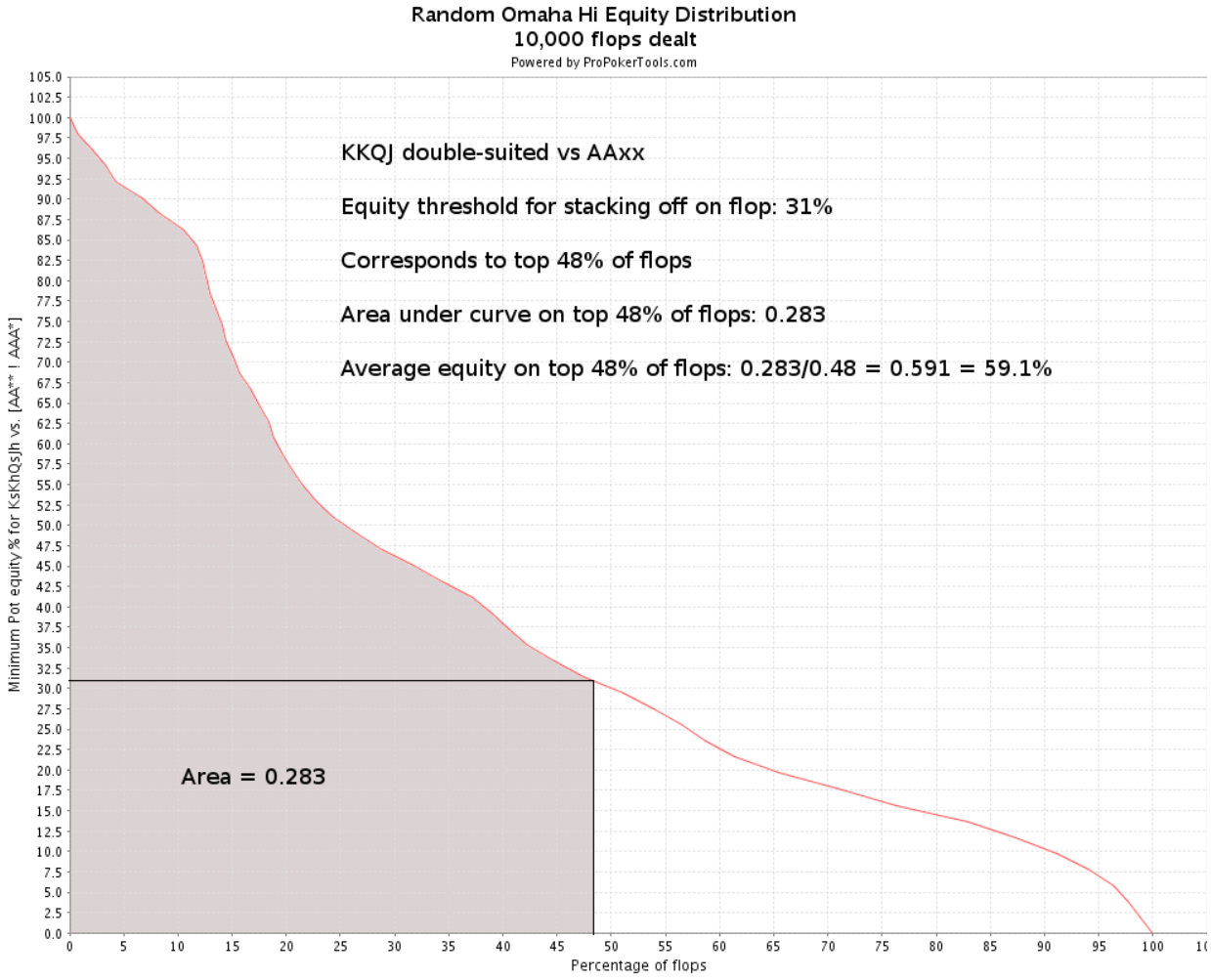



EV(call 4-bet)

= (1 - 0.46)(-25.5 BB) + 0.46[0.657(201.5 BB) - 88BB]

= +6.66 BB

### 3.3.2 Premium double-suited + connected KKxx ( K♠ K♥ Q♠ J♥ ) vs AAxx:

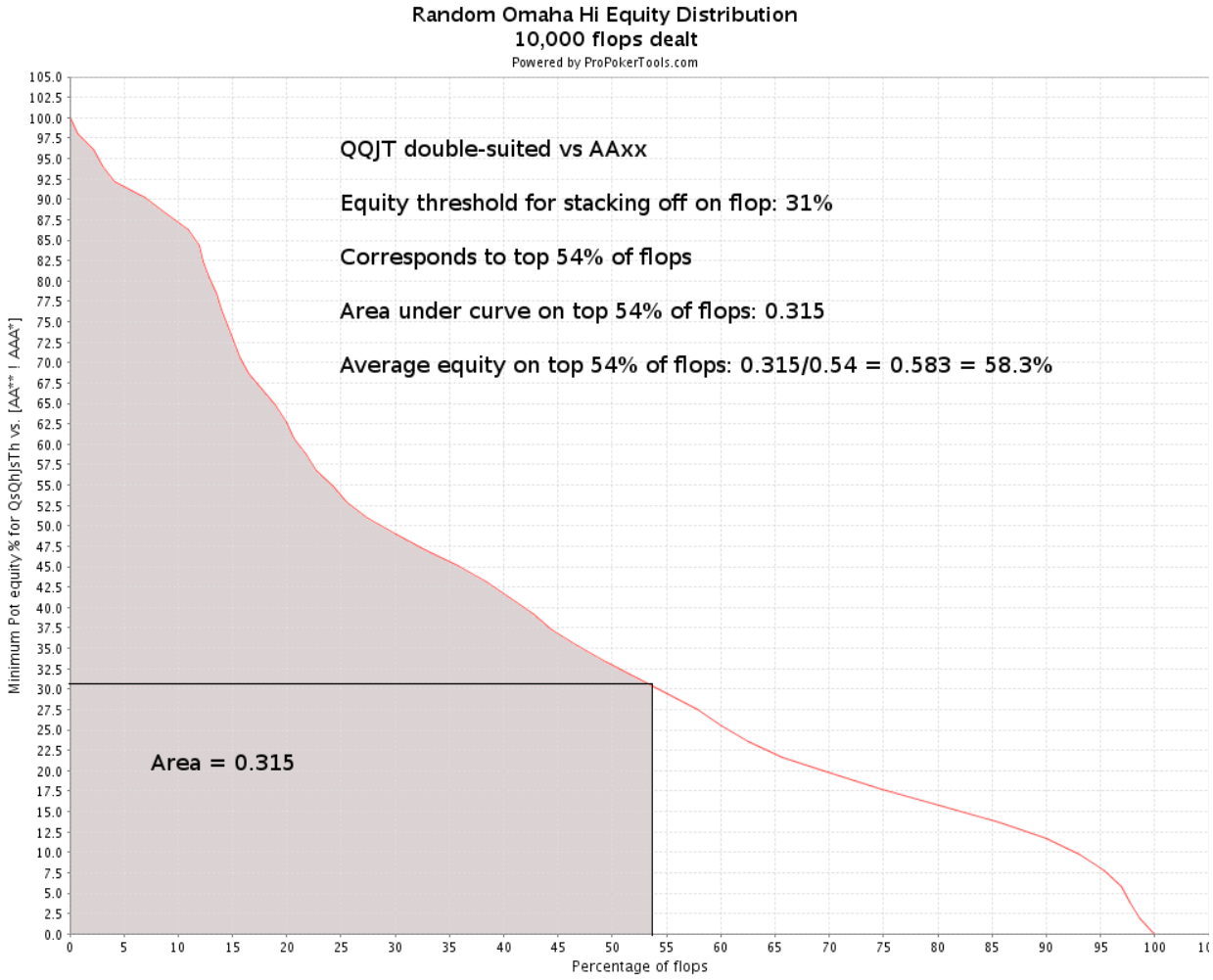



EV(call 4-bet)

= (1 - 0.48)(-25.5 BB) + 0.48[0.591(201.5 BB) - 88BB]

= +1.61 BB

### 3.3.3 Premium double-suited + connected QQxx ( Q♠ Q♥ J♠ T♥ ) vs AAxx:

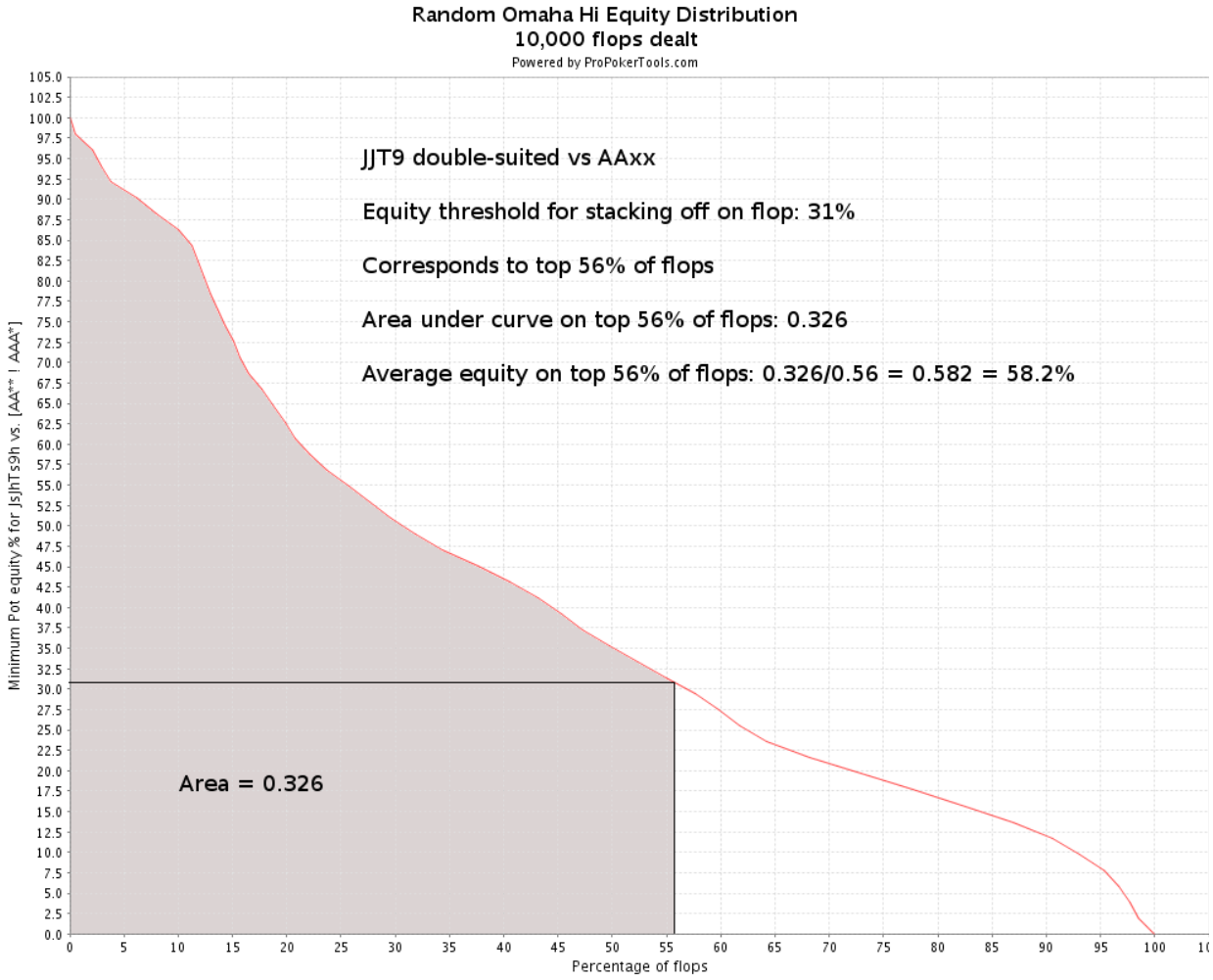



EV(call 4-bet)

= (1 - 0.54)(-25.5 BB) + 0.54[0.583(201.5 BB) - 88BB]

= +4.19 BB

### 3.3.4 Premium double-suited + connected JJxx ( J♠ J♥ T♠ 9♥ ) vs AAxx:

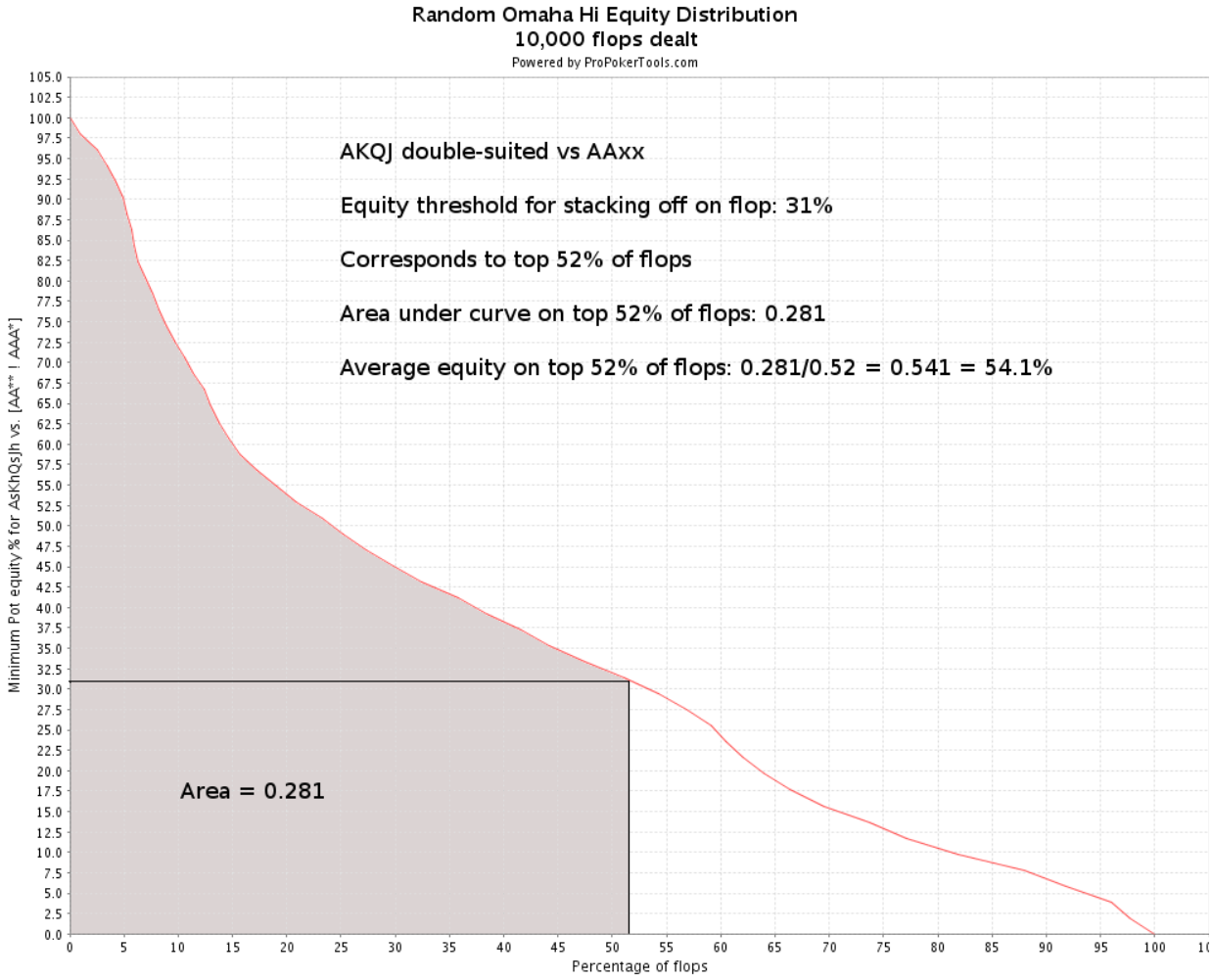



EV(call 4-bet)

= (1 - 0.56)(-25.5 BB) + 0.56[0.582(201.5 BB) - 88BB]

= +5.20 BB

### 3.3.5 Premium double-suited ace high Broadway wrap ( A♠ K♥ Q♠ J♥ ) vs AAxx:




```
EV(call 4-bet)

= (1 - 0.52)(-25.5 BB) + 0.52[0.541(201.5 BB) - 88BB]

= -1.34 BB
```

### 3.3.6 Summary of EV for premium double-suitede hands from the value 3-betting range:

- K♠ K♥ Q♠ Q♥: +6.66 BB
- K♠ K♥ Q♠ J♥: +1.61 BB
- Q♠ Q♥ J♠ T♥: +4.19 BB
- J♠ J♥ T♠ 9♥: +5.20 BB
- A♠ K♥ Q♠ J♥: -1.34 BB

We observe that we can call profitably with high pairs that have double-suited and connected side cards, but the ace high Broadway wraps should be folded, even double-suited.

We note that QQxx and JJxx perform better than KKxx. The reason for this is that Villain's AAxx hand blocks many of the straights KKxx can make, while the lower pairs make more straights that do not involve an ace. To investigate whether this

trend continues for even lower pairs, we will also do a simulation for a low pair with double-suited and connected side cards.

- 7♠ 7♥ 6♠ 5♥

We'll also do some more research on the Axxx hands from the value 3-betting range, and we do this by also including double-suited high pairs with an ace:

- A♠ K♥ K♠ J♥
- A♠ Q♥ Q♠ J♥
- A♠ J♥ J♠ T♥

Finally, we'll study the effect of having two suits by also calculating EV for the single-suited versions of all hands above. We then turn one of the cards into a club ( K♠ K♥ Q♠ Q♣, K♠ K♥ Q♠ J♣ etc.) and perform another round of flop equity distribution simulations.

We will not include all graphs and calculations here, and we simply list the results:

**3.3.7 Final data set for the hands from our value 3-betting range:**
Below are the EV for calling a 4-bet for all hands discussed so far. We list the double-suited versions, sorted by type (paired/unpaired and with or without an ace). The EVs for the single-suited hands are in parentheses:

- K♠ K♥ Q♠ Q♥: +6.66 BB (+2.63 BB)
- K♠ K♥ Q♠ J♥: +1.61 BB (-2.74 BB)
- Q♠ Q♥ J♠ T♥: +4.19 BB (+0.03 BB)
- J♠ J♥ T♠ 9♥: +5.20 BB (+1.14 BB)
- 7♠ 7♥ 6♠ 5♥: +6.01 BB (+2.02 BB)
- A♠ K♥ K♠ J♥: -1.04 BB (-3.83 BB)
- A♠ Q♥ Q♠ J♥: +0.21 BB (-3.37 BB)
- A♠ J♥ J♠ T♥: +1.31 BB (-2.61 BB)
- A♠ K♥ Q♠ J♥: -1.34 BB (-5.79 BB)

**3.3.8 Conclusion for calling a 4-bet with hands from the value 3-betting range:**
We can draws some conclusion from the data set above:

High double pairs can call profitably against AAxx, both single- and double-suited. If we had done the simulations, we would probably have seen JJTT perform better than KKQQ due to better straight potential (AAxx blocks more of KKQQ's straights). We can also call with the double-suited and connected single pairs, and we fold all unpaired ace high hands.

Having 2 suits is very important for the high pairs, and you can fold the single-suited versions of KKxx and QQxx. But you can call with single-suited and connected JJxx and lower. We don't 3-bet low pairs like 7♠ 7♥ 6♠ 5♥ as a default, but it's interesting to note that these pairs performs better against AAxx than KKxx and QQxx (because of the straight blocker effect).

We note that all Axxx hands struggle hard against AAxx. This is obvious, since these hands effectively only have 3 cards in play. Unpaired ace high Broaday wraps should always be folded, regardless of suits. The same goes for AKKx, while double-suited AQQx and AJJx are marginal calls (again because of straight blocker effects).

## 3.4 When we make a speculative 3-bet and get 4-bet by AAxx
Our core strategy for speculative 3-betting is:

- Good, suited rundowns
- Suited aces with good rundowns

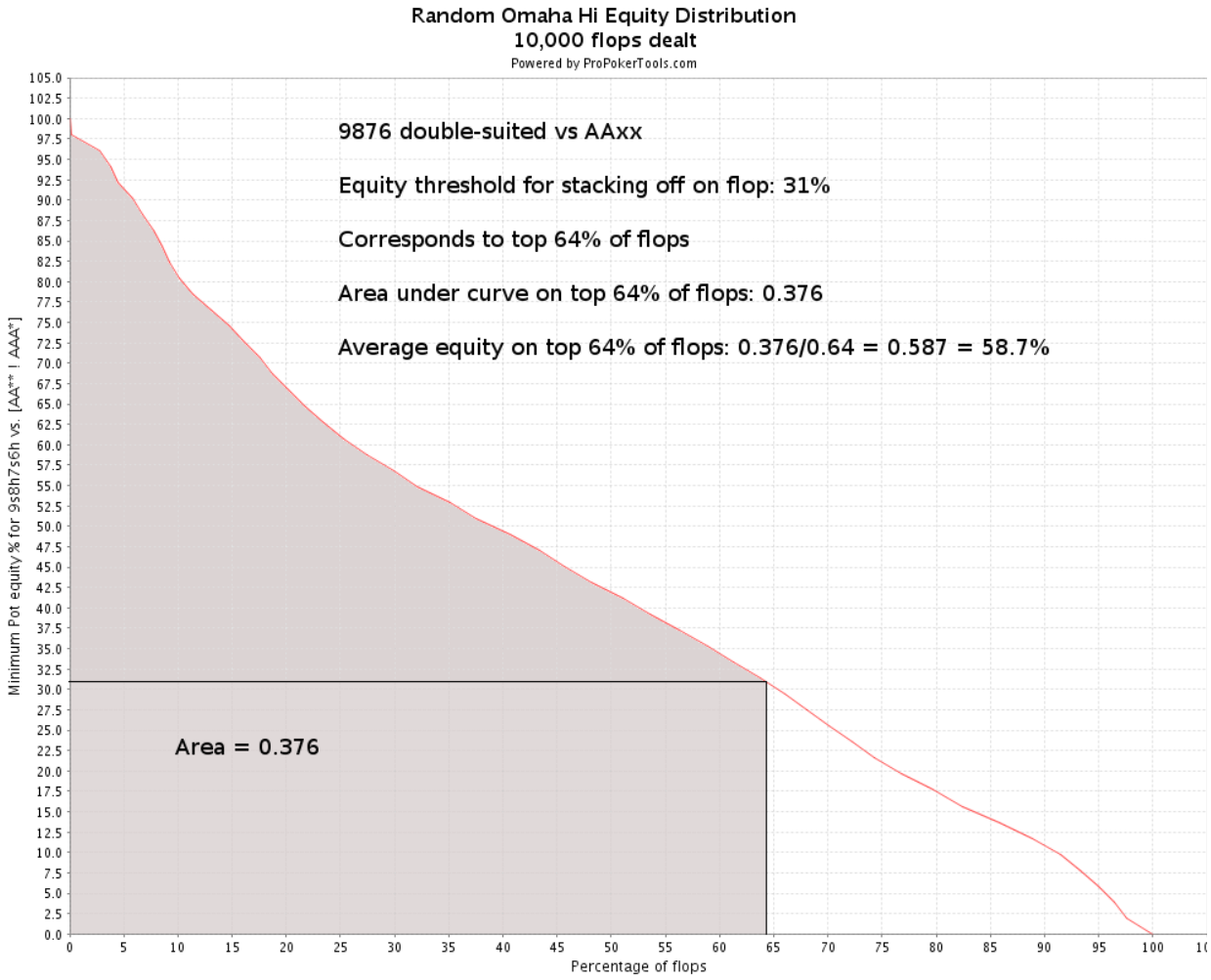
We begin with two double-suited best case candidates:

- 9♠ 8♥ 7♠ 6♥

- A♠ 9♥ 8♠ 7♥

Below are the flop equity distribution graphs for both hands, and the calculation of the EV for calling the 4-bet:

### 3.4.1 Premium double-suited rundown ( 9♠ 8♥ 7♠ 6♥ ) vs AAxx:

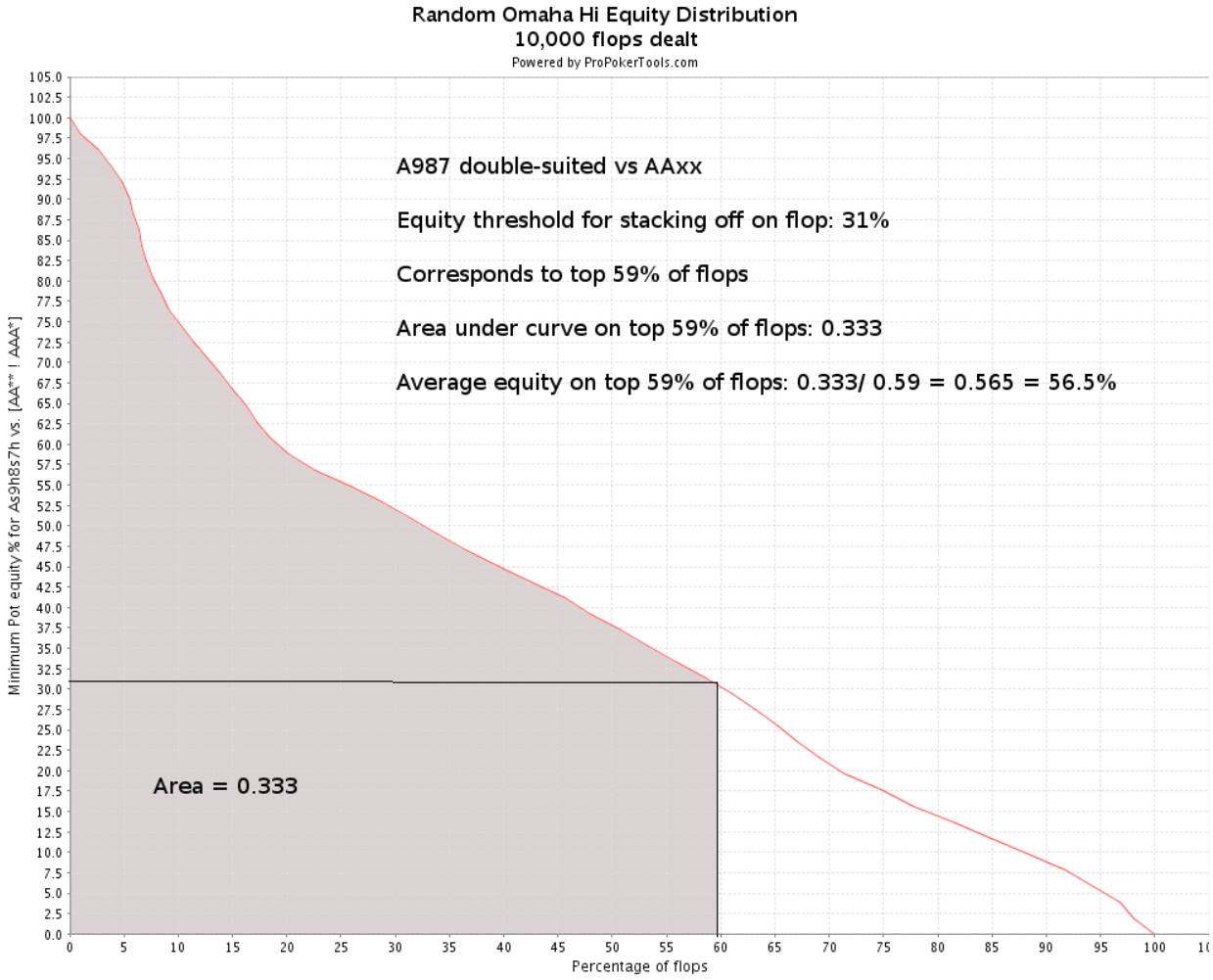



EV(call 4-bet)

= (1 - 0.64)(-25.5 BB) + 0.64[0.587(201.5 BB) - 88BB]

= +10.25 BB

### 3.4.2 Premium double-suited ace + rundown ( A♠ 9♥ 8♠ 7♥ ) vs AAxx:




```
EV(call 4-bet)

= (1 - 0.59)(-25.5 BB) + 0.59[0.565(201.5 BB) - 88BB]

= +4.74 BB
```

### 3.4.3 Summary of EV for premium double-suitede hands from the speculative 3-betting range:

- 9♠ 8♥ 7♠ 6♥: +10.25 BB
- A♠ 9♥ 8♠ 7♥: +4.74 BB

We have already seen (Part 3 and Part 4) )in that perfect double-suited rundowns perform very well against AAxx in 4-bet pots. However, it's interesting to see that a double-suited ace + rundown performs well too, even if it's effectively a 3-card hand against AAxx. As noted previously, it's important to have straight potential that isn't blocked by AAxx.

To study the effect of gaps in the rundown structures, we'll also perform a simulation for

- T♠ 8♥ 7♠ 5♥

And we'll also perform simulations for the single-suited versions of all these hands ( 9♠ 8♥ 7♠ 6♣, etc.)

### 3.4.4 Final data set for hands from the speculative 3-betting range:
Below are the EV's for all hands discussed so far (EV for single-suited hands in parentheses):

- 9♠ 8♥ 7♠ 6♥: +10.25 BB (+6.75 BB)
- T♠ 8♥ 7♠ 5♥: +10.19 BB (+6.05 BB)
- A♠ 9♥ 8♠ 7♥: +4.74 BB (+0.81 BB)

### 3.4.5 Conclusion for calling 4-bets with hands from the speculative 3-betting range:
We immediately conclude that *suited rundowns are robust hands against AAxx*. Going from a perfect rundown to a rundown with top + bottom gaps almost didn't change the EV. Rundowns benefit a lot from having 2 suits, but the single-suited hands were also clearly profitable.

When it comes to the suited ace + rundown hands, we see that these hands are very dependent on the second suit. The single-suited hands are marginally +EV, but we won't lose much by folding them.

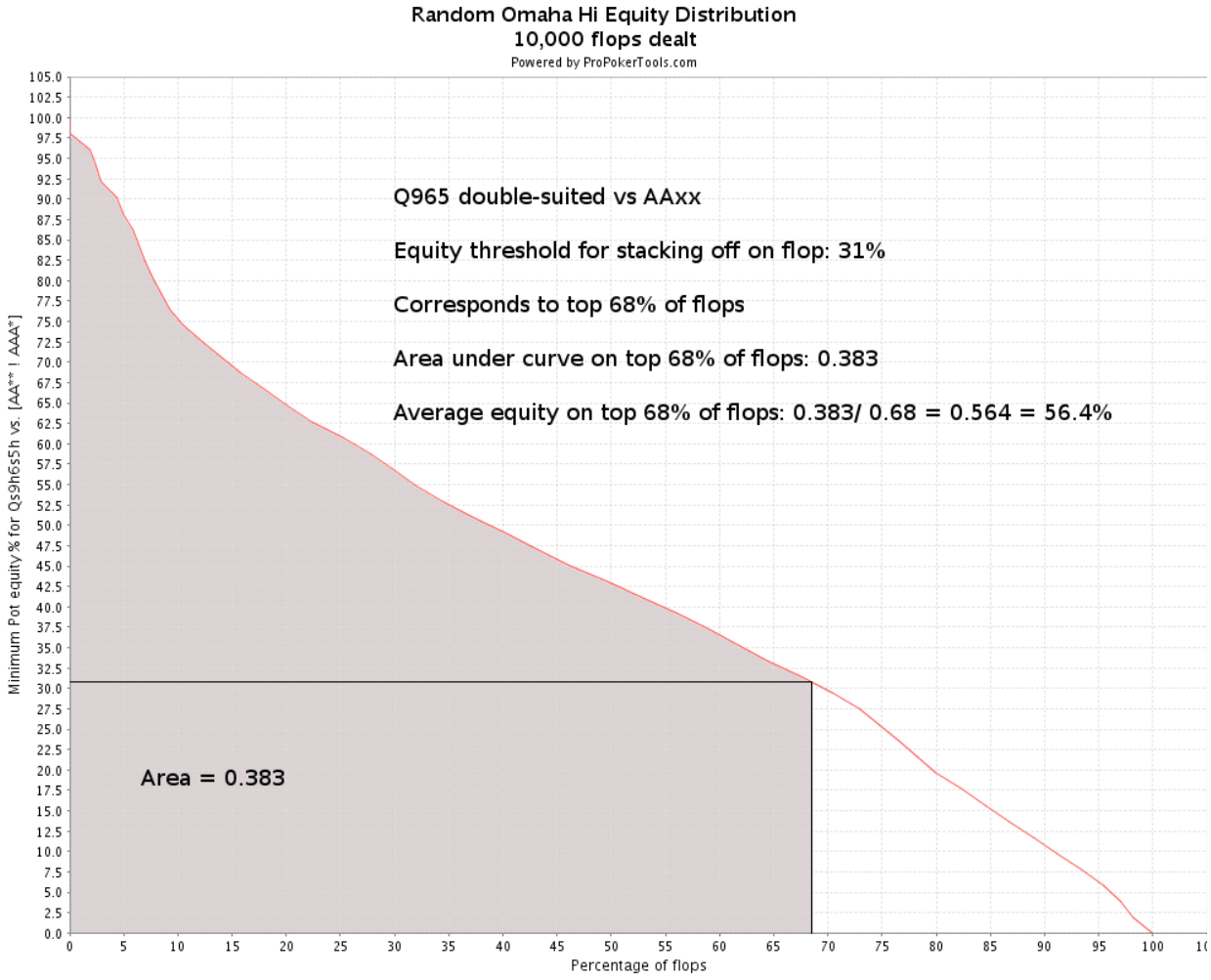
## 3.5 When we make a bluff 3-bet and get 4-bet by AAxx
It's difficult to make generalizations for this category, and we have not defined any core strategy ranges here. Instead, we defined guidelines for when to consider a bluff 3-bet. We also stated that we should avoid pure trash hands, and stick to suited hands with a minimum of potential.

Now we'll look at a 4-bet scenario where we 3-bet a double-suited and very rough rundown and get 4-bet. In Example 4.11 in Part 4 we did a bluff 3-bet with Q♠ 9♥ 6♠ 5♥. We did not calculate the EV for calling a 4-bet, but commented that we would study this scenario in more detail in this article.

This means we're performing a simulation on the following double-suited rundown with two double gaps at the top:

- Q♠ 9♥ 6♠ 5♥

### 3.5.1 Double-suited bluff 3-bet hand ( Q♠ 9♥ 6♠ 5♥ ) vs AAxx:




```
EV(call 4-bet)

= (1 - 0.68)(-25.5 BB) + 0.68[0.564(201.5 BB) - 88BB]

= +9.23 BB
```

### 3.5.2 Final data set for hands from the bluff 3-betting range:

We have only picked one hand to illustrate bluff 3-betting. We also ran a simulation for the single-suited version ( Q♠ 9♥ 6♠ 5♣ ) and we got:

- Q♠ 9♥ 6♠ 5♥: +9.23 BB (+4.60 BB)

### 3.5.3 Conclusion for calling a 4-bet with hands from the bluff 3-betting range:

The conclusion from the one hand we studied here confirms what we found for the speculative 3-betting hands: *rundowns are very robust hands against AAxx!* By "robust" we mean that structural defects don't matter as long as the hand has some coordination and is suited. A gap or two changes very little, even multiple gaps at the top.

But before we fall in too much in love with these suited semitrash hands, keep in mind that we're now pitting them against AAxx only. In this scenario they peform well, but if we in some way get involved in a multiway pot with these hands, we often get in trouble because of their limited nut potential.

So here it's important to think about the relation between preflop play and postflop play, and the kind of postflop scenarios we try to set up with our 3-bet. Before we 3-bet these hands we have to assess the situation carefully. We want fold equity, and we want to steal the pot either preflop or get heads-up in position against a raiser over whom we have good control.

If we do the preflop part right, we will rarely find ourselves in tricky postflop spots. If we have assessed the situation correctly, we will usually get heads-up. If we get 4-bet, we have an easy job defending against likely AAxx. This job becomes easy when we have:

- Position
- Reliable information about Villain's hand (he only 4-bets AAxx)
- A hand that performs well against AAxx

And we have ensured these things by:

- Using position when we bluff 3-bet
- Having reads on Villain as a straightforward player
- Choosing a suited hand with a minimum of coordination

We conclude this part with two examples where we defend against a 4-bet. In the first example we have a "bread-and-butter" situation with a speculative rundown against likely AAx, but we get a slightly trickier than usual job of counting outs on the flop when Villain probably has flopped top set.

In the second example we make a bluff 3-bet with a very rough double-suited hand, and we get 4-bet and 5-bet all-in in a 3-way pot. We shall see that this scenario is trivial (and profitable) under the assumption that both opponents are straightforward.

## 3.6 Example of defending against a 4-bet from likely AAxx: Counting outs against top set on the flop

$10PLO
6-handed

CO ($10) raises to $0.35. He is straightforward and plays tight out of position after a 3-bet, so you elect to make a speculative 3-bet to $1.20 with J♥ 9♥ 7♠ 5♠. The blinds fold, and CO 4-bets to $3.75.

As we have seen, this is a routine call with a decent suited and coordinated hand against likely AAxx. You call, planning to go all in on all flops where you have sufficient equity. As we have seen several times already, the equity threshold is 31%. So you need to flop two pair or better, or a pair/draw combination with at least 8 clean outs (which will gives us 4 x 8 = 32% equity).

**Flop:** A♥ T♥ 7♣ ($7.50)
CO ($6.25) pushes. Do you have enough equity to call here?

Flopping a pair + flush draw + gutshot against likely AAxx is normally worthy of rejoicement and a snap call. But here we need to be cautious. Villain probably has top set and in that case all our two pair/trips outs are dead.

So let's see what we got:

- 8 outs to a good flush (3rd nut flush)
- 3 non-flush outs to a nut straight

But if we hit an out on the turn, Villain has 9 outs to quads/full house (1 ace, 3 tens, 2 sevens, plus 3 outs that pair the turn card). 9 outs on the turn correspond to ~1/5 chance (we go easy on the decimals when making these rough estimates), so we can reduce the 11 outs to 11(4/5) = ~9.

In previous examples where we have counted outs, we have conservatively removed 1 additional out to account for the extra equity Villain gets from his side cards. But here all our outs are to minimum 3rd nuts (remember: all our two par and trips outs are dead), so we assume that further reduction is not necessary here.

Our 9 presumed clean outs give us 4 x 9 = 36% on the flop. A check shows that the real equity aganist random AAxx is 34.98% (ProPokerTools calculation), and our estimate was pretty good.

So we call and let the poker gods decide our fate.

**Turn:** A♥ T♥ 7♣ 2♠ ($20.15)

**River:** A♥ T♥ 7♣ 2♠ K♠ ($20.15)

Not this time. Villain shows A♣ A♦ K♣ 9♣ and takes the pot down with top set. We had 35.98% equity against his actual hand (ProPokerTools calculation) and we defended perfectly against his preflop 4-bet.

After such all-in clashes it's important to lower the shoulders and move on to the next hand calm, cool and collected. Loose-aggressive PLO play with lots of raising and 3-betting preflop unaviodably puts us in lots of marginal all-in spots like this one. And we will lose many of them. This should not bother us, and the only thing we need to be concerned with is whether or not we got our money in with sufficient equity.

If we consistently manage to get on the right side of 55/45 coinflips and marginal pot odds decisions like the one above, our job is done. The long run will take care of the rest (although we might have to wait a long time for our rightful profits if the PLO variance decides to torture us).

### 3.7 Example of defending against a 4-bet: Defending against 4-bet + 5-bet in a multiway pot

$10PLO
6-handed

CO ($17.20) raises to $0.35. He is tight/solid and easy to outplay by 3-betting him in position. You assess the situation and elect to make a bluff 3-bet to $1.20 with J♦ 8♦ 5♠ 4♠. Small blind ($15.30), who is a solid and straightforward TAG, now 4-bets to $4.05, and CO pushes all-in. What is your plan?

Ooops! You have clashed with two monster hands, so you have to fold your very speculative rundown hand, right?

Not quite. Before you do anything, use the time available to you and think about what has happened up to this point in the hand. CO (tight/solid) raises and he will have a wide range for this action. Then you 3-bet and another tight/solid player made a 4-bet from out of position in a scenario where he is 150 BB deep against CO.

Unless the small blind is completely out of character, there is only one hand he can hold, and that is AAxx. CO probably also knows this and when he pushes all-in we can assume he also holds AAxx. So if we call, we expect small blind to call behind us so that we get all-in in a $30.10 3-way main pot (note that our opponents have us covered, so we're playing with a $10 effective stack).

When it comes 5-bet back to us, there is $8.80 to call in order to win a net $21.30 (assuming small blind calls behind us). Effective pot odds are 21.30:8.80 = 2.42:1, and we need 1/(2.42 + 1) = 29% equity to call.

Do we have this much equity? Yes, if they both have AAxx we are probably even the favorite. This is because they now *block* each other (i.e. they have each other's outs). We punch our hand against 2 random AAxx hands into ProPokerTools and get:

**Omaha Hi Simulation**
600,000 trials (Randomized)

| Hand | Pot equity | Wins | Ties |
|---|---|---|---|
| Jd8d5s4s | 41.16% | 244,799 | 4,360 |
| AA** ! AAA* | 29.37% | 93,537 | 165,394 |
| AA** !AAA* | 29.47% | 94,071 | 165,470 |

Not only are we the favorite (we need more than 33% in a 3-way pot), we are a big favorite. So we're not only calling "defensively" for the pot odds, we have +EV for each additional chip that goes into the pot preflop.

By calling we invest $8.80 in an expected main pot of $30.10, where we have 41.6% equity. The EV for our call is:

```
EV (all-in)

= 0.4116($30.10) - $8.80

= +$3.59
```

Folding (EV = 0) is therefore a big mistake which costs more than 1/3 of a buy-in. So we call and we're happy to see the small blind calling behind us.

**Flop:** Q♥ J♠ 4♥ (Main pot: $30.10)

**Turn:** Q♥ J♠ 4♥ 7♦ (Main pot: $30.10)

**River:** Q♥ J♠ 4♥ 7♦ 2♦ (Main pot: $30.10)
You take down the pot with flopped bottom two pair. CO has A♦ A♠ K♠ 9♥, while small blind has A♥ A♣ 8♥ 8♣. They both scream in agony, and CO threatens to report you to support for cheating.

You had 37% equity preflop against the actual hands, and you got your money in as a significant favorite in a 3-way pot (ProPokerTools calculation). Not bad!

What we take from this example is this: When you are up against two AAxx hands in a 3-way pot, you can go profitably all-in with an extremely wide range of speculative hand (especially when you have already invested money in the pot). And some of these hands are so ugly that we don't dare to mention them here, out of fear for the starting hand police. Note that for this all-in scenario to be profitable, you want all players to have approximately equal stacks. What you don't want is to get all-in in a big side pot heads-up against one of the AAxx hands.

## 4. Summary

We have discussed 4-betting/playing against a 4-bet, using a mathematical/analytical approach. Our goal has been to lay the foundations for a mathematically sound 4-bet strategy where we do the big things right.

Since this material (as usual) expanded a bit during the writing process, I chose to use a few thorough examples instead of many shorter ones. The strategies for 4-betting and playing against a 4-bet with 100 BB stacks are conceptually simple, and postflop play mostly comes down to going all-in on the flop. Playing these situations well is more a craft than an art form and it isn't necessary to be a gifted poker player to get these things right. What you need is repetition, reptition, repetition.

With this article we have reached the end of the list of preflop concepts I planned to discuss. We have also talked about postflop play, but so far not with much subtlety and finesse.

The next stage is to talk about more advanced postflop concepts, and the plan is to make the rest of the article series be about postflop play. I haven't yet planned Part 7 and beyond in detail, so I will put on my thinking cap and come up with ideas for how to proceed.

Good luck!
Bugs

# Part 7: Grinding Low Limit PLO

## 1. Introduction

This is Part 7 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

We finished our discussion of preflop theory in Part 6, and I commented that Part 7 and onwards would be about postflop play. But before we do this, we'll take a break from theory and spend one article discussing:

- The practical part of the article series (building a bankroll from $5PLO to $200PLO)
- The low limit PLO player pool
- Sound value ranges for various preflop and postflop HEM stats
- How to design a simple HoldemManager (HEM) HUD for PLO 6-max

It so happens that since Part 6 was published I have gotten my hands on statistics from a huge HEM database. This database was built by a friend of mine who has grinded her way through the low limits during the last 4 months. She started at PLO25 in January 2010 with a 50 BI ($1250) bankroll, and at the time of writing (April 2010) she's about to move up to PLO200. Her plan is to build the bankroll to 100 BI here, before she moves on to PLO400.

Our friend (who shall remain anonymous) has purchased datamined hand histories and built a low limit PLO database with millions of hands from PLO25, PLO50 and PLO100. Some think this is acceptable, some (and most poker sites are among them) think it's unacceptable, but we won't discuss the ethics of this here.

What's interesting to us is that our cynical friend has made the database available for us to do some statistical analysis of the low limit player pool. I mentioned to her that I would have liked to know more about the general low limit conditions. It's been a while since I played low limit, and I didn't grind PLO below PLO100 when I learned the game myself, so I don't know much about these limits. I was also interested in estimating good values for common HEM stats like VP$IP, PFR%, 3Bet%, WTSD%, etc. under low limit conditions.

When our friend heard this, she offered to extract information from her database so that we could use it. I gleefully accepted the offer, and I decided to base an article on this analysis. We have gone through a lot of heavy theory up to now, so we could use a little break where we talk about more practical things before we move on to postflop theory.

So she purpose of Part 7 is to talk about grinding low limit PLO, study the player pool at these limits by extracting information from a large database, and show how we can design a simple PLO HUD for HoldemManager.

## 2. The practical part of the article series

Before we do statistical analysis of the database, let's talk briefly about the work done on the bankroll building project for the "PLO From Scratch" article series.

We remember from Part 1 that we defined a bankroll building project for the article series. We started with 50 BI ($250) at PLO5, and our goal was to build our bankroll big enough to move up to PLO200.

We use a move-up scheme we call "50+10". This means having at least 50 BI for the limit we're grinding, and then we can take shots at the next limit whenever we have at least 10 BI for that limit in addition to the 50 BI. For example, we start at PLO5 with 50 BI and then we grind in 10 BI ($100) for PLO10 and take a shot. If we lose the 10 BI, we drop down to PLO5 and grind in 10 BI more, rinse and repeat. This way we always have at least 50 BI for the limit we're grinding before we start taking shots at the next limit, and our shots are done in a controlled manner.

This gives the following progression.

- **$5PLO to $10PLO:** Grind in 20 BI ($100) at $5PLO and build the roll to 50+10 BI ($350) for a shot at $10PLO.
- **$10PLO to $25PLO:** Grind in 40 BI ($400) at $10PLO and build the roll to 50+10 BI ($750) for a shot at $25PLO.
- **$25PLO to $50PLO:** Grind in 40 BI ($1000) at $25PLO and build the roll to 50+10 BI ($1750) for a shot at $50PLO.
- **$50PLO to $100PLO:** Grind in 35 BI ($1750) at $50PLO and build the roll to 50+10 BI ($3500) for a shot at $100PLO.

- **$100PLO to $200PLO:** Grind in 35 BI ($3500) at $100PLO and build the roll to 50+10 BI ($7000) for a shot at $200PLO.

If all shots succeed at the first try, we have to grind in 20 + 40 + 40 + 35 + 35 = 170 BI. If we (somewhat arbitrarily) assume an average win rate of 7.5 ptBB/100 (ptBB = 2 x big blind), we will make 1.5 BI per 1000 hands on average. So we have to play a minimum of 170/(1.5 per 1000 hands) = 113,000 hands.

So what has happened with our bankroll building project since the start? This can be summarized in one sentence: *There and back again is twice as far*. I grinded through PLO5 and almost all of PLO10 while writing Part 2 and Part 3 (October-November 2009), and the plan was to blog about these limits before I moved on to PLO25.

But then my grinding computer crashed and died in December 2009 (merry X-mas!) and everything on the desktop hard drive that wasn't backed up (including the database and hand histories for the article series grind) was lost. This was mildly annoying, so I paused the grind for a while and concentrated on writing the theory articles instead.

Now the preflop part of the series is done, and this is a good time to take up the grind again. If things go smoothly, I should be able to finish the bankroll building project and the remaining theory articles at about the same time. So the plan for the next few months is to finish these two parts in parallel and then end the series with a summary. This will probably happen some time during the summer of 2010.

The setback for the practical part of the series just goes to show that things don't always go smoothly, and you have to expect problems along the way (a good poker mindset to have if there ever was one). But there's a silver lining. Losing the database and starting over gives me an opportunity to adjust my grinding strategy for the microlimits. I wrote in Blog 2 for the bankroll building project that I wanted to maximize winrate (and not necessarily hourly earn) and not volume. In other words, play few tables with high focus and try to squeeze every drop of value from each table.

In hindsight I see that this attack plan is overkill for the micro limits. After having grinded a few thousand hands at PLO5 and PLO10 and assessed the quality of the micro limit opposition, I have concluded that it's better to go for high volume. It's simply ineffective to spend lots of time and energy studying individual microlimit opponents to find and exploit their biggest personal leaks.

Let me explain what I mean:

Assume you're sitting at a table with 1 known big fish, 1 unknown and 3 solid regs. This is typical for the tables you'll play at mid and high stakes where there are lots of regs and few big fish. So when you find a table with a known big fish, you want to play him (there probably aren't many better tables available). Your plan at this table should be to exploit the fish maximally while trying to break even against the other regs (who we will assume are about as good as you).

For this plan to succeeed, you need to pay attention to each player at the table and gather reads. You have to punish the mistakes made by the fish, and at the same time you need to defend against the other regs' attempts to punish your mistakes. You also have to keep an eye on the unknown player at the table and try to quickly classify him, so that you can start formulating strategies to use against him. The work done at this table can have a huge payoff, both immediately (by exploiting the fish) and in future sessions (since you expect to meet many of these players again, especially the regs).

But at the micro limits, things are simpler for several reasons:

- You'll meet so many big fish that you don't need to exploit all of them maximally to have a high win rate
- You'll meet few solid regs who you need to defend against
- You'll rarely meet the same players in future sessions

So even if a grinding strategy of playing few tables with intense focus can give you astronomical win rates at the micros, you can also achieve a very good win rate simply by playing solid ABC poker and not paying much attention to reads. In other words: Standard solid ABC poker punishes the micro limit players' big and frequent mistakes *hard enough* to give you a high win rate.

Playing with intense focus can mean the difference between winning and losing at the higher limits. But at the micro limits it more likely means the difference between a high win rate and a very high win rate for a good player. Furthermore, the value of gathering reads is reduced when the player pool is very large, since you won't play lots of future sessions against the same players. Therefore, it's much more *effective poker* to play more tables with a slightly reduced win rate. This means we want to mazimize our hourly wage and not the win rate (measured in bb/100).

For example, you can easily make 10 bb/100 (e.g. 1 bI per 1000 hands) playing ABC poker at 8 micro limit tables. Playing about 70 hands per table per hour, our hourly wage is:

```
(10 bb/100 hands) x (560 hands/hour) = 56 bb/hour
```

Maybe you can manage 15 bb/100 when playing 4 tables with maximum focus (e.g. 4 x 70 = 280 hands/hour), but the hourly wage then drops to:

```
(15 bb/100 hands) x (280 hands/hour) = 42 bb/hour
```

Playing with the highest possible win rate in bb/100 is desirable, since this will lower your swings and give you a more linear profit curve. But even if you can manage 15 bb/100, playing with 10 bb/1000 is still a very good win rate, and you now make (56-42)/42 = 0.33 = 33% more per hour by playing twice as many tables.

These specific numbers are of course pulled out of a hat. But there will always exist a sweet spot (a compromise between volume and win rate) that maximizes your hourly wage. Maximizing the hourly wage at a partcular limit isn't necessarily the best for you in the long run, since you probably will learn more (and prepare youself better for higher limits) by playing fewer tables and maximizing your win rate. But at the micro limits I now believe the best strategy is to simply drill ABC play, maximize your hourly wage and get out of there as soon as you can. Then you can take your next strategical steps when you reach the low limits where you will find more regs. The less time you spend at the micro limits, the better, and a quick look at the rake you pay per hand should convince you this is correct.

Therefore, when I begin the bankroll building again this month (April 2010) I will play more tables (probably 8). I won't try to gather very detailed reads on my opponents, other than the things I pick up automatically while sitting at a table. Still, my advice to new players is that they start out at few tables so that they have time to think through their decisions. But when you have become skilled at ABC poker, it seems best to go for volume and quickly grind your way out of the micros.

Volume grinding your way out of the micros using ABC strategies will give you valuable practice that will come in handy later. Many standard lines and standard ways of thinking/planning will become automatized, and this frees up your brain to think about more difficult things when the need arises. Then you can reduce the volume and increase the complexity of your decision making processes when you reach higher limits where you'll meet more thinking opponents.

## 3. A simple statistical study of the low limit PLO player pool

As mentioned in the introduction, I recently got access to statistics from a large low limit PLO database with ~15 million recent hands from PLO25, PLO50 and PLO100. A few questions immediately popped into my head:

- What percentage of the low limit players are serious regs and how many of them just splash around without purpose or direction?
- How many of them are winners?
- What is the rake at the low limits and what is the overall effect of the rake?

By digging up answers to these questions, we can begin forming a general idea about the conditions at the low limits PLO25 to PLO100. And we can perhaps draw some conclusions about what it takes to establish ourselves as winners there. We will also learn things about the typical low limit PLO player and how he performs.

Before we get to work, here is a disclaimer:

*The analysis work done in this article is not meant to encourage anyone to break the rules at the pokersites they play at. If the use of datamined hand histories is against the rules at your sites, it is your responsibility to stay within the rules, or take the consequences of breaking them, should you do so and get caught.*

The work done in this article is of a very general nature, and we're trying to extract information about the low limit PLO playerpool as a whole. We're not analyzing the play of individual players. Therefore, I find this use of datamined hand histories ethically acceptable. The player who built this database of course had other reasons for doing so, but that is her resposibility and not ours. We're simply using an opportunity to analyze data to draw general conclusions about the low limit player pool.

### 3.1 Facts about the database

- About 15 million hands gathered at PLO25, PLO50 and PLO100
- 92469 unique players

- All hands come from the same hand history provider
- All hand histories are gathered at the same poker site between Jan 1 2010 and Apr 16 2010.

So we have a sample of 15 million recently played hands from the 3 low limits PLO25, PLO50 and PLO100 over a period of 3.5 months. Since all hands are played at the same site, we expect many of the players to have moved between these limits, but we have 92469 uniqe players in the database.

## 3.2 What is the distributon of winners and losers?

We pull this number directly out of the database. We define a winner as a player with at least 0 bb/100 win rate, and we get:

Winners: 24212 (26%)
Losers: 68257 (74%)

Of the players registered in our database about 1 out of 4 has turned a profit. The true distribution of winners and losers in the online poker universe is unknown, but we expect the majority of players to lose. And our data confirms this.

## 3.3 What is the volume for the typical low limit PLO player?

The first thing we want to investigate is how the player pool is distributed according to number of hands played. Some regulars grind the same limit for months, while some hobby players play a session or two, then leave and never return.

Before we begin this analysis, I want to remind you that all we have is a *sample*. But we will assume that all players have the same % of their hands registered in the database, and that we therefore can compare number of hands played for different players. In other words, if Player 1 has 5000 hands in the database and Player 2 has 1000 hands, we will assume that Player 1 has played 5 times as many hands as Player 2, even if we only have a sample of their hands in the database.

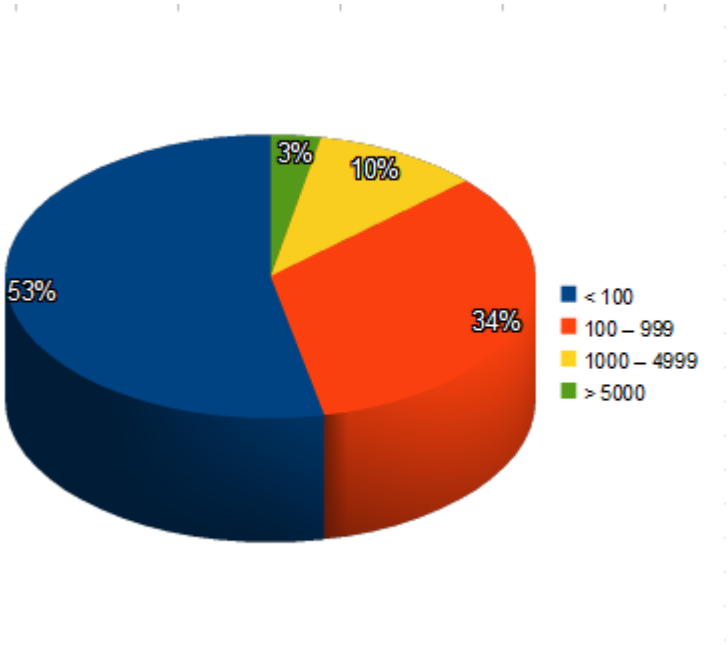
We note that these hands have been collected over a period of 3.5 months, so most players in the database have had enough time to play a lot of hands if they wanted to. Therefore, if we find lots of players with, say, less than 100 hands played, we can conclude with a high level of certainty that they don't play much. Of course, in theory they could have played a lot of hands that weren't registered in our database, but this is unlikely to happen over a period of several months. It could also be the case that these players just have started playing (i.e. they haven't had the time to log a lot of hands yet). But if there are many of them, this is unlikely, since we expect the influx of new players to be more or less constant.

Let's start by dividing the player pool (92469 players) into groups according to number of hands played:

< 100 hands: 49248 players
100-999 hands: 31007 players
1000-4999 hands: 9397 players
>= 5000 hands: 2817 players

**Total:** 92469 players

Let's illustrate this graphically:




This is a somewhat surprising result. Over a period of 3.5 months we sampled more than 5000 hands on only 3% of the player pool. This indicates that the percentage of regulars is very low. This could of course be because the hand history provider only sampled a tiny fraction of all hands played. But since we have 30 players in the database with 100,000 hands or more (one of them has 500,000 hands) this doesn't seem like a good explanation (those who play a lot of hands seem to get their hands registered)

We therefore conclude that the percentage of regulars at low limit PLO is low at this poker site. How we define a regular player is somewhat arbitrary, but it seems reasonable to demand at least 5000 hands registered in our database over a period of more than 3 months. If we use this definition, we have 3% regs at these limits. To allow for statistical uncertainty we can stretch this limit a bit and conclude that less than 5% of the players appear to be regulars.

Now we turn to the group of players at the oppisite end of the spectrum, namely the low volume players. We observe that more than half of the player pool has less than 100 hands registered. Could this be because many of them started playing at the end of the sampling period (for example, maybe most of them started playing in April)? We investigate this by looking at how the database grew from month to month:

31. January: 46716 players (+46716)
28. February: 67112 players (+20396)
31. March: 84326 players (+17214)
16. April: 92469 players (+8143)

The influx of new players seems to be fairly stable. And of the 49,248 players with < 100 sampled hands, no more than 8143 of them could possibly have started playing April 1st or later. It follows that most of the low limit players have operated between Jan 1 and Mar 31, and that they have had plenty of time to log hands.

So more than half (53%) of the player pool seems to have barely played low limit PLO at all. They have played a few hands and then (probably) moved on. Again, we only have a sample of all the hands played, but if a player has < 100 hands registered in the database, he most likely is a low volume player (again, we have many players with 100,000 hands or more, so those who play a lot of hands seem to get their hands registered).

So we conclude:

*The majority of players at low limit PLO on this poker site play a very low volume of hands. The percentage of regular players appears small. It seems that most players either only test the game over a few hands, or they play regularly but very sporadically.*

This means that most of the players you meet will be weak with a limited understanding of the game. Of course, the regular players play more often and they play more tables, so you will bump into an individual reg more often than any other individual random non-reg player. But you will mostly be playing against opponents who are easy to beat. This is encouraging (and not totally unexpected). However, it was surprising to see that the percentage of one-shot-and-done players (those with extremely low volume) was so high.

But having fish to play against is only one part of the equation. To win, we also need to beat the rake, so let us calculate it for each of the 3 limits:

## 3.4 What is the rake at PLO25, PLO50 and PLO100?

First, lets find out how much the total player pool has lost in rake. We pull the following data directly out of HEM:

- 92469 players
- Total profit: -$6071161.70
- Average profit: -$65.66
- Average win rate: -13.28 bb/100

Since the total profit for all players per definition equals the rake, we see that each player has paid -$65.66 in rake on average. Our sample gives a total of more than $6 millions in rake over 3.5 months, and our sample only contains a fraction of all hands played on PLO25, 50PLO and 100PLO during this time.

Conclusion: If you want to get rich off poker, start your own site.

Now to the rake for each limit. We pick the 3 players with most hands played on each limit, calculate their rake and take the average:

**$25PLO:**
Player 1: 175466 hands and -$7161.15 in rake = -16.32 bb/100 in rake
Player 2: 150728 hands and -$5886.37 in rake = -15.62 bb/100 in rake
Player 3: 134534 hands and -$5126.66 in rake = -15.24 bb/100 in rake

Totalt: 460,728 hands and -$18,174.18 in rake = -15.78 bb/100 in rake

**$50PLO:**
Player 1: 349,427 hands and -$22,575.55 in rake = -12.92 bb/100 in rake
Player 2: 259,214 hands and -$19,811.55 in rake = -15.29 bb/100 in rake
Player 3: 122,772 hands and -$8,698.48 in rake = -14.17 bb/100 in rake

Total: 731,413 hands and -$51,085.58 in rake = -13.97 bb/100 in rake

**$100PLO:**
Player 1: 295,804 hands and -$33,417.86 in rake = -11.30 bb/100 in rake
Player 2: 280,966 hands and -$32,858.25 in rake = -11.69 bb/100 in rake
Player 3: 218,506 hands and -$27,374.52 in rake = -12.53 bb/100 in rake

Total: 795,276 hands and -$93,650.63 in rake = -11.78 bb/100 in rake

**Estimated rake**
$25PLO: 15-16 bb/100
$50PLO: 13-14 bb/100
$100PLO: 11-12 bb/100

The rake is > 10 bb/100 at all limits, e.g. more than 1 buy-in per 1000 hands played. Relative to PLO25, the rake drops ~12% at PLO50 and ~25% at PLO100.

This steep rake is a huge obstacle to overcome for new players, and this is obviously the biggest reason why so few players come out ahead. Rake is partly a function of playing style. For example, if you play lots of hands and get involved in lots of small pots, you pay more rake. If you play fewer hands and let more small pots go and instead focus on maximizing value in big pots, you will pay less rake.

An important effect of the rake is that it might turn marginally profitable situations into break even or losing situations. If

you get involved in many of these situations, two things will happen:

- You reduce your win rate
- You introduce (even) more variance into the game

So keep in mind the rake when you have a close decision at the low limits. If it's a marginal play at best, it might be the case that the rake will turn it into a losing play. So you might want to make the rake a factor in the equation when you're in doubt.

We know that PLO is a game that allows for a lot of variation in style (you can win with many very different styles), but I suspect that the low limit rake severly limits our options with respect to style. At the high limits, where the rake is almost negligible, you will find winners who play very loose (> 40% VP$IP), but I doubt this is optimal at the low limits. You might be able to pull it off if you're a good player, but if you're that good you won't stay long at the low limits anyway. And even though a very loose style of play is profitable for you at the low limits, it might not be the *most* profitable way to play these limits.

So let's use the database to estimate reasonable values for some common preflop and postflop HEM stats. This should give us an idea about which playing styles work best at low limit PLO.

## 4. Estimating reasonable HEM stats for low limit PLO

We'll use the database to estimate sound ranges for the values of following HEM stats:

- VP$IP
- PFR%
- 3-Bet%
- Postflop Aggression Factor (AF)
- Flop CBet%
- Turn CBet%
- WTSD%

In other words:

- How many hands you play voluntarily
- How often you raise preflop
- How often you 3-bet preflop
- How aggressive you are postflop
- How often you c-bet the flop
- How often you c-bet the turn (2-barrelling)
- How often you go to showdown

Many other interesting stats exist, so we have only picked a handful of the most commonly used ones.

### 4.1 Defining our method

To estimate reasonable stat values from the HEM database, we'll use a method outlined in the article *Article 1) Plugging Leaks - Determining typical bb/100 based on Stat Ranges* that you can find on the HEM menu ("Help" --> "Articles"). The essence of the method is that we study how the win rate (bb/100) varies as a function of the stat value. Then we use this to estimate an optimal stat range.

We start by filtering out all players with at least 5000 hands in the database (i.e. the regular players). We need some minimum sample size, so we use the same sample size as in the article. This gives us a sample of 2817 players with 5000 hands or more. 5000 hands isn't a big sample, but we are going to study groups of players, not individual players.

For example, let's say you choose 1000 players with 5000 hands each and a VP$IP > 80%. Now compare these players to 1000 players with 5000 hands each and a VP$IP < 30%. Even if each player only has 5000 hands played, it's virtually guaranteed that the second group of players will outperform the first group. So we will be able to conclude with great certainty that VP$IP < 30 is much better than VP$IP > 80. Our analysis will work like this (and let's not forget that many players have much more than 5000 hands played).

For example, we'll investigate how VP$IP influences win rate. We then list all the 2817 players and sort the list according to VP$IP. Then we divide the player pool into 5 groups with an equal number of players in each group (the 1/5 with lowest VP$IP values go into group 1, the next 1/5 into group 2, etc).

For each group we note the upper and lower bounds for the VP$IP values in the group, and then we find the *median* for the win rates in the group (the median is the value that divides the group exactly in half). The higher the median, the better the players in the group perform on average, and the more optimal the group's VP$IP range. So we choose the VIP$IP range of the group with the highest median as our estimate of the optimal VP$IP range.

To make this method perfectly clear, let's illustrate it with a toy example where we use two groups. Let's say we have 6 players in the database with the following VP$IP values and win rates:

Player 1: VP$IP = 14 and bb/100 = -1
Player 2: VP$IP = 44 and bb/100 = -3
Player 3: VP$IP = 27 and bb/100 = 4
Player 4: VP$IP = 88 and bb/100 = -5
Player 5: VP$IP = 19 and bb/100 = 2
Player 6: VP$IP = 37 and bb/100 = 0

Then we sort the players according to VP$IP:

Player 1: VP$IP = 14 and bb/100 = -1
Player 5: VP$IP = 19 and bb/100 = 2
Player 3: VP$IP = 27 and bb/100 = 4
Player 6: VP$IP = 37 and bb/100 = 0
Player 2: VP$IP = 44 and bb/100 = -3
Player 4: VP$IP = 88 and bb/100 = -5

Now we divide this player pool into two equally sized groups (3 players in each) according to their VP$IP values (the 3 lowest in group 1, the 3 highest in group 2) and find the win rate median for each group. The median is defined as the data point that divides the group in half. This means that half the players in the group have win rates lower than the median and the other half have win rates higher than the median. It's obvious that the higher the median, the better the players in a group perform on average.

**Group 1**
Player 1: VP$IP = 14 and bb/100 = -1
Player 5: VP$IP = 19 and bb/100 = 2
Player 3: VP$IP = 27 and bb/100 = 4

VP$IP range: 14-27
Median bb/100: 2

**Group 2**
Player 6: VP$IP = 37 and bb/100 = 0
Player 2: VP$IP = 44 and bb/100 = -3
Player 4: VP$IP = 88 and bb/100 = -5

VP$IP-range: 37-88
Median bb/100: -3

**Conclusion for toy example**
The optimal VP$IP range in this toy example is 14-27 (the range for group 1). The win rate median for group 1 is +2 bb/100. The VP$IP range for the players in group 2 is 37-88 and their win rate median is -3 bb/100. We conclude that a VP$IP between 14 and 27 is better than a VP$IP between 37 and 88, and 14-27 is our estimate of the *optimal VP$IP range* based on this data set.

What we'll do next is to use this exact method for each of the HEM stats listed earlier. The difference is that we now have 2817 players instead of 6, and we will divide them into 5 groups instead of 2 (so we will have three groups with 563 players and two groups with 564 players).

For each HEM stat we do the data processing and computations in Excel and then I paste a screenshot with the results here. Optimal ranges are marked with a grey field.

## 4.2 Estimating Optimal VP$IP

| VP$IP range | Median bb/100 |
|---|---|
| < 21.2 | -3.96 |
| 21.2 to 26.6 | -3.26 |
| 26.7 to 33.7 | -3.88 |
| 33.8 to 43.9 | -5.97 |
| 44+ | -16.59 |

Note that the median is negative for all the VP$IP ranges. This is not unexpected, since the majority of the players in the database lose and the losers are distributed over all possible playing styles (and the brutal rake is an important reason for this). But this doesn't mean anything for our analysis. We simply want to find the range with the *highest median*, regardless of what this median is. We just assume that the stat regions with the highest median are a good estimate of the optimal range.

From the data above, we conclude that an optimal VP$IP range for the low limits is 21-27% (rounded to the nearest whole number). This is the typical tight-aggressive (TAG) region. This should not surprise us after the work we did computing the low limit rake. Playing a looser style can certainly also be profitable, but I'm guessing we won't find may low limit players who are able to turn a profit using a very loose preflop strategy. And those who are good enough to pull this off will tend to move up quickly.

These data also tell us that splashing around with a VP$IP higher than 45% is definitely not recommended. Most players trying this are probably fish (who have other leaks in addition to overly loose preflop play), but the rake will probably make it difficult to win with such a style also for competent players. It's a popular assumption that you can play very loose in PLO, but it's likely not a good idea to move far beyond 30% in a high rake environment.

## 4.3 Estimating Optimal PFR%

| PFR% range | Median bb/100 |
|---|---|
| < 6.9 | -8.38 |
| 6.9 to 10.2 | -5.6 |
| 10.3 to 13.2 | -3.93 |
| 13.3 to 16.9 | -4 |
| 17+ | -3.82 |

It's difficult to estimate an optimal PFR% range accurately based on these data, since all the ranges > 10% perform about equally well. This means we don't find a clearly defined optimal region surrounded by suboptimal regions on both sides like we did for VP$iP.

We're not able to estimate an upper bound for an optimal PFR% range, but we do find a lower bound. It seems clear from the data that a PFR% > 10% will perform well. And the range that performs best (although the differences are small) is PFR% > 17%. This is a typical TAG value. A standard PLO TAG wil have a VP$IP in the 20-25% region and a PFR% in the 15-20% region, and we have now confirmed that both these stat ranges work well for low limit PLO.

But note that a PFR% as low as 10% also seems to work well. An optimal stat value for an individual player can not be decided precicely in a vacuum, since it's also a function of how it works together with the other components of the player's style. For example, one can choose to overlimp more behind limpers and play small pots in position instead of raising them and playing big pots in position. Both lots of overlimping and lots of isolation raising can work well, as long as we choose the right types of hands for these actions, and as long as the postflop play is adjusted according to what happened preflop.

### 4.4 Estimating Optimal 3-Bet%

| 3-Bet% range | Median bb/100 |
|---|---|
| < 1.9 | -7.4 |
| 1.9 to 2.9 | -6.38 |
| 3.0 to 4.0 | -3.94 |
| 4.1 to 5.7 | -4.08 |
| 5.8+ | -4.3 |

We see the same trend as for PFR%, namely that the three highest 3-bet ranges have similar median values, so it's difficult to determine which is best. We don't find a clearly defined optimal range, but we do find a lower bound (> 3% clearly performs best) and it seems reasonable to us 3-6% as a starting point for an optimal 3-bet% region.

We remember from Part 6 that a 3-bet range of premium AAxx, premium Broadway hands, and premium speculative hands is about 5%. The database analysis indicates that this is a reasonable range to use in a vacuum. But we need to keep in mind that optimal 3-betting frequencies are highly opponent dependent, and that we can get away with a lot of loose 3-betting on the button, particularly against weak-tight opponents.

One thing worth commenting on is that the generally passive conditions at the low limit probably causes suboptimally low 3-bet% values to be *overrepresented* in the database. We see that a 3-bet% in the 3-6% region seems to work best, but > 6% might work even better (the 6+% region performs almost as well as the 3-6% region). But since few players 3-bet as much as 6+% at these limits, we don't get much data for this region. As a result, we don't get a clearly defined upper bound for an optimal 3-bet% range like we did for VP$IP (where we clearly identified an optimal region in the middle).

So we note that 3-betting somewhere > 6% is probably better than 3-6% for a strong player, especially when he faces weak opposition. But as a starting point, a 3-bet% in the upper part of the 3-6% range should work well (again, premium AAxx + premium Broadways + premium speculative hands gives us ~5%).

### 4.5 Estimating Optimal AF

| AF range | Median bb/100 |
|---|---|
| < 1.68 | -13.12 |
| 1.69 to 2.10 | -6.03 |
| 2.11 to 2.53 | -3.98 |
| 2.54 to 3.18 | -3.36 |
| 3.19+ | -2.57 |

Like PFR% and 3-Bet% we don't find a clearly defined optimal region for AF either. But we find a lower bound (> 3). We don't know how far up we can go before we reach suboptimal AF-values, but we definitely want to stay > 3.

### 4.6 Estimating Optimal Flop CBet%

| Flop CBet% range | Median bb/100 |
|---|---|
| < 48.5 | -7.25 |
| 48.6 to 56.2 | -4.75 |
| 56.3 to 62.6 | -4.1 |
| 62.7 to 69.9 | -4.91 |
| 70+ | -6.22 |

Here we have a clearly defined optimal region. It appears an optimal Flop CBet% lies somewhere between 56-63%. Going lower than 50% or higher than 60% is clearly suboptimal.

### 4.7 Estimating Optimal Turn CBet%

| Turn CBet% range | Median bb/100 |
|---|---|
| < 39 | -5.35 |
| 39.1 to 45.1 | -4.23 |
| 45.2 to 51.1 | -3.9 |
| 51.2 to 59.7 | -4.81 |
| 59.8+ | -9.44 |

We see the same pattern as for Flop CBet%. We have a clearly defined optimal region 45-51%. It's clear from these data that too much c-betting on the turn gets punished severely.

### 4.8 Estimating Optimal WTSD%

| WTSD% range | Median bb/100 |
|---|---|
| < 25.4 | -2.89 |
| 25.5 to 27.2 | -3.13 |
| 27.3 to 29.1 | -4.64 |
| 29.2 to 31.6 | -7.96 |
| 31.7+ | -11.09 |

WTSD% is not a stat we use a lot when playing, since there are other and better stats to use if we want to know if we can bluff an opponent out of the pot postflop. But it's a nice stat to include in a simple HUD layout.

We don't find a clearly defined optimal region, but we get an estimate of an upper bound. The data indicates that an optimal WTSD% lies somewhere below 27%.

## 5. We design a simple HUD layout for low limit PLO

The last thing we'll do in this article is to design a simple HoldemManager HUD layout to use when grinding low limit PLO. We'll base this work on the optimal stat ranges we found previously.

Before we begin, I'll say that I don't use HUD stats much when I play. I prefer to pay attention to find out how my opponents are behaving *here and now*, and I often play without a HUD altogether. But I of course understand that people like to use HUD stats when they play. So let's play around with the stat ranges we found previously and use them to construct the "skeleton" of a low limit PLO HUD.

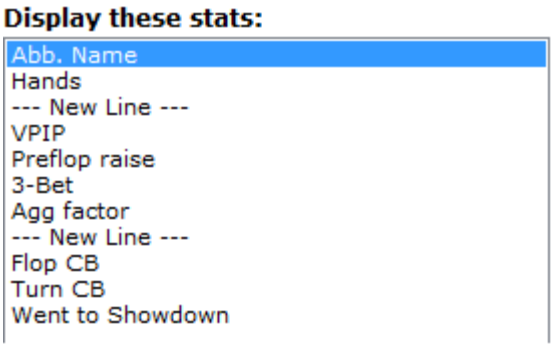
### 5.1 Our main HUD philosophy

We'll apply the KISS principle (Keep It Simple, Stupid) and use broad generalizations when we define the ranges in our HUD. We start with the 7 stats studied previously:

- VP$IP
- PFR%
- 3-Bet%
- Postflop Aggression Factor (AF)
- Flop CBet%
- Turn CBet%
- WTSD%

We also include the name of the player, and the number of hands he has in the database. We first put name and number of hands on one line, then VP$IP, PFR%, 3-Bet% and AF on a 2nd line, and finally Flop CBet%, Turn CBet%, and WTSD% on a 3rd line.

In the HEM HUD layout manager (Menu: "HUD Options" --> "Player Preferences...") it looks like this:




For each of these stats we will distinguish between optimal and suboptimal regions using a simple color coding system:

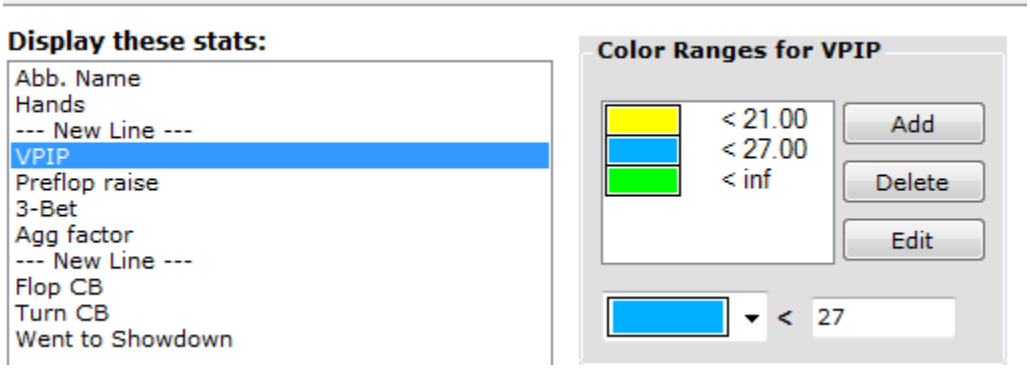
- Yellow = tight/nitty
- Green = loose/passive
- Red = aggressive
- Blue = solid/neutral

For each stat we will define 3 regions using these color codes. This will provide us with simple guidelines for how to interpret stat values for the players we meet. We'll now go through each stat, define stat regions and comment briefly on how these stats can be used while playing.

## 5.2 VP$IP

3 categories based on previous analysis:

Nit (yellow): < 21
Solid (blue): 21-27
Loose (green): > 27



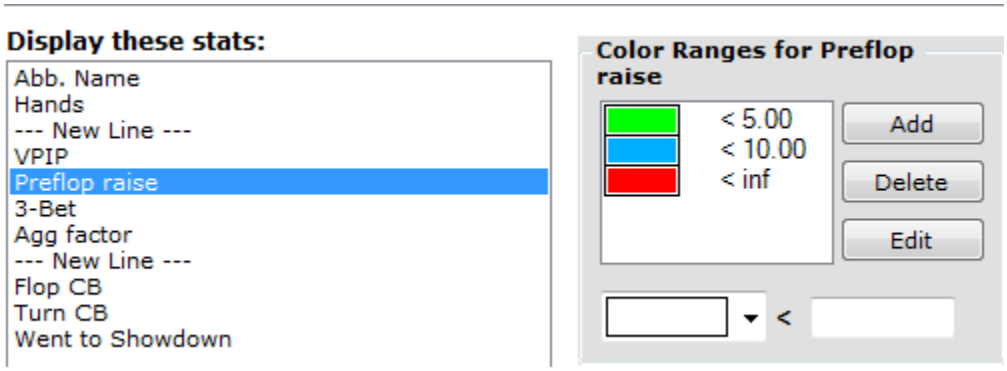

Note that we have bunched a lot of players together in a very broad category called "Loose". We could have defined a 4th category (semiloose), for example in the 27-35% region, and reserved "Loose" for players that are really loose (35+%). But we sacrifice precision for a simple 3-category-system.

Using VP$IP while playing is straightforward. VP$IP is the stat we start with when classifying an opponent, and it is the basis for all estimates of his range on all streets. The color coding system lets us easily identify nitty and solid playes just by looking at their colors. The "Loose" category is very wide, so here we need to look at the numbers as well to see if we're dealing with a semiloose (27-35) of truly loose (35+) player.

As for ourselves, we want to place ourselves squarely in the middle of the "Solid" region with a VP$IP a little below 25%. This is a solid TAG style that will perform well under low limit conditions.

### 5.3 PFR%
3 categories based on previous analysis (manually adjusted a little bit):

Passive (green): < 5
Neutral (blue): 5-10
Aggressive (red): > 10




A straighthforward categorization based on the previous analysis. The "Aggressive" category is broad, and we want to place ourselves around the 16-17% mark when using a VP$IP around 25%

### 5.4 3-Bet%
3-Bet% is a bit more tricky to categorize than the previous stats, since the optimal region was so poorly defined. But let's try this:

Passive (green): < 3
Solid (blue): 3-6
Aggressive (red): > 6


We remember from the analysis done in Part 6 that a strong 3-betting range of premuum AAxx + premium Broadway hands is around 2.5%. A wider range of premium AAxx, premium Broadways and premium speculative hands (the best rundown hands and the best suited ace + rundown hands) is about 5%.

So it makes sense to define the 3-6% range as "Solid", while everything below it is "Passive" and everything above it is "Aggressive". When we move below the 3% mark, our range becomes mostly premium AAXX + premium Broadways (alternatively, a range of all AAxx hands and no other hands, which is 2.5%). At the opposite end of the spectrum, if we move beyond 6%, there has to be a lot of speculative hands in our range, which is consistent with the 3-betting range of an aggressive and tricky player.

When we get 3-bet by a passive player, we can throw away our weakest hands and run for the hills, especially when he has position on us. He isn't splashing around, and trying to outplay a strong range with a weak hand from out of position is just silly. So we mostly fold our weak hands from out of position, plain and simple. When we 4-bet this type of player, we will

mostly have AAxx.

In position we can call with lots of weak hands, since we now have better control over the pot postflop, and since we will get more opportunities to use the information we have about his tight range to our advantage. For example, it's now easier for us to get the money in good when we hit, or steal the pot when we miss, but we know that he has also missed.

Against a very aggressive 3-bettor we have to fight back a bit more from out of position. Our 4-betting range will also be wider, and we will start 4-betting premium AKKx, AQQx and AKxx hands as discussed in Part 6.

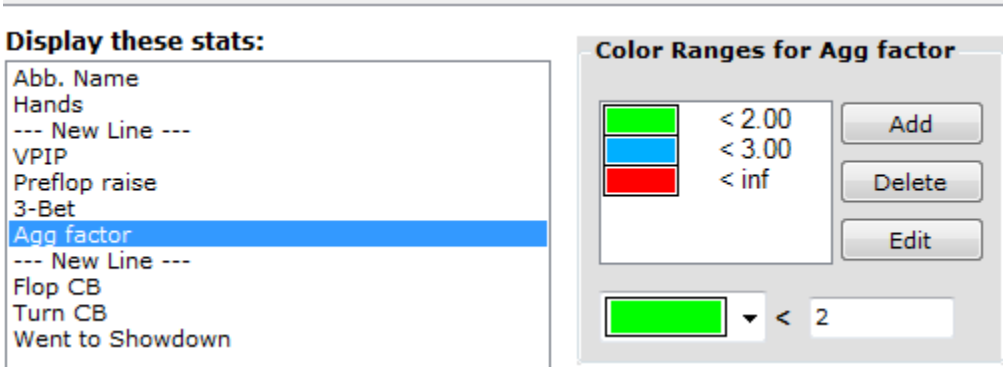
But don't go overboard with fighting back against an aggressive 3-bettor from out of position. You will still have to fold lots of weak hands in this case, and simply accept that a player with position on you has a certain amount of power over you.

When it comes to our own 3-Bet%, I recommend that you don't try to push it up to some predetermined value. Just analyze each 3-betting scenario using the decision making processes we have discussed previously in the article series. When you consistently find good opportunities to 3-bet for value, as a speculative 3-bet or as a bluff 3-bet, your 3-Bet% will take care of itself.

## 5.5 Postflop Aggression Factor (AF)

We define 3 broad categories:

Passive (green): < 2
Neutral (blue): 2-3
Aggressive (red): > 3



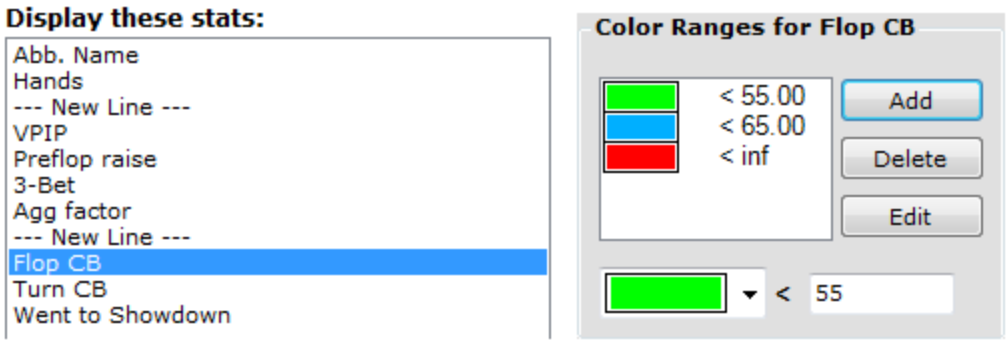

Using this parameter while playing is straighthforward. When a passive player bets or raises, he usually has it. When an aggressive player bets or raises, he doesn't necessarily have it. Take it from there.

We'll aim for an AF > 3, but we're not sure where the optimal region ends and the suboptimal region begins. But as long as we don't fall down to passive play, we should do just fine.

## 5.6 Flop CBet%

3 categories based on previous analysis:

Passive (green): < 55
Solid (blue): 55-65
Aggressive (red): > 65




This stat is relatively simple to use. The c-bet of a player who often checks weak hands, should be respected more than the c-bet of a player who c-bets most of his range on the flop. We fold more against a passive c-bettor, and we call and raise more against an aggressive c-bettor.

If you feel that your c-bets with weak hands always gets called or raised, you might be c-betting too much. If your opponents pick up this read on you, they will adjust by fighting back against your frequent c-bets, since they know you often have nothing.

Conversely, if your c-bets get a lot of respect, and you feel like you're never getting any action when you flop a big hand, you might be c-betting too little. If your opponents realize that you check a lot after missing the flop, they will respond by giving you more respect when you bet. So remember that you should c-bet a lot of air hands on the flop. It's profitable in itself (as long as you don't overdo it) and it balances your range and makes you harder to read postflop.

### 5.7 Turn CBet%

We define 3 broad categories:

Passive (green): < 40
Solid (blue): 40-55
Aggressiv (red): > 55


Players who rarely c-bet the turn without a hand can be exploited by:

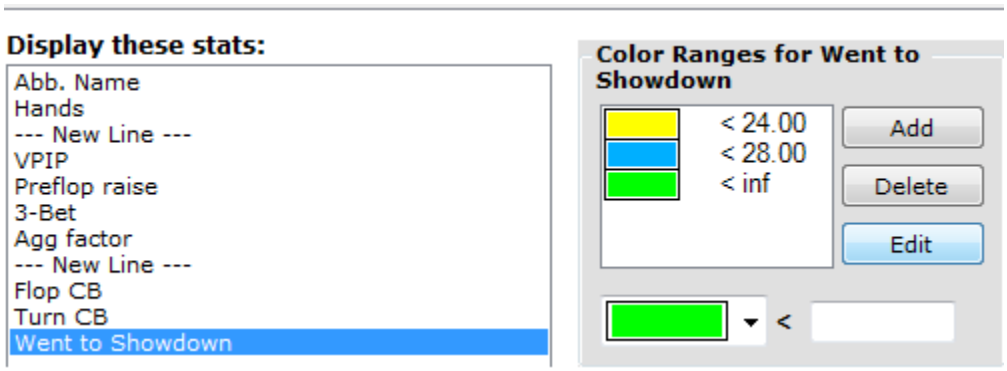
- Folding more marginal hands on the turn when they bet
- Floating more on the flop to see if they give up on the turn

Here you can look at both the Flop CBet% and the Turn CBet%. Against a player who c-bets too much on the flop, but rarely c-bets the turn without a hand, you can float a lot on the flop. An aggressive flop c-betting strategy can of course also be exploited by bluffraising more on the flop. But if you know he is going to give up on a lot of turns, it's better for you if you wait to see what he does on the turn. You can gather more information about his range before you bluff, and you also get to see a turn card (you would have to fold to a reraise if you bluff-raised the flop and he raised you back).

## 5.8 WTSD%

An optimal region was not clearly defined, but we found an upper bound (27%). We stretch this limit a bit to be on the safe side, and try the following categories:

Nitty (yellow): < 24
Solid (blue): 24-28
Loose (green): > 28




Use this stat to paint a broad picture of whether or not a player is showdown bound. But if you want to exploit a nitty player, there are better and more specific stats to use (for example "Fold to flop CBet", "Fold to turn CBet", or "Fold vs river bet"). But we include this stat to have a crude how-likely-is-it-that-I-can-steal-this-pot-from-him parameter in our HUD.

WTSD% is obviously very dependent on the cards we're dealt in the short run (when we make hands, we go more often to showdown), so don't rely on it when the sample size is small.

## 5.9 Summary of our HEM HUD design

The final HUD can be downloaded from the link below:

plo6max.xml (right click and choose "Save as")

You can construct much more refined HUDs than this one, but my philosophy is "less is more". I also like to know *why* I have included a certain stat in my HUD, and I want to know how to use the information it provides. If you don't know what to do with a piece of information, it stops being information and turns into noise.

Furthermore, I don't claim these HUD stat ranges are optimal for all types of game conditions. But I hope this work has given you a better understanding of how to organize the information that floats all around us when we play. Organizing it makes it easier to gather and process it.

One can use other methods than the one used here, but it all comes down to the same: We want to know approximately where the reasonable stat ranges lie, and then we define various categories ("tight", "loose", "passive", "aggressive", "solid", "nitty", etc.) based on this.

I recommend that you experiment a bit on your own with the borders between the categories. Use the work done here as a starting point, and adjust the borders up or down a bit as you see fit. You can also introduce more categories if you see the need for it. For example, you might want to define a "Semiloose" category for VP$IP in the 27-35% region as mentioned previously (it's a bit misleading to group a VP$IP 30 player with a VP$IP 80 fish).

Just keep in mind that all HEM stat classification systems that attempt to distinguish "good" stats from "bad" stats are approximate, and that there is no unique way to define categories of players based on their stats. We want reasonable and simple categories that can help us process and utilize information while playing. A HUD should help us, not confuse us. Always remember this, and you will see that designing and using HUD layouts is simple

## 6. Summary

We have discussed the progression (or lack thereof) of the article series' practical part and estimated a time frame for the bankroll building project and the rest of the article series. We expect to finish the work some time during the next 4-5 months.

Then we performed some simple statistical analysis on a big HEM database and drew some conclusions about the conditions and player types found on low limit PLO. We also estimated low limit PLO rake.

Finally, we used the database to estimate optimal ranges for a selection of commonly used HEM stats, and we used these to design a simple HEM HUD for PLO.

This article was a little "practical interlude" in the middle of all the theory and I hope you got some ideas about general low limit conditions, the processing of information from HEM databases, and HEM stats and HEM HUD. The next phase in the article series is to discuss postflop play, and by my estimation we have 3-4 articles left before we're finished.

Good Luck!
Bugs

# Part 8: Postflop Play I

## 1. Introduction

This is Part 8 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

As of Part 8 the article series will be all about postflop strategy. Structured thinking and planning have been themes throughout the series, and now we will use the same approach for postflop play. PLO is first and foremost a postflop game, and most of the money is won and lost there.

Preflop play in an important component too, but not because lots of pots are lost or won there (once you get involved, you usually see a flop) or because big mistakes are made there (PLO starting hands run close, so preflop mistakes are generelly small, viewed in isolation). The role of PLO preflop play is to *set us up for profitable postflop scenarios*, and this can't be stressed enough.

If you often face difficult postflop decisions (e.g. when sitting out of position with a marginal hand in a big pot), this can often be traced back to systematic preflop mistakes. So although it is valuable to have the ability to play well in difficult postflop scenarios, it is generally better to avoid putting ourself in lots of difficult scenarios to begin with.

So even if we will be talking mostly about postflop play for the rest of the article series, we will not forget about preflop play. We will get opportunities to revisit important preflop concepts, and how they lead up to various postflop scenarios. For example, we will often see that the cure for many common postflop problems can be found preflop.

The plan for Part 8 and future articles (probably 3 more articles in the series) is to go from the general to the specific. We start with some general principles for postflop planning, including accurately counting outs and estimating equity.

The topics for Part 8 are:

- General principles for postflop planning
- Evaluating postflop situations

We will use lots of examples along the way. Most examples in this article will be simple, in order to train using the concepts we're discussing. Then we will move on to more specific "real life" postflop scenarios in future articles.

## 2. General principles for postflop planning

One can write thick books about PLO postflop play, and it's impossible to cover everything in an articles series like this one. But we can say a lot about sound PLO thought processes, and which principles are most important for postflop play.

We'll begin with two very important concepts that are completely general. They can be used for all kinds of decision making and in all forms of poker:

- The Good Poker model
- The Gray Area

Good Poker describes how poker decisions are made, while the Gray Area tells us that there is a limit for how accurate our decisions can get:

### 2.1 Good Poker

"Good Poker" is a model of poker decision making presented by high stakes LHE player Bryce "Freedom25" Paradis in one of his early videos for Stoxpoker.com. The Good Poker model describes the poker decision making process as a two-step process:

**1.** Formulate a set of accurate assumptions
**2.** Find the best play based on these assumptions

Step 2 is the simplest part of the process. Step one can be very difficult, and we have to use a combination of generalized assumptions, specific opponent information and logic. This process is difficult to learn in a systematic manner, and experience is very important. The more we play, the better we get at perceiving what goes on around us.

But when a set of assumptions exists (whether they are good or bad), it's easy (in principle) to deduce the best play based

on these assumptions. Going from assumptions to a conclusion about the best course of action is a process governed by mathematics and logic. So Step 2 in the Good Poker decision making process can in principle be done exactly. In practice we rarely find the mathematically best line of play, but we can train ourselves to at least find a find a good line most of the time.

Since improving on Step 1 is a difficult and slow process, we want to put most effort into Step 2 when we want to improve our poker decision making process. Our goal is to always find the best line (or at least a decent line) given what we know, or think we know. If we can get Step 2 right, we will always be able to *get the most out of whatever information and assumptions we have*. And the more experience we gather, the better our assumptions will become, and the better our poker decisions will become.

Here is an example of the Good Poker decision making process in action:

### Example 2.1.1

$10PLO
6-handed

**Preflop:**
Hero ($10) raises to $0.35 with A♦ 8♦ 7♠ 4♥ on the button, Big Blind ($10) calls. Big blind's HEM-stats are loose-passive with VP$IP/PFR%/AF = 50/6/1.2.

**Flop:** A♠ 8♠ 5♦ ($0.75)
Big blind ($9.65) checks, Hero ($9.65) bets $0.75, Big Blind calls.

**Turn:** A♠ 8♠ 5♦ 3♣ (2.25)
Big blind ($9.65) checks, Hero hs a decision to make.

Here is a typical Good Poker thought process for a competent player:

*My flop bet was an automatic c-bet with top two pair. Big Blind's flop call is consistent with a wide range of draws and marginal made hands. He can have many combinations of straight and flush draws, possibly with a pair to go with them. He can also have check-called with any top pair hand. I have top two pair, and I should have decent equity against his range. But I don't have a monster hand, and I have to fold to a checkraise.*

*But I don't think Villain will checkraise anything I beat, so I am not worried about getting bluffed. And since I also believe I have good equity, I should bet. I want to give Villain a chance to fold his 2nd best hands, or pay for the privilige of drawing to a better hand. I only have two pair on a coordinated board, so I prefer he folds. But I'm probably in good shape when he calls. If he calls and checks the river, I'll have a choice between taking a free showdown or valuebetting. I'll make that decision when I get there.*

So Hero bets $2.25, and Big Blind calls again.

**River:** A♠ 8♠ 5♦ 3♣ J♠ (6.75)
Big blind ($7.40) checks, Hero has a decision to make

*A scary river card, but I don't think he made a flush, because I expect him to often bet his flushes for value (he can't expect me to bet many worse hands if he checks). I think I'm usually ahead here, so should I bet for value? No, that's not a good idea, since Villain probably won't call with many worse hands on a scary board like this one.*

*He might have called a river bet with top pair and worse two pair hands if the river were blank, but when the flush hits, I assume he will check-fold all his one pair hands and most of his two pair hands, even if he is loose. He probably also has many busted straight draws in his range, but I can't get value from those. So all in all I think I should check behind, since I don't see enough value in a bet (I need to be > 50% favorite the times he calls)*

So Hero checks behind. Villain has J♥ 8♥ 7♣ 6♣ for a flopped open-ended straight draw + pair. Hero wins with two pair.

Note the assumptions Hero made along the way. These were based on two things:

- Hero identified Big Blind as loose based on his HEM-stats.
- Hero made generalized assumptions about Big Blinds range and tendencies, based on how loose-passive players generally

play

Given these assumptions, Hero concluded that he should bet his vulnerable two pair hand on the turn. On the river, Hero concluded that he would not get called enough by worse hands to bet for value, so he took a free showdown. Big Blind's actual hand was one we expected to see frequently, namely a busted straight draw (that stumbled into two pair on the river).

All players use some variation of the Good Poker process when they play, even if they aren't aware of it. We assume various things, and then we try to find out what to do. But by being aware of this process and verbalizing our thought processes, we will have more control over how our decisions are made.

It's important to distinguish between making assumptions and drawing conclusions from assumptions. Separating these two processes makes it easier to identify and correct flaws in our thinking. Mistakes made in Step 2 are generally easy to correct, once you become aware of them. Mistakes and shortcomings in Step 1 are harder to to fix in a systematic manner. But if the problem is lack of information, we can at least find comfort in the fact that we know where the problem lies (we simply don't have enough information to draw precise conclusions).

But no matter how skilled we are at drawing logical conclusions based on assumptions, and no matter how good we get at making accurate assumptions at the table: There is a border that we can't cross. This is because we can never have complete and perfect information about what goes on at the table. In other words: Sometimes we find ourselves in the *Gray Area*.

## 2.2 The Gray Area

"The Gray Area" is a poker concept introduced by poker player/coach Tommy Angelo in his article Reciprocality: The Cause of Profit at Poker (an article I highly recommend). Angelo begins by stating that there are poker decisions that are either completely right or completely wrong. For example, it's completely right to openraise A♠ A♥ K♠ K♥ on the button. And it's completely wrong to call a button raise with 2♠ 2♥ 2♦ 2♣ in the big blind.

Decisions that are either completely right or completely wrong are in the black/white regions. Black/white decisions are simple, and there is only one correct answer. Of course, this doesn't mean all black/white decisions are easy for a beginner. But a lot of the poker improvement process is about learning concepts that are black/white in nature. We learn them, use them, and soon they become ingrained in our thinking.

But not all decisions are black/white. There is a region between black and white where we find many decisions that are neither completely right, nor completely wrong. In this case, it doesn't matter much what we do, since one alternative seems about as good as any other (at least it seems that way to us). For example, openraising a raggedy Q♠ Q♥ 7♠ 2♦ from UTG is probably not profitable for a beginning PLO player. But it's not a big mistake either, and a good player can probably play this hand profitably from UTG if the table conditions are passive.

When we start out in poker, our Gray Area is big (in fact, when we start out, everything is in the Gray Area). The reason is that we haven't learned about most black/white decisions yet. So we have a huge Gray Area filled with decisions we find difficult, simply because we don't know any better.

And here comes the important part:

As we improve our poker skills, our Gray Area shrinks, while the black/white regions grow (since we get better and better at identifying decisions as completely right or completely wrong). *But the Gray Area never disappears completely!* It doesn't matter whether your name is Phil Ivey, Tom Dwan, or Skjervøy; everybody has a Gray Area that they sometimes walk into. The reason is that the Gray Area is not only a part of us; it's also a part of the game.

Unlike chess, where we have perfect information about the game state at all times, we don't have access to complete and perfect information at the poker table. So even if we perfect Step 2 in the Good Poker decision making process and always find the best line based on our assumptions, there will always be a border we can not move beyond, simply because we don't have complete and perfect information.

For example:

You're on the button with a ragedy  and CO has openraised. You don't know CO or the players in the blinds. 3-bet, call or fold are all viable options here. If you'd known that CO opens a wide range, that he plays straightforward out of position, and that the blinds are tight, you might want to 3-bet or make a loose call with this speculative hand. But if CO is good/aggressive and/or the blinds are loose, you should be more conservative and lean more towards folding hands like this one.

Right now you don't have information, so you simply have to choose an action. Not a difficult decision by any means, but you are definitely in the Gray Area here. If you want to play it safe, just fold this speculative hand. If you want to probe your opponents, make a loose 3-bet or call in position and see how they react. What you choose here is more a matter of your default style than what is "correct".

In situations like this one you play a somewhat "ineffective" form of poker until you get to know the opposition better. You can use reasonable default strategies against them, based on generalized information, but you won't be able to exploit their personal weaknesses maximally at this point.

Being aware of the Gray Area will help you keep focus on what's important. Always try to come up with accurate assumptions, and always try to deduce good lines of play based on these assumptions. But if you find yourselves stuck in a difficult spot, unable to interpret your opponents' actions, you have to accept that we sometimes land in the Gray Area without a good plan.

Accept this and don't let it frustrate you while you play. Move on to the next hand and use the time between sessions to shrink your Gray Area. Analyzing difficult hands after every session is an excellent way to improve. Just mark difficult hands in HEM during session, and look at them later.

When the session is over, you can return to these hands and see if you missed some vital pieces of information, or if the hand was simply impossible to solve (at least with your current skill set). You can also discuss hands with others. Sometimes another player will give you an eye-opening piece of advice. I call these aha-moments "learning to see". Sometimes your understanding of the game makes a quantum leap and you are now able to see things at the table that were previously hidden to you.

Finally: Keep in mind that the definition of a close decision is that it doesn't matter much what we do. Per definition these decisions don't have much impact on our win rate, unless there are many of them (and if there are many of them, we might have a leak in another part of our game, often preflop).

So don't get hung up in close decisions when you first start out. Get the big things right first. Plug your big leaks, then move on to the small ones, that's a good work model for systematic improvement.

## 2.3 Play to win money, not pots

Some players seem vaccinated against this concept. They play to win pots, regardless of size, and they pay little attention to risk vs reward. The reason is obviously their ego. Giving up a pot where we have made an investment causes mental discomfort, and we sometimes do stupid things to win the pot so that we can avoid this discomfort. Particularly in heads-up pots, where it's easy to feel "humiliated" by our opponent when he takes a pot away from us.

But regardless of what our ego tells us: If there isn't any money to be made by getting involved, we will retreat gracefully and save our chips.

Here is an example of very poor postflop play that you'll see often at the lowest PLO limits:

### Example 2.3.1: Overplaying AAxx on the flop

$10PLO

6-handed

Hero ($10) raises to $0.35 with A♠ A♥ 7♦ 2♣ from UTG, CO ($10) calls, button ($10) calls, small blind ($10) calls, big blind folds.

**Flop:** T♥ 9♥ 5♠ ($1.50)
Small blind ($9.65) checks, Hero ($9.65) bets $1.50, CO folds, button ($9.65) raises pot to $6, small blind folds, Hero (now frustrated) thinks for 2 seconds and pushes, button calls.

**Turn:** T♥ 9♥ 5♠ K♠ ($20.80)

**River:** T♥ 9♥ 5♠ K♠ 4♠ ($20.80)

Button wins with J♥ J♠ T♦ T♠ for flopped trips + backdoor flushdraw + backdoor straightdraw.
UsingProPokerTools we find that Hero had 11% equity on the flop:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: Th 9h 5s**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| As Ah7d 2c | *11.22%* | 92 | 0 |
| Jh Js Td Ts | *88.78%* | 728 | 0 |

Edit · Link · 2+2 · Deuces Cracked

What happened here?

Hero started out with a correct preflop raise. We have the worst possible AAxx hand, but it's good enough to openraise, and we won't get into tough spots if we use a sound default strategy. If we get 3-bet, we can 4-bet and set ourselves up for profitably shoving any flop if called. If our openraise gets called, we will sometimes c-bet the flop (we prefer a dry flop and few opponents), and sometimes we will check and give up (on coordinated flops and/or against many opponents).

The point is that we are not committed to c-bet any flop after we get called. So those times we don't think it's profitable to continue with the hand, we escape with a small loss (a 3.5 bb preflop raise). This is an acceptable price to pay for the chance to either steal the blinds, get a chance to 4-bet profitably, or see a flop with a chance to hit top set (which is what we're mostly playing for with bad AAxx in a multiway pot).

Hero got called, and the flop was one of the worst possible for his unimproved AAxx. He has a naked overpair, 3 opponents, and he is crushed by the hands that give action on this type of flop. So Hero's postflop plan should be the simplest one possible: Check and give up immediately.

But Hero chose to bet. This tells us that he isn't thinking about EV here, but about winning a pot he feels "entitled to" after having raised AAxx preflop. And he is willing to risk his stack to achieve this. He c-bets, gets raised, and gets heads-up with the raiser. Hero now has one last opportunity to fold and escape with most of his stack intact. But instead he reraises out of spite and gets all-in as a huge underdog.

The feeling that we are entitled to pick up a lot of pots with a c-bet after raising preflop is one of the first things we have to get rid of when coming over to PLO from Hold'em. In PLO, there is always a significant chance someone has hit the flop (any flop) hard, and often we simply have to play fit-or-fold, especially against many opponents, on coordinated flops, and when out of position.

If you have many opponents AND a coordinated flop AND you are out of position, using a fit-or-fold postflop strategy is the only thing that makes sense. This was Hero's exact situation in the previous example, but he let his ego dictate his play, and ended up donating a full stack in a situation that was completely in the black/white-region (all competent PLO players would automatically check and give up in Hero's shoes).

## 2.4 Don't let your cards dictate your play

This principle is a variation of the previous one. A common "disease" among new PLO players is that they give too much weight to the cards that they see, and don't pay enough attention to other factors. They also don't adjust enough to how their situation changes from street to street, especially when they start out with a premum hand. We saw a typical example of this in Example 2.3.1 where our Hero refused to accept that his AAxx (which does well against any other non-AAxx hand preflop) was toast on the flop.

For a beginning PLO player the cards on his hand and the cards on the board are the two most important factors and nothing else is remotely close. But an experienced player will evaluate each and every situation by going through a long list of factors in addition to the cards. And sometimes the cards will not rank among the most important factors.

Experienced players understand that *hand values are relative, not absolute*. For example, we don't need a "strong hand" to bet for value, we need a hand that is better than 50% of the hands that call us (whatever they are). An experienced player also understands that sometimes the value he can extract from a situation is independent of his cards (for example, when he is attacking in position against a player he perceives as weak).

Below are two examples to illustrate what we're talking about:

### Example 2.4.1: Weak AAxx heads-up in position against loose-passive

$10PLO
6-handed

**Preflop**

UTG ($10) limps, Hero ($10) raises to $0.45 with A♠ A♥ T♣ 3♥ on the button, the blinds fold, UTG calls. UTG is loose-passive, and we haven't seen him bluff in pots where another player has the initiative.

**Flop:** K♠ 9♦ 4♦ ($1.05)
UTG ($9.55) checks, Hero ($9.55) bets ($0.80), UTG calls.

**Turn:** K♠ 9♦ 4♦ 3♣ ($2.65)
UTG ($8.75) checks, Hero ($8.75) bets ($2), UTG folds.

Hero raised a so-so AAxx (one suit and little else) in position behind a loose-passive (and presumed weak) player. We succeeded in isolating the weak player and flopped a naked overpair on a somewhat coordinated flop (flushdraws and and inside wrap straight draw are possible). Villain check-called the flop, and we therefore put him on a weak range of various draws, one pair hands, and perhaps some weak two pair hands without backup draws.

Turn was a blank and UTG checked again. Hero now realizes that his mediocre one pair hand is probably still ahead of whatever Villain has. We don't expect to have great equity here, but we are probably doing OK against Villain's range. So we bet again, mostly to give Villain a chance to fold his (probably decent) equity. We don't expect to get checkraised by anything we beat, and we have an easy fold should that happen.

UTG folded to our turnbet, which confirms that his flop check-calling range was weak. But if he had some piece of the board on the flop, he should probably have called again if he had known we only had a naked overpair. If this was the case, we gained more from his fold than by getting called.

In this scenario many new PLO players will freeze up on the turn when they are in Hero's shoes. They bet a marginal hand once and get called. Then they automatically assume Villain has a hand he is taking to the river, and they fear getting called again if they bet again. These players also live in eternal fear of getting checkraised, and fear of getting bluffed (now or on the next street) if they build a big pot with a marginal hand.

But think about the circumstances surrounding our marginal hand on the turn:

- Villain is loose-passive
- We therefore expect him to peel the flop with a wide and weak range
- He checks for the 2nd time on a blank turn
- We don't expect him to checkraise -bluff us, or bluff the river

So Villain's message to us, street by street is:

- He is weak preflop (limps and calls a raise)

- He is still weak on the flop (checks and calls a bet)
- He is still weak on the turn (the turn card was a blank, and now he checks again)

So why not simply believe him and bet again for value/protection? We have nothing to be worried about. If he checkraises, we fold without regret. If he calls and bet the river, we do the same. And if he calls, checks the river, we check behind, and he wins with a two pair hand like 6♦ 5♦ 4♠ 3♦ , we shrug and say "oh well".

Note that checking behind with a marginal hand on the turn to induce bluffs doesn't do much for us in PLO. For starters, we often induce thin valuebets, not bluffs. And we will often be unable to call a river bet anyway, when the river card completes draws Villain could easily have. Finally, it's better for us that Villain folds his marginal hands on the turn instead of getting to see the river for free.

This is because he usually has decent equity against our marginal hand (there are fewer way ahead/way behind scenarios in PLO than in NLHE). By betting the turn with our marginal hand and making him fold his marginal hand, we often cause him to make a mistake (he should have called or checkraised if he knew what we had). Marginal 2nd best hands usually have decent equity against marginal best hands in PLO, and the best hand almost always prefers the 2nd best hand folds on the flop or turn.

Note that having position is very important here. The information we get from Villain when he checks for the 2nd time allows us to bet the turn with confidence. But had we been out of position, we would have been in a tough spot (we don't get to see Villain's reaction to the turn card before we make our decision).

### Example 2.4.2: Weak AAxx out of position in a limped multiway pot

$10PLO
6-handed

**Preflop**

UTG ($10) limps, CO ($10) limps, SB ($10) limps, Hero ($10) checks A♠ A♥ T♣ 3♥ in the big blind. UTG is the loose-passive player from Example 2.4.1, the others are unknown.

**Flop:** K♠ 9♦ 4♦ ($0.40)
Small blind ($9.90) checks. What's our plan?

We have the same starting hand and the same flop as in the previous example, but the postflop scenario is different. In Example 2.4.1 we have a hand good enough to raise to isolate a weak limper in position. Postflop we had a mediocre hand, but it was strong enough to extract value heads-up in position against a weak player who kept signalling weakness by checking to us. So on the relative scale of hand values our hand was strong enough raise preflop and then bet twice postflop.

Here we don't have enough hand to raise preflop, since we are out of position in a multiway pot. So we start with a check preflop. Postflop we have the same absolute hand value as in the previous example (our cards are the same and the flop is the same), but on the relative hand value scale our hand has dropped a lot. We're not heads-up and in position, we are out if position in a multiway pot, and we have zero information about the hands we're up against. We can assume that the Small Blind is weak after his check, but everything else is covered in darkness.

Betting to protect our weak-but-possibly-best hand against draws doesn't do anything for us here. The pot is microscopic, and there's nothing to protect. And we have a weak hand against 3 other hands we know very little about, and we have close to zero outs when behind (in the worst case we're drawing to only A♣). And even if we bet the flop and get called by weaker hands, the turn will be very difficult to play, since we have to act first. Should we assume we're still ahead and bet again on a blank turn? Should we worry about being outdrawn and check and give up? And if we bet the turn and get called, we face the same problem on the river, only this time in a much bigger pot (which makes our river decision out of position with a weak hand even more difficult).

Take some time to think about this, and how the hand will play out on future streets if we decide to bet the flop. You should see that betting the flop only sets us up for either winning a very small pot, or facing tough turn/river decisions out of position with a mediocre hand in a pot that's getting big. This is generally one of the worst situations in PLO. So we look ahead, we see the threat looming in the horizon, and then we check the flop to avoid it:

**Flop:** K♠ 9♦ 4♦ ($0.40)
Small blind ($9.90) checks, Hero ($9.90) checks, UTG ($9.90) checks, CO ($9.90) bets $0.40, SB folds. What does Hero do now?

Hero folds. We sometimes fold the best hand on the flop, but "best hand on the flop" doesn't mean much in PLO. The only thing that matters is whether or not we have a hand strong enough to continue profitably on the flop, and we don't. CO is representing a decent hand or a decent draw, and all we have is a mediocre made hand with little potential for improvement. We can't get to showdown if CO keeps betting, and our flop check-call will tell him that he should indeed keep betting to force us to fold (just like we did against UTG in Example 2.4.1). So we simply fold on the flop and let him have this small pot.

Our  was a weak but profitable hand in the postflop scenario in Example 2.4.1. But in Example 2.4.2 the hand was weak and worthless postflop. In the first example we set ourselves up for a profitable postflop scenario by isolating a weak player, and then we used position, hand reading, and logic to extract value postflop.

In the 2nd example we set ourselves up for a profitable postflop scenario (set mining) by checking preflop and seeing a free flop. We didn't get the flop we hoped for, and our hand turned mostly into garbage. We withdrew gracefully, without spewing chips in an attempt to win a microscopic pot out of position with a mediocre hand and no outs.

In the two previous examples we discussed some of the situational factors we have to think about when planning postflop play. Now we'll look at these factors in more detail:

## 3. Planning postflop play

We'll now discuss some important situational factors that you always have to take into consideration when planning postflop play. We always start planning before we put the first chip into the pot on the flop, and we want to have a postflop plan before we move on from the flop to the turn.

Note that our postflop plan often follows directly from our preflop plan. Remember that the purpose of our preflop strategy is to set us up for profitable postflop scenarios. So most of the time we see the flop with a broad picture of what we are going to do on different types of flops.

A consequence of sound preflop play is that we also think through the probabilities for ending up in various postflop scenarios (beyond what we flop). For example, before we make a speculative 3-bet heads-up on the button, we have to think about the chance of getting called by the blinds (should be small), and also the tendencies of the raiser (he should play meekly from out of position).

The list of situational factors to assess can be made long, but we will limit ourselves to the most important ones. Train yourselves to think through all of them each and every time you see a flop, and your postflop decision making will get easier. Below is the list of factors to assess:

**1.** The number of opponents
**2.** Position
**3.** Stack sizes (measured by SPR)
**4.** Our estimated equity (given by the cards we can see and our assumptions about our opponents and their ranges)

We have reserved this article for general discussion of postflop planning, so we will go through 1-3 here. In other words, the situational factors besides the cards and the information we have about our opponents. We save the discussion of equity for Part 9. There we will learn how to estimate our equity based on the cards we can see and assumptions about the opponent ranges we're facing.

### 3.1 The number of opponents

The number of players that see the flop is very important for relative hand strength, as illustrated in Example 2.4.1 and Example 2.4.2. This has consequences for how much hand strength we need to continue profitably beyond the flop, and how aggressively we play with various types of hands.

A frequently occuring postflop scenario is c-betting on the flop after we raise preflop and get called by one or several opponents. As a starting point (before we look at flop texture and other factors) we can use the following guidelines:

- Heads-up: C-bet most flops
- 3-way: C-bet many flops, but mostly check coordinated flops without a strong hand
- 4-way: Play mostly fit-or-fold

Heads-up and very multiway pots generally give us the simplest c-bet decisions. Who wins the pot in a heads-up confrontation is strongly correlated with preflop initiative and continuing to show aggression postflop. Both players know that the other guy can have almost anything on any flop, so aggression is often the tie breaker in pots where both players

miss.

In a very multiway pot, the preflop initiative is less important. As a rule of thumb, against 3 or more opponents, you can just ignore preflop initiative in your postflop decision making. If you raise preflop and miss the flop against 3 or more opponents, just check and give up immediately. And if you call a raise in the blinds and flop a monster in a very multiway pot, it's fine to lead the flop. You don't want to risk the flop checking through, and you can't trust the preflop raiser to bet your hand for you against many opponents.

We'll talk more about c-betting in Part 9, but below are 3 examples of c-betting decisions in heads-up, 3-way and 4-way pots:

### Example 3.1.1: A c-bet decision in a heads-up pot

$10PLO
6-handed

**Preflop:**
CO ($10) limps, you ($10) raise to $0.45 with  on the button, the blinds fold, CO calls.

**Flop:**  ($1.05)
CO ($9.55) checks, you ($9.55) bet $0.80, CO folds.

Here is a situation where PLO differs from NLHE. In NLHE we often check good underpairs on ace high and dry flops. The reason is we are in a way ahead/way behind scenario with a hand that has some value. We can check behind and induce bluffs that we can call on later streets, or we might get an opportunity to valuebet.

This way of thinking does not transfer well to PLO. One reason is that when our opponent has 4 cards on his hand, it's less likely that we are way ahead or way behind. For example, if he has JT98 on this flop, he has 11 outs to two pair or trips, and he can also pick up straight draws on the turn. So we generally don't want to turn a marginal hand into a bluffcatcher in PLO when we suspect our opponent is weak, we'd rather make him fold. Since his marginal 2nd best hands often have decent equity against our marginal best hand, he is often making a mistake by folding, which is exactly what we want.

Also, note that when we induce a bluff, it's often a bluff we can't call. Villain can represent a lot of hands on the turn and river and any turn/river card can beat our marginal hand. Again, remember that PLO hands are rarely way ahead/way behind on the flop, so Villain can easily represent a strong hand on the turn and river (which is much harder for us to do, after revealing weakness by checking the flop).

As a rule of thumb, if you have a mediocre hand with some showdown value, and you expect Villain's range is weak, you should usually bet and force him to fold his weak hands. This is generally better for you than sneaking to showdown in a small pot. Even if Villain is far behind on the flop, he often picks up outs on the turn, so why let him improve for free?

### Example 3.1.2: A c-bet decision in a 3-way pot

$10PLO
6-handed

**Preflop:**
CO ($10) limps, Small Blind ($10) limps, you ($10) raise to $0.40 with  in the big blind, CO calls, Small Blind calls.

**Flop:**  ($1.20)
Small Blind ($9.60) checks, you ($9.60) bet $1.20, CO folds, Small Blind calls.

The preflop raise is standard with a premium double-suited Broadway hand. You are out of position, but you'll hit a lot of flops hard, so you raise purely for value.

We flop top pair/top kicker + backdoor straight draws + 2 backdoor nutflush draws. A naked top pair is not enough to get to the river in a multiway pot, but here we have top pair with decent backup. By betting the flop, we're setting ourselves up for profitably continuing on a lot of turn cards:

- Any A, K, Q, J T
- Most spades
- Most clubs

We have to be careful on turn cards that pair the two low cards on the board, or fill a straight draw, but more than half the deck will be good for us. In other words, we expect to often pick up more equity on the turn. This means that even if we don't have enough hand to get to the river *now*, we will often have enough hand on the turn.

Therefore we don't expect to set ourselves up for many tricky turn scenarios with an unimproved naked top pair if we c-bet and get called, even if we're out of position. So we are happy with building the pot bigger, based on value (and of course we won't mind picking up the pot on the flop):

**Turn:** A♠ 6♥ 5♣ K♣ (3.60)
Small Blind ($8.40) checks, you ($8.40) bet $3.60, Small Blind folds.

You hit one of your many good turn cards, and now you have topp two pair + nutflush draw + gutshot. Small Blind continues to display weakness, and we have a clear turn bet for value. It's very unlikely he has us beat at this point (he needs a set), and if he is drawing we want him to pay for the privilege. If we get checkraised, we of course call with 16 outs to nutflush, nutstraight, or a full house.

### Example 3.1.3: A c-bet decision in a 4-way pot

$10PLO
6-handed

**Preflop:**
CO ($10) limps, you ($10) raise to $0.45 with A♣ 8♦ 7♣ 5♦ on the button, Small Blind ($10) calls, Big Blind ($10) calls, CO calls.

**Flop:** K♣ J♣ 6♠ ($1.80)
Small Blind ($9.55) checks, Big Blind ($9.55) checks, CO ($9.55) checks, you ($9.55) check.

The preflop raise is a standard raise to isolate a limper with a solid hand. We don't get the postflop scenario we had hoped for (heads-up with position in a raised pot), and we see the flop 4-way. This is of course fine with us, since we have a nutty coordinated and double-suited hand that plays very well multiway. But it means we have to adjust our postflop plan accordingly. Instead of c-betting most flop heads-up, our plan is now to play fit-or-fold multiway, and we won't c-bet unless we hit the flop in some way.

So is this flop fit or fold for us? We have the nutflush draw and a backdoor straight draw, but we definitely don't have enough hand to bet and get the stack in on the flop. And we don't expect to pick up the pot often on the flop, since we expect our opponents to often hit a piece on a K J x flop. So we simply use our position to take a free card and hope to improve for free.

**Flop:** K♣ J♣ 6♠ Q♠ ($1.80)
Small Blind ($9.55) checks, Big Blind ($9.55) bets $1.80, CO folds, you fold.

The turn card didn't help us, and now Big Blind bets pot. All we have is a naked nutflush draw without anything extra, so this is a simple pot odds problem. We need > 4:1, and we're getting 2:1 with presumed poor implied odds, so we fold. Can't win them all.

Note that position made this hand much simpler and cheaper to play than if we had raised from UTG. Here we got a free card on the flop, but someone would often have bet behind us if we had checked this hand from out of position. This would force us to either pay to improve, or fold decent equity if we didn't believe we had enough pot odds + implied odds.

## 3.2 Position

There are two kinds of position:

- Absolute position
- Relative position

Absolute position is our position relative to the button. Relative position is our position relative to the preflop raiser (or other players who we expect to bet).

When it comes to absolute position, we prefer to act last, and this is extremely important. Relative position matters less, but we will always keep it in mind when planning our play.

The first mantras a new PLO player learns are "position is everything" and "position, position, position". Beginnners of course understand that position is important, based on common sense. But they don't fully understand just how important position really is in this game until they have played a few thousand hands and felt the effect of playing in and out of position.

They quickly discover how much more betting you can do in position, due to the fact that players out of positon are forced to reveal weakness first. For example, marginal hands that you have to check out of position after betting the flop and getting called, can often be bet twice in position. They also experience the discomfort of sitting out of position with a so-so hand, particularly when an aggressive and competent player has position on them.

Two key concepts for understanding the importance of position in PLO are:

**1.** The players out of position are generally forced to play a more straightforward game
**2.** The players out of position are often forced to limit their range first

Both factors cause information to flow from the players out of position to the players in position. PLO is a game where anyone can have (or represent) anything at any time. Because of this, there isn't much naked bluffing in PLO, unless the pot is heads-up. Also, if you have the best hand on the flop, you can easily get outdrawn.

So if we find ourselves out of position with a strong hand, we rarely slowplay in a multiway pot. Both because we can easily get outdrawn, and because we can't trust the players behind us (for example, the preflop raiser) to bet a worse hand and give us a chance to checkraise. This means that players out of position often bet out with their strong hands, even if they didn't raise preflop. This benefits the players with position, since they now get a lot of honest information about the strength of their opponent's hand.

If we are weak and out of position, we will rarely make big moves to win a pot. This is because any of the players behind us could have flopped a big hand, and we don't have any information about where the strength lies (since nobody has acted before us). But in position with a weak hand, we can sometimes put in a well-timed bluff, after our opponents have revealed weakness by checking to us.

A big part of the postflop game is based in simple assumption about strength, where we don't necessarily think about the details of our opponents' ranges. Betting and raising, followed by more of the same on the next street, signals strength. Betting followed by checking signals weakness. Calling is weaker than betting and rasing, but does not necessarily mean weakness.

Let's look at a common postflop scenario that illustrates the ills of playing out of position:

### Example 3.2.1: Playing out of position with a limited range

$10PLO
6-handed

**Preflop:**
UTG ($10) raises to $0.35, button ($10) calls, the blinds fold. UTG is a straightforward TAG, and button is unknown (both to us and to UTG).

UTG raise represents a strong range weighted towards suited and coordinated high card hands. Button's call represents a weaker range (since he didn't 3-bet), but he will never be a big underdog against UTG's range (PLO starting hand values run close).

**Flop:** A♠ 8♦ 4♦ ($0.85)
UTG ($9.65) bets $0.70, button calls.

UTG's flop play did not limit his range. His range for c-betting heads-up is probably identical to his preflop raising range, so he can have anything from top set to air. Button's call tells us that he has hit the flop in some way. He isn't representing a monster by calling, but he isn't necessarily weak. He could be slowplaying a monster, or he has a medium strong hand that does well in this scenario (heads-up against a wide range that didn't necessarily hit the flop). Remember, we expect UTG to c-bet a lot of air on this flop.

But as a starting point we expect button to mostly have a moderately strong hand since he didn't raise, and since there aren't many monster hands possible on this dry flop. Button could also be floating (calling with a very weak hand, planning to steal the pot on later streets if UTG checks and gives up). At any rate, we expect his range to be fairly wide after the flop call, and it's difficult to say anything precise about his hand.

**Turn:** A♠ 8♦ 4♦ K♣ ($2.25)
UTG ($8.95) now has an important decision to make

If UTG checks this turn, *he limits his range, while button still has a wide range*. The board isn't very draw-heavy, but a flush draw and some weak straight draws are possible. So if UTG has a strong made hand, it will rarely be strong enough to offer button a free card (unless UTG expects button to bet a lot when checked to, so that UTG can checkraise). Therefore, with a strong hand against an unknown player on the button, a straightforward TAG would simply bet again most of the time. He could be going for a checkraise, but hands that are strong enough to checkraise don't come around all that often.

Therefore, if UTG checks this turn he is sending button a lot of information about the strength of his hand. Basically, he is telling button that he probably isn't strong enough to make it to showdown. A thinking player on the button can now use this information to his advantage. He can create a lot of *leverage* by betting the turn against a presumed weak range.

If UTG has a marginal hand that he would like to take to showdown, he is now faced with the threat of having to call two big bets. He might get to a showdown by calling only one bet, and he might not. Only button, who now is in control of the hand, knows. This threat forces UTG to give up on the turn with a lot of marginal hands. He is weak and by checking he has told button that he is weak. Button now has the power to muscle him out of the pot by making a big turn bet and threatening to follow up with an even bigger river bet.

Let's say UTG has A♠ Q♠ Q♦ 9♣ and checks the turn. He now has top pair/top kicker on a somewhat coordinated board, where button probably has a medium strong range (mostly various marginal made hands or draws). But button could have a strong hand and, if he doesn't, he might improve to one on the river. So what is UTG supposed to do if button bets after his check? Check-call down? Check-call one bet, and then check-fold the river?

UTG's problem is that he has revealed weakness by checking. And if he check-calls the turn, he confirms he is weak. Button can now read UTG's hand pretty accurately as at best a marginal hand with showdown value that would like to get cheaply to showdown. Button should then realize that UTG probably can't call two big bets to get to a showdown. So he can create enormous pressure on UTG by betting big on the turn.

Since UTG knows that button knows that UTG probably can't call down, UTG has to realize that a turn check-call (to keep button honest) is unlikely to do much for him. If UTG starts check-calling turns with marginal hands, but folding them to a river bet, he will simply donate chips against an observant opponent. But if he decides to check-call all the way down with these hands, he will get value-bet to death. So a static strategy where UTG either check-calls once, or check-calls down, will not do him much good.

Therefore, when UTG has limited his range to weak hands by checking the turn, he will be better off by simply check-folding his marginal hands instead of trying to sneak them to showdown in a small pot (which is out of his control). If UTG thinks it is a good idea to put more chips into the pot with a marginal hand on the turn, it will generally be better for him to bet himself (and keeping his range unlimited) instead of checking to button and revealing weakness.

A turn bet would then be partly for value (we might get called by a weaker hand), partly a semibluff (we hope button folds, but we might improve to the best hand when he calls with a better hand), and partly to stop him from bluffing (we risk getting bluffed out after a check, since we can't really check-call).

At any rate, the morale here is that as a general rule you don't want to play passively out of position with a weak range. You will get bet to death by competent and aggressive players with position on you. They can read your range for what is is (especially when they have seen you do this a couple of times), and they will make your life hell on the turn and river. They know more about your range than you know about theirs, and they can easily represent strong hands (especially of you keep checking).

NB! This does not mean that you should keep betting marginal hands on the turn any time you are afraid of getting bluffed if you check! The cure for this problem is found on the previous streets. You have to look ahead and see the problems that come from:

**1.** Playing a lot of non-nutty starting hands out of position preflop
**2.** Betting a lot of marginal hands out of position on the flop

For example, let's say you get a free flop with Q♠ 9♥ 6♦ 2♣ in a 4-way pot, and you flop bottom two pair on a coordinated board like J♣ 9♣ 2♠ . Don't bet out with this hand out of position in a multiway pot, simply check and fold. Your hand is extremely weak, even if it might be the "best hand" on the flop.

You will sometimes get raised and have to fold. And you will often get called, and then you will inavoidably have to check a lot of turns and be faced with unpleasant decisions when the opposition bets. Just count all the nasty turn cards that could come and you will see that betting this flop can only lead to misery on later streets. Sure, you will sometimes pick up the pot on the flop, but it's a tiny pot. And you risk losing a lot when you get action.

Understanding and exploiting position is in my opinion the most important skill to learn when you want to master PLO. We have talked about position throughout this article series, and we will continue to explore position and its uses in future articles. In Part 9 we will talk more about hand reading and using information and "betting leverage" in position (a topic we touched on in Example 3.2.1).

## 3.3 Stack sizes (measured by SPR)

The third factor that we will use in postflop planning is the ratio of stack size to pot size on the flop (and only on the flop). We call this "SPR" (Stack-Pot-Ratio). If the players have different stack sizes, there will exist an SPR value between each pair of players.

Here is an example:

### Example 3.3.1: SPR in a multiway pot

$10PLO
6-handed

**Preflop:**
You ($20.50) raise to $0.35 with  from UTG, MP ($8.20) calls, button ($2.60) calls, Big Blind ($21.50) calls.

**Flop:** x x x ($1.45)

Below are the SPR values between you and each opponent (remember that effective stack size between two players is equal to the smaller stack):

- Hero ($20.15) vs MP ($7.85): 7.85/1.45 = 5.4
- Hero ($20.15) vs button ($2.25): 2.25/1.45 = 1.6
- Hero ($20.15) vs Big Blind ($21.15): 20.15/1.45 = 13.9

We remember from Part 5 that we loosely defined 4 categories of SPR values:

- Ultra low: < 1
- Low: < 4
- Medium: 4-13
- High: > 13

We note that the SPR values 1, 4, and 13 correspond to needing exactly 1, 2 and 3 pot-sized bets to get all-in. Scenarios with high or high/medium SPR typically occur in limped and raised pots. In 3-bet pots we usually have low or medium/low SPR. In 4-bet pots we usually have low/ultra low SPR.

In the example above we have medium SPR (5.4) against MP, low SPR (1.6) against button, and high SPR against Big Blind. If we want to be a little more nuanced, we can say medium/low against MP, low/ultra low against button, and high against Big Blind.

Now we know how to compute SPR values and categorize them, and the next step is to learn how to use this information in postflop planning. The principle is easy to understand:

*The higher the SPR, the lower effective pot odds we're getting for going all-in postflop, and the more equity we need to get profitably all-in- Conversely, the lower the SPR, the less equity we need to get profitably all-in.*

We can illustrate this concept in a simple way by computing how much equity we need to get profitably all-in heads-up on the flop with different SPR values:

**SPR = 1:**
We risk 1 to win 1 + 1 = 2, so we're getting effective pot odds 2 : 1. We need 1/(2+1) = 33% equity.

**SPR = 4:**

We risk 4 to win 1 + 4 = 5, so we're getting effective pot odds 5:4. We need 4/(5+4) = 44% equity.

**SPR = 13:**
We risk 13 to win 1 + 13 = 14, so we're getting effective pot odds 14:13. We need 13/(14+13) = 48% equity.

In other words, the higher the SPR, the more important it is to be a favorite on the flop (e.g. more than 50% equity heads-up, more than 33% 3-way, etc.). The reason is that when the SPR increases, there is less overlay from dead money on the pot. Therefore our EV is depends more on having good equity when the money goes in.

We don't always play to get all-in postflop, but this principle hangs over our heads any time we get involved on the flop. If we're in a scenario where we either get all-in on the flop, or set ourselves up for getting all-in on a later street, we have to make sure our equity correlates well with our SPR.

The higher the SPR, the more important it becomes to have the nuts or draws to the nuts when we build a big pot. This is even more important in multiway pots where the risk of running into the nuts is far greater than in heads-up pots.

We will now look at 4 examples where we operate with different SPR values, and we'll discuss the consequences this has for postflop play. To keep things simple, we'll assume all players have the same stack size.

### Example 3.3.2: Postflop planning with high SPR
$10PLO
6-handed

**Preflop:**
UTG ($10) limps, CO ($10) limps, you ($10) limp  on the button, Big Blind ($10) checks.

**Flop:**  ($0.45)
Big Blind ($9.90) checks, UTG ($9.90) bets $0.45, CO ($9.90) calls. What is your plan?

Let's go through the 3 postflop factors we have discussed in this article (number of opponents, position, and SPR). We have 3 opponents, and we have the best absolute position (but not the best relative position, since we're not closing the betting). SPR is 9.90/0.45 = 22 (very high).

A high SPR in a multiway pot where 2 players have already gotten involved on the flop means we need nutty hands/draws to be happy playing a big pot. And on a draw-heavy flop like this one, we want nut potential before putting a single chip into the pot. Having position makes it easier to get to showdown with hands that can't be raised for value, but this is not an argument for getting involved with weak hands/draws in this type of scenario.

The most important factor in a high SPR scenario that is heading towards a showdown in a big pot is our nut potential. We also have to think about negative implied odds when we get involved with marginal hands/draws. And this is precisely the case here.

We flop a mostly naked overpair (we can almost ignore the low flushdraw in a multiway pot) on a very draw-heavy flop. There is a bet and a call in front of us. We have:

- A weak hand without much potential for improvement, and no nut outs
- A high SPR, which means a poor risk/reward ratio in a big pot
- Good absolute position, but this does not help us much with a hand this poor

Conclusion: Fold on the flop

Calling a bet because we think we often have "the best hand on the flop" will only lead to problems. For starters, we're far behind monster draws and our flushdraw is worthless. Furthermore, we can't keep calling unimproved with our weak hand/weak draw if UTG keeps betting. And finally we don't have any outs that give us a hand we can be confident is best. So fold, fold fold.

### Example 3.3.3: Postflop planning with medium SPR
$10PLO
6-handed

**Preflop:**
UTG ($16) raises to $0.35, you ($16) 3-bet to $1.20 with A♠ A♣ 8♠ 8♦ on the button, the blinds fold, UTG calls.

**Flop:** J♥ 9♥ 6♦ ($2.55)
UTG ($14.80) checks, what is your plan?

The postflop factors in addition to our cards:

- Heads-up
- In position
- Medium SPR (14.8/2.55 = 5.8)

The first two are very good for us, and the third is neutral before we look at the cards. By neutral we mean that SPR doesn't have any advantage or disadvantage in and of itself. What matters is how we adjust our postflop plan according to the SPR. When we look at our cards and the flop, we can make good and bad decisions, relative to our SPR.

So let's see what we have equity-wise. Not much. We have a naked overpair without draws on a very coordinated flop. We have a little extra from two blockers to the straight draws out there, but that is all.

So we basically have to choose between two lines:

- Bet-fold the flop
- Check the flop and hope to check the hand down (but reserving the right to bet the turn if Villain checks again)

Here we have stumbled into the Gray Area, and we have to play poker as best we can. But note that if we stick to one of the lines above, the potential for self-inflicted damage is limited. The only catastrophically bad thing we can do is to put more than one bet into the pot, and that is not an option.

Using position to take a free card and hope to check the hand down is a good plan here. If we elect to bet, we have to fold to a check-raise, since our equity is very poor against Villain's check-raising range (mostly strong combinations of made hands + draws). To be happy about getting all-in with naked AAxx on this flop, I would want an SPR < 1. For example, a 4-bet pot with 100 BB starting stacks where we have committed ourselves to get all-in on any flop.

### Example 3.3.4: Postflop planning with low SPR
$10PLO
6-handed

**Preflop:**
UTG ($10) raises to $0.35, button ($10) calls, you ($10) 3-bet to $1.50 with A♠ A♦ 8♠ 7♦ in the small blind, UTG calls, button calls.

**Flop:** T♠ 6♥ 3♦ ($4.60)
You ($8.50) act first. What is your plan?

Postflop factors in addition to the cards:

- 2 opponents
- Out of position
- Low SPR (8.50/4.60 = 1.8)

The low SPR value (< 2) means we don't need a monster to bet out and commit ourselves on this flop (we should not bet unless we are willing to get the rest of the stack in). Having two opponents is an argument for caution, but this is less of a concern with such a low SPR. We are out of position, but this is not a big problem either, since we're not planning to give up at any point in the hand, if we have a hand good enough to bet.

So do we have enough hand to bet here? Definitely. We have an overpair + nut gutshot draw + 2 backdoor flush draws. We usually have the best hand on the flop, and we have decent equity against better hands, should we clash with one. We

have about 2 + 4 + 2 = 8 nut-outs (for about 4x8 = 32% equity) against most better hands, so we're not too worried about running into a better hand.

We expect to often pick up the pot on the flop, and we never have very bad equity when we don't. So this is a clear bet-and-get-it-in flop scenario.

### Example 3.3.5: Postflop planning with ultra low SPR

$10PLO
6-handed

**Preflop:**
CO ($10) raises to $0.35, you ($10) make a speculative 3-bet to $1.20 with J♥ 8♣ 7♥ 5♣ on the button, the blinds fold, CO 4-bets to $3.75, you call.

**Flop:** K♣ J♠ 6♥ ($7.65)
CO ($6.25) pushes, what do you do?

Postflop factors in addition to our cards:

- Heads-up
- In position
- Ultra low SPR (6.25/7.65 = 0.82)

We note that in ultra low SPR scenarios the two other factors become unimportant. The reason is that with less than pot-sized bet left in the stack we only have a pot odds decision to make. We get it in with sufficient equity, and otherwise we fold.

Here we're getting pot odds 13.90:6.25 = 2.2:1, so we need 1/(2.2 + 1) = 31% equity. We assume CO almost always has AAxx here, so we need to flop two pair or better, or a draw with at least 8 clean outs (for 4x8 = 32% equity according to the 4x rule).

Here we have one pair (9+2 = 11 outs to two par/trips) + backdoor straight draw + 2 non-nut backdoor flushdraws on a not-too-coordinated flop. As shown in examples in previous articles, we reduce the two pair/trips outs from 11 to 8 to account for the redraw that AAxx has against our two pair, and the equity AAxx gets from the unknown side cards. The 1 + 2 = 3 backdoor outs to a straight and 2 non-nut flushes should also be discounted a bit because of the lack of nut potential. We exercise some judgment and count 2 backdor outs. Our final estimate is 8 + 2 = 10 presumed clean outs on the flop.

This gives 4x10 = 40% estimated equity on the flop, so we're well above the 31% threshold, and we have an easy call. A ProPokerTools simulation confirms our estimate:

**board: KcJs6h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Jh8c7h5c | *39.35%* | 235,418 | 1,359 |
| AA** | *60.65%* | 363,223 | 1,359 |

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**Turn:** K♣ J♠ 6♥ T♠ ($20.15)

**River:** K♣ J♠ 6♥ T♠ A♠ ($20.15)

CO wins with A♥ A♣ 7♦ 6♣. We had 41% equity against his actual hand on the flop.

board: KcJs6h

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Jh8c7h5c | 40.73% | 334 | 0 |
| AhAc7d6c | 59.27% | 486 | 0 |

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### 3.4 Summary of postflop planning

We have decided to focus on the following factors when planning postflop play on the flop:

**1.** The number of opponents
**2.** Position
**3.** Stack sizes (measured by SPR)
**4.** Our estimated equity (given by the cards we can see and our assumptions about our opponents and their ranges)

In this article we have discussed 1-3, and we save the discussion of equity for Part 9. By separating the general factors (everything except our cards) from the specific ones (the cards), we're underlining the importance of looking up from the cards and paying attention to the other things going on in the hand. A poker hand is not the cards we see, it's the cards we see in the context of all other avaliable information. The more information we can gather and process, the better our decision making will be.

A good exercise to train the understaning of factors outside of the cards goes as follows:

- Ignore the cards
- Think through all the other factors
- Decide what kind of hand you need to get involved on the flop
- Look at what you actually have, and decide whether or not this is good enough

For example, you have overlimped some hand xxxx behind CO on the button, and both blinds come along. You see an X X X flop in a 4-way pot. Small Blind bets and CO calls. Everyone has a full stack, so the SPR is high. Which cards do you now want to see?

It should be fairly obvious that we want a nutty hand here. Either a strong made hand (preferably with backup draws) or a strong and nutty draw. If you now see 9♣ 8♣ 7♠ 6♥ on a 6♦ 5♠ 4♥ flop, you are happy. If you see K♠ K♥ J♦ 7♥ on a K♦ 9♥ 6♠ flop, you are happy. If you see A♥ K♥ T♠ T♦ on a 7♥ 7♠ 6♥ flop, you hold your nose and fold.

You can also pick a hand you have played previously and play the "what if?" game. What should you have done in this scenario, the way it was? What should you have done with another type of hand? What should you have done if your position had changed? And so on and so forth.

Practicing postflop planning away from the table will increase your ability to think and plan at the table. You want to see your cards as a part of a bigger whole, and you want to understand how the different postflop factors are connected.

## 4. Summary

In this article we have built a minimalistic theoretical framework for thinking about postflop scenarios and planning postflop play. We made a list of 4 important factors (number of opponents, position, SPR and equity), and we discussed how these factors guide our postflop decision making.

We illustrated sound PLO postflop decison making with many examples. The examples were kept simple to stress important concepts, but we will get to more complex "real life" scenarios in future articles, and we'll see how our model for postflop

plannnig can be used there.

In the next article we'll end our discussion about postflop planning with a thorough treatment of equity and equity-related concepts. Among other things we'll learn how to count outs for various draws (including big wrap straight draws) and how to quickly and accurately estimate equity on the flop. Then, when we have learned how to analyze and plan hands on the flop, we will start discussing some specific and common postflop scenarios.

In a few days I'll also post blog #3 for the practical part of the article series. There I will present results from the lowest PLO limit ($5PLO) we have played through. I'll also talk about my experience with this limit (general comments on the limit, the most common mistakes players make there, and how to exploit these mistakes).

Good luck!
Bugs

# Part 9: Postflop Play II

## 1. Introduction

This is Part 9 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

In Part 9 we'll continue the discussion of our simple model for postflop planning based on 4 important factors:

**1.** The number of opponents
**2.** Position
**3.** SPR
**4.** Equity (given by the cards on our hand, the cards on the table and our assumptions about our opponents' ranges)

In Part 8 we talked about the factors that didn't involve the cards (1-3), and the turn has now come to factor 4, equity.

Being able to quickly and accurately estimate equity on the flop is definitely a craft, not a mysterious art. Our estimates are based on the cards that we see + assumptions about the opponent ranges we are up against. The rest follows from mathematics. We start by counting outs, then we estimate the number of "clean" outs by taking into consideration the chance of hitting an out and still losing. Finally, we convert outs to equity using the "4x" and "3x+9" rules (more about those later).

In this article we'll do a thorough walk-through of this process. Estimating equity is a very important part of the game, and it's also relatively easy to learn. Players who are sloppy when estimating equities often get away with it, especially in low SPR scenarios where there is room for error. But with high SPR, it's more important to have good control. Sloppy play in high SPR scenarios causes us to end up at the wrong end of 55-45 coinflops way more often than we should.

So even if working with outs and equity is a bit tedious and perhaps a bit boring, we have to learn how it's done. When you have learned the method, it's like riding a bicycle, and after a while you will start doing it more or less automatically. Those of you who find it difficult to count outs for the big wrap straight draws in the heat of battle will find useful stuff here, since we will define an easily memorizable notation for these draws.

When all the technical work is done, and our postflop model is ready for use, we'll start using it as of Part 10. We will begin Part 10 with a series of examples where we do postflop analysis and planning, using the framework of our model (number of opponents/position/SPR/equity). We'll pick some typical postflop scenarios and talk about how we should evaluate, plan and think when we navigate our way through them. We will also get an opportunity to repeat some important concepts from previous articles.

PLO is a game with an inifinite number of variations for every possible scenario, so we will not get too hung up in details when we analyze hands. We'll first and foremost try to get the big things right, using sound PLO thought processes. If we start with a sound overall framework for PLO play, and we also know the mathematics behind pot-odds and outs, we have what we need to deal with specific postflop scenarios as they turn up.

When the discussion of general postflop planning has been concluded (at the beginning of Part 10), we'll move on to some specific postflop scenarios and apply our model as a tool for analyzing them. For example, we will end Part 10 with a thorough discussion of c-betting, and we'll see how our c-bet decisions vary as a function of the number of opponents, our position, SPR and our estimated equity.

## 2. Our method for estimating postflop equity

We'll now do our systematic treatment of estimating outs/equity in PLO, and we will mainly focus on situations where we are drawing and we know we have to hit an out to win. We start by defining the procedure, and then we go through various types of draws, illustrating with examples along the way.

To learn these techniques it's necessary to do a little memorization, but its well worth it. Nothing mysterious goes on here, and it's a straightforward process. But there are some PLO specific "quirks" that makes the process a bit different from equity estimates in Hold'em, and that's why we have dedicated this article to learn it.

### 2.1 General procedure for estimating equities for draws

We use a 3-step process:

**1.** Count all our outs

**2.** Estimate the number of "clean" outs
**3.** Convert clean outs to equity

The first step is simply counting all outs we have to a winning hand. This of course depends on what we think we have to beat. For example, if you have a low pair and nothing else on the flop, you have a handful of outs against top pair, but you're drawing dead against top set.

In the second step we reduce the number of outs to take into consideration that:

**1.** We can hit an out and still be behind
**2.** We can hit an out and improve to the best hand, but on the next card our opponent makes an even better hand

For example, with a king high flush draw with nothing else to go along with it, we have 9 outs to a flush. But if someone has the nutflush draw, we're drawing close to dead. So we often can't count all outs as clean, and we have to estimate the likelihood of hitting and losing. As we shall see later in this article, whether or not we should draw to "dirty" outs is strongly correlated with SPR.

In a pot with ultra-low SPR, drawing to dirty outs is rarely a problem, since we're often getting a big overlay from the pot. But in a high SPR scenario, it's critical that we are careful with draws where many of our outs are dirty, since we now have negative implied odds and a poor risk/reward ratio. So we usually avoid playing big pots with non-nutty draws in high SPR scenarios.

Another way to hit and lose is to have winning outs on the flop, but after we hit, our opponents can draw out to a better hand on the river. For example, if you have the nutflush draw on an unpaired flop (e.g.  on a  flop), and Villain has top set, you have 8 clean outs (all hearts except  ). But if you hit your flush on the turn, Villain has 10 board-pairing outs to a full house or quads. So *effectively* you have less than 8 clean outs on the flop. We shall learn to reduce outs to clean outs, using simple math + assumptions about our opponents' hands.

When we have estimated the number of clean outs, we convert them to equity. On the flop, where we have two cards to come, we use two simple numerical approximations (note that they give the same answer with x = 9 outs):

- With x < 9 outs: Equity = 4x
- With x = 9 outs or more: Equity = 3x + 9

For example, with x = 4 outs, we have 4x4 = 16% equity on the flop. With x = 14 outs, we have 3x14 + 9 = 51% equity on the flop. These rules are numerical approximations to the exact equity, but as we can see from the exact calculations below, they work well:

**Exact equity with 4 outs on the flop**
We know 7 cards (4 on our hand + the 3 flop cards), so there are 52 - 7 = 45 unknown cards, and 4 of them are outs for us. The chance of hitting on either the turn or river equals 1 minus the chance of missing on both the turn and river:

P = 1-(41/45)(40/44) = 0.17 = 17%

Which is close to the estimate given by the 4x rule (16%).

**Exact equity with 14 outs on the flop**
We use the same logic as above, and get:

P = 1-(31/45)(30/44) = 0.53 = 53%

Which is close to the estimate given by the 3x + 9 rule (51%).

We'll often get an error of a percentage point or two, but it's important to realize that the whole process is approximate. We will often introduce errors when estimating the number of outs, and then a couple of percentage points extra in the outs-to-equity conversion is rarely significant. For example, if we have counted 1 out too much or too little, we have already introduced a ~4% error in our equity estimate, which is bigger than the numerical error in the 4x and 3x + 9 rules.

Finally, if we want to estimate equity on the turn, this is simply the probability of hitting on the last card. We compute this number by dividing the number of outs on the number of unseen cards. For example, with 4 outs, we have 4/44 = 0.09 = 9% equity on the turn. With 14 outs, we have 14/44 = 0.32 = 32 = 32% equity on the turn.

Now we have defined our procedure, and we move on to counting outs for various types of draws. For each type of draw we'll also talk briefly about how the value of the draw varies according to SPR.

Note that the distinction between made hand and draw is more "fuzzy" in PLO than in Hold'em, and often it doesn't make sense to think about hands in terms of made hands and drawing hands. In this article we will loosely use the notation "draw" for hands that need to improve to win. This includes hands that also have value as made hands, but not enough to go to showdown unimproved if we meet aggression.

## 3. Flopped pair and outs to two pair/trips

When you have flopped a pair, for example with K♦ Q♠ J♦ 9♠ on a K♥ 8♠ 4♦ flop, you also have a draw to two pair/trips. This is a weak draw in a high SPR scenario (e.g. limped and raised pots), but can be a strong draw in a low SPR scenario (e.g. 3-bet and 4-bet pots).

The strength of a two pair/trips draw is very dependent on the number of opponents, SPR and flop texture. You have to think about the hands you are up against, your immediate pot odds, the chance of improving and losing, and future betting (which can give you severe negative implied odds if the stacks are deep).

The classical example of playing a two pair/trips draw as our primary draw is heads-up against AAxx in a 4-bet pot. On a dry flop it's easy to estimate the number of clean outs, as shown in the example below:

### Example 3.1: A two pair/trips draw against presumed AAxx in a 4-bet pot

$10PLO
6-handed

CO ($10) raises to $0.35, you ($10) 3-bet to $1.20 with Q♦ J♦ T♠ 9♥ on the button, the blinds fold, CO 4-bets to $3.75, you call. You're assuming CO has AAxx, so your plan is to go all-in on all flops where you have sufficient equity against AAxx.

Let's look at two different flops:

**Flop 1:** A♣ 9♥ 4♣ ($7.65)
CO ($6.25) pushes, what do you do?

You're getting pot odds 13.9 : 6.25 = 2.22 : 1, and you need 1/(2.22 + 1) = 31% equity to call profitably. You have flopped a pair, but you're assuming Villain has AAxx, so you're treating all flopped pairs as a two pair/trips draw. So you have 9 + 2 = 11 outs to two pair/trips. That's fine and dandy, but if CO has AAxx, you're drawing dead against top set on this particular flop. So you are forced to fold under this assumption.

**Flop 2:** Q♠ 4♥ 2♣ ($7.65)
CO ($6.25) pushes, what do you do?

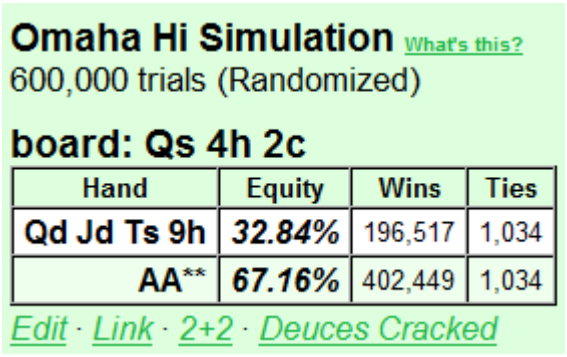
You need 31% equity as before, and now you have flopped a pair on a dry flop where AAxx usually haven't picked up any additional equity. So you can assume an unimproved pair of aces is the hand you have to beat. You start by counting 9 + 2 = 11 outs to two pair/trips. Trips will almost always win the pot for you, so you count these 2 outs as clean.

But the outs to two pair need to be discounted a bit to account for AAxx's redraw to top set or a better two pair after we hit. When we hit one of our 9 two pair outs on the turn, CO has 8 outs (2 aces, 3 fours, 3 deuces) to top set or aces up on the river. On the turn we know 10 cards (the 4 on our hand, the 2 aces on CO's hand and the 4 cards on the board), so there are 42 unknown cards. This gives CO a 8/42 chance to draw out against our turned two pair, and we can round this to 1/5.

So we subtract 1/5 of our two pair outs and get 9(4/5) = 7.2 clean two pair outs, which we round down to 7. Then we conservatively subtract 1 more out to account for the equity CO gets from his 2 unknown side cards. So our final estimate is 6 clean two pair outs.

This gives us 6 + 2 = 8 clean outs to two pair/trips on this dry flop, and we convert this to 4x8 = 32% equity on the flop. This is barely above the 31% threshold, and we have a marginal call. However, if we want to keep the variance down, and also adjust to the effect of the rake (can turn slightly +EV calls into break even or slightly -EV calls), it's perfectly fine to fold. But if we'd had a couple of backdoor draws to go along with our two pair/trips draw, this would have been an automatic call.

From the ProPokerTools-calculation below we see that our 32% equity estimate against AAxx on a dry flop was close:



**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Qs 4h 2c**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Qd Jd Ts 9h | *32.84%* | 196,517 | 1,034 |
| AA** | *67.16%* | 402,449 | 1,034 |

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With high SPR and/or many opponents, we rarely play a two pair/trips draw unless it works as a backup for another primary draw. The main reason is that in these scenarios a two pair/trips draw isn't a draw to a hand we necessarily can take to a showdown when we hit and then face aggression. With high SPR we have large negative implied odds if we get stubborn with marginal hands, so we have to be careful. So we want something more before we are comfortable playing a big pot with high SPR. Below is an example where you have a naked two pair/trips draw in a multiway pot with high SPR:

### Example 3.2: A two pair/trips draw in a limped multiway pot

$10PLO
6-handed

Button ($10) openlimps, small blind ($10) limps, you ($10) check K♠ J♦ 9♠ 2♣ in the big blind.

**Flop:** A♥ K♦ 8♣ ($0.30)
Small blind ($9.90) bets $0.20. What do you do?

You fold. You almost never have the best hand on the flop, and this is a scenario with high SPR in a multiway pot, which means you want nutty hands/draws before you play a big pot. Your risk/reward ratio is poor, you have few outs (and even fewer clean outs), you have one player left to act, and and small blind is representing a strong hand when he bets into two opponents, so fold, fold, fold.

Before we finish our discussion of two pair/trips draws, we'll look at situations where we have flopped a pair as backup for another primary draw. If we get heads-up with a strong draw plus a pair, this is generally a good situation for us, since we can now be in a *dominating draw vs draw matchup*. If we clash with another draw similar to ours, but without a pair, we can be a big favorite. The reason is simply that our pair will often win when both draws miss. Below is an example:

### Example 3.3: A pair + draw versus a draw without a pair

$10PLO
6-handed

You ($10) raise to $0.35 with K♦ Q♣ J♣ 9♦ on the button, small blind ($10) 3-bets to $1.15, you call. Small blind is a known TAG with a 3-betting range mostly made up of AAxx, good Broadway hands, and a few premium speculative hands.

**Flop:** T♠ 9♣ 4♥ ($2.40)
Small blind ($8.85) bets $2.40. What do you do?

You have been 3-bet by a TAG, and he bets out on a flop that has given you a strong draw. You have flopped one of the very good wrap straight draws (more about them later in this article), and you have 13 nut outs (4 eights, 3 jacks, 3 queens, 3 kings) to a straight. We count all these as clean, since we're drawing to the nuts on a dry flop, and we don't expect Villain to have 3-bet many hands that can flop a set on this flop.

You also have a pair and a backdoor flush draw. Hitting one of your kickers gives you a straight, so you don't gain anything extra from having outs to two pair. But you have 2 extra outs to trips, and 1 extra out to a backdoor flush. You

conservatively estimate that these two weak draws give you 2 clean outs to go with your wrap. So you estimate 13 + 2 = 15 clean outs on the flop.

This gives us 3x15 + 9 = 54% equity on the flop against a better hand that doesn't have a redraw after we hit (for example AAxx with worthless side cards). TheProPokerTools calculation below confirms our estimate:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Ts 9c 4h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Kd Qc Jc 9d | *56.20%* | 335,737 | 2,948 |
| AA** | *43.80%* | 261,315 | 2,948 |

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So we can definitely raise our pair + wrap for value against the AAxx part of Villain's range. Since he also 3-bets other hands, he can have flopped a draw as well, or he can have missed the flop completely. If he has a draw, it can't be better than our draw, unless he has the same wrap + a better pair. This rarely happens, so we can raise for value against his draws as well. And if he is c-betting air, we're of course a big favorite, so we raise (and we don't mind him folding his air hands in a big pot).

We conclude that a raise seems correct against all hand types in Villains range, so we simply shove all-in on the flop:

**Flop:** T♠ 9♣ 4♥ ($2.40)
Small blind ($8.85) bets $2.40, we ($8.85) raise all-in, small blind calls.

**Turn:** T♠ 9♣ 4♥ K♠ ($20.10)

**River:** T♠ 9♣ 4♥ K♠ 7♥ ($20.10)
Small blind has A♦ K♥ Q♥ J♦ for the same wrap as us, but without a pair. We were 66% favorite on the flop, as shown below:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: Ts 9c 4h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Kd Qc Jc 9d | *66.16%* | 395 | 295 |
| Ad Kh Qh Jd | *33.84%* | 130 | 295 |

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66% edge on the flop is huge in PLO. But if we'd had the same wrap but without a pair (e.g. K♦ Q♣ J♣ 7♦ ), Villain would have been the favorite. He would now have the same wrap as us, and also the best hand with ace high on the flop:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: Ts 9c 4h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Kd Qc Jc 7d | *32.38%* | 111 | 309 |
| Ad Kh Qh Jd | *67.62%* | 400 | 309 |

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So we see that the effect of having a pair in addition to a strong draw can be huge. Note that when we have a pair + wrap combination, the pair rarely gives us extra outs, since the kickers are a part of the wrap. We get a couple of extra outs to trips, but the biggest effect is that our pair is the best made hand on the flop. If Villain has a draw without a pair, we now win a significant number of pots where turn and river are blanks. A pair also works as a blocker against Villain's redraws those times he has flopped a set or two pair (there's one less card that can make him a full house on the river after we draw out on the turn).

We conclude that a pair can be a very valuable addition to a strong primary draw like a wrap or a nutflush draw. It's having these extra bits and pieces of equity that sets us up for getting on the right end of 55-45 coinflips on the flop, or they can turn marginal +EV to strong +EV.

## 4. Flush draws

The probability of the flop coming rainbow is:

P(rainbow flop) = (52/52)(39/51)(26/50) = 0.40 = 40%

So on 60% of flops there will exist the possibility of a flush draw of a flopped flush. This makes suitedness an extremely important property for a PLO starting hands. Every time you play a staring hand without suits, you are setting yourself up for tricky postflop decisions, and this is why we demand a suit before we label a starting hand "Premium". In our starting hand discussion in PLO From Scratch - Part 2, we classified unsuited hands as "Marginal" at best, and this is the reason.

When you have flopped a hand of the type good-but-not-great, without much potential for improvement, you will often have to play defensively postflop when the flop comes with the possibility of a flush draw. But if you have a flush draw as a backup for your made hand, you can play much more aggressively, especially with the nutflush draw (which can turn your hand into a true monster).

Estimating outs for a flushdraw in PLO is more complicated than in Hold'em because of the much bigger difference between the nutflush draw and low flush draws (when you have a low flush draw, it's much more likely someone else has a bigger flush draw in PLO than in Hold'em). So instead of counting flush outs, we'll think more "holistically" about the hand, and assess the strength of the flush draw based on whatever else we have, the number of opponents, and SPR.

At any rate, a nutflush draw gives us 8 nut outs on the flop (there are 8 flush outs that don't pair the board), but sometimes we have to discount this a bit if we suspect there are other flushdraws out there and/or if we suspect someone has a set (= a good redraw against our nutflush). These considerations are particularly important with high SPR in a multiway pot, where the price of making a mistake in a big pot goes up.

The value of a non-nut flush draw is much less than the nutflush draw, since we always risk being up against the nut draw when we get action on the flop. The value of a non-nut flush draw is also extremely dependent of SPR and the number of opponents. Drawing to a non-nut flush and little else in a multiway pot with high SPR is suicidal. But a non-nut flush draw can be a strong equity component heads-up with low SPR, for example heads-up in a 4-bet pot with SPR around 1.

We can also have valuable extra equity with a backdoor flushdraw, for example A♠ K♥ J♠ T♥ on a Q♥ 9♠ 2♣ flop where we have a 13 out wrap plus 2 backdoor flush draws. We usually count backdoor flush draws as 1 out, but we can reduce this a bit (e.g. to 1/2 out) when we have many opponents and/or the draw is low.

Here is a warm-up example to illustrate the huge difference a nutflush draw can make for the value of a hand on the flop:

**Example 4.1 A naked overpair compared to an overpair + nutflush draw**
$10PLO
6-handed

Button ($10) raises to $0.35, you ($10) 3-bet to $1.15 with A♥ A♣ 8♥ 7♣ in the small blind, button calls. Button is a solid TAG.

**Flop 1:** Q♠ J♠ 7♥ ($2.40)
You have $8.85 behind. What is your plan?

It's obvious that you are toast if you c-bet and get raised on this type of flop. So if you bet, you are bet-folding. The flop is pretty "wet" with a large number of possible draws. It's also a flop we expect to have coordinated well with buttons range for open-raising and then calling a 3-bet (his range should contain a lot of suited high/medium card hands).

For example, if button has a random Broadway hand with 4 cards from A to 9, we are pretty much crushed, even if he doesn't always have a flush draw:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Qs Js 7h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ah Ac 8h 7c | *32.58%* | 188,674 | 13,623 |
| BBBB,BBB9 | *67.42%* | 397,703 | 13,623 |

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And against the nuts, we are completely toast:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Qs Js 7h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ah Ac 8h 7c | *12.49%* | 74,959 | 0 |
| QQ** | *87.51%* | 525,041 | 0 |

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So we have a flop that we expect to have connected well with Villain's range, and when he has connected well, our equity is very poor. So your options are checking and giving up, or betting and folding to a raise (and be lost on most turn cards if you get called). Now let's see how things change when you flop a nutflush draw:

**Flop 2:** Q♠ J♥ 7♥ ($2.40)
You have $8.85 behind. What is your plan?

Here it's obvious to bet and get the stack in if we get raised. With the nutflush draw, our equity shoots up, and against a random Broadway hand with 4 cards between A and 9, we are now the favorite:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Qs Jh 7h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ah Ac 8h 7c | *52.60%* | 310,884 | 9,400 |
| BBBB,BBB9 | *47.40%* | 279,716 | 9,400 |

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We even have decent equity against the nuts:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Qs Jh 7h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ah Ac 8h 7c | *33.62%* | 201,712 | 0 |
| QQ** | *66.38%* | 398,288 | 0 |

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Sitting with or without a flush draw is like two different worlds in PLO. Without a flushdraw on a two-tone flop, we're often forced to check and give up or bet-fold with our marginal hands. The higher the SPR, the more difficult it gets to profitably play hands without flush draws when someone else very well could have one. But with a flush draw, especially the nutflush draw, we can bet more, and with a low SPR our decisions often become automatic (for example, we happily get our stack in with an overpair + the nutflush draw in a 3-bet pot with 100 BB stacks).

But it's easy for beginners to overvalue naked flush draws in PLO. So here are a few guidelines:

- The nutflush draw has big value in combination with another draw or with a decent made hand
- A naked nutflush draw has limited value
- A non-nut flush draw can have decent value in combination with another good draw, or a good made hand
- A naked non-nut flushdraw is mostly worthless (an exception is heads-up with ultra-low SPR)

We'll first look at a naked nutflush draw. It's always tempting to continue with this draw on the flop, and this can be correct. But we always have to take into consideration that:

- When there is a lot of action on a two-tone flop, it's highly likely that several of our flush outs are in other hands.
- It's difficult to extract a lot of value with the nut flush when we hit, especially when out of position

So a naked nutflush draw is not a hand strong enough to take to the river, and it's generally not a draw we bet on the flop (unless we expect to have good fold equity). And if you're playing a naked nutflush draw passively for implied odds, it's important to make an accurate assessment of how much we expect to make when we hit.

We have already looked at a combination of made hand + nutflush draw in Example 4.1. Below are 4 more examples of playing flush draws with different combinations of SPR and number of opponents. The first 3 examples are with the naked nutflush draw, then there is an example of playing a non-nutflush draw as a part of a strong combo draw:

### Example 4.2: Naked nutflush draw in a limped, multiway pot

$10PLO
6-handed

CO ($10) limps, button ($10) limps, SB ($10) limps, you ($10) check A♥ 8♠ 7♥ 4♣ in the big blind.

**Flop:** K♥ J♥ 6♠ ($0.40)
Small blind ($9.90) bets $0.40, what is your plan?

Here you have to fold because of the following bad combination of circumstances:

- You only have a naked flush draw with at most 9 outs (note that we don't expect an ace to be an out for us on this flop)
- You're only getting 2:1 in immediate pot odds, and you need > 4:1
- You have poor implied odds (your opponents won't give you much action, since your hand is obvious when you hit and start betting for value)
- You're not closing the action, and you risk getting raised if you call
- The small blind often has a flush draw himself as a part of his hand/draw when he leads into 3 opponents on the flop. If this is the case, you have fewer outs than you think

So fold, plain and simple.

### Example 4.3: Naked nutflush draw in a raised, multiway pot

$10PLO
6-handed

CO ($10) limps, you ($10) raise to $0.45 with A♣ 9♠ 8♠ 7♣ on the button, SB ($10) calls, BB ($10) calls, CO calls.

**Flop:** K♣ J♣ 6♠ ($1.80)
Small blind ($9.55) bets $0.50, BB ($9.55) calls, CO folds, what is your plan?

We start by noting that this is a flop where you should check behind with the naked nutflush draw in a 4-way pot if everybody checks to you. You have a handful of outs to the nutflush, but you're not strong enough to bet for value, and betting a weak draw as a semibluff is generally not a good idea with 3 opponents and a pretty coordinated flop.

As played, here you can call with your naked nutflush draw, since:

- You're getting 2.80:0.50 = 5.6:1 in immediate pot odds (and you need 4:1)
- You're closing the action
- You have position, and it will be easier for you to make money after you hit

So even if some of your outs sometimes are in the hands of the opposition, you can call profitably here. Unlike Example 4.2 you here have sufficient immediate pot odds, and you also have better implied odds because of your position.

Let's say you hit on the turn, and both opponents check. You of course bet, and they have to sit there and wonder if you're bluffing (unlike Example 4.2 where you would have had to bet into the field from out of position and reveal your strength). And whenever someone suspects bluffing, he will pay off more often. And when you're not checked to, this means someone is betting into you, and donating implied odds that way.

So call for pot odds + implied odds. Of course, you also have some chance of stealing the pot on the turn if both check to you. The small flop bet and the call in front of you seems weak, and both opponents could very well be planning to give up unimproved on the turn. It's also theoretically possible you can win a showdown with top pair when you spike an ace.

Top pair is obviously not a hand you can bet for value, but you will sometimes win a showdown with it if both opponents are passive enough to let you check the hand down. As an alternative, you can turn top pair into a bluff if they check to you, since you can now bet big and represent the nut straight. At any rate, the possibility of stealing the pot later in the hand, or winning a showdown with top pair can be added to the showown equity from the nutflush draw.

Note how easy it is to make this call when we're closing the action in position. We can sit laid back and ponder our alternatives with excellent control over pot odds and implied odds, and with more ways to win the pot than hitting the nuts.

### Example 4.4: Naked nutflush draw in 3-bet heads-up pot

$10PLO

6-handed

CO ($10) raises to $0.25, you ($10) 3-bet to $1.20 with A♦ Q♠ J♠ T♦ on the button, the blinds fold, CO calls. CO seems tight and straightforward.

**Flop:** 8♦ 4♦ 3♠ ($2.55)
CO ($8.80) checks, what is your plan?

Your 3-bet set you up for a very profiable scenario, namely heads-up in position against a straightforward player who is telling you he doesn't have AAxx (since he didn't 4-bet). You should c-bet virtually any flop in this scenario, and definitely a flop like this, since:

- The flop texture is low and dry, and CO usually has flopped nothing
- You can credibly represent AAxx which CO's range has poor equity against
- You have the nutflush draw to fall back on if you get called
- If you get called and CO checks the turn, you can bet again on various turn scare cards (e.g. overcards to the flop) and put a lot of pressure on his marginal hands

Like in Example 4.3 we have position, and therefore more options. But unlike the previous example, we're not basing our play mainly on the value of the draw, but on the value of position + initiative in a heads-up pot against a straightforward opponent. You can bet any random hand here and profit from it, since we expect CO to usually check-fold. Having the nutflush draw to fall back on simply makes a c-bet even more profitable.

So in this scenario the value of the draw is less important than some of the other factors we're considering. Note the different mindsets we use in multiway and heads-up pots. Sitting HU with position and initiative is a totally different world compared to sitting out of position in a multiway pot, even if we have the same cards.

### Example 4.5: Combo draw with a non-nutflush draw in a 3-bet heads-up pot

$10PLO
6-handed

You ($10) raise to $0.35 with Q♦ J♦ T♠ 6♠ on the button, SB ($10) 3-bets to $1.15, BB folds, you call. SB 3-bets tight out of position and you're assuming AAxx makes up a large portion of his range.

**Flop:** 9♦ 8♣ 4♦ ($2.40)
SB ($8.85) bets $2.40, what is your plan?

Automatic shove all-in. You have a strong 13 out nut wrap plus a 3rd nutflush draw, and it's difficult for Villain to have you crushed. If he has a random AAxx, you are a big favorite:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: 9d 8c 4d**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Qd Jd Ts 6s | *62.39%* | 372,909 | 2,802 |
| AA** | *37.61%* | 224,289 | 2,802 |

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However, if he has AA + nutflush draw, we're struggling a bit:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: 9d 8c 4d**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| **Qd Jd Ts 6s** | ***36.27%*** | 216,512 | 2,210 |
| **AAd*d*** | ***63.73%*** | 381,278 | 2,210 |

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But this is only a small portion of his AAxx hands, and we can confirm this withProPokerTools' "count" function. There are 5085 combinations of AAxx, given the known cards in our hand and on the flop:

**Omaha Hi Hand Count** What's this?
**dead cards: Qd Jd Ts 6s 9d 8c 4d**

| Hand | Best Count | Dead Count | Base Count |
|---|---|---|---|
| **AA**** | **5085** /148995 **(3.41%)** | 5085 /148995 (3.41%) | 6961 /270725 (2.57%) |

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But only 921 of them has a higher flushdraw (we also count the AAxx hands with a K high flush draw for the sake of completeness):

**Omaha Hi Hand Count** What's this?
**dead cards: Qd Jd Ts 6s 9d 8c 4d**

| Hand | Best Count | Dead Count | Base Count |
|---|---|---|---|
| **AA**&(Ad*d**,Kd*d**)** | **921** /148995 **(0.62%)** | 921 /148995 (0.62%) | 1563 /270725 (0.58%) |

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So the chance Villain has a better flushdraw to go with his AAxx hands is only 921/5085 = 18%, and we still have about 36% equity in this case, so it's not a disaster for us.

Villain might also have various other combinations of premium high card hands, but we're doing OK against these hands on average, since Villain needs a better flush draw to have good equity against us. So given our read on small blind and the estimate of our flop equity, it's a straightforward shove in a 3-bet pot.

In situations with multiple opponents and high SPR, we have to be a bit more catious with strong combo draws that have a non-nut flush-component. For example, the value of the draw in the example above would have been drastically reduced in a singly raised 3-way pot if there had been a bet + raise in front of us on the flop. Now we would have a significant chance of clashing with a better flush draw and/or a wrap similar to our own. We would also have a worse risk/reward ratio (because of higher SPR), and going with the hand on the flop would no longer be automatic.

This type of flexible thinking on the flop, where we assess our hand strength as a function of the number of opponents, position, SPR and equity estimates, is precisely what our model for postflop planning is all about. When our discussion of equity is done, we will put all the pieces together in Part 10 with a series of thorough examples where we focus on the whole.

We now move on to the last type of draw we'll consider here, namely the straight draws with focus on the strong wrap straight draws:

## 5. Straight draws

When big PLO pots get built postflop, the equity matchups frequently revolve around straight draws. This means that when 2 or more players are willing to build a big pot postflop, this usually involves at least one big straight draw. To see why this is the case, look at the two flops below, and assume the pot starts out small:

**Flop 1:** K♠ 7♦ 2♣
**Flop 2:** A♠ 8♠ 3♠

For a big pot to get build on Flop 1, we need two players to have a set, and this rarely happens. And even when it happens, the player with the lowest set will (or should) understand that the other player also has a set when he gives a lot of action on this extremely dry flop and this will (or should) slow down the action.

On flop 2 the nutflush will get some action from lower flushes, but a competent player with a low flush will slow down when he sees he is up against another flush. And he will not always be willing to take his low flush to showdown if the nutflush bets big on all streets.

Now consider the flop texture below:

**Flop 3:** J♠ T♦ 6♣

This is an action flop with a large number of possible straight draws, and many of them are strong draws:

- 97xx/87xx = 4 out gutshots
- KQxx/Q9xx/98xx = 8 out open-enders
- AKQx/987x = 13 out wraps
- AKQ9 = 16 outs wrap (with only nut outs)
- KQ9x/Q98x = 17 out wraps
- KQ98 = 20 out wrap

We can make 3 important observations:

**1.** Flop 3 is an action flop with lots of straight draws
**2.** Some of these draws are nutty, and some aren't
**3.** Flop 3 therefore gives bad players plenty of opportunities to make big mistakes!

Action flops with straight draws invites aggressive play with draws. And when two draws clash, a good player has an opportunity to outplay a bad player by using his superior understanding of starting hand strength/playability preflop and equity postflop. A good player's edge becomes even greater on flops where a flush draw is possible (more opportunities for the bad player to make mistakes) and when the SPR is high (deep stacks magnifies the effect of mistakes).

The significance of straight draws in PLO is clearly reflected in our categorization of starting hand strength (PLO From Scratch - Part 3). For example:

K♠ K♦ Q♠ J♥
A♥ T♠ 9♥ 8♠
A♦ K♦ Q♥ J♠

are all premium/near premium starting hands, while

K♦ K♠ 8♥ 3♣
A♠ J♥ 6♠ 2♣

are both marginal hands that are unsuitable for playing big preflop pots (we prefer to keep the pot small preflop and wait to hit the flop hard before we build a big pot). The first three hands all have excellent straight potential in addition to various other strength components (a high pair, a suited ace, and high card strength, respectively). The last two hands only have one single (but nutty) strength component, and non-existant or minimal straight potential.

We'll split the discussion of straight draws into two parts:

- Weak straight draws (gutshots, open-enders)

- Wraps (defined as straight draws with > 8 outs)

I feel it's important to treat the weak straight draws (e.g. the standard straight draws we also have in Hold'em) separately, since overvaluing them is a common error among PLO beginners. We'll see why these draws are much weaker in PLO than in Hold'em, also when we're getting seemingly very good pot odds. But we'll also see that they can be valuable equity components when the conditions are right, for example when they work as backup for another primary hand/draw in a medium/low SPR scenario.

Then we'll move on to the fun part, namely the big wrap straight draws. We'll learn to quickly count outs for them, and we'll learn to distinguish between nut outs and non-nut outs. This distinction is important when we build big pots in high SPR scenarios, and bad players make many big mistakes in this area.

## 5.1 Weak straight draws

For many new PLO players it's tempting to simply write the following, and then be done with it:

**Gutshots**
- 4 outs
- Example:  on a  flop

**Open-enders**
- 8 outs
- Example:  on a  flop

But this would be highly misleading. The reasoning is similar to our discussion of non-nut flush draws. The value of the draw is highly dependent on the specifics of the situation (number of opponents, position, SPR), and we can't simply count 4 outs or 8 outs and be done with it. We have to think through which hands we're facing, whether or not we're getting freerolled by a dominating straight draw, the chance of hitting and losing, and the negative implied odds we have when that happens.

In other words: A 4 out or 8 out straight draw rarely has 4 or 8 *clean outs*, even if we have 4 or 8 immediately clean outs on the flop. Remember that a clean out is an out that always wins the whole pot for us, and we rarely have many clean outs with a weak straight draw when we get lots of action on the flop.

Below are two examples to illustrate how the strength of a weak straight draw varies with the situation, and in which scenarios they perform well:

### Example 5.1.1: An open-ender in a limped, multiway pot

$10PLO
6-handed

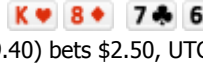
UTG ($10) limps, CO ($10) limps, you ($10) limp  on the button, SB ($10) limps, BB ($10) checks.

**Flop:**  ($0.50)
SB ($9.90) bets $0.50, UTG ($9.90) calls, CO ($9.90) calls, what is your plan?

Fold. You have a naked open-ender in a 4-way pot, and you have to assume you're often dominated by better straight draws (e.g. wraps). A weak player might think he's getting almost the immediate pot odds he needs (getting 4:1, and needing 5:1) and a dash of implied odds, but in reality he is donating significant negative implied odds to his opponents.

To see this, let's play out the hand like an optimistic fish might play our cards:

**Flop:**  ($0.50)
SB ($9.90) bets $0.50, UTG ($9.90) calls, CO ($9.90) calls, Mr. Optimist ($9.90) calls.

**Turn:**  ($2.50)
SB ($9.40) bets $2.50, UTG ($9.40) folds, CO ($9.40) folds, Mr. Optimist ($9.40) raises all-in, SB calls.

**River:**  ($21.30)
SB wins with  , Mr. Optimist, who now has a counterfeited  thinks ("bad beat!").

Really? Not really. Let's look at his equity against SB on the flop and turn:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: Kh 8d 7c**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| As Ts 9d 4c | *54.33%* | 345 | 201 |
| Qc Js Th 9c | *45.67%* | 274 | 201 |

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**Omaha Hi Simulation** What's this?
40 trials (Exhaustive)

**board: Kh 8d 7c 6c**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| As Ts 9d 4c | *36.25%* | 0 | 29 |
| Qc Js Th 9c | *63.75%* | 11 | 29 |

Edit · Link · 2+2 · Deuces Cracked

His equity on the flop was seemingly OK (54%). The mathematical reason for this is that we have the best hand with ace high, which means we will win lots of pots when the turn and river blanks, or when we improve to top pair. However, this equity edge is an illusion, since it will be impossible for us to get to showdown with ace high or top pair if SB keeps semibluffing his big draw (which, of course, is precisely the reason why semibluffing big draws works so well).

So in reality we only have our straight outs. But now our problem is that the best these outs can do for us is split the pot. Therefore, SB is *freerolling* us (he can't lose the pot, only split or scoop). If we look more closely at the calculation for the turn equity, we see that SB has 11 outs to a winning hand (all clubs and nines), and he splits the pot with us on the remaining 29 cards.

Using these numbers, we can calulate the EV for raising all-in on the turn with our naked nutstraight against SB's nutstraight + redraw. 11 times we lose $9.40, and 29 times we get back our $9.40 plus half the initial turn pot (0.5 x $2.50 = $1.25) for a net gain of +$1.25.

EV (raise turn)
= (11/40)(-$9.40) + (29/40)(+$1.25)
= -$1.68

So this was a situation where we had the nuts on the turn, but still we couldn't make a dime by raising all-in, even if the initial turn pot had a lot of dead money in it. What went wrong?

The biggest mistake in this hand was calling with a naked open-ender on the flop in a multiway pot after SB elected to bet into a field of 3 opponents. His flop bet signals a strong made hand and/or a strong draw, and when both UTG and CO call behind him, we have to assume we're often up against a dominating straight draw. Thus, calling on the flop sets us up for lots of scenarios where we're getting freerolled, which means the best that can happen is we split the pot.

This isn't necessarily all that bad in a heads-up pot with low SPR, but it can be a disaster in a high SPR/multiway pot scenario. So we have to be picky about the quality of our draw in these spots and get out early if we see the threat of a negative freeroll looming in the horizon. When we're up against many opponents and the stacks are deep, it's not enough to have a handful of outs to the nuts. What we really want is *outs to the nuts with redraws to better nuts*. And this was precicely what SB had here.

SB started with a 13 out nut wrap + backdoor flushdraw and he elected to semibluff into the field. This strategy will force

out lots of better hands either on the flop or by betting again on the turn (it will be increasingly difficult to keep calling with marginal hands when the pot grows bigger). And if he doesn't succeed in stealing the pot, he has a draw that will give him a nut straight approximately 3 x 13 + 9 = 48% of the time, and also a backdoor flush (about 1 out = 4% additional flop equity).

SB then hit the nut straight on the turn, and he got a flop caller tagging along who did precicely what SB hoped for, namely raising all-in with the naked nuts. Note that getting raised all-in is better for SB than winning the pot on the turn. Folding the naked nuts is EV = 0, while raising all-in gave us EV = -$1.68.

The observent reader will see that there are two solutions to Hero's dilemma when he suspects he is up against the same nutdraw + redraw:

- Fold on the flop
- Don't raise all-in on the turn

The first solution is obvious. But when we have stumbled into this particular turn predicament, it's possible to save chips by only calling SB's turn bet, planning to get the rest of the chips in on a blank river. This will be a good plan against an SB player of the weak-tight kind (he will bet the river with the nuts, but check his non-nut hands).

Against this type of opponent we can conclude we're behind if he bets all-in on a river scare card, and we save a large bet. And if he checks a river scare card (e.g. a board-pairing card), we'll have an opportunity to win the whole pot by turning our straight into a bluff and hoping SB folds the same straight.

But even if we have options on the turn in this nuts vs nuts+redraws scenario, particularly against a weak opponent, it's generally better to avoid these scenarios to begin with. Sometimes it's unavoidable (for example, if we stumble into a straight with a hand where the weak straight draws worked as a backup for another hand/draw), but usually we can control this nicely on the flop.

So remember:

*With a high SPR and many opponents we want straight draws that are to the nuts, and that also have redraws to better nuts. In other words, we want strong and nutty wraps.*

We conclude this section with an example of playing a weak straight draw as a backup draw in a heads-up pot with low SPR:

### Example 5.1.2: A gutshot in a 3-bet heads-up pot

$10PLO
6-handed

Button ($10) raises to $0.35, you ($10) 3-bet to $1.15 with  , button calls.

**Flop:**  ($2.40)
You have $8.85 behind. What is you plan?

This is an obvious bet-and-get-it-in spot. The flop is very dry, so unless button has many mysterious JJxx/55xx/44xx/J5xx/J4xx/54xx combinations in his range (unlikely), you are almost always ahead. And if you should be behind, you have 6 nut outs to a gutshut or top set, and also a backdoor nutflush draw (1 out).

So you are in a situation where you expect to pick up the pot with a c-bet most of the time. And when you don't, you have ~7 nut outs, so you are never in very poor shape here. Your plan is therefore to bet out and call a raise.

## 5.2 Wrap straight draws

We define wrap straight draws as any straight draw with more outs than the standard open-ender. In other words, any straight draw with 9 or more outs. We can divide wraps into two classes:

- Medium strong wraps (up to 13 outs)
- Monster wraps (16, 17 and 20 outs)

Keep in mind that we need ~14 clean outs to be a favorite heads-up on the flop (for 3 x 14 + 9 = 51% equity). So the 13 out wraps are near the threshold for monster draws that can be bet and raised for value on the flop, regardless of the

number of opponents. Therefore, conceptually it makes sense to treat the wraps with 13 outs or less as medium strong, while the bigger wraps are monster wraps.

But the strength of a wrap is not given only by the number of outs. We have to distinguish between nut outs and non-nut outs, especially when we begin the postflop play with many opponents and high SPR. Therefore it's critical that you're able to quickly count nut outs when you have flopped a big wrap in a multiway pot.

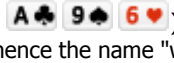
Let's first get the simplest and weakest wrap out of the way. This is the 9 out inside wrap. This wrap is created by having 3 cards inside a 3-gapper, as shown below:

 on a  flop.

All the 9 outs to the inside wrap above (3 eights, 3 sevens, 3 sixes) are to the nuts, so even if it's not a strong wrap, it's nutty. In a heads-up ultra-low SPR scenario an inside wrap can be all we need. If it also comes with a pair or some other extra pieces of equity, it can be enough to go profitably all-in on the flop with medium SPR (for example in a heads-up 3-bet pot).

We now move on to the wraps with 13+ outs. We'll systematically count total number of outs and number of nut outs for 3 classes of wraps:

**1.** Wrap around a connector on the flop
**2.** Wrap around a 1-gapper on the flop
**3.** Wrap around a 2-gapper on the flop

These scenarios are created when there is a connector (e.g.  ), or a 1-gapper (e.g.  ), or a 2-gapper (e.g.  ) on the board, and we have some rundown hand that wraps itself around the board cards in some way (hence the name "wrap").

We now list these wrap straight draws using a generalized notation. We let "x" denote a card on our hand, while "y" is a board card. For each draw type we write the type of draw we have, followed by a number that tells us how many of the cards in our hand are over or below the board cards. Then we write down the total number of outs, followed by the number of nut outs in parenthesis, and then an example.

Here is an example of this notation to make things crystal clear:

**3-0 wrap around connector**
General form: xxxyy
Outs: 13(13)

Example:  on a  flop.

There is a 98-connector on the board, and we have a wrap around this connector with 3 cards over it and 0 cards below it. The result is a 13 out wrap (all queens, jacks, tens and sevens) and all 13 outs are to the nuts.

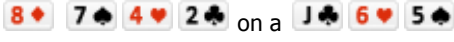
Now we grit out teeth and do the same for all wraps around connectors, 1-gappers, and 2 gappers, in this order. We start with the biggest wraps for each category and move down towards the weakest ones.

## Wrap around connector

**2-2 wrap around connector**
General form: xxyyxx
Outs: 20 (14)

Example:  on a  flop.

**2-1 wrap around connector**
General form: xxyyx
Outs: 17 (11)

Example:  on a  flop.

**1-2 wrap around connector**

General form: xyyxx
Outs: 17 (7)

Example: J♠ 8♥ 7♥ 5♠ on a A♥ T♣ 9♦ flop.

**3-1 wrap around connector**
General form: xxxyyx
Outs: 16 (16)

Example: K♣ Q♠ J♠ 8♥ on a T♣ 9♥ 2♠ flop.

**3-0 wrap around connector**
General form: xxxyy
Outs: 13 (13)

Example: A♥ K♣ Q♠ on a J♥ T♠ 7♣ flop.

**0-3 wrap around connector**
General form: yyxxx
Outs: 13 (3)

Example: 7♠ 6♠ 5♥ 4♥ on a A♦ 9♠ 8♥ flop.

## Wrap around 1-gapper

For these wraps one of our cards always fills the gap, while the remaining cards are distributed around it.

**1-1 wrap around 1-gapper**
General form: xyxyx
Outs: 17 (11)

Example: J♥ 9♠ 7♣ 5♣ on a K♥ 8♣ 6♠ flop.

**2-1 wrap around 1-gapper**
General form: xxyxyx
Outs: 16 (16)

Example: J♥ T♠ 8♥ 6♠ on a A♦ 9♥ 7♠ flop.

**2-0 wrap around 1-gapper**
General form: xxyxy
Outs: 13 (13)

Example: A♠ 8♠ 7♣ 5♣ on a K♥ 6♠ 4♦ flop.

**0-2 wrap around 1-gapper**
General form: yxyxx
Outs: 13 (3)

Example: A♦ J♥ 9♥ 8♠ on a Q♦ T♠ 5♥ flop.

## Wrap around 2-gapper

For these wraps 2 of our cards always fill the gap, while the 2 remaining cards are distributed around it. There is obviously only two ways to do this:

**1-0 wrap around 2-gapper**
General form: xyxxy
Outs: 13 (13)

Example: J♠ 9♣ 8♥ 2♠ on a T♥ 7♣ 4♠ flop.

**0-1 wrap around 2-gapper**
General form: yxxyx
Outs: 13 (7)

Example:  on a  flop.

## Summary of wraps around connectors, 1-gappers and 2-gappers

First, below is a more compact version of the information outlined above. The draws are sorted by structure, with outs and nut-outs listed to the right:

```
Wrap around connector:

2-2     x x y y x x     20 (14)

2-1     x x y y x       17 (11)

1-2     x y y x x       17 (7)

3-1     x x x y y x     16 (16)

3-0     x x x y y       13 (13)

0-3     y y x x x       13 (3)


Wrap around 1-gapper:

1-1     x y x y x       17 (11)

2-1     x x y x y x     16 (16)

2-0     x x y x y       13 (13)

0-2     y x y x x       13 (3)


Wrap around 2-gapper:

1-0     x y x x y       13 (13)

0-1     y x x y x       13 (7)
```

This information can be easily memorized, and as such it is "low hanging fruit". Know these draws in and out so that the out counting process becomes automatic. For example, if you have  on a  flop, your thought process should go "Ding! I have a 3-0 wrap around a connector with 13 outs and 13 to the nuts". I can guarantee you that the majority of low limit PLO players don't know these things as well as they should. This is of course why they so often overplay non-nutty draws, only to get their asses handed to them in big pots.

If you want to print out this overview, or have it available on-screen while playing, you can download this text document: wraps.txt (right-click the link and choose "save as").

It's worth noting the big differences in quality for these wraps. The larges possible wrap is a 20 out 2-2 wrap around a connector, but this draw only has 14 nut outs. In practice, if a big pot is brewing in a high SPR scenario, we would rather have a 16 out wrap composed solely of nut outs, in other words a 3-1 wrap around a connector or a 2-1 wrap around a 1-gapper.

On the other side of the wrap spectrum we have the non-nutty 13 out draws (0-3 wrap around a connector, 0-2 wrap

around 1-gapper and 0-1 wrap around 2-gapper). The latter (7 nut outs) performs a little better than the first two (3 nut outs), but in general these draws are garbage wraps that we don't want to play a big pot with against many opponents and/or with high SPR. But they can of course perform well with low SPR, or as backup to another hand/draw.

We end Part 9 with two examples of counting outs for wraps and playing them on the flop. In both examples we assess the value of our hand based not only on outs, but also on the other situational factors (number of opponents, position and SPR), and we'll make a habit out of doing this kind of quick, initial postflop analysis every time we see a flop and have to make postflop decisions.

### Example 5.2.1: Wrap in a raised, multiway pot

$10PLO
6-handed

You ($10) raise to $0.35 with  in MP, CO ($10) calls, button ($10) calls, SB ($10) calls, BB ($10) calls.

**Flop:**  ($1.75)
SB ($9.65) checks, BB ($9.65) bets $1.75, what is your plan?

We raised a double-suited rundown from MP and ended up in a 5-way pot with a wrap and 2 backdoor flush draws. The postflop scenario is:

- 4 opponents
- Out of position
- SPR = 5.5 (low/medium)
- A 0-3 wrap around a connector with 13 (3) outs + 2 outs to backdoor flush draws

When BB bets the flop our position becomes a little worse, since we're now forced to make a decision with two unknown quantities (CO's and button's hands) behind us.

So we have 3 nut outs, 10 outs to a non-nut straight and 2 outs to non-nut flushes. Is this enough to get involved in this pot? The answer is definitley no after BB bets into the field with 3 players (including the preflop raiser) behind him. If BB knows what he's doing, he needs a very strong hand, and on this type of flop texture his range will be weighted towards quality wraps (that have our non-nutty wrap dominated). And even if BB should be splashing around, this flop will often have hit CO or button, and sometimes SB will also have a strong hand, looking to checkraise.

This scenario is pretty poor for us, and if we continue, we will mostly get a lot of chips in with insufficient equity. We note that having memorized the wrap outs gives us strong control over the situation. We immediately know both the number of outs and the number of *nut outs*, and it's the lack of nut potential that forces us to fold in a multiway pot. We have too many opponents, too little information about their hands, and too high SPR to be splashing around with a non-nutty draw.

### Example 5.2.2: Pair + inside wrap + flush draw in raised, multiway pot

$10PLO
6-handed

CO ($10) limps, button ($10) limps, SB ($10) limps, you ($10) raise to $0.50 with  in the big blind, CO calls, button calls, SB calls.

**Flop:**  ($2)
SB ($9.50) checks, what is your plan?

This looks much better than the previous example. The postflop scenario is:

- 3 opponents
- Out of position
- SPR = 4.8 (low/medium)
- Top pair/top kicker + nutflush draw + inside wrap

In other words, pretty similar to the previous example, with the exception of our equity, which is much better. Here we have a true monster. Our top pair of course has limited value in a multiway pot, but we're backing it up with two strong

draws. The nutflush draw gives us 8 nut outs (the T♠ pairs the board), and we have 8 additional non-spade inside wrap outs. This gives us a total of 16 nut outs on the flop.

So let's do a worst case equity estimate and see how we do against the current nuts (top set):

We then have 16 outs on the flop to a nut straight or the nut flush. But if we hit on the turn, Villain's top set has 9 outs to a full house (note that he doesn't have 1 out to quads, since we have an ace on our hand). This means he draws out on us 9 out of 43 times (there are 43 unknown cards in the deck, since we know our cards, the cards on the board, and Villains two aces). We round this to 1/5.

So we subtract 1/5 of our outs and reduce 16 outs to 16(4/5) = 12.8 clean outs on the flop. We conservatively round this to 12 clean outs to account for the unknown equity Villain has from his side cards. This gives us 3 x 12 + 9 = 45% equity against the flopped nuts.

If we get all-in heads-up against the nuts on the flop, we get all-in with 45% equity in a $2 + 2 x $9.5 = $21 pot where our investment on the flop is $9.50. The EV for going all-in is then:

EV 0.45($21) - $9.50 = -0.05

In other words: We are break even in the worst case all-in scenario, even if we get it in against the nuts. A ProPokerTools simluation confirms our equity estimate:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: As Th 7s**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ad Ks Qd Js | *46.93%* | 280,062 | 3,067 |
| AA** | *53.07%* | 316,871 | 3,067 |

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Of course it's overkill to calculate our equity against the nuts here, since it's obvious that we have monster draw strong enough to get all-in against anything. But it's good practice to do these equity calculations from time to time, even if they are obvious. This trains our ability to quickly and accurately esimate equity on the flop against various hands we might meet.

At any rate, on this flop we can get it in heads-up against any hand, even top set. This is good news, but not the best news. The best news is that the flop is an action flop where we expect to get action from a wide range of made hands and draws that we crush!

When we bet out on this flop, we can expect to get action from many Broadway hands (two pair, top pair + straight draw, top pair + flush draw, etc.), and all of these are dominated by our extremely nutty top pair + draw combination. We might also pick up action from hands that have some non-nutty pair + draw combination involving the T7-combination on the board.

Betting out and getting called or raised in a multiway pot would be a wonderful result for us, so we c-bet pot and hope we get plenty of action. This is the type of nutty hand/draw we dream about having when we get involved in a very multiway pot, and they don't give us many tricky decisions.

## 6. Summary

In Part 9 we have done a systematic discussion of equity for various draws. We have learned to estimate outs, and we have seen that the value of a draw can be very dependent on the other situational factors.

The best way to assess the quality of a draw is not to count outs in a vacuum, but to look at the whole picture. We estimate outs, and then we look at the other factors and think about the type of hand we need to be comfortable playing a big pot.

This concludes our work with the simple model for postflop planning, where we systematecally look at the factors:

- Number of opponents
- Position
- SPR
- Equity

From here on we'll think through these factors every time we see a flop, just like we did in the last two examples. If you make a habit out of it, this kind of structured thinking will eventually become automatic. Of course you'll still be faced with tricky postflop decisions, but this structured model for postflop planning will stop you from doing lots of obvious and boneheaded mistakes. In other words: It provides lots of low hanging fruit.

We'll begin Part 10 with a series of examples of postflop planning where we use our model. All examples will be "real life" and taken from hands I have played myself or particularly interesting hands I have found in training videos or on forums. This will provide valuable training in adjusting to different types of opponents, various stack sizes (= multiple SPR values on the flop), and all kinds of other information that we have to process and adjust to.

The rest of Part 10 will be about c-betting on the flop. After Part 10 there will be at least 1, possibly 2 more articles about postflop play. And after that there will be a concluding article where we summarize our work and discuss the practical bankroll building project ($5PLO to $200 PLO).

Good luck!
Bugs

# Part 10: Postflop Play III

## 1. Introduction

This is Part 10 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

Part 10 will revolve around two topics:

**1.** A discussion of c-betting on the flop
**2.** Illustrating systematic postflop planning along the way

The original plan for Part 10 was to start with a series of examples of postflop planning, but I decided to merge this with the discussion of c-betting. We remember that we defined a simple model of postflop planning in Part 8 and Part 9. Using this model we start every postflop decision making process by assessing the following factors:

- The number of opponents
- Position
- SPR
- Equity (estimated from the cards that we see + assumptions about opponent ranges)

The point of going through this list *before we make our first decision on the flop* is that we can avoid many obvious mistakes by thinking through these important situational factors. We can also say a lot about what kind of hand we need to continue from the flop, without even looking at the cards. For example:

- Do I have steal equity, or should I base my decisions mainly on my showdown equity?
- If I play my hand for showdown equity, what kind of hand do I need to continue from the flop?
- Given my actual cards, can I bet for value, or am I playing for pot odds + implied odds?
- Given my actual cards, do I want to play a big pot or a small pot?

We'll now start using the model for postflop planning to aid our postflop decision making process, and in this article we'll see how c-bet decisions vary as a function of the 4 factors. For simplicity, we'll split the discussion of c-betting into three main scenarios:

**1.** Singly raised pots
**2.** 3-bet pots
**3.** 4-bet pots (a formality, but included for completeness)

For each scenario, we'll discuss what to think about when making a c-bet decision, and we'll clearly see how pot size (e.g. the SPR value) influences our hand strength requirements (the bigger the preflop pot, the less hand strength we need to continue past the flop). In addition to the 4 factors in the postflop planning model, we'll look at how different types of opponents (loose/tight, passive/agressive) influence our decisions.

Part 10 will be about c-betting in singly raised pots. Then we continue with 3-bet and 4-bet pots in Part 11. The rest of Part 11 will also discuss c-betting and topics related to c-betting. For example, donk-betting the flop (e.g. betting into the preflop raiser), playing against a c-bet, and double-barreling (c-betting both flop and turn).

We'll try to view our c-bet decisions as part of an integrated strategy. In other words, we won't be terribly concerned with the specific cards we hold, but rather talk about how to think and play with various *types* of hands in various scenarios. We'll also think about exploitive strategies (we're trying to exploit our opponents' mistakes maximally) versus balanced strategies (we're trying to avoid creating opportunities for our opponents to exploit us).

All examples in this article are taken from hands I have played as part of the bankrholl building project for the article series ($5PLO --> $200PLO). At every decision point I describe my thoughts at the time the hand was played. In addition to our model for postflop planning, we'll also make frequent use of the concept "Good Poker" (described in Part 8):

**1.** Make explicit assumptions
**2.** Find the best line based on these assumptions

I hope these examples will show that it's always possible to make rational decisions, based on the available information. Of

course, analysis at the table can't be as structured and thorough as analysis on paper after the session, but a structured and completely rational thought process is still an *ideal* that we're always striving for when we're making a poker decision.

## 2. Principles for c-betting the flop

C-bet decisions are among the most important decisions in PLO. This is because:

- They occur frequently
- A good flop c-betting strategy leads to simpler decisions on later streets
- C-betting mistakes on the flop can lead to expensive mistakes on later streets

Whenever you have a c-bet/check decision to make on the flop, it'simportant to think about how the hand is likely to play out on later streets after you choose one or the other. C-betting too aggressively is a common novice mistake, and it can develop into a major leak. For example, if you:

- C-bet bluff too often with poor fold equity (we spew chips on the flop)
- C-bet too often with marginal/non-nutty hands out of position (we're setting ourselves up for difficult decisions on later streets, out of position with a weak hand in a big pot)
- C-bet too often in position with marginal hands that would have benefited from a free card (we spew chips on the flop, and/or set ourselves up for getting checkraised out of the pot with hands that have some equity, and would have benefited from seeing a turn card)

A good strategy for c-betting on the flop starts with assessing the flop texture. We will therefore start our discussion of c-betting by learning a "language" for analyzing flop texture in a structured manner. Then we'll talk about c-betting in singly raised pots, and we'll look at heads-up pots and multiway pots separately. We'll use plenty of examples along the way to illustrate important principles, and nuances of these.

When the cases 3-bet pot and 4-bet pot have been discussed in Part 11, we'll end the topic of c-betting with a summary of the most important principles.

### 2.1 Assessing flop texture

I'm assuming everybody is familiar with the concepts "dry flop" and "wet flop" that we use to describe flops with few or many possible draws, respectively. Here we'll refine these descriptions, and use a system for flop texture characterization defined by Tom "LearnedFromTV" Chambers in his recent Cardrunners PLO video series "PLO Postflop Theory" (a series I highly recommend).

Chambers uses a two-axis system to describe flop texture:

**1.** Wet/dry = How many draws are possibke
**2.** Heavy/light = How hard the flop has hit the players' ranges

And using these two descriptions, we're trying to get an idea about:

**3.** Static/dynamic = How likely is it that the relative strength between the players will change from flop --> turn --> river (static = unlikely, dynamic = likely)

The concepts "wet/dry" and "heavy/light" might at first seem to describe the same thing, but they are distinct. To see this, consider the two flops below:

**Flop 1:** J♥ T♥ 6♠
**Flop 2:** 7♥ 6♥ 2♠

Both flops have the same structure (a connector + a low card that connects somewhat with the connector + a 2-flush), but Flop 1 hits players' ranges harder than Flop 2. The reason is that people's ranges will be weighted more towards high card combinations A/K/Q/J/T/9/8 than low card combinations 9/8/7/6/5/4/ (since people play high cards more often than low cards).

So even if both flops have approximately the same number of possible draws, people are less likely to actually *have* these draws on Flop 2. Therefore it will be easier to play marginal hands (e.g. AAxx heads-up in a 3-bet pot without a strong backup draw) on Flop 2, since there is less reason to think someone has flopped a strong draw.

We can classify Flop 1 as wet/heavy (coordinated and likely to hit people's ranges), and Flop 2 as wet/medium heavy (coordinated but less likely to hit people's ranges). The precise nuances of wet/dry/heavy/light that we use aren't all that important. We're not after very precise categorizations, but qualitative assessments that can help us to think correctly when evaluating our options on different flop textures.

Below are a few examples of how to categorize flop textures:

- A♠ K♥ 2♣

A very dry/very heavy flop. No monster draws are possible (a QJT 9 out inside wrap is the strongest possible draw), but it's a flop that will hit people's ranges hard, since AAxx, KKxx, Axxx are hands that are frequently played.

- 7♠ 7♥ 2♦

An extremely dry/extremely light flop. No draws are possible, and it's unlikely anyone has 77xx/72xx/22xx/7xxx.

- 8♥ 6♥ 2♠

A medium wet/medium light flop. Many draws are possible, but not as many as on an extremely wet/heavy J♥ T♥ 6♠ flop, and it's also less likely anyone has these draws.

- K♠ Q♥ 7♣

A medium dry/heavy flop. Two high cards often hit people's ranges, so the flop is heavy. But the absence of flush draws gives it fewer strong draws, and this flop isn't very wet.

- K♦ 8♠ 5♠

A medium wet/medium light flop. A texture with a king + two low and mostly uncoordinated cards doesn't hammer people's ranges, so it's not a heavy flop. There are some possible draws, but few very strong draws, so it's not a very wet flop either.

- Q♥ 6♥ 2♥

A dry/light flop. To hit this texture hard, you need two hearts. This doesn't happen all that often (but the likelihood someone has a flush is of course a function of the number of players that saw the flop), so the flop isn't heavy. There are no draws here, except draws to a full house or quads, and its unlikely people have a lot of 66/22/Q6/Q2/62 combinations in their ranges, so this is also a very dry flop.

- Q♣ J♣ 8♠

A very wet/very heavy flop. Straights and a plethora of strong draws are possible, and it's also likely that people actually have these.

What we're most interested in when we classify a flop according to the wet/dry + heavy/light system is *how likely is the relative strength between players to change from the flop to the river?*

In other words:

- How static/dynamic is the flop?

On a static flop it's difficult for a 2nd best hand to draw out on a better hand (or *represent* having drawn out on a better hand). On a dynamic flop, we expect the nuts to change often from flop --> turn --> river. Dynamic textures provide lots of opportunities to draw out on better hands, or credibly represent having done so (and try to win the pot by bluffing).

Here are a few flops, categorized as static or dynamic:

- A♣ K♦ 2♠

This is a very static flop (that we previously labeled "dry/heavy"). If anyone has AAxx/KKxx/AKxx (and these are frequently played hands), it's impossible for a worse hand to have a strong draw against it. So if you're sitting with AKxx or better, you

expect to have the best hand on the flop, and you also expect to often have the best hand on the river.

- K♥ 7♥ 2♥

A very static flop (that we previously labeled "dry/light"). If anyone has the nut flush, all other hands are crushed. Only sets/two pair hands have significant chances to draw out, and there aren't many combinations of KK/77/22/K7/K2/72 in people's ranges.

- J♣ T♣ 6♥

A very dynamic flop. It's easy to draw out on the current nuts (= wet flop), and it's likely that many of the possible draws are actually in people's hands (= heavy flop), since people play a lot of starting hands that connect well with the cards on the board.

**What the flop categorizations static/dynamic mean for postflop plannig**
Static flops give us more opportunities to have or represent hands our opponents rarely have good equity against, also when the pot is multiway. So a bet on a static flop carries a lot of leverage, and our opponents will realize early that it will be expensive to get involved wih a 2nd best hand.

For example, let's assume you c-bet on a A♠ K♥ 4♣ flop in a HU pot where Villain has A♦ J♥ 9♠ 8♦ . If you have the range AAxx/KKxx/AKxx (which you are representing credibly with your c-bet), Villain is drawing close to dead, as shown below:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: As Kh 4c**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| AA**,KK**,AK** | *97.28%* | 582,807 | 1,701 |
| Ad Jh 9s 8d | *2.72%* | 15,492 | 1,701 |

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In fact, he is drawing just as dead, even if you only have top two pair with AK:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: As Kh 4c**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| AK** | *97.53%* | 584,257 | 1,812 |
| Ad Jh 9s 8d | *2.47%* | 13,931 | 1,812 |

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So a c-bet on this flop texture carries a lot of weight, since it forces Villain to either fold, or invest chips in a scenario where he could be drawing dead. He has serious negative implied odds if he decides to call us down, since we can stop betting worse hands whenever we want, but he has decided to go all the way those times we're ahead of him. This means we can make sure a lot more chips go in when we have the goods than when we're bluffing.

And if Villain calls a flop bet, planning to reevaluate on the turn, and we follow up with a big turn bet, we have extreme leverage. A turn bet is equivalent to saying to Villain: *I assume you often have at least top pair when you call the flop, and*

*I'm betting the turn anyway. Are you willing to risk your stack with top pair, drawing dead when you're behind, to see if I'm bluffing?*

We'll talk more about the concept of leverage in Part 11, where we'll look at 2-barreling in more detail. Until then, know that static flop textures, where strong flopped hands often will stay strong on the turn and river, create a postflop dynamic where we can put a lot of pressure on marginal hands (like top pair) by c-betting and sometimes continuing to bet on the turn.

Dynamic flops create a different postflop dynamic. Since many turn and river cards can change the relative strength between players, it's difficult for flopped strong hands to survive to the river with their relative strength intact. Therefore it's difficult to represent strength all the way after betting the flop, and it's easy for someone else to jump in at any time and represent a strong hand.

The art of navigating on dynamic flop textures lies in being selective with the hands we take past the flop. We start by c-betting less often when we're weak. We also make sure that the range we continue with past the flop contains made hands and draws of all types (so that it's always a possibility we have improved, regardless of what the turn and river cards are).

For example, let's say we call a raise from the blinds. We flop top set, and we checkraise the flop. Checkraising the flop with top set is of course good in isolation, but if we never bet out with very strong hands, we create an imbalance in our betting range. Let's say we have made a habit out of leading into the raiser with various draws as a cheap semibluff, and we checkraise our strongest hands for value. If we never can have sets and other monster hands when we bet, this makes our flop betting range heavily weighted towards draws. As a consequence, it will be harder for us to credibly represent strength (against an observant opponent) those times the board pairs.

We have now learned concepts for describing and thinking about flop textures, so let's move on to c-bet decisions in raised, 3-bet and 4-bet pots. We're assuming 100 BB starting stacks unless mentioned otherwise, and we'll illustrate c-betting and postflop planning in general with some thorough examples from actual play at microlimit PLO.

## 2.2. About c-betting in singly raised pots in general

Singly raised pots usually have middle to high SPR (i.e. > 4), and this makes it necessary to fulfill certain minimum hand strength requirements before we build a big pot for value postflop.

For example, assume we raise pot (4.5 BB) in position behind a limper, the blinds fold, and the limper calls. We see the flop heads-up with 10.5 BB in the pot and 95.5 BB behind. The SPR is 95.5/10.5 = 9.1 (medium/high).

Or assume we open-raise pot (3.5 BB), get called by the button, and the blinds fold. We see the flop heads-up with 8.5 BB in the pot, and 96.5 BB behind. The SPR is 11.3 (high)

Or assume we raise pot (4.5 BB) on the button behind a limper, and the big blind and the limper call. We see the flop 3-way with 14 BB in the pot and 95.5 BB behind. The SPR is 6.8 (medium/low).

So we are usually operating in the SPR region 6-11 with 100 BB stacks. This means we need more than 2 pot-sized bets to get all-in (since SPR > 4), which means the risk/reward ratio on the flop isn't all that great. Therefore, big pots that get built postflop in singly raised pots revolve around the strongest part of people's ranges (nuts, near nuts, and strong nut draws).

This means an aggressive c-bet strategy in singly raised pots has to include a certain amount of bet-folding of hands that are good-but-not-great (for example, two pair). If not, we will get value-raised to death by nutty hands and nutty draws.

Another consequence of playing with high SPR in singly raised pots is that position gets more important than in 3-bet and 4-bet pots. The deeper the stacks, the more postflop decisions we get to make, and the more we get to use position. High SPR makes it more important to avoid non-nutty hands/draws out of position, since these set us up for difficult decisions, which can lead to big mistakes when the stacks are deep.

It will often be correct to check-fold seemingly OK (but non-nutty) hands on the flop, out of position with high SPR, even if we have a decent chance of winning a showdown if we get to see both the turn and river cards. And the more opponents we have, the more correct check-folding becomes. By playing marginal/non-nutty hands out of position with deep stacks, we're putting ourselves in scenarios where:

- We're generally giving our opponents more information about our range than they give us about their ranges
- We have poor control over the pot size
- We have negative implied odds (since our opponents have better control over the pot size than we do)
- We are easy to bluff when scare cards fall

In other words, we set ourselves up for problems on later streets. Being picky about which hands to take past the flop, is an area where many PLO novices struggle, and we'll see examples of such decisions later in this article.

We start with c-bet decisions in heads-up singly raised pots:

## 2.3 C-betting heads-up in a singly raised pot

Heads-up we can get away with a lot of c-betting *especially against passive opponents*. No matter how coordinated the flop is, you range will usually be just as threatening to Villain as his range is to you, and you can credibly represent almost anything (since you will raise a wide range of hands preflop). Therefore you can c-bet almost any flop texture with all of your range against a fit-or-fold player who never (check)raises you without the goods. Especially when you have position and Villain checks to you (which indicates weakness).

But against an aggressive and competent player we have to be more cautious. This player type will not let us run over him on the flop, and if you c-bet too much, he will play back at you when he suspects your range is weak. This depends on the flop texture and how he reads your range.

Here are a handful of examples to illustrate different ways of thinking and planning when we c-bet heads-up against passive and aggressive opponents:

### Example 2.3.1: C-bet decision heads-up on a dry flop against a passive Villain

$10PLO
6-handed

You ($10) open-raise to $0.35 with A♣ A♠ J♥ 7♣ from UTG, button ($7.65) calls. Button is loose-passive, and you don't expect him to make any moves postflop without a hand.

**Flop:** K♠ 8♦ 2♥ ($0.85)
You have $9.65 in your stack, and button has $7.30. What is your plan?

We start with our list of postflop parameters:

- **Heads-up**
- **Out of position**
- **SPR** = 7.30/0.75 = 8.6 (medium/high)
- **Equity:** We don't have a monster, but we do OK against Villain's range. We are usually ahead on the flop, and we probably have decent equity against the range that calls us. Villain is loose-passive, so we expect him to call with a wide range, and there aren't many strong hands possible on this dry/light flop.

It's obvious to c-bet this dry/light flop against a loose-passive player, and we will bet again on a lot of turns. If we get raised at any point, we can fold our marginal hand. Villain is passive, so we don't expect him to raise us with anything we have good equity against.

**Flop:** K♠ 8♦ 2♥ ($0.85)
We ($9.65) bet $0.50, Villain ($7.30) calls.

Note the bet sizing. We don't have to bet pot here, since there aren't any strong draws possible on this flop. Also, this is an either-or type of flop where Villain usually either flopped something good enough to continue (e.g. top pair) or he has nothing. If he folds to a big bet on this flop, he probably also folds to a moderate bet. And if he calls a moderate bet, he would probably also have called a big bet.

On the other hand, when we are out of position with a marginal hand and we very much would like Villain to fold, this is an argument for betting a bit more than we would have done in position. When we have position and initiative, the pressure is on Villain when he has a marginal hand. And if his marginal hand calls our marginal hand, this is not a big problem, since future streets are easy to play when we have position. But out of position, we have to act first on the turn and river, which means we often have to reveal weakness first. So out of position its extra nice for us if Villain folds on the flop, those times we have a marginal hand.

At any rate, here I elected to bet a bit more than 1/2 pot on this flop texture:

**Turn:** K♠ 8♦ 2♥ K♣ ($1.85)
We ($9.15) check, button ($6.80) checks.

A standard turn check when an either-or card like this falls. If Villain flopped top pair, we are drawing almost dead. If he flopped something weaker, we have good equity and a good chance of winning a showdown, but there aren't any worse hands Villain can (reasonably) call us with. So we check and hope to check the hand down.

If Villain makes a decently sized turn bet, we will check-fold. Yes, he could be bluffing, but he is passive, so the odds are against it. Regardless, we don't have enough hand to check-call two streets to get to a showdown. So it's best to give up right away and avoid guesswork on the river in a big pot. At any rate, button checks behind and doesn't put us to a decision.

**River:** K♠ 8♦ 2♥ K♥ Q♣ ($1.85)
We ($9.15) check, button ($6.80) checks and wins with K♦ 7♦ 6♦ 4♣ .

I didn't see any value in a river bet, and I didn't have to bluff to win, so I checked and was happy to get a free showdown. I expect to be good most of the time after button's turn check, but this is not sufficient reason to bet a blank river. To bet for value, we have to be ahead more than 50% of the time Villain calls our bet and here I expect Villain to fold most hands we beat.

I was a bit surprised by Villain's hand, but let's try to understand his logic:

- **Preflop:** His hand looks nice (to him), so he calls
- **Flop:** He has top pair + a couple of backdoor draws, so he definitely isn't folding on the flop
- **Turn:** He has trips, but he's probably concerned about me slowplaying a better hand. If he had started with a coordinated hand, he would have had better kickers, but here he has a hand he isn't comfortable betting for value (or he is slowplaying and hoping to trap me, who knows)
- **River** He now knows that he almost always has the best hand, but he checks it down. I interpret this as fear of getting checkraised by a slowplayed better hand, since I don't expect him to be thinking abut whether or not he is > 50% favorite when he bets and gets called.

At any rate, Villain won the pot, but he didn't put us to any decisions after drawing out, so we are happy about how things went. This hand illustrates a big problem for loose-passive players. They splash around with weak hands preflop, and they therefore end up with a lot of weak hands postflop. This makes it difficult for them to maximize profit when ahead (they're afraid to bet their so-so hands for value), while they loose a lot when behind (since they pay of better hands a lot).

### Example 2.3.2: C-bet decision heads-up on a dry flop against a passive Villain

$10PLO
6-handed

You ($17.30) open-raise to $0.35 with J♦ J♣ 9♥ 9♠ on the button, big blind ($11.15) calls. Big blind is a loose-passive player who only folds 50% to a steal raise, and you don't expect him to show aggression without a hand postflop.

**Flop:** 8♠ 3♥ 8♣ ($0.75)
Big blind ($10.80) checks, what is your plan?

We start with our list of postflop parameters:

- **Heads-up**
- **In position**
- **SPR** = 10.80/0.75 = 14 (high)
- **Equity:** Often ahead on the flop, but we are crushed by the hands Villain checkraise us with, and it's easy for Villain to draw out

So we have a marginal hand on a very dry/light flop where Villain usually has nothing (and his flop check is consistent with that). Here it's important to realize the following:

Even if we have an overpair, this is *not* a situation where we should check behind for pot control/to induce bluffs with a marginal showdownable hand. We are *not* way ahead/way behind here, and many turn cards can beat us. Furthermore, a

loose-passive player will seldom bet the turn with hands we can call down profitably against. If we'd had AAxx against an aggressive Villain, we might have considered a flop check, planning to call at least one bet if Villain then bet the turn, but that plan doesn't do anything for us here.

So we have a scenario where c-betting seems immediately profitable, regardless of our cards, because this is a flop texture where we have good fold equity. And since checking doesn't seem to be more proftiable than betting, we should simply bet. Note that by betting we're basically turning our hand into a bluff, since we don't plan to call a checkraise or put another chip into the pot if Villain calls (if he calls, we're hoping he lets us check the hand down). Also, note that our cards really don't matter much.

We c-bet because this is a very dry and light flop and we expect to pick up the pot with a c-bet the majority of the time. Against a passive player, this is a flop where we can bet our whole range, and never check behind, since we expect him to play fit or fold (and this flop is hard to hit), and never checkraise bluff.

**Flop:** 8♠ 3♥ 8♣ ($0.75)
Big Blind ($10.80) checks, you ($16.95) bet $0.40, big blind folds.

As expected. Note the bet sizing. This is a static flop where we have excellent fold equity, and we want to bet our whole range here, simply because it's an excellent flop to bluff at. So we bet small, both when bluffing and when betting for value (e.g. we would have bet the same amount with trips or better). If we're bluffing (and we usually are), we're getting a good price on our bluff. And by using the same bet size when valuebetting, it' impossible for Villain to know when we have it and when we don't.

Note that a bigger bet probably won't increase our success rate at all, but it will get more expensive when Villain has a hand. So we win the same amount (we steal the pot) when he has nothing, but lose more when he has something, and our c-bet becomes less profitable. And those times both we and Villain have flopped a big hand, it will usually be easy to get the stacks in, regardless of our bet sizing on the flop. So we don't have to worry about losing value with our monster hands by c-betting small.

This is a flop where we'll also bluff a lot against an *aggressive* player. But as we'll see later, we have to make some adjustments on this type of flop texture against an aggressive and competent player who will fight back against aggressive c-betting on dry flops.

### Example 2.3.3: C-bet decision heads-up on a wet flop against a passive Villain

$10PLO
6-handed

You ($10) open-raise to $0.35 with A♣ T♣ 9♥ 7♦ on the button, Big Blind ($11.45) calls. Big Blind is loose-passive.

**Flop:** Q♣ 8♥ 7♠ ($0.75)
Big Blind ($11.10) checks, what is your plan?

We start with the list of postflop parameters:

- **Heads-up**
- **In position**
- **SPR** = 9.65/0.75 = 13 (high)
- **Equity:** We never have enormous equity here against the range Villain called our raised with, but we have decent equity with a low pair + open-ended + backdoor nutflush draw. We also have some equity against the hands that checkraise is, but not enough to continue, should that happen

This is an example of a flop where both checking and c-betting are alternatives, and where Villain's aggression level becomes an important factor. We have flopped decent-but-not-great equity on a medium dry/medium light type of flop. The flop is rainbow, but there are some possible straight draws, and we expect it to have hit Villain's range fairly well.

Here is an important principle:

Since we have decent-but-not-great equity, this is a situation where would hate to get checkraised and have to fold. Note that we aren't strong enough to call a checkraise, since we have poor equity against a range of good made hands and good draws. So against aggressive players, who we expect will checkraise a fair amount on this type of flop, we should often take

a free card and *preserve our equity*. Note that we have a pair + 8 outs to the nuts + a nutty backdoor draw, so we will be able to continue on a lot of turn cards, should Villain try to bet us out of the pot on the turn, after our flop check.

The last sentence I wrote is very important. By checking behind against an aggressive player, we are revealing weakness that he will often try to exploit. But it's not weakness he can exploit hard, if we make sure our checking range contains many medium strong hands that can develop into big hands on some turn cards. The important point here is that the free card we give ourself often gives us the nuts or a strong draw. So if Villain tries to exploit us by betting any turn card, he will sometimes bet into the nuts, and sometimes he will get called when we pick up additional equity (e.g. the nutflush draw or trips).

So against an aggressive player, who won't let us get away with c-betting our whole range without getting punished, we have to check more flops with hands that can't continue against a checkraise. And this type of medium-strong-but-nutty draw is a fine hand to check back. We preserve our equity, and we ensure our flop checking range has balance, so that Villain can't get away with bluffing any turn after we check. So what do we do here, against a passive player?

Well, a passive player rarely checkraises, and he definitely doesn't checkraise light, so we're not setting ourselves up for losing equity by c-betting. So if the risk of having to bet-fold away decent equity is low, it's mostly about how often we get called, and our equity against the hands that call us. This is a flop where we'll get called a fair amount, since it connects fairly well with high/medium hands (which are often played). But getting called by a passive player isn't all that bad. He will often check the turn, and we get to choose between taking a free card and betting again.

If we elect to c-bet, and we get called, we will of course bet again if we turn the nuts, and we can also bet trips for value. If we pick up the nutflush draw, we can bet as a strong semibluff. If an ace falls, we can bet our marginal two pair + marginal draw hand for value/protection and fold to a checkraise.

But both c-betting and checking are fine here against a passive player. So you can mix it up as you want. I elected to check behind this time, planning to make a *delayed c-bet* on a lot of turn cards (all cards that improve us, and perhaps a few more) if Villain checked again.

**Flop:** Q♣ 8♥ 7♠ ($0.75)
Big Blind ($9.65) checks, you ($9.65) check behind.

**Turn:** Q♣ 8♥ 7♠ 4♣ ($0.75)
Big Blind ($9.65) checks, what is your plan?

We picked up extra equity, and we now have 15 outs to the nut flush or a nut straight. The turn card made a straight possible and Villain checks again. We can assume he never has the nuts here, since even a passive player would have bet out with a straight to protect a vulnerable hand.

So Villain probably has nothing, and we can bet the turn as a strong semibluff. If we get called, we of course bet the river for value with all our nut hands, but we can check behind with trips and two pair if he checks again. Villain will often have a busted draw in that case, and it's difficult for him to call us with something we beat. So even if we will often have the best hand with rivered trips/two pair, it's doubtful whether we have the best hand more than 50% *those times Villain calls a river bet*. At any rate, this is a matter of judgment, and also a "luxury problem" (since we can always take a free showdown after Villain checks).

If the river is a blank, and Villain checks again, we have the choice between checking down our low pair (and often losing a showdown) or bluffing. We should often bluff a busted draw in a situation where Villain has indicated nothing but weakness, and we're very certain he doesn't have a strong hand (but we could very well have one). We will not continue this thought here, but we will talk more about river bluffing in a future article.

At any rate, we semibluff the turn:

**Turn:** Q♣ 8♥ 7♠ 4♣ ($0.75)
Big Blind ($9.65) checks, you ($9.65) bet $0.75, Villain folds.

As expected. Here we bet pot to represent a straight that we want to protect against draws. We want to give Villain every reason to fold, so there is no need for subtlety.

### Example 2.3.4: C-bet decision heads-up on dry flop against aggressive Villain (part 1)

$10PLO
6-handed

You ($12.75) open-raise to $0.35 with 8♦ 8♥ 7♠ 5♦ on the button, Big Blind ($23.60) calls. Big Blind is tight-aggressive, but he seems to be trying very hard to steal heads-up pots postflop. He seems to understand flop textures, and how they connect with ranges. You have previously seen him checkraise a few ace high flop textures heads-up, and win all of these without a showdown. This is consistent with him understanding that these are good textures to bluff at. But he might be overdoing it a bit (since we have noticed it).

**Flop:** A♠ 4♣ 2♦ ($0.75)
Big Blind ($23.25) checks, what is your plan?

We start with the list of postflop parameters:

- **Heads-up**
- **In position**
- **SPR** = 12.40/0.75 = 17 (high)
- **Equity:** Poor. We often have the best hand (but still a poor hand) with our low pair, but starting a betting process on the flop is equivalent to bluffing. We have very poor equity against all hands that call or checkraise for value, and many turn cards can beat us

This is a dry/medium light flop, and we have a more or less worthless hand, so our choice is simple: C-bet as a bluff, or check and give up.

Against a passive player, this would be an OK spot for c-betting our whole range. We often pick up the pot, and we don't expect him to re-bluff us, even if he knows we are often bluffing. But against an aggressive player, we have to be more cautious.

We suspect Villain is capable of checkraising light on dry flops, but we don't know whether he is doing this for value (e.g. if he thinks he should checkraise any top pair/overpair for value on these flops), or if he is bluffing. But what we do know is that he doesn't seem to play only fit-or-fold on these flops. He seems to be willing to splash around a bit against what he perceives to be a weak range.

And he is right, of course. We have a wide range for open-raising on the button, so when the flop comes dry/light it's *impossible* for us to be strong on average. An opportunistic bluff checkraise is therefore a smart move by Villain, unless he does it so much that we can fight back by bluffing him back.

At the moment this hand was played, I was aware of the risk of getting checkraisd, but I elected to c-bet anway, planning to give up if called or raised.

**Flop:** A♠ 4♣ 2♦ ($0.75)
Big Blind ($23.25) checks, we bet $0.40, Big Blind checkraises to $1.50, we fold.

Fair enough, but now we have gotten our read confirmed once more. Villain appears to be checkraising far more than a reasonable amount on dry flops, and we store this information for future use. Later in the session this hand occured:

### Example 2.3.5: C-bet decision heads-up on a dry flop against an aggressive Villain (part 2)

$10PLO
6-handed

You ($15.05) open-raise to $0.35 with J♠ 8♠ 7♥ 6♣ on the button, Big Blind ($19.30) calls. Big Blind is the aggressive player from the previous example. Based on what happened there, plus other hands we have observed, we are now convinced his checkraises on dry flops are often bluffs.

**Flop:** Q♣ Q♠ 7♣ ($0.75)
Big Blind ($18.95) checks, what is your plan?

We start with the list of postflop parameters:

- **Heads-up**
- **In position**

- **SPR** = 14.7/0.75 = 20 (high)
- **Equity:** Poor. We have a low pair, which amounts to nothing on this flop, and we have little chance of improvement

Another dry/light flop, and we have a hand without showdown equity. So our choices are c-betting as a bluff, or checking and giving up.

But since we now know (or at least are strongly convinced) that this is a flop where Villain will often re-bluff us with a bluff checkraise, it's important that we think through risk/reward before betting. Against a Villain who often attack a weak range (ours), bluffing becomes less profitable, *especially if we never re-re-bluff against Villain's re-bluffing.*

Let's phrase this in simpler terms:

If we often c-bet dry flops with "air", an observant opponent will know that most of our bets are bluffs. So he can fight back by sometimes checkraising us as a re-bluff with no hand. This is a proper adjustment on his part. But let's say he does it so often that we want to adjust to his adjustment. We now have two alternatives:

- C-bet less "air"
- Be more willing to re-re-bluff against his re-bluffing

This should be obvious. If we keep pounding away with aggressive c-betting on these flops (like we would against a passive player), we're opening ourselves up for getting exploited by a thinking, aggressive opponent who is willing to re-bluff. So even if our ego would like us to continue, we have to use rational thinking and realize we're being exploited if we do. So we have to put less money into the pot with worthless hands, or be more willing to fight back against Villain's bluff check-raises. In practice we usually employ a combination of these two adjustments.

My philosophy for these situations (which I carried over from LHE to PLO) is: *Splash around early, make good decisions later*. This means I like to test my opponents early in the session, in order to learn about them and their ways. If I have a suspicion about a tendency in a player, I try to test my hypotheses early, particularly when it's cheap to do so.

Information "bought" early in a session can pay for itself many times over. This is particularly true against opponents who are quick to adjust to your game (or more correctly, their perception of your game), but who then are not willing or capable to adjust further, after you have adjusted to them.

A lot of talk about a single decision, but it's important that you understand how to play against opponents who are capable of bluffing on dry flops, as these become more common as you move up from the micros. Here I assumed Villain's flop bluffing frequency was high enough to be exploitable, and I c-bet as a bluff, planning to bluff 3-bet if I got checkraised:

**Flop:** Q♣ Q♠ 7♣ ($0.75)
Big Blind ($18.95) checks, we ($14.70) bet $0.40, Big Blind check-raises til $1.50, we 3-bet to $3.50 (a little more than 1/2 pot), Villain folds quickly.

Bingo. Note the bet sizing. If we believe Villain is usualy re-bluffing against our bluffy c-bet-range, we don't have to re-re-bluff big. Note that it helps to have the low pair and the six of clubs, since these work as blockers (it's less likely Villain hit the board).

After this hand, Villain became noticeably less frisky, and there was more folding and calling in our button-vs-blind battles, and less check-raising. One shouldn't get too proud after successfully pulling off an advanced move, but it's always nice to passify an aggressive player (it makes life easier).

NB! For this strategy to work well in the long run, it's important that you also sometimes 3-bet with trips or better, even if it's tempting to always slowplay against an aggressive opponent. Mix up your play with monster hands and don't fall back on standard lines. If you do, you risk having lines in your arsenal that are completely without nut hands, and that's something an observant opponent can exploit.

Before we finish this example, I want to mention that in this type of scenario we should also call checkraises more often with medium strong hand, for example aces or kings, if we elect to c-bet them. Let's return to the flop, but this time we have AAxx:

**Flop:** Q♣ Q♠ 7♣ ($0.75)
Big Blind ($18.95) checks, we ($14.70) have A♣ A♦ 4♥ 4♠ . How should we think here?

If we assume Villain is the same aggressive player, we have to look ahead and think abut how we want to deal with an eventual check-raise. Here it seems reasonable to choose between two alternatives:

- We can call more checkraises
- We can avoid them by checking and inducing bluffs on later streets

So we can choose between:

- C-betting and calling a check-raise, planning to fold to further betting
- Checking behind on the flop, planning to call a turn bet (but not necessarily a second bet on the river)

We know that Villain is often checkraise-bluffing, so automatically folding to a checkraise is too tight. But we're not necessarily committed to calling down either. So let's make some reasonable assumptions:

- Checking the flop might tempt Villain to bluff, but if he bets big on both the turn and the river, we're most likely beat
- If we call a checkraise, Villain will rarely keep bluffing on the turn

We can't be sure these are good assumptions, but they are reasonable. If you don't like them, change them to your liking. So we plug these assumptions into our "Good Poker" model for decision making, and we conclude that the two proposed lines are OK

Before we move on to multiway singly raises pots, here is a heads-up example against an aggressive Villain on a coordinated flop:

### Example 2.3.6: C-bet decision on wet/heavy flop against aggressive Villain

$10PLO
6-handed

You ($10) open-raise to $0.35 with A♥ T♦ 7♥ 6♣ on the button, Big Blind ($14) calls. He is loose-aggressive, and calls a lot preflop, but he shows restraint out of position. He plays loose-aggressive postflop, and isn't afraid to splash around with debatable equity.

**Flop:** K♥ Q♠ 9♠ ($0.75)
Big Blind ($18.95) checks, what is your plan?

We start with the list of postflop parameters:

- **Heads-up**
- **In position**
- **SPR** = 9.65/0.75 = 13 (high)
- **Equity:** Poor. We have a gutshot + backdoor flushdraw, though.

A very wet/very heavy flop that we must assume have hit Villain's range pretty hard. This is a scenario where it seems best to forego all steal equity and simply take a free card. We have poor equity and probably poor steal equity, so betting isn't going to do much for us, especially against an aggressive Villain who is likely to punish overly aggressive c-betting. Against a passive player we will often get to see a turn card even if we c-bet, but with poor equity and presumed poor fold equity it's perfectly fine to take a free card also against a passive opponet. We don't have to try and steal every pot on the flop.

So we check behind and hope to improve, and/or getting checked to again (in which case we might go for a delayed c-bet):

**Flop:** K♥ Q♠ 9♠ ($0.75)
Big Blind ($13.65) checks, we ($9.65) check.

**Turn:** K♥ Q♠ 9♠ Q♥ ($0.75)
Big Blind ($13.65) bets $0.75, we ($9.65) fold.

We pick up a nutflush draw, but the board pairs and Villain bets pot, so we simply fold. We can't draw to a flush + gutshot anyway with only 2:1 in pot odds and we could be drawing dead on a paired board. Villain could be bluffing, but we don't even have a bluffcatcher, so there is no need to get fancy. Can't win them all.

Now over to c-betting in multiway, singly raised pots:

## 2.4 C-betting multiway in singly-raised pots

Previously in this article we stated that we can c-bet aggressively heads-up, although with some restraint on coordinated flops and/or against aggressive opponents. And if it's a mistake to c-bet heads-up in a singly raised pot, it's rarely a big mistake. We always have decent fold equity, after all.

But multiway we have to be much more picky about the flop textures we c-bet and now it's rarely correct to c-bet our whole range (meaning: all hands we could possibly hold after having raised preflop) after missing the flop, even if the texture is both dry and light. There are exceptions, for example if we have blockers, or we have position and everybody has checked to us at least once. But we will stick closely to the following rules of thumb:

- Don't c-bet with very poor equity and very few outs in a multiway pot, regardless of flop texture
- But you can consider c-betting (as a bluff/semibluff) without a hand if you have a handful of outs/blockers/information that indicates a c-bet is profitable. You also very much prefer position.

So, simply phrased:

When you have absolutely nothing, usually don't start a betting process on the flop in a multiway pot. Check and give up, and move on to the next hand. But if you have a little something, like position and/or reason to believe everyone is weak and/or some outs, it might be correct to c-bet anyway. But we avoid bluffing on wet/heavy flops where we expect action, and we prefer to do our bluffing on dry/light flops. So in a multiway pot, our c-bet range will be heavily weighted towards value hands, plus an occasional opportunistic and well-timed steal. There will not be much naked bluffing.

And when we bet for value, we remember that being out of position is an argument for sticking to nutty hands. Both because the nuts are more important with many opponents, and because non-nutty hands are difficult to play well from out of position.

We start with an example of a non-nutty hand out of position in a multiway pot. Then we look at an example of a c-bet decision with a draw in position, and then we end the article with a straightforward bet-fold scenario with a marginal hand.

### Example 2.4.1: C-bet decisison in a multiway pot with a non-nutty hand out of position

$10PLO
6-handed

You ($10) raise to $0.35 with  in MP, CO ($7.55) calls, button ($11.80) calls, BB ($13.15) calls. CO is very loose-passive, button is moderately loose and moderately aggressive, and BB is unknown.

Note that this open-raise is a tad loose from MP when I have two loose players behind me. The structure of this hand is very gappy and non-nutty, and this bad when I'll often be sitting out of position postflop. But I was double-suited, so I elected to play. As we shall see, I got what I deserved:

**Flop:**  ($1.45)
BB ($12.80) checks, you have $9.65 in your stack. Now what?

We start with the list of postflop parameters:

- **4-way**
- **Out of position**
- **SPR:** From 5.0 (against CO) to 8.8 (against button), so medium
- **Equity:** Difficult to estimate. We have lots of outs, but none are to the nuts, and we have a draw that is hard to play out of position

Hmmmmm... We hit something half-decent in multiple directions, and we have top pair + open-ended straight draw + backdoor flushdraw on a pretty wet/heavy flop. We have a lot of outs that improve us, but exactly zero outs to the nuts. Is this a hand good enough to c-bet?

I say no, being out of position against two loose players. To begin with, we don't have good equity against the hands that will call us. This is a flop that should connect fairly well with their ranges, and we don't have any nut outs. And even if they haven't hit the flop hard, they will often call a flop bet anyway.

So by c-betting this non-nutty hand into two loose playes, we're just building a big pot where we have insufficient equity and no clear idea about what to do on most turn card. Note that the latter will be a problem for us both when we hit and when we miss, since we don't have any outs that give us a hand good enough to bet confidently for value.

So we fall back on the general principle that out of position, we want to build nutty ranges. This means we will give up on the flop with a lot of non-nutty hand to avoid difficulties out of position on later streets, even if we have some equity. This hand is precisely one of scenarios where we remove a non-nutty hand from our postflop range.

**Flop:** J♥ 8♣ 7♦ ($1.45)
BB ($12.80) checks, we ($9.65) check, CO ($7.20) checks, button ($11.45) checks.

**Turn:** J♥ 8♣ 7♦ K♠ ($1.45)
BB ($12.80) checks, we ($9.65) check, CO ($7.20) checks, button ($11.45) bets $1, and everybody folds.

No improvement on the turn, and we stick to the plan and give up the pot. You don't win the war by fighting only, but also by avoiding battles you can't win.

### Example 2.4.2: C-bet decision in multiway pot with a medium strong draw in position

$10PLO
6-handed

UTG ($4.40) limps, MP ($8.10) limps, you ($37.90) raise to $0.55 with K♣ K♥ Q♣ T♠ on the button, SB ($11) calls, BB ($7.80) calls, UTG calls, MP calls. UTG, MP and SB are loose-passive, BB is unknown.

A standard preflop raise for value behind two limpers. We end up in a 4-way pot, so we have to be picky about the flops we c-bet.

**Flop:** A♣ 9♥ 7♣ ($1.50)
SB ($10.45) checks, UTG ($3.85) checks, MP ($7.55) checks, what is your plan?

We start with the list of postflop parameters:

- **4-way**
- **In position**
- **SPR:** From 2.9 (against UTG) to 7.0 (against button), so low to middle
- **Equity:** Of the type good-but-not-great. We have a nutflush draw + two outs to a set, but this is not enough to want to get all-in on the flop. For example, we only have 43% against a random top pair, and we need more than that, unless we get all-in against the smallest stack (we need 42% equity to profitably get all-in against UTG when there's $1.50 in the pot)

We flop a draw of the type good-but-not-great in a 4-way pot, and this is a scenario where it's great to get a free card. When the flop comes ace high and somewhat coordinated, we need a small miracle to pick up the pot with a c-bet against 3 opponents. So if we rarely win the pot on the flop and if we don't have enough equity to get all-in on the flop (so we would hate to get checkraised), we don't gain anything from betting compared to seeing the turn for free. On this flop I would have started with a check regardless of my position, and I'm happy about getting a free card.

**Flop:** A♣ 9♥ 7♣ ($1.50)
SB ($10.45) checks, UTG ($3.85) checks, MP ($7.55) checks, we ($37.35) check.

**Turn:** A♣ 9♥ 7♣ J♣ ($1.50)
SB ($10.45) bets $1.50, UTG folds, MP folds, we ($37.35) raise to $6, UTG pushes all-in, we call.

A standard raise for value. UTG should have a strong hand to bet pot into 3 opponents, and we raise to go for his stack now, while he's still enthusiastic. No subtleties necessary with respect to bet size either; we simply pot it and hope he overvalues his non-nut hand. If your reflexes tell you to slowplay, keep in mind that when a loose-passive player bets in a multiway pot, he is strong. And his looseness usually prevents him from folding when he meets a better hand.

**River:** A♣ 9♥ 7♣ J♣ A♥ ($22.40)

UTG wins with J♥ T♣ 9♣ 9♠ and a rivered full house. He flopped middle set + flushdraw + gutushot, so he had solid equity (68%) on the flop:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: Ac 9h 7c**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Kc Kh Qc Ts | *31.46%* | 258 | 0 |
| Jh Tc 9c 9s | *68.54%* | 562 | 0 |

Edit · Link · 2+2 · Deuces Cracked

And we had 75% equity when the stacks went in:

**Omaha Hi Simulation** What's this?
40 trials (Exhaustive)

**board: Ac 9h 7c Jc**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Kc Kh Qc Ts | *75.00%* | 30 | 0 |
| Jh Tc 9c 9s | *25.00%* | 10 | 0 |

Edit · Link · 2+2 · Deuces Cracked

An unfortunate result, but we played the hand well, and there is also something to learn here. Our prudent flop check threw a wrench in Villains plan to trap us on the flop and get a checkraise in with huge equity. He undoubtedly assumed that we (or someone else) would bet the flop for him, but instead we took a valuable free card, turned the tables on him, and forced him all-in as a big underdog on the turn.

Villain should not have automatically checked the flop, since he can't rely on anyone betting the flop light in a 4-way pot. With that many players there is (or should be) little correlation between who raised preflop and who bets the flop. In a very multiway pot, the preflop pecking order is history, and the responsibility for betting the flop belongs to those who have flopped good equity.

So Villain made a debatable decision to check on the flop, and we made a good decision to check behind. His choice led to a tricky situation for him on the turn and our choice led to beautiful situation for us. This hand provides a good illustration of how a good c-betting strategy avoids tricky spots and makes future decisions easier.

### Example 2.4.3: C-bet decision in multiway pot with a marginal made hand on a dry flop

$10PLO
6-handed

You ($10) raise to $0.35 with A♥ 9♣ 8♥ 6♣ from UTG, MP ($6.75) calls, button ($10) calls, the blinds fold. MP is loose-passive, button is TAG.

**Flop:** A♦ Q♣ 6♠ ($1.20)
You have $9.65 in your stack, what is your plan?

We start with the list of postflop parameters:

- **3-way**

- **Out of position**
- **SPR:** From 5.3 (against MP) to 8.0 (against button), so medium/low
- **Equity:** Of the type good-but-not-great. We have top + bottom two pair on a dry/heavy rainbow flop without strong draw possibilities. We often have the best hand, but if we are behind, we are far behind.

An obvious spot for c-betting, planning to fold to a raise. We often have the best hand on the flop, but many turn cards can beat us. An opponent with top pair + high kickers can have up to 12 outs to a better two pair (9 kicker outs + 3 queens that counterfeit our two pair) and there are also Broadway gutshot possibilities.

So we should bet for value/protection, and we don't mind worse hands folding on the flop. There are many turn cards (first and foremost K, Q, J, T) that will make future streets difficult to play from out of position, and we would very much like to end the hand on the flop.

**Flop:** A♦ Q♣ 6♠ ($1.20)
You ($9.65) bet $1, MP ($6.40) folds, button ($9.65) raises to $4.20, now what?

Here we bet-fold without much regret. The c-bet was obvious, and when we get raised by a presumed rational player on a very dry/heavy = static flop, folding is just as obvious. If he has at least top two pair, and this is what he is representing, we are crushed:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Ad Qc 6s**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ah 9c 8h 6c | *16.04%* | 94,733 | 3,032 |
| AQ** | *83.96%* | 502,235 | 3,032 |

Edit · Link · 2+2 · Deuces Cracked

Marginal hands of this type often have to be bet-folded in PLO. It's generally correct to bet them when we believe we are ahead, because we don't want to give free cards when many cards can beat us. Also, when we bet a marginal hand, people will often fold hands they should have called with if they knew what we had. But when we get notified that we are behind, and we don't have reason to suspect trickery, it is a straightforward fold. Because we have poor equity against the hands *we are now up against*, even if we had decent equity against people's ranges before any betting occured on the flop.

Note that we're not giving up much equity when we fold a hand with few outs. Unlike situations where we have a good-but-not-great draw (e.g. a naked nutflush draw in a multiway pot) where we are too weak to call a checkraise, but where we would hate to have to fold away a decent chunk of equity.

Therefore it makes perfect sense to bet-fold marginal hands without outs and to try to see more turns with marginal hands that have outs. This is the logic behind checking behind on the button with weak/medium nutty draws when the risk of getting checkraised is big. With those hands a free card will often help us, but a free card will rarely improve a marginal hand without outs. On the contrary, a free card will help the opposition more than us and the board will usually only get uglier for us.

## 3. Summary

We have discussed c-betting in singly raised pots, and we have illustrated important principles with thorough examples. We will continue with this topic in Part 11, and there we will move on to 3-bet and 4-bet pots.

The rest of Part 11 will be about topics related to c-betting the flop, for example donk betting, playing against a c-bet, and 2-barreling.

Good luck!
Bugs

# Part 11: Postflop Play IV

## 1. Introduction

This is Part 11 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

In Part 11 we'll continue our discussion of continuation betting (c-betting) that we started in Part 10, this time with focus on 3-bet and 4-bet pots. Next we'll talk about defending against c-bets, and then we end the article with a summary of the most important principles regarding c-betting.

The original plan for Part 11 was to then move on to other topics related to c-betting and flop betting in general (delayed c-betting, 2-barreling, identifying good bluffing spots), but these will be moved to Part 12 due to space constraints. The plan for Part 12 is to discuss the aforementioned topics and then move on to turn play in general. Turn play is strongly correlated with our planning on the flop, and we'll see how good flop planning sets up play on future streets. When we are done with turn play, we'll move on to river play, probably in Part 13.

## 2. C-betting in 3-bet and 4-bet pots

C-betting in 3-bet and 4-bet pots will mostly occur in heads-up scenarios. For simplicity we'll only consider heads-up pots here, and we're assuming 100bb starting stacks unless otherwise mentioned.

When more then one raise goes in preflop with 100bb starting stacks, the SPR drops to low (< 4) or ultra-low (< 1). In a 3-bet heads-up pot we typically get an SPR between 3 and 4. In a 4-bet heads-up pot we typically get an SPR between 0.8 and 1.2. As discussed in previous articles, a lower SPR value means we have a better risk/reward ratio postflop. It's therefore correct to also lower our stack-off requirements, but this doesn't necessarily mean we can blast away blindly.

For example, we generally want to avoid bet-folding in a 3-bet pot, since this is very costly. So before we c-bet, it's important that we have done a thorough assessment of our equity and fold equity on the flop. If we have little of one of them, we need a lot of the other. Precisely how much we need depends on the risk/reward ratio, namely the effective pot odds we're getting when we c-bet (possibly planning to get all-in when Villain doesn't fold).

In 4-bet pots with 100bb starting stacks it's usually correct to simply push the rest of the stack (about 1 pot-sized bet when all preflop (re)raises were pot-sized) in on the flop. But as we have seen in previous articles, the reason for this is that we chose the right type of hand to 4-bet with (namely hands that often hit the flop). One way to view this is to say that the decision to c-bet any flop after 4-betting preflop was made in the moment you decided to 4-bet. If you choose the right hands to 4-bet preflop, the mathematics of the situation prevents Villain from exploiting you postflop, even if you shove every flop, or close to it.

We usually have AAxx when we 4-bet, but we remember from the previous article about 4-betting (Part 6) that we will 4-bet a wider range against opponents who are 3-betting us with a wide and weak range. At any rate we will 4-bet with premium hands that will hit lots of flops in various ways, and therefore it's generally correct to c-bet any flop all-in with effective pot-odds 1 : 1 or more.

We'll now look at c-betting in 3-bet and 4-bet pots, using some thorough examples. In all examples we use the simple model for postflop planning that we defined in Part 8 andPart 9, and we'll start every postflop decision making process by assessing the situational factors in the model. We'll also use the classification scheme for flop textures (wet/dry and heavy/light) defined in Part 9.

### Example 2.1: C-bet decision in 3-bet pot

$10PLO
6-handed

**Preflop**

CO ($12.80) raises to $0.35, you ($10) 3-bet to $1.20 with  , the blinds fold, CO calls. CO likes to see flops, and has been calling lots of raises and 3-bets preflop. He open-raises loosely from late position, but he is passive postflop. He seems to be cautious without a strong hand postflop, and usually has the goods when he continues past the flop. We haven't seen him fold to a 3-bet so far, so we're assuming he's calling with most of his raising range.

**Flop:**  ($2.55)
CO ($11.60) checks, you have $8.80 left, what's your plan?

Postflop parameters:

- **Number of opponents:** Heads-up
- **Position:** In position
- **SPR:** 8.80/2.55 = 3.5 (low)
- **Equity:** Poor. We basically have no hand/no draw

We flop absolutely nothing after 3-betting preflop and in these spots it's important to realize that we're not obligated to c-bet every flop. But here we can assume a couple of things:

- The flop is dry/light, and our opponent has often missed it
- We don't have a reason to think he'll try to bluff us

So we can assume Villain most of the time has missed as well, and that he will fold to our c-bet when this is the case. C-betting this flop texture therefore seems like a profitable play, even if we have no equity to speak of against the hands that call or checkraise us. We can credibly represent top set, an overpair, or top pair, since most of our 3-betting range consists of AAxx and good Broadway hands. Therefore, if CO is thinking about our hand, he will know that we often have hit at least top pair on this flop. Of course, CO can have flopped a good hand as well, but the odds are against it since he raises and calls 3-bets with a wide and weak range.

The profitability of c-betting most of our "air" hands as pure bluffs on very dry flop textures is of course intuitively obvious to anyone. But in this article series we're not in the habit of taking all obvious things for granted, so let's estimate how often he has a Kxxx hand on this flop. In other words, we want to know how often he has top pair, top two pair, top + bottom two pair, or top set, since Kxxx includes all these combos.

From the HUD I saw that CO was raising 30% of his hands from this position. Since he seemed very loose preflop, also in raised and 3-bet pots, we can assume he calls the 3-bet with his whole range (except AAxx, which he would have 4-bet). Let's start by counting the number of combos in his range, given the cards we can see. We're assuming his top 30% of hands follows the hand ranking used by ProPokerTools.

**Omaha Hi Hand Count** What's this?
**dead cards: Qc Js Ts 8cKd 7h 4s**

| Hand | Best Count |
|---|---|
| 30% !AA** | **35785** /148995 **(24.02%)** |

The top 30% range lost some hands, since some cards are either in our hand or on the board. We have also removed all CO's AAxx hands, assuming he would have 4-bet with them. So he now has 35785 combos in his range. Then we calculate how many of these that contain a king:

**Omaha Hi Hand Count** What's this?
**dead cards: Qc Js Ts 8cKd 7h 4s**

| Hand | Best Count |
|---|---|
| 30% &K*** !AA** | **13947** /148995 **(9.36%)** |

This gives 13947 combos. So the chance of CO having a K in his hand is 13947/35785 = 39%. Note that these are not only top pair hands, but also top set with KKxx and the two pair combinations K7xx/K4xx, since all of these are a subset of Kxxx (however, the number of K7xx/K4xx hands in a top 30% range is probably low). This looks promising, so let's go one step further and calculate the probability of CO having some combination of:

- Kxxx (top set with KKxx, two pair with K7xx/K4xx, top pair with Kxxx)
- 77xx, 44xx, 74xx (middle set, bottom set, bottom two pair)

- 65xx for an open-ended straight draw.

In other words, we count all combinations in CO's top 30% range that now have flopped top pair, two pair, a set, or the only decent draw available. We get 16952 combos as shown below:

**Omaha Hi Hand Count** What's this?
**dead cards: Qc Js Ts 8cKd 7h 4s**

| Hand | Best Count |
|---|---|
| 30% &(K***,77**,44**,74**,65**) !AA** | **16952** /148995 **(11.38%)** |

We remember that the total number of combos in CO's range is 35785, so the probability of him flopping top pair, two pair, a set, or an open-ended straight draw is 16952/35785 = 44%. Thus, we know that *if CO has flopped anything worse than top pair or an open-ender on this flop, it can't be anything stronger than a low pair without a strong draw*. These are hands we expect him to fold to a c-bet. If this is the case, then CO will fold 100 - 44 = 56% of the time.

So should we c-bet? Absolutely. Even if we were to bet full pot, we would get 1:1 in effective pot-odds, so we will make money if Villain folds more than 50%. And here we have estimated a 56% chance of him having flopped less than top pair on this dry flop. Also, we don't have to bet full pot on such a dry flop, so we can give ourselves better effective pot odds by c-betting smaller (for example, 3/4 pot).

I elected to bet a little more than 3/4 pot. I might have gotten away with a smaller bet (for example, about 1/2 pot) on such a dry flop texture. But it's a useful rule of thumb at the micro limits to bet slightly more than you think you can get away with. You'll meet lots of opponents who are looking for any excuse to call with various trashy hands and you don't want to encourage this. Remember, in PLO you generally want your opponents to fold on the flop, even if they have weak hands.

**Flop:** K♦ 7♥ 4♠ ($2.55)
CO ($11.60) checks, you ($8.80) bet $2, CO folds.

As expected. With this bet sizing we gave ourselves effective pot odds 2.55:2 = 1.28:1. So we automatically make money if CO folds more than 1/(1.28 + 1) = 44%. We have estimated that he has less than top pair or a decent draw 56% of the time, and we expect him to fold when this is the case. And we of course expect him to call or checkraise with top pair, a decent draw, or better.

Since we have already started doing math for this scenario, let's also estimate the EV of the c-bet. We're assuming CO will fold 56% of the time, and we can conservatively assume that our chance of winning is 0% when he calls or checkraises. Under these assumptions, the EV of the c-bet is:

```
EV = 0.56($2.55) + 0.44(-$2) = +$0.55
```

We can also make a more conservative estimate by assuming CO sometimes calls or checkraises with a hand worse than top pair or an open-ended straight draw. For example, let's assume CO's effective fold percentage is reduced from 56% to 50% because of this. Our EV then becomes:

```
EV (Conservative) = 0.50($2.55) + 0.50(-$2) = +$0.28
```

So we're still making money from our c-bet, *even if CO sometimes calls or checkraises with hands worse than top pair or a decent draw*. We (finally) conclude that this must be a profitable situation for a c-bet.

This was an example where we did a detailed analysis of a heads-up c-bet scenario that most of you immediately recognized as profitable, based on the flop texture alone (dry and king high), so why all the work? The point of this analysis was to show you how to systematically estimate the chance of succeeding, and the EV of the bet. We put Villain on a range, and used the ProPokerTools count function to count the number of various types of hands in his range. We were then able to "prove" why it's generally profitable to c-bet a lot on dry/light flops.

Of course we have to make assumptions along the way, so this kind of analysis is never perfect. But if we use a

conservative "worst case" mindset, and still end up with profitable c-bet, we can assume our conclusion is reliable. This was the case here. We estimated the EV for a c-bet to be positive even with conservative assumptions, so we c-bet. Winning +$0.28 (or thereabouts) on average isn't a big deal, but keep in mind that c-bet decisions occur often. So these small profits quickly add up over time, and they make up a significant part of your total win rate.

### Example 2.2: C-bet decision in 3-bet pot II

$10PLO
6-handed

**Preflop**

Button (14.85) raises to $0.35, you ($11.15) 3-bet to $1.10 with A♦ A♥ 6♦ 4♥ in the small blind, button calls. Button is a TAG who is raising a fairly wide range (43%) on the button. He folds a decent amount to 3-bets, so we can assume he folds hands like dry pairs and bad Axxx hands. His calling range should therefore be made up of mostly decent suited and coordinated hands.

**Flop:** Q♣ 9♣ 7♠ ($2.30).
You have $10.05 left. What is your plan?

Postflop parameters:

- **Number of opponents:** Heads-up
- **Position:** Out of position
- **SPR:** 10.05/2.30 = 4.4 (low/medium)
- **Equity:** Poor. Our overpair is often the best hand on the flop, but we have poor equity against a range made up of good pair + draw combinations. There are many such possibilities on this flop texture, and we can assume Villain's range has hit this flop pretty hard.

Here we have a situation where we 3-bet a good AAxx hand preflop, planning to c-bet lots of flops and often call a shove. As shown in previous articles (for example the discussion about the difference between 3-betting good and bad AAxx hands in Part 5) this is a good plan with good AAxx. These hands often flop decent equity, since their coordinated side cards often connect with the flop. Thus, good AAxx hands preflop often become good overpair + draw hands on the flop. 3-betting good AAxx preflop therefore sets us up for lots of profitable c-betting spots on the flop with a hand that is often the best hand, and has some equity to fall back on those times it isn't.

But this is not one of those flops. Even worse, it's a flop we expect has connected well with Villain's range. So let's make a quick estimate and see. We know he raises 43% on the button, and that he folds his weakest hands when 3-bet. We'll assume he calls with the top 30% of hands heads-up on the button, except the AAxx hands (which he would 4-bet). After taking all seen cards into to consideration, there are 37032 combinations left in button's range:

**Omaha Hi Hand Count** What's this?
**dead cards: Ad Ah 6d 4hQc 9c 7s**

| Hand | Best Count |
|---|---|
| 30% !AA** | **37032** /148995 **(24.85%)** |

*Edit* · *Link*

Then we count the number of hands in this range that has flopped a set, two pair, top pair, a straight draw (at least an open-ender), or a flush draw. These are the candidates for Villain's flop shoving range. He probably won't shove all of them (for example, a naked flush draw without a pair), but many of the hands in this range will be of the type pair + draw or better. These are hands good enough to shove over a c-bet heads-up in a 3-bet pot.

**Omaha Hi Hand Count** What's this?

**dead cards: Ad Ah 6d 4hQc 9c 7s**

| Hand | Best Count |
|---|---|
| 30%<br>&(Q***,99**,77**,97**,86**,T8**,JT**,*c*c**)<br>!AA** | 28172<br>/148995<br>(18.91%) |

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Villain's candidates for shoving the flop add up to 28172 combos, which is 28172/37032 = 76% of his total range. ~3/4 of Villain's range has flopped at least some kind of decent made hand and/or a decent draw. Our equity against these hands is 36.53% as shown below:

**Omaha Hi Simulation** What's this?

600,000 trials (Randomized)

**board: Qc 9c 7s**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| 30% &(Q***,99**,77**,97**,86**,T8**,JT**,*c*c**) !AA** | *63.47%* | 380,740 | 167 |
| Ad Ah 6d 4h | *36.53%* | 219,093 | 167 |

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We are a big underdog against the part of Villain's range that hit the flop at least decently. So what will happen if we decide to c-bet? We can estimate the EV of a c-bet by making some simple assumptions and constructing a model of the situation. First we look at bet-folding, then bet-calling.

We start by tightening up button's shoving range a bit, since it isn't realistic to assume he will shove with all hands in his candidate range of made hands + draws. Some of these hands are too weak (for example, naked flush draws or naked open-ended straight draws). And those times button doesn't have a flush draw, he has to worry about us having one.

So let's simply assume button will shove 50% of the time and not 76%. What our equity is against this "best of the best" part of Villain's range is unknown to us at this point, but it's definitely lower than the 36.53% we had against his 76% shove range. Let's use some judgment and say 33%.

Then we define our model:

- We c-bet pot
- Button raises pot with the best 50% of his total range on the flop, and otherwise he folds

Note that this model does not capture all possible outcomes after a c-bet. Villain could decide to call our bet with some part of his range, but we're assuming he either raises or folds. After all, simplifying reality is what modelling is all about.

**C-betting and folding to a shove**

We pick up a $2.30 pot 50% of the time, and 50% of the time we fold to button's shove and lose $2.30. The EV for this line is obviously zero:

```
EV (bet-fold) = 0.50(+$2.30) + 0.50(-$2.30) = $0
```

**C-betting and going all-in after a shove**

We bet $2.30. Button folds 50% of the time, and otherwise he raises pot to $9.20. Since we're not folding, our only alternative is to shove the rest of the stack in (e.g. we 3-bet to $10.05 total). We then get all-in in a $22.40 total pot where we have invested $10.05 from the moment we c-bet:

The EV is:

```
EV (bet-call)

= 0.50(+$2.30) + 0.50[0.33($22.40) - $10.05] = -$0.18
```

**Conclusion**
A c-bet isn't profitable, based on the modelling above. We have made assumptions along the way, but we have definitely established two things:

- Button has hit this flop more often than he has missed it
- When he has hit the flop, we are a big underdog on average

We also estimated that a c-bet was -EV, even if we assumed Villain folded some of his possible shoving candidates (76% --> 50%). If we let him shove the whole 76% range of candidate hands (where our equity is 36.53%), our EVs for bet-folding and bet-calling become -$1.20 and -$1.87, respectively. But this isn't very realistic.

At any rate, even if our c-bet is subsidized by quite a lot of dead money in a 3-bet pot, we can't c-bet profitably here. We don't pick up the pot often enough, and we don't have enough equity when Villain doesn't fold. This was more or less the conclusion I came to (skipping the detailed analysis) when I played the hand. So I checked the flop, planning to give up.

**Flop:** Q♣ 9♣ 7♠ ($2.30).
You ($10.05) check, button ($13.75) checks.

We got a free card, which is nice.

**Turn:** Q♣ 9♣ 7♠ Q♥ ($2.30).
You ($10.05) check, button ($13.75) checks.

Our situation improved, and our equity has now increased against draws and one pair hands after seeing a blank turn card. But I saw no compelling reasons to bet the turn. I checked again, hoping to get a free showdown, which I expect a tight-aggressive Villain will often give me.

**River:** Q♣ 9♣ 7♠ Q♥ 6♠ ($2.30).
You ($10.05) check, button ($13.75) checks, you win. Button has A♠ K♥ K♠ J♦ .

After such confrontations it's a good habit to analyze Villain's line and try to understand how he thinks, since this will be useful in future hands. He has a solid starting hand, so calling my 3-bet is fine. Especially against a player like me, who 3-bets with a decently wide range (but of course somewhat tighter from the blinds).

I also like his flop check. Button has flopped a hand of the type decent-but-not-great with an overpair + gutshot + backdoor flush nutflush draw on a coordinated flop with a possible flushdraw. He knows I'm often weak here after checking, but he can't be 100% sure.

On the turn he probably uses the same logic as on the flop. He has a hand with showdown value + a weak draw. I seem to be in check-down mode, so button joins the club and decides to check his hand down and see who wins. This is definitely a spot where he can think about betting (basically turning his hand into a bluff) to make me fold whatever I have, especially if he thinks I have AAxx. But a turncheck is fine.

On the river he gets checked to for the third time, and now his choice is simple: Bet and turn his hand into a bluff to make me fold my AAxx hands, or check and win against almost everything else in my range. Villain chooses the latter. I'm not sure what his best play is, since this depends on which percentage of my range consists of AAxx hands, and whether or not I call a river bet with AAxx. These things are not constants, but will vary a bit depending on the game flow and my reads on Villain.

I was obviously pleased about getting the hand checked down in a situation where I was prepared to give up. Villain played his hand fine though. The most interesting postflop decision was the c-bet decision. We had good equity (68%) against Villain's actual hand, but poor equity against his presumed range. By doing the same type of range analysis as in Example 2.1, we estimated that c-betting wasn't profitable.

This was an example where we abstained from c-betting, simply because we didn't want to bet blindly into a strong range

as a big underdog. Bet-folding is costly in 3-bet pots, and we generally don't want to put ourselves in situations where we often have to choose between bet-folding or getting our stack in with poor equity. Doing this kind of analysis work is good away-from-the-table practice that will make it easier for you to quickly estimate equity against various ranges on various flops. So do it regularly as a part of your poker "homework".

### Example 2.3: C-bet decision in 3-bet pot III

$10PLO
5-handed

**Preflop**

Button (10) raises to $0.35, you ($10) 3-bet to $1.10 with A♠ A♥ Q♥ J♥ in the small blind, button calls. You have only played 2 orbits against button, and from what you have seen he doesn't seem very loose or very aggressive.

**Flop:** K♥ 9♦ 5♠ ($2.30).
You have $8.90 left. What is your plan?

Postflop parameters:

- **Number of opponents:** Heads-up
- **Position:** Out of position
- **SPR:** 8.90/2.30 = 3.9 (low)
- **Equity:** Good against Villain's total range, and probably decent against the hands he will continue with. Our overpair is usually the best hand on the flop, and we have a handful of outs to top set + gutshot + backdoor nutflush draw when behind. Our straight cards also block Villain's straight draws when he has a Broadway hand like KJQT. Note that the best possible straight draws on this flop are QJTx and 876x (9 out inside wraps), so we don't risk running into monster wraps here.

The flop comes medium dry/medium heavy, and we have picked up some weak draws in addition to our overpair. With low SPR in a 3-bet pot this is a flop where we can feel good bout c-betting and getting all-in with our AAxx hand (but not necessarily in a singly raised pot with SPR around 10). So we c-bet, planning to call a raise.

**Flop:** K♥ 9♦ 5♠ ($2.30).
You ($8.90) bet $2, button ($8.90) raises to $8.30, you 3-bet all-in to $8.90, button calls.

**Turn:** K♥ 9♦ 5♠ 2♦ ($2.30).

**River:** K♥ 9♦ 5♠ 2♦ K♣ ($2.30).
Button wins with K♠ Q♠ T♥ 7♥ for a flopped top pair + gutshot. We had exactly 60% equity on the flop as shown below:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: Kh 9d 5s**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| As Ah Qh Jh | *60.00%* | 492 | 0 |
| Ks Qs Th 7h | *40.00%* | 328 | 0 |

*Edit · Link · 2+2 · Deuces Cracked*

Our EV for getting all-in on the flop against Villain's actual hand in a $2.30 pot was:

```
EV = 0.60($2.30 + 2x$8.90) - $8.90 = +$3.16
```

To illustrate the importance of having draws to go with an AAxx hand when bet-calling the flop, let's calculate the EV for bet-calling a random AAxx hand on this flop. We are now a small underdog with 48% equity on the flop:

**Omaha Hi Simulation** What's this?
600,000 trials (Randomized)

**board: Kh 9d 5s**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| AA** | *48.27%* | 288,761 | 1,715 |
| Ks Qs Th 7h | *51.73%* | 309,524 | 1,715 |

Edit · Link · 2+2 · Deuces Cracked

With the dead money in the pot it's of course still correct to get all-in, but our EV drops dramatically:

```
EV = 0.48($2.30 + 2x$8.90) - $8.90 = +$0.75
```

This is something we have talked about many times throughout this article series. We use preflop play to set up profitable postflop scenarios. When we 3-bet AAxx we want to set up flop scenarios where we can profitably get the rest of the stack in postflop. And we set this up by 3-betting good AAxx hands (especially when we're out of position). Good AAxx often flop "bits and pieces" of equity that allow us to bet-call the flop profitably on average, and this was precisely what happened in this hand.

With trashy AAxx, for example A♥ A♦ 8♠ 4♣, it's generally smart to flat preflop and play more fit-or-fold postflop, since this type of hand rarely flops well. When we rarely hit the flop hard, we'll find ourselves in more tricky c-bets spots with weak hands on the flop. For example, with A♥ A♦ 8♠ 4♣ on this flop, our equity against Villain's actual hand would have been 44%:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: Kh 9d 5s**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ah Ad 8s 4c | *43.90%* | 360 | 0 |
| Ks Qs Th 7h | *56.10%* | 460 | 0 |

Edit · Link · 2+2 · Deuces Cracked

Going all-in on the flop in this case would't have done us any good:

```
EV = 0.44($2.30 + 2x$8.90) - $8.90 = -$0.06
```

So remember: There's a *big* difference between good and bad AAxx hands. Be cautious about 3-betting the worst AAxx hands, especially from out of position where you are more or less forced to c-bet lots of flops heads-up. When you're forced to c-bet a lot, you want to have the equity to back it up.

### Example 2.4: C-bet decision in 3-bet pot IV

$10PLO
6-handed

**Preflop**

Button (19.10) raises to $0.35, you ($10) 3-bet to $1.10 with A♣ K♠ J♣ 9♠ in the small blind, button calls. Button is unknown.

**Flop:** Q♦ 7♠ 7♥ ($2.30).

You have $8.90 left. What's your plan?

Postflop parameters:

- **Number of opponents:** Heads-up
- **Position:** Out of position
- **SPR:** 8.90/2.30 = 3.9 (low)
- **Equity:** Poor. We have no hand and only a couple of backdoor draws on the flop.

A flop of the dry/light variety where we have flopped nothing, but Villain probably hasn't flopped anything either. It's a good rule to think long and hard before c-betting in a 3-bet pot with no equity, since an observant opponent can exploit overly aggressive c-betting by (semi)bluff-raising us more. So we have to be prepared to check a lot with no hand/no draw on the flop. It's particularly important not to set ourselves up for lots of bet-folding in 3-bet pots, since this is very costly (big pot = we have to c-bet big = we lose a lot when we have to fold, or when we get called with no chance to win the pot).

But this is one of the better flops for bluff c-betting. If we do the same kind of analysis we did in Example 2.1, we'll see that Villain's range is also very weak on this flop, so he should often fold. Note that we can credibly represent AAxx here, and if we have AAxx, Villain's equity will be very bad unless he has trips or better.

So we c-bet here, and on this dry texture we don't have to bet big, both when bluffing and when valuebetting. If Villain has nothing, we expect him to fold, almost regardless of our bet size. If he has something, we expect him to call or raise, regardless of our bet size.

**Flop:** Q♦ 7♠ 7♥ ($2.30).
You ($8.90) bet $1.50, button ($18) calls.

**Turn:** Q♦ 7♠ 7♥ 5♥ ($5.30).
You have $7.40 left. What's your plan?

Here we have a relatively simple decision to make. Villain has hit this flop in some way, and we expect him to have a range with many top pair/overpair hands, and sometimes slowplayed trips or better. There are basically two routes open for us:

- We can continue to represent AAxx and bet again as a bluff against his one pair hands
- We can check and give up

In order to continue to bluff we need some reason to believe Villain will fold his top pair/overpair hands to a second bet. Usually this will not be the case in a 3-bet pot at the low limits, so we can scrap that plan. We made a percentage play by c-betting the flop; we got called by a better hand, so we give up.

**Turn:** Q♦ 7♠ 7♥ 5♥ ($5.30).
You ($7.40) check, button ($16.50) checks.

Nothing has changed. Button is probably exercising pot control with a top pair/overpair hand, planning to call a river bet. So bluffing the river probably won't do anything for us.

**River:** Q♦ 7♠ 7♥ 5♥ T♣ ($5.30).
You ($7.40) check, button ($16.50) checks. Button wins with A♦ Q♠ J♥ 6♥. He flopped top pair/top kicker, called a c-bet, and then checked the hand down. His play was fine.

### Example 2.5: C-bet decision in 4-bet pot

$10PLO
6-handed

#### Preflop

You ($13.45) raise to $0.35 with A♣ K♠ Q♣ T♠ in CO, Button (9.65) 3-bets to $1.20, you 4-bet to $3.75. Button calls. Button is a very loose-aggressive player who has 3-bet us aggressively. Based on previous hands he can have anything from premium AAxx to a raggedy hand like 7♠ 7♥ 5♠ 3♦. He hasn't 3-bet us every time, but he seems to know that it's hard to defend against loose 3-bettting (which is true). So with a playable hand in position behind a raiser, often tosses in a 3-bet to isolate, and his definition of "playable" is very broad.

We have a premium double-suited Broadway hand that does well against Villain's total 3-betting range. We don't want him to think he can sit behind us and 3-bet semitrash hands at every opportunity, so we can adjust by loosening up our 4-betting range. Instead of 4-betting only AAxx, we can start 4-betting the best AKKx, AQQx and AKxx hands as discussed in Part 6.

If he doesn't 5-bet us, we can assume he doesn't have AAxx, and then we can play our hand like we have AAxx postflop. This is obviously correct when we have made a light 4-bet with AKKx or AQQx, since we then almost always have the best pair. But we plan to c-bet all-in also with AKxx on a wide range of flops in an ultra low SPR scenario. Against a loose 3-bettor we often flop the best hand, and we usually have some outs when he calls us with a better hand.

**Flop:** 8♦ 4♠ 3♥ ($7.65).
You have $9.70. What's your plan?

Postflop parameters:

- **Number of opponents::** Heads-up
- **Position:** Out of position
- **SPR:** 5.9/7.75 = 0.8 (ultra low)
- **Equity:** Decent against Villain's total range, even if we only have overcards. We expect his preflop calling range to be full of hands that we beat at the moment (dominated Broadway hands, and rundowns that didn't flop a pair). And even if he should have floppped a pair, we have some outs.

A dry/light flop where we have flopped 4 overcards. The SPR is ultra low, and we're getting effective pot odds (7.65 + 5.9):5.9 = 2.3:1 when pushing the rest of the stack in ($5.90). We then need to win 1/(2.30 + 1) = 30% of the time to make money. We have some fold equity on this dry flop, and we have some outs when we get called by a better hand.

So this is obviously a flop where we continue with our preflop plan of c-betting most flops all-in. We had hoped to flop a pair or better, but this flop is the next best thing for us. We don't have a pair or a draw, but Villain probably doesn't either, and then we have good equity.

**Flop:** 8♦ 4♠ 3♥ ($7.65).
You ($9.70) push, button ($5.90) calls.

**Turn:** 8♦ 4♠ 3♥ 5♣ ($19.45).

**River:** 8♦ 4♠ 3♥ 5♣ J♥ ($19.45)
Button has A♦ T♥ 6♦ 6♠ and wins with a pair of sixes. We had 39% equity on the flop as shown below:

**Omaha Hi Simulation** What's this?
820 trials (Exhaustive)

**board: 8d 4s 3h**

| Hand | Equity | Wins | Ties |
|---|---|---|---|
| Ac Ks Qc Ts | *38.78%* | 290 | 56 |
| Ad Th 6d 6s | *61.22%* | 474 | 56 |

Edit · Link · 2+2 · Deuces Cracked

The EV for getting all-in on the flop in a $7.65 pot with $5.90 remaining stack and 39% equity was:

```
EV = 0.39($7.65 + 2x$5-90) - $5.90 = +$1.69
```

So we would have gotten all-in, even if we could see Villain's hand. Add the fact that we often have the best hand on this flop, and that we have some fold equity, and it should be clear that we have a very profitable c-bet. Note that we had the

best hand preflop with 57% equity, even if button had a pair. His loose call of our 4-bet confirms our read of him as very loose. Against players like that, it's correct to loosen up our 4-betting range and include premium Broadway hands in addition to AAxx.

4-betting and c-betting heads-up with AAxx hands has been discussed thoroughly in previous articles, so we won't continue this topic further in this article. The example above was included to illustrate c-bet decisions with non-AAxx hands in 4-bet heads-up pots, and we see that the postflop planning is more or less the same when Villain doesn't 5-bet us.

It's important that you see that profitable c-betting in a 4-bet pot is something you set up by choosing the right starting hands to 4-bet preflop. We mostly stick to AAxx and ultra premium non-AAxx hands. In other words, hands that usually flop enough equity to push any flop profitably with ultra low SPR against a loose 3-betting range. But note that this can change when stacks get deeper than 100bb.

## 3. Playing against a c-bet

We have now discussed some important principles for c-betting and how they are applied in raised, 3-bet and 4-bet pots. Now it's time to "turn the table" and talk about how to play against a c-bet. We'll focus on heads-up scenarios where we are too weak to continue past the flop, based on value.

This choice of focus is natural, since multiway pots and pots where we have a strong hand are relatively straightforward to play. Multiway we usually give up with our weakest hands when someone else has the betting lead. And with a strong hand heads-up, we usually checkraise out of position, and choose between value raising and slowplaying in position. With medium strong hands (e.g. top + bottom two pair) we generally aim at going to showdown in a moderate pot.

When we are heads-up with a weak hand, we have some room to outplay our opponent, since we will often find ourselves in situations where *both* players are weak. If our opponent then gives us openings where we can attack him profitably, we can fight back by rebluffing against his bluff c-bets (and they are usually plentiful). Stealing an occasional extra pot by attacking a c-bettors weak range is obviously better than letting him use initiative to steal all pots where both players miss the flop.

But we have to be selective, and not fire blindly every time we suspect our opponent's range is weak. We have to think about his range, how it connects with the flop, and also about how Villain views us and our range.

Here are two important classes of scenarios where we are heads-up with a weak hand on the flop, and elect to play back against a c-bet:

- Bluff (check)raising heads-up
- Floating in position heads-up

We'll now study some detailed examples of these two scenarios, and talk about how we should think when playing back against a c-bet we suspect is often a bluff.

### Example 3.1: Bluff checkraising heads-up

$10PLO
6-handed

Button ($14.45) raises to $0.35, small blind ($15.90) calls, you ($10) call with  in the big blind.

Button is tight-aggressive, and the same goes for the small blind. You look at the HUD and notice that button is opening 54% of his hands from that position. This isn't a bad strategy, since both you and the small blind are tight-aggressive players who fold a lot out of position in the blinds. Button also has a high c-bet% of 75%. You have been cold-decked for a while, and haven't made any moves. You therefore assume your image is tight and solid.

**Flop:**  ($1.05)
SB ($15.55) checks, you have $9.65. What's your plan?

Postflop parameters:

- **Number of opponents:** 3-way
- **Position:** Out of position
- **SPR:** 9.65/1.05 = 9.2 (high)

- **Equity:** Poor. We have a low pair and a backdoor flushdraw, but this isn't worth anything, other than the blocker effect (makes it less likely our opponents hit the flop)

You basically flop nothing ((2nd pair without overcard kickers + a low backdoor flushdraw). The pot is multiway, so our starting point is to surrender this pot without a fight. But if button c-bets and small blind folds, we will get an opportunity to steal the pot from a presumed wide and weak range. And this is what happens:

**Flop:** A♠ 9♥ 2♦ ($1.05)
SB ($15.55) checks, you ($9.65) check, button ($14.10) bets 0.80, small blind folds. What's your plan?

Let's start by listing some facts:

- Button is opening a wide range preflop, and he's c-betting aggressively. *So he should have a wide and weak range, also after c-betting this flop*. This is a dry flop where he can assume good fold equity in position against two tight-aggressive players, so it's correct of him to c-bet a lot of "air" in this particular spot, even if the pot is multiway.
- You can therefore expect to have good fold equity when you bluff checkraise button on this type of flop, but:
- That doesn't mean you should bluff every time

If you check-fold this flop every time, you will be check-folding too often against this player. He has a presumed wide and weak range, so it should be possible for you to steal some pots on dry flops. But if you bluff checkraise every time on these flops, you will be bluffing way too much, and he can adjust by calling you down light, or bluff you back with a bluff-3-bet. So when should we bluff?

First, let's estimate how often button has anything to continue with after we checkraise. We can estimate this percentage by counting the number of sets, two pair, and top pair in his range, namely all combinations of {AAxx, 99xx, 22xx, A9xx, A2xx, 92xx, Axxx}. Some of these are less likely, but button has a wide range, so we include all of them. There aren't any possible straight or flush draws on this flop, so we don't have to worry about those. Some of the top pair and two pair combos are too weak to continue after a checkraise from a tight player (us), but we include them anyway in order to weight the analysis towards "worst" case for us. If a bluff is profitable under worst case conditions, we can trust the conclusion.

The total number of combos in a top 54% range is 78295 after adjusting for the known cards in our hand and on the flop:

**Omaha Hi Hand Count** What's this?
**dead cards: Jc Td 9c 7hAs 9h 2d**

| Hand | Best Count |
|---|---|
| **54%** | **78295** /148995 **(52.55%)** |

Then we count the number of combos of {AAxxx, 99xx, 22xx, A9xx, A2xx, 92xx, Axxx} in Villain's range. This gives us 30569 combos:

**Omaha Hi Hand Count** What's this?
**dead cards: Jc Td 9c 7hAs 9h 2d**

| Hand | Best Count |
|---|---|
| **54% & (AA**,99**,22**,A9**,A2**,92**,A***)** | **30569** /148995 **(20.52%)** |

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The chance of button having top pair or better on this flop, given the cards that we can see, is therefore 30569/78295 = 39%. If button never re-bluffs is, and never continues past the flop with a hand worse than top pair, we have a 100 - 39 = 61% chance of stealing the pot on the flop with a checkraise. So we should have a profitable checkraise bluff opportunity,

even if we have been liberal in our assumptions about Villains range for continuing.

Note that we have assumed that:

- Button c-bets his whole range
- He never re-bluffs us when we checkraise
- He calls or 3-bets with all hands top pair or better

The first assumption isn't necessarily valid, but it's reasonable. We know that button is c-betting a lot, and he is now in a scenario where he has postion on two tight players on a dry flop. So he should c-bet a lot here. The second assumption isn't necessarily valid either, but it's very reasonable given our image. And, if the third assumption isn't valid, so much the better for us (for example if button bet-folds all top pair hands, and only continues with two pair or better).

An experienced player will immediately recognize this scenario as a good spot for a bluff checkraise, and we have used range analysis to see why this is so. We therefore checkraise as a bluff:

**Flop:** A♠ 9♥ 2♦ ($1.05)
SB ($15.55) checks, you ($9.65) check, button ($14.10) bets 0.80, small blind folds, you checkraise to $2.40 (0.6 x pot), button quickly folds.

As expected. We checkraised to 0.6 x pot, and could probably have gotten away with a bit less. But at the loose micro limits it's a good rule to lean towards slightly bigger bets and raises. Note that we aren't credibly representing many strong on this type of flop, and a good, thinking opponent might exploit this fact by calling us down light or rebluffing.

Which hands could we have to checkraise this flop for value? AAxx obviously, since we will flat quite a bit with bad AAxx hands out of position. We can also credibly represent A9xx and 99xx, even if we probabably don't have many 99xx hands in our flatting range from out of position. Beyond AAxx, A9xx and 99xx, there really aren't many strong hands we could hold, since we probably aren't flatting 22xx, A2xx and 92xx out of position.

So against a thinking opponent it will be difficult for us to represent a strong hand credibly. Luckily, this is not something we need to worry about aagainst the typical low limit opponents.

Using this particular raise size, we invested $2.40 to win $1.85, so we gave ourselves 1.85:2.40 = 0.77:1 in effective pot-odds. We therefore need to win more than 1/(1.77 + 1) = 56% to profit. We have estimated that button will fold 61% of the time, so the bluff should be profitable. If we choose a smaller bet size, it will be even more profitable.

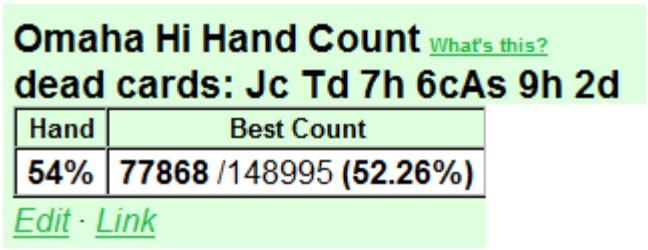
**So how often should we bluff in these scenarios?**
Let's return to this question. Here are two possible answers:

- Use feel/instinct
- Use blockers both to randomize and to increase our success rate

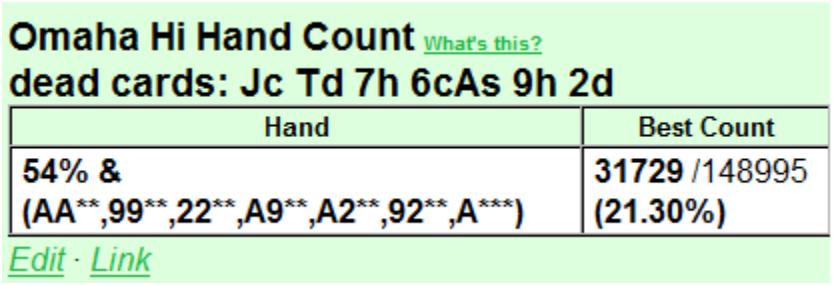
Playing these scenarios by feel is fine. We know it's a good flop to bluff at, unless we overdo it, so we can just make the occasional checkraise when the circumstances otherwise seem good for it (our image is good, Villain seems tight and not tilting, etc.).

But we can also use blockers on our hand as the deciding factor. Here we had 2nd pair, which reduces the chanse button has two pair (A9xx, 92xx) or middle set (99xx). So our low pair eliminates some of the combos button can continue with. Let's estimate the blocker effect for our hand by removing the 9.

We change our hand from J♣ T♦ 9♣ 7♥ to J♣ T♦ 7♥ 6♣. The total number of combos in Villain's range then becomes 77868:




While the total number of combos of {AAxxx, 99xx, 22xx, A9xx, A2xx, 92xx, Axxx} becomes 31729:




So the chance of button having flopped top pair or better becomes 31729/77868 = 41%. We remember that the corresponding probability was 39% with a 9 in our hand. The likelihood of button having a hand to call or 3-bet is therefore reduced by 2 percentage points from 41% to 39% by putting a 9 in our hand. The chance of button folding then increases from 59% to 61%

This is a small effect, but absolutely significant. Also, note that using blockers as an argument for checkraising also will *randomize* our bluffs. We don't bluff this type of flop every time (we do it when we have hit a small piece, but not enough to continue for value), and we maximize our success rate by choosing situations where Villain is less likely to have hit the flop.

For example, if we have some nearly worthless hand on a 9♠ 9♥ 6♣ flop, we can use hands like 6xxx, 87xx, 75xx, T8xx, T7xx as blockers/randomizers, both when we bluff checkraise out of position, and when we bluffraise in position.

We won't look at bluffraising in position in this article, but the same principles apply. For example, if you have cold-called on the button and get heads-up against a player who c-bets way too much (or who is weak-tight and can be bullied around), be willing to bluffraise a bit on flops that aren't very coordinated. And prefer to do it with hands that have a little bit of equity, both to randomize your bluffs and to increase their success rate.

If we're in position, we also have another weapon at our disposal, and that is the *float*. This is the next heads-up stealing scenario we'll look at:

### Example 3.2: Floating in position heads-up

$10PLO
6-handed

**Preflop**

UTG ($17.55) raises to $0.35, you ($13.20) call with A♠ J♠ T♣ 9♥ on the button, the blinds fold. UTG is TAG. He c-bets most flops heads-up, but your impression is that he rarely keeps firing on the turn and river without a hand.

**Flop:** K♠ 6♠ 5♦ ($0.85)
UTG ($17.20) bets $0.85; you have $12.85 left, what's your plan?

Here we elected to flat UTG's raise with a good suited ace hand on the button. This is also a hand we could have 3-bet, but 3-betting becomes better against a looser raising range, for example a CO raise. Flatting on the button and inviting multiway action from the players in the blinds after an UTG raise is fine with our nutty multiway-hand.

We hit the flop, but not very hard. We have a nutflush draw with an overcard, but this is not a monster draw in PLO. So let's analyze the situation under the assumption that we play our hand passively, without attempting to steal.

We have 8 clean flush outs that don't pair the board, and we have 3 outs to top pair. Let's assume that this gives us 9 clean outs on average. To call the c-bet profitably with 9 outs, we need a bit more than 4:1 in pot odds. Here we're getting 2:1, so we're depending on implied odds (we have to make at least 2x$0.85 = $1.70 more when we hit). But we have poor implied odds with a flush draw, since the 3rd spade will be an action killer, unless UTG has a flush himself (which is unlikely). So if we play our hand passively and strictly for pot-odds/implied odds, calling the flop bet probably isn't profitable.

Therefore, if we call here, it's not just to draw to our outs, but also because we want to steal the pot on later streets some of the time. This type of calling with a hand that technically isn't strong enough to call for pot odds/implied odds alone is called *floating*.

The point of floating a c-bet in position is to see the turn cheaply, and then exploiting the fact that Villain will check and give up on some turn cards. To maximize our chance of winning the pot, we want as many as possible of the following conditions to hold:

- Villain has a wide and weak range for betting the flop
- Villain is straightforward, and he will check and give up his weak hands on the turn when his c-bet gets called
- Villain rarely checkraises the turn
- We have some outs

A c-bet heads-up is definitely a scenario where the bettor has a wide and weak range, since it's correct to c-bet most flops heads-up. Here we also know that Villain is an aggressive c-bettor (we have a read), and we can safely assume his c-betting range isn't very strong on this flop.

He can't have the nutflush draw (we have it), and there aren't many combos in an UTG raisers range that will give him two pair or a set on this flop (K6xx, K5xx, 65xx, 66xx, 55xx are unlikely combinations in a TAG's UTG-range). We can therefore assume his range is weighted towards "air" hands that have missed the flop, and top pair/overpair hands. Since one pair hands without a good draw generally aren't strong enough to take to showdown when you meet resistance, Villain will be forced to check a lot of turns with these hands, hoping to get cheaply to showdown.

We don't want this of course, and a turn check is the green light we were looking for when calling the flop. If he checks the turn, our plan is to bet to bluff out all his one pair hands and worse.

**But wait a minute, if his range is weak, why don't we just raise the flop?**
We can raise the nutflush draw as a semibluff on the flop, but let's look at the math and compare floating and raising:

- If we call a pot-sized bet on the flop, planning to bet pot on the turn if Villain checks, we're investing an amount equal to 4x the pot on the flop
- If we raise pot after a pot-sized flop bet, we're investing an amount equal to 4x the pot on the flop

So what's the difference?

- Sometimes Villain will 3-bet a flop raise and force us to fold decent equity (a naked nutflush draw isn't strong enough to continue after a 3-bet)
- By delaying our attack until the turn, we make sure the majority of our investment is made *after Villain has revealed weakness by checking*. This gives us on average a better return for our investment.

Those times Villain is strong, a float gives us a cheap shot at drawing out. And unlike a flop raise, a float gives us more information about Villain's range before we try to steal. We attack after he signals weakness by checking the turn. If he keeps betting the turn, we can abort the float (or float again, if we think this will be profitable), and thereby save most of the chips we had planned to invest in our attempt to steal the pot. And those times Villain is strong enough to 3-bet a flop raise, we avoid putting the whole investment into the pot without getting to see the turn.

**But what if Villain bluffs a lot on the turn?**
We prefer to float against players that give up easily on the turn, but note that if Villain bets too much on the turn, he is giving us *better implied odds for our draw*. For example, let's assume Villain bets the turn 100% of the time, regardless of his hand. But then he's giving us enough implied odds to call the flop c-bet, based purely on pot-odds/implied odds and

outs.

If he bets pot on the flop, and then pots every turn, he invests 4x the pot on the flop, and this gives us enough implied odds to call the flop bet with a 9 out nutflush draw. In this particular hand, the pot is $0.85 on the flop, and Villlain's pot-sized c-bet + our call makes the pot $2.55 on the turn. Villain now bets $2.55. This makes our effective implied odds on the flop (2x$0.85 + $2.55):0.85 = 5:1. This is more than the 4:1 we need to call with our 9 out draw.

So Villain can't defend against our floating by firing mindlessly on every turn card, as long as we make sure we always have some outs. Villain is therefore forced to choose between either:

a) Checking and giving up on some turn cards
b) Donating implied odds

And this is what makes floating with decent-but-not-great draws work for us, even if we seemingly don't have the pot-odds + implied odds to draw on the flop. If Villain gives up easily on the turn, having outs is less important, since we gain more EV from steal equity. Conversely, if Villain bets a lot of turns, it's more important that we have outs, preferably a nutty draw that makes it easy for us to maximize implied odds when we hit. Now we're floating more for implied odds and less for steal equity.

**So should we always bet the turn after Villain checks? If not, which turn cards should we bet at?**
This is a matter of judgment. If Villain is the tight and straightforward type who check-folds every marginal top pair and worse, I will bet just about any turn card when he checks. These players are afraid (and rightly so) to get "stuck" with a marginal hand out of position in a big pot and they tend to choose the safe route and check-fold these hands on the turn. Since they don't checkraise a lot, their turn checks are easy to read. And if they check-call the turn with a marginal hand, trying to keep you honest, you'll often get another chance to steal the pot on the river.

Against more tricky players who checkraise the turn with some regularity, or who check decent hands to snap off bluffs, it makes sense to take more free cards after they check to you. Against these players I'd rather bet at turn scare cards. Any draw-completing turn card is a candidate. Villain knows you're often drawing after your flop call, but he doesn't know which draw you have. So if you bet a draw-completing turn card, and he's now sitting with a marginal made hand out of position on a scary board, this is a pretty bad situation for him, since:

- You sometimes have the draw that completed, and he is drawing thin or dead
- And if you don't, you will sometimes draw out on the river anyway
- And even if the river is a blank, it will be very uncomfortable for him to be faced with another big bet (which might or might not come, that decision is up to you and not Villain)

The theory behind the float should now be well understood, so let's continue with our hand. I elected to call the flop as a float:

**Flop:** K♠ 6♠ 5♦ ($0.85)
UTG ($17.20) bets $0.85, you ($12.85) call.

**Turn:** K♠ 6♠ 5♦ 2♦ ($2.55)
UTG ($16.35) checks, you have $12. What's your plan?

Villain checks. The plan, given my reads on him as straightforward, was to bet any turn card after a check. Here the turn card is pretty much a blank, but it does fill a straight draw (an unlikely straight for us to have, but Villain doesn't necessarily think about this). If he has a hand worse than top pair (and his range should be full of them), I expect him to check-fold. And even with a top pair hand, he can't be thrilled about calling a turnbet, seeing the threat of an even bigger river bet looming on the horizon.

**Turn:** K♠ 6♠ 5♦ 2♦ ($2.55)
UTG ($16.35) checks, you ($12) bet $2, UTG folds.

A successful and rather standard float with a medium strong draw heads-up in position against a weak player. I chose to bet less than pot to give myself a better price on the bluff. I didn't expect this player to vary his strategy much based on my bet size. If he has a weak hand, and this includes hands as strong as top pair, I expect him to fold.

Here we floated with a decent draw, but if the circumstances are good, you can also float without outs. This should not be a standard play by any means, but you can use it as a weapon to exploit very skittish players. For example, let's assume we're

in a situation like the one above, but this time the flop comes 9♠ 9♥ 4♣.

You have a hand like K♥ Q♠ J♥ 8♣, and Villain is the one-stab-and-done type who always c-bets dry boards heads-up, but shuts down without a hand when he gets called. By all means try a naked float without outs against this type of player. As discussed previously, you can use the blocker-effect both to randomize your floats and to increase your success rate. Here you have a couple of backdoor outs that make it somewhat less likely Villain holds cards that have connected with this flop.

Position gives you power, and against weak players, position gives you enormous power. This is the moral to learn from our discussion of floating in position. We'll discuss floating further in Part 12, when we talk about 2-barreling.

## 4. Summary of principles for c-betting the flop

Below is a summary of the most important c-betting concepts we have discussed in Part 10 and Part 11:

### 4.1 C-betting in heads-up singly raised pots

- C-bet most flops heads-up, both with your "air" hands and your strong hands
- Keep in mind that with high SPR, you want strong, nutty hands when getting all-in
- You can let your bet sizing vary according to flop texture (but not according to your hand strength). For example, c-bet small on dry/light flops where the opposition rarely is strong (e.g. 8♥ 5♠ 2♦, J♠ 6♣ 6♥, or A♦ 7♥ 3♠). Use the same bet sizing for your bluffs and value bets
- In position, check more flops with marginal hands/draws that have some outs (e.g. a nutty open-ended straight draw without anything extra) and that will benefit from a free card. This is especially important when there's a high risk of getting checkraised, and you have a hand that has decent equity with some outs, but it's not strong enough to continue after a checkraise
- With marginal hands that have few outs (e.g. top + bottom two pair on a coordinated flop) it's generally better to bet-fold than to check and go for pot control. Keep in mind that you're rarely way ahead/way behind in PLO, and inducing bluffs with marginal hands has less value than in NLHE.
- When you're playing against a c-bet in a heads-up pot, think about how to exploit players who c-bet too much, or who give up too easily on the turn when they get called. You can attack them with selective bluffraising/bluff-checkraising on the flop, or float with marginal hands/draws, planning to sometimes steal the pot on the turn when they check

### 4.2 C-betting in multiway singly raised pots

- Rarely c-bet the flop as a pure bluff in a multiway pot. With 3 or more opponents, play completely fit-or-fold, and only c-bet for value or as a strong semibluff with your best hands
- But if you have a little extra, for example presumed good fold equity, some equity, some blockers, some outs, and information from seeing your opponents check, you might take a stab at the pot also in a multiway pot
- Don't try to fight back against c-betting without a hand in a multiway pot. If you are too weak to continue, based on the showdown equity of your hand, usually just give up. Don't attempt bluffraising or thin floating in a multiway pot without good reads and good reasons to think it will be profitable
- Other than that, use the principles listed for heads-up pots, and remember that with many opponents it becomes more important to focus on nutty hands when big pots get played.

### 4.3 C-betting 3-bet and 4-bet heads-up pots

The adjustments we make in our c-betting strategy in these pots revolve mainly around the fact that low SPR makes it correct to lower our hand strength requirements postflop.

In a singly raised pot, the all-in pots revolve around the top of people's ranges, namely the nutty hands and nutty draws. In 3-bet pots we will also often go all-in with the middle part of our range, for example pair + nutflush draw, a good-but-not-monster wrap, two pair without backup draws, etc. And in 4-bet pots with SPR around 1, we are basically willing to get all-in if we hit any piece of the flop. A naked nutflush is more than enough, and any combination of pair + decent draw is generally a monster.

For 3-bet and 4-bet pots the connection between preflop play and postflop play is very important. We don't want to set ourselves up for often flopping poor equity in a 3-bet or 4-bet pot, and we avoid this by sticking mostly to premium suited

and coordinated hands when we 3-bet and 4-bet preflop. If we do this, we will be setting ourselves up for lots of profitable c-betting spots on the flop.

## 5. Summary

In Part 11 we have completed our discussion of c-betting on the flop, and we used some thorough examples to illustrate strategies and planning for singly 3-bet/4-bet pots, and also for playing against a c-bet.

The original plan for Part 11 was to include some more topics related to c-betting on the flop and flop betting in general, but we will move these to Part 12. In Part 12 we'll also move on to turn play. Below are some of the topics we'll talk about:

- Delayed c-betting
- Using hand reading + logic to identify good spots for stealing
- Donk betting
- Planning for later streets
- 2-barreling
- Defending against floating

Good luck!
Bugs

# Part 12: Postflop Play V

## 1. Introduction

This is Part 12 of the article series "PLO From Scratch". The target audience is micro and low limit players with some experience from limit or no-limit Hold'em, but little or no PLO experience. My goal with this series is to teach basic PLO strategy in a systematic and structured manner.

First, let's talk about the status for this article series. There's been a long break between Part 11 (June 2010) and Part 12 (January 2011). The reason for this is mainly that I spent a lot of time working on NLHE theory during the summer/autumn 2010 and I used this work as basis for an NLHE article series. The PLO series was put on hold while this was going on, but "PLO From Scratch" is very much alive. The plan is to publish several articles throughout the spring of 2011, and also finish the bankroll building project for the series (building a bankroll from 50 BI = $250 at $5PLO, and stop the project when we have 50+10 BI ($5000+$2000 = $7000) at $100PLO, ready for a 10 BI shot at $200PLO).

The practical part was also put on ice while I was working on NLHE theory. This grinding project is done on my spare time, and the last months have been busy for me. But it's important for us to finish the grinding project, and the plan is to kick the grind up a notch and log more sessions in 2011. Status for the project as of Jan 01 2011 is that we're done with the first limit ($5PLO), and most of the next limit ($10PLO). When the bankroll has grown to 50+10 BI ($500+$250 = $750) for $10PLO, ready for a 10 BI shot at $25PLO, I'll update the article series blog and discuss the results there, before we move on to $25PLO. I hope to get this done in January/February 2011.

Before we define the topics for Part 12, let's summarize what the previous articles have covered:

- Part 1: Introduction
- Part2, Part 3, Part 4, Part 5, and Part 6: Preflop play
- Part 7: About online low limit PLO
- Part 8, Part 9, Part 10, and Part 11: Postflop play

I consider our treatment of preflop play as finished, and the remaining articles in the series will be about postflop play, plus one final article where we summarize the series and discuss the results from the bankroll building project $5PLO --> $200PLO. I am not 100% sure about how many articles remain, but I expect there will be at least 4 more before we end this series.

What have we covered so far in the area of postflop play?

- Part 8 and Part 9: General discussion about postflop planning, and a simple postflop planning model (assess the situation based on the number of opponents/position/SPR/equity) to help us with this
- Part 10 and Part 11: We discussed c-betting, with many examples of c-bet decisions in singly raised, 3-bet and 4-bet pots

These are important topics, since these scenarios occur frequently. Our approach in Part 8 - Part 11 was generally practical. We have talked about some fundamental principles for postflop planning and c-betting, and then we illustrated them with many thorough examples. The examples served both to illustrate general concepts, and to provide practical guidelines for how to play postflop in typical and frequently occuring scenarios.

We'll continuue our discussion of postflop play in Part 12 and future articles, but we start by taking a step back from the *specific* and towards the *general*. In parts 10-11 we looked specifically at c-betting, and illustrated the discussion with many examples. In the articles to come our discussion will be more about *postflop betting in general*, and we won't distinguish sharply between different types of scenarios (e.g. whether we're c-betting as the preflop rasiser, donk-betting into the preflop raiser, or betting out in a limped pot). We'll focus on learning sound PLO thought processes that tie together the postflop play over all streets from flop to river. And then we'll pause here and there and look more into the specific details of various common and important postflop scenarios.

Part 12 will be more theoretical than the 4 previous postflop articles, but there will of course be examples along the way. Hopefully, we'll find a good balance between theory and examples that will help you understand why PLO postflop betting strategies are the way they are. As a part of our discussion of postflop betting in this and future articles, we'll also return to the important concept *planning over multiple streets* (that we began discussing in Part 8 and Part 9).

To avoid biting off too much at once, we'll mostly talk about heads-up scenarios to illustrate how theoretical concepts are put to use. But we'll also generalize to multiway scenarios along the way. Below are some important big picture ideas that we'll talk about in the articles to come:

- How the concept "the strength principle" is used in PLO (different from NLHE)
- Why the concept ""way ahead/way behind" (and the corresponding WA/WB postflop line) is less useful in PLO than in NLHE, and the consequences this has for PLO postflop betting
- Bet-folding versus passive play when we have a medium/weak hand that is often best (a consequence of the two topics above)
- The concept "the betting machine" and why this is a good mindset to have when we're starting a postflop betting process in PLO
- Simple hand reading based on relative strength (which is simpler than you might think, especially when you have position)
- Looking ahead and having a plan for the next street and the different cards that can come

In these topics there will also be included plenty of discussion about the transition from flop to turn, and from turn to river. Instead of talking about turn play/river play in isolation, we'll view these topics more as a *continuation* of flop play and the postflop planning process we began on the flop. Just like good preflop play sets us up for profitable postflop scenarios, so will good flop play set us up for profitable turn and river situations. But we will of course also talk about some turn/river specifics (for example, how to play the river with a bluffcatcher heads-up and out of position).

So we choose to discuss play on the different streets in a unified way, and be very aware that the scenarios we find ourselves in on one street always are consequences of choices made earlier in the hand. The strategy for the street we're at right now is therefore connected both with the plan we started out with earlier in the hand, as well as all possible scenarios we can find ourselves in on the next street (and we have to be prepared for all of those).

We'll complement this "holistic" way if thinking about betting by also discussing some concrete postflop scenarios in some detail. Some specific postflop topics we'll talk about are:

- Checking behind on the flop as the preflop raiser instead of c-betting. Why do we do it? Which hands do we bet and which hands do we check?
- Situations for bet-folding
- 2- and 3-barreling (bluffing over multiple streets)
- Donk-betting on the flop (betting into the preflop raiser)
- Checkraising
- Playing medium/weak hands in position and out of position. When do we play them passively, and when do we play them aggressively? When should we fold them, when should we take them to showdown, and when should we turn them into bluffs?

To summarize: The plan for this and the future postflop articles is to talk about postflop betting in general. We'll use theoretical concepts and "big picture ideas", while also giving practical guidelines for various specific scenarios that occur frequently. But we'll try to avoid getting bogged down in details. We first and foremost want to learn general betting concepts that apply to a wide variety of situations.

We start this process in Part 12 by discussing a theoretical model of betting heads-up in position ("the AKQ game"). From this model, we'll extract some important betting concepts, and then we'll use these concepts in the scenario where we're the preflop raiser in position in a heads-up pot, having to make a c-bet/check decision after our opponent has checked to us.

This is a c-bet/check decision that occurs frequently (for example, after we openraise on the button and get one caller in the blinds), and we'll look at the c-bet- and check-behind ranges for this situation in Part 13. In Part 12 we'll warm up by looking a t a special case of this scenario, namely the way ahead/way behind (WA/WB) scenario. We'll compare the WA/WB scenario in PLO with the WA/WB scenario in NLHE to illustrate an important difference between the two games: In PLO we're more often happy to win the pot right there, without extracting more value from weaker hands, and so we more often prefer that they fold when we bet.

Part 12 contains some theory and discussion that at first glance might seem unrelated to PLO. But the point of this article is to build a theoretical foundation for future discussion, so please be patient. :-) In Part 13 and future articles we'll use the concepts from Part 12, and we begin in Part 13 with a discussion of c-bet-range and check-behind-range when we c-bet

heads-up and in position. When we have understood this scenario well, we'll have learned a lot about good PLO thought processes for betting the flop. Then we'll apply this knowledge to future articles where we'll look at c-betting out of position, planning 2- and 3-barrel bluffs, donk-betting, checkraising, and various other topics.

We begin with a presentation of the general strength principle for poker betting:

## 2. The Strength Principle

The Strength Principle is a macro concept for betting in all forms of poker:

- Bet and raise with your strongest hands
- Check and call with your medium strong hands
- Check and fold, and occasionally bluff, with your weakest hands

Defaulting to betting with our strongest hands is obviously correct, since we want to profit from getting called by weaker hands. And with our very weakest hands, we usually give up the pot postflop, but sometimes we bluff. Note that bluffing with our weakest hands makes things easy for us when our bluff doesn't succeed. For example, if we bet a worthless hand and get raised, we can fold without having to worry about folding the best hand.

So the class of hands that gives us the most difficult decicions is the class of medium strong hands. These are hands that are sometimes best, sometimes behind, and where a bet often doesn't work well either as a valuebet (since few weaker hands call) or a bluff (since few better hands fold). With this class of hands it intuitively makes more sense to keep the pot small, and try to get cheaply to a showdown and see if we win.

But as we shall see in this and future articles, this way of thinking often breaks down in PLO. So in PLO we'll often bet medium strong hands simply because we want to give the opposition a chance to fold weaker hands (since they usually have decent chance of drawing out on our hand, if we allow them to stay in the pot). Only getting called by better hands is not a big problem for us if our bet forces our opponents to fold sufficiently many weaker hands that have decent equity against us. This is often the case in PLO.

And we also haven't got any problems turning a medium strong hand (for example, top pair with nothing else) into a bluff against better hands when we suspect our opponents aren't very strong. It's hard to call big bets in PLO when you don't have the nuts, since the nuts is often in the hands of someone else. So the assumption that few better hands fold when you bet a medium strong hand doesn't work as well in PLO as it does in NLHE. More about these concepts later.

The next concept in this article is "way ahead/way behind" in an NLHE-setting. Then we'll study a game theory model of betting in position (the AKQ game) to build a theoretical foundation for understanding the strength principle and the way ahead/way behind-scenario. When we have understood the strength principle and the way ahead/way behind scenario in a NLHE setting, we'll turn to PLO and see how these concepts work there.

I have chosen to take the route from general poker theory --> NLHE --> PLO to build a general understanding of these concepts since most new PLO players already know basic NLHE strategy. By taking these steps, it will be easy for us to understand principles of PLO betting, based on our understanding of well-known NLHE betting principles, plus an understanding of how the *structure* of PLO (4-card starting hands and pot-limit betting) differs from the structure of NLHE (2-card starting hands and no-limit betting).

## 3. The way ahead/way-behind scenario

In NLHE it often makes sense to use the concept "way ahead/way behind" (WA/WB) and the corresponding WA/WB postflop line (play passively, and try to get to showdown in a small pot). These are scenarios where we have a medium strong hand that is either far ahead or far behind, typically on dry flops with no draws. In these situations we don't expect worse hands to call or better hands to fold if we bet. The logic is then that a bet does not work well as a value bet, and it doesn't work well as a bluff, so it's best to check the flop, planning to get to showdown in a small pot and see who wins. If our opponent bets the turn after we check the flop, we are prepared to call a lot, since we expect our check to have *induced bluffs* from our opponents. But our goal is still to get to showdown without building the pot big.

Below is an example to illustrate the WA/WB postflop line in NLHE:

### Example 3.1 A way ahead/way behind situation in NLHE

**Preflop:**
$100NLHE

Hero ($100) raises to $3.5 with  on the button, big blind ($100) calls. Hero expects big blind to play the top 15% against a button raise, and that he would have 3-bet {99+,AQ}, which is the top 5% of hands. So our starting assumption is that the big blind's preflop calling range is the top 5-15% of hands (top 15% minus top 5%).

**Flop:**  ($7.5)
Big blind ($3.5) checks. Should Hero c-bet or check behind? What should his overall postflop plan be?

We flop the best possible underpair on an ace high and very dry flop. We're assuming that Villain has a medium strong range with many Broadway hands (ATs, KQ, JTs, etc). Since the flop is without draws, and since we have at most 2 outs when behind, we can conclude that:

- We're either ahead with very good equity
- Or we're behind with very poor equity

Thus, we're either way ahead or way behind. One assumption we made about Villains range is that he would have 3-bet any pocket pair AA-99. So if he has a pocket pair now, it will be 88 or lower. If he doesn't have a pair, he has two cards that can't beat us by spiking a pair on the turn. It seems reasonable to assume these low pocket pairs and undercards will fold on the flop if we c-bet. It's also more or less irrelevant to us whether or not these hands get to see a free showdown, since they almost never draw out on us anyway.

Those times Villain has us beat, he has at least top pair, and then our equity is very poor (we have at most 2 outs). It's also obvious that Villain won't fold these hands if we bet. So we see that a c-bet doesn't do anything good for us, regardless of whether Villain has a better hand (he never folds), or a worse hand (he will fold, but he won't make a mistake by doing so, and he would rarely have drawn out on us anyway with these hands).

We can formulate our problem like this: The small equity we gain from folding out Villain's weak hands, thus denying them their tiny chance of drawing out, does not compensate for our big loss those times we bet into Villain's better hands. So intuitively, a flop check seems better than a c-bet. We'll now do some simple modelling to show that this is indeed the case.

**Modeling the EV of c-betting and checking**
We'll assume the following:

- Villain's range is the top 5-15% (top 15% minus top 5%), based on the ProPokerTools'hand rankings
- He will fold any hand worse than top pair if we bet (and remember that he doesn't have QQ-99) in his range, since he would have 3-bet them preflop)
- He will call down with all hands top pair or better if we c-bet the flop. In other words, he will check all streets, planning to call if we bet, and he will never bet himself
- Our postflop strategy is to either a) c-bet pot (7.5 bb), planning to check down if we get called, or b) check the flop, planning to check the hand down

Note that we're now working with a *model* of reality to estimate whether c-betting or checking has the highest EV. And we're making some simplifying assumptions in order to get a model that is easy to work with. Note that it's reasonable for Villain to check-call the flop with the hands he doesn't fold, since these are mostly medium strong hands. He would have 3-bet AA/AK/AQ/99 preflop, and he can't have 22 (bottom set), A2 (top and bottom two pair), or 92 (bottom two pair) with a top 5-15% range.

Now we turn to our poker software toolbox (I have used EVPlusPlus.com) and compute equities and range distributions. Below is a summary (our hand/Villain's range to the left, equities in the middle, and the number of combos in Villain's range to the right):

```
KsKh                            51.6%

Top 5-15%                       48.4%   96 combos


KsKh                            8.6%

Top 5-15% & (A*,99,22,92)       91.4%   47 combos (49.0%)


KsKh                            93.5%

Top 5-15% ! (A*,99,22,92)       6.5%    49 combos (51.0%)


EV (c-bet and check down when called)

= EV(villain check-folds) + EV(villain check-calls)

= 0.51(7.5 bb) + 0.49{0.086(22.5 bb) - (7.5 bb)}

= (3.83 bb) + (-2.73 bb)

= +1.10 bb


EV (check down)

= 0.516(7.5 bb)

= +3.87 bb
```

About the notation:

Top 5-15% & (A*,99,22,92) means "the hands in the top 5-15% range of the type A*, 99, 22, 92", while Top 5-15% ! (A*,99,22,92) means "the hands in the top 5-15%-range that are *not* of the type A*, 99, 22, 92").

Our calculations show that:

- We have 51.6% equity against Villain's total range
- We have 8.6% equity against the range he calls down with (49% of his total range)
- We have 93.5% equity against the range he folds (51% of his total range)

We're 90+% favorite around half the time, and the other half Villain is a 90+% favorite, so this is an extreme way ahead/way behind scenario. In general, the best postflop line for these scenarios is to get to showdown in a small pot, and our model illustrates this clearly.

C-betting and checking down when called is +EV in isolation (+1.10 bb), *but checking the flop and then checking down is more than 3 times as profitable* (+3.87 bb). We see from the calculations that the EV for c-betting can be written as a sum of two components: What we win when we pick up the pot on the flop (+3.83 bb), and what we win when our c-bet gets called (and here we lose -2.73 bb). Since the hands that fold almost never would have drawn out on us anyway, a c-bet is

simply a lot of extra risk for very little extra reward, and checking is clearly the best option.

Now we have seen a practical example of a WA/WB scenario in NLHE. The next step in our theory study is to model c-betting heads-up in position using a "toy game" that we can solve exactly using game theory. We will then see the same as in the example above, but this time using a mathematical and exactly solvable model.

Then we'll end this article by connecting the concepts "the strength principle" and "way ahead/way behind" with PLO and use an example to illustrate how they work there for a c-bet decision heads-up in position. We will then discover a fundamental difference between NLHE and PLO with regards to postflop betting. We will continue with our discovery in Part 13, where we'll discuss the consequences this has for our postflop betting lines in PLO.

## 4. The AKQ game

"The AKQ game" is an example of a "toy game" that models important aspects of real poker, but in such a way that we can solve the game exactly. Solving the game means finding the optimal strategies for the players involved. "Optimal strategy" here means the best strategy against opponents who always exploit our strategy maximally, whatever our strategy is. In other words, we're playing opponents who will exploit maximally all mistakes we make. By defining, solving and studying the solutions for such toy games, we can gain insight into real poker strategies.

The AKQ game is a so-called "half-street game", defined as:

- There are two players, Alice (out of position) and Bob (in position)
- The game uses a deck with 3 cards: A, K and Q
- The games begins with both players putting a 1 bb ante into the pot
- Each player is then dealt a card from the deck
- Alice checks "in the dark" (a forced check)
- Bob can now bet 1 bb, or check behind and let the hand go to showdown
- Those times Bob bets, Alice can fold, or call and let the hand go to showdown
- Those times the hand goes to showdown, the highest card wins

The classification of this game as a "half-street game" stems from the rules that force Alice to always check to Bob. Thus, she does not have any decisions to make unless Bob chooses to bet, and she is not allowed to play her half of the street (i.e. she's not allowed to force Bob into a decision by betting into him). This model is similar to the scenario where we openraise on the button, get called by a player in the blinds, and he starts the postflop play by always checking to us. Not entirely the same situation, since the player out of position can bet into us if he wants to (so we can never be sure his flop checking range is identical to his preflop calling range). Also, on the flop the hand values are not static like in the AKQ game (the turn and river cards will change hand values drastically). Nevertheless, we can use this model to extract qualitative guidelines for c-bet/check decisions heads-up and in position on the flop.

We'll now solve the AQK game. Solving the game means finding the answers to the following questions:

- What is Bob's optimal strategy for betting/checking behind?
- What is Alice's optimal strategy for calling/folding those times Bob bets?

"Optimal" in this context means finding the most profitable strategy against an opponent who uses the most profitable strategy against our strategy. If one player makes a systematic mistake, the other player will adjust his strategy so that he exploits this mistake. Then the first player can realize this, fix his mistake, and adjust to the opponents' adjusted strategy, and so on and so forth. So we can imagine a continuous process of adjustments and counter-adjustments that converges towards a pair of strategies that can not be improved further. When the two players have reached this point, neither of them can change their strategy without giving their opponent an opportunity to exploit them, and the process ends.

Alice and Bob then end up with an *optimal strategy pair*, and this strategy pair is the solution to the AKQ game. It's not a certainty that any of them can make money from an optimal strategy, but this result is acceptable to both of them. A game theory optimal strategy is first and foremost a *defensive* strategy. We want to make money by exloiting opponent mistakes, but since our opponents are trying to exploit us at the same time, we also have to think abut not giving them openings they can attack profitably. But an optimal strategy pair can also allow one player to win (and we'll see in a minute that Bob wins in the AKQ game because of his positional advantage). But in many game theory optimal strategy pairs, both players break even when they play perfectly against each other.

**What is Bob's optimal strategy for betting/checking?**
It's obvious that Bob's optimal strategy must have the following characteristics:

- Always bet an A (nuts)
- Always check behind a K (medium)
- Sometimes bluff with a Q (air)

Because when Bob as an A, Alice has a K or a Q. So Bob can never lose with an A, so he bets for value every time, hoping Alice calls. Similarly, when Bob has a K, Alice must have an A or a Q. *Therefore, it's impossible for Alice to make a mistake if Bob should choose to bet a K*. If she has an A, she has the nuts and she calls. If she has a Q, she can not beat any of Bob's hands, and she folds. So Bob can not gain value by betting a K, and he checks behind and takes a free showdown.

We see that the principle "don't bet when no worse hands will call and no better hands will fold" rears its head again. This game is of course only a simplistic model of real poker but the principle is the same for this toy game and for the way ahead/way behind scenario we studied in the NLHE example previously in this article.

Finally, Bob knows that he has to sometimes bluff with a Q to gain value from betting his A hands. The reason is that Alice (who always adjusts to Bob's strategy) will fold K every time when she discovers that Bob is only betting his A nut hands. So if Bob only bets A and checks down K and Q, he is giving Alice an opportunity to exploit him by never paying off his valuebets when she has a bluffcatcher (the K). The question now becomes, how often should Bob bluff to ensure himself the best possible minimum profit from betting?

This is a pot odds question. When Bob bets 1 bb into a 2 bb pot, Alice get pot odds 3:1 on a call. She of course calls every time with an A and folds every time with a Q, but when she has the bluffcatcher K (loses to Bob's best hands and wins against his bluffs), she has a decision to make. She can't call every time, because then she is paying off Bob's A every time, and Bob will simply stop bluffing his Q's (Bob will stop bluffing and only valuebet when Alice always calls with a K, because then his bluffs never succeed).

For example, if Bob chooses to bluff 10% of his Q's, the A:Q ratio in his betting range is 100%:10% = 10:1 (1 bluff for every 11 bets). Since Alice is only getting pot odds 3:1, she has to fold her K's every time *even if she knows Bob is sometimes bluffing* (but he is not bluffing enough for her to call profitably with 3:1 pot odds). But then Bob makes more profit than if he only bets his A hands, since he now gets to sneak in one successful bluff for every 11 bets.

Reversely, if Bob should bluff with, say, 50% of his Q's, the value:bluff ratio for his betting range becomes 100:50 = 2:1. Now Alice can call profitably every time with a K, since the pot odds 3:1 are better than the odds 2:1 against Bob bluffing. She will lose 1 bb 2 times, and win a 3 bb pot 1 time for a 3 - 2 = 1 bb net profit for every 3 bets Bob makes. So her call with the bluffcatcher K has an expected value of +1/3 bb per call.

We see that Bob can get away with a certain amount of bluffing (for example, 10%) that Alice can't defend against (she loses to Bob when she folds every time, but she loses more if she calls every time). So Bob can ensure himself a steadily increasing guaranteed profit by starting to bluff, and then bluffing more and more. But there is a certain threshold that he can't cross (and we saw that this threshold must be below 50%), because then Alice can switch from the necessary always-fold-strategy (since she's not getting the pot-odds to call) to a profitable always-call strategy, so that Bob begins losing money on his bluffs. Next step is to find this threshold, and from the calculations above we know that it must be somewhere between 10% and 50%.

What if Bob uses a value/bluff ratio identical to the pot odds Alice is getting? When Alice has the bluffcatcher K, she's getting 3:1 to call and snap off a possible bluff, but when the odds against Bob bluffing is also 3:1, it doesn't matter for Alice whether she's calling or folding. If she calls with her K every time, she loses 1 bb 3 times to Bob's A's and wins a 3 bb pot 1 time against Bob's Q's. So her net profit from calling is 3(-1 bb) + 3 bb = 0.

So Alice becomes *indifferent* to calling or folding with her bluffcatcher when Bob employs this *optimal bluffing strategy*. Therefore, when we calculate what bluffing does for the EV of Bob's bet, we can simply assume she folds every time with a K and only calls with an A. When Bob bets 8 times with a 3:1 value/bluff ratio (6 times with an A and 2 times with a Q), Alice folds every time he has an A (because then she has either a K or a Q), and Bob picks up 6 x 2 bb pots = 12 bb. When Bob bets his 2 Q's, she calls half the time (when she has the A) and folds half the time (when she has the K), so Bob picks up 1 x 2 bb pot once and loses 1 bb once. Therefore, on these 8 bets, Bob's gain is 6 x 2 + 2 - 1 = 13 bb.

This is 1 bb more than if he only bets his 6 A's and checks the 2 Q's, because then he wins 6 x 2 bb pots when Alice folds to his A valuebets, and he loses 2 showdowns against Alices A's and K's when he checks behind with his Q's. So Bob's optimally balanced valuebet/bluff strategy ensures him an extra 1 bb for every 8 bets he makes *and there is nothing Alice can do to prevent this*. It's 3:1 against Bob bluffing, and Alice's getting pot-odds 3:1 when she calls to snap off a bluff, so calling with her bluffcatchers becomes break even. She can play her K's however she wants, and Bob will still make 1 bb

more (compared to never bluffing) per 8 bets.

Bob's total optimal strategy that guarantees him a 1/8 extra profit per bet then becomes:

- Always bet an A
- Always check behind with a K
- Bet 1/3 of the time with a Q

Because then the value/bluff ratio becomes 1:1/3 = 3:1, which is what Bob wants. Now we move on to Alice, and find her optimal call/fold strategy to use against Bob's betting strategy:

**What is Alice's optimal call/fold strategy?**
It's obvious that Alice's optimal strategy must have the following characteristics:

- Always call with an A (nuts)
- Sometimes call with a K (bluffcatcher)
- Always fold a Q (air)

Calling with the best hand is automatic, and the same is true for folding her air hands (Q) that can't beat anything that Bob bets. So what we have to do now is to find Alice's optimal calling frequency with her K's, so that she can keep Bob's guaranteed profit to a minimum. She can't call every time, because then Bob stops bluffing, and exploits her by always getting his valuebets with an A paid off. Now Bob's bets win a 3 bb pot half the time (when she calls with a K) and a 2 bb pot half the time (when she folds a Q), so Bob's gains 3 + 2 bb = 5 bb for every two bets, or 2.5 bb/bet. This is an extra 1/2 bb/bet compared to never getting paid off getting called, which is better than the extra 1/8 bb/bet he gains from his optimal strategy.

But Alice can't fold every time either, because then Bob will bluff his Q's every time and rob her blind. When Bob has a Q, there's a 50-50 chance that Alice has an A or a K. So Bob risks 1 bb to steal 2 bb, and he succeeds half the time if Alice always folds her K's. So when he has bluffed 2 times, he has stolen 1 x 2 bb pot once and lost 1 bb once for a net profit of 1 bb (= 1/2 bb per bluff). So Alice loses a lot to Bob's adjusted strategy when she always folds as well.

Keep in mind that Bob can guarantee himself an extra 1/8 profit per bet by following the optimal valuebet/bluff strategy outlined above, and his profit is the same no matter whether Alice always folds or calls with her K's. But if Alice should choose one of these extremes, Bob can *win even more* by moving away from his optimal strategy (he can choose to never bluff or always bluff). So Alice's goal is to deny him this opportunity, and keep him down to a 1/8 bb per bet minimum.

What if Alice calls and folds in a ratio identical to the pot odds Bob is getting on his bluffs (2:1. since he's risking 1 bb to win 2 bb). When Bob bluffs a Q 3 times, he will get called twice (and lose 1 bb each time) and succeed once (and steal a 2 bb pot) for a net profit of 2 x (-1) + 2 = 0 bb, which is 0 bb per bluff. So if Alices chooses to call and fold in this ratio, she guarantees that Bob can't pfofit from bluffing his Q's every time. She will still lose minimum 1/8 bb per bet to Bob's overall betting range when he sticks with the optimal valuebet/bluff strategy, but he keeps his profit down to this amount, and she doesn't give him an opportunity to profit even more by always bluffing or never bluffing.

So Alice needs to call 2 out of 3 times (66.67%) when Bob bets. She can get to 50% by always calling with her A's (since A's make up 50% of the 2 hands A and K she can have when Bob bets), and she needs to call enough with K's to get to 66.67% total call percentage. She can get there by calling with 1/3 of her K's (since 50%/3 = 16.67%). Alice's total optimal strategy then becomes:

- Always call with an A
- Call 1/3 of the time with a K
- Always fold with a Q

The reader can easily verify that Bob now can't gain by switching from his optimal strategy to an always-bluff or a never-bluff strategy.

**What is Bob's winrate in the AKQ-game against Alice?**
First, if Bob never bets, but checks down all his A's, K's and Q's, the game is symmetrical and break even for both players:

- Bob has an A = he wins against K and Q
- Bob has a K = he wins agains Q and loses against A
- Bob has a Q = he loses against A and K

So Bob wins 3 pots and loses 3 pots, and all pots are 2 bb in antes since there is no betting. So Alice and Bob on average

get their 1 bb ante back. The same will happen if Bob never bluffs. He now checks all K's and Q's and only bets his A's. But then Alice can fold her K's every times against Bob's valuebet, so the result becomes the same as if he had checked down his A's. Therefore, Bob can not make money with a strategy where he always checks, or where he only value bets his best hands and checks everything else.

But when Bob employs his optimal valuebet/bluff strategy with a balanced mix of value bets and bluffs, he is guaranteed to win 1 bb per 8 bets. Alice responds with her optimal strategy that keeps Bob's profit to this minimum. If Alice and Bob plays the AKQ game 18 times, Bob will on average have A, K and Q 6 times each. The distribution of outcomes becomes:

- Bob valuebets A 6 times and bluffs Q 2 times (= 3:1 value/bluff ratio). As explained previously, he picks up 13 bb by doing so, regardless of Alice's strategy. So his net gain is 5 bb (13 bb won minus the 8 x 1 bb he paid in antes for those 8 hands)
- Bob checks K 6 times. He wins 2 bb 3 times (against Alice's Q) and wins nothing 3 times (against Alice's A). His net gain is 0 bb (6 bb in won pots minus 6 bb in antes)
- Bob checks Q 4 times. He loses all of these pots to Alice's A and K, so his net gain is -4 bb (0 bb won minus 4 bb in antes)

So Bob's net gain on these 18 hands is 5 bb + 0 bb - 4 bb = +1 bb.

Conclusion: Bob's guaranteed profit from the AKQ game is 1/18 bb per hand = 0.056 bb per hand, or 5.6 bb/100.

Not bad! And all of this profit stems from the fact that Bob has position on a player who never bets into him. Note that the game is *symmetrical* with respect to the player's hands (each player is equally likely to get dealt an A, K or Q), so without any betting both players break even. Thus the only profit source is the betting round after the cards are dealt. In other words, this result can be interpreted as a measure of the value of position against a passive player.

**What we can learn from the AKQ game**
We'll use insights from the AKQ-game in future articles, where we'll discuss the value of position and what the player out of position can do to counter this (for example, by leading into the raiser and checkraising him). What we'll use from this solved toy game right now is the insight into why Bob shouldn't bet his medium strong hands (his K's), and how this is related to real poker games.

The reason it was "forbidden" for Bob to bet the medium part of his range was that *hand strengths were well-defined and completely static*. When Bob had a K, Alice either had a hand that was always better (A) or a hand that was always worse (Q), *and Alice always knew whether she was ahead or behind with these hands*. There were no future streets that could change relative hand strengths, and their relative ordering stayed constant.

Now we ask:

*Why are we using the rule of thumb "don't bet when no worse hands call and no better hands fold" in NLHE postflop betting decisions? It's correct in the AQK game, but does this rule apply to a real poker game?*

We can of course always use this rule at the river, where hand strengths are completely static (there are no more cards to come), but it often makes sense to use the same line of thinking in earlier streets in NLHE as well. One reason for this is:

*The structure of Hold'em results in a game where relative hand strengths change less from street to street than in many other games, especially after the flop. Thus, Hold'em after the flop is more similar to the structure of the AKQ game than many other games.*

For example:

Alice has 6♥ 6♠, Bob has A♠ K♠. Alice has the best hand before the flop. The probability that Bob outflops Alice with a better pair, two pair, trips, straight, or flush is 32%. So Alice is a big favorite (68%) to also have the best hand on the flop.

Let's say the flop comes 8♠ 3♣ 2♦ . Alice is still ahead, and Bob now has 6 outs to a better hand among the 45 unseen cards. So on this flop, there is a 39/45 = 87% chance that Alice will still have the best hand on the turn.

If the turn comes 8♠ 3♣ 2♦ Q♣, Bob is still behind with 6 outs among the now 44 unseen cards. So there is a 38/44 = 86% chance that Alice will also have the best hand on the river.

One reason for this stability in the relative strengths of hands from street to street is the use of community cards in Hold'em (the board cards that all players have to share). For example, if you have two opponents who are both drawing to a flush to beat your straight, you will either be beat by both of them on the next card, or by none of them. But if you had played 7-card stud, each opponent would have gotten a separate card, so that both could have beaten you, or one of them, or none of them. So you would have gotten drawn out on more frequently in stud.

Another reason for this stability, compared to PLO (where we also use community cards) is the starting hand structure. We use 2-card hands in Hold'em, and 4-card hands in PLO. It's much harder to hit the board with only two cards in your hand, which has given rise to the expression "most hands miss most flops" in Hold'em (which isn't the case in PLO).

Another important reason why we won't like to bet in NLHE when worse hands won't call and better hands won't fold has to do with the betting structure:

*In a "big bet" game (no-limit or pot-limit) it's expensive to bet when you shouldn't*

If you think no worse hands will call, and no better hands will fold, you risk a bet comparable to the pot size to win only what's in the pot. If the hands you beat rarely will draw out on you if you allow them to get to showdown, and if you rarely draw out on the hands that beat you, you might be in a situation where the risk/reward ratio for a bet becomes so poor that a bet can't make you money. The cost of paying off the better hands might be too high compared to the pots you pick up when you are ahead. Then it might be best to check the hand down, or at least pay the minimum to get to showdown. The way ahead/way behind example earlier in this article illustrated this.

## 5. An illustration of how NLHE betting strategies can break down in PLO

We have now reached a very important point in the theoretical work done in this article, namely that postflop planning and betting strategies that we carry over from NLHE, aren't always applicable in PLO. We have discussed the strength principle and way ahead/way behind scenarios (and the corresponding way ahead/way behind postflop line) in a NLHE context. Then we did a mathematical model study (the AKQ game) which told us something about why the WA/WB line works well in NLHE and why we in NLHE don't like to bet when worse hands don't call and better hands don't fold.

The gist of it is that the relative strengths between hands have a statical nature in NLHE. Medium strong hands therefore often find themselves in situations where they don't make much money from betting.

We'll now go through a tandem example that illustrates how it can be correct to check down a Hold'em hand in a WA/WB scenario, while in a similar PLO-scenario it's better to bet and be happy to win the pot right there on the flop. Even if no worse hands call or no better hands fold.

### 5.1 Comparing postflop betting lines for NLHE and PLO in similar situations and under equivalent assumptions

We raise pot (3.5 bb) with AA/AA72 on the button in NLHE and PLO, respectively:

- NLHE: A♠ A♣
- PLO: A♠ A♣ 7♦ 2♥

The big blind calls, and the flop comes: J♠ J♥ 9♥

In both cases we have a naked overpair without draws on a paired and coordinated flop against a Villain with a medium strong calling range. We're assuming (as in the previous WA/WB example) that the big blind plays the top 15% of hands preflop, and that he would have 3-bet with the top 5% of hands. So his flatting range preflop is top 5-15% of hands. Big blind checks to us on the flop, and we have a c-bet/check decision to make.

We'll now calculate the EV for c-betting and checking in NLHE and PLO. We'll use a model with assumptions similar to the ones in the previous way ahead/way behind example:

- Villain's range is Top 5-15% (Top 15% minus top 5%) in both NLHE and PLO, based on the hand rankings from ProPokerTools
- He folds all hands worse than trips if we bet. This is a very reasonable assumption in the PLO case. And since Villain doesn't have overpairs or good underpairs in his range (he would have 3-bet {AA-99,AQ+} = 5% preflop) it's also a reasonable assumption in the NLHE case.

- He calls down with all hands trips or better if we c-bet. In other words, he checks every street, planning to call if we bet, and he never bets himself. This is an assumption we make to get a simple model that is easy to work with.
- Our strategy on the flop is to either a) c-bet pot (7.5 bb), planning to check the hand down if called, or b) check the flop, planning to check the hand down

**EV for c-betting and checking in the NLHE case**

```
AsAc                    70.8%

Top 5-15%               29.2%   85 combos


AsAc                    7.7%

Top 5-15% & (J*,99)     92.3%   15 combos (17.6%)


AsAc                    84.4%

Top 5-15% ! (J*,99)     15.6%   70 combos (82.4%)


EV (c-bet and check down when called)

= EV(villain check-folds) + EV(villain check-calls)

= 0.824(7.5 bb) + 0.176{0.077(22.5 bb) - (7.5 bb)}

= (6.18 bb) + (-1.02 bb)

= +5.16 bb


EV (check down)

= 0.708(7.5 bb)

= +5.31 bb
```

The results are similar to the previous WA/WB-example:

- We're a big favorite (84%) against 1/6 of Villain's range, and a big underdog (7.7%) against the rest of his hands
- We're not getting called by worse hands, and we're not folding out better hands (per assumption)
- As a result, checking the hand down (+5.31 bb) is better than betting (+5.16 bb)

**EV for c-betting and checking in the PLO case**

```
AsAc7d2h                52.8%

Top 5-15%               47.2%   12973 combos


AsAc7d2h                8.2%

Top 5-15% & (J*,99)     91.8%   3086 combos (23.8%)


AsAc7d2h                67.0%

Top 5-15% ! (J*,99)     33.0%   9887 combos (76.2%)


EV (c-bet and check down when called)

= EV(villain check-folds) + EV(villain check-calls)

= 0.762(7.5 bb) + 0.238{0.082(22.5 bb) - (7.5 bb)}

= (5.72 bb) + (-1.35 bb)

= +4.37 bb


EV (check down)

= 0.528(7.5 bb)

= +4.00 bb
```

The situation in the PLO case is similar to the NLHE case:

- We're a big favorite against 1/5 of Villain's range, and a big underdog against the rest of his range. However, when we're ahead, we're less of a favorite than in the NLHE case (67% in PLO versus 84% in NLHE).
- We don't get called by worse hands, and we don't fold out better hands (per assumption)
- But it's still better to bet (+4.37 bb) than to check the hand down (+4.00 bb)

Also, note that in the NLHE case we're a 70.8% favorite against Villain's total flop range, *but we can't bet* (within our model). In the PLO case we're basically a coinflip with 52.8% against Villain's total flop range, *but now a bet is obligatory*.

The mathematical explanation for this curious result is that we make so much money (+5.72 bb) from betting and folding out weaker PLO hands (that nevertheless have decent equity against our hand) that we can afford to lose a bit (-1.35 bb) those times Villain calls. The reason is that the hands Villain folds have much better equity against us in the PLO case (33%) than in the NLHE case (15.6%). So it costs us much more to give Villains weaker hands a free showdown in the PLO case. But in NLHE, betting to protect ourselves against Villains weak hands isn't worth it, since they draw out so rarely.

**Conclusion:**
Checking down a medium strength hand that is often best on the flop, but will only get called by better hands, doesn't necessarily do anything good for us in PLO. In NLHE it's often best to take these hands to showdown in a small pot. In PLO it's often best to bet them on the flop and hope to win the pot right there.

**Consequence:**
In PLO we will bet-fold medium strength hands on the flop more often than in NLHE. In NLHE we will more often turn medium strength hands into bluffcatchers (checking the flop, planning to call if Villain bets on a later street).

We have now illustrated, with some general poker theory and a couple of detours into NLHE strategy land, an important concept for PLO postflop betting. We will often find ourselves on the flop with a hand that is probably best at the moment, but not really strong enough to bet for value (if we define "for value" as betting and being willing to get stacks in if we get checkraised). For example, if we raise  on the button, get called by the big blind, and the flop comes  . We're often ahead on the flop, but it's clear that we have to fold to a checkraise if we bet. So a bet is probably not for value against the range Villain continues with.

So is a bet a bluff then? Yes and no. We fold to a checkraise (like we would with a pure bluff), but it's possible that Villain will call with some hands we beat, and we can win some showdowns if this happens. So a bet does have a value component too.

But the main point is that we can argue that our overpair is *too strong to check and give up, but too weak to check behind and use as a bluffcatcher on future streets*, because there aren't really many good turn cards for us. There are 10 diamonds that will make a flush possible, all 2, 3, 5, 7, 8 will make a straight possible, all hearts put another flush draw on board (which we don't have), and all A and K might give Villain a better pair. So the list over turn cards we'd like to see is short and we will rarely find ourselves on the turn with the desire to call a bet, should we check the flop, planning to call the turn bluffs we then sometimes induce.

Therefore, since we're probably ahead on the flop, with the possibility of getting called by some hands that we beat, and since we will often win the pot right there, it seems best to simply bet and hope Villain folds, even if our hand is too weak to continue against a checkraise, or if Villain should call the flop and then bet the turn. Note that if Villain only calls the flop, he has revealed weakness. Then we can use the turn and river to make his life very difficult, even if his weak hand is better than our weak hand. Sometimes we will win a showdown after checking the turn and river, and other times we will turn our hand into a bluff and 2- or 3-barrel to make Villain fold a better hand (it's hard to call down in PLO with a hand of moderate strength).

More about these things in future articles, but you should already now see that getting our flop bet called doesn't necessarily make our medium hand difficult to play on future street. We have position, Villain has told us that his range is weak, and we'll have all the good options available on later streets if he continues to check to us.

## 6. Summary
You can view this article as a "theoretical interlude" on our journey through PLO postflop theory. The main point of the article was to introduce some important betting concepts. A concept we will use a lot in future articles is:

*In PLO it's often better to bet a marginal hand and hope our opponent(s) fold (if there aren't too many of them) than to check and try to sneak our hand to showdown in a small pot.*

This concept will be the starting point for lots of aggressive postflop betting, especially when we are heads-up in position and we have the opportunity to valuebet and bluff as we please against a player who has told us he has a weak range out of position.

We will put this concept to work immediately in Part 13, where we'll begin with a discussion of c-betting/checking behind as the preflop raiser heads-up and in position on the flop. After this we'll talk about 2- and 3-barreling (bluffing over multiple streets), which is also a very profitable and enjoyable activity.

The day a new and inexperienced PLO player understands how barreling works, its like "the light goes on" in his head, and a new world of profitable opportunities is laid before his feet. He now realizes how much of the game is about position and reading the situation, and how little his cards often mean. So we'll spend plenty of time on this subject.

Part 13 will be a practical article with lots of specific strategy talk. I expect to have it ready in 1-2 weeks, and then I plan to

publsh at least 1 article per month until the "PLO From Scratch" article series is done.

Good luck!
Bugs

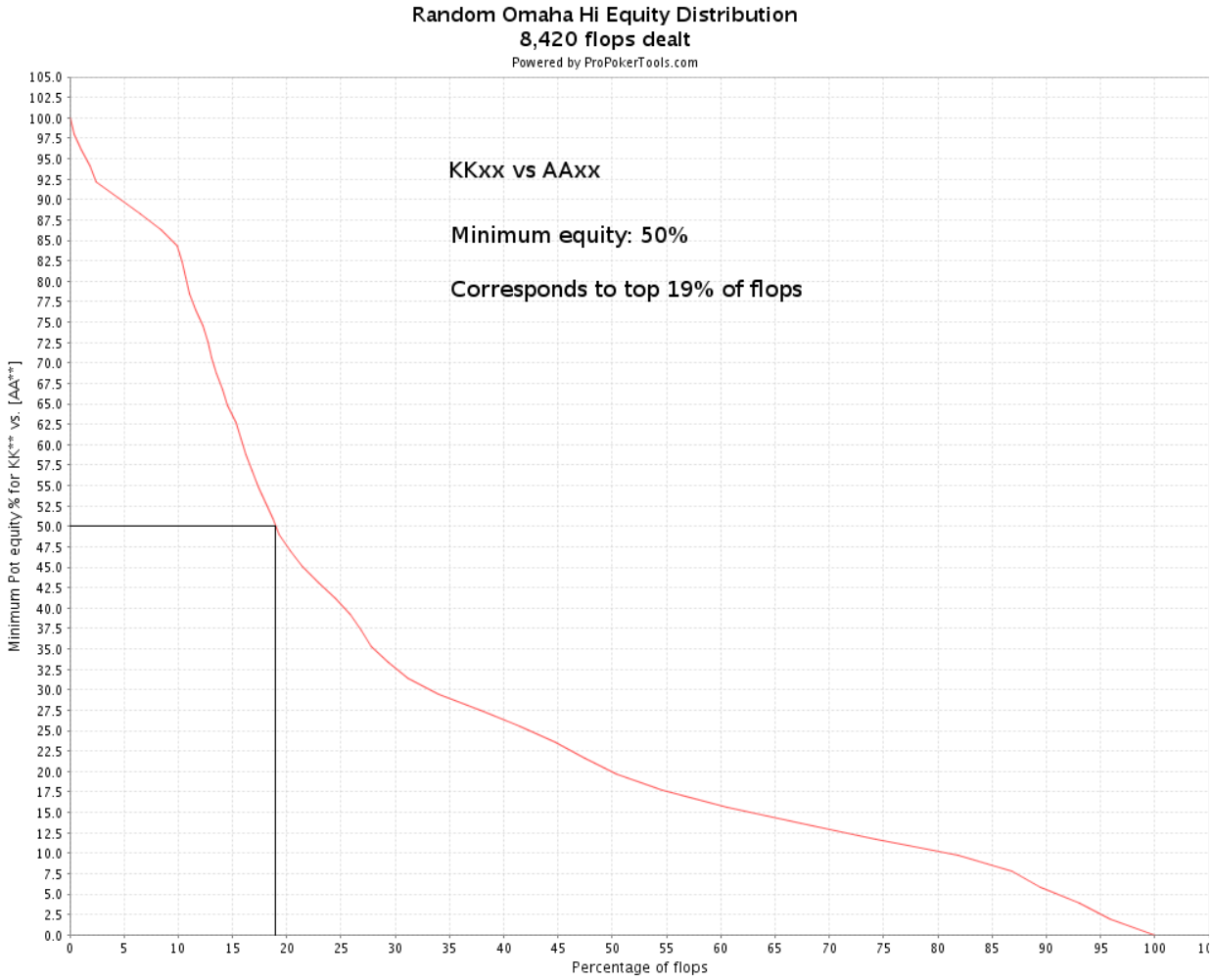
# Appendix A: Mathematics from Part 3

## Numerical Integration Using Simpson's Method

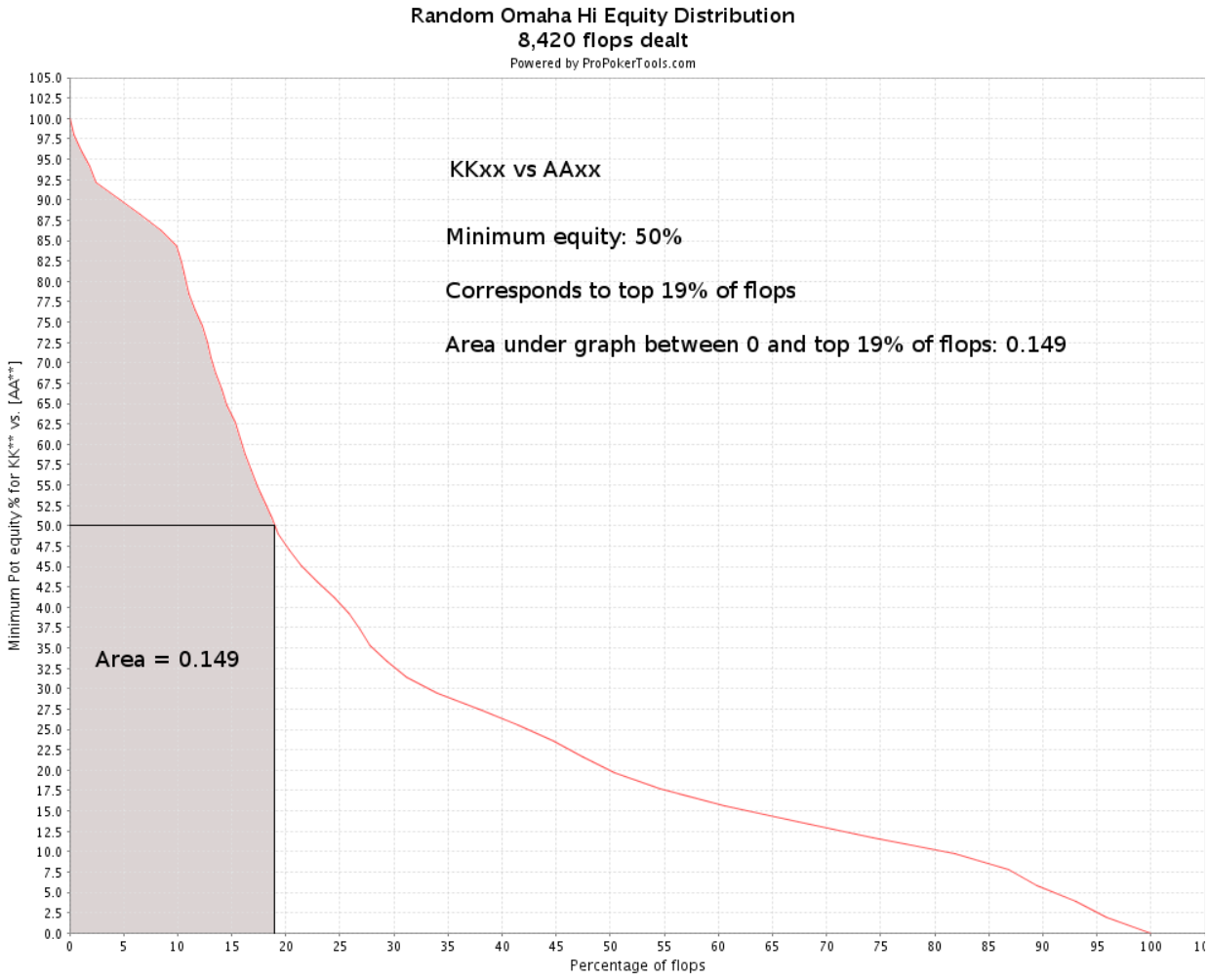
Before we get started with the mathematics, let's agree on what we want to achieve. The purpose of the work done in this Appendix to Part 3 is to find the answer to the following question:

*What is the area under the curve of a flop equity distribution graph between 0 and top x% of flops?*

For example, we pit KKxx against AAxx and ask: *On what percentage of flops does KKxx have minimum 50% equity against AAxx?* We look at the graph and find the answer to be top 19% of flops, as shown below:




Then we ask: *What is the area under the curve between 0 and top 19% of flops?* This is the colored area shown on the figure below:




Now we'll compute this area using a technique called "Simpson's Method" (not Homer):

## Computing the area under a curve using Simpson's Method

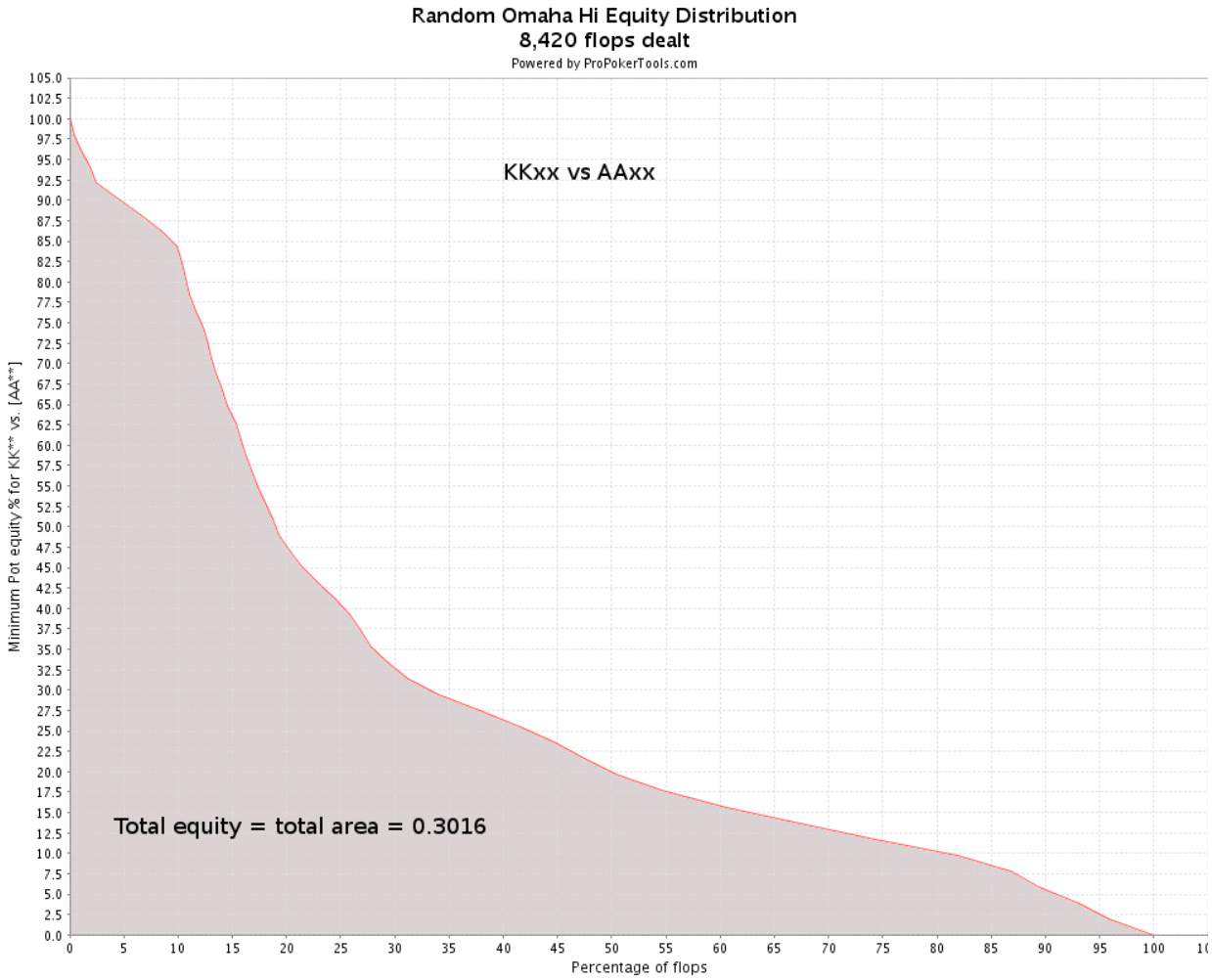
Computing the area A[a, b] under a curve on an interval [a, b] (for example, the area under a flop equity distribution curve between x = 0 and x = 1) can be done approximatively using Simpson's formula:

```
A[a, b] = (1/6)(b-a)[f(a) + 4f((a-b)/2) + f(b)]
```

Where

f(a) = the value of the curve at the starting point a
f(b) = the value of the curve at the endpoint b
(a-b)/2 = the midpoint between a and b
f((a-b)/2) = the value of the curve at the midpoint

To show how this is done, let's compute the total area under the flop equity distribution curve for KKxx vs AAxx. When we discussed flop equity distributions previously in Part 3, we stated that the total equity of KKxx versus AAxx is equal to the total area under the flop equity distributon curve. Using ProPokerTools we know that this equity is 30.16% (ProPokerTools calculation), so the area under the curve is 0.3016 as shown below:




Now we'll use this exact number as a test of the accuracy of Simpson's method. We'll compute the area under the curve between 0 and top 100% of flops (e.g. between x = 0 and x = 1) and compare our answer to the exact answer.

Since our curve segment is the whole curve, we are working on a large interval [0, 1]. So in order to increase our accuracy, we'll split the interval into 10 sub-intervals [0, 0.10], [0.10, 0.20], ..., [0.90, 1.00] (the smaller the interval we're working in, the more accurate Simpson's method becomes). We'll compute the area for each sub-interval, and then we sum them to find the total area.

We start with the first interval [0, 0.10]. First we read the value (y) of the curve at the starting point x = 0, then at the endpoint x = 0.10, and then at the midpoint x = (0.10 - 0)/2 = 0.05. We do this manually, and with some practice it should be possible to obtain an accuracy of +/- 0.005:

x = 0.000 y = 1.000
x = 0.050 y = 0.900
x = 0.100 y = 0.845

We plug these numbers into Simpson's formula, and get:

A[0, 0.10]
= (1/6)(0.10 - 0.00)[1.000 + 4(0.900) + 0.845]
= 0.0908

So the area under the curve between x = 0 og x = 0.10 is 0.0908. Then we compute the areas of the other sub-intervals A[0.10, 0.20], A[0.20, 0.30], ..., A[0.90, 1.00] in a similar way. Below is all the necessary data x and y for all the data points we need. Further below are the computed areas:

x = 0.000 y = 1.000
x = 0.050 y = 0.900
x = 0.100 y = 0.845
x = 0.150 y = 0.630
x = 0.200 y = 0.475
x = 0.250 y = 0.405
x = 0.300 y = 0.325
x = 0.350 y = 0.290
x = 0.400 y = 0.265
x = 0.450 y = 0.230
x = 0.500 y = 0.200
x = 0.550 y = 0.175
x = 0.600 y = 0.155
x = 0.650 y = 0.145
x = 0.700 y = 0.130
x = 0.750 y = 0.120
x = 0.800 y = 0.100
x = 0.850 y = 0.085
x = 0.900 y = 0.055
x = 0.950 y = 0.025
x = 1.000 y = 0.000

A[0.00, 0.10] = 0.0908
A[0.10, 0.20] = 0.0640
A[0.20, 0.30] = 0.0403
A[0.30, 0.40] = 0.0292
A[0.40, 0.50] = 0.0231
A[0.50, 0.60] = 0.0176
A[0.60, 0.70] = 0.0144
A[0.70, 0.80] = 0.0118
A[0.80, 0.90] = 0.0083
A[0.90, 1.00] = 0.0026

The total area under the curve is:

A[0.00, 1.00]
= 0.0908 + 0.0640 + 0.0403 + 0.0292 + 0.0231 + 0.0176 + 0.0144 + 0.0118 + 0.0083 + 0.0026
= 0.3020

This is almost identical with the exact answer (0.3016). We conclude that Simpson's formula gives us more than sufficient accuracy for computing the area under a curve.

Then, finally, we'll find the area under the curve between 0 and top 19% of flops, which we have used as an example. We compute this number using the following division of the interval [0.10, 0.19] into sub-intervals:
[0, 0.10], [0.10, 0.19]

x = 0.000 y = 1.000
x = 0.050 y = 0.900
x = 0.100 y = 0.845
x = 0.145 y = 0.640
x = 0.19 y = 0.500

And Simpson's formula gives us:

A[0.00, 0.10] = 0.0908
A[0.10, 0.19] = 0.0586

The total area between 0 and top 19% of flops is therefore:

A[0, 0.19]
= 0.0908 + 0.0586
= 0.149

This is the total equity that KKxx has on it's top 19% of flops against AAxx. The *average* equity on these flops is found by simply dividing the total equity found on these flops on the length of the interval (which is 19% - 0% = 0.19 - 0 = 0.19):

Average equity
= 0.149/0.19
= 0.784
= 78.4%

We now have the necessary mathematical tools to compute average equity on top x% of flops for one hand/range against another hand/range, and we will use these tools in future work.

# Appendix B: PLO from Scratch Blogs

## Blog 1: 16 September 2009

Hello all,

I'm writing my first blog here in the English section of Donkr to introduce myself and the new article series I'm writing, called "PLO From Scratch" (part 1 was published yesterday).

First a bit about myself:

I've played poker for a living for a bit more than 3 years now and I've been mostly playing LHE and NLHE 6-max at the mid-limits ($10-20 to $30-60 LHE and $2-4 to $5-10 NLHE).

About a year ago I also started to dabble in PLO, mostly for variation (and without much skill or understanding of the game, I might add). I quickly discovered that PLO is very fun to play, and there's also a lot of money to be made for competent players.

I also realized that although I was a winner at the $2-4 to $5-10 PLO limits, most of my edge came from exploiting the really poor players (and there were quite a few of them), and not from playing particularly well myself.

So I decided to make an effort to really learn the game in a systematic manner, and to develop a fundamentally sound PLO game good enough to beat the mid limits consistently.

I like to write about poker theory, so I decided to simultaneously write a PLO article series here at Donkr where I write about the strategies and concepts that I work on as a part of my own learning process. My goal for this series is to teach beginning players the fundamentals of PLO, and I hope that the series can be a starting point for learning the game, both how to play it and how to think about PLO strategy (which can be very different from the way we think about Hold'em).

The article series will also have a practical part, where I build a PLO bankroll from scratch, starting at the micro limits and hopefully reaching $1-2 PLO before the end of the series (more about the details in PLO From Scratch - Part 1).

I hope you will find the "PLO From Scratch" series interesting, and that it will inspire more small stakes players to take up the game (its fun!).

Good luck at the tables!
Bugs

## Blog 2: 17 October 2009

PLO From Scratch - Part 2 has been published, and here is the corresponding blog about the practical part of the article series. The plan for the blogging is to present the results for each new limit we grind our way through, and between limits I plan to blog about more general things.

**Status for the grinding project**
Since the start, I have gotten halfway through $5PLO by relaxed multitabling. Part 2 was a long article that took some time to write, so there was less time for grinding (but not to worry, we will make up for it later).

In this blog I will talk about how I have chosen to attack the microstakes. Generally, we can choose between two paths, and arguments can be made for both of them:

**Massive multi-tabling**
The micro limits have two things going for them:

- It's easy to find lots of good tables
- The players are so bad, that you can have a big edge by playing simple ABC poker

These are arguments for grand scale multi-tabling. If you know solid ABC strategy in and out, you can achieve very good win rates playing as many as 6-8 tables, and this will maximize your hourly wage. By playing this way, you can move quickly through the lowest limits and reach the limits where money starts to matter.

Here are a couple of arguments against this move-up strategy:

- Massive multi-tabling makes your decision making processes more static and inflexible
- You are not maximizing your winrate at each table (although your hourly wage can be very good)
- You gain less experience in gathering and exploiting reads
- You gain less experience in using advanced strategies

By playing more like a "robot", you will still exploit the opponents' many big mistakes. However, you will leave some profit at the table because you don't have the time to exploit opponent specific mistakes maximally. This is because you have less time available to gather and then exploit reads. Less time per decision also means you will lose some opportunities to make plays that are better than the ABC plays (for example, when a certain bet size would have been better than your default bet size for the situation).

An alternative route is:

**High focus and few tables**
The arguments for and against this choice are the opposite of those we listed for massive multi-tabling above. You will play fewer hands per hour, and you will probably have a lower hourly wage, and you will use more time (measured in hours, not hands) to move up.

On the other hand, you will maximize your win rate per table, you will find time to gather and exploit reads, and you will have more opportunities to experiment with advanced play, simply because you have more time to think about each decision. Maximizing your win rate will also reduce the swings. (The "swingyness" of your profit curve is a function of variance and win rate. When the variance increases, while the win rate stays the same, you will experience bigger swings. When the win rate increases, while the variance stays the same, you will experience smaller swings)

So what do we choose?

Personally, I believe high focus and few tables is the way to go (but I won't argue with those who choose the other path). When I began playing poker in 2005, the conditions (extremely many soft games to choose from) were ideal for massive multi-tabling and the norm for serious grinders was to play 6-8 tables at a time, or even more. But since the "Golden Age" of online poker, it has become harder to gain

an edge by playing ABC poker, and we should keep in mind that we're not only playing for profit. Grinding our way through a certain limit is also a *learning process* and a preparation for playing at the next limit. Our ultimate goal is to achieve a high win rate at a high limit, so the road leading up to this goal is a learning process, and not only something we do to build our bankroll.

Since this article series and this grinding project is about learning, I recommend focusing on the learning process. If this means playing fewer tables and using more time to move up, so be it.

**Table selection**
Given my choice of of playing few tables and focusing on high win rate and high quality on all decisions, what should we look for when selecting tables? The answer follows from simple logic:

- The bigger our edge, the more we benefit from playing with deep stacks. So we should seek out tables where every one is sitting with a deep stack
- Then we should, when possible, pick a seat with good position relative to the deepest stacks
- If we find a deep stacked table where someone is tilting, so much the better

I recommend that you start by looking at stack sizes, and then you simply assume that you have an edge at a micro limit table where every one is playing with full stacks. If you also find a good seat, great! And if you also spot a tilting opponent, great-great!

Your dream table is one with 5 deep-stacked and loose-passive opponents who will let you bully them around and value bet them to death. You won't have much problem with weak-tight opponents either, since these are generally looking for excuses to fold and stay out of trouble. The latter category will sit and wait for the nuts and let you steal a lot preflop and postflop. But when a passive player plays back at you, you need to respect his aggression.

Another type of table you should look for is a deep-stacked table with an obvious maniac who has built an ultra-deep stack (which means he has been running well). At these tables the other players will often be re-loading non-stop and splashing around with weak hands in an attempt to "get revenge". When a maniac goes on a tear, this tends to make otherwise tight and disciplined players foam at the mouth, and they might start loosening up to the point where they play almost as bad as the maniac. They will start gambling with him in big pots where no one has a big edge, which can create very profitable opportunities for you. So if you see a table where one player has 4-500 BB and seems to be playing every hand, while the other players have full stacks and also seem active, you probably have this type of table.

If you find an open seat at such a table with a good position relative to the maniac, you should take it. Now you are in a dream scenario if you are comfortable playing deep-stacked, but you need to be tiltless, disciplined, and intensely focused. This is not a scenario that allows you to get tilted or sloppy.

Your strategy should revolve around sitting somewhat laid-back and waiting for very profitable scenarios to present themselves. You should focus on the maniac and try to get involved in pots where you have position on him. Don't bluff much, but wait for good starting hands in position (stick to the playable hand categories we defined ini PLO From Scratch - Part 2), and try to get heads-up with him.

You should often call the maniac's preflop raises with playable hands in position instead of 3-betting, particilarly if you expect to get heads-up also when you don't 3-bet. Keep the pots small until you have a hand worth betting hard for value. Don't set yourself up for playing big pots without a good hand or draw, but instead use position to pick up small and moderately sized pots with marginal hands when the maniac gives up, or by sitting behind him and letting him bluff into you.

In my experience, maniacs who feel they are being "hunted" by a competent player in position (namely you) will adjust by reducing their aggression somewhat. They don't mind splashing around in big pots

against opponents who try to play back at them with trashy hands, but they will often pull in the horns when they realize that you are not looking to gamble with them, and that you seem to always have a hand when you get involved. So the maniac will usually give you opportunities to take pots away from him, and thus exploit your positional advantage. For example, he might adjust by shutting down on many flops where he misses, because he feels threatened by you. This gives you opportunities to steal the pot on the flop when he checks to you.

**General session tips**
Here are a few tips for playing sessions with few tables and maximum concentration:

- Start by finding 2-4 very juicy tables (I don't play more than 4, sometimes only 2)
- Keep the table selection process running while you play. Always be on the look out for better tables, and always have a good candidate ready in case one of your current tables breaks up
- Take notes. You have the time for it when playing few tables, and notes will help you make better decisions
- Never make a rushed decision in a big pot. Take your time.
- Pay close attention, also to hands you are not involved in. A gold mine of information is available to you when you are playing few tables. Use dead time to gather reads and take notes. Also pay attention to the table dynamics and note who is tilting
- Take breaks when you feel tired
- When you have found some very good tables, and you have gathered a lot of reads, stay as long as you can (but take short breaks when necessary). The combination of many soft opponents + lots of opponent specific information will maximize your win rate

After the session, usually do a session review. Analyze big pot scenarios thoroughly, since these are very important for your win rate.

**Plans for the future**
In the time leading up to Part 3, my plan is to finish grinding $5PLO and get well on the way with $10PLO. In the next blog, I plan to discuss the results from $5PLO, and also talk about using Omaha Manager and the Omaha Manager HUD (heads-up display).

Good luck!
Bugs

## Blog 3: 13 May 2010

After a slow start start for the article series' bankroll building project (including some computer trouble), I have finally gained some momentum, wo-ho! As mentioned in PLO From Scratch - Part 7, I started grinding $5PLO in late April 2010, and my goal is to finish both the theoretical articles and the bankroll building project some time during summer/autumn 2010.

We remember that our plan was to climb the PLO limits with a 50 BI banlroll, starting at $5PLO with $250. We use a move-up scheme called "50+10". We grind each limit until we have 50 BI for the current limit + 10 BI for the next. Then we take a 10 BI shot at the next limit. If we succeed, we we keep grinding at the new limit. If we lose the 10 BI, we move back down, grind in 10 BI more for a new shot, and try again. Rinse and repeat.

If all shots succeed at first try, we get the following minimum work load (as described in PLO From Scratch - Part 1):

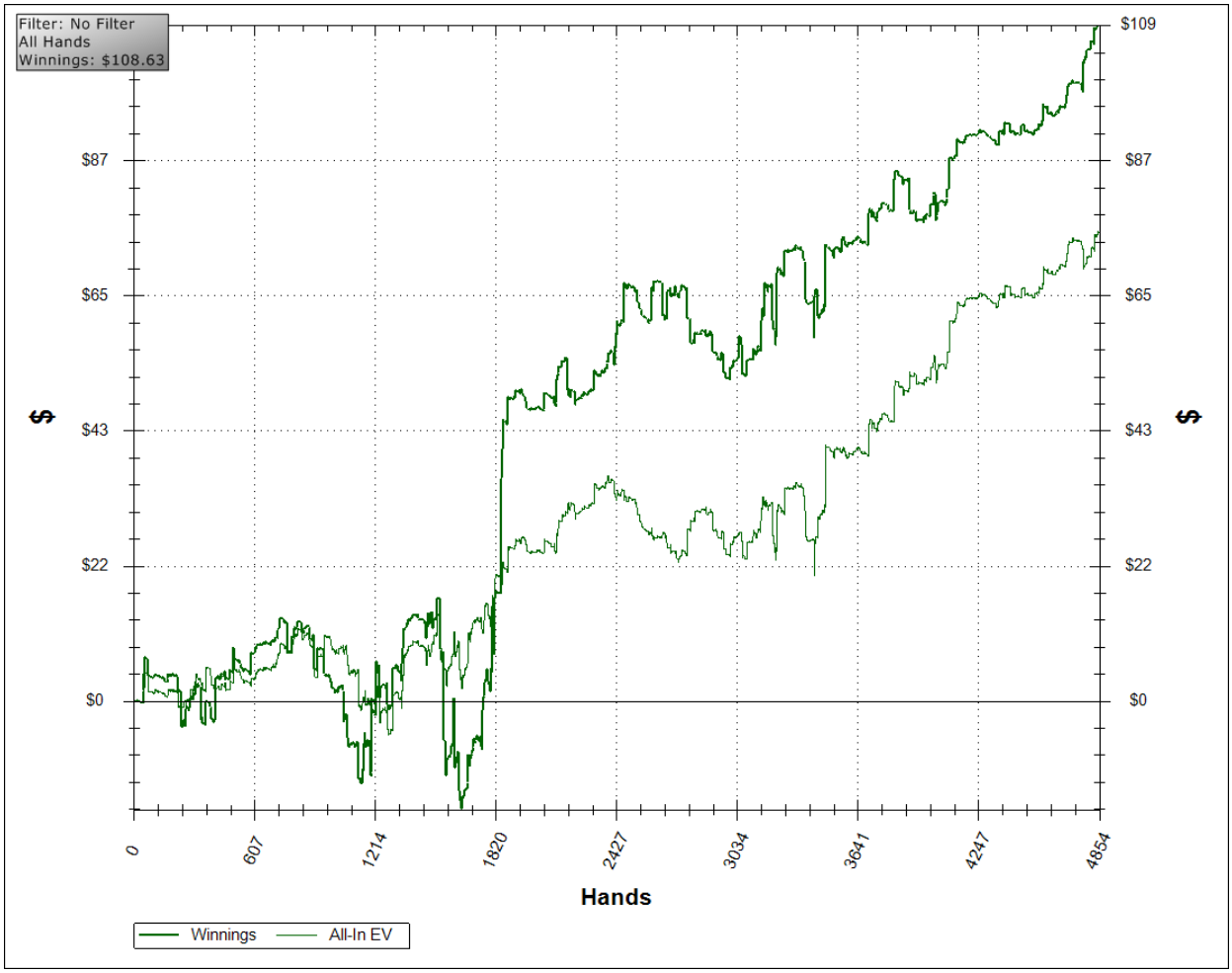
- **$5PLO to $10PLO:** Grind in 20 BI ($100) at $5PLO and build the roll to 50+10 BI ($350) for a shot at $10PLO.
- **$10PLO to $25PLO:** Grind in 40 BI ($400) at $10PLO and build the roll to 50+10 BI ($750) for a shot at $25PLO.

- **$25PLO to $50PLO:** Grind in 40 BI ($1000) at $25PLO and build the roll to 50+10 BI ($1750) for a shot at $50PLO.
- **$50PLO to $100PLO:** Grind in 35 BI ($1750) at $50PLO and build the roll to 50+10 BI ($3500) for a shot at $100PLO.
- **$100PLO to $200PLO:** Grind in 35 BI ($3500) at $100PLO and build the roll to 50+10 BI ($7000) for a shot at $200PLO.

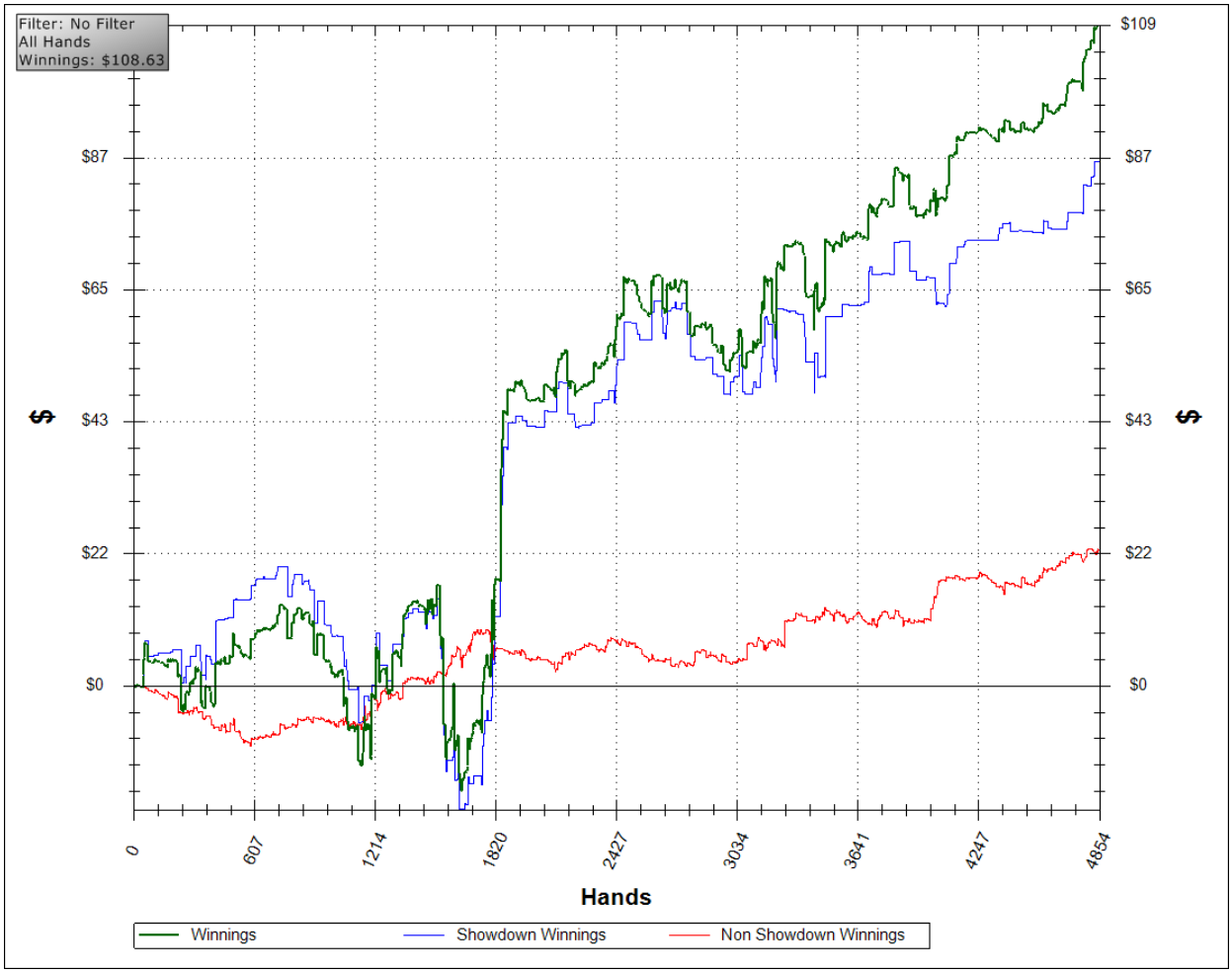
The first step has now been completed, and the bankroll has grown from 50 BI ($250) at $5PLO to $250 + $100 = $350 and ready for a 10 BI shot at $10PLO. The next step is to grind in 40 BI ($400) at $10PLO, and build the bankroll to $500+$250 = $750, ready for a $10 BI shot at $25PLO.

Without further ado, here are graphs and HEM stats for $5PLO (click the images to view them full sized):

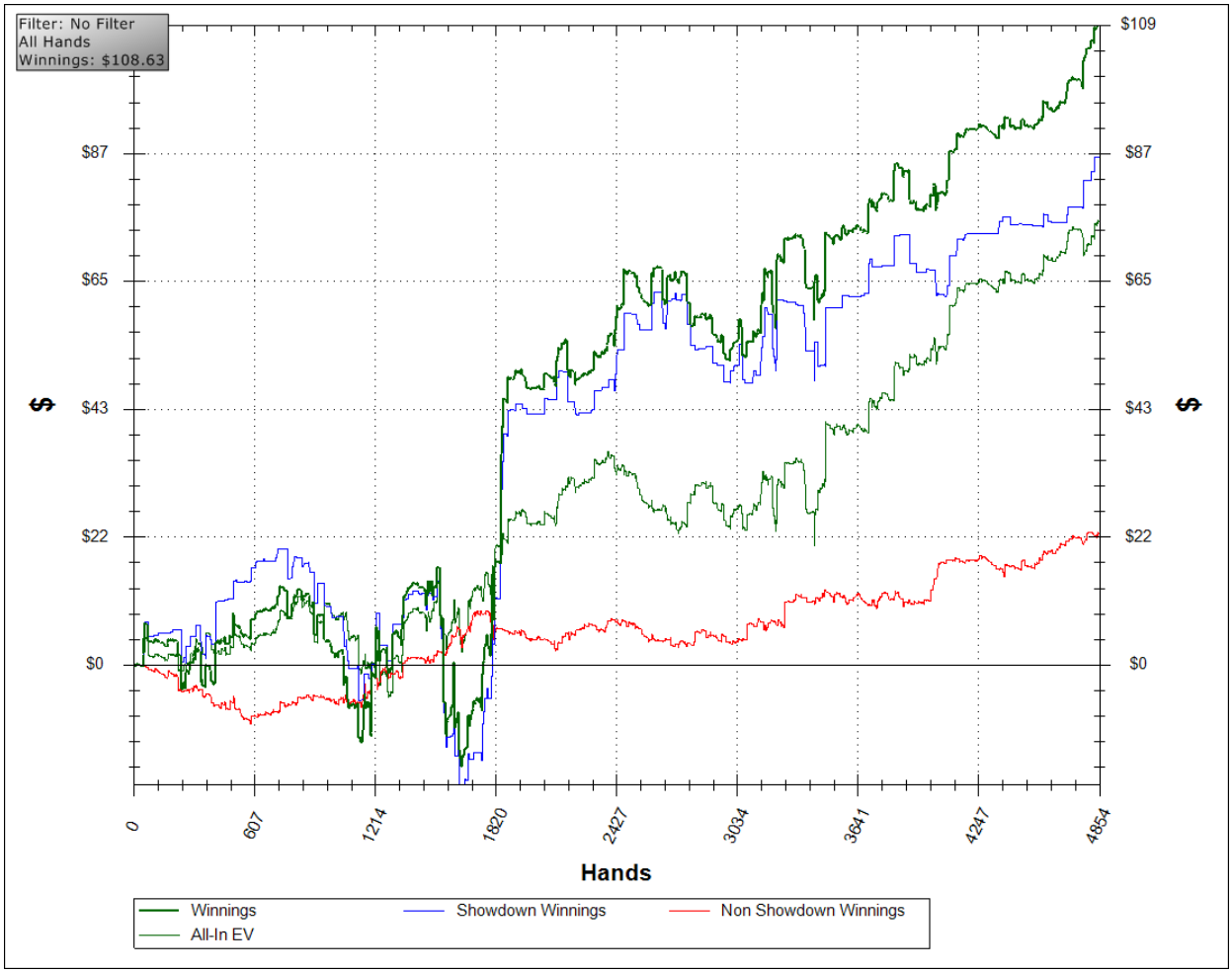
**Profit + all-in EV**



**Profit + showdown winnings**



## Profit + all-in EV + showdown winnings

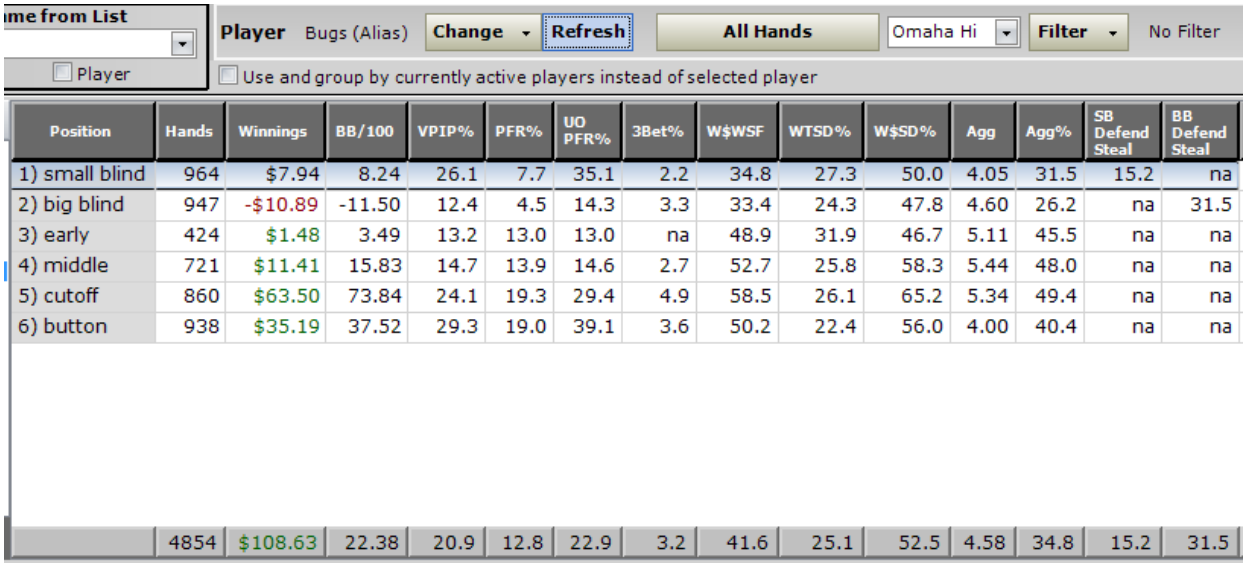



## Hem-stats (by stakes)

me from List
Player
Player Bugs (Alias) Change Refresh All Hands Omaha Hi Filter No Filter
Use and group by currently active players instead of selected player

| Game Type Description | Game | Hands | Winnings | bb/100 | Std Dev bb | VPIP% | PFR% | 3Bet% | Agg | Agg% | Steal Pct | Flop CBet% | Turn CBet% | WTSD% | W$SD% | Rake |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $0.02/0.05 PL | omaha | 4854 | $108.63 | 44.76 | 148.01 | 20.9 | 12.8 | 3.2 | 4.58 | 34.8 | 33.5 | 82.0 | 69.5 | 25.1 | 52.5 | $41.82 |
| | | 4854 | $108.63 | 44.76 | 148.01 | 20.9 | 12.8 | 3.2 | 4.58 | 34.8 | 33.5 | 82.0 | 69.5 | 25.1 | 52.5 | $41.82 |

**Hem-stats (by position)**




| Position | Hands | Winnings | BB/100 | VPIP% | PFR% | UO PFR% | 3Bet% | W$WSF | WTSD% | W$SD% | Agg | Agg% | SB Defend Steal | BB Defend Steal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1) small blind | 964 | $7.94 | 8.24 | 26.1 | 7.7 | 35.1 | 2.2 | 34.8 | 27.3 | 50.0 | 4.05 | 31.5 | 15.2 | na |
| 2) big blind | 947 | -$10.89 | -11.50 | 12.4 | 4.5 | 14.3 | 3.3 | 33.4 | 24.3 | 47.8 | 4.60 | 26.2 | na | 31.5 |
| 3) early | 424 | $1.48 | 3.49 | 13.2 | 13.0 | 13.0 | na | 48.9 | 31.9 | 46.7 | 5.11 | 45.5 | na | na |
| 4) middle | 721 | $11.41 | 15.83 | 14.7 | 13.9 | 14.6 | 2.7 | 52.7 | 25.8 | 58.3 | 5.44 | 48.0 | na | na |
| 5) cutoff | 860 | $63.50 | 73.84 | 24.1 | 19.3 | 29.4 | 4.9 | 58.5 | 26.1 | 65.2 | 5.34 | 49.4 | na | na |
| 6) button | 938 | $35.19 | 37.52 | 29.3 | 19.0 | 39.1 | 3.6 | 50.2 | 22.4 | 56.0 | 4.00 | 40.4 | na | na |
| | 4854 | $108.63 | 22.38 | 20.9 | 12.8 | 22.9 | 3.2 | 41.6 | 25.1 | 52.5 | 4.58 | 34.8 | 15.2 | 31.5 |

**General comments**

Lady Luck was on our side at $5PLO, no doubt about it, and the observant reader will notice that I'm ~7 BI above EV. Most (~5BI) of this surplus EV was gained in two big pots at around 1800 hands (where the profit graph makes a big leap upwards). These two pots were 400bb and 750bb, respectively, and in both I was only a slight favorite. If I had lost both of them, I would have had to grind $5PLO for a few thousand hands more.

Another thing worth noting from the graphs is that my "non showdown winnings" graph is positive. This means I made good profit from picking up pots postflop, and I will have more to say about this later.

When it comes to the HEM stats, I did not pay much attention to them during the $5PLO grind. I simply sat down, tried to play my best, and tried to exploit my opponents' mistakes to the best of my ability. The sample size is small, so we can't draw strong conclusions from the HEM stats at this point. But we will get to talk about it more, when we have a bigger sample size.

But what we can conclude, even with only ~5k hands in the database, is that I played a very tight and very aggressive form of poker, but with some preflop overlimping as well (the PFR% is slightly low relative to the VP$IP):

VP$IP = 20.9
PFR% = 12.8
3-bet% = 3.2
AF = 4.58

And I used an obscenely aggressive c-bet + fire multiple barrels strategy postflop:

Flop C-bet% = 82.0
Turn C-bet% = 69.5

So what was the reason for this choice of strategy?

**Exploiting mistakes at $5PLO**

First, let's conclude that a pure nut-peddling style, playing premium starting hands and waiting for good flops before playing big pots, will work well at $5PLO. You can probably play as tight as VP$IP/PFR% = 15/10 and still have a decent win rate. The reason is that most players in the $5PLO player pool make gargantuan mistakes.

For example, I have seen players call 3 big bets on the flop, turn and river with a naked overpair on a monotone board (e.g. A♠ A♥ 7♣ 6♠ on a J♣ 8♣ 2♣ flop). Embarrassingly, on one occasion I was the one who got my 3-barrel naked ace bluff called down. At any rate, an overall strategy of nut-peddling and waiting for the opposition to screw up badly will be very profitable, given the mistakes I observed.

So a core strategy for nanolimit play should be value-based with strict starting hand selection. If you do this, you will win. Raise and 3-bet for value preflop (mostly forget about speculative 3-betting), c-bet/valuebet when you have hit the flop, and let nature take its course. When these fundamentals hav been laid, we can of course improve on our core strategy. The biggest adjustment you should make, in my opinion, is based on the following observation:

*The players at $5PLO play very loose out of position, especially preflop and on the flop. But they are generally not willing to take marginal hands to showdown in big pots.*

As you sit there and raise preflop and c-bet flops with your premium starting hands, you'll observe that you get called often, both preflop and on the flop. Your first reaction might be to tighten up even more, since it's seems difficult to steal pots without making a hand. But there is another path available to you:

Just realize what your opponents are actually doing (they put a lot of chips into the pot with weak hands on the early streets, but they fold a lot on later streets when the bets get bigger), and you should have no problems figuring out a response to their loose calling:

*Use preflop play to place yourself in a shorthanded pot (heads-up or 3-way) with position and initiative, and then you use aggression + reads + hand reading to steal pots postflop.*

In other words, you can isolation raise mercilessly in position and rob your opponents blind postflop by c-betting a lot of flops and turns. Of course, that doesn't mean you *have* to. An alternative is to overlimp, especially with your weak but nutty hands, see a cheap flop and take it from there. Isolating with a lot of marginal hands creates more variance, and your opponents won't always let you get away with it.

If you constantly find yourself in raised, multiway pots with weak hands, things will get difficult for you, even with position. So if the opposition won't cooperate, just shift gears, fold more speculative non-nutty hands like J♠ 7♥ 6♠ 4♥ , and raise primarily for value with your best hands. Under loose-passive conditions overlimping weak, nutty hands in position is a good play. For example weak suited aces (e.g. A♣ T♣ 8♠ 4♥ ) and tarshy KKxx hands (e.g. K♥ K♣ 8♦ 3♠ ). These hands have excellent implied odds when you overlimp them on the button and see a cheap flop in a multiway pot.

You can also overlimp a bit with speculative non-nutty hands on the button and use position to either play them profitably for showdown equity (when you make a hand), or steal postflop (when nobody hits the flop). However, I elected to play tight, and I folded a lot of these hands, even if I might have been able to squeeze out some extra profit with them. Playing a lot of weak hands introduces more variance, and you'll have more close decisions to make. This is generally not something you want if you play a lot of tables.

Another thing you should do is to overlimp weak, nutty hands in the small blind. The big blind rarely raises, and you're getting excellent implied odds. Again, weak suited aces and big pairs perform well in this scenario. If you flop the nut flush or top set, you'll often get loose action (like I said, I saw people calling down with naked overpairs on monotone boards, drawing almost dead against a flush). But weight your limping range towards *nutty* hands when overlimping for implied odds in a multiway pot. This is very important in the small blind, since non-nutty hands and draws are difficult to play well out of position postflop.

So how active you should be is very much up to you. I elected to play very tight preflop, and I folded many weak-but-marginally-playable hands to save myself a lot of marginal and tricky postflop decisions. I played 6-8 tables and based my strategy on playing mostly premum hands and good speculative hands. Then I added to my profits by barrelling a lot postflop when I succeeded in getting heads-up or 3-way with position and initiative.

My choice of strategy is clearly reflected in the stats. Very tight, very aggressive, and with very high flop/turn c-bet percentages. It's important to realize that this is a very exploitive playing style, designed as a response to the general conditions at $5PLO:

- General looseness (an argument for a TAG style)
- A lot of loose peeling on the flop, but a lot of folding on later streets (an argument for barreling a lot postflop)
- Not a lot of bluffing (you can bet marginal hands until they raise you, and then fold without regret)

So the playing style I used was definitely a function of the conditions at this limit. If you play this tight and use this kind of brute aggression at higher stakes, you will end up getting exploited yourself. But at $5PLO, I believe this is close to optimal strategy (and then you can decide for yourself exactly how tight and aggressive you want to be).

**Conclusion about the choice of strategy**
We only have a small sample size, and we definitely ran above EV at $5PLO. But based on what I observed, this is one of the easiest games in the world to beat. The secret is to play tight-aggressive and wait for your opponents to screw up badly (which they will often do). That's the core strategy; tight and aggressive on all streets.

Then you can go one step further and exploit your opponents hard by being an aggressive son-of-a-bitch postflop. You respond to their loose and weak peeling by firing more bluff/semibluff barrels postflop when you have succeeded in getting position + initiative in a heads-up or 3-way pot. You simply use the information your opponents are sending you (check-call = weak, all kinds of raising = strong) and steal, steal, steal.

If you also want to splash around a lot with weak hands in position, for example by 3-betting and cold-calling with speculative hands and then bullying people around postflop, that's up to you. I decided to stick to mostly premium and good speculative hands to play a minimum-headache kind of poker (and also since the rake is very high). But a good player should easily be able play a loose-aggressive style profitably at $5PLO, since the players are so soft and timid.

**What you learn at $5PLO**
The most important skills you develop at the lowest micro limits are:

- A basic, value based TAG style
- Using the combination position + aggression

Don't be afraid to experiment down at the nano limits. You can win money fairly efffortlessly by playing completely ABC postflop, and shutting down every time you c-bet with no hand and get called. There's nothing wrong in using that strategy, but there's additional money to be made for the adventurous. Train yourself to risk more in order to win more, and your win rate will soar.

When you know that it's correct to take an aggressive line, grit your teeth and bet, even if it makes you uncomfortable. Most people are "programmed" to feel more comfortable in low risk/low profit senarios than in high risk/high profit scenarios. But you can train your ability to tolerate risk (it gets progressively easier, as you learn to trust that it works). The mediocre ABC TAG is happy with low risk and low profit. He rarely climbs up from the low limits. Don't be like him.

Use the training period at $5PLO to learn good fundamentals and to learn using raw postflop aggression against soft opponents. Pound on your opponents, and don't let them off easy. If you see an opportunity to steal a pot, take it. Test your opponents, find out what they let you get away with (usually a lot), and get comfortable building and stealing big pots in position against weak players. At higher stakes you will have to learn to restrain yourself a bit more, but worry about that when you get there. Learn to use raw aggression as a tool against weak opponents, and then you can work on the finesse later.

**Until next time**
The next mountain to climb is grinding in 40 BI at $10PLO. I reckon we'll see much of the same tendencies in the $10 PLO player pool, and that tight-aggressive play with plenty of postflop aggression will work well. But we might have to tone down the aggression a bit, and become more balanced and less one-dimensional in our aggression. We'll see.

Starting bankroll: $250
Bankroll at this point: $359

Bye for now!
Bugs

## Appendix C: Links to the Articles

Part 01: http://www.donkr.com/articles/viewArticle.asp?aid=1301

Part 02: http://www.donkr.com/articles/viewArticle.asp?aid=1324

Part 03: http://www.donkr.com/articles/viewArticle.asp?aid=1336

Part 04: http://www.donkr.com/articles/viewArticle.asp?aid=1522

Part 05: http://www.donkr.com/articles/viewArticle.asp?aid=1543

Part 06: http://www.donkr.com/articles/viewArticle.asp?aid=1579

Part 07: http://www.donkr.com/articles/viewArticle.asp?aid=1621

Part 08: http://www.donkr.com/articles/viewArticle.asp?aid=1646

Part 09: http://www.donkr.com/articles/viewArticle.asp?aid=1668

Part 10: http://www.donkr.com/articles/viewArticle.asp?aid=1688

Part 11: http://www.donkr.com/articles/viewArticle.asp?aid=1708

Part 12: http://www.donkr.com/articles/viewArticle.asp?aid=1765

Part 13: Coming Soon

Appendix A: http://www.donkr.com/articles/viewArticle.asp?aid=1530

Appendix B:

Blog 1: http://www.donkr.com/blogs/viewBlog.asp?b=6619

Blog 2: http://www.donkr.com/blogs/viewBlog.asp?b=6787

Blog 3: http://www.donkr.com/blogs/viewBlog.asp?b=7828