Sets Galore

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I tried no-limit hold'em ring games for the first time this past February. I have played many no-limit hold'em tournaments, but this was my first experience playing no-limit for cash. I found the game to be exhilarating because I felt I had to be much more focussed than in a limit game. Readers might say that I should be just as focussed in limit games, but I find playing limit poker reminds me of the mental concentration I use for driving. There are aspects of both activities that are best described as being on automatic pilot.

My mind wanders and some of the actions I take are done almost unconsciously. That is not the approach I took to no-limit hold'em. I was constantly alert and enjoyed the feeling of having to watch every detail of what was going on around me. It also took longer to wind down after finishing a session.

I also had a graphic lesson in how your entire stack of chips is always at risk. Let me now spin this tale. I had bought in for $200 in a $1/2 no-limit game. About an hour later I had built my stack to $270 and found myself in the small blind. Three players had limped in for $2. When the action got back to me, I peeked at my cards and found Q-Q. I raised to $8 and two of the three limpers called the raise.

The flop came 6-Q-K giving me a set of queens. When you are confident you have the best hand, the object in poker is to get as many of your opponents' chips in the pot as possible. However, one huge difference between limit and no-limit is that you can get many chips in the pot at any stage of the betting in no-limit. Hence, in limit hold'em I would have bet my hand after the flop, whereas, in this particular case, I checked. Both of my opponents also checked.

The turn card was a 7 and I again checked. The opponent who acted next also checked. The remaining opponent then went all in for about $230. I have no real explanation for flashes of insight, but they do happen. In this case, I knew with close to certainty that he held 6-6. Thus, after a short pause, I went all in for $270. I fully expected the other opponent to fold. Instead, he covered both of our bets with his bigger stack. As he did so, I again had the same flash of insight and I again knew with close to certainty that he held K-K.

After another 7 came on the river, we exposed our hands. The first player to go all in rolled over 6-6, I showed my Q-Q with trepidation and the player who covered both of us rolled over K-K. The main solace I took out of this small disaster was the fact that I had been on the nose with regard to reading the hands. What I later wondered, and still do, is whether I could have laid down my set of queens had I been third to act and had the same reads on the players. I must confess I don't know the answer to that.

The other thought that came to mind was the rarity of seeing three sets on the flop. I shall conclude this article with a derivation of the chances of seeing three sets on the flop. I have talked to numerous players who have never seen it. Let's work out the probability. This is a straightforward computation so that I shall provide an outline of the details. The first ingredient is the flop. In order for the flop to produce three sets, all three cards must have different ranks. The total number of flops is $C(52, 3) = 22,100$. There are 52 flops that are three-of-a-kind and 3,744 flops that have exactly one pair. Thus, subtraction gives us 18,304 flops that have three distinct ranks. We divide by 22,100 and get a probability of 352/425 that the flop allows three sets.

Given that the flop allows three sets, we now have to determine the probability that three players hold pairs of the ranks in the flop. The total number of ways of dealing 10 hands from the 49 remaining cards is obtained by multiplying $C(49, 20)$ by 19!! The latter number is the number of ways of taking 20 cards and forming 10 hold'em hands from the 20 cards. Doing so yields 18,514,119,322,779,963,082,200 possible ways of dealing 10 hands from 49 cards. (Don't you just love those ridiculously big numbers about which we have no intuition?)

Next we have to determine the number of ways of dealing 10 hands with three pairs of given rank. There are 27 ways to set aside three pairs of the given ranks because we have three choices for each pair. We then choose the other seven hands in $C(43, 14)$ multiplied by 13!! ways. Altogether we obtain 285,977,001,822,712,200 ways of dealing the three given pairs.

We divide the two big numbers above and get a probability of 9/582,659 that there are three pairs of the three ranks in the flop. We now multiply by the probability 352/425 above. Therefore, the probability that three sets flop is 288/22,511,825 which is about 1/78,166. We can see it is, indeed, a rare event. The probability of three sets flopping in 9-handed hold'em is about 1/111,666.

Of course, the actual occurrence of three sets flopping is a little less because players will fold pairs preflop according to the game conditions. The above numbers assume no one folds a pair before the flop.