Texas Hold’em Utilities

: pot value

: win probability

: fold probability (everyone folds after bet/raise)

: risk adjusted expected value (i.e. exponential utility)

Worst case utilities (after player bet/raised every opponent except one folds):

1. When cost to call (big blind, first to bet after deal or everyone before checked):

Raise if :

**Decision procedure:** If estimated win probability is , then bet appropriate amount, else check. When risk neutral

1. When cost to call (small blind, someone before bet/raised):

Call if (note that always):

Raise if and :

Suppose and estimated win probability is :

When risk neutral, and let :

Suppose and estimated win probability is :

When risk neutral, and let :

**Decision procedure:** If estimated win probability , then

1. If then raise appropriate amount,
2. If then raise no more than ,

else () raise no more than

1. When cost to call (big blind, first to bet after deal or everyone before checked):

Bet if , i.e.

If :

1. When cost to call (small blind, someone before bet or raised):  
   Call if , i.e.  
   Raise if , i.e.
2. If I checked, the next opponents will either check or bet:
3. If I bet/raised , the next opponents will either fold, call or raise, suppose opponents have called and none raised:  
    will check if  
    will raise if

Texas Hold’em Probabilities

**Approximation to players from probabilities calculated for players**

For a given round with 10 players and resulting ranking of (i.e. player is beaten by opponents), the corresponding win probability if there were only players can be approximated by

1. If , then there’s no way to pick opponents without one beating the player.
2. If 1. Is not the case, then winning probability is divided by .

**Number of possible combinations of dealing cards to players from a deck of cards:**

**Probability of one unique card being dealt when dealing cards to players from a deck of cards:**

**Probability of one of unique cards being dealt when dealing cards to players from a deck of cards:**

**Probability of one unique pair of cards being dealt when dealing cards to players from a deck of cards:**

**Probability of unique (and mutually disjoint) pair of cards being dealt when dealing cards to players from a deck of cards:**