

The answer to this question has quite surprisingly been around for ages though it is discussed, analysed and refined often. Named after its author, John L Kelly Jr, it was first published in 1956.

Quite simply, the strategy enables you to find the answer to a question that is common amongst speculators and gamblers. If you have a bank of X , how much should you stake on each occasion to maximise your gain but minimise your loss so that in the long run you can perpetually increase your wealth!

Kelly considered the strategy of betting a fixed fraction of the bank on each occasion. In a favourable game, your fortune ought to grow exponentially, like compound interest. He worked out the way the rate of growth varied according to the fraction you bet. If you bet only a tiny fraction you will not go bankrupt but your wealth grows very little. Make the fraction large and the losses when they occur will wipe you out.

Kelly's answer was simple. The right balance is struck when the fraction you bet exactly measures the size of your advantage. If you are being offered even money but the chance of an event occurring is 51% (and therefore the chance of failure is 49%) you should bet the difference between the two, 2%.

Therefore if you started with a bank of £100 and you correctly assessed your chances as discussed above you would need to place a bet of £2. Any higher and your probability of liquidation (risk) increases exponentially to your likely return.

In short the "Kelly strategy" maximises your long term growth rate by equalising it with your risk.

Probability of success

51%

Probability of failure
Kelly's strategy stake

Bank size	£100
Stake size	£2

The strategy relies upon you "Playing" the game for the long term. You will have fluctuations along the way based upon the law of large numbers and equipartition but in the long term you will end up with an effective strategy.

When your bet is advantageous, but the payout is not at even money, you need to scale the loss probability to find the Kelly Strategy. Suppose you are offered odds of 3-1 and your winning probability is 28%. Your chance of loss is 72%, scale this by the odds offered or by a factor of 3. $72/3=24\%$. Kelly's analysis tells you that you should bet 28%-24% or 4% of you bank on this bet.

One note, If you find that your bet size does not equal an amount you can stake you should always round down.