MARCH 2023 BRAIN TEASER & SOLUTION

Your Friend Wants to be a Trader

Your friend John is passionate about trading stocks and has discovered a unique and aggressive stock market trading strategy with a consistent track record of success. If correctly executed the trade has a solid two/thirds chance of success, with independent outcomes. John is excited and has ready $10K to deploy this strategy. If successful, the trade doubles the money deployed or takes it all. John asks for your advice and your assessment of the potential for this strategy.

You clearly realize that even with the robust chance of success, John runs the risk of ruin if he deploys all his portfolio to this strategy. The opportunity happens on average 12 times a year requiring full-time attention. John only wants to trade for a maximum of 5 years. You tell John you are not sure that over 5 years this will be very profitable; better to find a good paying job, but John insists. To mitigate, you suggest to divide the portfolio into a number of equal portions, and deploy only one portion at a time to this strategy. The remainder of the portfolio will remain safe in cash not earning interest. For instance John's $10K portfolio if partitioned, say into 10, all investments will always be $1K (no doubling down).

Questions:

1.) John asks in how many parts to partition his portfolio to have at least 90% confidence he will not go broke?

2.) Concerned that 10% chance of going broke per question 1 is still very risky, John asks in how many parts to partition his portfolio to have at least 99% confidence he will not go broke?

3.) John will go with the 99% confidence answer to question 2. Starting with $10K, what is his expected profit after 5 years?

4.) The answer to question 3 is not very comforting and his alternative is to get a $30K per year job. John asks what the probability of success needs to be to earn on average $30K per year?

Note: This is not an exercise in precision. Approximate well reasoned answers will be accepted. Hint: a 5-minute mini-model works wonders - try it!

The answer to the March 2023 Brain Teaser - Your Friend Wants to be a Trader

There were no answers submitted. The way to tackle this problem is creating a mini-model. Start with the number of parts John will subdivide his $10K initial trading capital, and then with random numbers simulate each successive outcome over 5 years, i.e., 60 monthly periods. Each month if John wins he adds a unit, or subtracts if he loses, with the given 67% Prob Success. Copy column over as many individual trails and summarize averages for frequency of the portfolio going bust. For question 1 the

portfolio goes bust 48% of the time for a partition of 1 (going full $10K), 25% for a partition of 2 (going $5K), 12% for 3 ($3.3K) and 6% for 4 ($2.5K). Hence at a 90% confidence level 4 is the answer. For Q2 keep going, 5, 6, 7 until you get 0.8% bust for 7 partitions ($1.4K at risk each trade), i.e., 99% confidence level. For question 3 sum up the expected profit for Q2 over the 60 periods, which is $29K over 5 years. But John wants to make $30K per year, i.e., $150K over 5 years, this requires a higher probability of success. Restart by goal-seeking partitions for higher probabilities to increase profit, reaching 3 partitions in the 80% range and then finetune to 88% chance of success to make a total $150K over 5 years. Much higher than the initial 67%; utterly unrealistic. It would be much more productive for John to seek employment as opposed to trading.

The model can be accessed in the link below with the setups in various tabs to address each question. Note this is a probabilistic mini-model, hence results from random numbers can move a bit. You can hit key F9 a few times to get a sense of the relative movement.

SDP Mar-2023 Mini-Model

Q1.) John asks in how many parts to partition his portfolio to have at least 90% confidence he will not go broke? Answer: 4

Q2.) Concerned that 10% chance of going broke per Q1 is still very risky, so John asks in how many parts to partition his portfolio to have at least 99% confidence he will not go broke? Answer: 7

Q3.) John will go with the 99% confidence answer to Q2. Starting with $10K, what is his expected profit after 5 years? Answer: $29K

Q4.) The answer to Q3 is not very comforting. John asks what the probability of success needs to be to earn on average $30K per year? Answer: 88%.