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Toggle AI

AI and Advanced Risk Allocation

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As with all investments, your capital is at risk

Wed May 22nd, 2024

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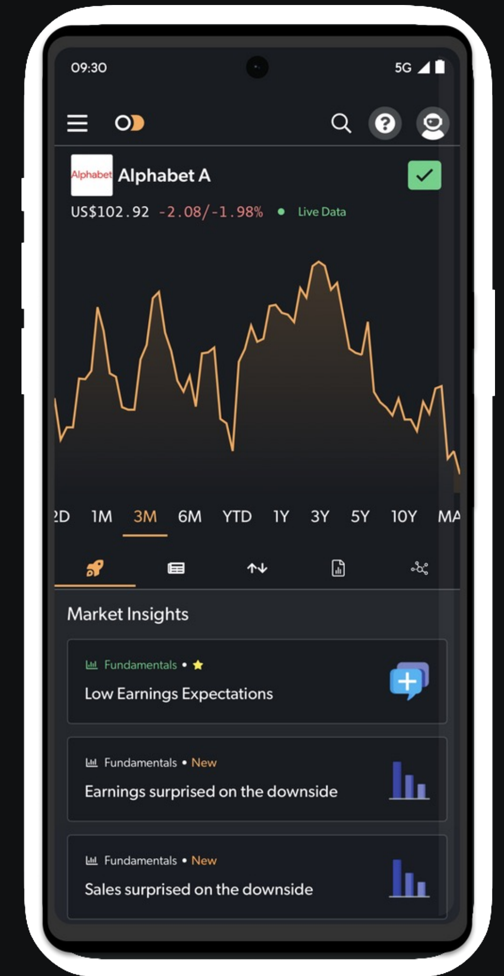
TOGGLE

TURN ON INSIGHTS. TURN OFF NOISE



AI and risk budgeting

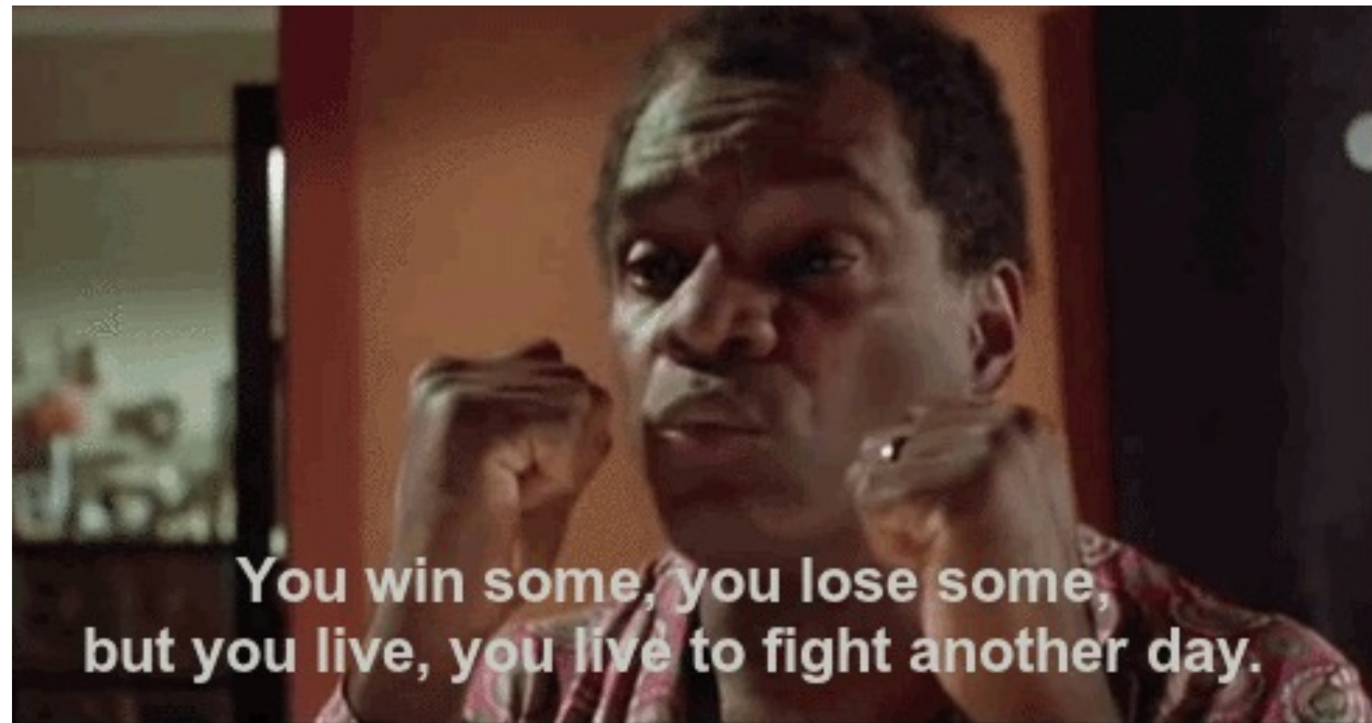
Today we'll talk about the most underrated aspect of investing: risk budgeting

Risk budgeting gets less attention than security selection...

Security Selection

Risk budgeting

...but proper risk budgeting is what keeps you in the game



Risk Budgeting has been studied for a long time

Kelly Formula

13 languages

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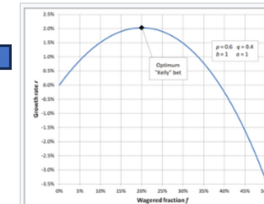
From Wikipedia, the free encyclopedia

In probability theory, the **Kelly criterion** is a formula for sizing a bet. The Kelly bet size is found by maximizing the expected value of the logarithm of wealth, which is equivalent to maximizing the expected geometric growth rate. Assuming that the expected returns are known, the Kelly criterion [can potentially lead to] higher wealth (i.e., the theoretical maximum return as the number of bets goes to infinity). J. L. Kelly Jr, a researcher at Bell Labs, described the criterion in 1956.[1]



Example of the optimal Kelly betting fraction, versus expected return of other fractional bets.

idea was used to explain diversification in investment management.[4] In the 2000s, Kelly-style analysis became a part of mainstream investment theory[5] and the claim has been made that well-known successful investors including Warren Buffett[6] and Bill Gross[7] use Kelly methods.[8] Also see Intertemporal portfolio choice. It is also the standard replacement of statistical power in anytime-valid statistical tests and confidence intervals, based on e-values and e-processes.

[edit]

In a system where the return on an investment or a bet is binary, so an interested party either [gains] or loses a fixed percentage of their bet, the expected growth rate coefficient yields a very specific solution for an optimal betting percentage.

Where losing the bet involves losing the entire wager, the Kelly [formula] is:

$$f^* = p - \frac{q}{b} = p - \frac{1-p}{b}$$

where:

- f^* is the fraction of the current bankroll to wager.
- p is the probability of a [desired trade outcome]
- q is the probability of a loss ($q = 1 - p$).
- b is the proportion of the bet gained with a [desired trade outcome]. E.g., if [trading] $10 on a 2-to-1 odds bet (upon [desired trade outcome] you are returned $30, [earning] you $20), then $b = \$20/\$10 = 2.0$.

...with some interesting results

Where losing the bet involves losing the entire wager, the Kelly is:

[formula]

$$f^* = p - \frac{q}{b} = p - \frac{1-p}{b}$$

where:

- f^* is the fraction of the current bankroll to wager.
- p is the probability of a [desired trade outcome]
- q is the probability of a loss ($q = 1 - p$).
- b is the proportion of the bet gained with a
  $b = \$20/\$10 = 2.0$.

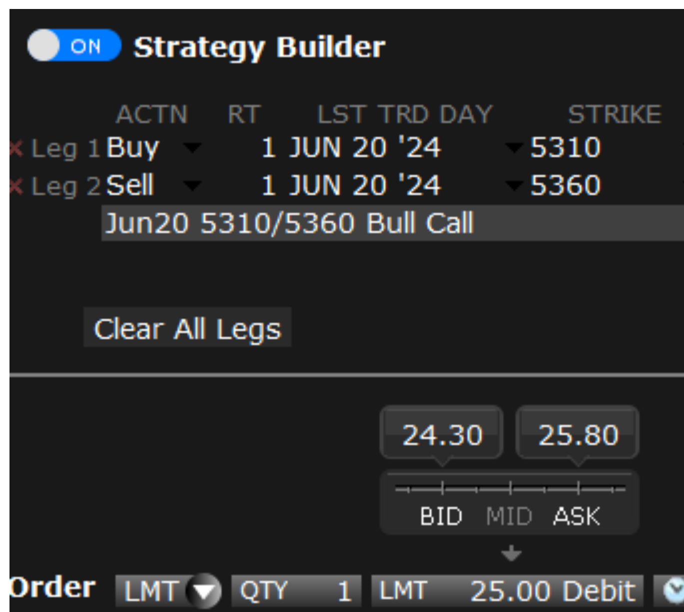
[desired trade outcome]

The concept of budgeting for repeated investing

Expressing an view in a number of consecutive iterations, with varying risk budgets, to mitigate the issues with entry point

The role of spread structures

Spread structures help us express very clear risk-return profiles, and lend themselves well to repeated investing



50.00 wide

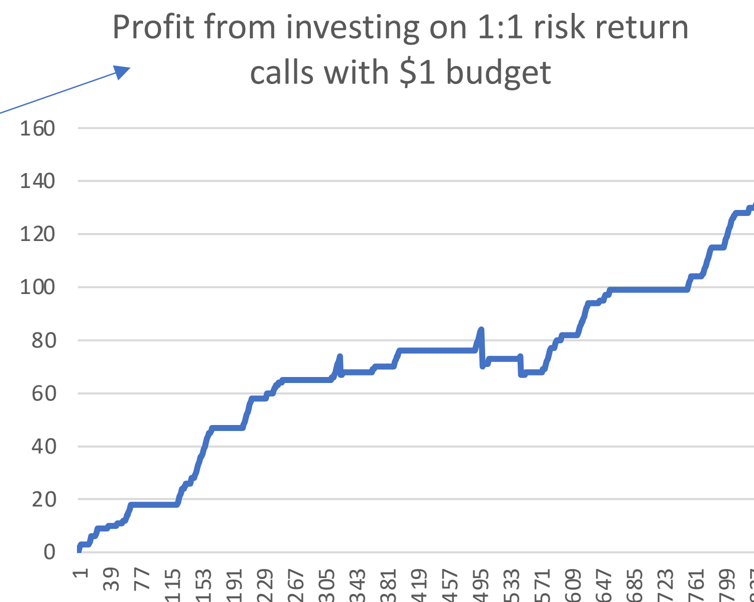
1:1 risk return!

25.00 price

An example of AI work on risk budgeting

Our AI Leading Indicators tell us something about *when* it is convenient to roll a bet

Probability of having a positive 5 day streak in the next 15 days	High Peak Leading Indicator	Low Peak Leading Indicator
High Toggle Leading Indicator	75%	68%
Low Toggle Leading Indicator	55%	48%



This works on all horizons

From intraday to 6-month options, you can apply the same philosophy

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Thank you

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TURN ON INSIGHTS. TURN OFF NOISE

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