

# Kelly Criterion + Lessons from Pro Poker

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Presented to On Deck Investing

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# About Me

Poker: Played 2MM hands over 16 years (10 years semi/FT pro)

- Ranked in top 20 online cash game players in the world (2011)

Forcing Function: Peak Performance Architecture

- Train investors/executives to maximize personal/professional outcomes
- Offer a group class 2x/yr: [teamperformancetraining.com](https://www.teamperformancetraining.com)

Investing

- Normal: Public markets, VC/PE, collateral loans, crypto
- Not Normal: Staking poker/DFS, random bets

# Kelly Criterion Formula

$$\text{Sizing} = \frac{\text{Edge}}{\text{Odds}} = \frac{\text{Expected Value}}{\text{Odds}} = \frac{(\text{Odds} * \% \text{ Win}) - (1 - \% \text{ Win})}{\text{Odds}}$$

\*Odds = Odds received from the betting counterparty

\*Sizing = % of bankroll to bet for Full Kelly, multiply by 0.3 to 0.5

Bet > 0.3Kelly (50% profit / 10% variance)

Bet < 0.5Kelly (75% profit / 25% variance)

# Kelly Criterion Example

Coin Flip (50% heads), offered 1.5/1 on heads

$$\text{Sizing} = \frac{(\text{Odds} * \% \text{ Win}) - (1 - \% \text{ Win})}{\text{Odds}}$$

Odds

$$\text{Sizing} = \frac{[(1.5 * 0.5) - (1 - 0.5)]}{[(1.5 / 1)]} = \frac{0.75 - 0.5}{1.5} = \frac{0.25}{1.5} = 16.6\%$$

(Half Kelly = 8.3%)

# 2020 Election Bet Case Study

TX — Trump to win ; NH — Biden to win

Data:

- 2016 Results (TX +10%, NH +0.4%)
- 2020 Polling (TX +4%, NH +8%)
- Demo shift (TX Latino +15%, NH +20% new voters: younger, minority)
- Early voters (TX +10%, NH +16%), larger than expected turnout

# 2020 Election Bet Case Study

TX — Trump to win ; NH — Biden to win

Odds — -350 or 1 to 3.5 (78% implied odds of winning)

My Estimate (Upper Bound) — -900 or 1 to 9 (90% implied odds of winning)

My Estimate (Lower Bound) — -500 or 1 to 5 (83% implied odds of winning)

# Bet Sizing Results

Bet at least (0.3Kelly, 83% probability): 7% of bankroll

Bet less than (0.5Kelly, 90% probability): 27% of bankroll

- Negative correlation of bets acts as a pairs trade, deviation is offset
- Actual: I bet 0.5Kelly at Lower Bound = 11% of bankroll each, 22% total

# Kelly Criterion Implications

- Kelly represents the *limit* of rational bets
  - It does not calculate probabilities, payoffs, or tell us how much we actually should bet
- Account for:
  - Edge uncertainty (assume you will overestimate)
  - Level of control over outcomes
  - Information reliability
    - Source
    - Noise
  - Return distribution
    - Variance
    - Power law
  - Portfolio of bets (seeking non-correlation)
  - Opportunity set / Opportunity cost
  - Risk tolerance



# Resources on Kelly Criterion

- Fortune's Formula — William Poundstone
- A Man for All Markets — Ed Thorp
- Against the Gods — Peter Bernstein
- <https://nickyoder.com/kelly-criterion/>

## Other topics:

- Decision making bookends
  - Conducting Pre/Post-Mortems
  - Process-orientation
- Inner game
  - Cultivating and trusting intuition
  - Avoiding tilt / installing guardrails
  - Maximizing psychological capital
- Peak performance
  - Pre/Post Session routines
- Cultivating deal flow
- Play to Win [<https://www.forcingfunction.com/articles/play-to-win>]

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