

Martingale vs Fixed-Fractional Betting

Conditions

- All bankrolls start at £10,000 (100u)
- Simulations contain 500 games and are ran 10000 times (5,000,000 total games)
- 1 round = 1000 simulations
- Fixed-Fraction: 2% of bankroll = average martingale bet
- Martingale: £100 bet (1u)
- Minimum table bet: 1u
- Maximum table bet: 40u

Results

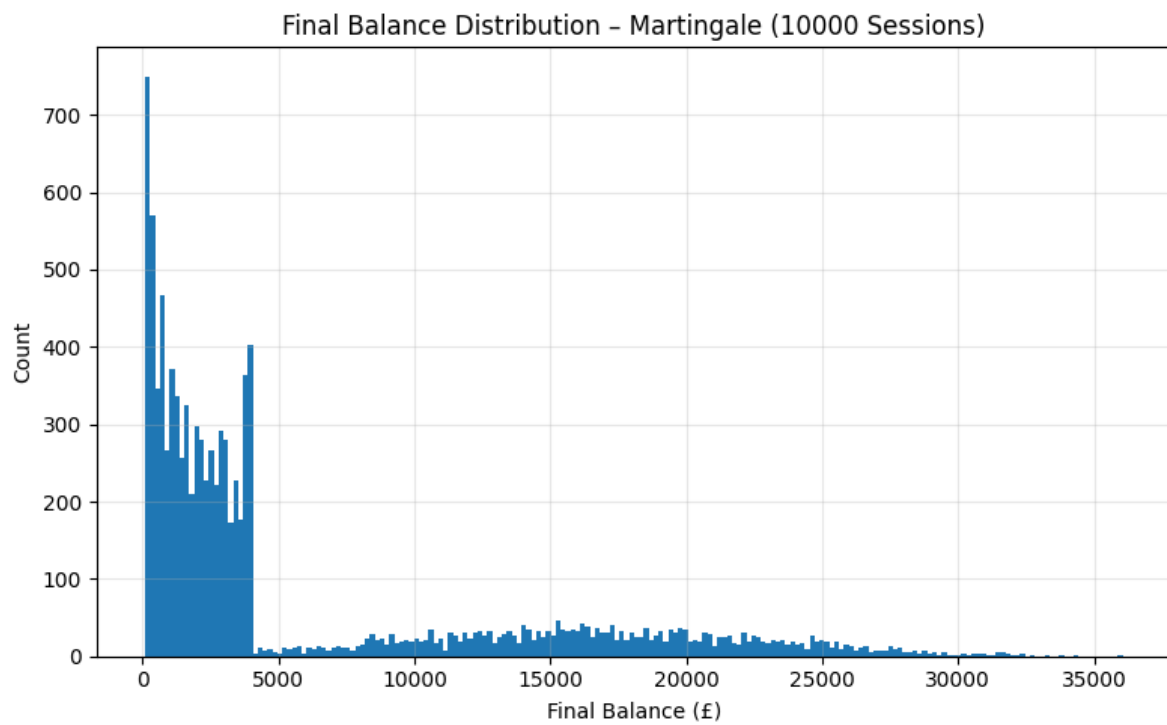
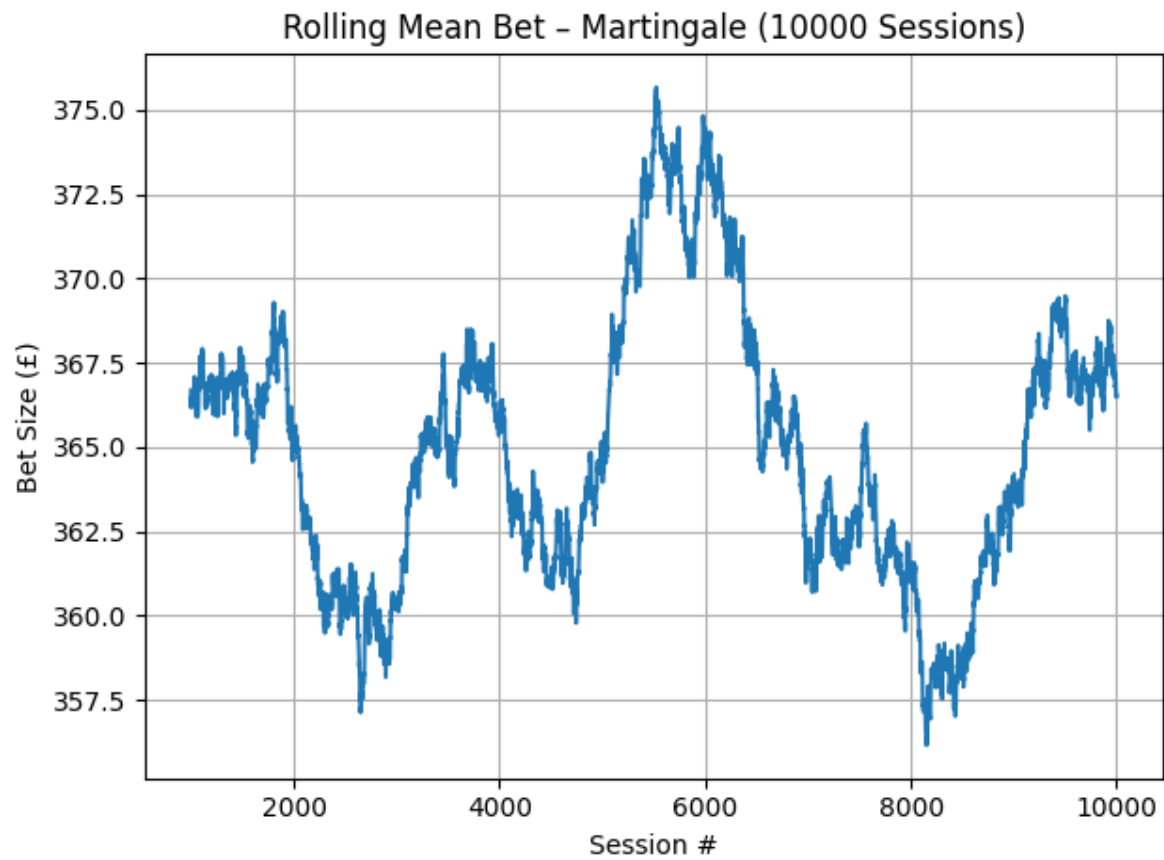
Metrics	Martingale	Fixed-Fractional
EV per session (%)	-38.65	-43.21
Loss per 100u (u)	15.44	6.29
Ruin per session (%)	70.06	0.95
Avg drawdown (%)	70.61	52.26
Sharpe ratio	-0.508	-1.558
VaR95(%)	-98.00	-81.38
CVaR95 (%)	-98.55	-89.77

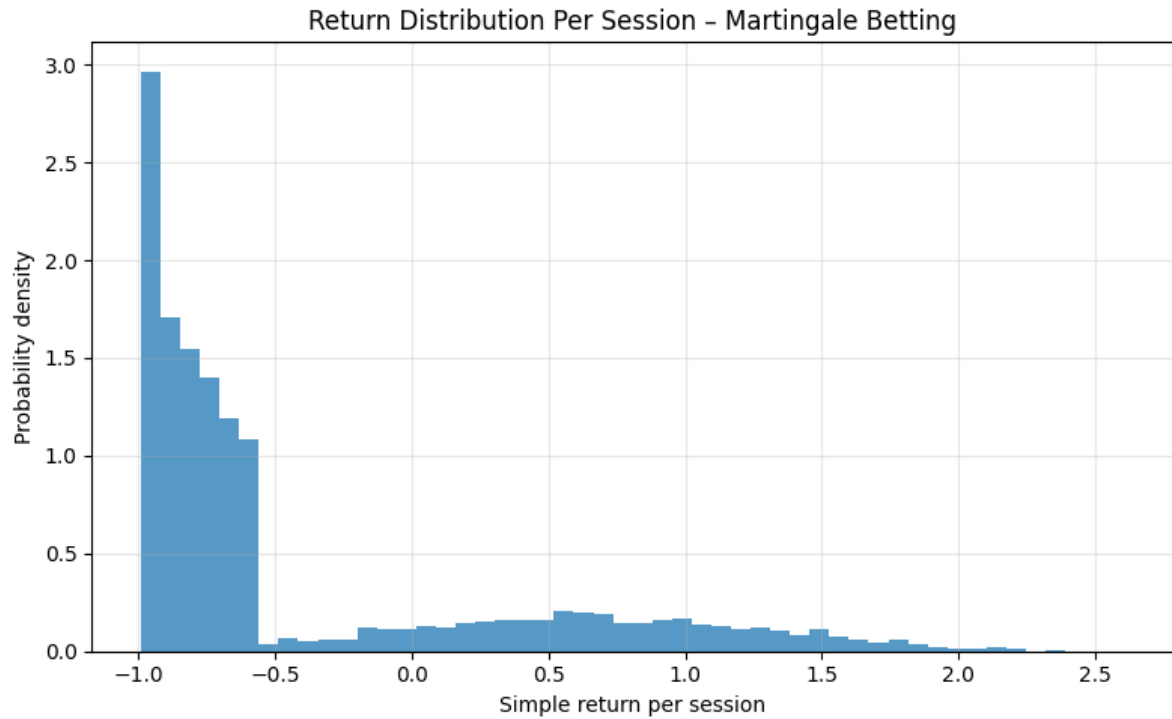
Martingale: 95% CI for loss per 100u staked: [14.997u, 15.883u]

Fixed-Fractional: 95% CI for loss per 100u staked: [6.20u, 6.37u]

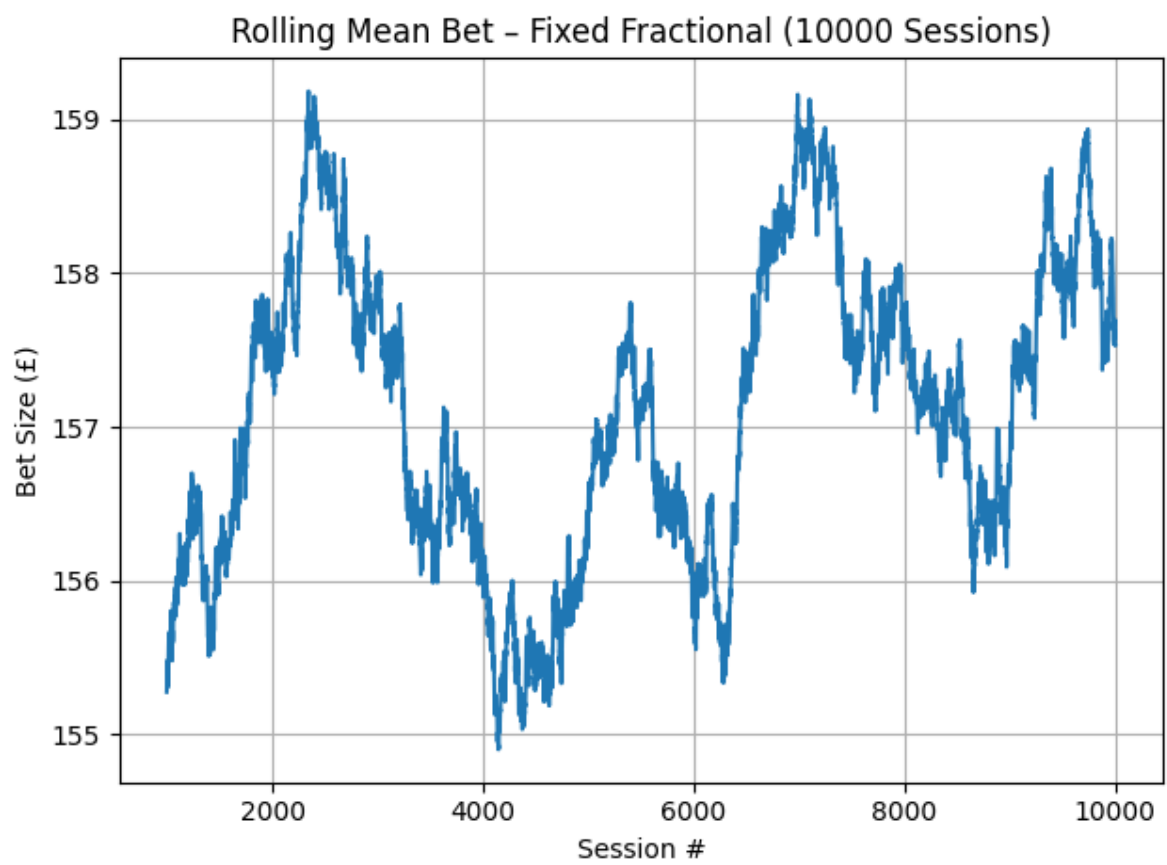
Graphs

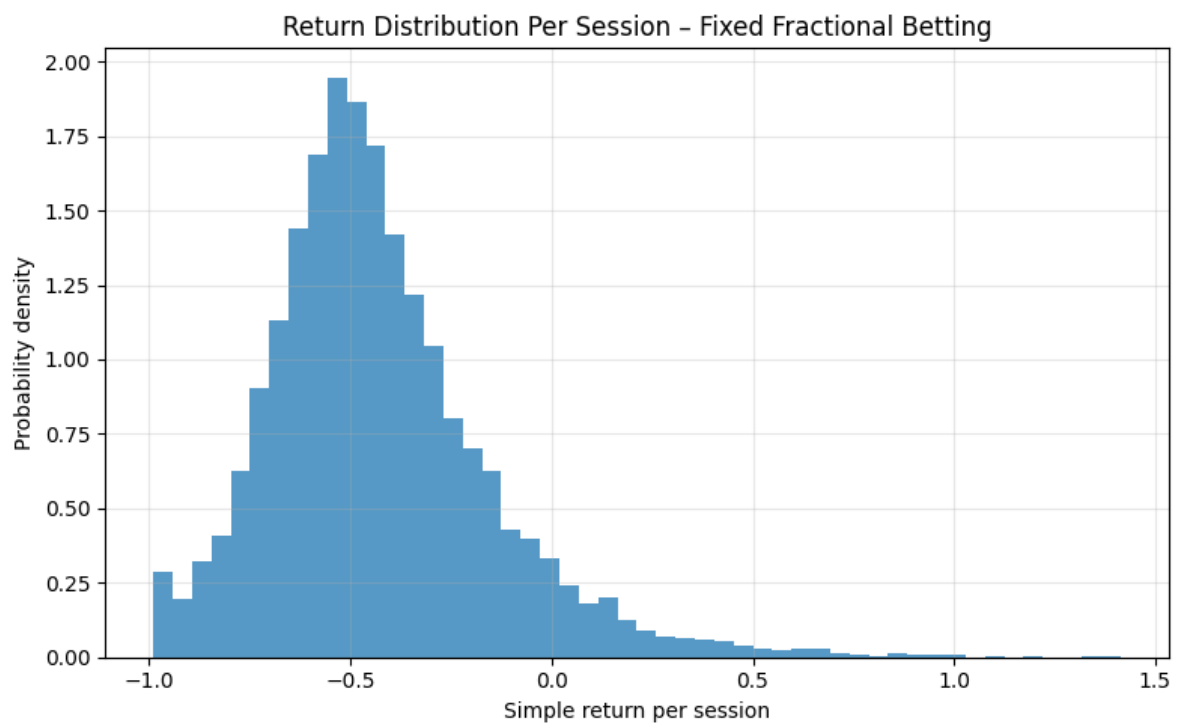
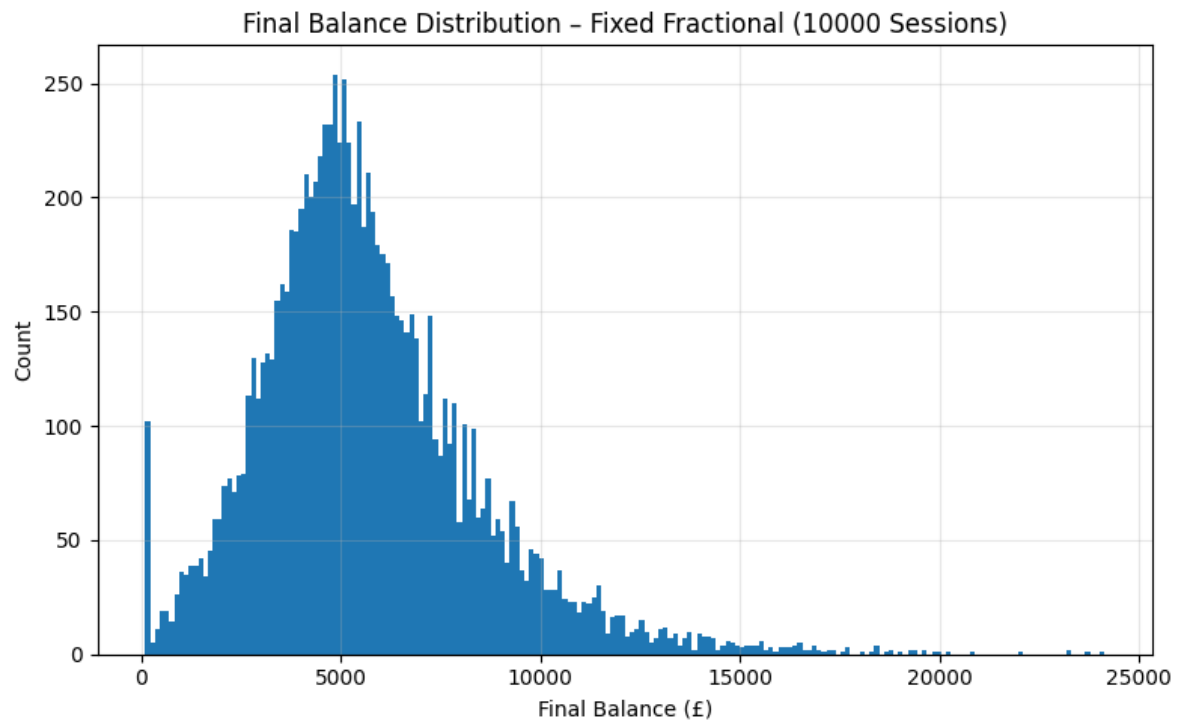
Martingale





Fixed-Fractional





Report

Project overview

I built a Monte-Carlo blackjack simulator to compare two bet sizing approaches: Martingale vs Fixed-Fractional. Same rules, same first-hand stake, different risk profiles. The goal was to measure risk, ruin, and how returns behave when your sizing rule changes.

How I modelled the game

- Rules: dealer stands on 17 (S17), 3:2 payout on player blackjack
- Player decision rule: a simple “basic-lite” strategy - stand on hard 17+, stand on soft 19+, otherwise hit.
- Mechanics: each hand starts with two cards to the player and dealer; Aces are handled properly (11 -> 1 if needed). If the player busts, the hand ends immediately (no dealer draw).

Conclusion

Fixed-Fractional preserves capital and loses more slowly than Martingale under the same rules and initial stake. Volatility and drawdowns are much lower, and ruin is ~0%, whereas Martingale concentrates risk in rare but catastrophic streaks.