The Economics of FinTech, Lecture 6

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Outline

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Overview

- Background of Robo-Advising
- Kelly Criterion and Goal Based Investing

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Background of Robo-Advising

- As estimated by the U.S. News & World Report (October 5, 2017), as of October 2017 robo-advisors had $224 billion in assets under management. For example, Vanguard Group and Charles Schwab Corporation had about $83 billion and $19 billion in assets under management related to robo-advising in September 2017, respectively (Forbes Magazine, September 12, 2017).
- See https://personal.vanguard.com/us/FundsInvQuestionnaire
- The differences between traditional advising and robo-advising
  - A robo-advisor must effectively identify clients' risk profile based on simple inputs of clients, as the clients may have no idea about utility functions.
  - A robo-advisor must provide recommendations that are consistent with the common investment wisdom.

Examples of robo-advising

- Kelly criterion: Consider *log* utility; assume homogeneous risk profile; dynamic; time horizon may be relevant for models with stochastic volatility or stochastic returns.
- Goal based investing: Consider the probability of achieving goals; heterogeneous risk profile; dynamic; time horizon may be relevant.
- Dynamic mean variance: Extending mean variance to a dynamics setting; heterogeneous risk profile; dynamic; time horizon may be relevant for models with stochastic volatility or stochastic returns.
- Black-Litterman model: Single period mean variance with Bayesian estimation; heterogeneous risk profile; one period, not dynamic; time horizon is irrelevant.

Outline

Kelly Criterion and Goal Based Investing

- The difficulty of investment (My cousin's husband story, Shiller story)
- A game with equal odds: winning 50% of wager with 55% probability or losing 50% of wager with 45% probability. The expected payoff is $1.5 * 0.55 + 0.5 * 0.45 = 1.05 > 1$, i.e. 5% expected profit per play.

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- Why? Because the distribution is skewed to the right, due to the multiplicative nature of investment.
- Mean is much larger than median

Kelly Criterion and Goal Based Investing

- Kelly criterion, using the logarithm utility to choose the best fraction of the wealth, i.e. max the median.
- See https://www.forbes.com/sites/startswithabang/2017/05/23/how-physicists-used-science-to-beat-the-odds-at-roulette/#344526093c39
- See https://en.wikipedia.org/wiki/Breaking_Vegas
- Merton, any power utility function. Nobel prize 1997.