Multiple goals wealth management

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Goals

I created a customized retirement planning for clients. It maximized the outcomes over multiple, competing goals over the long period. It can meet customers' specific need and improve the engagement.

Difficulty

Long period: customers need to make multiple investment choices at each time for a long period.

Multiple goals: customers need to make balance with multiple competing goals.

Long horizon simulation: investment decisions should rely on the current business cycle.

Problem

Use investor preferences to dynamically make optimal choice of achieving goals and selecting portfolios. One example of optimal choice is at year 5 with wealth $100K, choose goal 1 and portfolio 2.

Three essential inputs

Wealth infusion. Example: paychecks.

Possible portfolios constructed from efficient frontiers.

Cost and utility of multiple goals.

An example of two goals. Cost in thousand dollars.

Time	Goal	Cost	Utility	Note
5	1	0	0	Do not fulfill
5	1	50	1000	Buy a car
10	2	0	0	Do not fulfill
10	2	100	1000	Remodel house

One goal at time 5, first row is not to fulfill the goal. The second row is to fulfill the goal (buy a car) with expense $50K. The utility can be viewed as priority. Here these two goals are equivalent important.

Visualization of results:

Probability of achieving goals under the optimal strategy.

An example of visualization.

Time	Goal	Cost	Utility	Probability (%)
5	1	0	0	10
5	1	50	1000	90
10	2	0	0	70
10	2	100	1000	30

For example, it tells the probability of achieving the goal 1at time 5 is 90%.

Note if the investor finds those goal probabilities does not fit well with their preferences, they may change utility of goals or increase infusion and rerun the algorithm to see if the new results meet their desires.

Methodology Summary

Long horizon simulation

Discretization

Dynamic programming

Demo

Implemented in streamlit.

Input: Planning horizon (years), initial wealth, yearly infusion, upload files of goals.

Output: optimal expected sum of utilities. Probability of achieving goals under the optimal strategy.