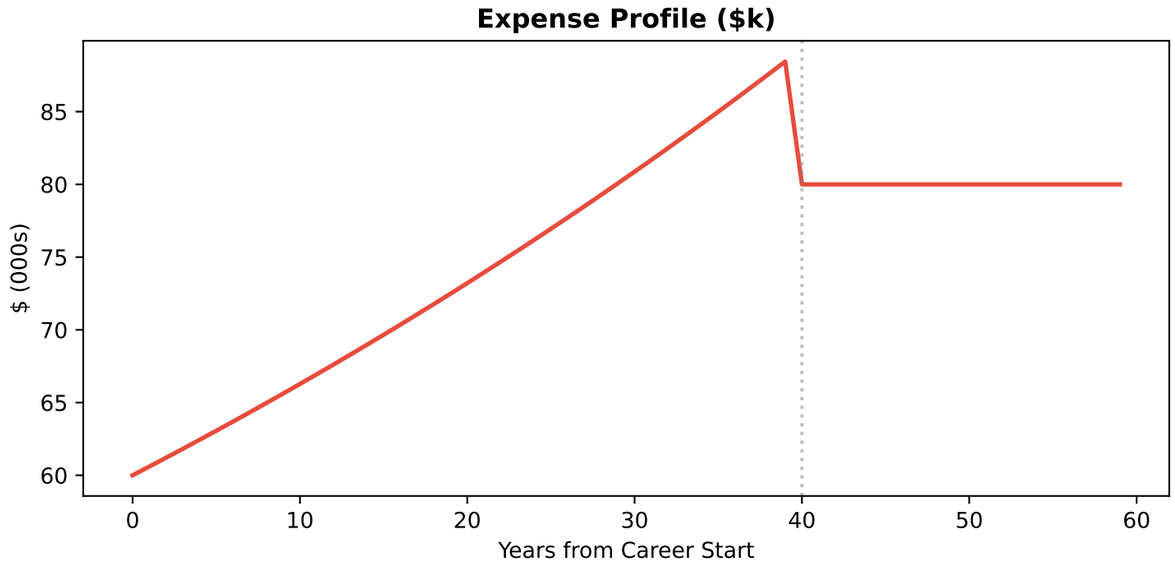
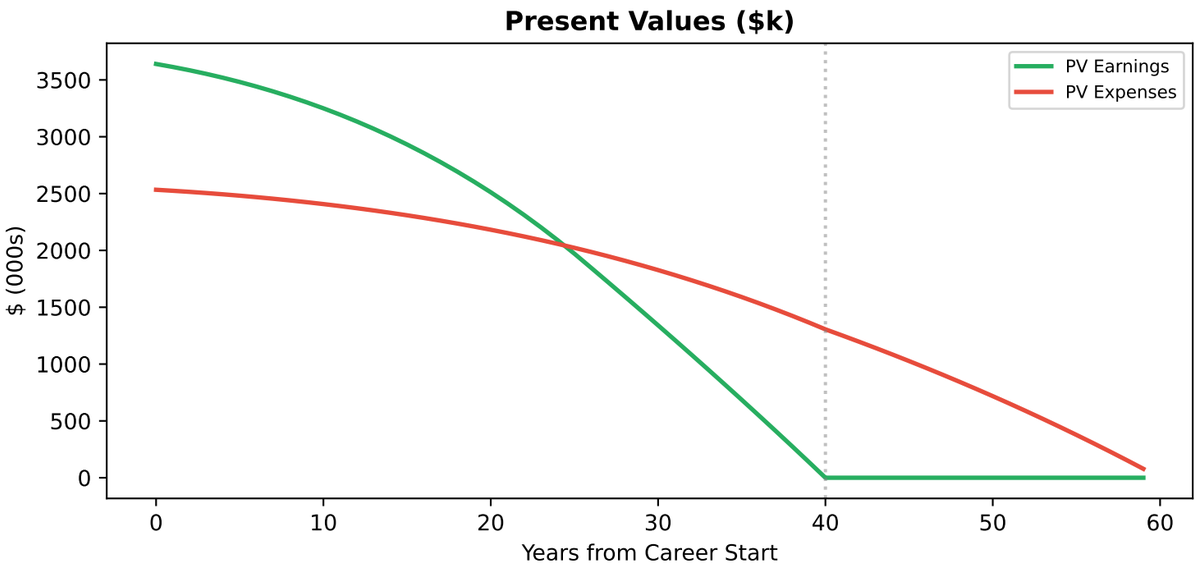
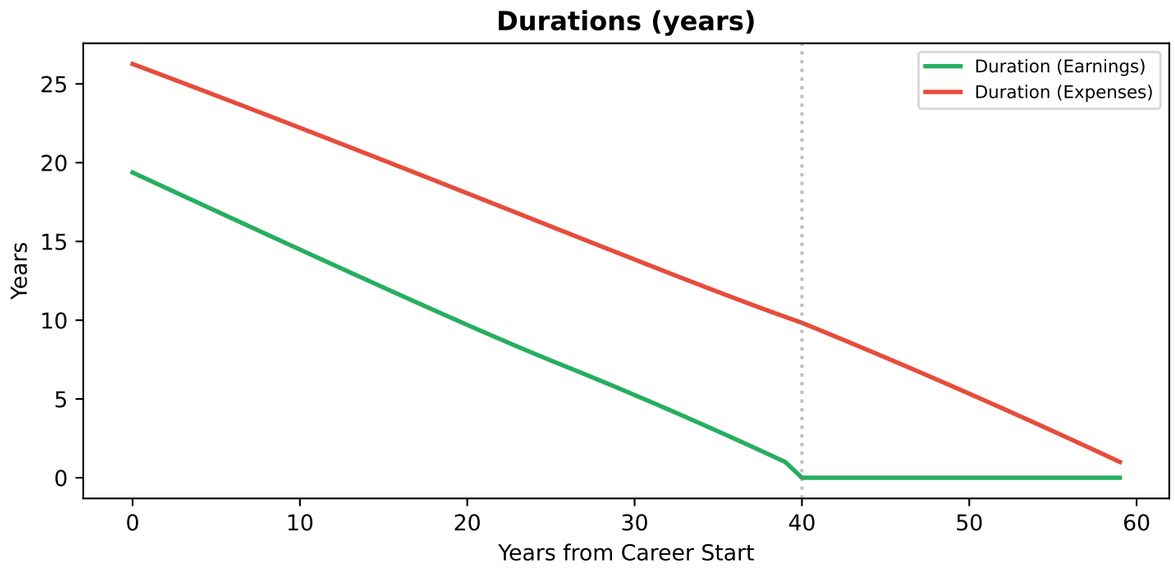
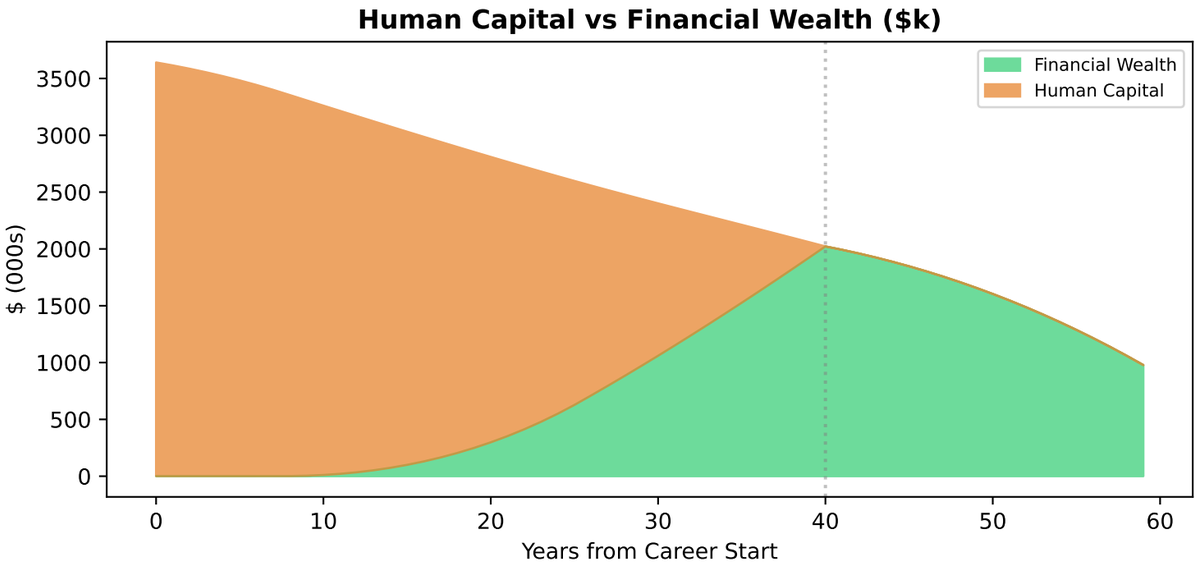
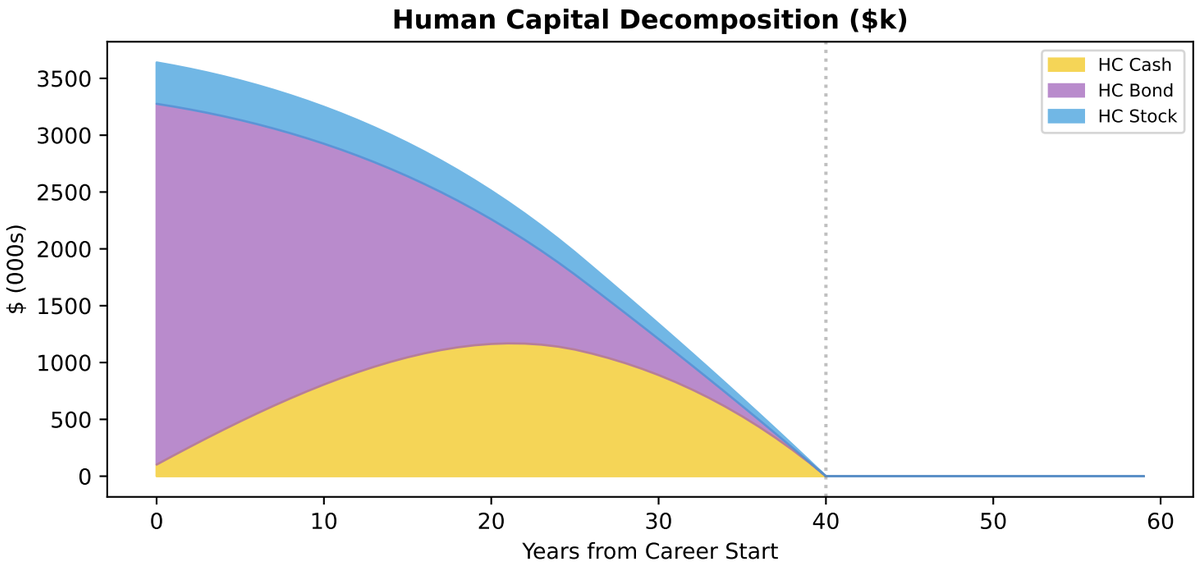
PAGE 1: BASE CASE (Deterministic Median Path)

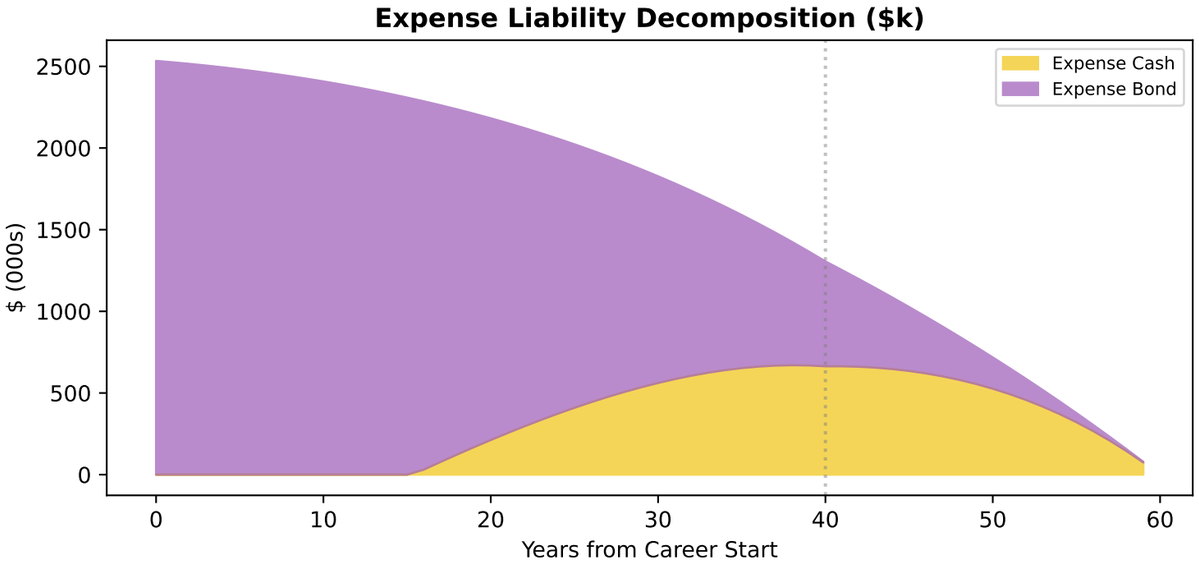


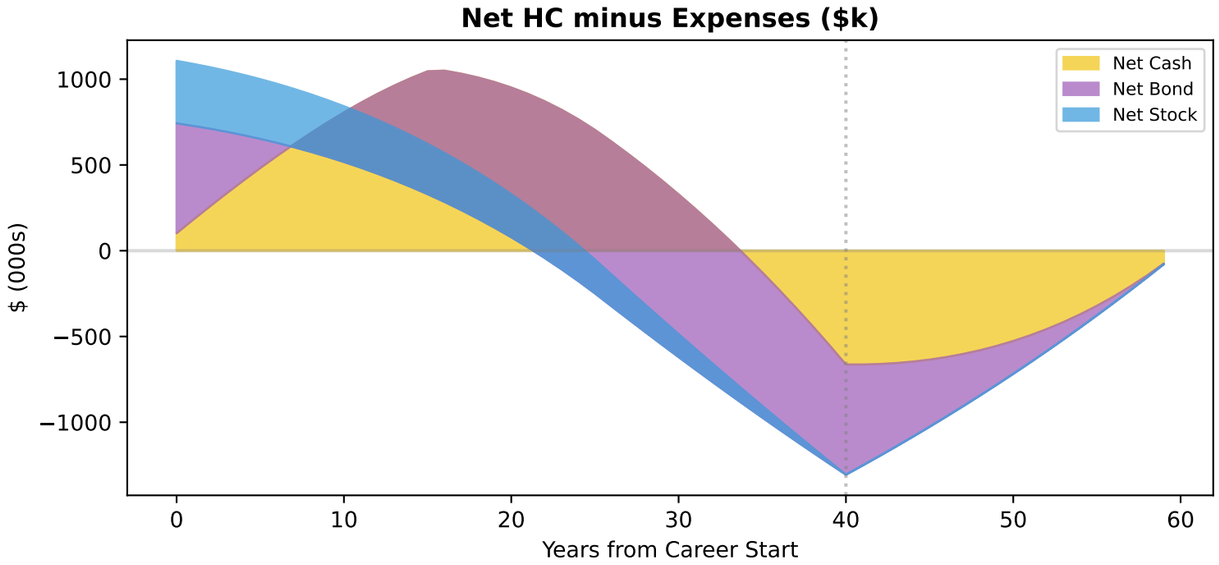


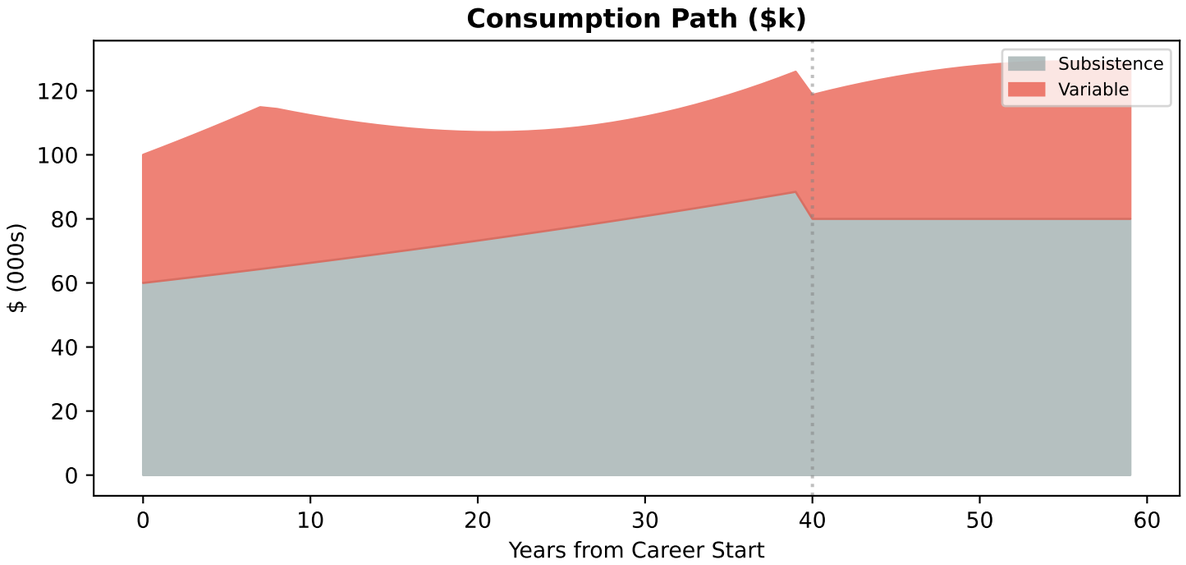


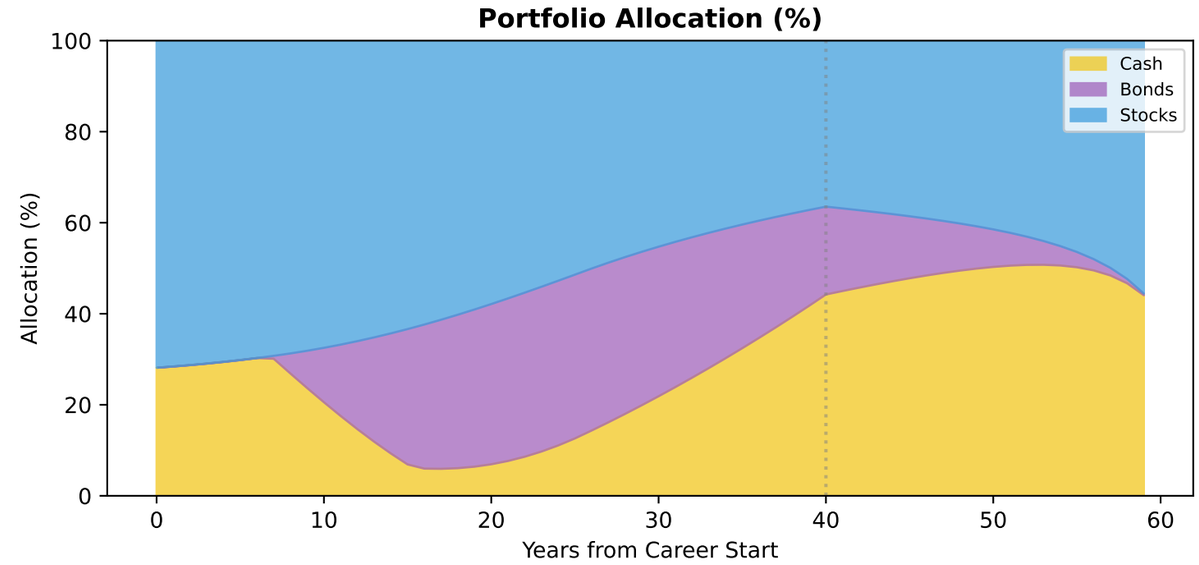




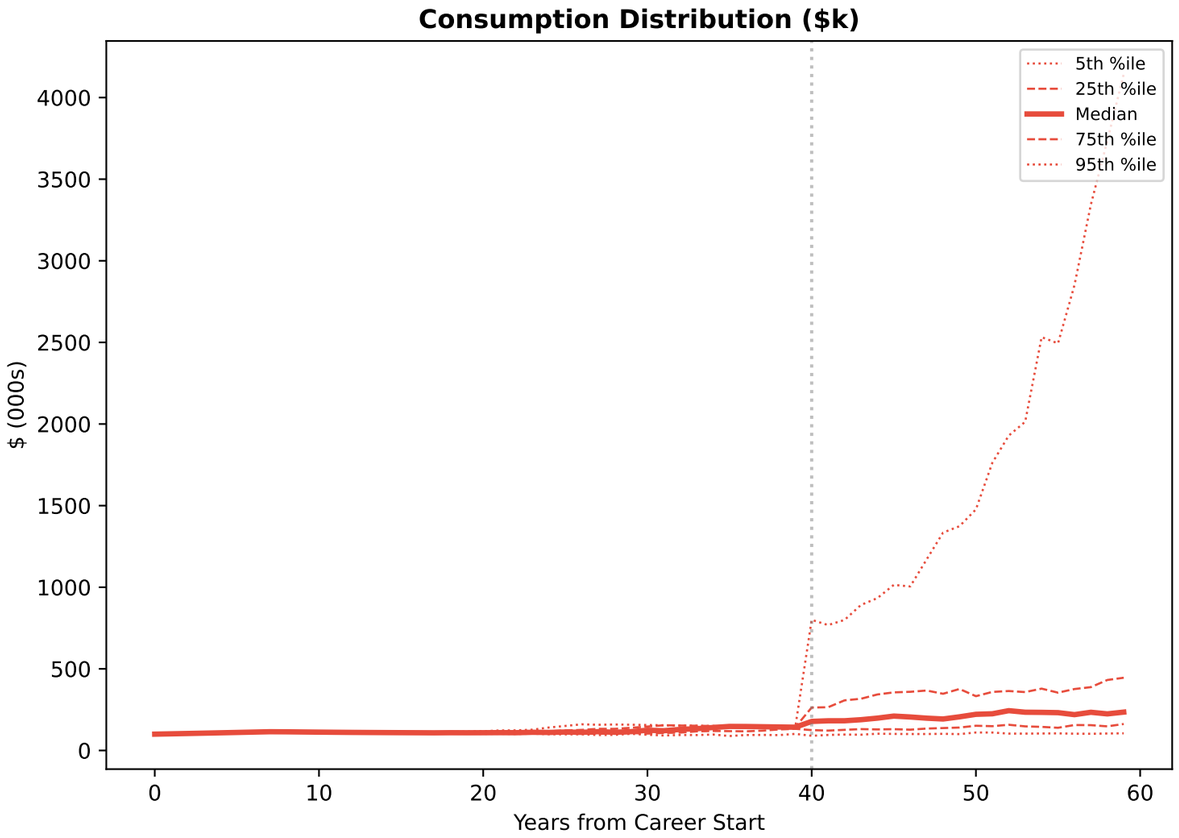


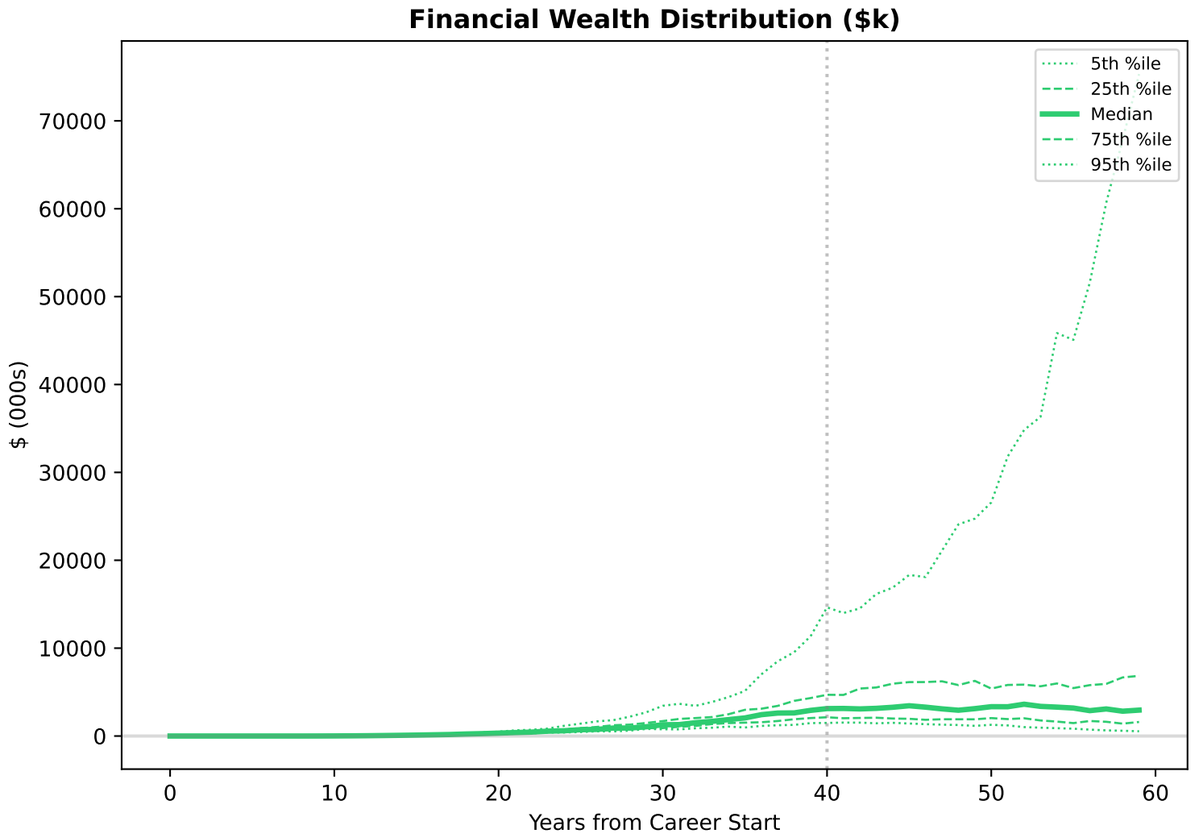


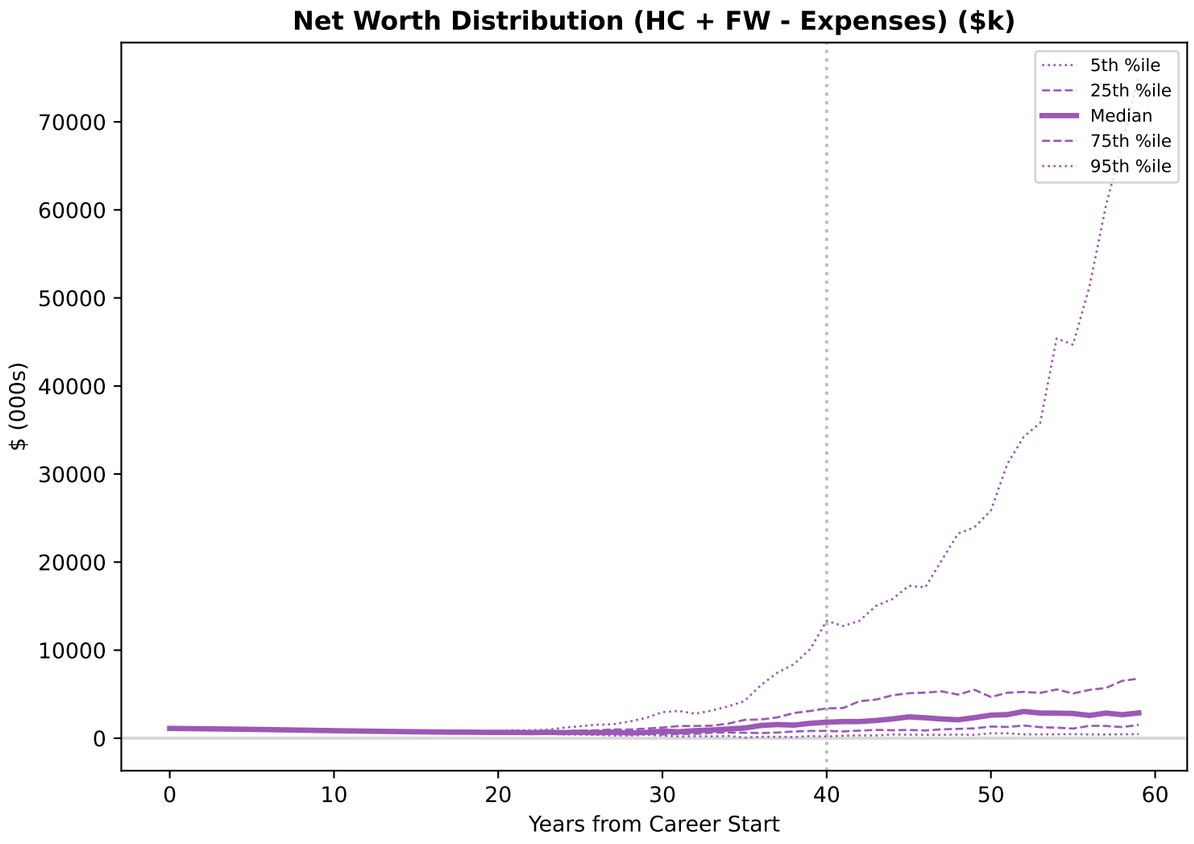




PAGE 2: MONTE CARLO (50 Runs)

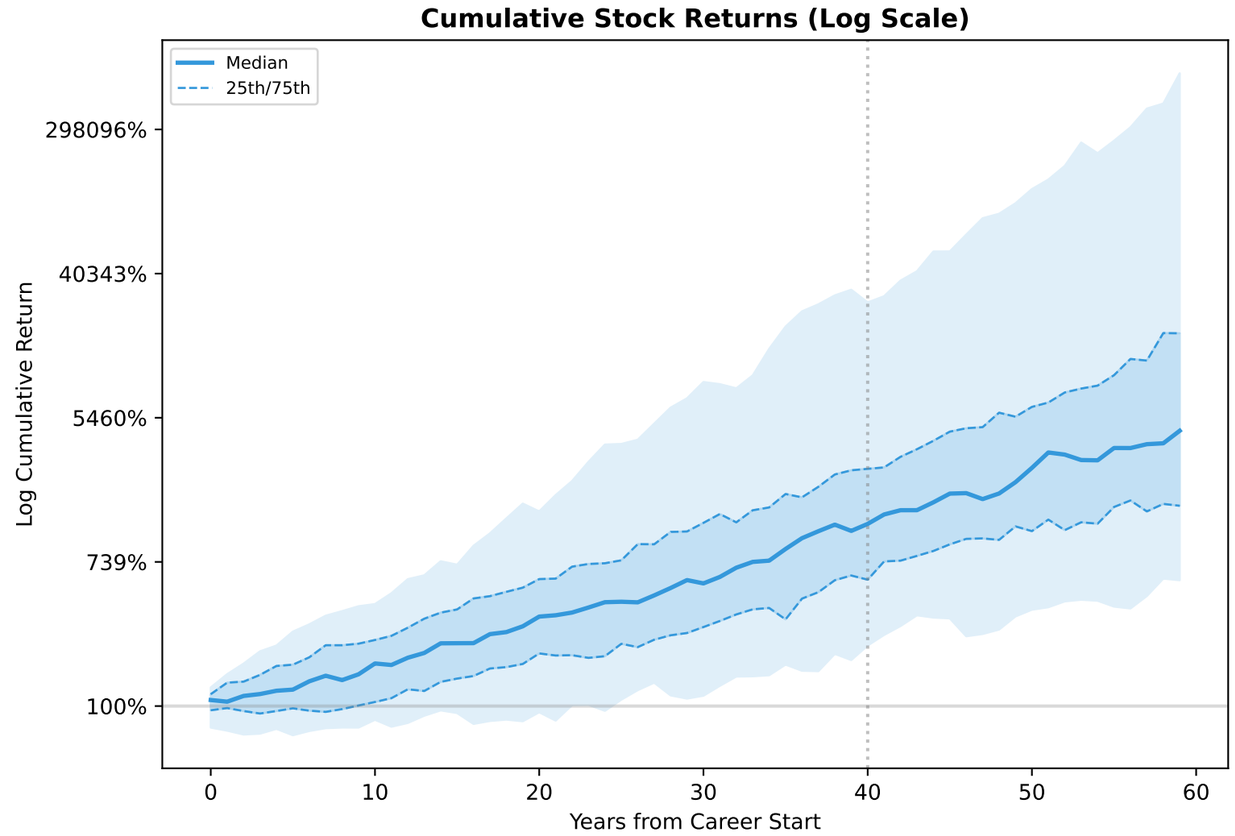


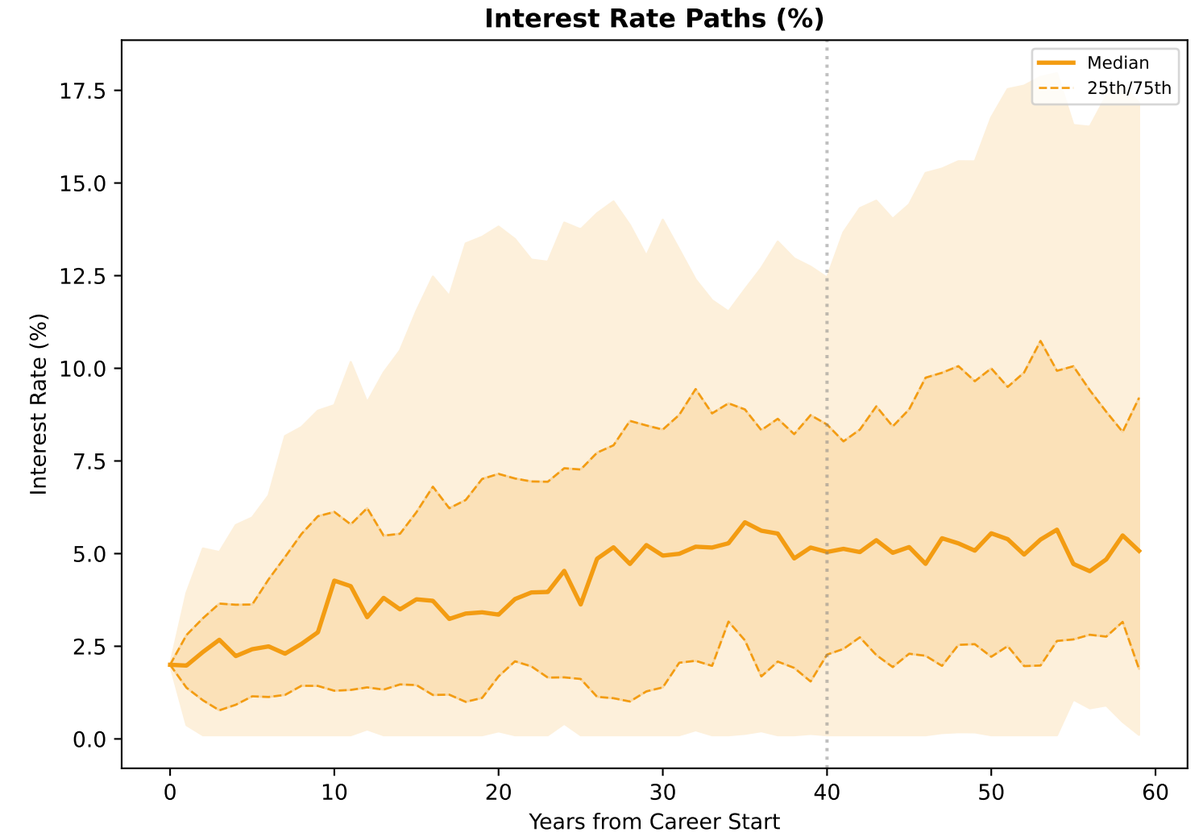




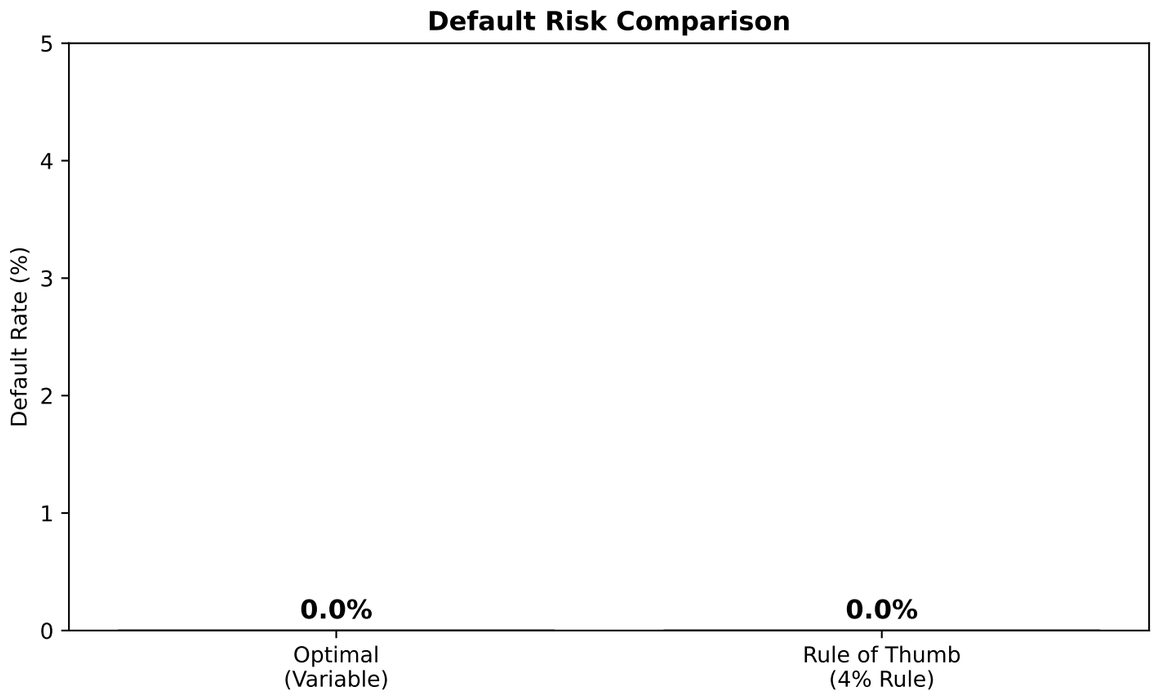
Terminal Values Grid

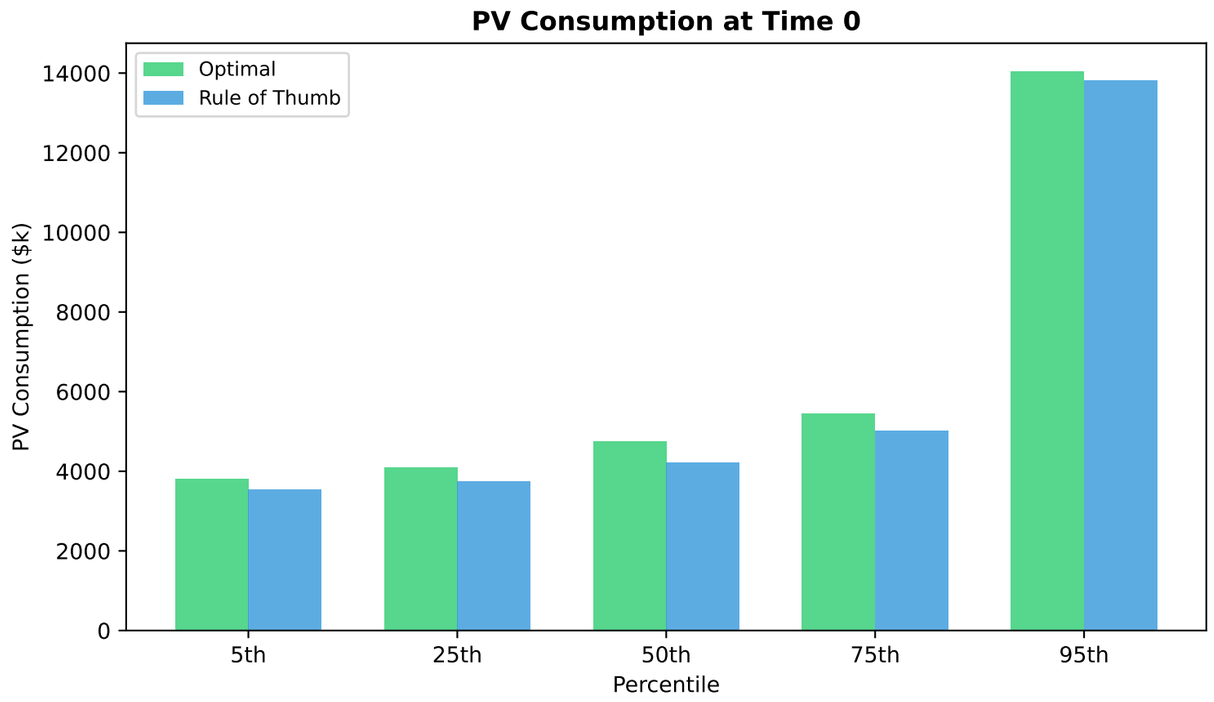
```
Terminal Values at Age 84
==================================================

Financial Wealth ($k):
  5th percentile:  $       542
  25th percentile: $     1,599
  Median:          $     2,949
  75th percentile: $     6,847
  95th percentile: $    75,324

Annual Consumption ($k):
  5th percentile:  $       105
  25th percentile: $       162
  Median:          $       235
  75th percentile: $       446
  95th percentile: $     4,144

Runs depleted (FW < $10k): 0 of 50
Default Rate: 0.0%
```

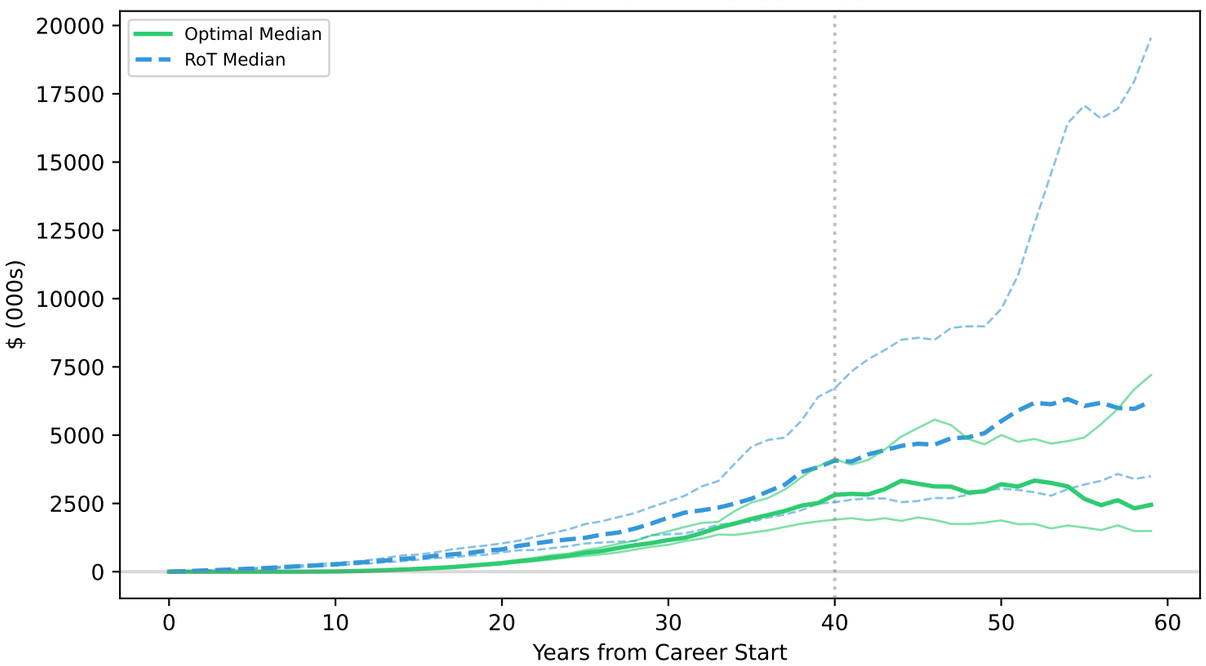


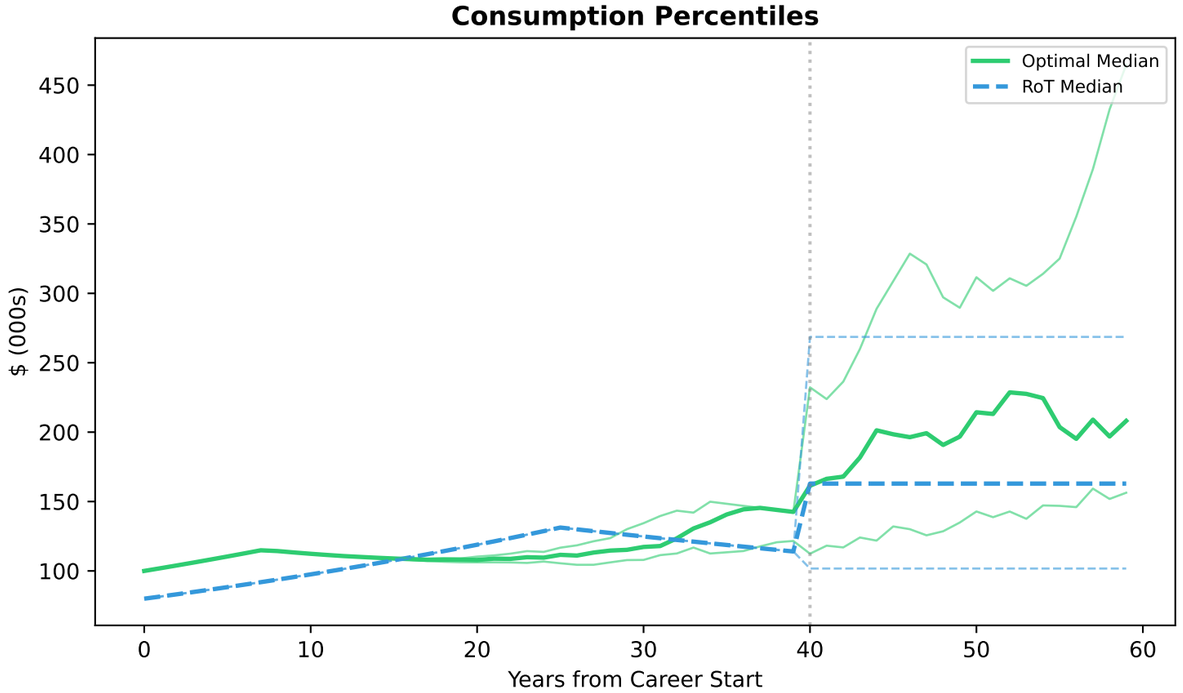


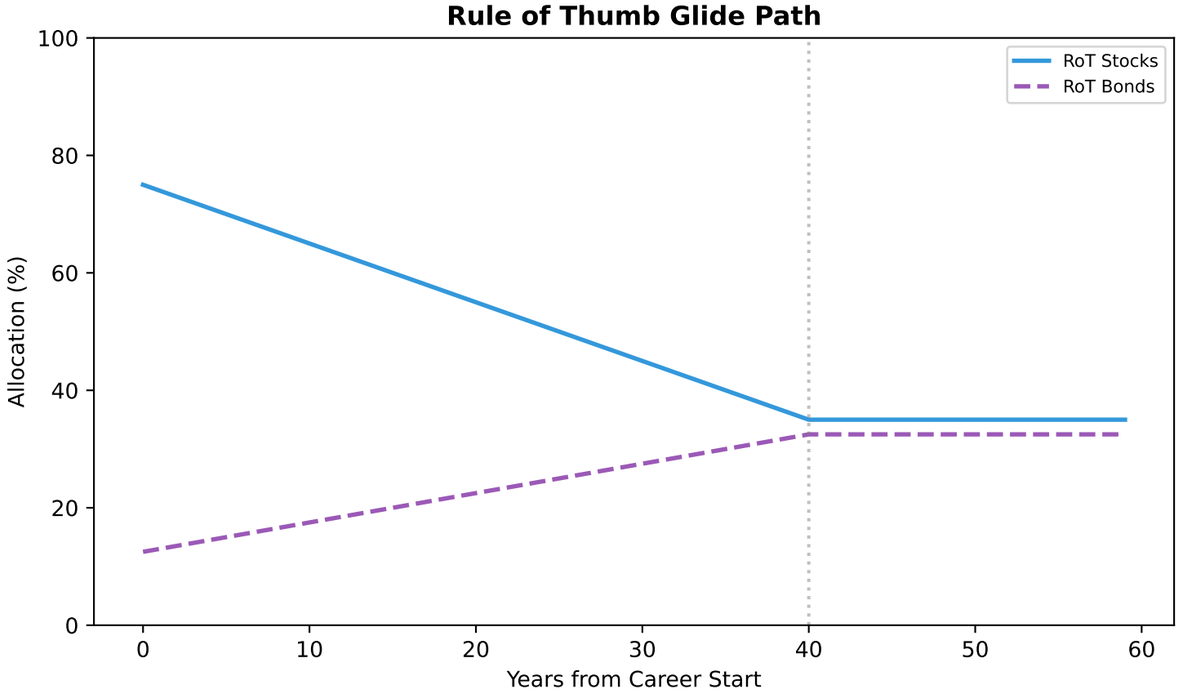
PAGE 3a: TEACHING SCENARIO - Normal Market Conditions





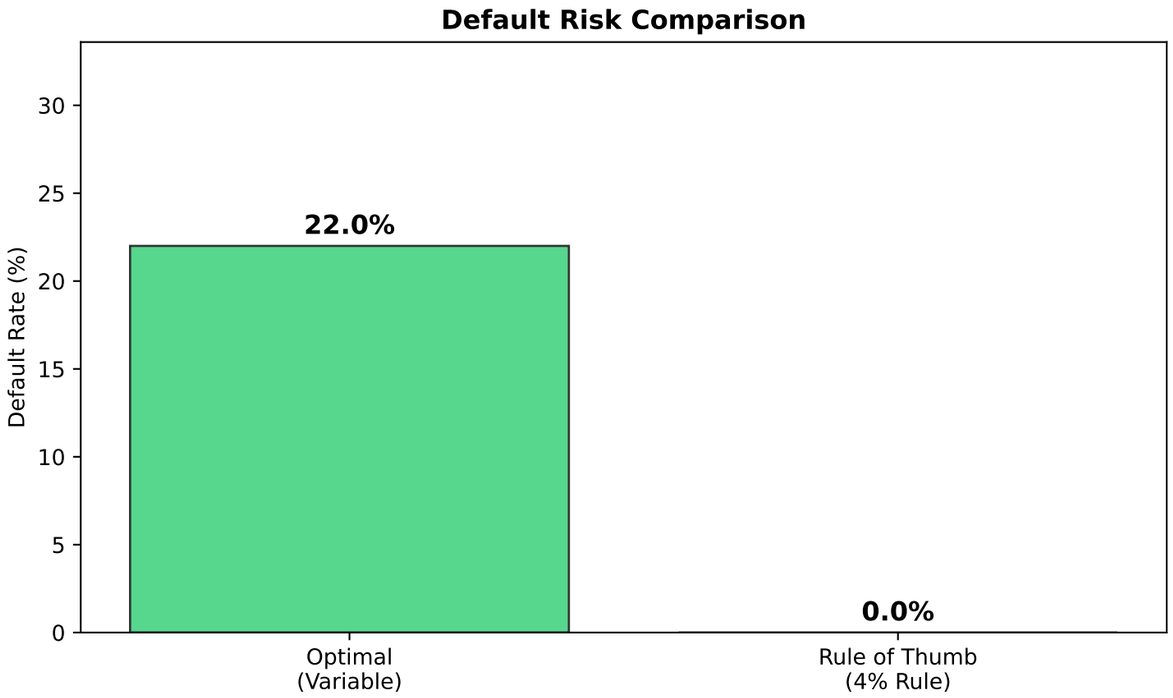


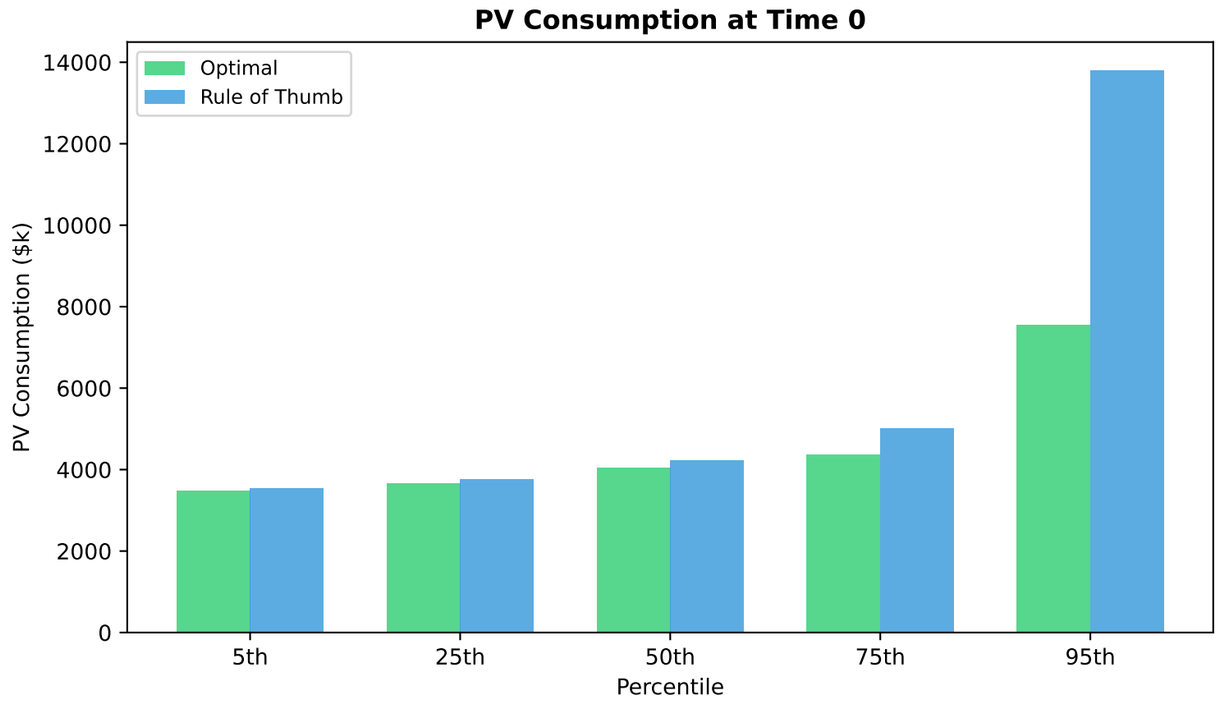


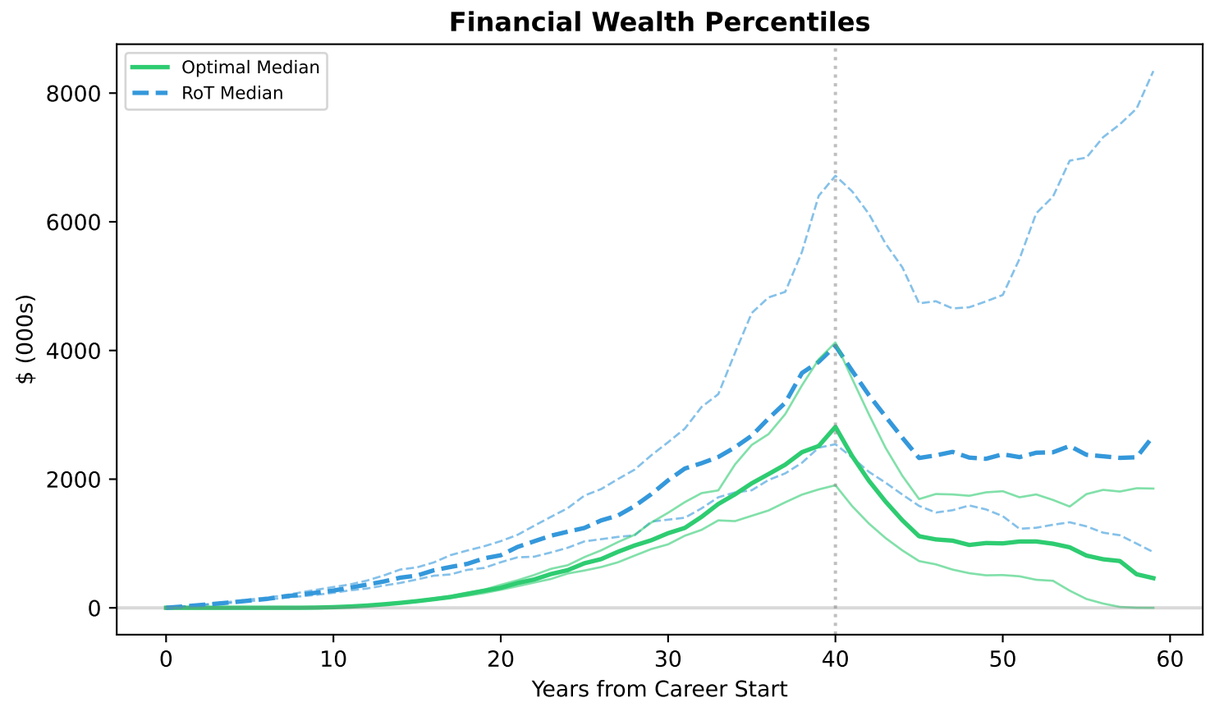


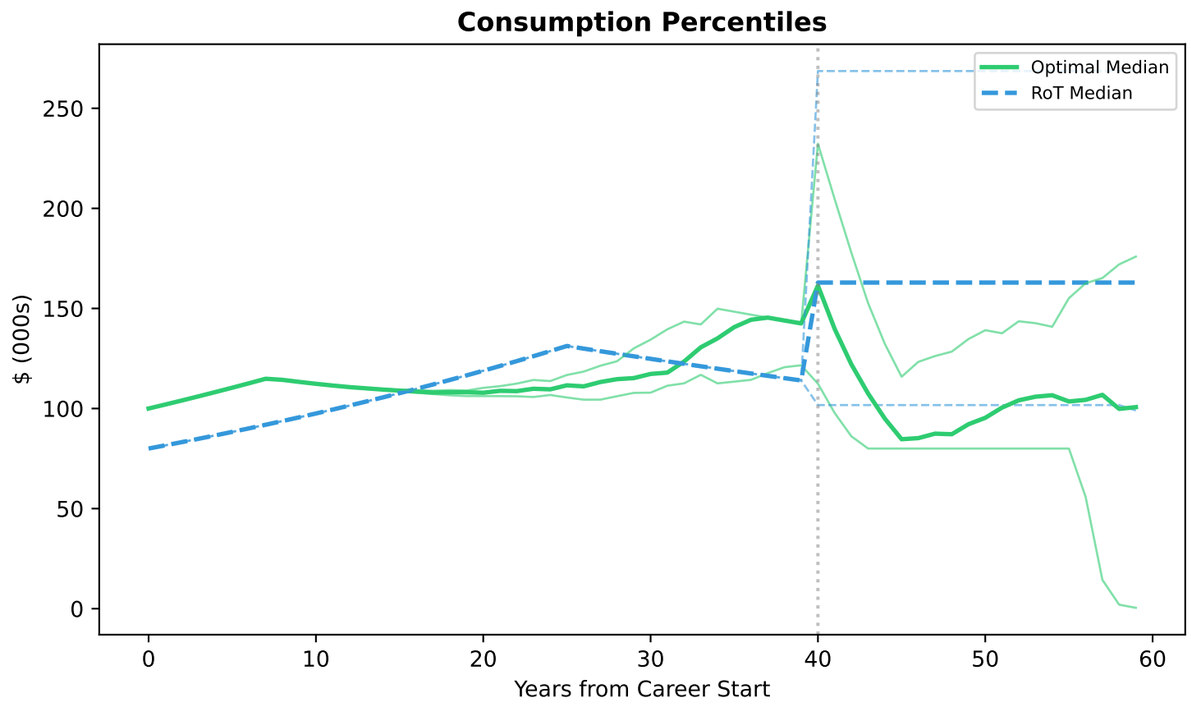

```
Strategy Comparison Summary
================================================

Scenario: Normal Market Conditions

Default Rates:
  Optimal (Variable):        0.0%
  Rule of Thumb (4%):        0.0%

Median Final Wealth ($k):
  Optimal:                $     2,450
  Rule of Thumb:          $     6,232

Median PV Consumption ($k):
  Optimal:                $     4,750
  Rule of Thumb:          $     4,212

Simulations: 50
```

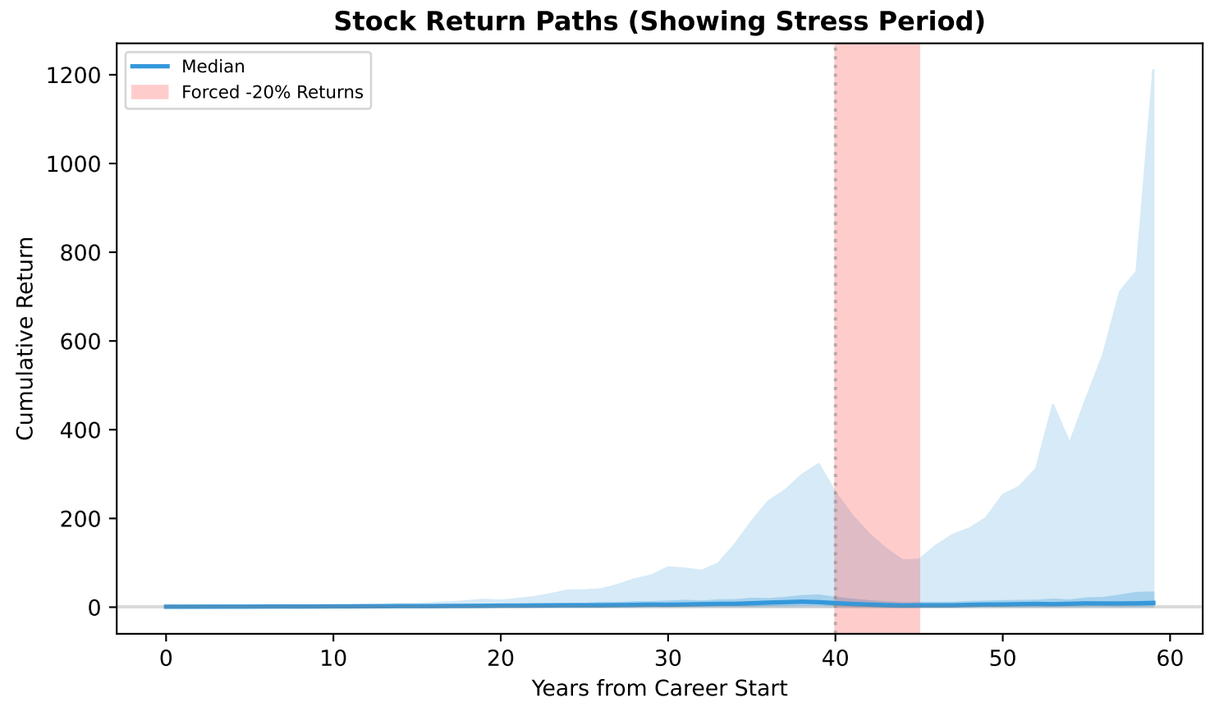
PAGE 3b: TEACHING SCENARIO - Sequence Risk (Bad Early Returns)





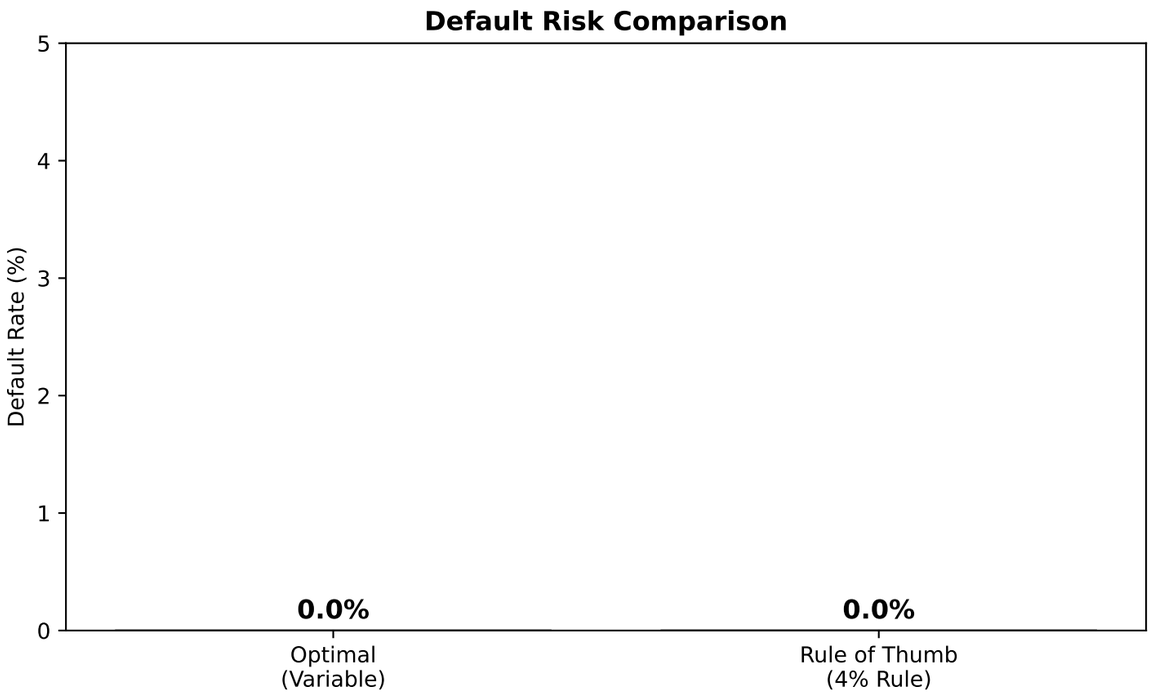


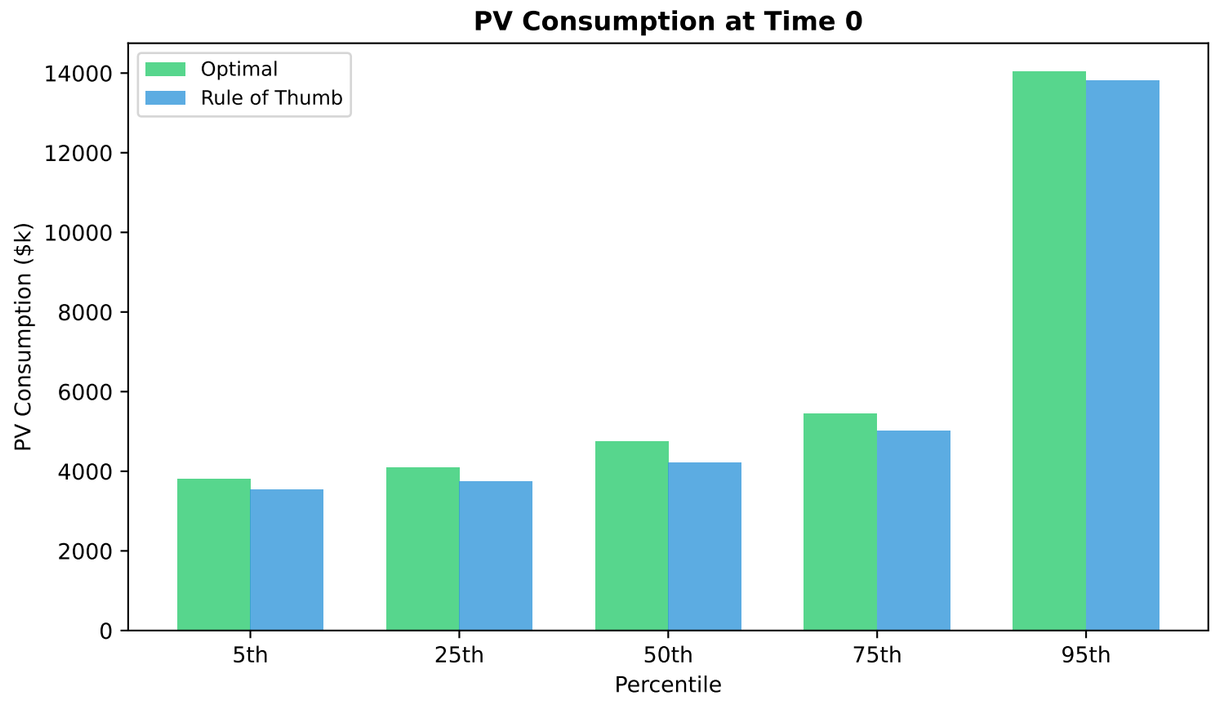


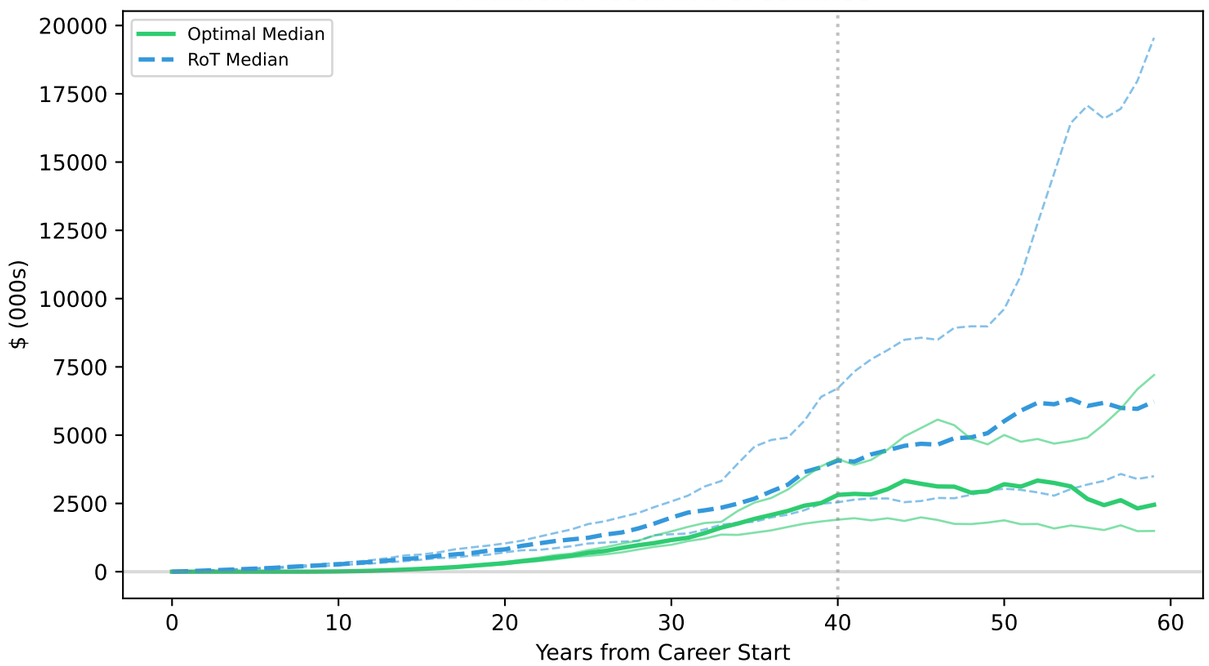


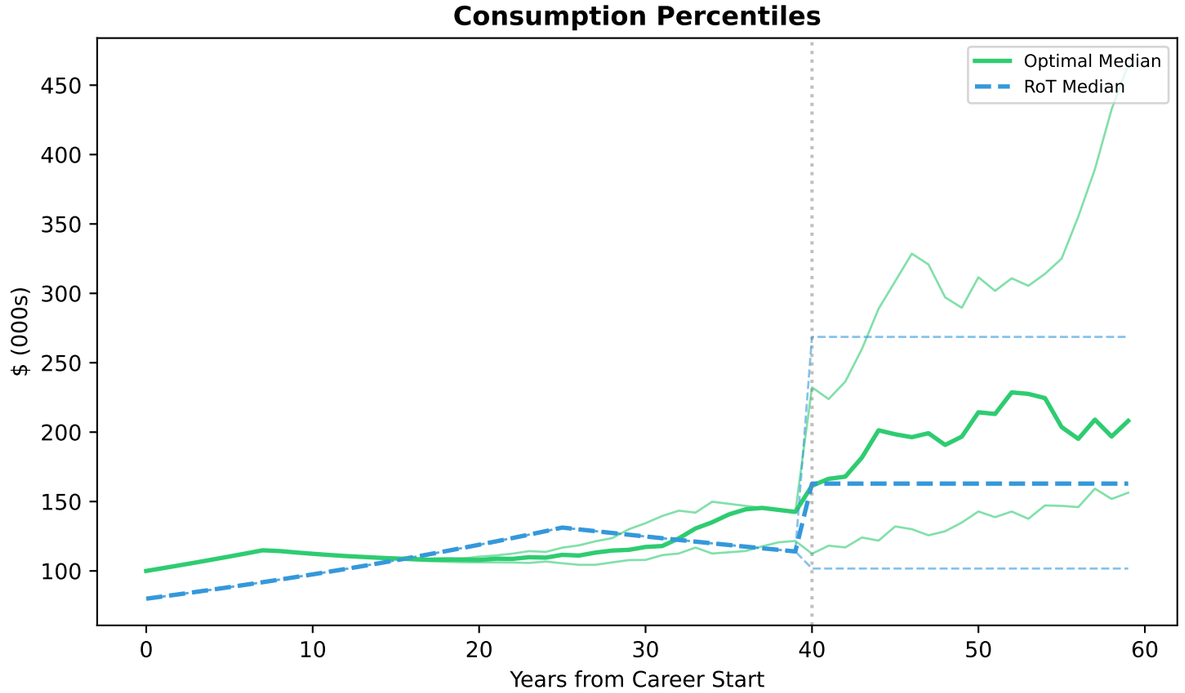

```
Strategy Comparison Summary
==================================================

Scenario: Sequence Risk (Bad Early Returns)

Default Rates:
  Optimal (Variable):       22.0%
  Rule of Thumb (4%):        0.0%

Median Final Wealth ($k):
  Optimal:                $       462
  Rule of Thumb:          $     2,672

Median PV Consumption ($k):
  Optimal:                $     4,038
  Rule of Thumb:          $     4,212

Simulations: 50
```

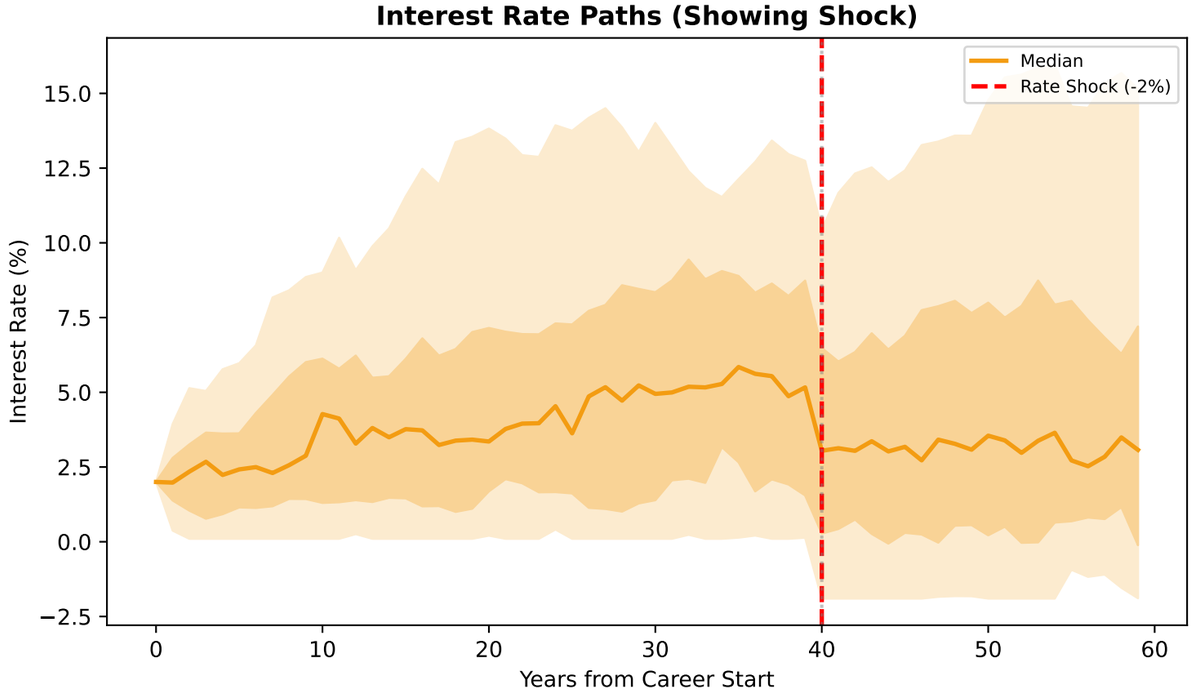
PAGE 3c: TEACHING SCENARIO - Interest Rate Shock (at age 65)







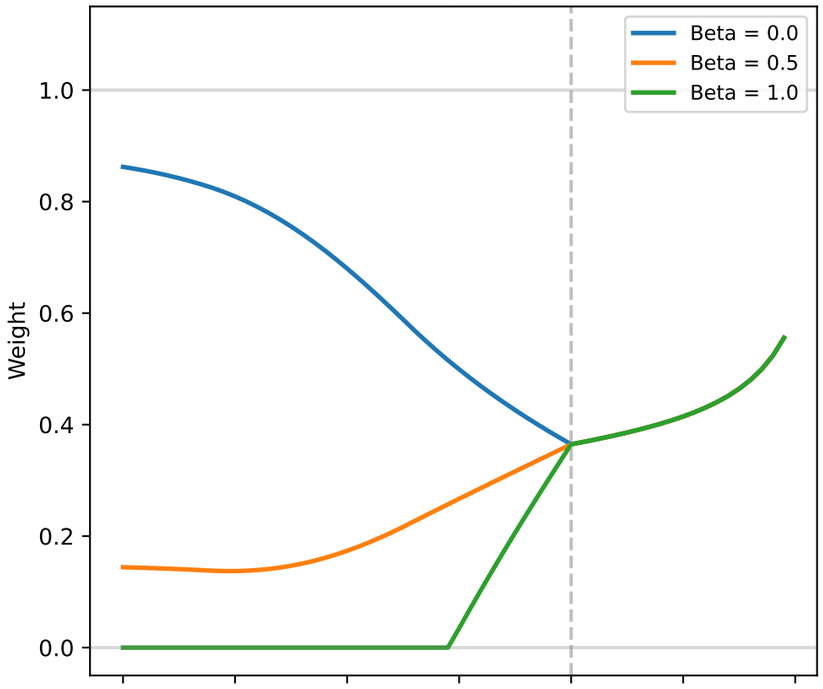




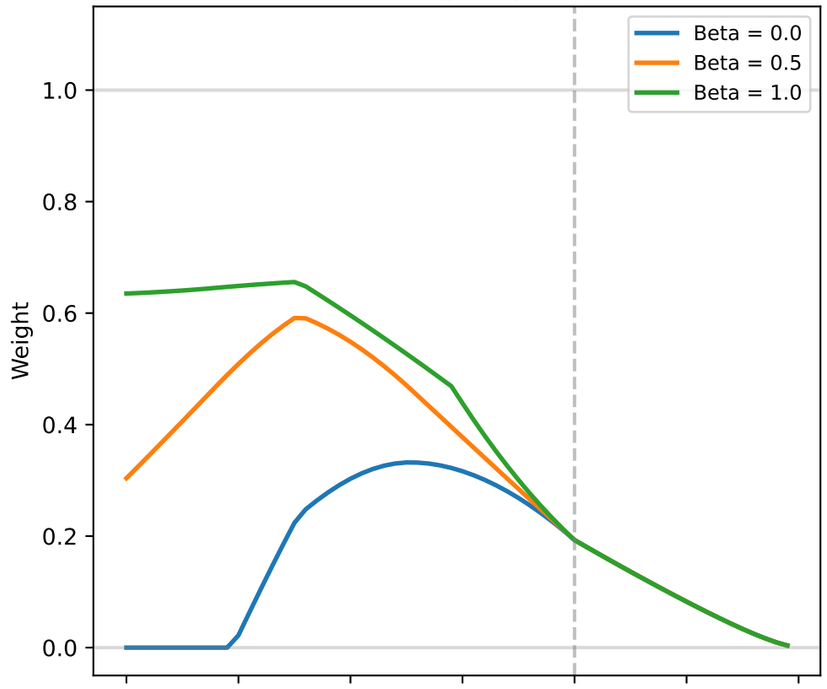

```
Strategy Comparison Summary
================================================

Scenario: Interest Rate Shock (at age 65)

Default Rates:
  Optimal (Variable):        0.0%
  Rule of Thumb (4%):        0.0%

Median Final Wealth ($k):
  Optimal:                $     2,450
  Rule of Thumb:          $     6,232

Median PV Consumption ($k):
  Optimal:                $     4,750
  Rule of Thumb:          $     4,212

Simulations: 50
```

Effect of Stock Beta on Portfolio Allocation & Human Capital

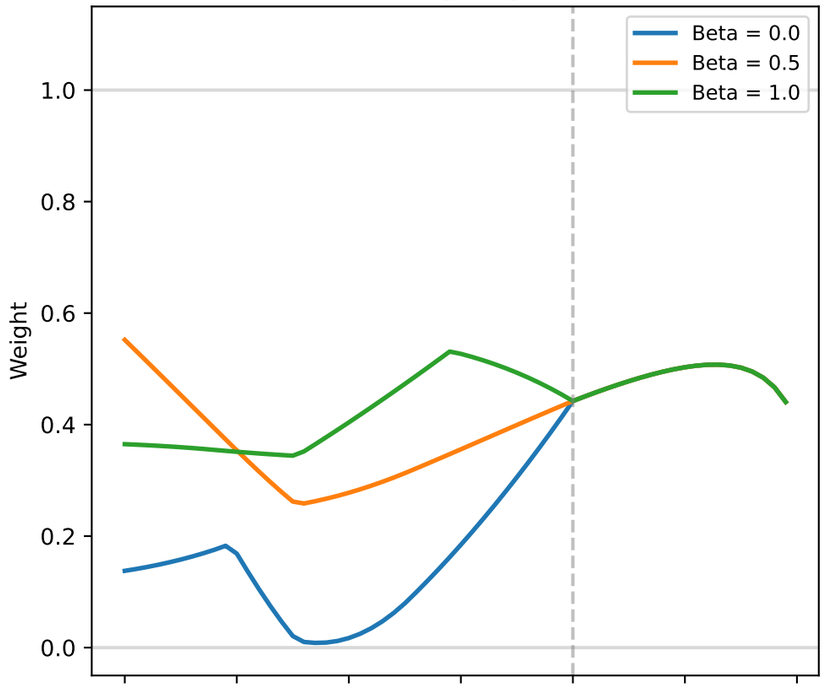
Stock Weight by Beta



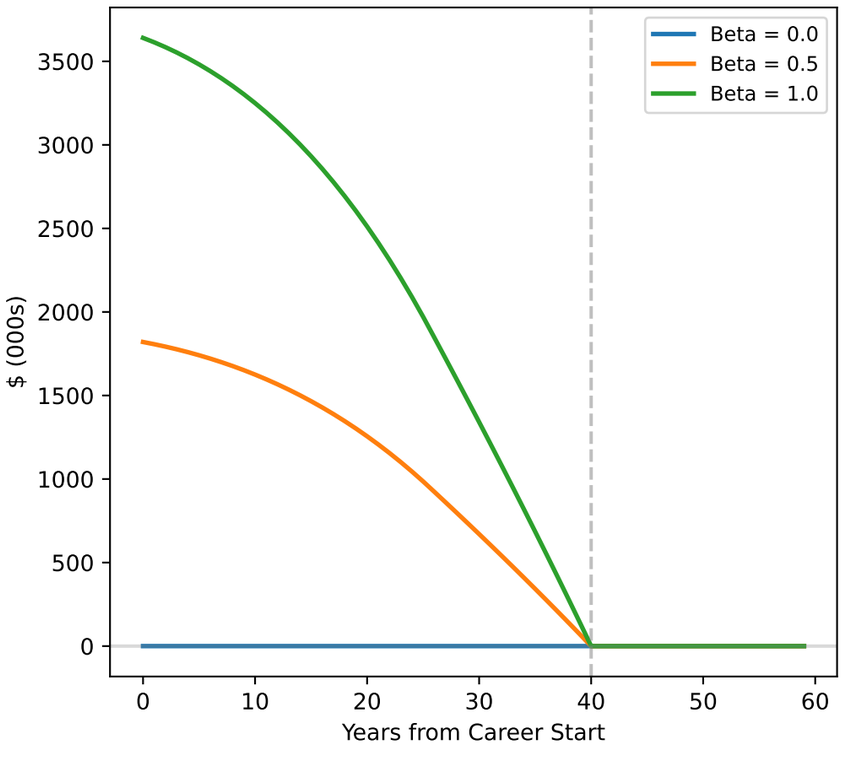
Bond Weight by Beta



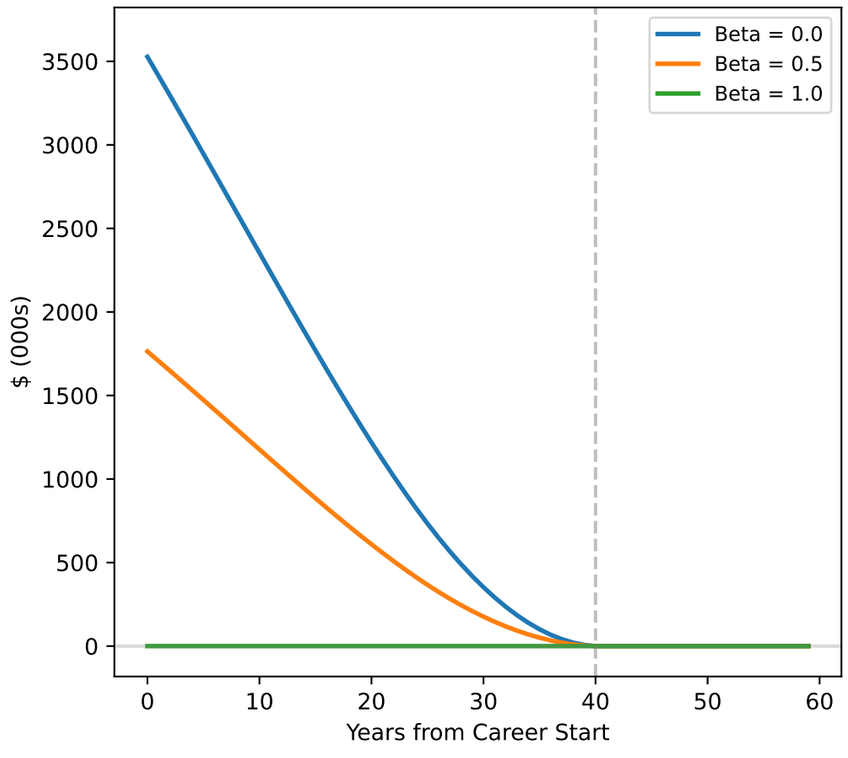
Cash Weight by Beta



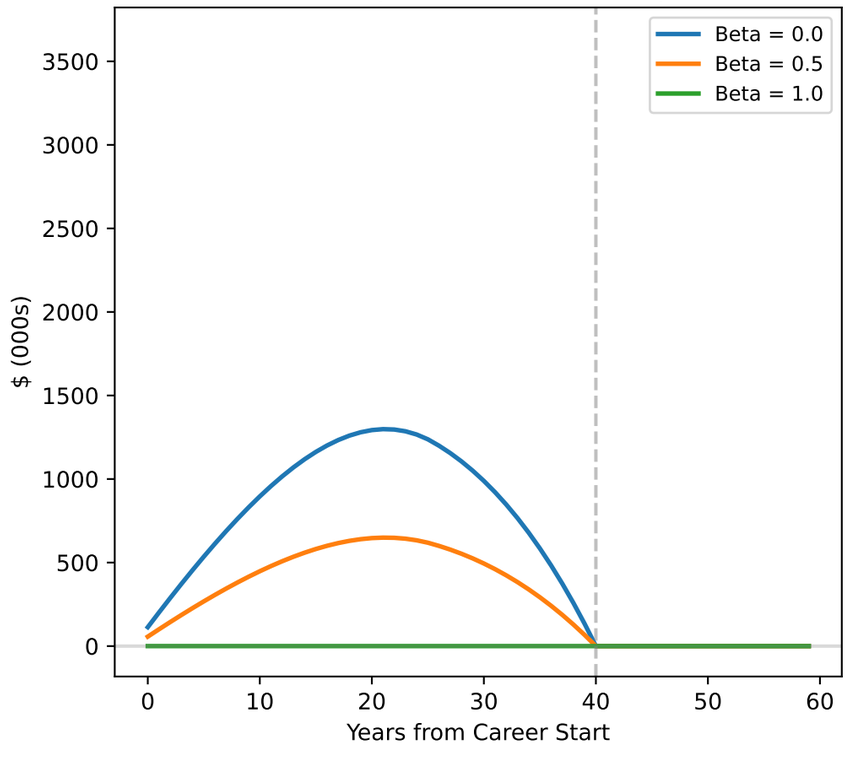
Stock Component of Human Capital



Bond Component of Human Capital



Cash Component of Human Capital



```
Lifecycle Investment Strategy Parameters
========================================

Age Parameters:
  - Career Start: 25
  - Retirement Age: 65
  - Planning Horizon: 85

Income Parameters:
  - Initial Earnings: $100k
  - Earnings Growth: 2.0%
  - Peak Earnings Age: 50

Subsistence Expense Parameters:
  - Base Expenses: $60k
  - Retirement Expenses: $80k

Initial Wealth:
  - Starting Financial Wealth: $1k

Consumption Model:
  - Total Consumption = Subsistence + Rate x Net Worth
  - Net Worth = Human Capital + Financial Wealth - PV(Future Expenses)
  - Consumption Rate = Median Return + 1.0pp

Human Capital Allocation:
  - Stock Beta: 0.10
  - Bond Duration: 20.0 years (used for HC decomposition and MV optimization)

Mean-Variance Optimization (Full VCV):
  - Risk-Free Rate (r_bar): 2.0%
  - Stock Excess Return (mu_s): 4.0%
  - Bond Excess Return (mu_b): 0.50%
  - Stock Volatility (sigma_s): 18%
  - Rate Shock Volatility (sigma_r): 1.2%
  - Rate/Stock Correlation (rho): -0.20
  - Risk Aversion (gamma): 2.0
  - Allocation Source: Mean-Variance Optimization (Full VCV)
  - w* = (1/gamma) * Sigma^(-1) * mu (Full VCV Merton solution)

VCV-Based Asset Return Models:
  - Stock: R_s = r + mu_s + sigma_s * eps_s
  - Bond:  R_b = r + mu_b - D * sigma_r * eps_r
  - Bond Vol: D * sigma_r = 24.0%
  - Cov(R_s,R_b): -D*sigma_s*sigma_r*rho = 0.864%

Target Total Wealth Allocation (from MV):
  - Stocks: 60.0%
  - Bonds: 0.0%
  - Cash: 40.0%

Key Insights:
-------------
1. Portfolio allocation is derived from full Merton
   solution: w* = (1/gamma) * Sigma^(-1) * mu

2. The VCV matrix accounts for bond return volatility
   from duration and rate shock correlation with stocks.

3. Changing gamma, mu, sigma, rho, or duration allows
   studying how portfolios respond to assumptions.

4. Human capital is treated as implicit asset holdings,
   and financial portfolio adjusts to reach total targets.
```