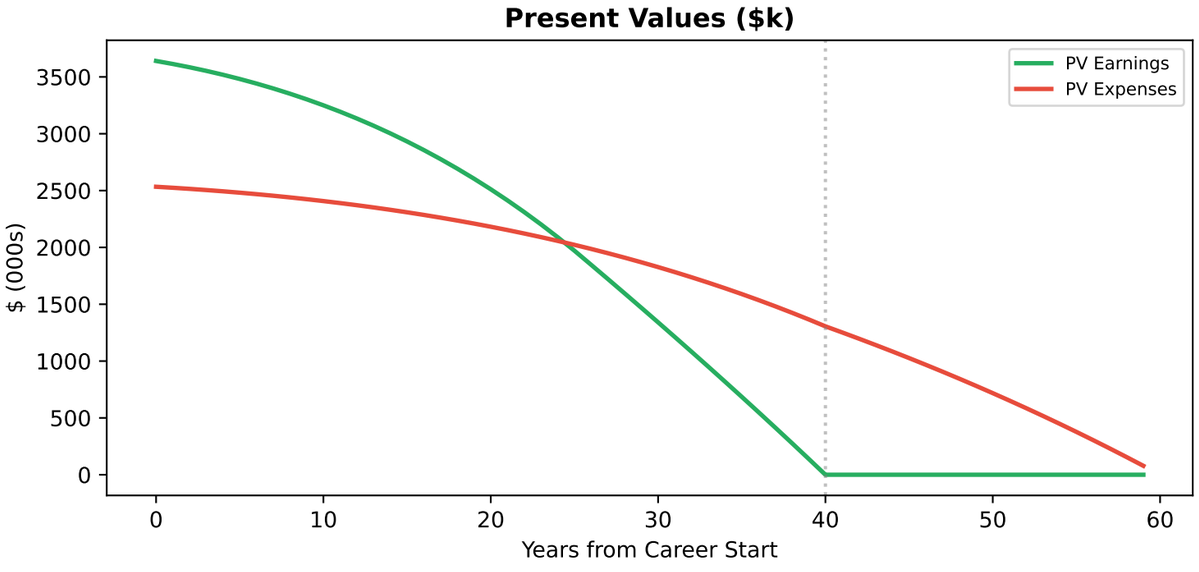
PAGE 1: BASE CASE (Deterministic Median Path)

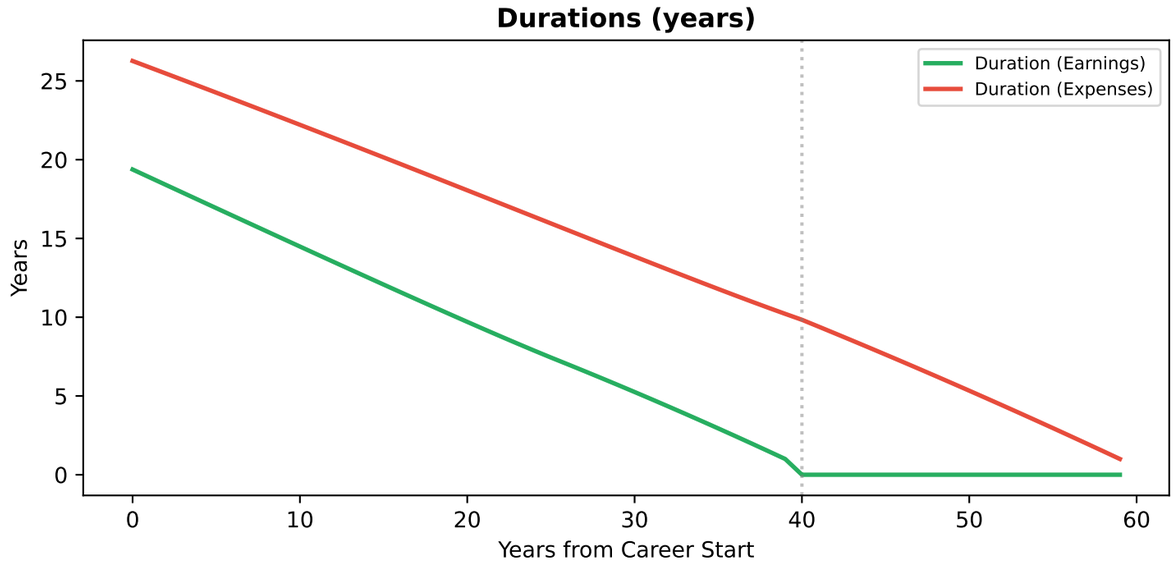
Earnings Profile ($k)

Expense Profile ($k)

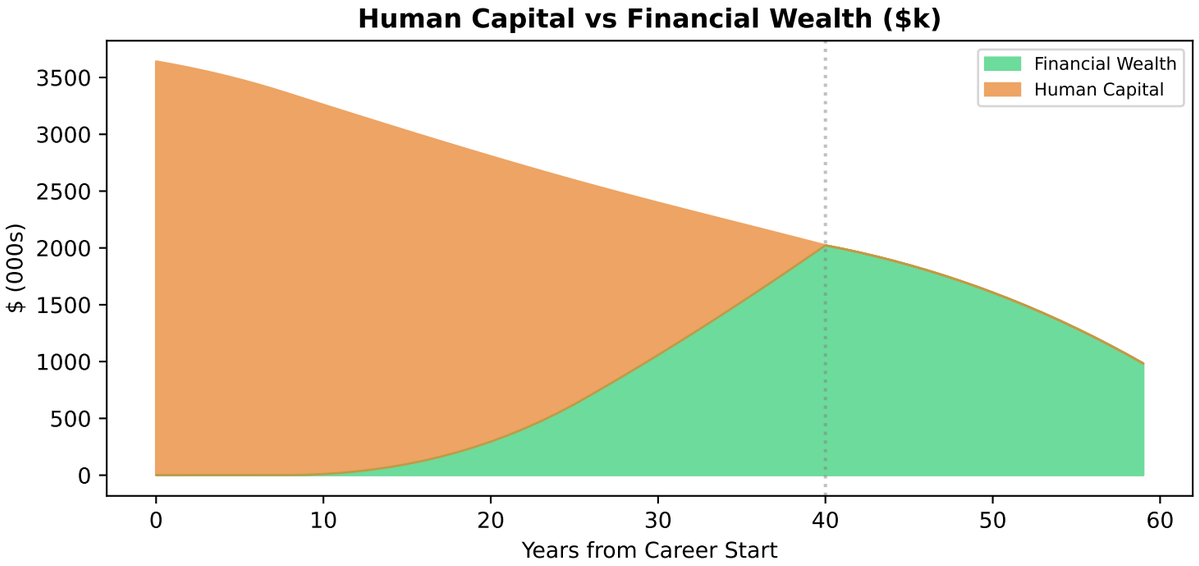
Present Values ($k)



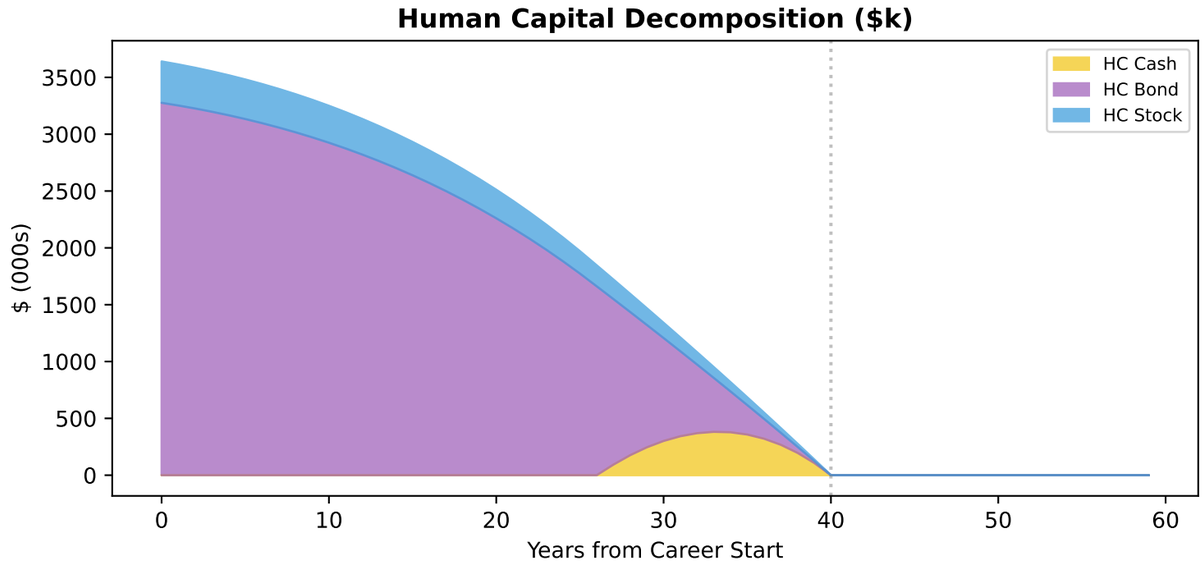
Durations (years)



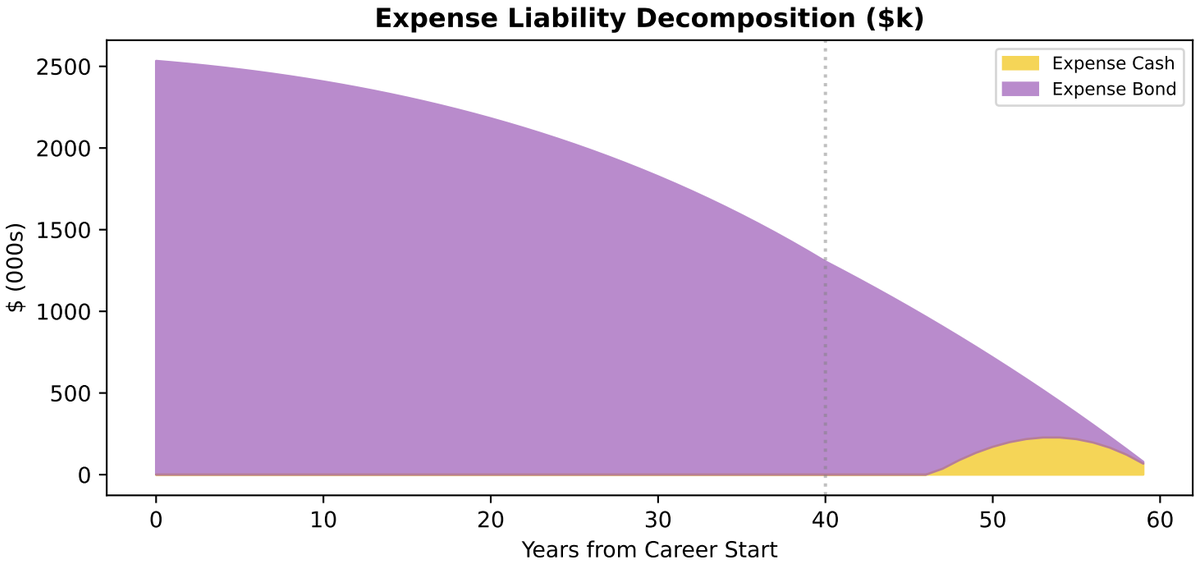
Human Capital vs Financial Wealth ($k)



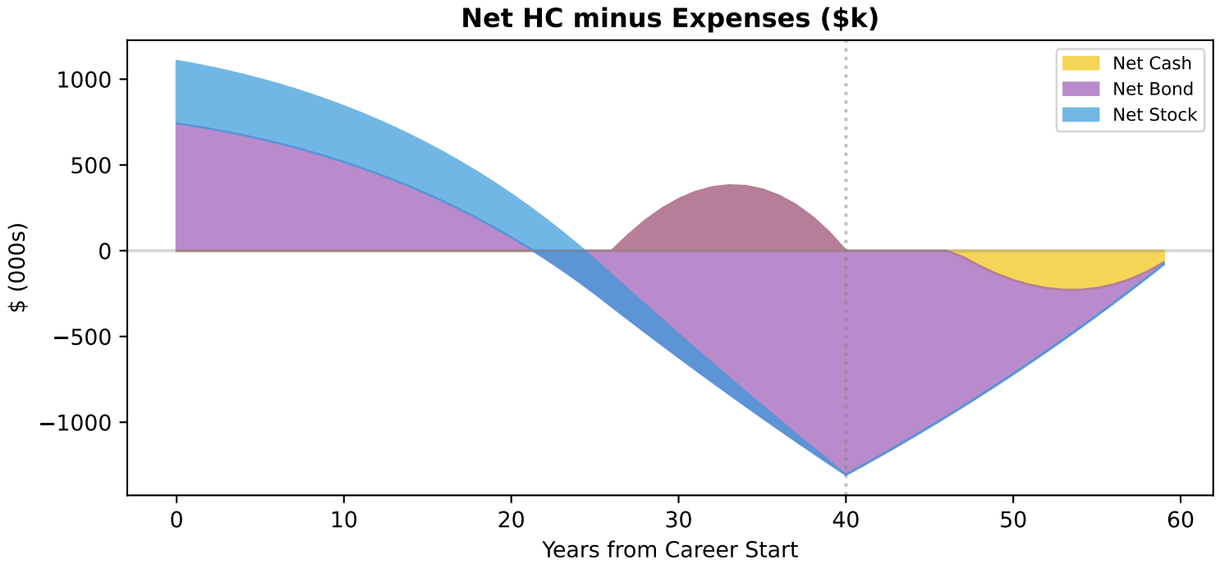
Human Capital Decomposition ($k)



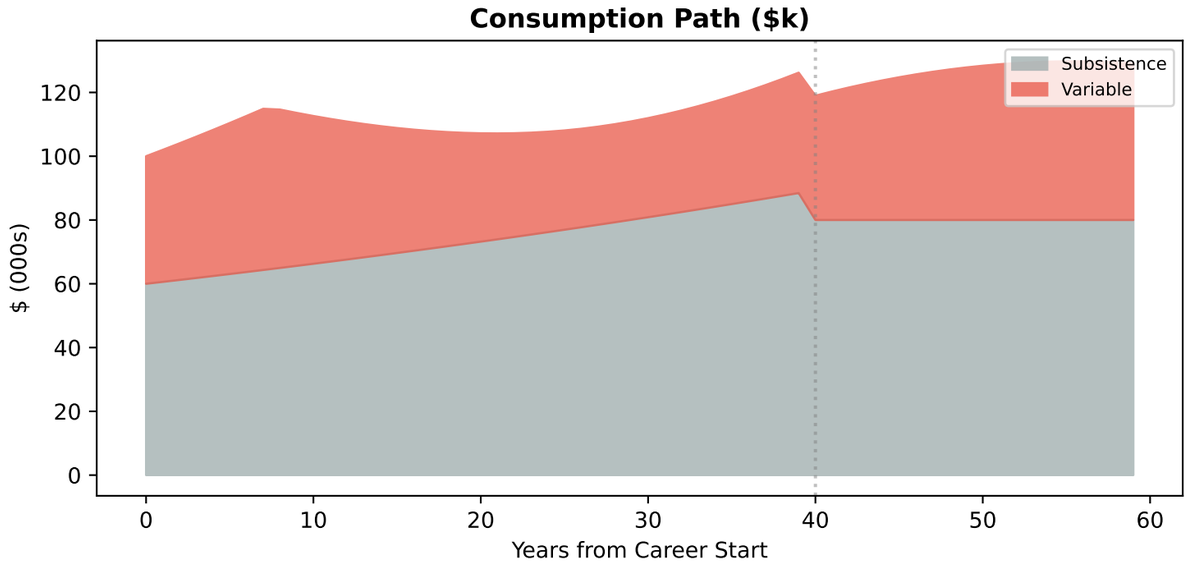
Expense Liability Decomposition ($k)



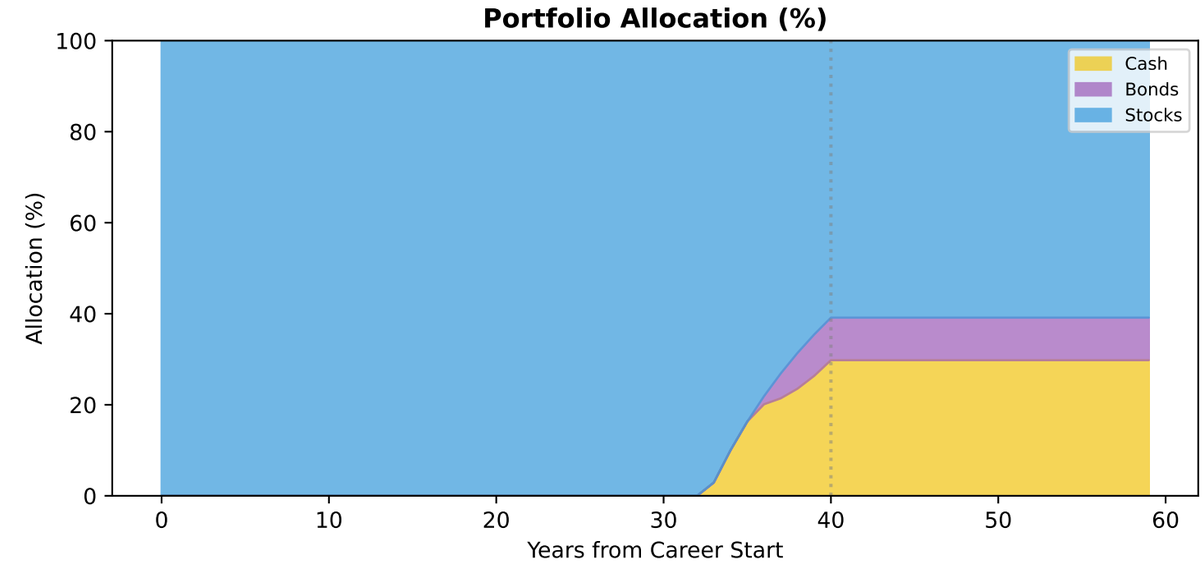
Net HC minus Expenses ($k)



Consumption Path ($k)

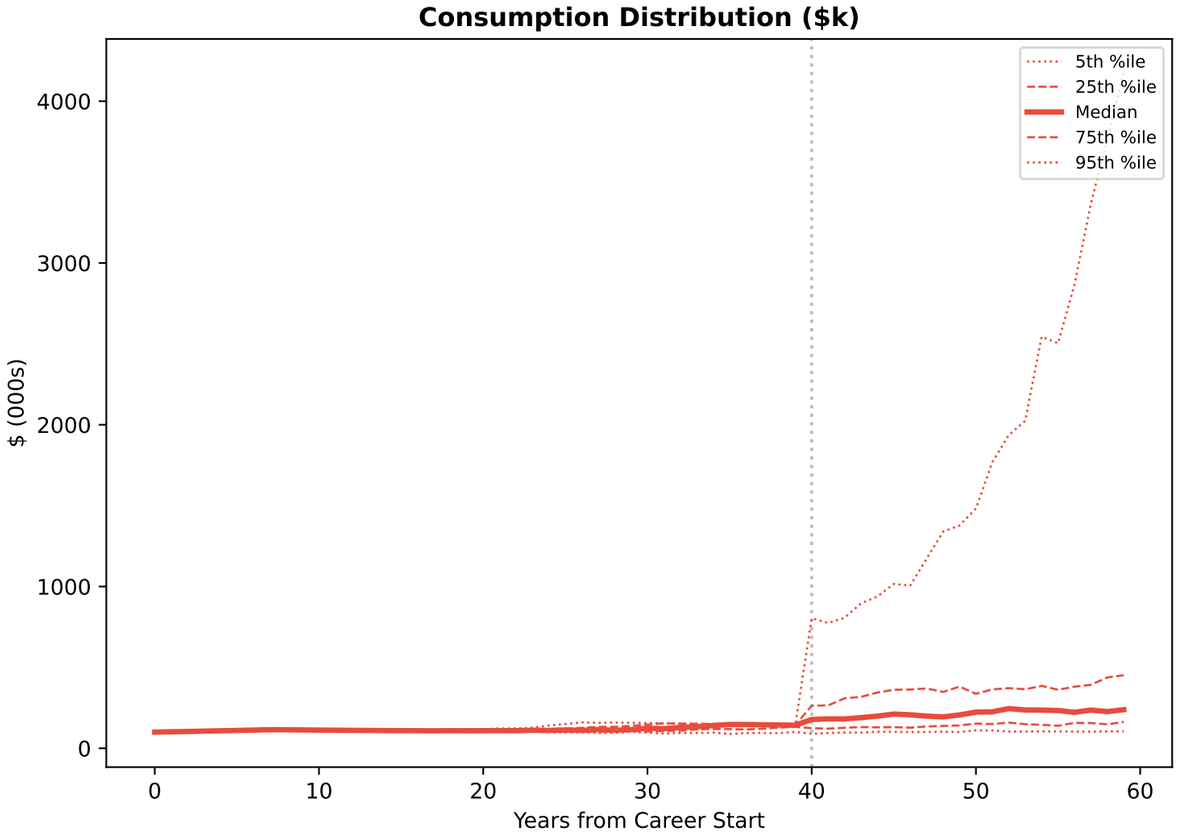


Portfolio Allocation (%)

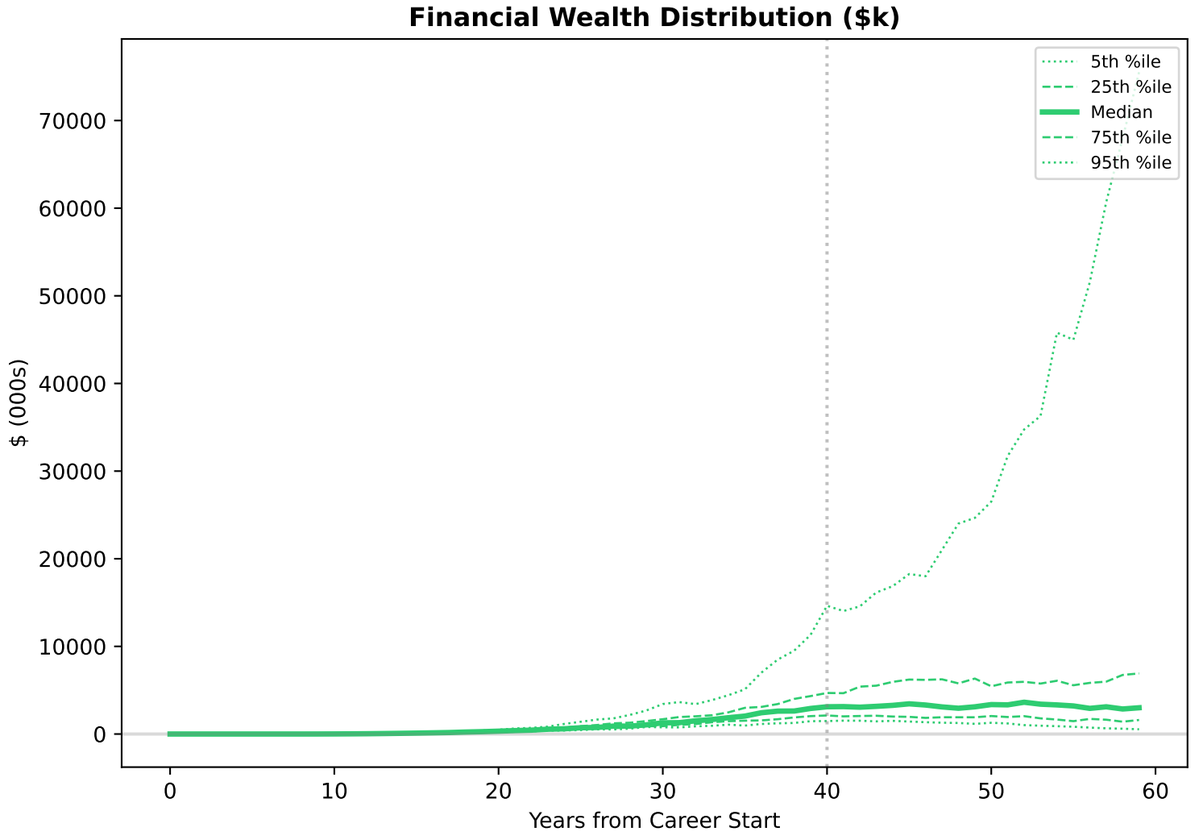


PAGE 2: MONTE CARLO (50 Runs)

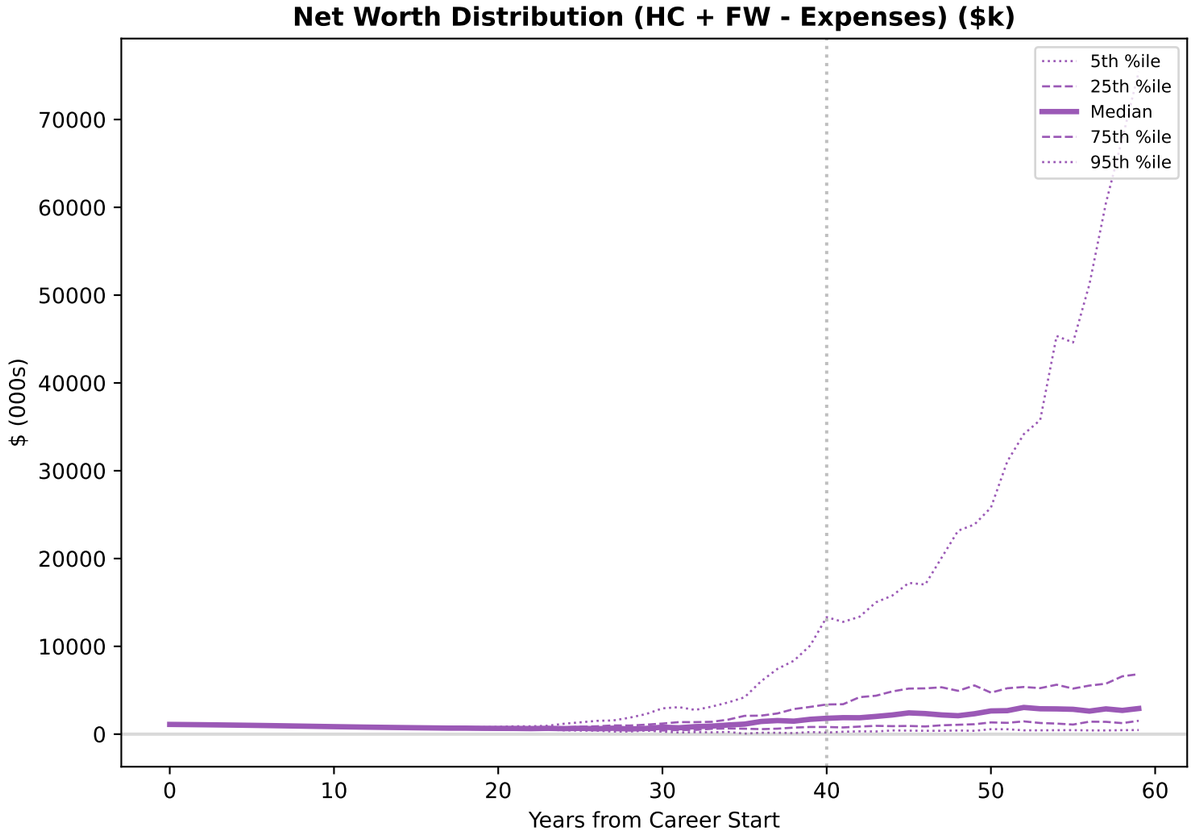
Consumption Distribution ($k)



Financial Wealth Distribution ($k)



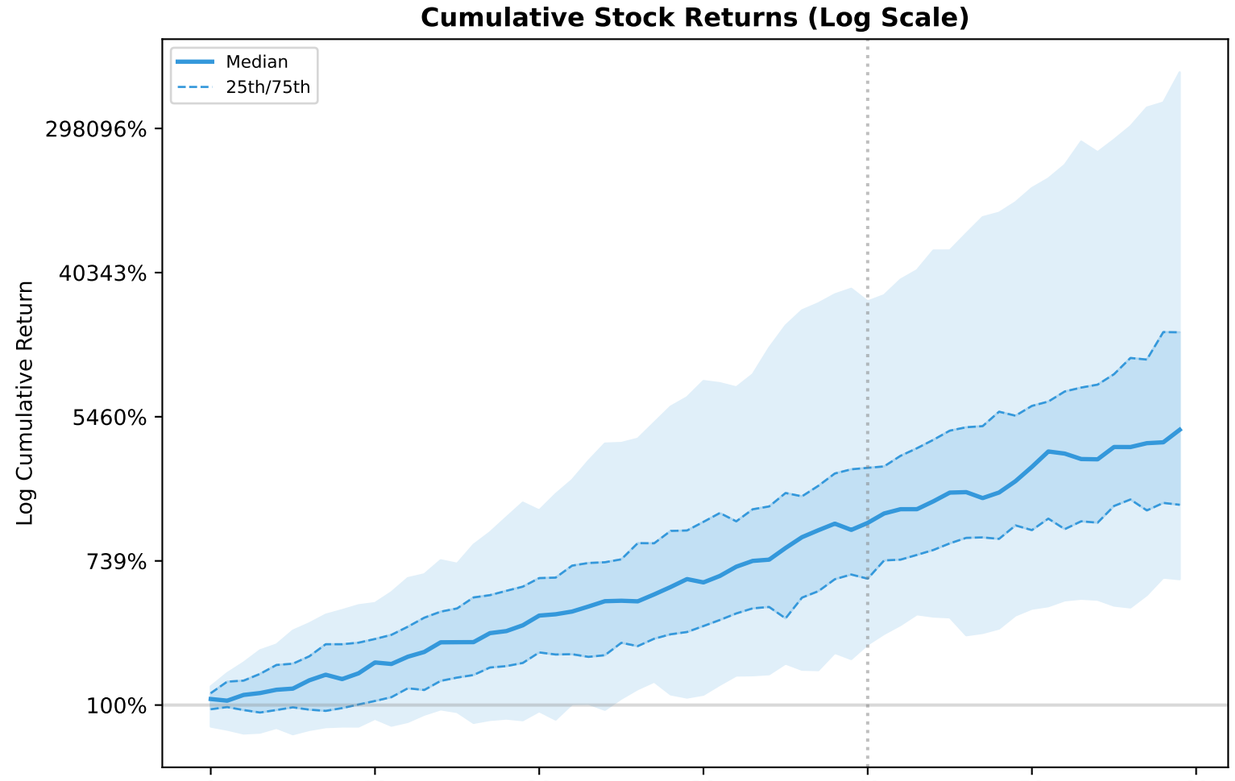
Net Worth Distribution (HC + FW - Expenses) ($k)



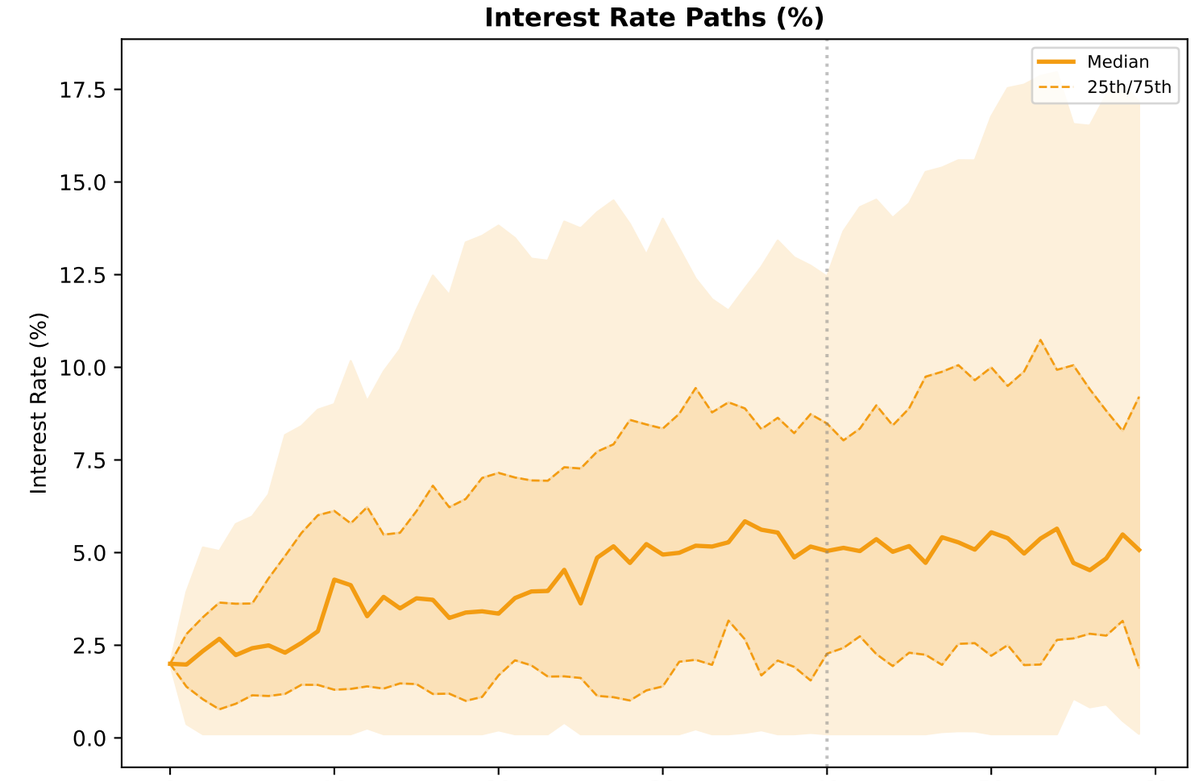
Terminal Values Grid

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

Financial Wealth ($k):
  5th percentile:  $       544
  25th percentile: $     1,601
  Median:          $     2,998
  75th percentile: $     6,913
  95th percentile: $    75,529

Annual Consumption ($k):
  5th percentile:  $       105
  25th percentile: $       163
  Median:          $       239
  75th percentile: $       451
  95th percentile: $     4,180

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

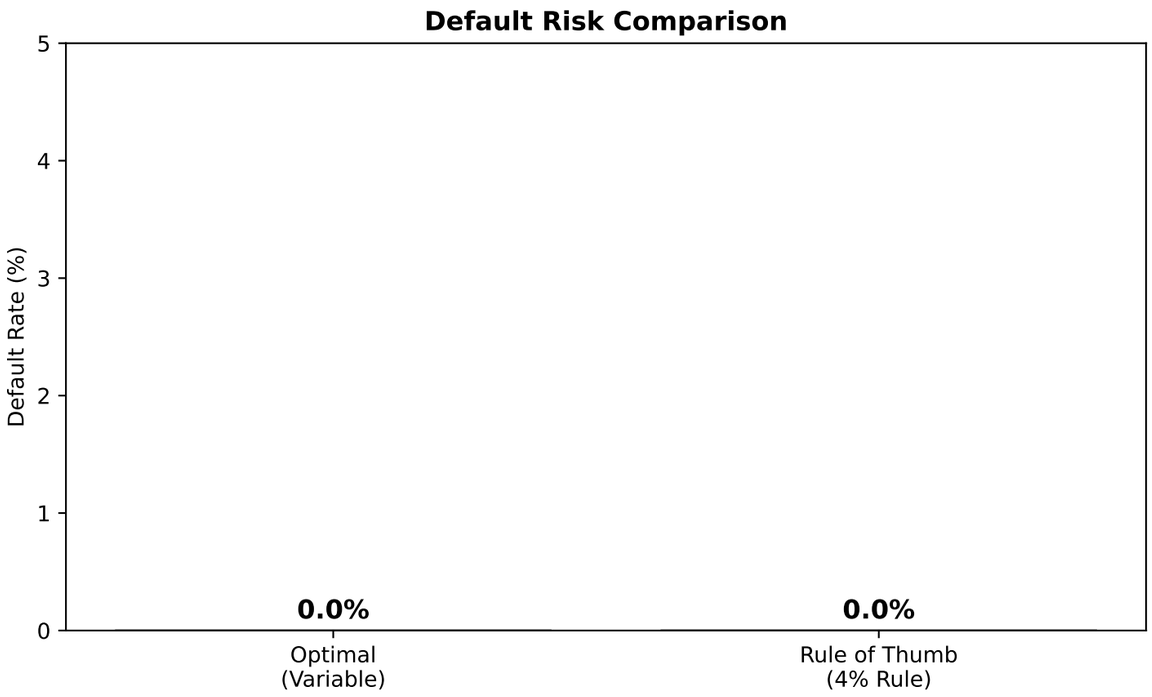
Cumulative Stock Returns (Log Scale)

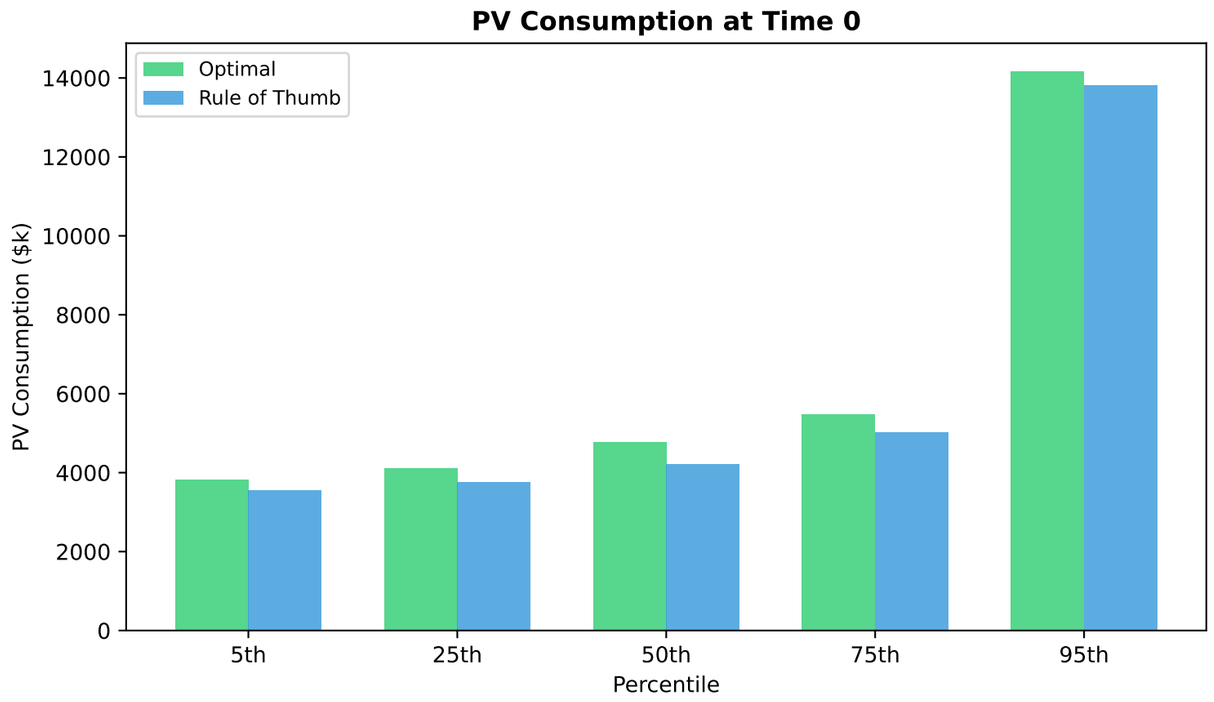


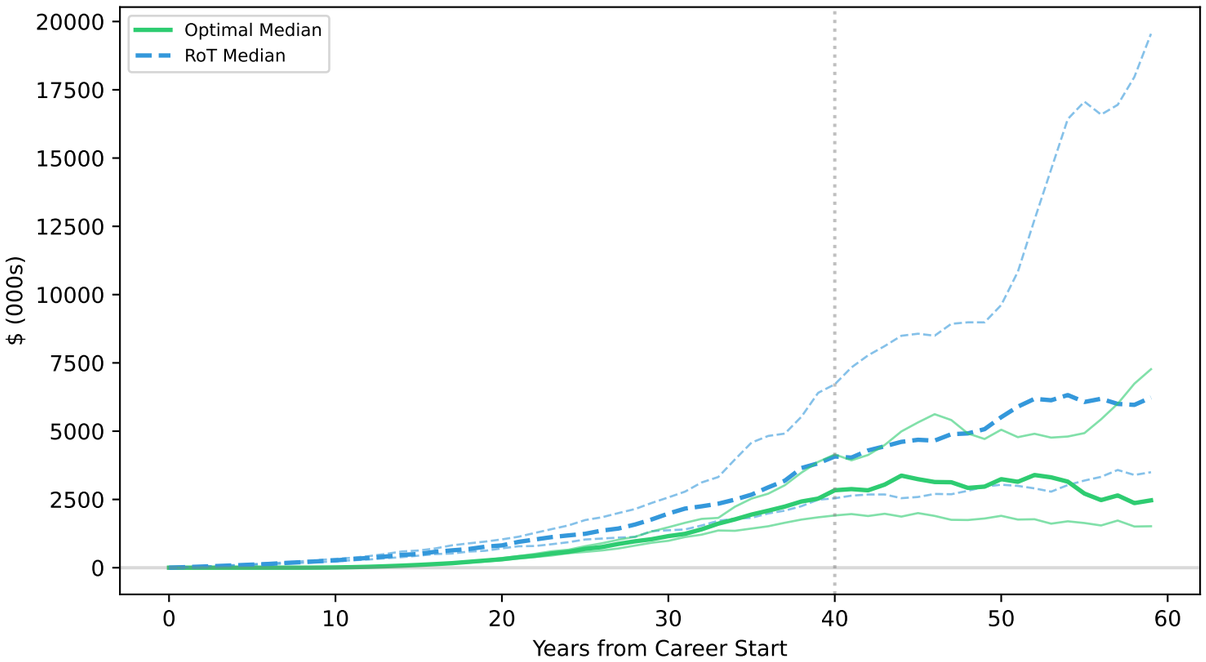
Interest Rate Paths (%)

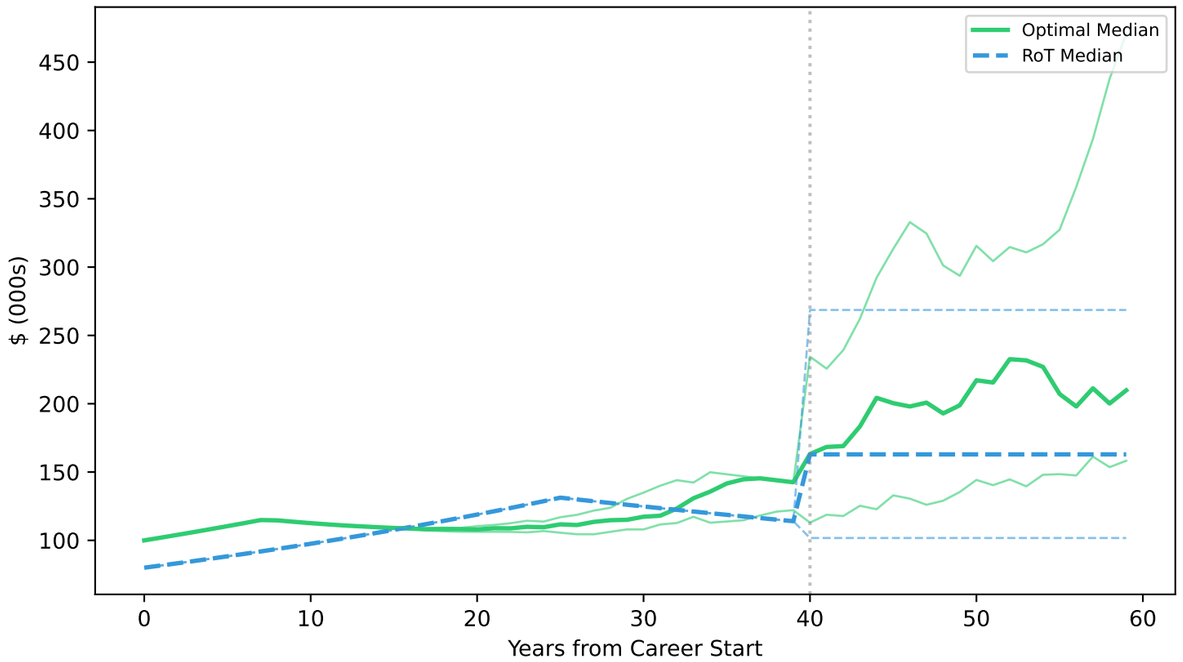


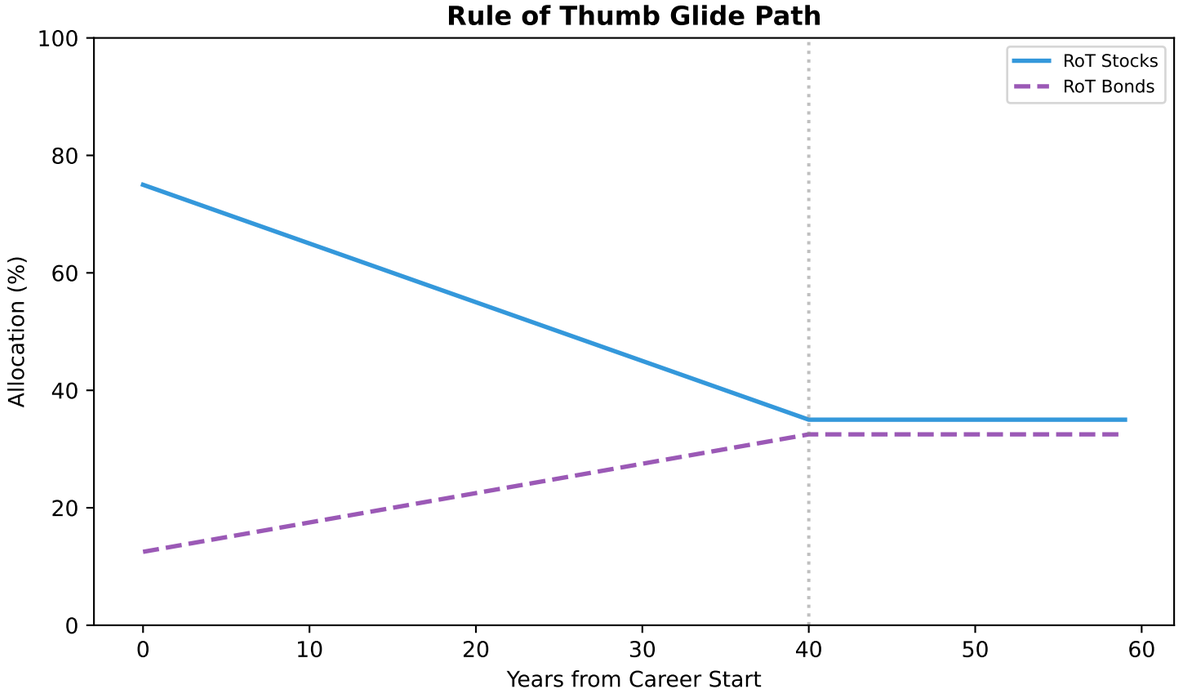
PAGE 3a: TEACHING SCENARIO - Normal Market Conditions





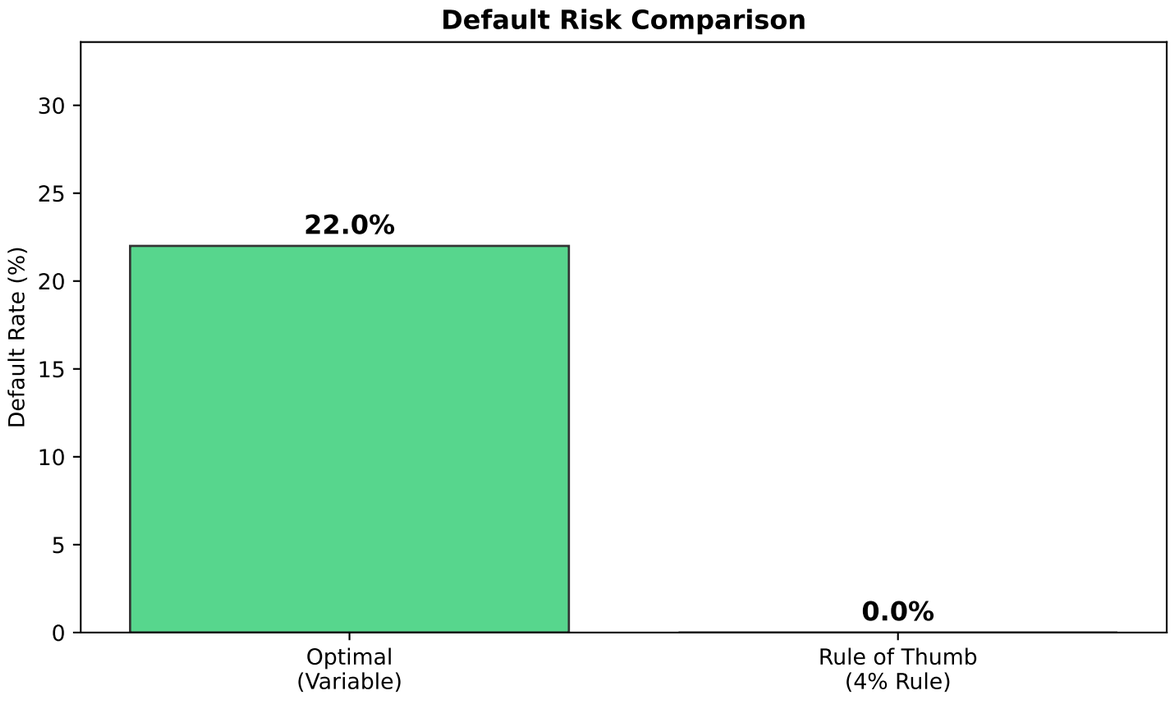


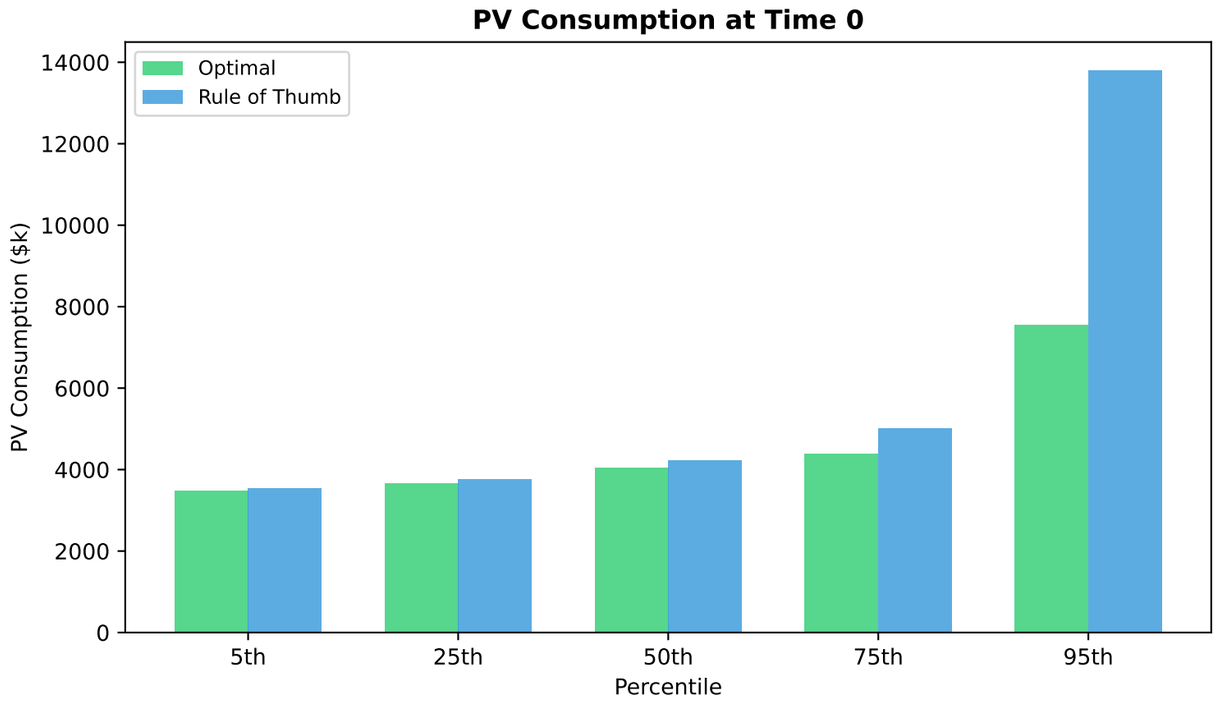


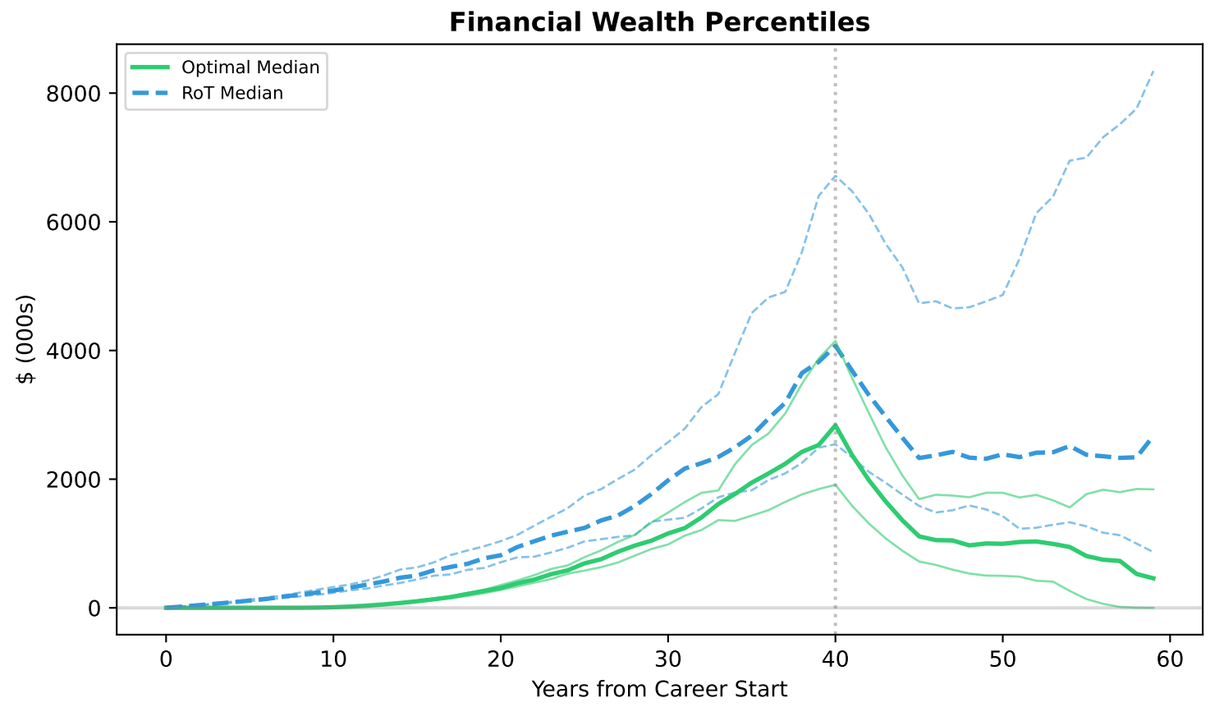


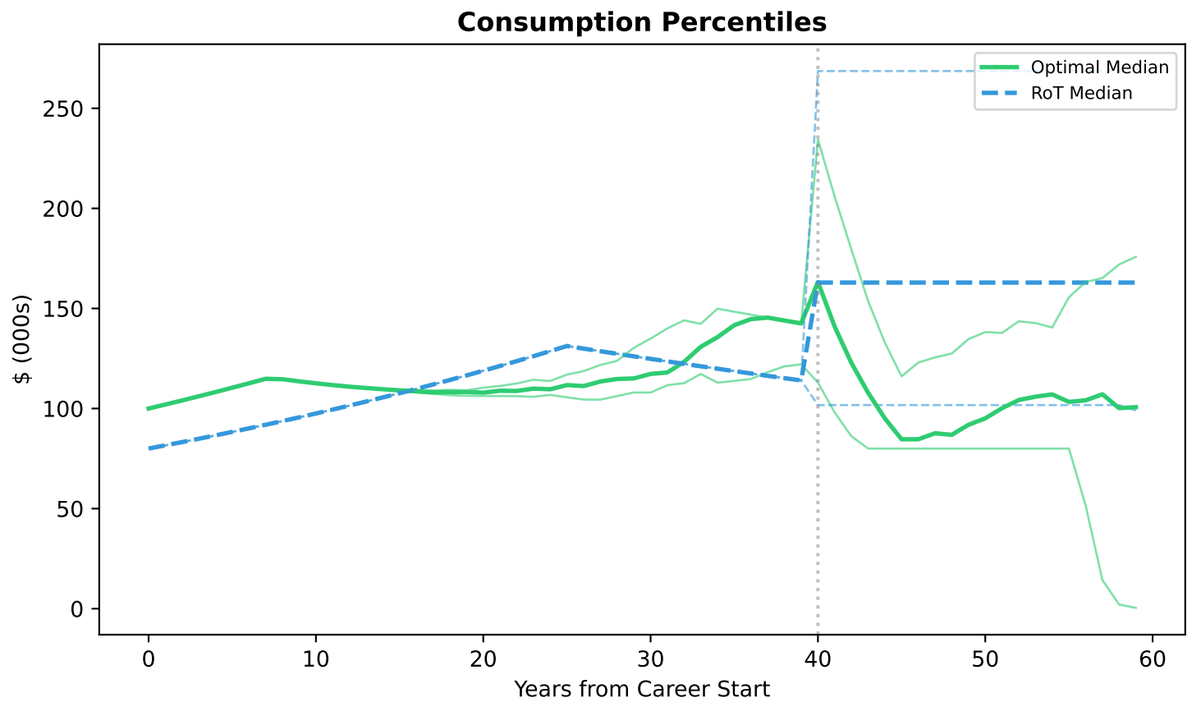

```
Strategy Comparison Summary
================================================

Scenario: Normal Market Conditions

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

Median Final Wealth ($k):
  Optimal:                $     2,467
  Rule of Thumb:          $     6,232

Median PV Consumption ($k):
  Optimal:                $     4,770
  Rule of Thumb:          $     4,212

Simulations: 50
```

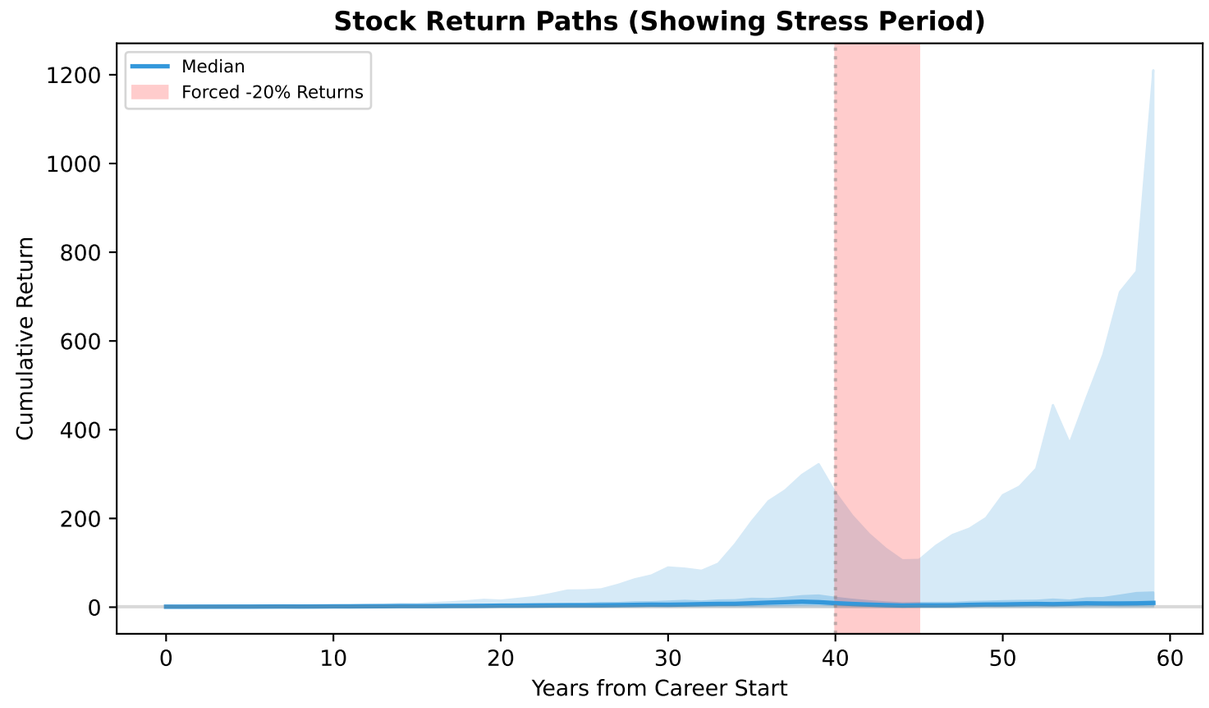
PAGE 3b: TEACHING SCENARIO - Sequence Risk (Bad Early Returns)





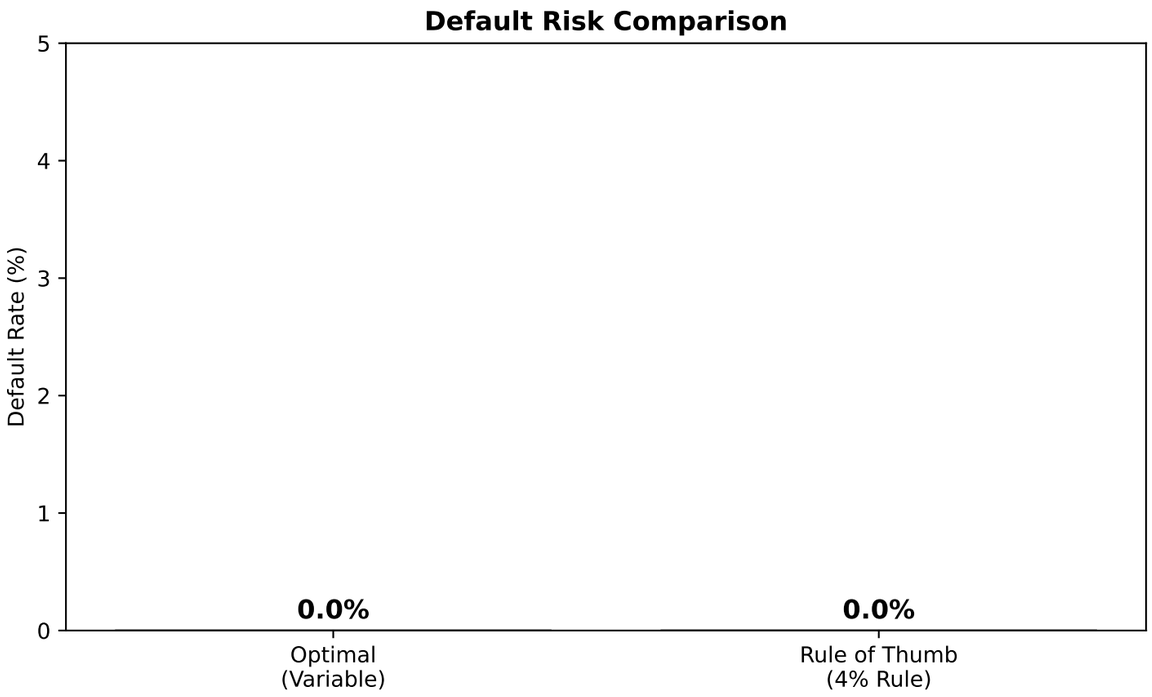


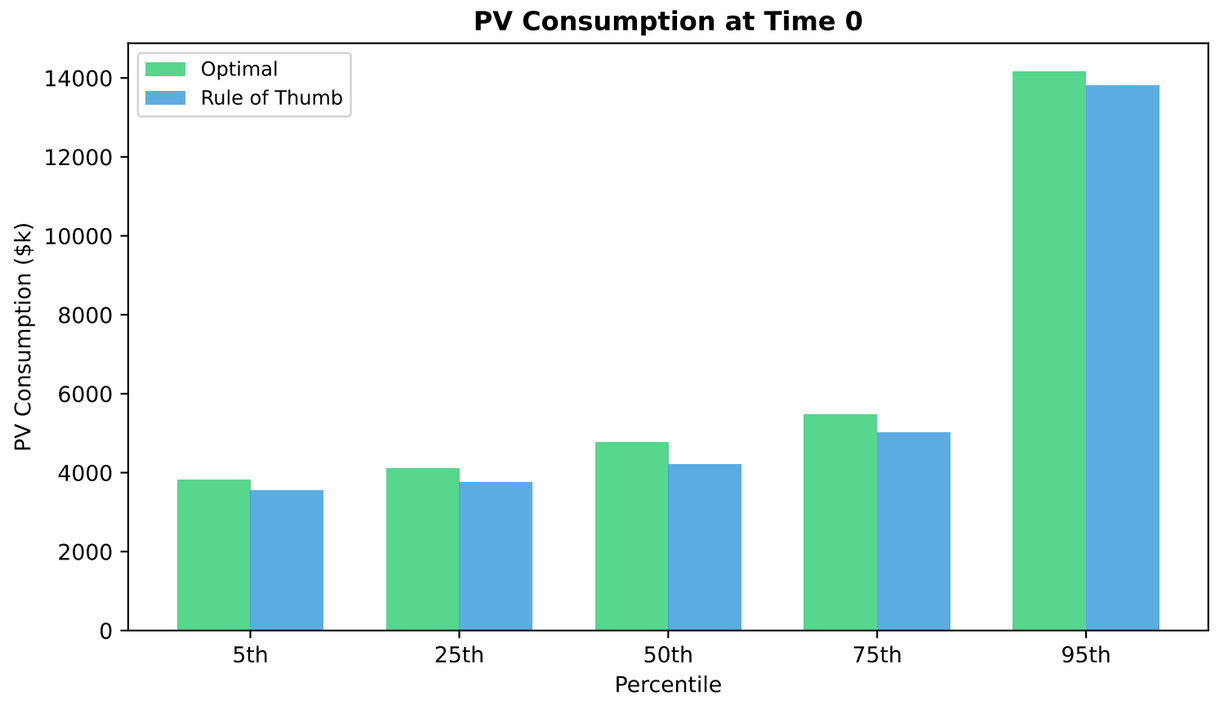


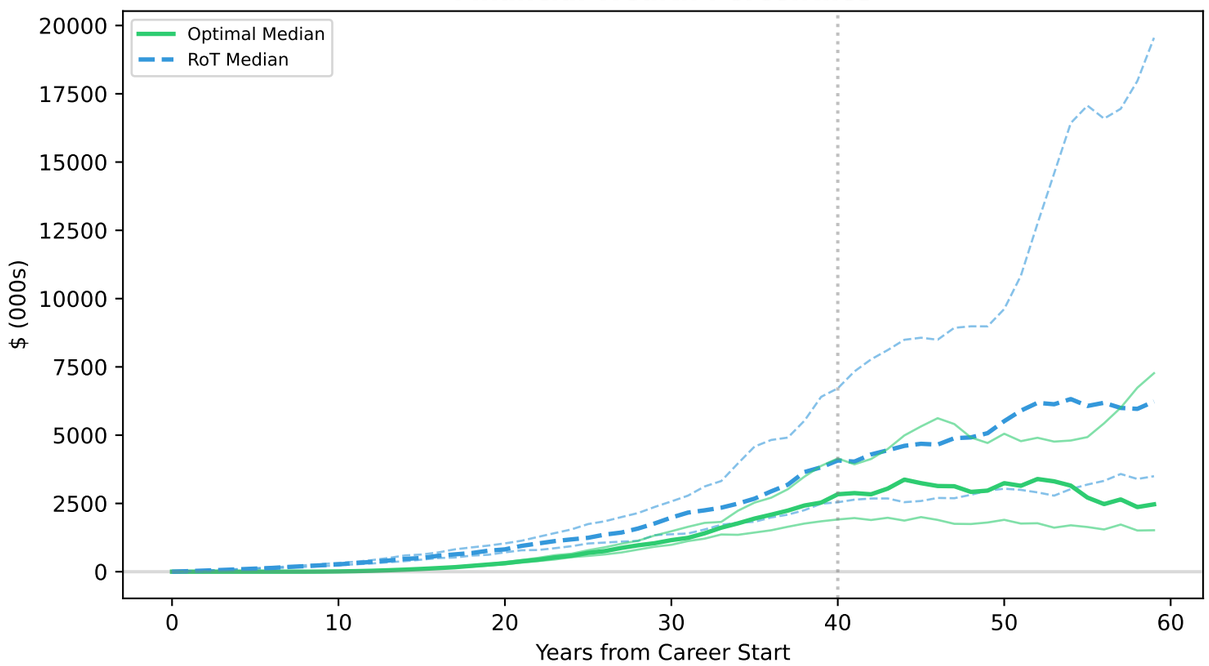


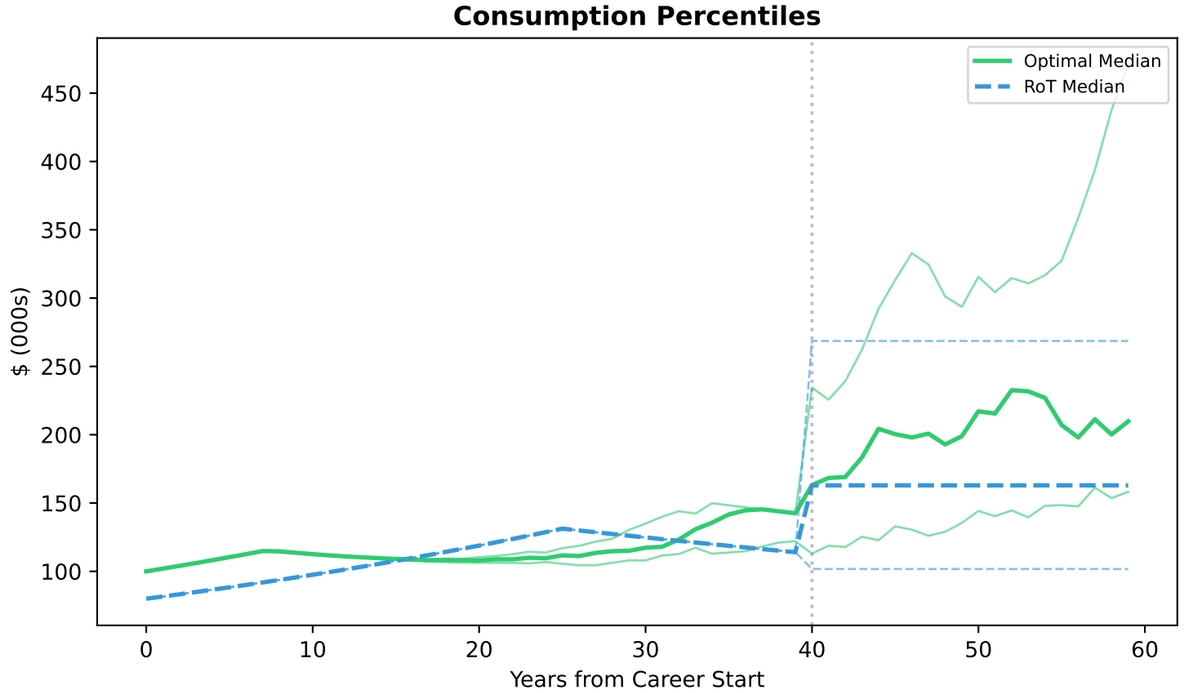

```
Strategy Comparison Summary
====================================================

Scenario: Sequence Risk (Bad Early Returns)

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

Median Final Wealth ($k):
  Optimal:                $       459
  Rule of Thumb:          $     2,672

Median PV Consumption ($k):
  Optimal:                $     4,046
  Rule of Thumb:          $     4,212

Simulations: 50
```

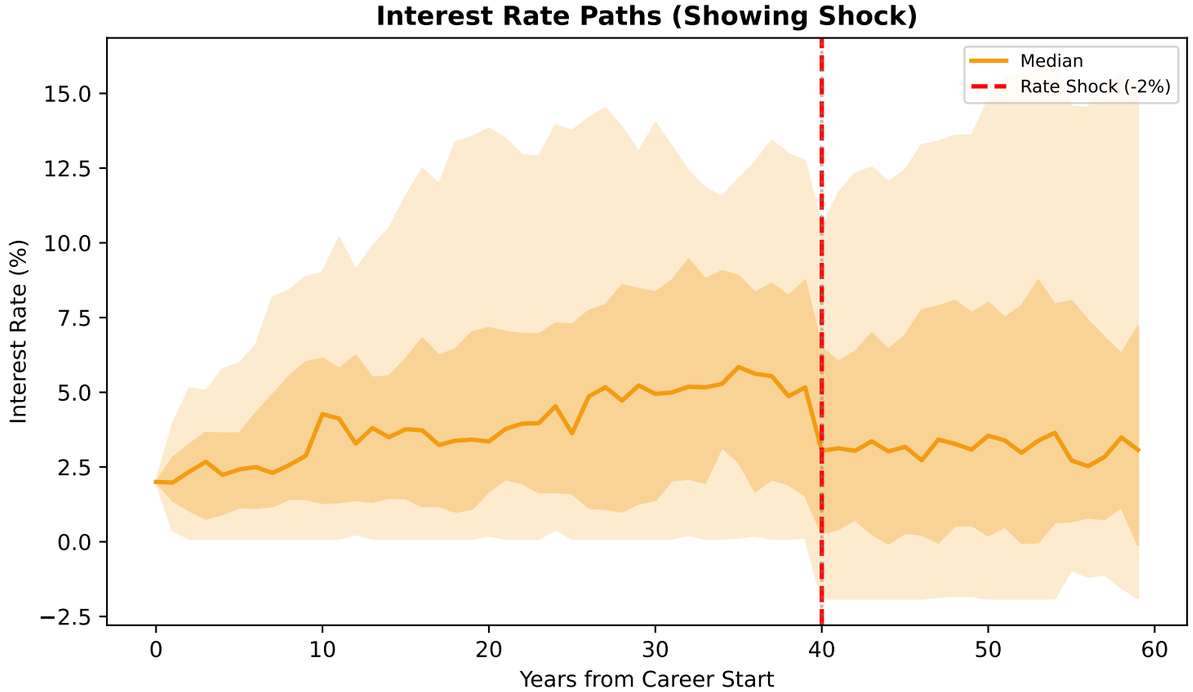
PAGE 3c: TEACHING SCENARIO - Interest Rate Shock (at age 65)












```
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:                $     2,467
  Rule of Thumb:          $     6,232

Median PV Consumption ($k):
  Optimal:                $     4,770
  Rule of Thumb:          $     4,212

Simulations: 50
```

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: 7.0 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 = 8.4%
  - Cov(R_s,R_b): -D*sigma_s*sigma_r*rho = 0.302%

Target Total Wealth Allocation (from MV):
  - Stocks: 60.9%
  - Bonds: 9.3%
  - Cash: 29.8%

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.