

Lifecycle Investing: A Finance Theory Perspective

FINC 450

Today's Lecture

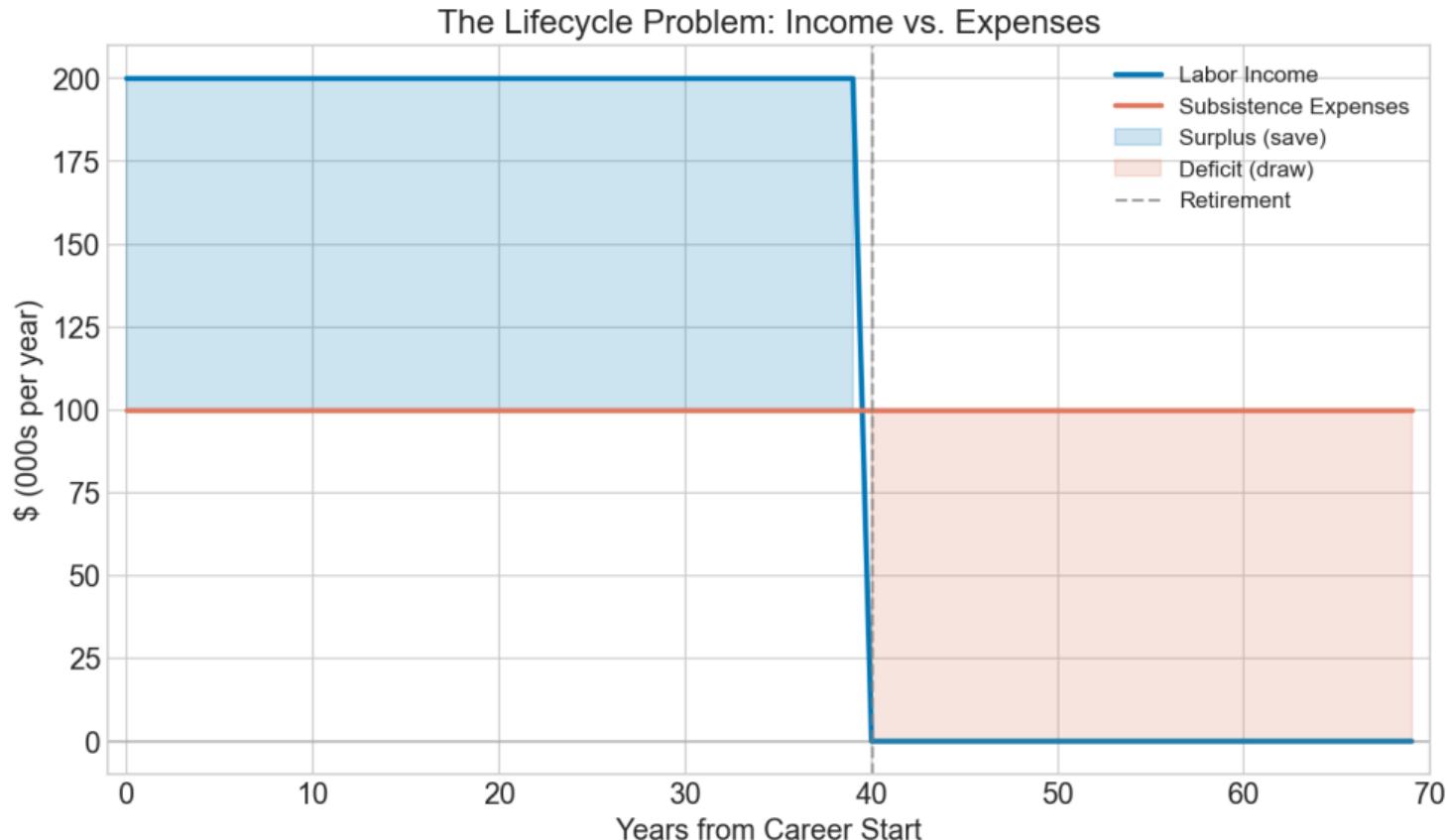
- 1 The Lifecycle Problem
- 2 Your Hidden Balance Sheet
- 3 The Four Gauges
- 4 Why Portfolio Allocation Changes Over Life
- 5 Labor Income Risk Matters
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- 7 Optimal Consumption
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The Fundamental Problem

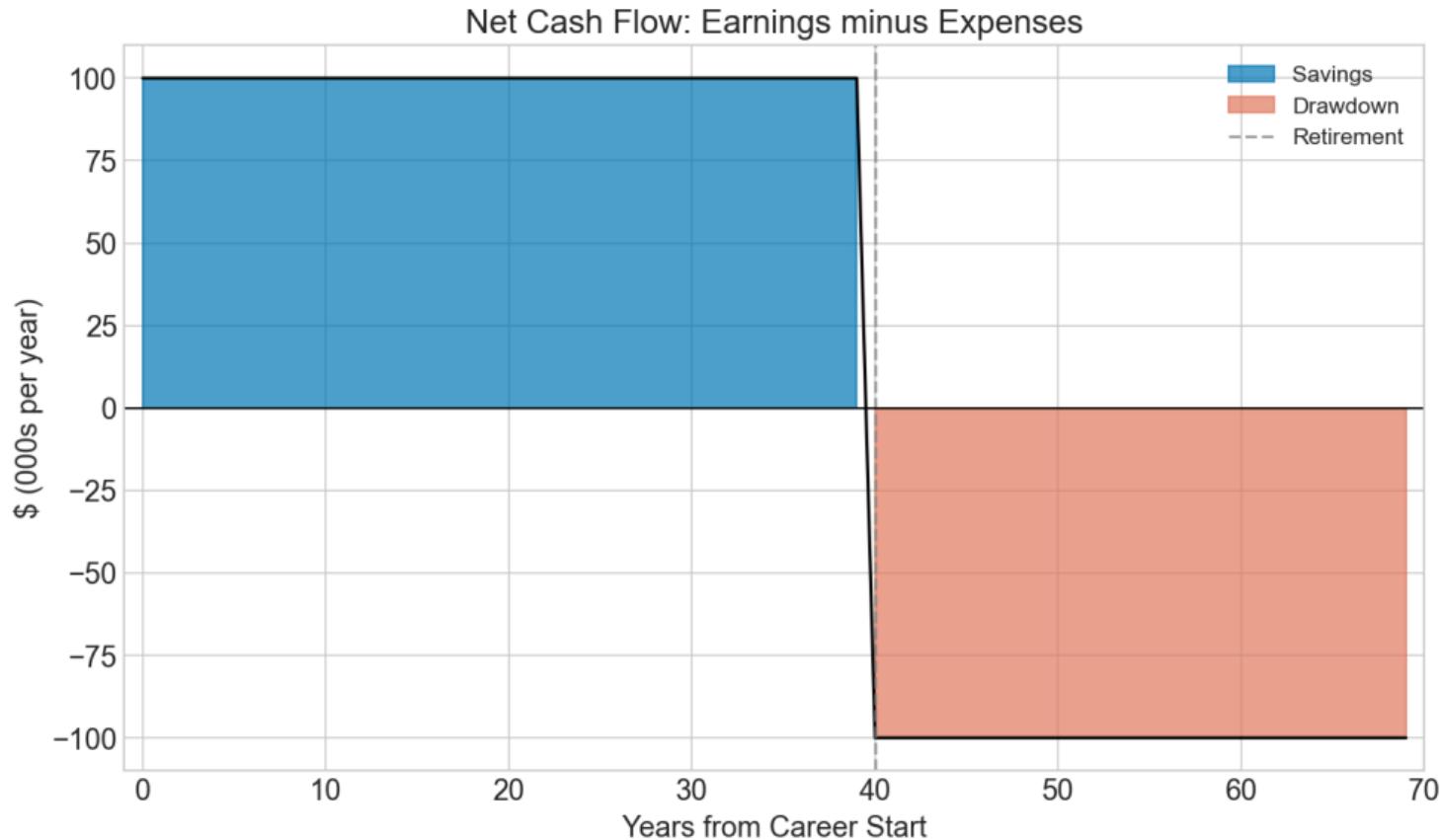
Income and expenses don't match over time.

- You earn during working years (ages 25–65)
- You consume throughout your entire life (ages 25–85+)
- This **mismatch** is THE problem lifecycle finance solves

Income vs. Expenses Over the Lifecycle



The Cash Flow Pattern



Thinking in Present Values

Finance thinks in present values.

Assets:

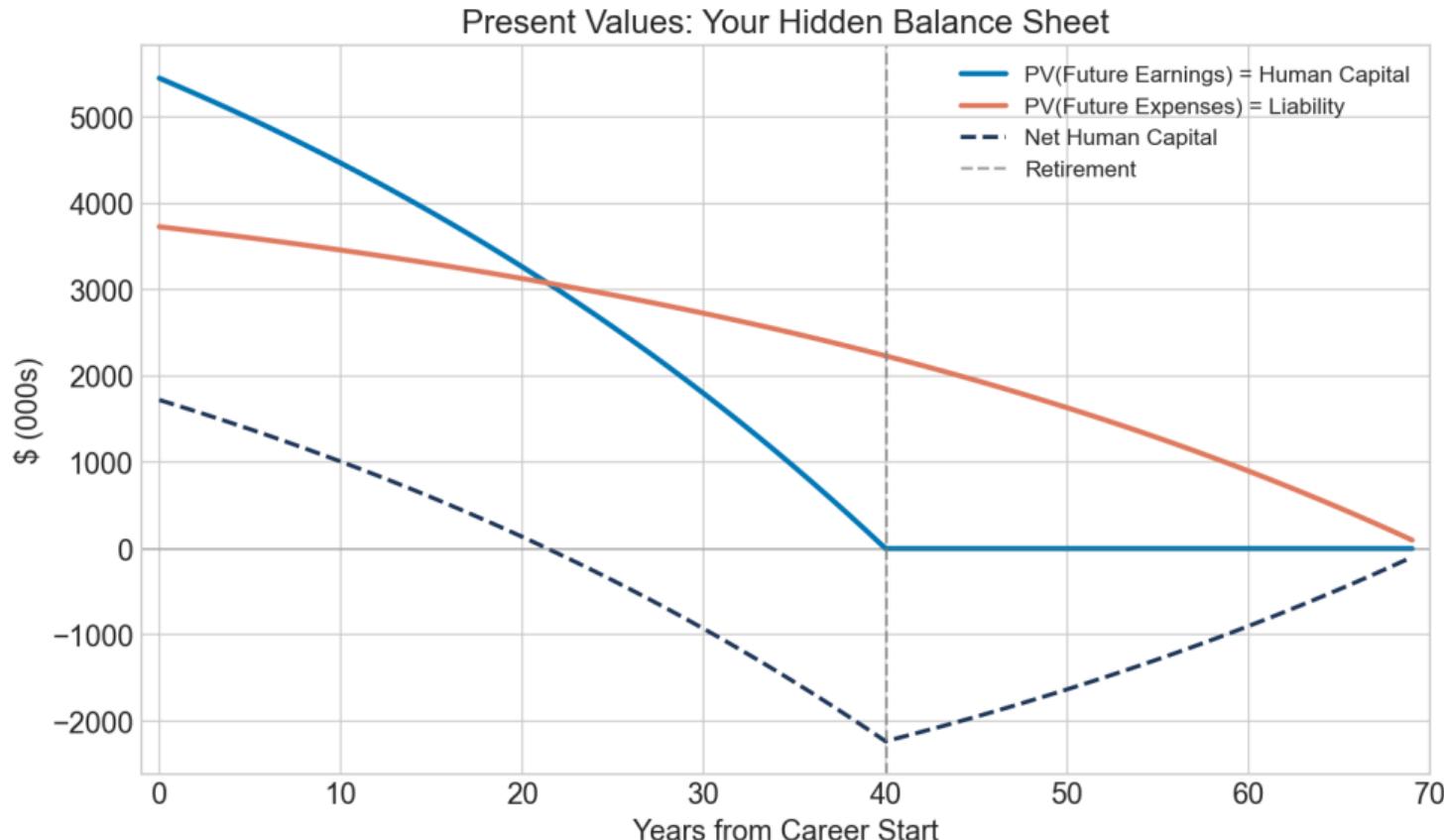
- Financial wealth (savings)
- **Human capital** (PV of future earnings)

Liabilities:

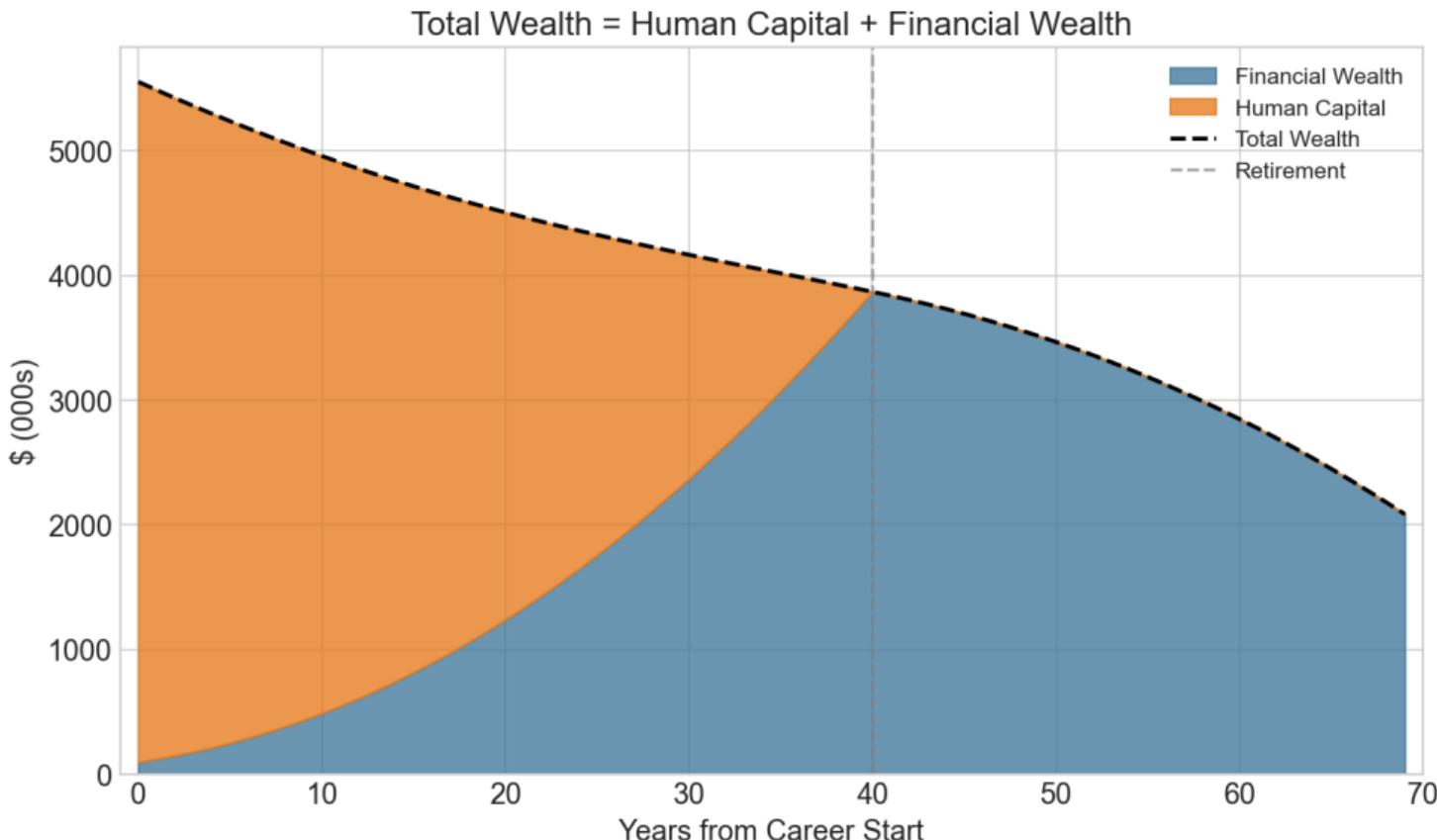
- **Expense liability** (PV of future spending needs)

$$\text{Net Worth} = \text{Human Capital} + \text{Financial Wealth} - \text{PV(Expenses)}$$

Present Values: Your Hidden Balance Sheet



Human Capital is Your Biggest Asset (Early On)



Beyond the 401(k) Balance

It's not just about your retirement account.

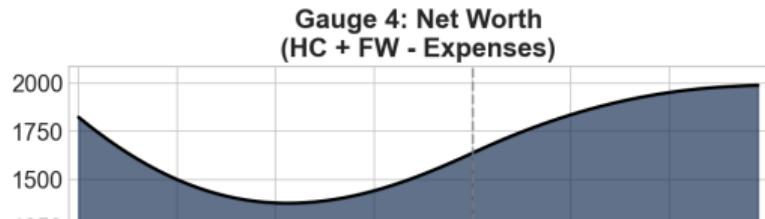
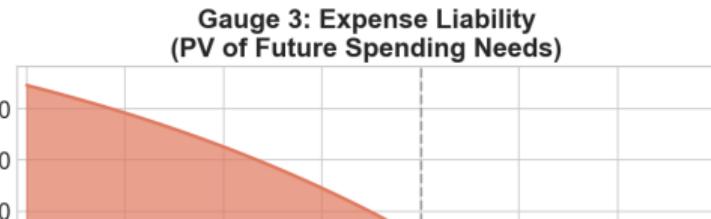
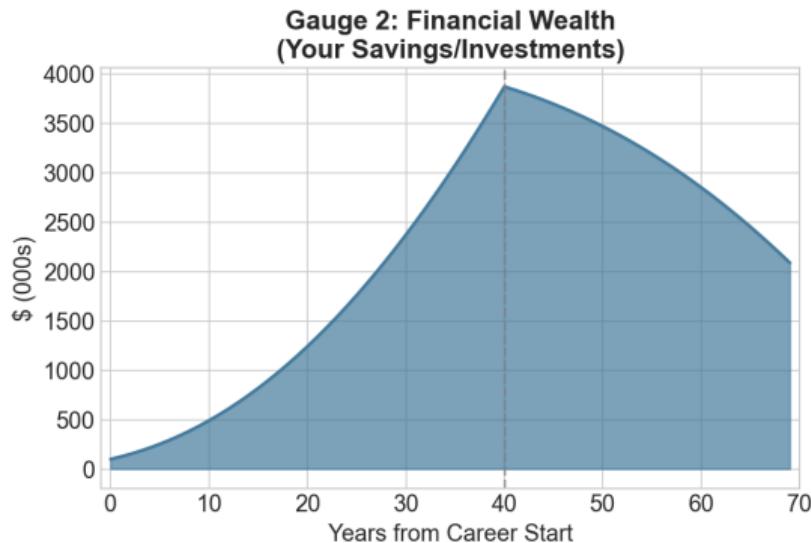
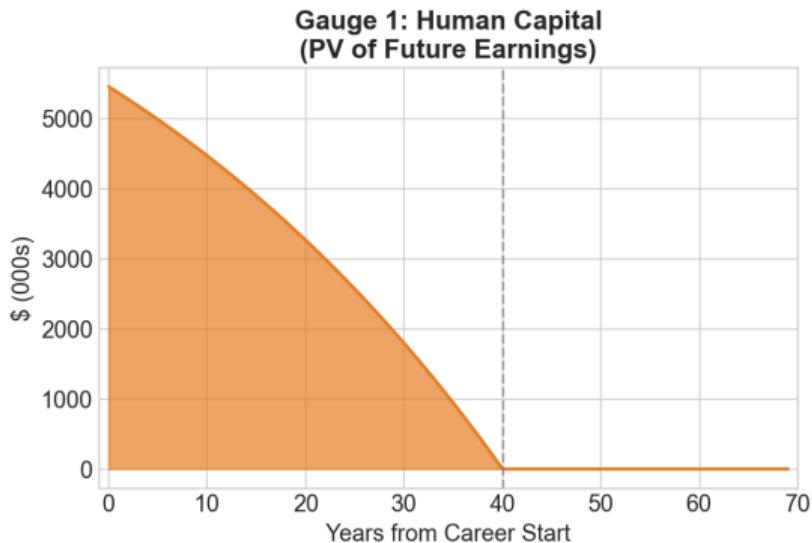
Traditional advice focuses on one number: your savings balance.

Finance theory says you need to track **four gauges**:

- ① Human Capital (your future earning power)
- ② Financial Wealth (your savings)
- ③ Expense Liability (what you owe your future self)
- ④ Net Worth (assets minus liabilities)

The Four Gauges of Lifecycle Finance

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Why Track All Four?

Human Capital (Gauge 1):

- Depletes as you age
- Affected by career risk
- Has duration (interest rate sensitivity)

Financial Wealth (Gauge 2):

- What you control directly
- Grows through savings + returns
- Must replace HC over time

Expense Liability (Gauge 3):

- Your commitment to future self
- Has duration too!
- Determines “fully funded” status

Net Worth (Gauge 4):

- The bottom line
- Drives consumption decisions
- Should stay positive!

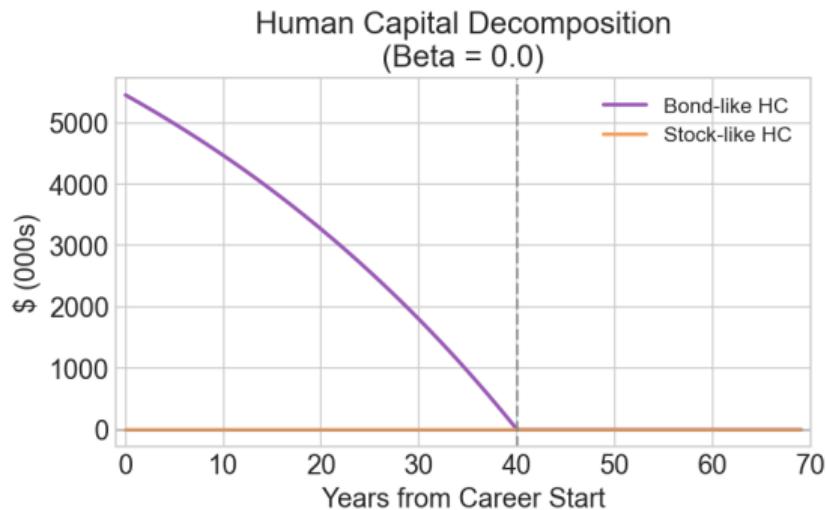
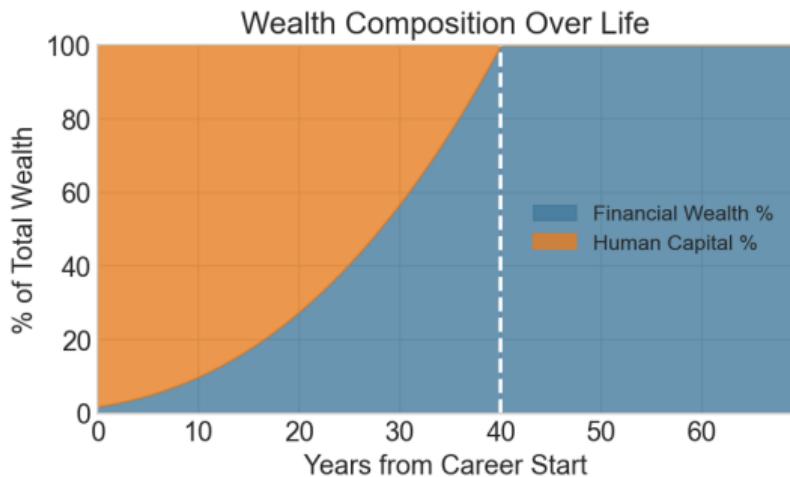
Human capital is like a bond.

- Stable, predictable income stream (for most people)
- Has **duration**: sensitive to interest rates
- Beta to stock market ≈ 0 for professors, consultants
- Beta > 0 for entrepreneurs, tech workers

Implication: To maintain target total risk, financial portfolio must adjust as HC depletes.

Why Portfolio Allocation Changes Over Life

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The Logic of the Glide Path

Young investor (age 25):

- Total wealth = 90% Human Capital + 10% Financial Wealth
- HC is bond-like \Rightarrow already have implicit bond position
- Financial portfolio should be **100% stocks** to balance

Retiree (age 70):

- Total wealth = 0% Human Capital + 100% Financial Wealth
- No implicit bond position from HC
- Financial portfolio should match **target allocation** (e.g., 50/50)

This is WHY target-date funds have a “glide path”!

Not All Human Capital is the Same

Your job's riskiness matters.

Low Beta ($\beta \approx 0$):

- Tenured professor
- Government employee
- Doctor, lawyer

HC is bond-like

⇒ Hold **more** stocks

High Beta ($\beta \approx 1$):

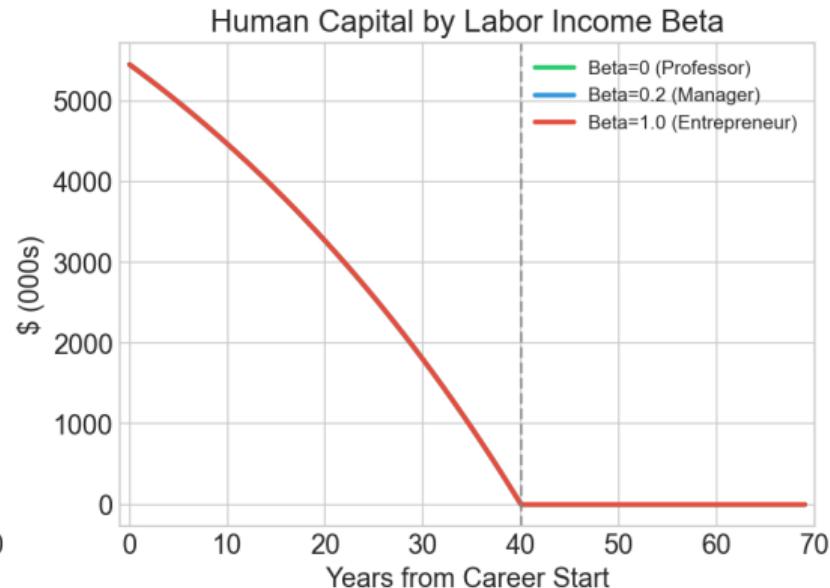
- Tech startup founder
- Investment banker
- Sales (commission-based)

HC is stock-like

⇒ Hold **fewer** stocks

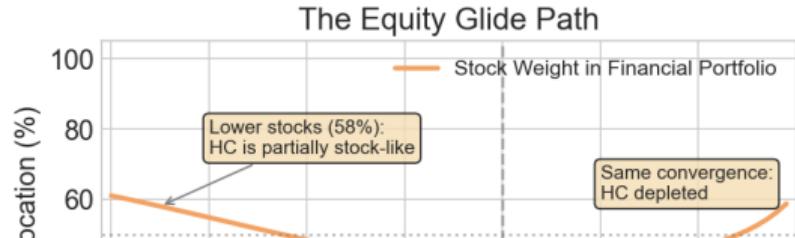
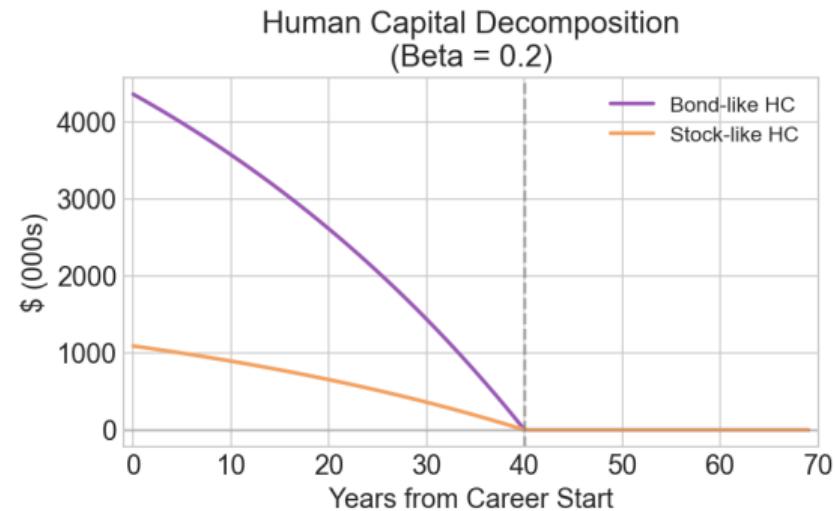
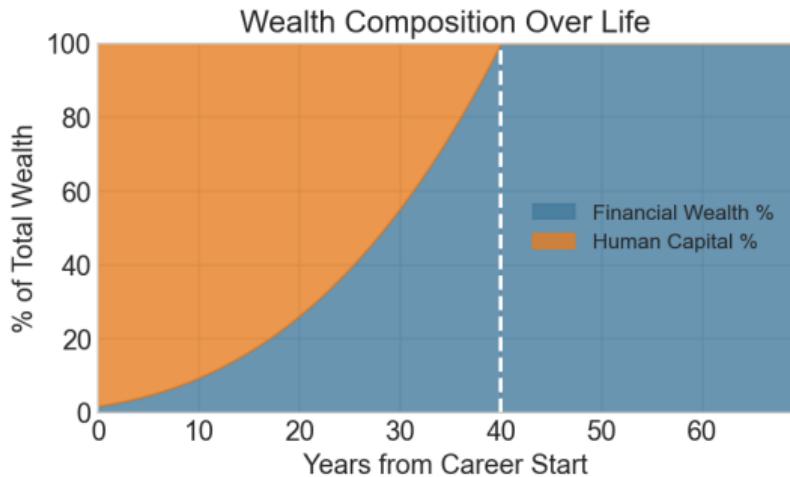
Effect of Labor Income Risk on Portfolio Choice

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Detailed View: Risky Human Capital ($\beta = 0.2$)

Portfolio Allocation with Risky Human Capital ($\beta = 0.2$)



Practical Implications

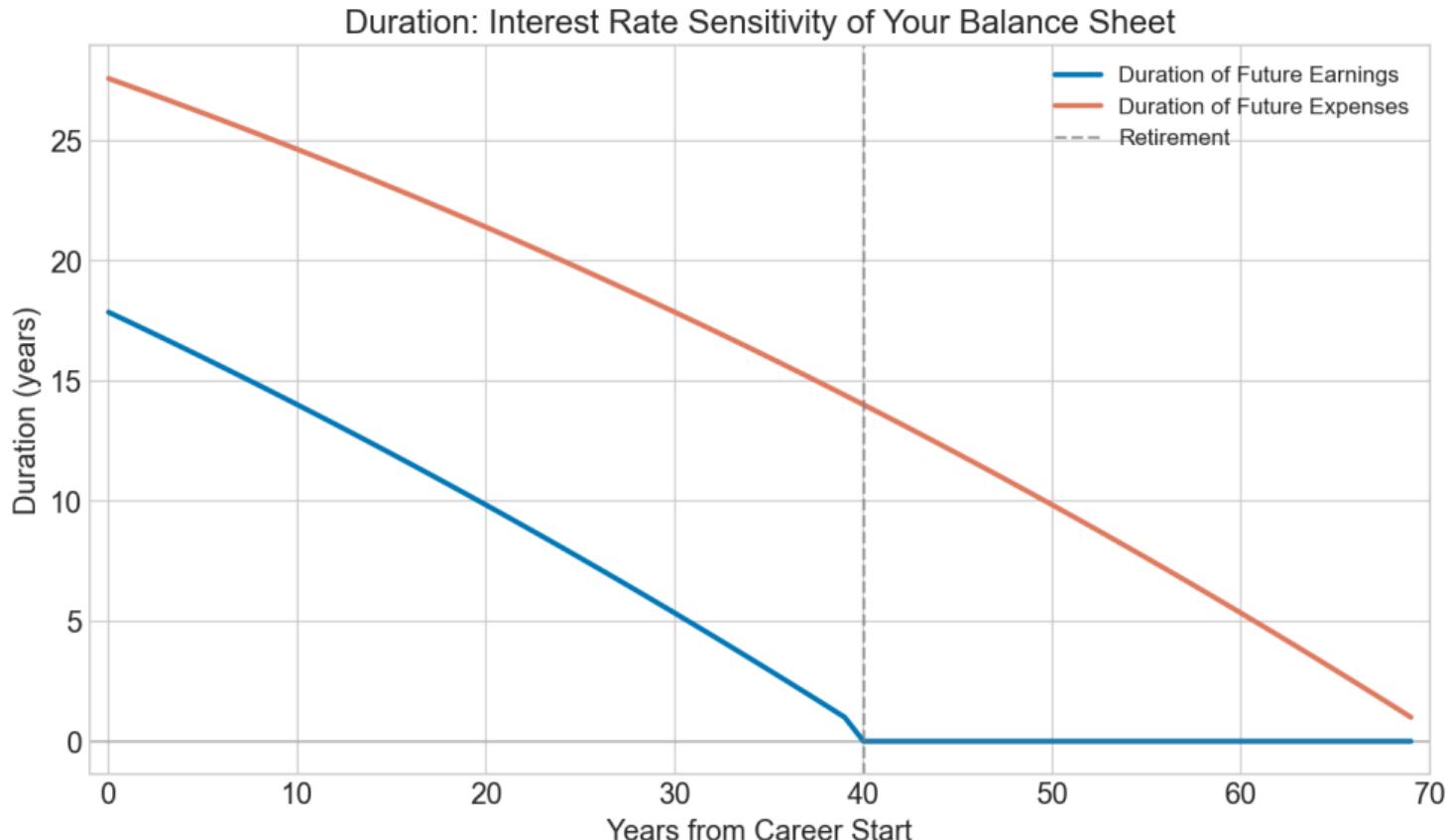
If your income is stable (professor, government):

- You can afford more risk in your portfolio
- 100% stocks early in career is reasonable
- Your human capital provides diversification

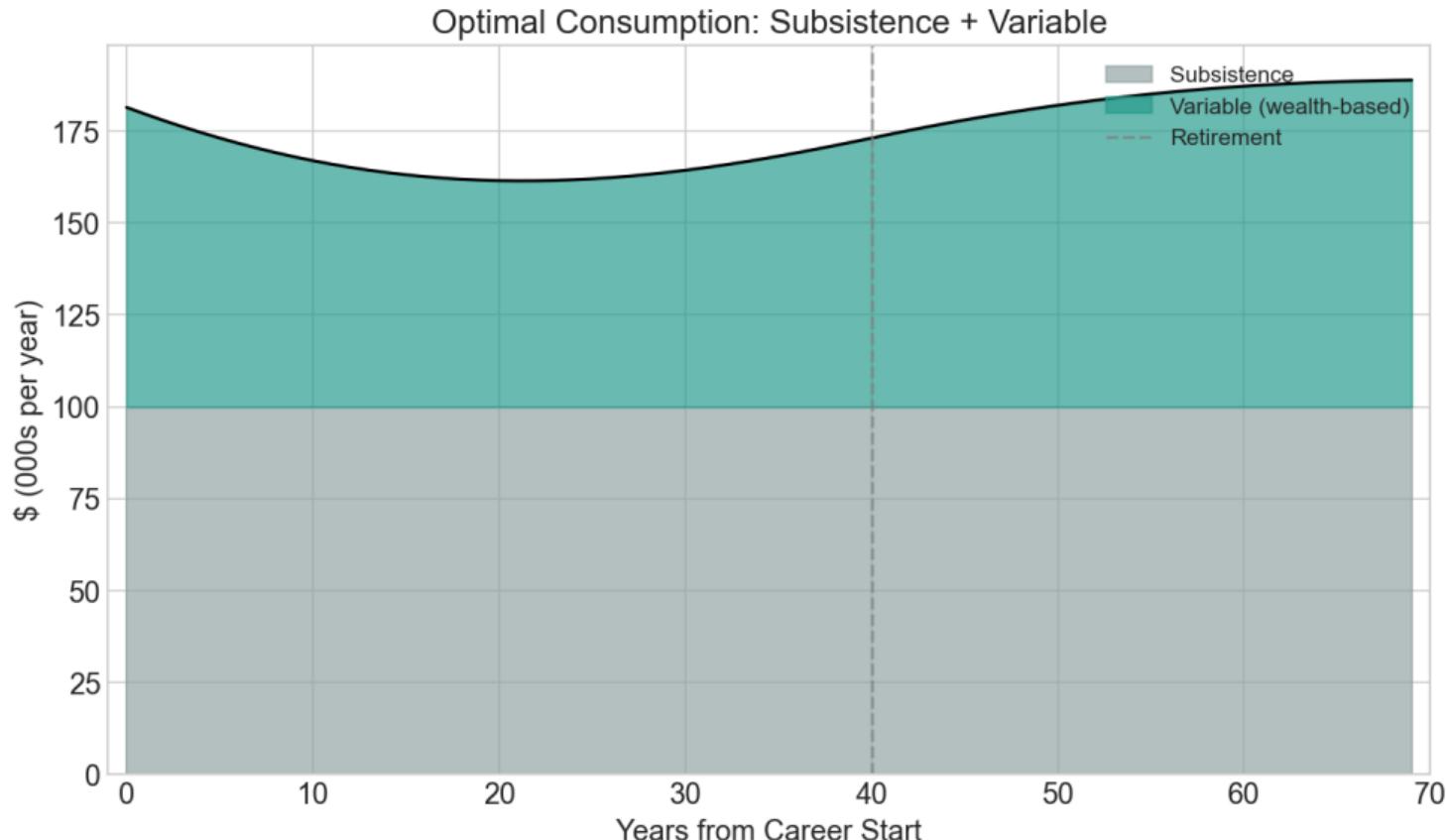
If your income is risky (entrepreneur, tech):

- Be more conservative in your portfolio
- Don't double down on market risk
- Consider your company stock exposure carefully!

Interest Rate Risk on Your Balance Sheet



Consumption Smoothing



Key Takeaways

- ① **The Problem:** Income and expenses don't match over time
- ② **Human Capital:** Your biggest asset early in life (but invisible)
- ③ **Four Gauges:** Track HC, FW, Expenses, and Net Worth—not just your 401(k)
- ④ **Glide Path Logic:** HC is bond-like \Rightarrow young people should hold more stocks
- ⑤ **Labor Risk Matters:** Risky job \Rightarrow more conservative portfolio
- ⑥ **Duration:** Match asset and liability durations to manage interest rate risk

The Merton Framework

Optimal portfolio allocation:

$$w^* = \frac{1}{\gamma} \Sigma^{-1} \mu$$

where:

- γ = risk aversion coefficient
- Σ = covariance matrix of asset returns
- μ = vector of expected excess returns

Key extension for lifecycle:

- Human capital is an implicit asset in your portfolio
- Financial portfolio adjusts to reach total wealth target
- As HC depletes, financial portfolio converges to w^*

Questions?