Lifetime Advice
Asset Allocation, Life Insurance, & Payout Annuities

Roger Ibbotson
Professor, Yale School of Management
Chairman, Ibbotson Associates

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Investor Risks at Different Life Stages

- Market Risk
- Mortality Risk
- Savings Risk
**Investor Risks at Different Life Stages**

- Age 25
- 65
- 100

**Retirement Income**
- Market Risk
- Longevity Risk
- Bequest

**Managing Risks at Different Life Stages**

- Age 25
- 65
- 100

**Accumulation**
- Market Risk → Asset Allocation
- Mortality Risk → Life Insurance
- Savings Risk → Savings Rate
Accumulation Stage: Asset Allocation, Life Insurance, and Human Capital

- Human capital is the actuarial net present value of future earnings
- Takes into account an investor’s
  - Income
  - Savings
  - DB income
  - Social Security

Typical Life Cycle of Human Capital and Financial Capital
Accumulation Stage: Financial Capital & Human Capital

<table>
<thead>
<tr>
<th>Age</th>
<th>25</th>
<th>45</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Capital</td>
<td>Stocks</td>
<td>Bonds</td>
<td>Stocks</td>
</tr>
<tr>
<td>Human Capital</td>
<td>Stocks</td>
<td>Bonds</td>
<td>Stocks</td>
</tr>
<tr>
<td>Total Portfolio</td>
<td>Stocks</td>
<td>Bonds</td>
<td>Stocks</td>
</tr>
</tbody>
</table>

Human capital, Life Insurance, and Asset Allocation

- Life insurance modeling
  - Human capital (future income)
  - Current financial wealth
  - Preference for family well being
  - Risk tolerance
- Asset allocation modeling
  - Risk tolerance
  - Risk and return
  - Human capital & financial capital
- Correlation between income and market environment
### Case Profile

- **Age:** 45
- **Retirement age:** 65
- **Gender:** Male
- **Financial wealth:** $500,000
- **Real income:** $50,000
- **Consumption:** $45,000
- **Future Social Security Benefit:** $10,000
- **Real income growth rate and Standard deviation:** 0%; 5%
- **Income Correlation:** 0.5

Other inputs are insurance loading 12.5%, moderate preference for family well being, moderate bequest, and moderate risk tolerance.

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### Risk, Return and Inflation 1926-2003

- **Equity (S&P 500 total return index)**
  - Expected return: 10.4%
  - Standard deviation: 20.4%

- **Bond (Long-term government bond)**
  - Expected return: 5.4%
  - Standard deviation: 9.4%

- **Inflation rate**
  - 3.0%
Life Cycle of Human Capital

Financial Wealth, Human Capital, and Life Insurance

Age

Insurance Need

Wealth

Human Capital

Insurance Need

Risk Tolerance vs. Asset Allocation and Life Insurance Need

Asset Allocation vs. Risk Tolerance

Conservative

Moderate

Aggressive

Insurance Need vs. Risk Tolerance

$510,796

$388,737

$281,669

$0

$100,000

$200,000

$300,000

$400,000

$500,000

$600,000
**Life Insurance Needs**

- Higher risk aversion → Less risky assets → More insurance
- Higher initial wealth → Less risky assets → Less Insurance
- Higher correlation between income and investment returns → Little impact on AA → Less Insurance
- Older → Less risky assets → Less Insurance

**Term vs Whole Life Insurance**

- Term Life Insurance (shorter horizon, low tax bracket)
- Whole Life or Variable Life (long horizon, high tax bracket)
- Life Insurance can also be used to reduce estate taxes
Managing Risks at Different Life Stages

Mix Between Assets and Annuity Products
- Income and bequest goals
- Market and longevity risk

Optimization with Annuities and Asset Classes

Asset Allocation with Annuities*

*Patent Pending
Inputs to Optimization with Annuities and Asset Classes

- Risks & Returns
- Risk Tolerance
- Desires for Consumption & Bequest
- Probability of Living Beyond Life Expectancy
- Expenses & Fees

Couple at 65 - Including Annuities

Moderate Bequest Desire
- Conservative: Stocks, Fixed Annuity, Bonds
- Moderate: Stocks, Variable Annuity, Fixed Annuity, Bonds
- Aggressive: Stocks, Variable Annuity, Fixed Annuity, Bonds

Stronger Bequest Desire
- Stocks, Fixed Annuity, Bonds
- Stocks, Variable Annuity, Fixed Annuity, Bonds
- Stocks, Variable Annuity, Fixed Annuity, Bonds
Couple at 65 - No Annuities

**Wealth**
Today's Dollars

- $1,000,000
- $100,000
- $10,000

**Market Risk**
Chance of this scenario:
- 1 in 2

**Income**
Today's Dollars

- $80,000
- $60,000
- $40,000
- $20,000
- $0

**Social Security**

**Age**
65 70 75 80 85 90 95 100

**Longevity**
Chance of living longer

- 9 in 10
- 3 in 4
- 1 in 2
- 1 in 4
- 1 in 10

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Couple at 65 - No Annuities

**Wealth**
- Today's Dollars
  - $1,000,000
  - $100,000
  - $10,000
- Market Risk
  - Chance of this scenario:
    - 1 in 2
    - 1 in 4
    - 1 in 10

**Income**
- Today's Dollars
  - $80,000
  - $60,000
  - $40,000
  - $20,000
  - $0
- Social Security

**Longevity**
- Chance of living longer
  - Age 65 70 75 80 85 90 95 100
  - 9 in 10
  - 3 in 4
  - 1 in 2
  - 1 in 4
  - 1 in 10

Couple at 65 - Including Annuities (moderate bequest)

**Wealth**
- Today's Dollars
  - $1,000,000
  - $100,000
  - $10,000
  - $100,000
- Market Risk
  - Chance of this scenario:
    - 1 in 2

**Income**
- Today's Dollars
  - $80,000
  - $60,000
  - $40,000
  - $20,000
  - $0
- Social Security

**Longevity**
- Chance of living longer
  - Age 65 70 75 80 85 90 95 100
  - 9 in 10
  - 3 in 4
  - 1 in 2
  - 1 in 4
  - 1 in 10

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Couple at 65 - Including Annuities (moderate bequest)

- Wealth: Today's Dollars
- Longevity: Chance of living longer

<table>
<thead>
<tr>
<th>Age 65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
<th>95</th>
<th>100</th>
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<tbody>
<tr>
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<td>1 in 2</td>
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<td>1 in 10</td>
<td></td>
<td></td>
<td></td>
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</table>

- Market Risk: Chance of this scenario:
  - 1 in 2
  - 1 in 4
  - 1 in 10

- Buy life insurance
- Don't buy life insurance

Summary

- Accumulation Stage (25-65)
  - Market risk, mortality risk, & savings
  - Asset allocation, life insurance, & savings rates

- Retirement Stage (65-100)
  - Market risk, longevity risk, & bequest
  - Asset allocation, annuities, & life insurance

- Financial Models Provide Lifetime Advice
  - Optimal allocations across all products
  - Human & financial capital, risk & returns, correlations, and risk tolerance