Review: Social Security, endogenous retirement and intra-household cooperation by Laura Turner

Professor John M. Mulvey
Bendheim Center for Finance
Department of Operations Research & Financial Engineering
Princeton University

September 11, 2010

Outline

- 1. Recap and general comments
- 2. Suggested extensions
  - Address significant issues
  - Example of interacting decisions
- 3. Alternative explanation

Recap

- Generic Everyman (or everywoman)

  At age j:

  wealth (a)
  wages (w)
  health (δ)
  social security credit (E)
  marital status (ms)
  labor force status (lfs) -- {career job, non-career job, retired}

  When to take social security benefits (after age 62 – up to age 70)

- Goal: maximize E u(consumption c, leisure l)

Recap

- General comments

  Ambitious effort

  Myriad of details with numerous parameters and relationships

  Builds on previous work in the area

  Carefully developed analysis

  Interesting concept – non-cooperative games for couples

- Puzzles

  Select to receive Social Security benefits in U.S. at age 62, often couples together, partial retirement (bridge jobs), and disability benefits

- General approach
  - Dynamic programming model for individual or couples (assessing leisure and working life decisions over random lifespans)

Recap

- Issues and questions

1. Can an individual make a decision about marriage or children?
   Non-cooperative game – why stay married?
2. Which variables are uncertain?
   Lifespan
   wealth – what about investment returns?
   Wages – depends upon many factors
   Health status

3. How are taxes addressed?

4. Solution of dynamic program for large state space

Extensions

1. The discount rate could be adjusted, depending upon lifespan – perhaps hyperbolic discounting.

2. Asset returns could be modeled from current conditions as stochastic variables. Why 4.2% constant interest rates?

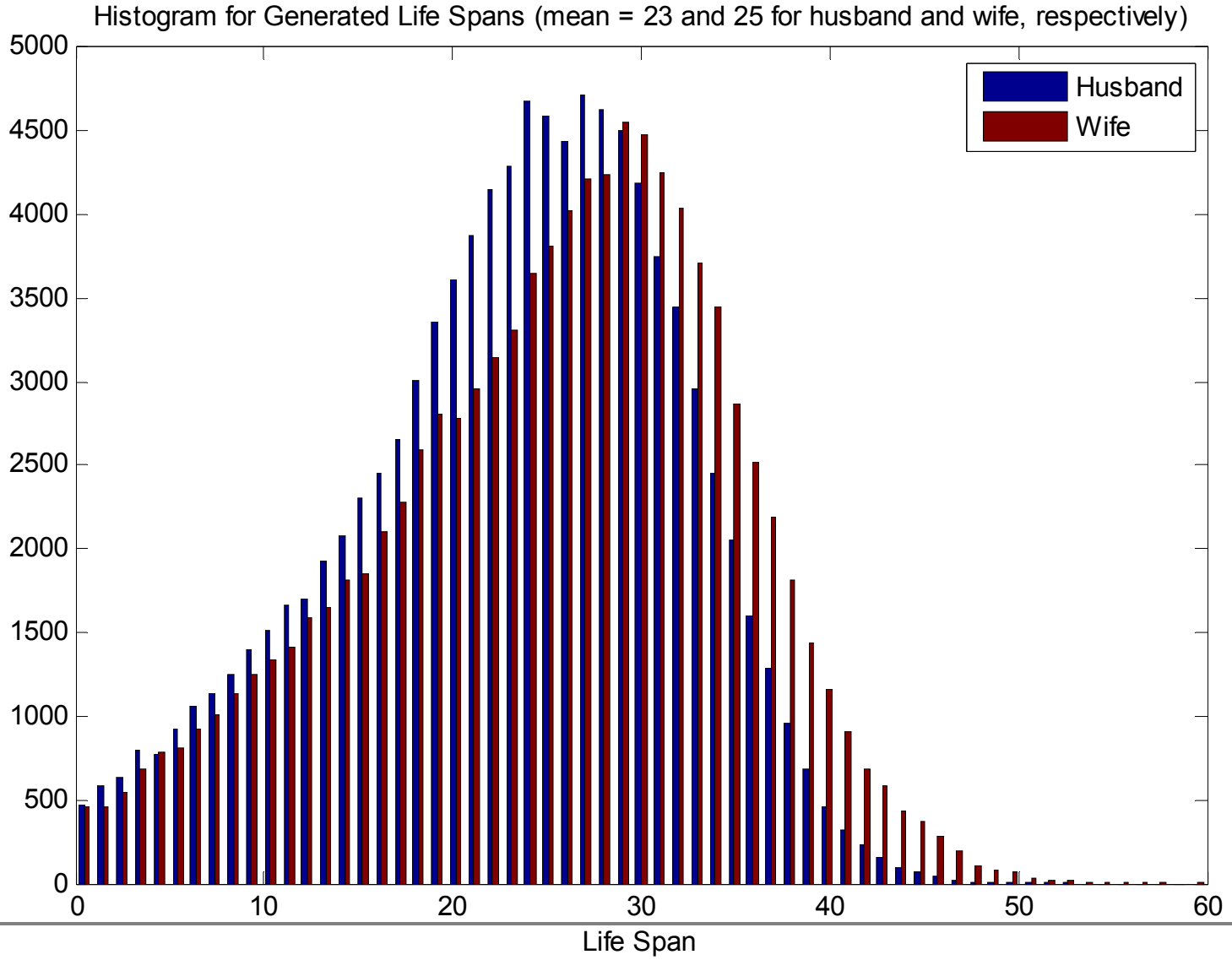
3. Include interacting variables, such as investment decisions – purchase annuity, manage DC pension plans, life insurance

4. Address longevity risks – people are living much longer than estimated by standard actuarial models of life-span

Example: interacting decisions

- Assumptions
  - Couple are both 60 years old and have just retired
  - They can live up to 120
  - Their remaining lives are modeled from the mortality table used for the U.S. pension plans.
  - The average life spans for the base case are 23 and 25 for the husband and the wife, respectively (c.f. actual estimated life spans are 23.3 and 25.2 in 2010).
  - Remaining lives of husband and the wife are assumed to independent.
  - Current wealth = $200k, husband receives DB pension = $50k/year
  - Expenses = $50k/year
  - Invest in equity and bonds
  - Maximize E u(consumption)

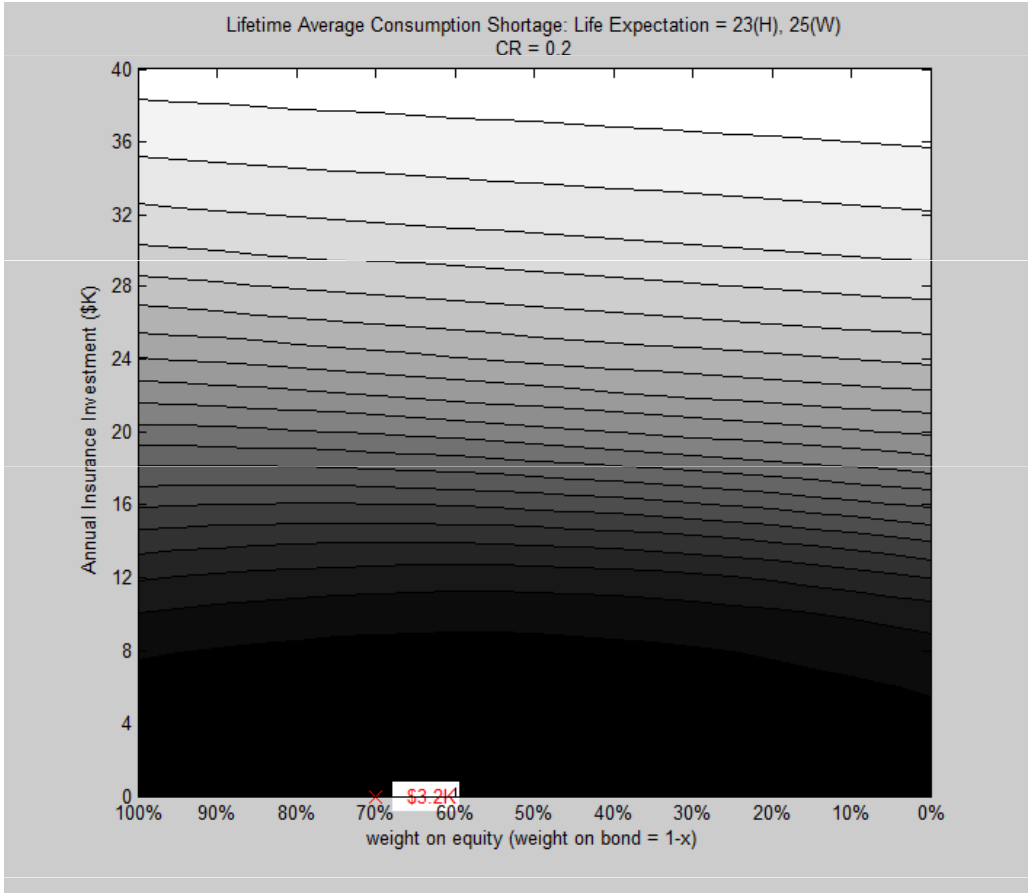
The Couple


Histogram for Generated Life Spans (mean = 23 and 25 for husband and wife, respectively)
Husband
Wife
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
Life Span

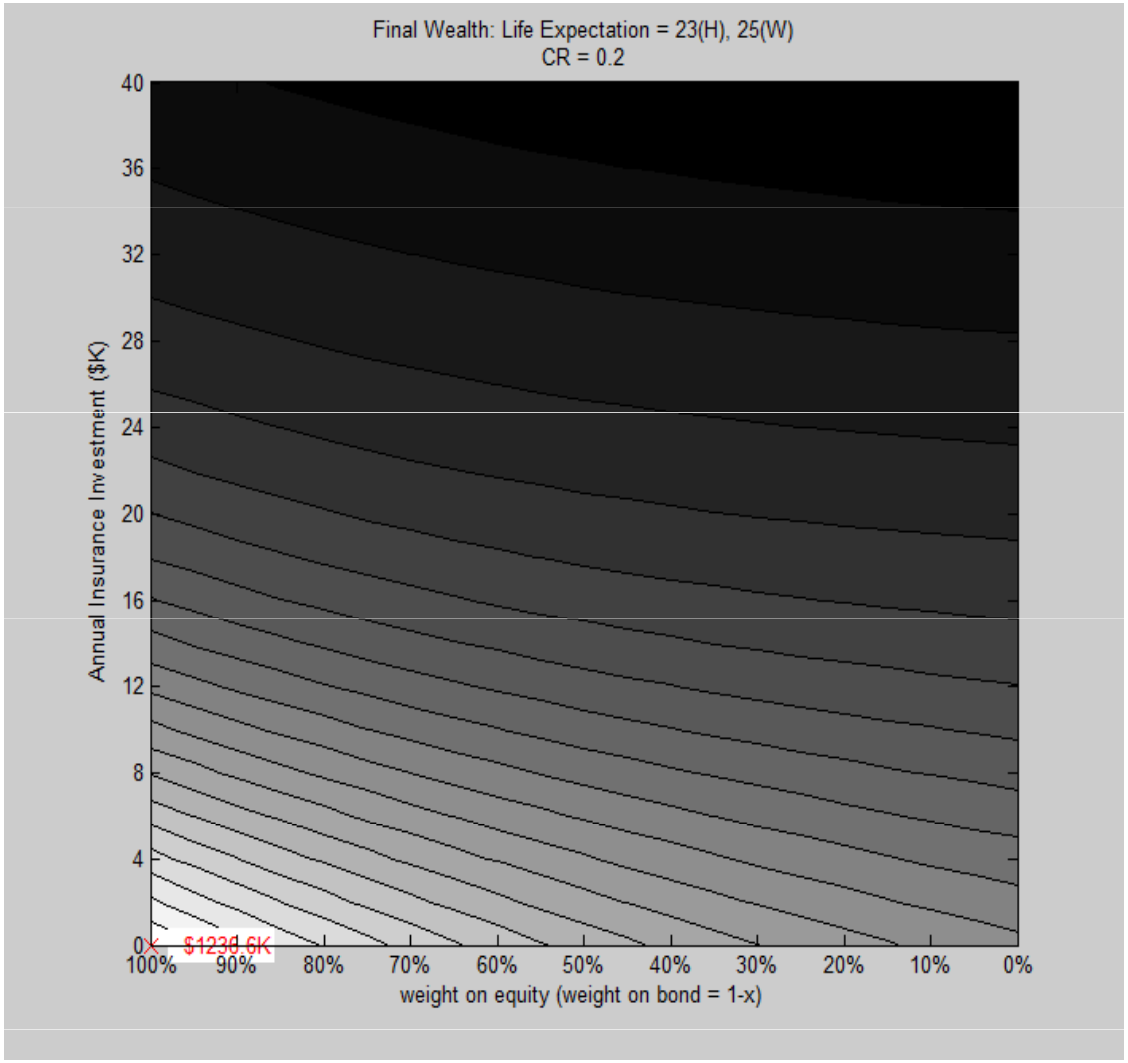
Insurance

- Contract
  - The life insurance is 10-year long.
  - If the policy owner dies within 10 years after the initial contract, they will receive a designated amount of benefits.
  - The couple could decide how much to invest in the life insurance.
- Premium vs. benefit
  - If the policy owner dies within the coverage period, the beneficiary receives the face amount according to the conversion ratio (CR).
    - Face value = CR * annual premium for first 10-year sub period.
  - CR decreases at every renewal of the policy
    - The base CR is set to make the expected total premium payment and the expected benefit to be equal according to the given mortality rates.
    - For instance, for the base case (life expectation for husband = 23)
      - Expected total premium payment for the first 10 years = 9.68*annual premium
      - Pr(benefit payments made) = 0.0898
      - Thus, CR = 9.68/0.0898 = 107.79
      - Meaning that, the premium of $1, the face value is $107.79

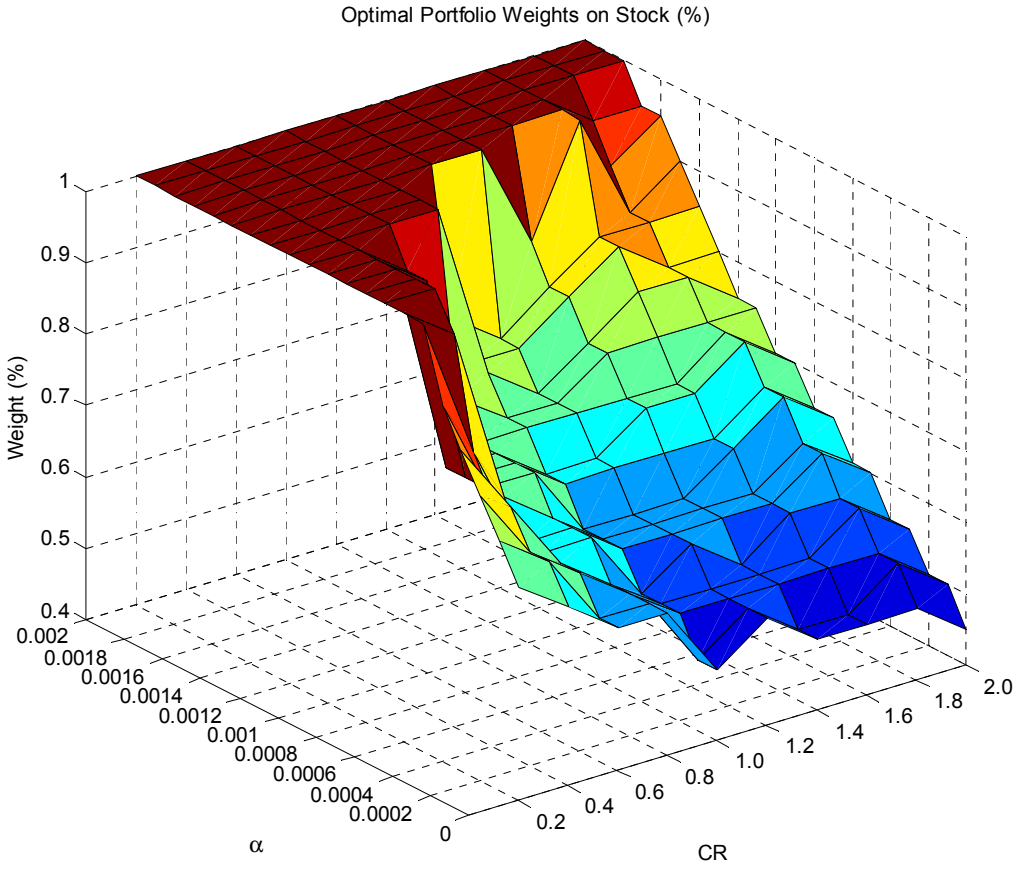
Life Time Average Shortage in Consumption



Final Wealth



Optimal Portfolio from Expected Utility Maximization



Alternative Explanation – Why 62?

1. Individuals do not optimize a stochastic dynamic programming model

2. Instead, individuals may opt to achieve goals – and then retire (satisficing) -- behavioral explanation

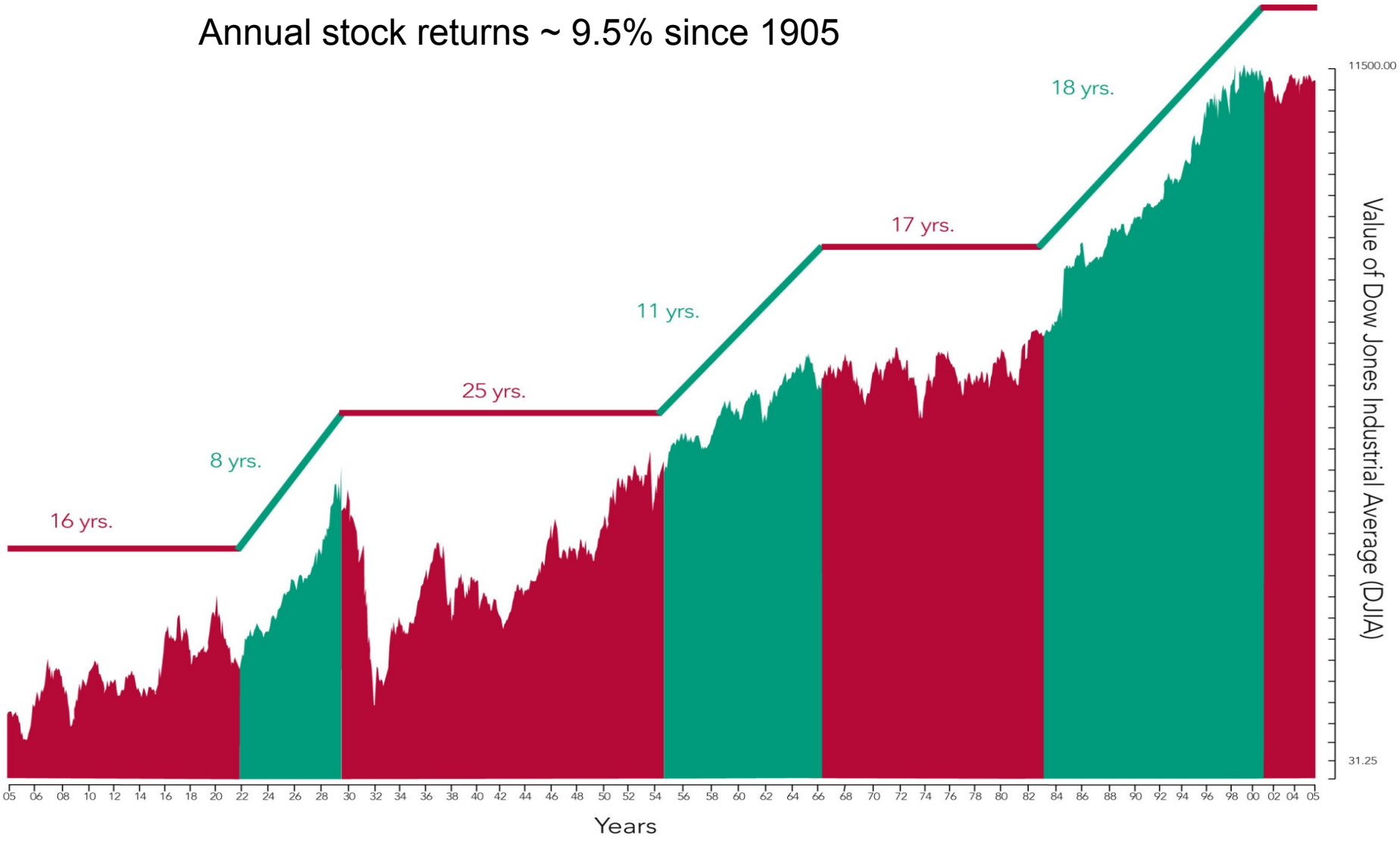
3. Recent study by Danny Kahneman and Angus Deaton at Princeton

    1. "people's life evaluations rise steadily with income, but their reported quality of emotional daily experience levels off as a certain income level."

4. How much is enough?
    1. Individuals may be fatalistic – my turn is next
    2. Individuals may not trust the government to be able to pay in the future
    3. Individuals may be able to hide income (hidden economy)

History: returns have occurred in long-term bull markets

Annual stock returns ~ 9.5% since 1905



Conclusions

1. Carefully conducted analysis of retirement decisions for individuals and couples in the U.S., regarding their date for accepting social security benefits.

2. Non-cooperative models explains the puzzles better than the simpler cooperative model

3. What about alternative explanations? Can we judge the retirement decision on current wealth and projected future income during retirement – critical issue as DC plans become a common place

4. Address additional factors in individual decision making (via financial optimization models such as iALM – Dempster and Medova)