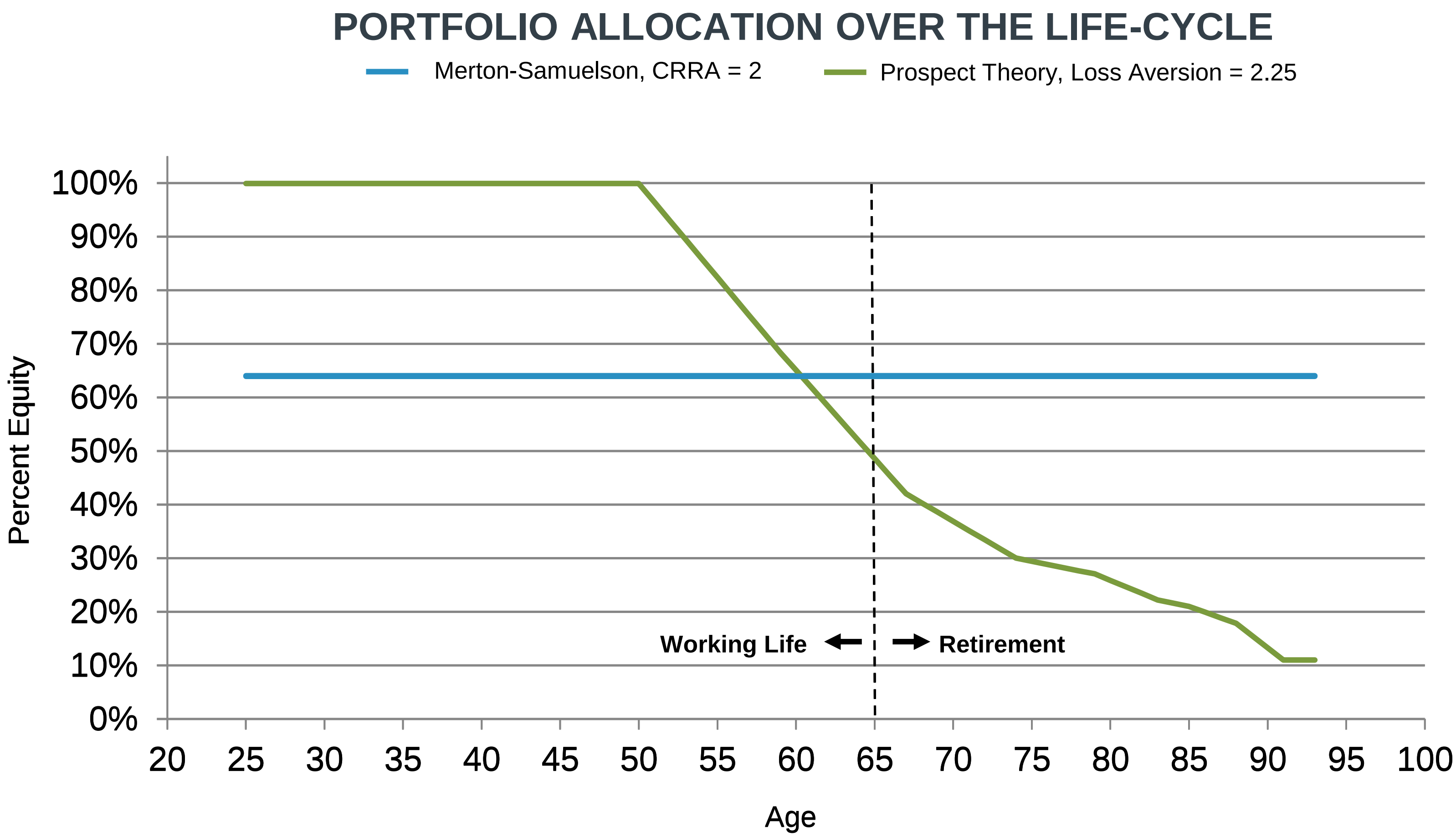
Prospect Theory and Robust Life-Cycle Investing

NABE TEC2019

November 5, 2019

Emil P. Iantchev
Head of Portfolio Construction Research

Need to Save for Retirement: How to Invest?

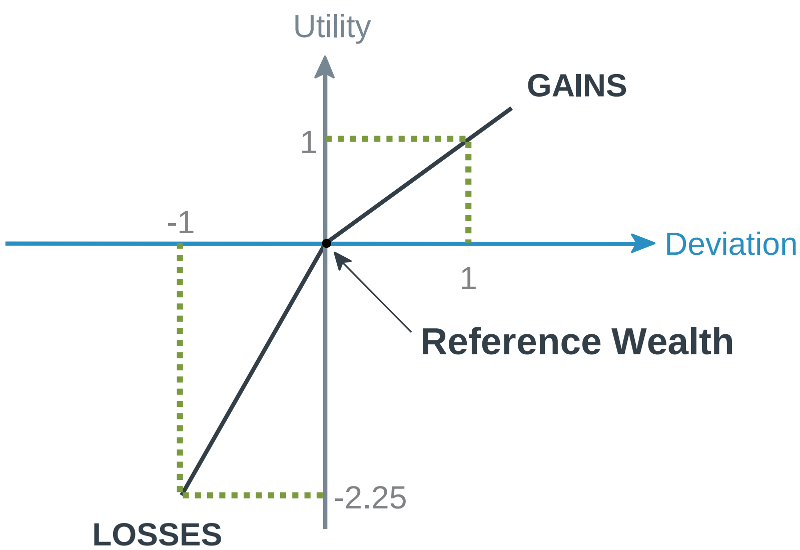


For this presentation: Capital Markets is the only source of uncertainty

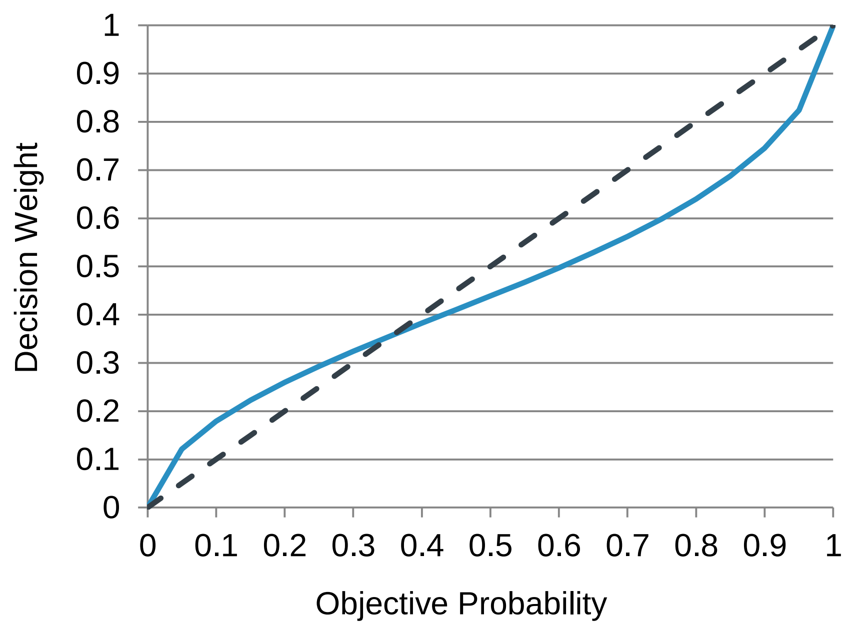
Past performance is no guarantee of future results. Sources: U.S. Equity: S&P 500 Global Financial Database (GFD) prior to 1926.07, Fama-French All Market since 1926.07. Non-U.S. Equity: 60% UK, 40% FRA equity prior to 1926 (per GFD relative weights, GFD WxUS (EAFE) 1926-1987, MSCI ACWIxUS since 1988. U.S. Bonds: UST10 (GFD) prior to 1975.12, Barclays US Agg since 1975.12.

Prospect Theory: An Analysis of Decision Under Risk

VALUE FUNCTION



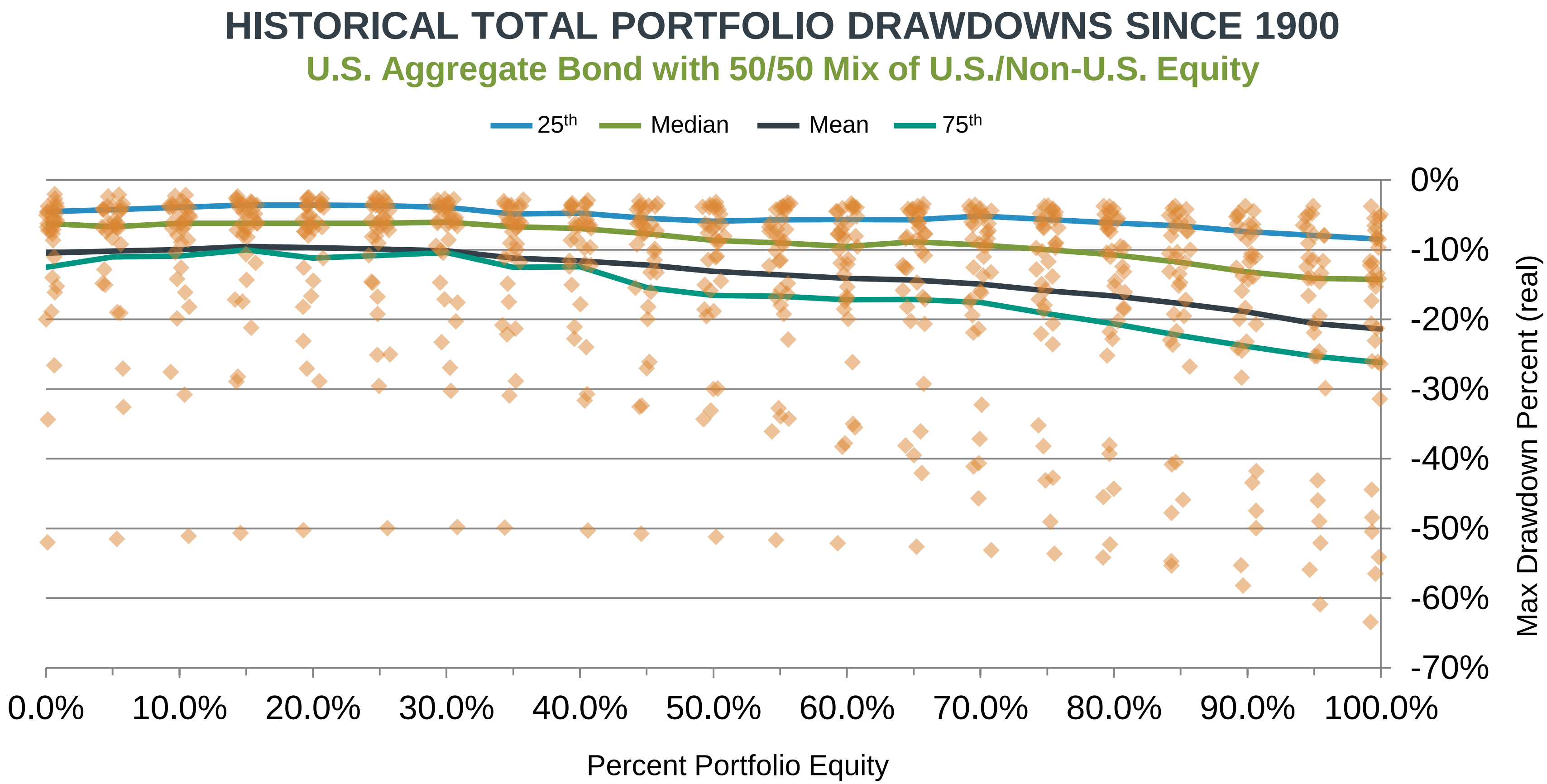
PROBABILITY WEIGHTING FUNCTION



Source: Daniel Kahneman and Amos Tversky (1979, 1992).

 For educational use only.

Loss Aversion + Concern for Tail Events = Robust Control



The set of historical worst case scenarios varies by portfolio

An 80% bond portfolio can do well under high equity drawdowns

Past performance is no guarantee of future results. Sources: U.S. Equity: S&P 500 Global Financial Database (GFD) prior to 1926.07, Fama-French All Market since 1926.07. Non-U.S. Equity: 60% UK, 40% FRA equity prior to 1926 (per GFD relative weights, GFD WxUS (EAFE) 1926-1987, MSCI ACWIxUS since 1988. U.S. Bonds: UST10 (GFD) prior to 1975.12, Barclays US Agg since 1975.12.

 For educational use only.

Composition of Cyclical Drawdowns For An All-Equity Portfolio

STATISTICALLY REASONABLE SET OF WORSE-CASE SCENARIOS

Market Risk:
Exposure to the largest market drawdowns (peak to trough)

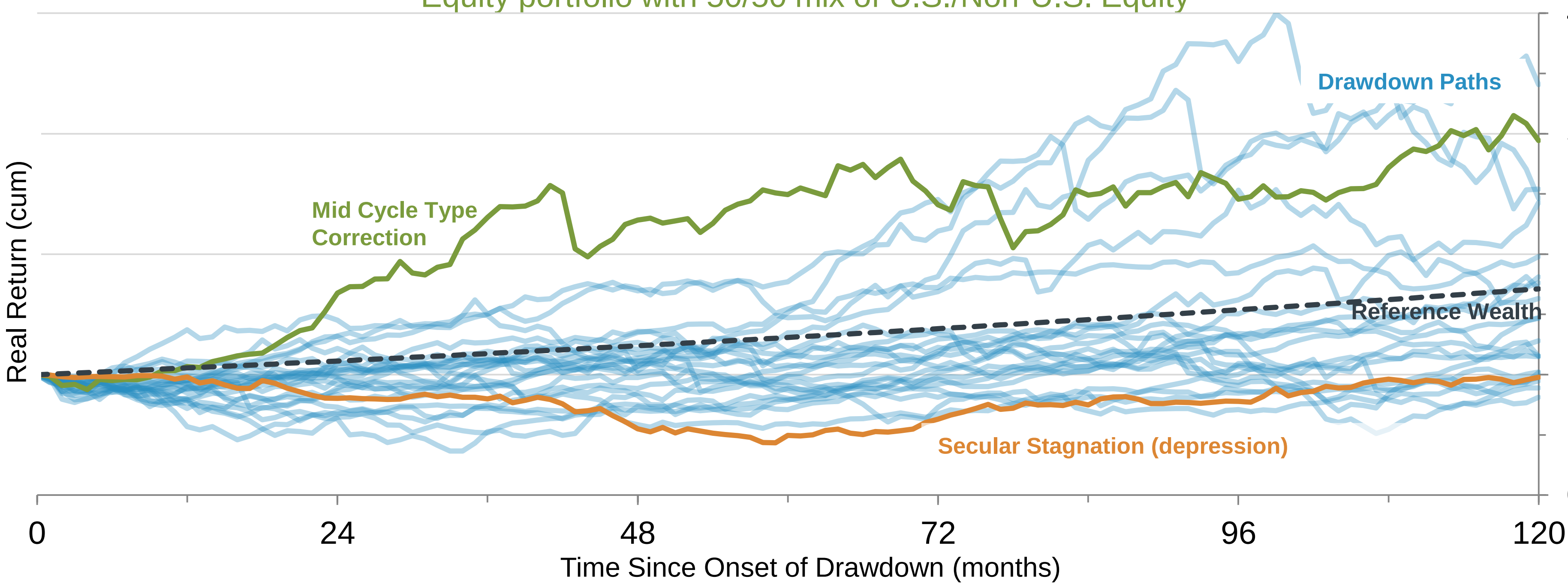
Recovery Risk:
Exposure to the slowest recoveries (time to par)

Sequence Risk:
Evaluate each strategy at the event onset

TOP 25 EQUITY DRAWDOWNS SINCE 1900

Drawdown Plus Trailing 10-year Return

Equity portfolio with 50/50 mix of U.S./Non-U.S. Equity



Sources: U.S. Equity: S&P 500 Global Financial Database (GFD) prior to 1926.07, Fama-French All Market since 1926.07. Non-U.S. Equity: 60% UK, 40% FRA equity prior to 1926 (per GFD relative weights, GFD WxUS (EAFE) 1926-1987, MSCI ACWIxUS since 1988. U.S. Bonds: UST10 (GFD) prior to 1975.12, Barclays US Agg since 1975.12.

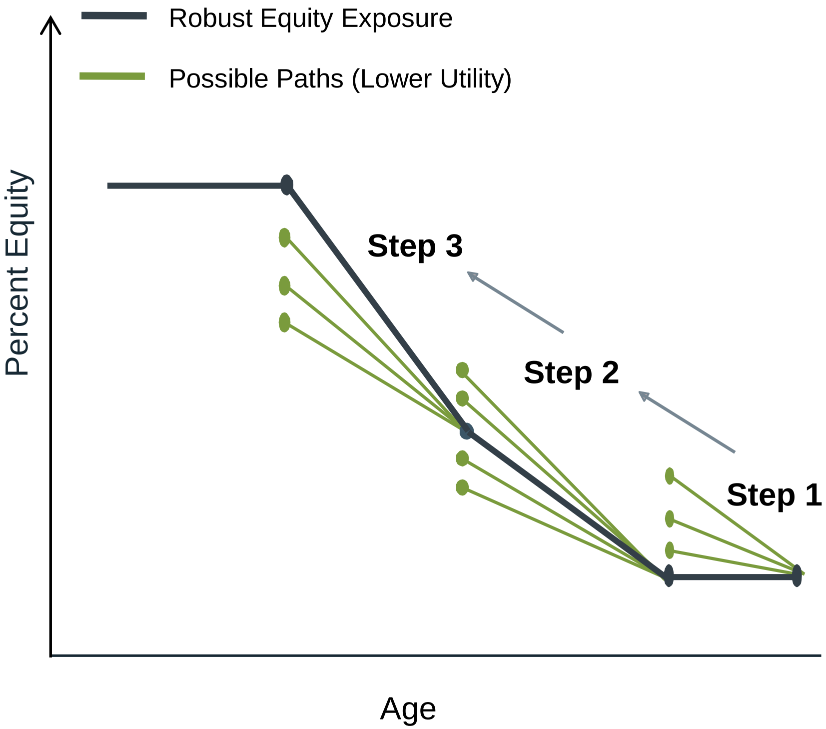
 For educational use only.

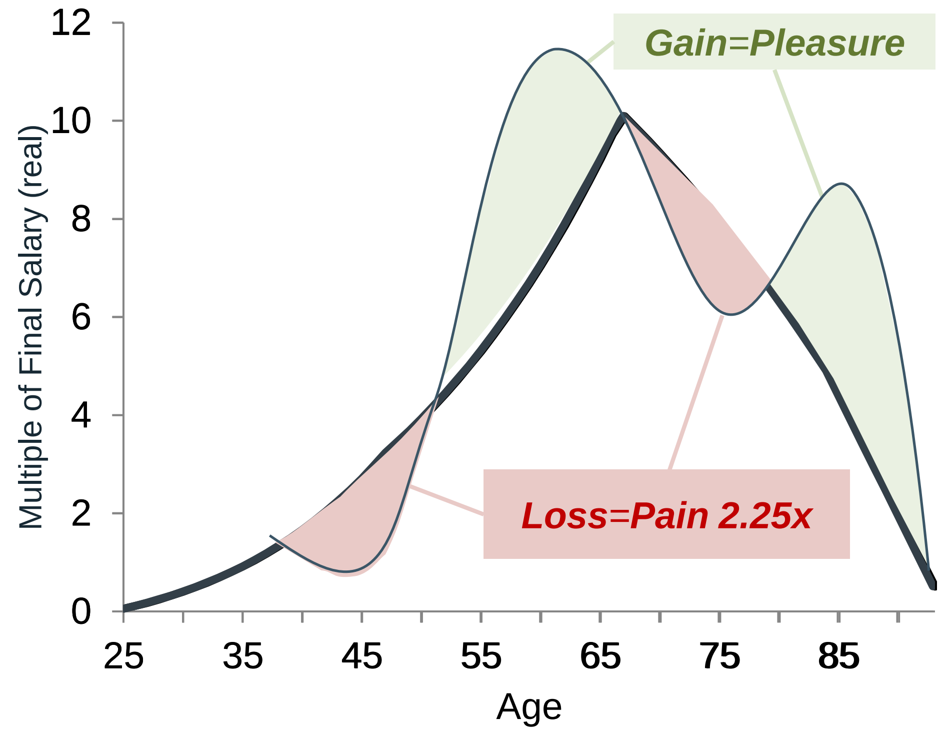
Solution Method: Robust Dynamic Programming

Step 1: A strategy that funds retirement

Step 2: Evil agent hits us with portfolio drawdowns

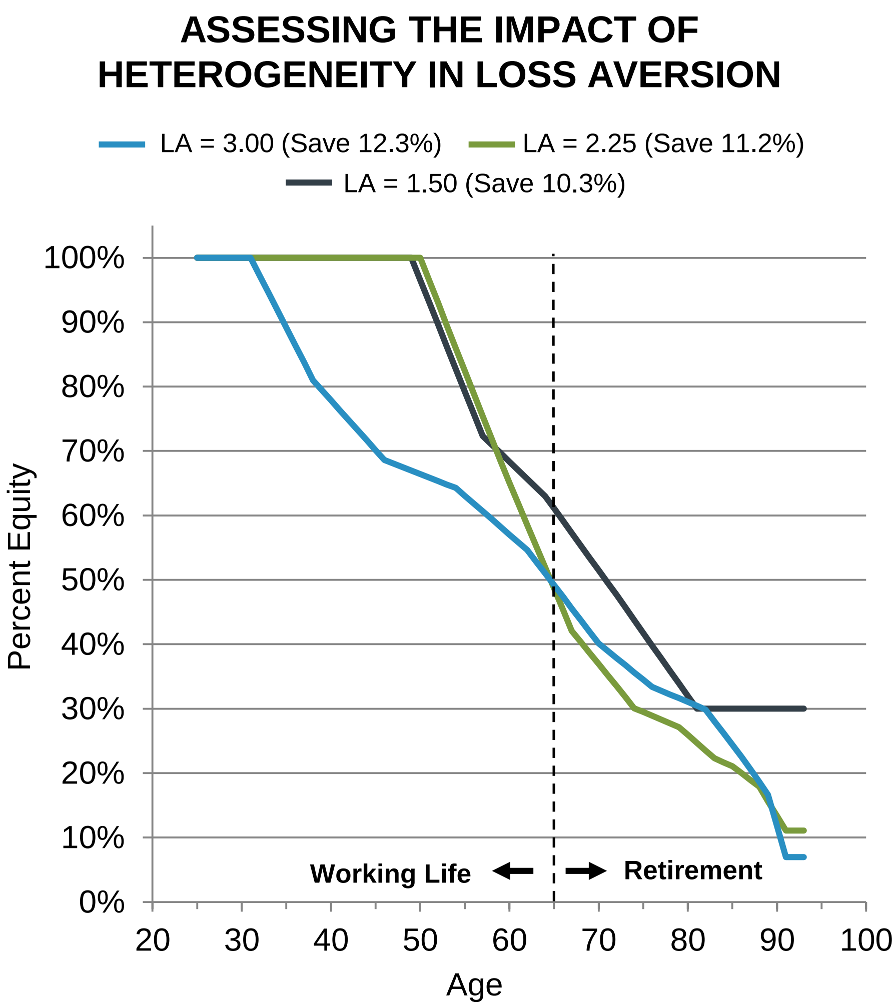
Step 3: Calculate Welfare

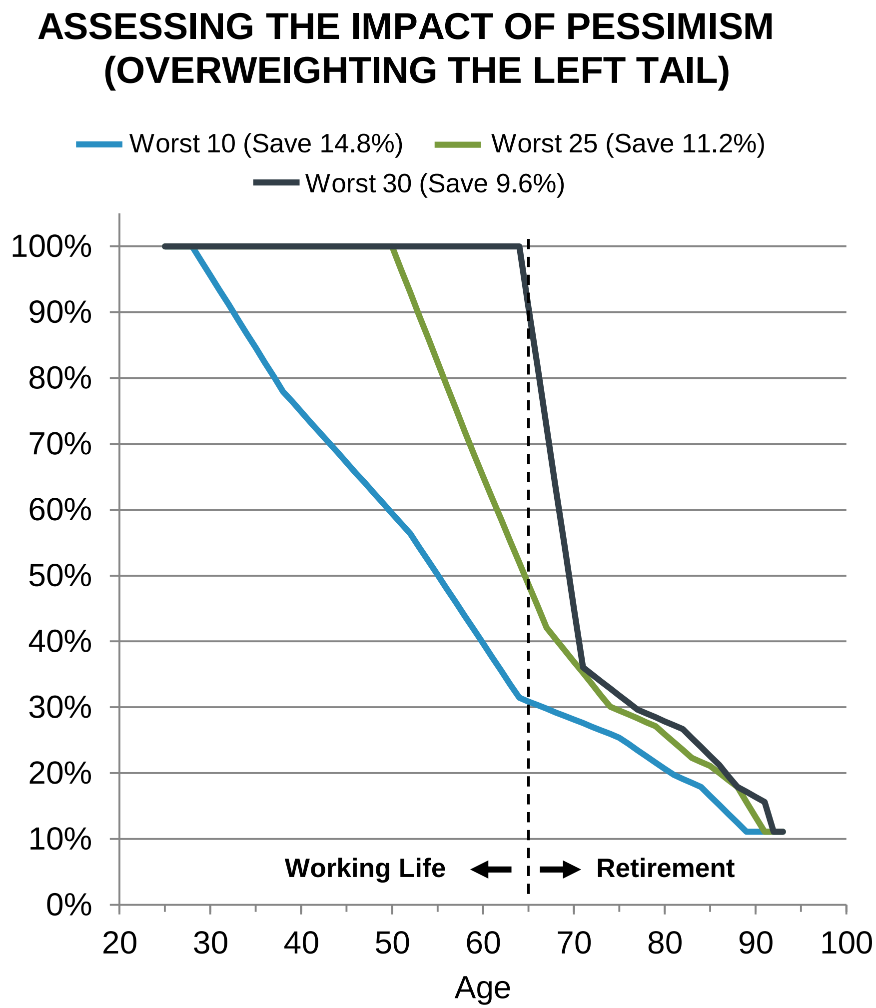




For illustrative purposes only.
For educational use only.

Impact of Preference Heterogeneity





Sources: U.S. Equity: S&P 500 Global Financial Database (GFD) prior to 1926.07, Fama-French All Market since 1926.07. Non-U.S. Equity: 60% UK, 40% FRA equity prior to 1926 (per GFD relative weights, GFD WxUS (EAFE) 1926-1987, MSCI ACWIxUS since 1988. U.S. Bonds: UST10 (GFD) prior to 1975.12, Barclays US Agg since 1975.12.

 For educational use only.

What We Are Currently Investigating

- Accounting for pervasive heterogeneity
  - Preference parameters
  - Labor income processes and their covariance with asset returns[1]
  - Contribution rates
- Modular vs. fully integrated investment design?
  - Mental accounting
  - Efficiency-robustness trade-off
- What is the appropriate level of customization?

[1] Guvenen et al. (2014). "The nature of countercyclical income risk," JPE.

Important Information

Information presented herein is for discussion and illustrative purposes only and is not a recommendation or an offer or solicitation to buy or sell any securities. Views expressed are as of the date indicated, based on the information available at that time, and may change based on market and other conditions. Unless otherwise noted, the opinions provided are those of the authors and not necessarily those of Fidelity Investments of its affiliates. Fidelity does not assume any duty to update any of the information.

Information provided in this document is for informational and educational purposes only. To the extent any investment information in this material is deemed to be a recommendation, it is not meant to be impartial investment advice o advice in a fiduciary capacity and is not intended to be used as a primary basis for you or your client's investment decisions. Fidelity and its representatives may have a conflict of interest in the products or services mentioned in this material because they have a financial interest in them, and receive compensation, directly or indirectly, in connection with the management, distribution, and/or servicing of these products or services, including Fidelity funds, certain third-party funds and products, and certain investment services.

Past performance is no guarantee of future results.

905831.1.0