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The Impact of Social Security on Defined Contribution Portfolios

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Motivation

- How to help workers and retirees manage their money up to and through retirement in a DC-orientated pension landscape?
- What are the impact of the level of SoSe-Benefits (cuts) on the optimal portfolio choice of households?
- Should households builds their own DB-plan (within a DC-world) by purchasing life annuities in the private market?
- In view of labor income risk, asymmetric mortality beliefs, capital market risk, longevity risk, various preferences , loadings

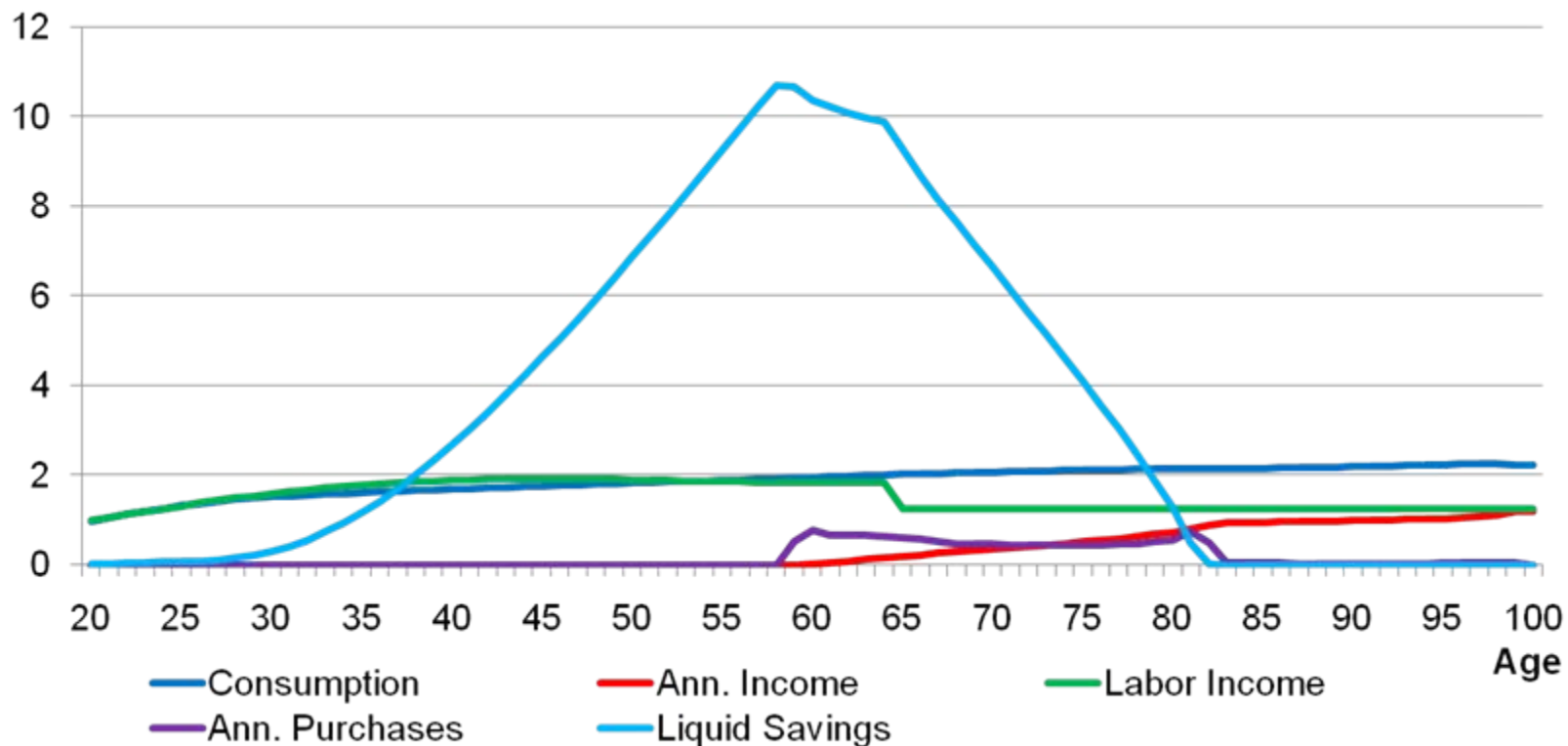
The Model

- Household: Rational dynamic utility optimizer (CRRA)
 - **Uncertain labor income** (profile: high school education) with low, medium, and high risk
 - Retirement from age 65 on with high (68%), medium (60%), and low (50%) replc. Rates (SoSe benefits of last salary)
 - Risk aversion low (3), medium (5), and high (8)
 - **Uncertain time of death**: age 20-100 based on empirical mortality
 - **Borrowing restrictions**

- Capital & Insurance markets
 - Riskless bonds: 2% p.a. (real terms)
 - **Risky stocks**: expected return 6% p.a. with standard deviation 18%
 - Life-annuity with immediate fixed payments, **purchase irreversible**

- Derive optimal consumption, investment, and decumulation plan (stocks, bonds, and annuities) over the life cycle by numerical dynamic optimization

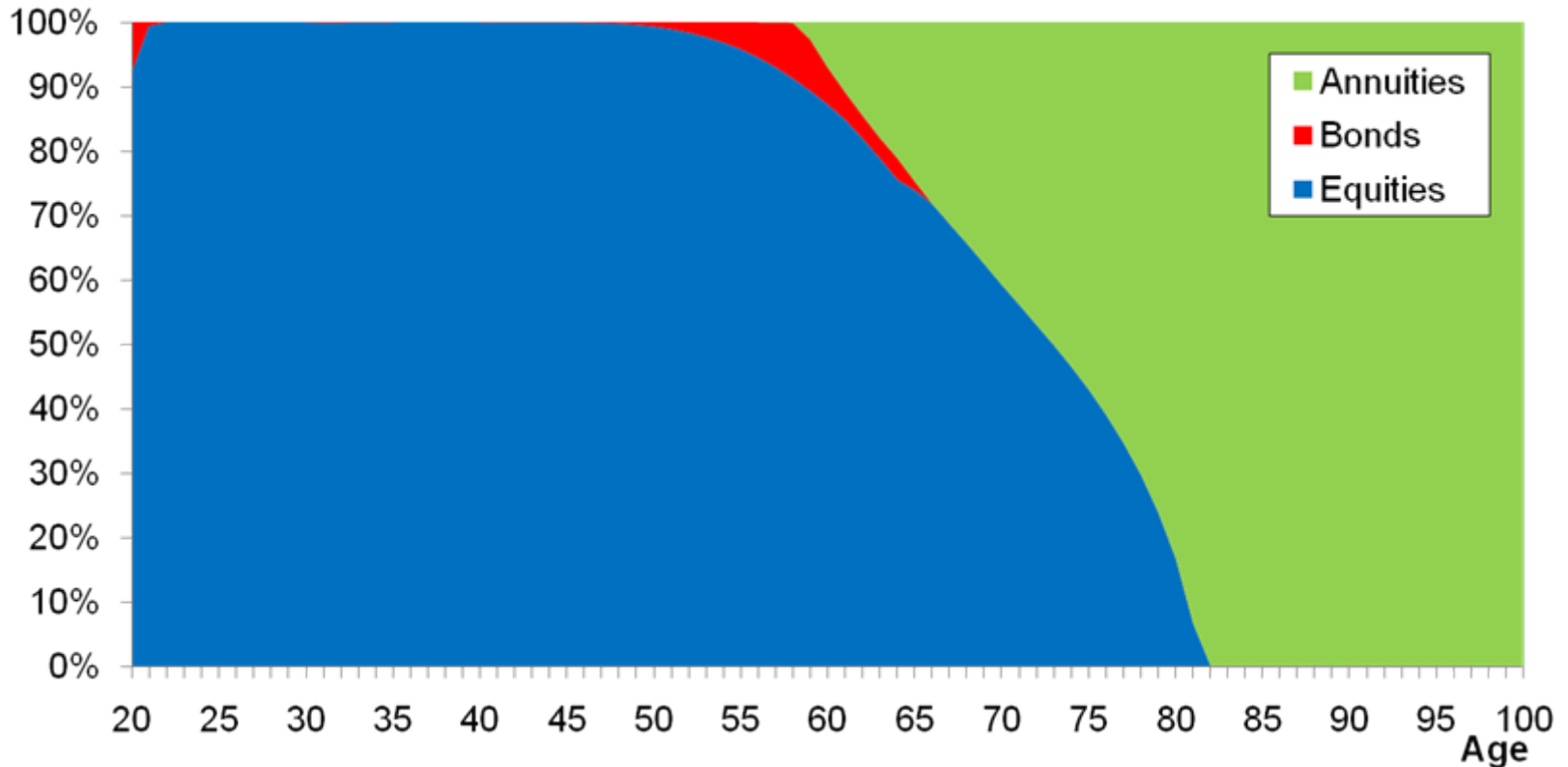
Expected optimal life cycle patterns (10,000 life cycles)



The Base Case: High replacement rate (68%), low labor income risk

- gradual shift from liquid savings into payout annuities
- start to buy annuities at age 58
- full annuitization and no liquid savings at age 82

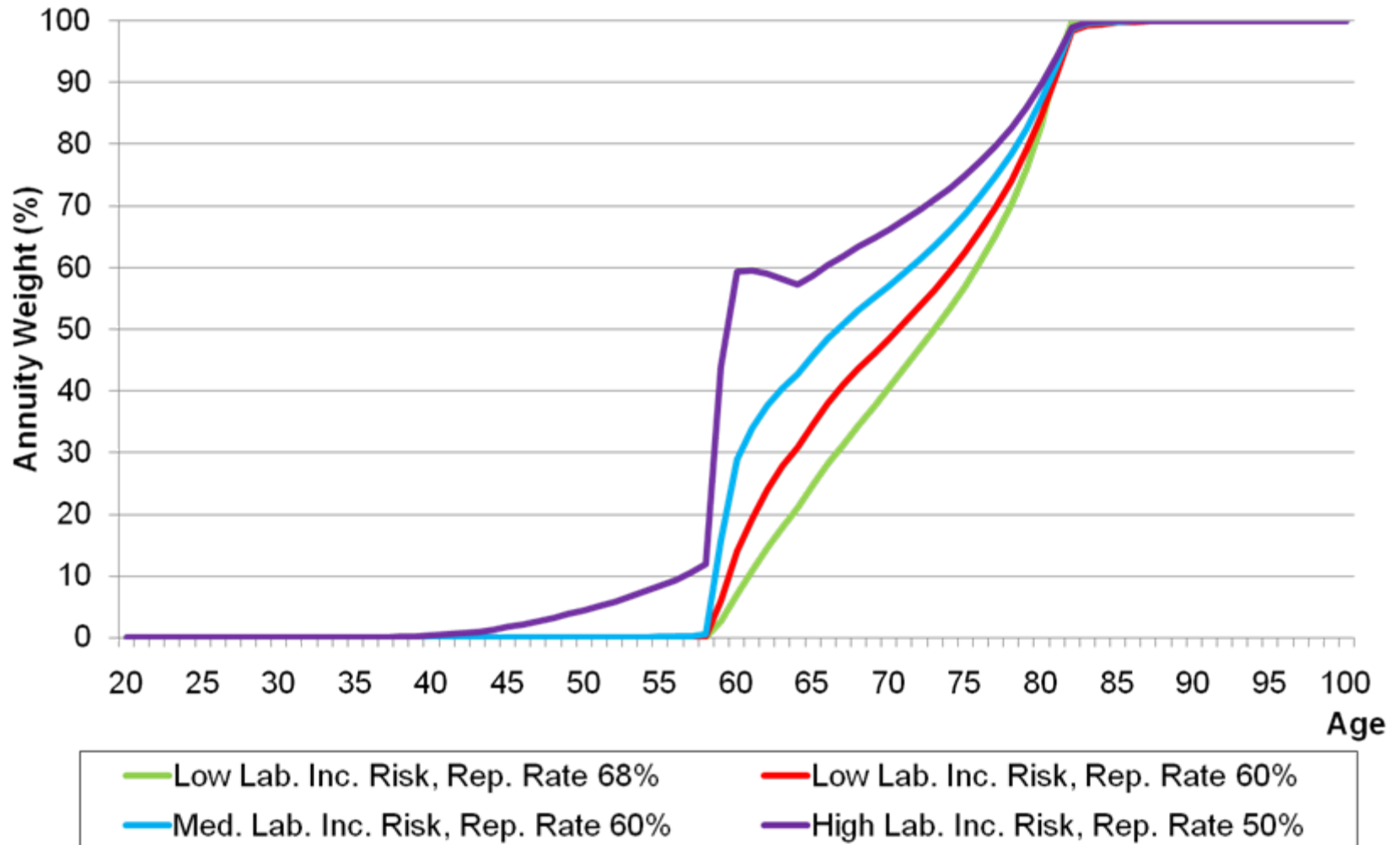
The expected asset allocation



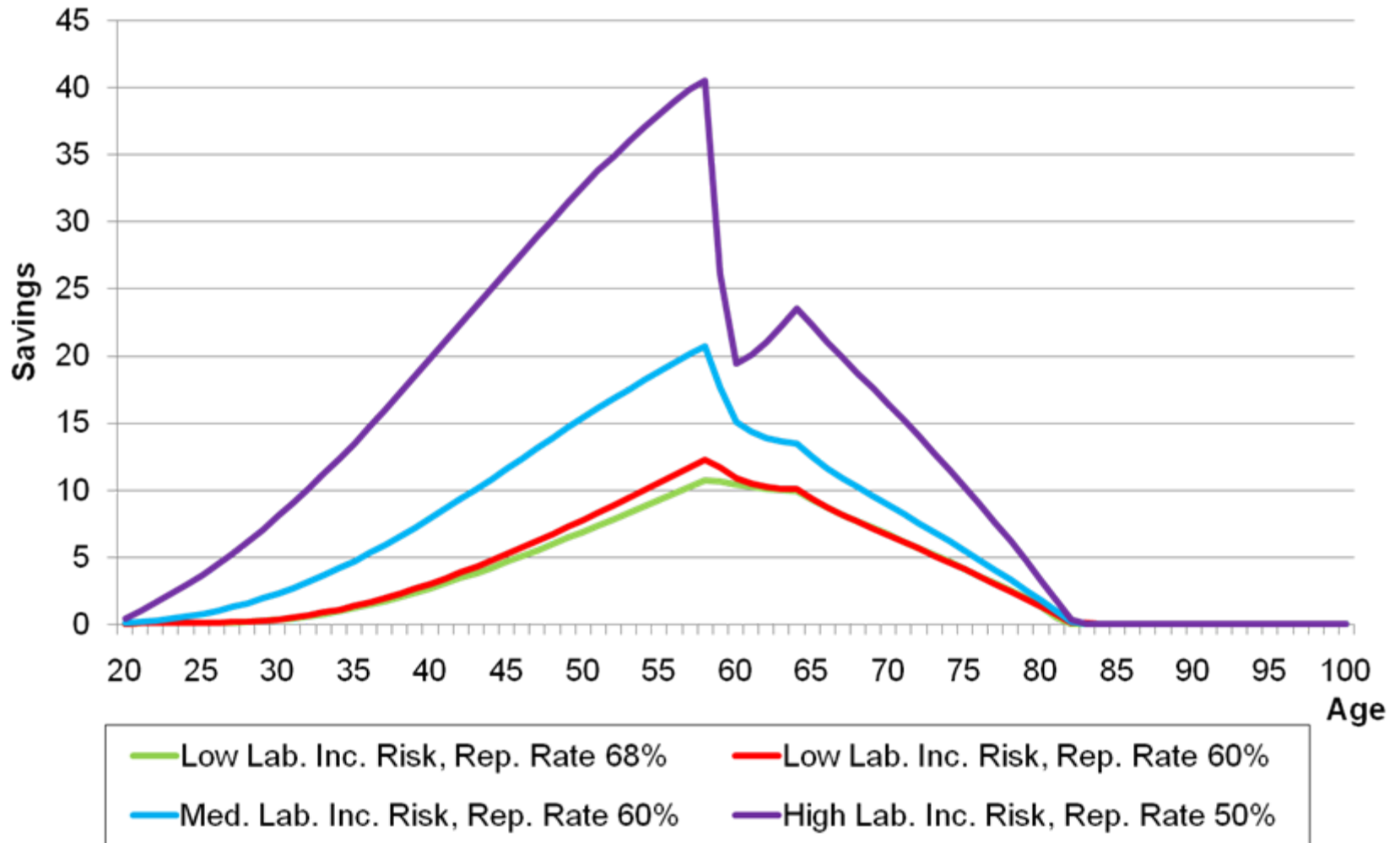
The Base Case: high replacement rate (68%), low labor income risk

- equities dominant asset class during work life
- labor income and SoSe-benefits comparable to bonds
- annuities first crowd out bonds later also stocks

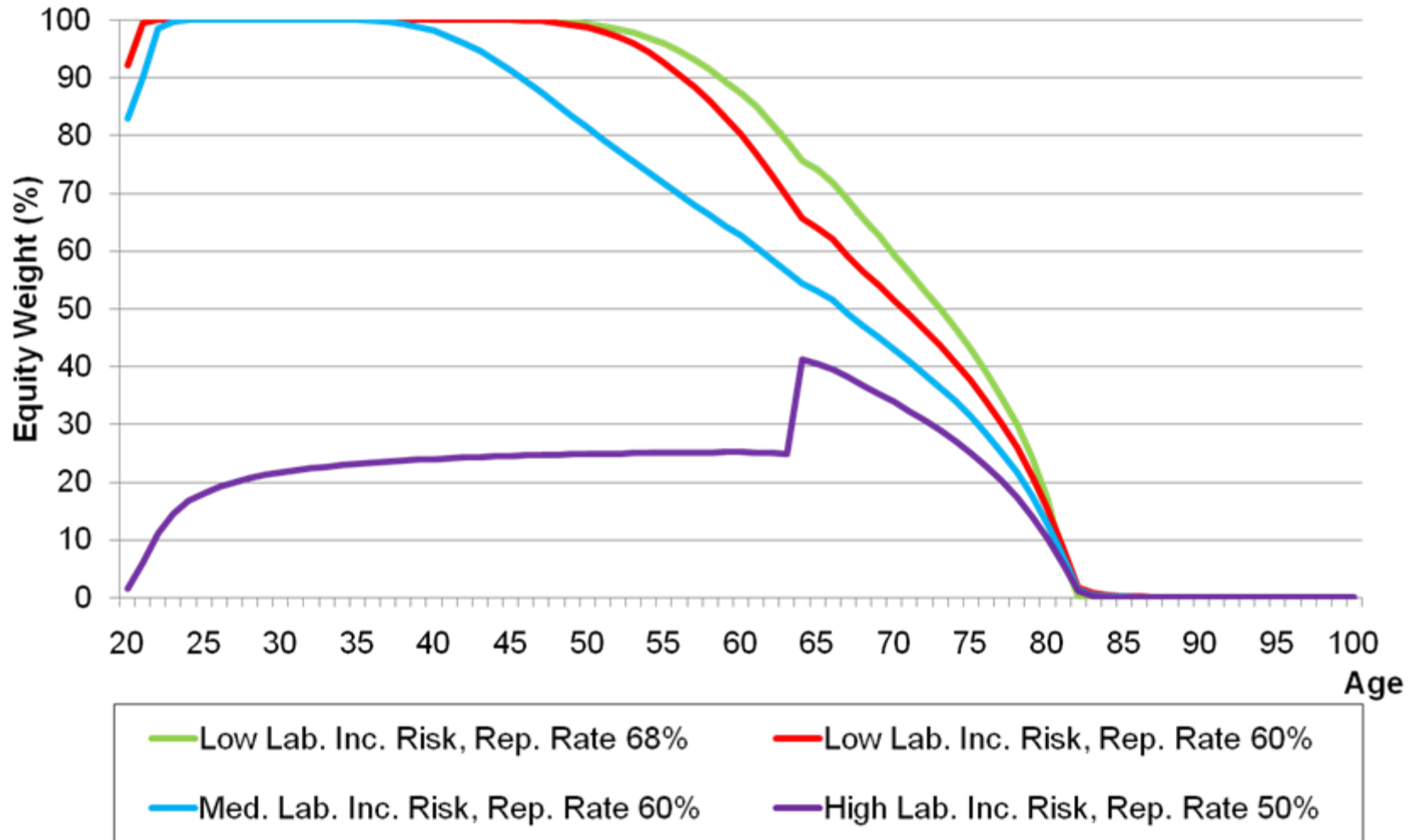
SoSec Cuts + Increase in Labor Income Risk and their Impacts on Annuity Holdings, ...



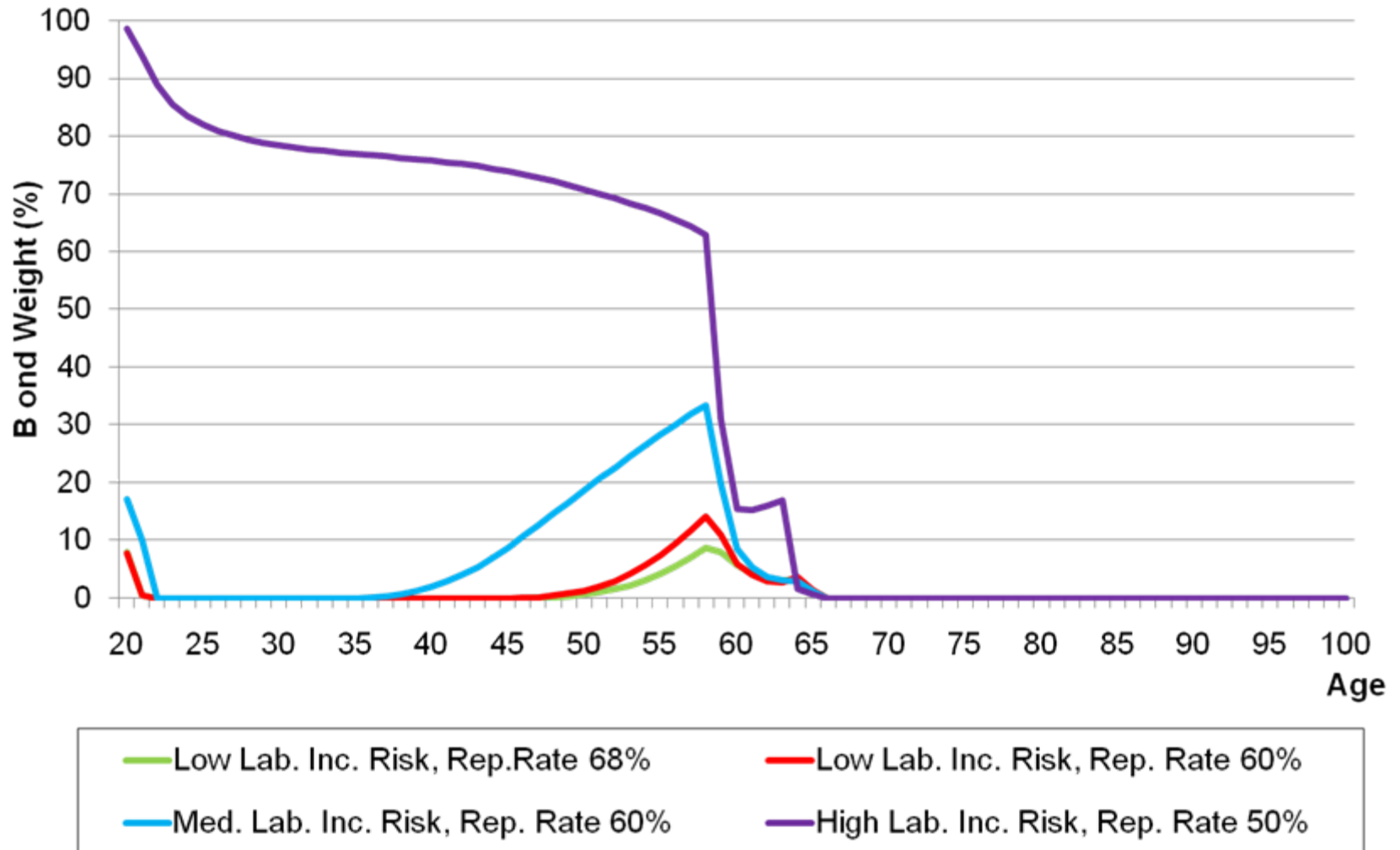
... on Liquid Savings, ...



... on Equity Exposures, ...



... and on Bond Positions



Conclusions

- Endogenizing the annuitization strategy within a life-cycle model shows
 - Gradual purchase optimal
 - Survival credit high enough to compensate for illiquidity and lack of equity premium

- Labor income risk and level of SoSe benefits are crucial parameters for optimal annuity, bond, and stock holdings in DC-pension plans
 - Low labor income risk / high SoSe-Benefits → High equity holdings during work life, start to buy payout annuities around age 55; reduce equity position
 - High labor income / low SoSe-Benefits: → High Bond Holdings early in life, start to buy payout annuities around age 40 (second and stable income), increase stock holdings

- Interactions between insurance products and investment portfolios are beneficial to retirement security