Survival ambiguity and welfare

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• ...but the family of distributions from which one's survival probabilities are drawn is known.

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   - With annuities, survival ambiguity improves welfare.
   - Welfare gains from annuities even larger under ambiguity.
4. Evaluate the role of public insurance (Social Security):
   - SS does not help to hedge survival ambiguity.

Measurement of ambiguity

Structural calibration

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- At $t = 0$, p_i is the subjective (prior) probability of being a low type for an individual in quintile i. Expected utility maximizers make plans with a convex combination $p_i\underline{\Phi}(t) + (1 - p_i)\bar{\Phi}(t)$.

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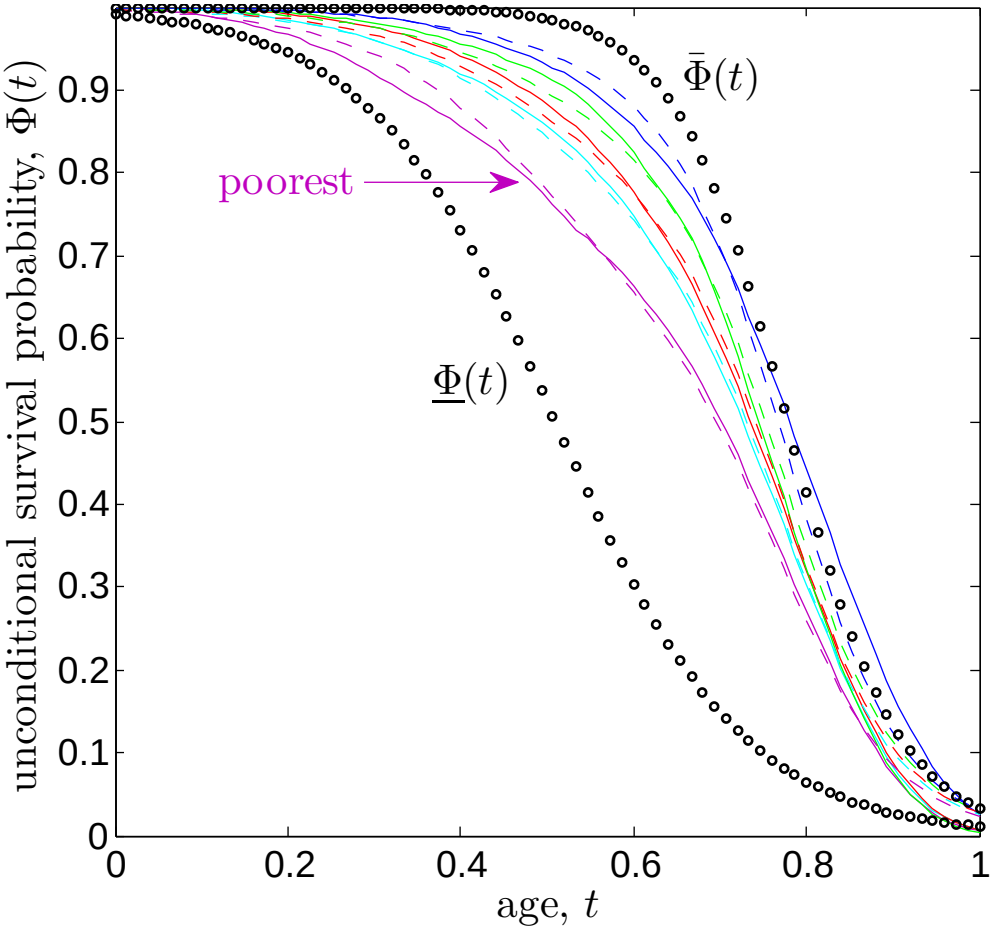
- Given the actual survival data by quintile $\Phi_i(t)$, our calibration problem:

$$\min_{\underline{\Phi}(t), \bar{\Phi}(t), p_i} \mathcal{L} = \sqrt{\sum_{i=1}^{5} \int_0^1 \{\Phi_i(t) - [p_i\underline{\Phi}(t) + (1 - p_i)\bar{\Phi}(t)]\}^2 dt}$$

Figure 1. Calibration of Mortality and Binary Ambiguity by Income Quintile



Note: Solid lines are data. Dashes and circles are calibrated.

Welfare cost of ambiguity

Theory

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- Define three objective functionals

$$
\begin{aligned}
J^* &= \int_0^1 [p\underline{\Phi}(t) + (1-p)\bar{\Phi}(t)]u(c(t))dt \\
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- and three optimal consumption paths

$$\begin{aligned} c^*(t) &= \arg\max J^* \\ \underline{c}(t) &= \arg\max \underline{J} \\ \bar{c}(t) &= \arg\max \bar{J} \end{aligned}$$

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$$p\underline{J}(\underline{c}(1-\Delta)) + (1-p)\bar{J}(\bar{c}(1-\Delta)) = J^*(c^*)$$

• Ambiguity is costly because decisions are distorted away from their full information counterparts where the individual fully optimizes based on known survival risk.

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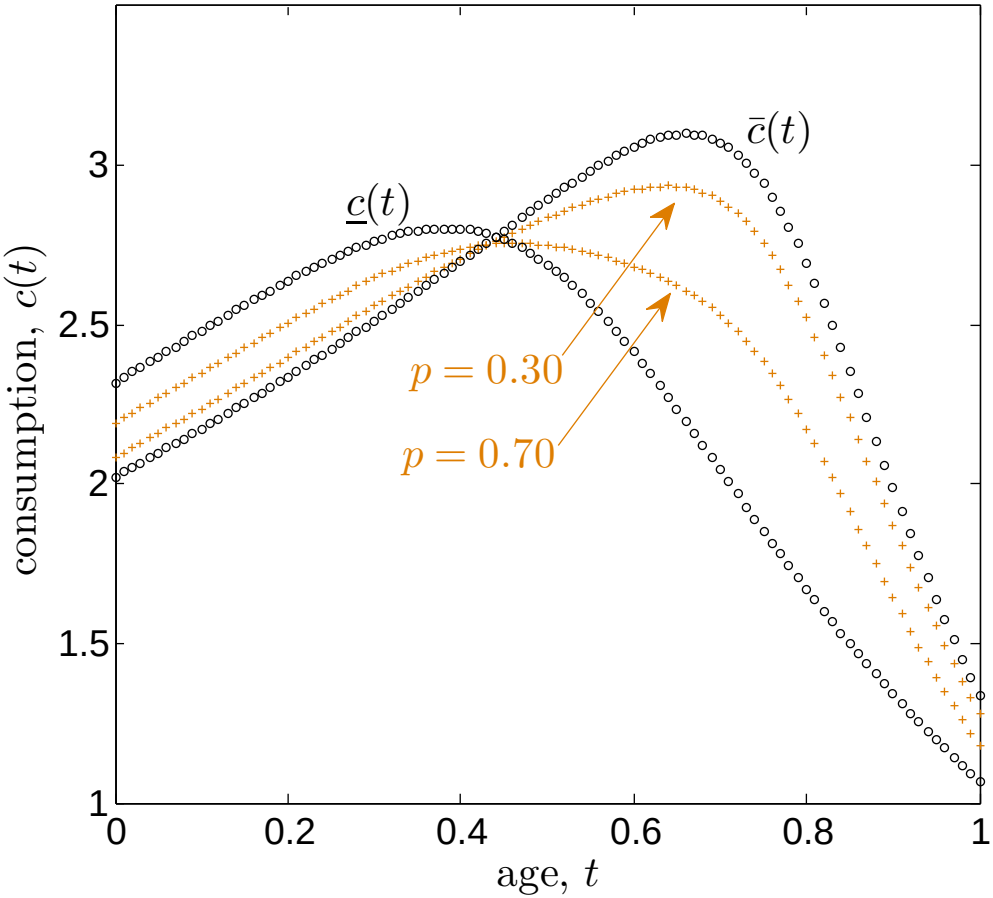
• Survival ambiguity is **highly regressive**: cost to the poorest quintile is 4 times larger than the cost to the richest quintile.

• Why? The poor rationally believe there is a strong chance they are a low survival type, causing them to save very little relative to what they would save if they knew they were a high type: ambiguity causes a painful "undersaving" problem among the poor who are the high survival type.

Figure 4. Fair Comparison of Consumption under Binary Ambiguity



Note: Plus marks are consumption under ambiguity. Circles are consumption when the survival type is known in advance.

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   - Brown, Kapteyn, Luttmer, and Mitchell (2016) quantify the degree to which individuals are cognitively constrained in their internal valuation of annuities.

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1. Only two survival types.
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2. Individuals form priors about survival type based solely on their position in the income distribution.
   - While survival risk is strongly connected to income class (e.g., Cristia (2009)), other non-income factors could be informative about survival type.

Private insurance (annuities)

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- Insurance companies cannot separate people by survival type because that information is unknown.

- Instead, they pool everyone together and offer a zero-profit contract with competitive return

$$r(t) = -\frac{\frac{d}{dt}[p\underline{\Phi}(t) + (1-p)\bar{\Phi}(t)]}{p\underline{\Phi}(t) + (1-p)\bar{\Phi}(t)}.$$

• In contrast, without ambiguity, insurance companies have full information about survival type and offer separate competitive contracts to each type

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• *But* ambiguity also causes competitive insurance companies to pool risk across survival type.

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- Past studies underestimate the welfare gains from annuitization because they abstract from survival ambiguity.

- Competitive annuities not only insure *survival risk* as past studies have established, but they also pool risk across *survival type*.

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• Hence, while asymmetric information about survival risk can rationalize thin annuity markets, ambiguity about survival risk makes thin annuity markets even more puzzling.

Social Security

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- While SS can improve welfare by providing a life annuity, the cost of survival ambiguity is the same whether SS exists or not (SS does not affect willingness to pay for immediate resolution of ambiguity).
- Likewise, the welfare gain from SS's provision of a life annuity is the same with or without ambiguity.

Thank you