Making Your Money Last a Lifetime

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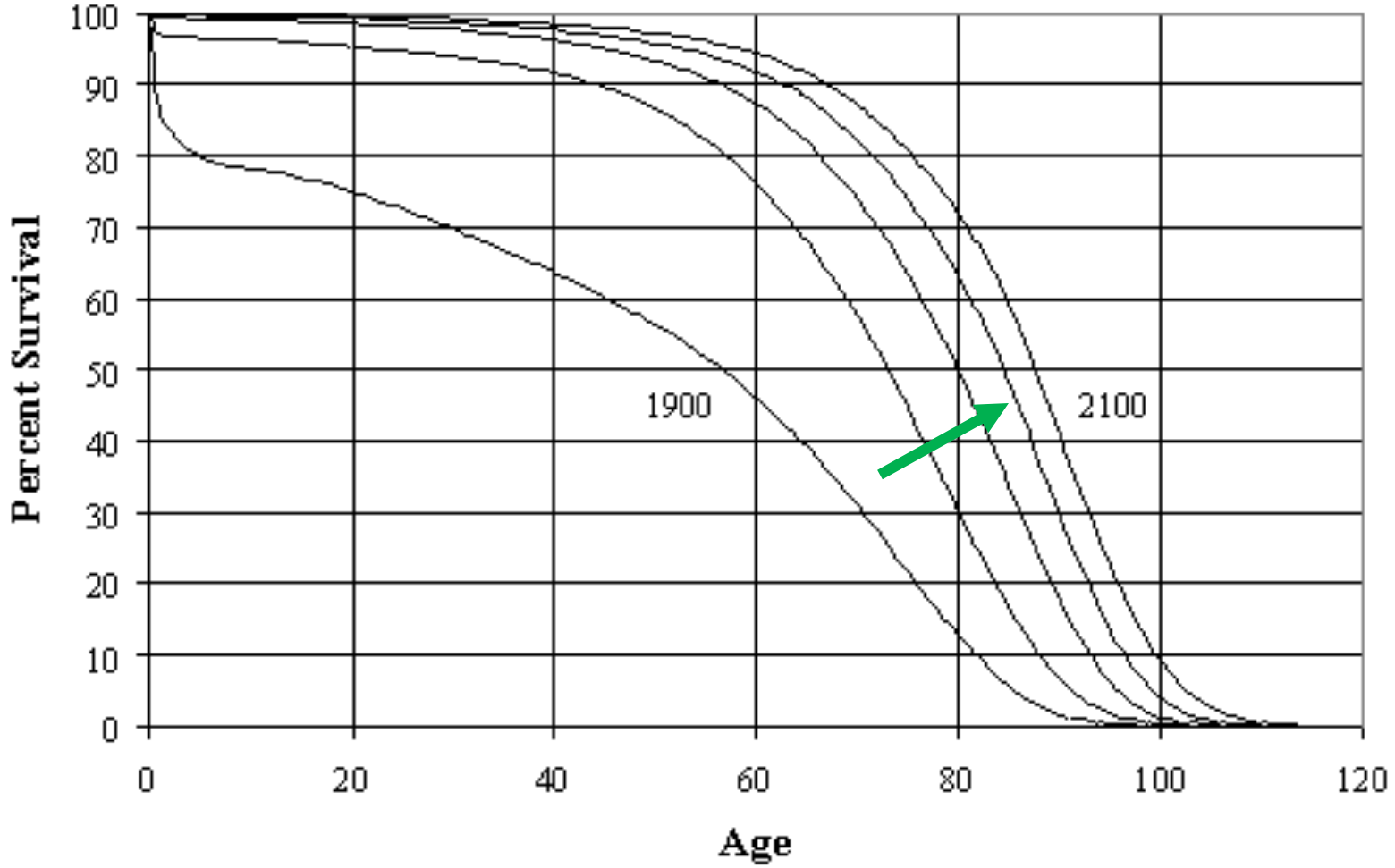
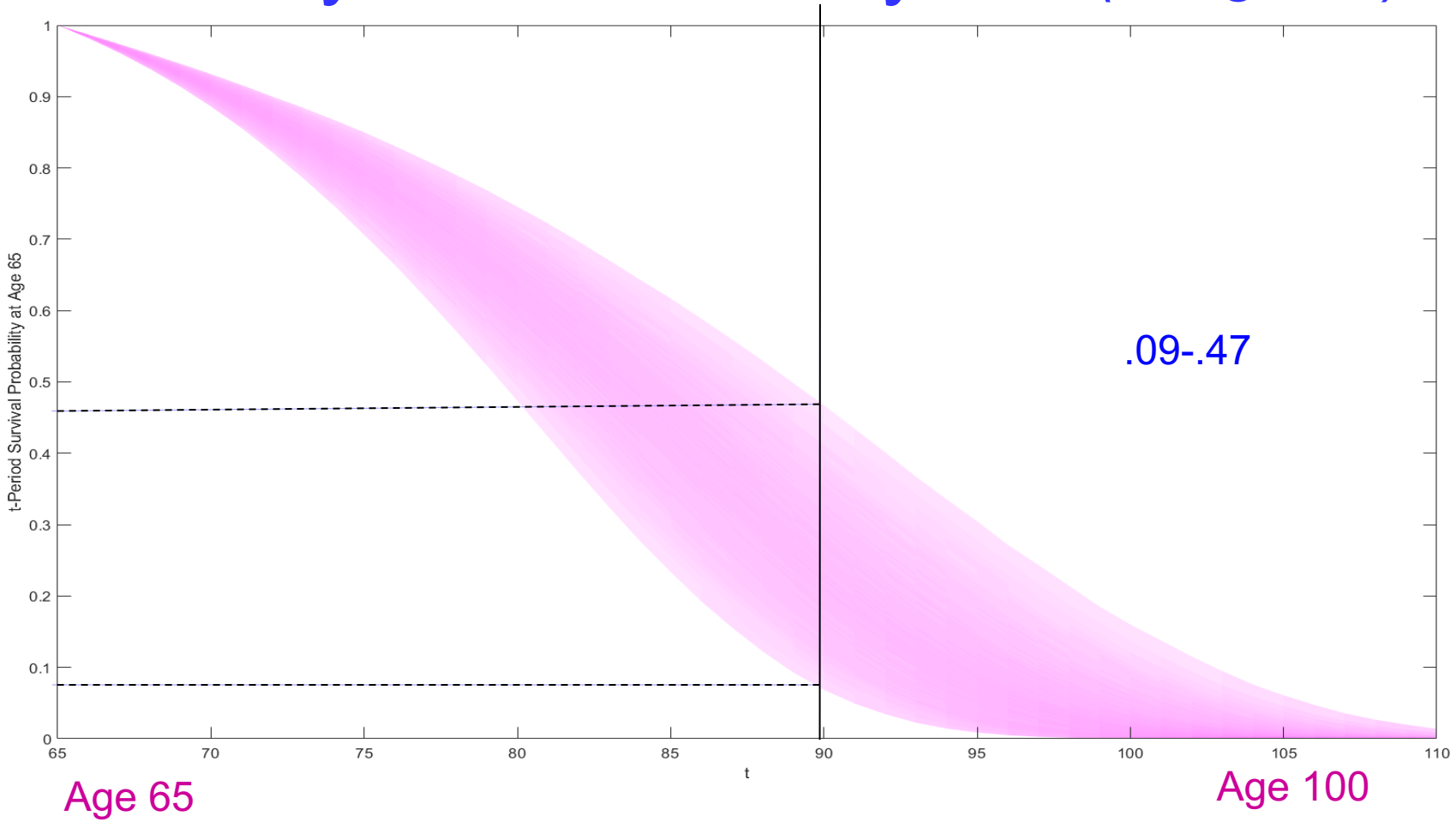
HEC Montreal

Wharton
University of Pennsylvania

Longevity has improved over time around the world (US population, SSA 2016)

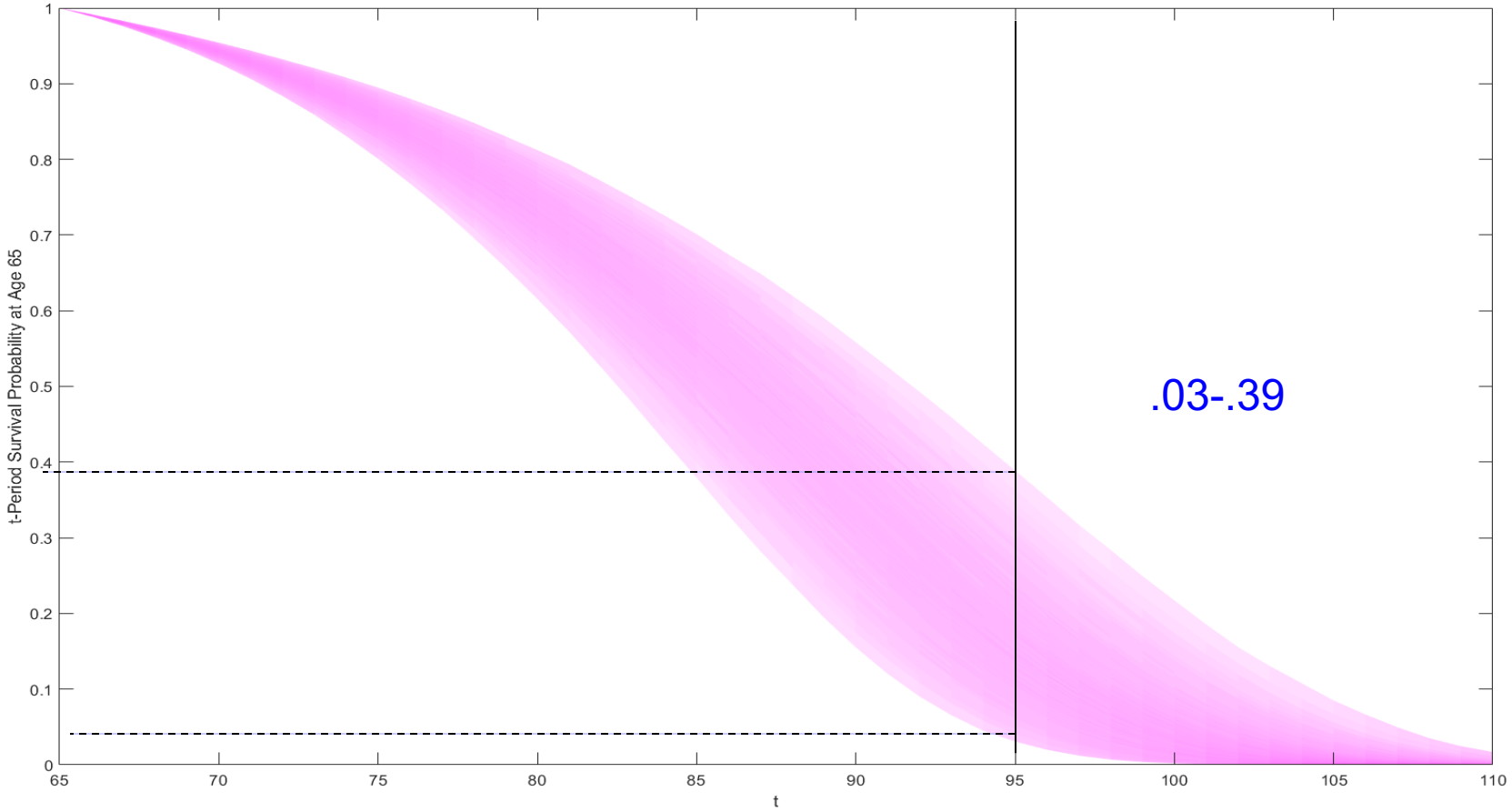


Yet at retirement, there's still much uncertainty about mortality risk *(M age 65)*



- Darker areas represent higher probability mass.
- Sim dist. of age-65 F *t*-period survival probabilities (99%:1%) based on CBD mortality model (10K sims).

And still wide for women *(F age 65)*



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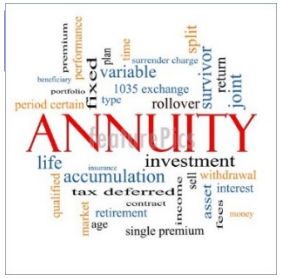
- Sim dist. of age-65 F *t*-period survival probabilities (99%:1%) based on CBD mortality model (10K sims).

Life annuities are insurance products that pay as long as the policyholder lives

("survival contingent" claim)

- Survival uncertainty at retirement substantial!

- Social Security: many peoples' biggest asset, an annuity, national & mandatory lifetime payout.
- Defined Benefit plans paid annuities, Defined Contribution plans don't.



- Our question: What's optimal role for longevity protection in LC portfolio?

Motivation:

With trillions invested in self-directed pension plans:

"many retirees face the daunting task of determining an appropriate spending and investment strategy for their accumulated savings."

William Sharpe 2007 Wharton Pension Research Council meeting.

Risks?

- Earnings risk, longevity risk, investment risk, healthcare costs risk

Institutional Constraints?

- Taxes (including Required Minimum Distribution or RMD rules)
- Social Security taxes and benefit rules

Preferences?

- Consumption/leisure

Today: Two Policy-Relevant Applications

- Putting the Pension Back in 401(k) Plans
  - Optimal Retirement Plan Design with Longevity Income Annuities *(Horneff/Maurer/Mitchell)*

- Social Security Benefits vs Lump Sums
  - Will They Take the Money and Work? People's Willingness to Delay Claiming Social Security Benefits for a Lump Sum *(Maurer/Mitchell/Rogalla/Schimetzchek)*
  - Optimal Social Security Claiming Behavior under Lump Sum Incentives: Theory and Evidence (*MMRS)*
  - Evaluating Lump Sum Incentives for Delayed Social Security Claiming. *(MM)*

❖ Putting the Pension Back: Motivation

- In the old days, DB pension plans paid income for life.
- Now, most US retirees (~$15 Tr, 90m participants) with tax-qualified 401(k) DC-plans *have no access to annuities inside the pension plan*. This exposes them to **longevity risk**.

- US Treasury sought to encourage converting *part* of DC balances into *deferred income annuities (DIA).*
  - ✓ Pay lifetime benefits from ~age 85 onward.
  - ✓ Potential default solution for payout phase.
- We examine welfare implications of reform using realistically-calibrated LC consumption & portfolio choice model.
- And evaluate default solutions.

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Longevity

The 2014 reform:

- Pre-2014: Required Minimum Distribution (RMD) had to be w/drawn annually from age 70.5+
  - Else 50% penalty levied.
  - RMDs included any annuity value so retirees could be forced to take > liquid wealth or pay penalty.

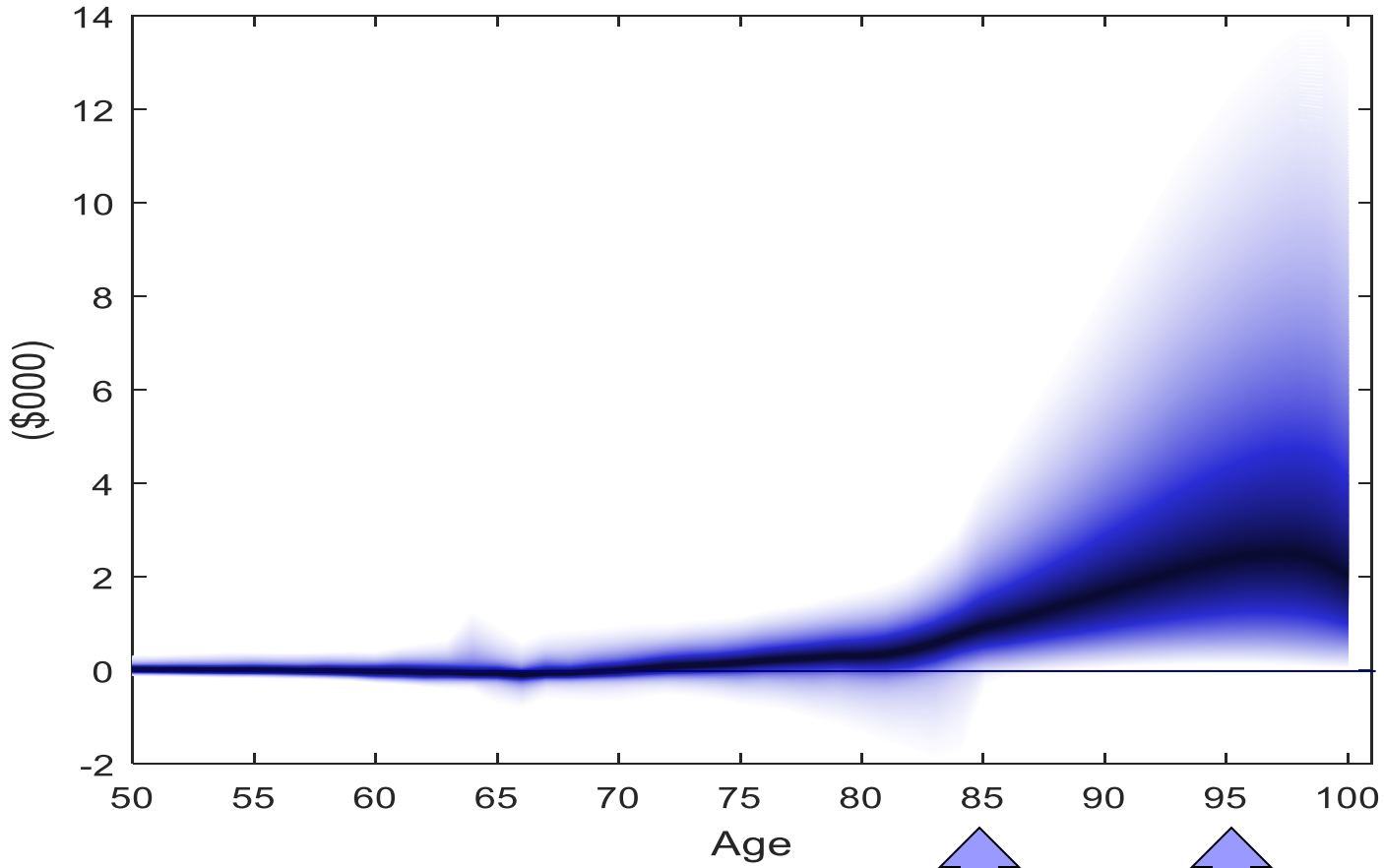
  →Basically no demand for annuities in 401(k)s/IRAs.

- 2014 on: New tax rules facilitate converting assets into *deferred income annuities* (DIA).
  - Approved deferred annuities must start paying lifelong benefits by age 85 & cost < 25% of account balance.
  - Now annuity value excluded from RMD.

Life Cycle Model U.S. Household

- **Objective:** Optimal consumption, savings/investment in 2 types of accounts; @65 may buy Deferred Income Annuity with 401(k) assets
- **Financial assets:** risky stocks, bonds, age 85 DIA
  - ✓ Taxable Account (TTE)
  - ✓ Tax-Deferred Account (EET)
- **Risky labor income:** to age 66 by sex & 3 education levels from PSID; age 66+ Soc Sec benefits based on lifetime earnings
- **Institutional rules:**
  - ✓ Taxes: progressive income taxation (US rules)
  - ✓ Social Security: contribution caps, benefits, PIA
  - ✓ 401(k) plan: RMD rules, contribution limits
- **Preferences:** CRRA function *(age 25-100).*
- **Regimes:** old/new RMD rules w/ & w/o defaults

LC Consumption Diffs with-without DIA



At 85: retiree with DIA consumes ~$1K/yr more & $4K more by age 95.

Measured gain in wellbeing: Default 10% of 401(k) > $65,000 Threshold into DIA

Case	*Education level*	*Alternative specifications*	*Welfare Gain ($)*
Female age 66	College+		13,521
	High School		7,796
	< High school		4,403

Takeaways:

- If employers defaulted workers into DIAs at 10% over >$65K, most benefit substantially.
- If mortality differs by education, welfare gains smaller.
- Payout defaults crucial for many real-world consumers.
- Relevant to current debate on default solution in Pan-European Pension Accounts (PPEP).

❖ Reforming Social Security

- U.S. Old-Age & Survivors Insurance (OASI) pays annuity benefits.
- These are *progressive* up to a cap*:* depend on average wage-indexed earnings over best 35 years.

- Can claim at any age 62-70:
  - ✓ Full Retirement Age (FRA) now ~66 (rising to 67)
  - ✓ Prior to FRA: Lifelong benefit reduction (5%-6.67% p.a.)
  - ✓ After FRA: Lifelong benefit increase (8% p.a.)

Today: Most People Claim Social Security Early

Claim Age	*% Men*	*% Women*
62	42	48
63	7	8
64	7	8
65-66	34	27
67-70	9	10

And ~90% claim before their Full Retirement Age
(so experience a benefit cut for the rest of their lives).

But Later Claiming Boosts Social Security Annuity

(FRA= 67)

Claiming Age	Benefit as % of PIA	% Boost with 1 year delay	% Boost with N year delay
62	70		
63	75	7.14	**7.14**
64	80	6.67	14.29
65	86.67	8.34	23.81
66	93.33	7.70	33.33
67	**100**	**7.15**	**42.86**
68	108	8	54.29
69	116	7.41	65.71
70	124	6.90	**77.14**

Our questions:

- Would people delay claiming Social Security, if they got the benefit boost as an *actuarially fair lump sum* instead of higher annuity?
- If so, how would they adjust their labor supply?
- And how about for a less than actuarially fair annuity?

Why?

- Rational to prefer lump sum (LS) over actuarially fair annuity if risk averse, uncertain wrt mortality/health/ political risk.
- How many will work how much longer? (are they healthier?)
- Might help Social Security solvency.

Rewards for Later Claiming: *Status Quo* vs Lump Sum Experiment

Eg: FRA = 67, Monthly Benefit (at age 62) = $1,500

Claiming Age	*Status Quo*	*Lump Sum*	
	Annuity	Annuity	Lump Sum
62	1,500		
63	1,607		
64	1,714		
65	1,857		
66	2,000		
67	2,143		
68	2,314		
69	2,486		
70	2,657		

Authors' calculations.

Strategic Surveys: RAND American Life Panel (ALP)

- ~6K respondents age 18+ taking frequent online surveys
  - ✓ Laptops given to those lacking internet to ensure survey representativeness.
- Since 2006, ~450 online surveys: e.g.
  - ✓ Financial decision-making, inflation expectations, retirement preferences, health decision making, Social Security knowledge, and financial literacy.
- Our module surveyed expected claiming ages & work plans/effort under *Status Quo* and a lump sum experimental treatment.
- Data available at *ALP website* (https://mmicdata.rand.org/alp/)

The Experiment: Status Quo (SQ)

In the next few questions, we are going to ask you to make a number of choices about Social Security benefits. Please assume that all amounts shown are after tax (that is, you don't owe any tax on any of the amounts we will

For the sake of these questions, assume you are currently age 62 and single. You are thinking about when to claim your Social Security benefit.

The Social Security system allows you to claim your benefit anytime between age 62 and 70. On average, the system will neither lose nor make money no matter when people claim. If you claim your benefit at age 62, you will receive an estimated monthly amount of $1,500 for life.

RAND American Life Panel

Your choice:

Either

- You can claim your Social Security benefit at age **62** and receive that **$1,500** monthly payment for life.

OR

- You can claim your Social Security benefit at a later age and receive a **higher monthly payment** from that age on for life.

Monthly benefit: $

Age: Months:

<<Back Next>>

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Monthly benefit: $ 2243

Age: 67 Months: 7

<<Back Next>>

RAND American Life Panel

Lump Sum to Any Later Age

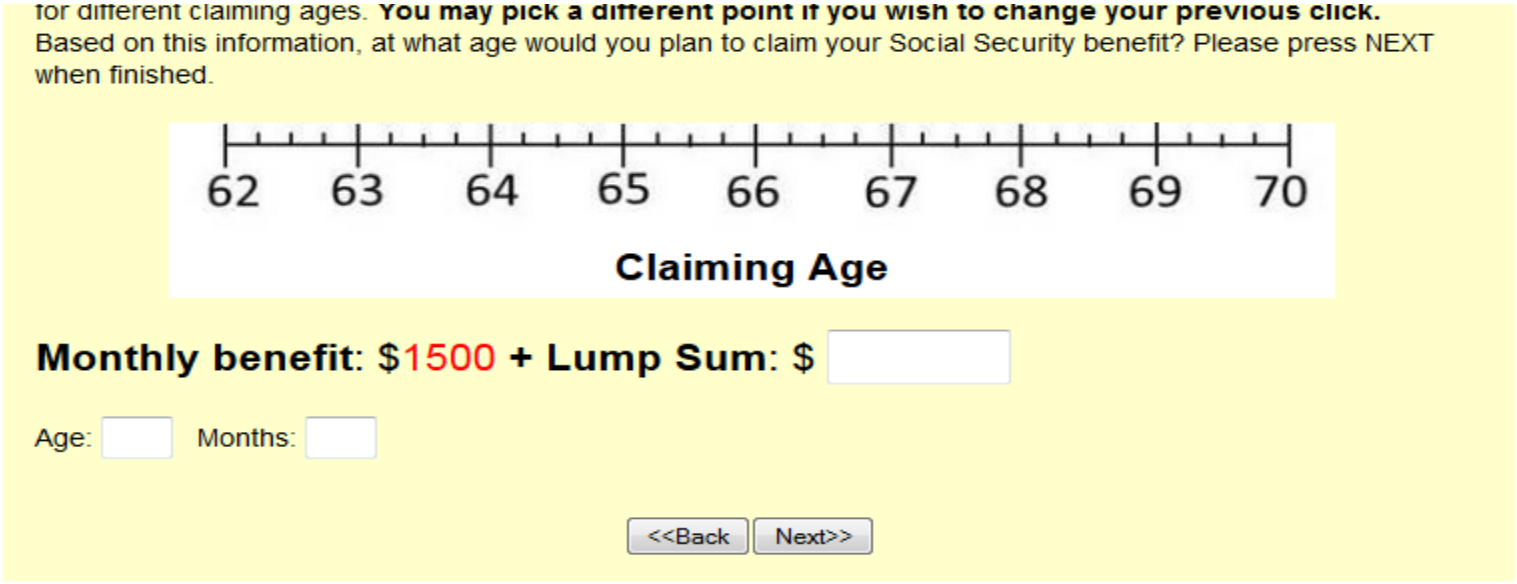
Your choice:

Either

- You can claim your Social Security benefit at age **62** and receive that **$1,500** monthly payment for life.

OR

- You can claim your Social Security benefit at a later age and receive the same monthly payment of **$1,500** from that age on for life, **plus an additional lump sum payable at that later claiming age**.



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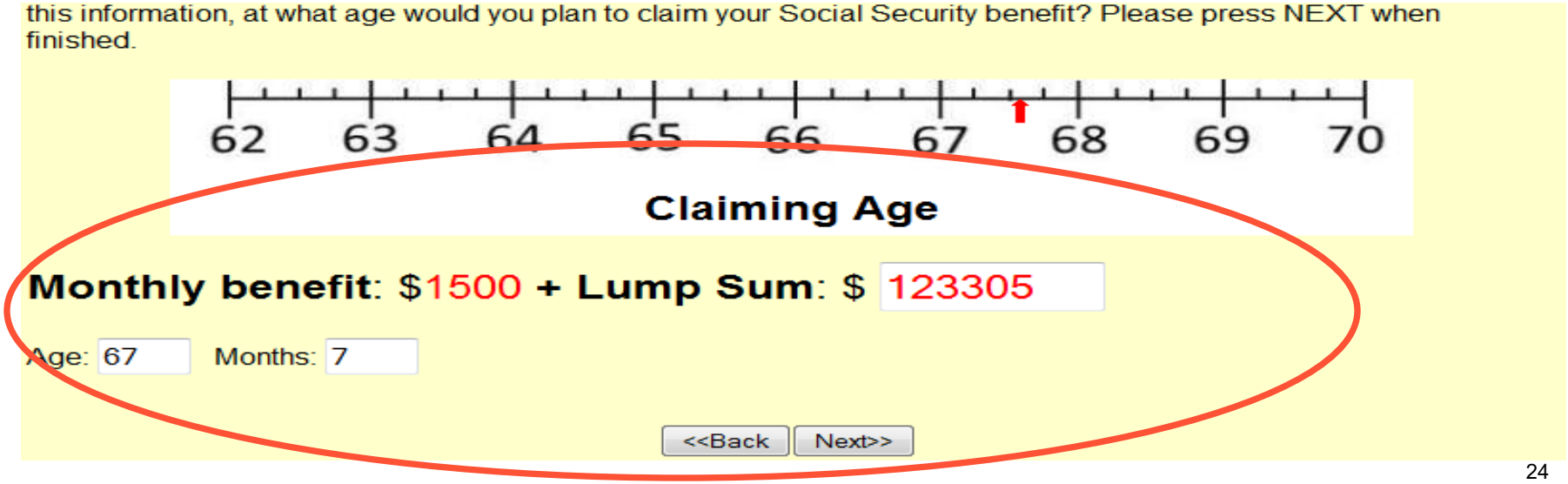


Results: Months Delay Claiming post-62

	Status Quo	Lump Sum
Mean	45	50
P 25%	24	35
Median	38	48
P 75%	71	72

→Δ Means LS-SQ, 1% significant

→Early claimants (p25) respond most to LS by claiming later.

→Median up almost a year.

→Less action around age 70.

Who's Most Likely to Delay Claiming? LS vs *Status Quo*

- Those who expect to *live longer* delay claiming for LS (more likely to live to get it).
- Those *in debt* want LS & claim later.
- *Risk averse* liked LS too, as do the more *financially literate*.
- Politically *skeptical* defer claiming more than the trusting.

Months of FT work post age-62

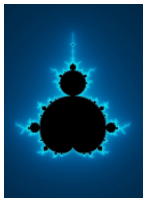
	Status Quo	Lump Sum
Mean	35	36
P 25%	2	12
Median	32	35
P 75%	53	54

- Lump Sum payments for later claiming also incentivize people to work longer, but on average only ~ 1 month.
- So work effects weaker than claiming.
- But strong effect on people initially working little.

Next step:

- Built a rational LC model to replicate the Status Quo claiming ages and use it to predict impact of the Lump Sum reform with this model.
- See if model predictions line up with ALP strategic survey projections!
- If so, can use it for out-of-sample policy analysis.

Life-Cycle Model



- Household
  - Eckstein/Zin utility function age 62 to 100
  - Choose consumption, saving, work effort, and optimal Social Security claiming age under current rules. Time budget of 100 hours per week for work or leisure.
  - K market pays uncertain gross returns R_{t+1}, ~N iid w mean 1.029 and st dev 3.6%
  - Sex-specific mortality tables
  - Build in taxes, SocSec benefit rules
  - Calibrate leisure preference α, time preference β, elasticity of intertemporal substitution ϕ, and coefficient of relative risk aversion γ.

Methods:

- Seek optimal parameter set to match model-predicted claiming age distribution with ALP *Status Quo* survey responses.
- First, solve life cycle optimization problem.
- Next, simulate LC paths for each individual based on optimal controls for that claiming age subgroup.
- Select optimal parameter set by minimizing Kolmogorov-Smirnov test statistic. Compare model-based simulated CDF claiming age distribution $F_{model}(x)$ to survey-based, empirical counterpart $F_{empirical}(x)$, $x \in [62, 63, \ldots, 70]$.

Results sensible

	Early Claimers	*Late Claimers*
Fitted Model Parameters		
Risk Aversion (γ)	5.30	7.54
Time Preference (β)	0.87	0.99
Leisure Preference (α)	2.51	1.30
EIS (ϕ)	0.25	0.15
Goodness of Fit		
Max. CDF Distance	0.20	0.17
Claiming age group hit ratio	0.80	0.83
Δ Mean SQ Claiming Age (in years)	0.1	0.2

Claiming age group hit ratio denotes the probability that model correctly predicts the SQ claiming age group

What we show:

- Model predictions match *Status Quo* av. claiming age of 65.6: 0.1 years less than overall ALP empirical mean. (0.1/0.2 for *Early/Late Claimers)*.
- "Out-of-sample" prediction for *Lump Sum reform:* Our model claiming ages closely match what survey respondents predicted about own claiming with *Lump Sum*.

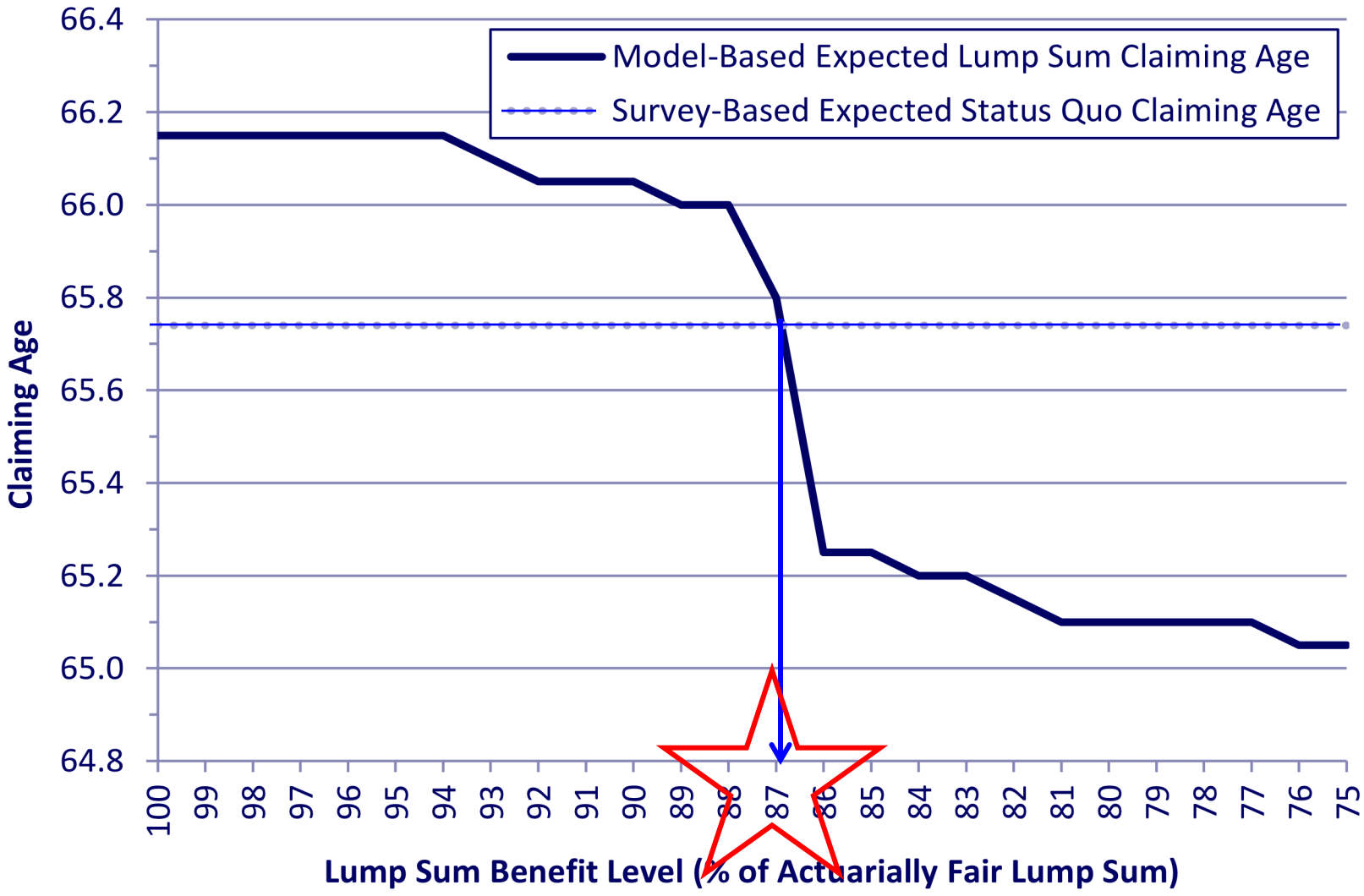
➔ Robust model can be used to assess other changes *(e.g., raising retirement ages, changing benefits)*

Extensions:

- Median welfare change ~zero (st dev ~$27K). So the *Lump Sum* reform is welfare neutral overall, though there is heterogeneity across individuals.

- Adding survival heterogeneity across claiming age subgroups amplifies main finding: *Lump Sum* alternative has a more pronounced impact raising claiming ages of *Early Claimers* than *Late Claimers*.

Policy Experiment: What if offered a Smaller Lump Sum (by 13%)?

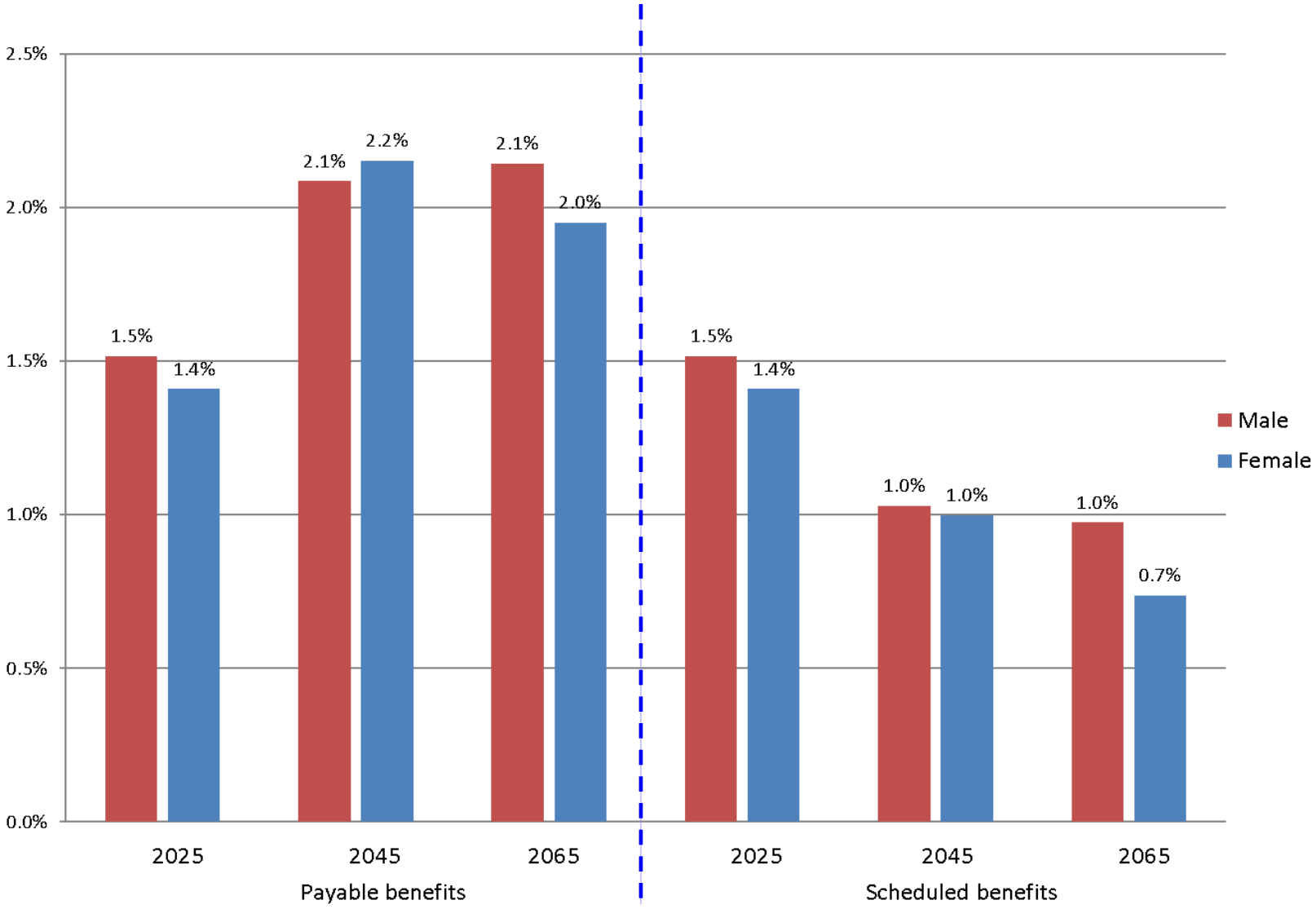


Not advocating this, just evaluating!

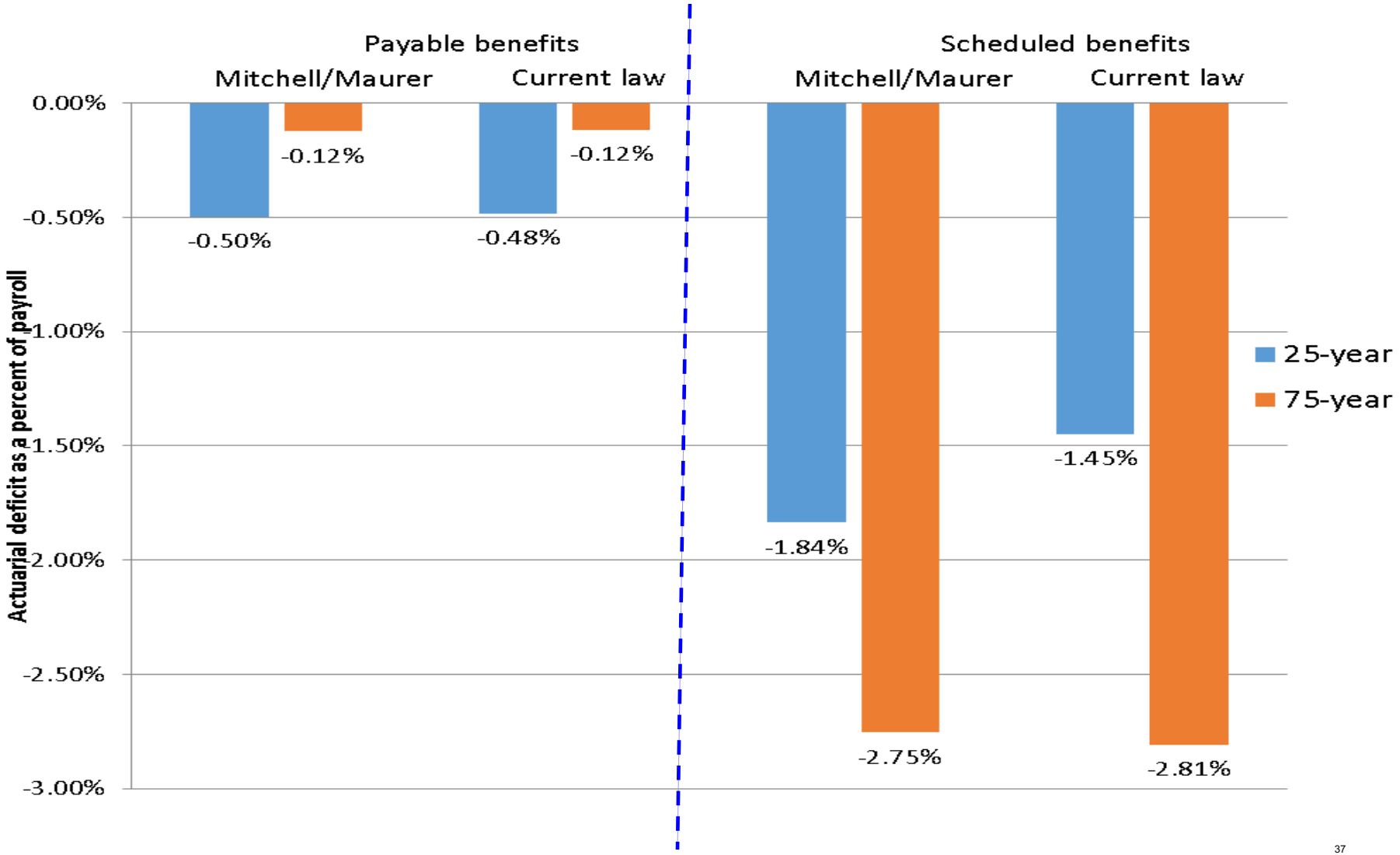
(popular proposal in some US cases)

- We find that people would delay claiming for Lump Sum 13% below the actuarial equivalent.
- Clearly welfare would fall, but illustrates range of Lump Sums over which benefit claiming ages could be induced to rise.
- Also we generate some distributional outcomes with microsimulation model (DYNASIM).

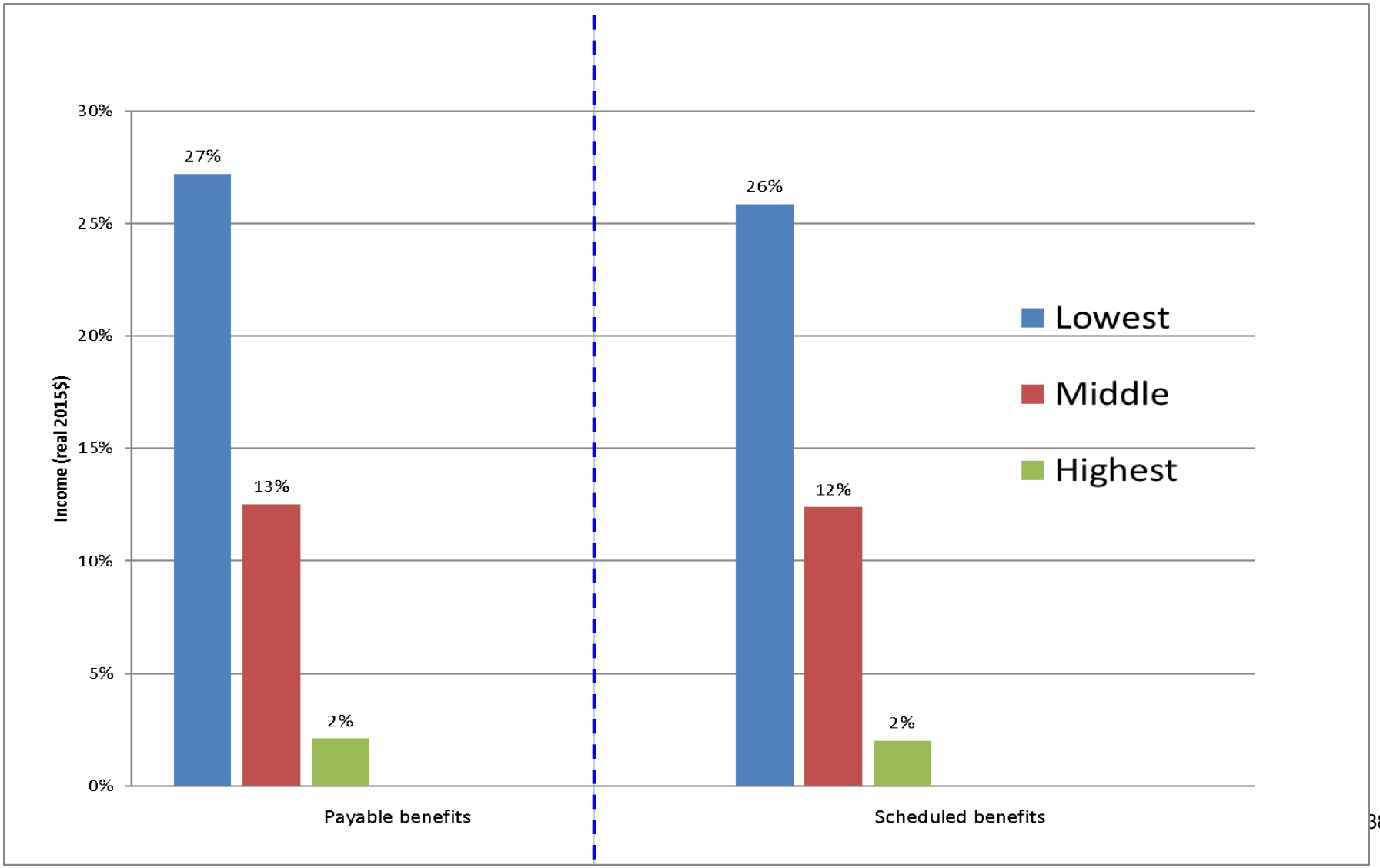
% Change in Av. Cash Income for 62+ *(DYNASIM)*



Projected Actuarial Balance for 25 & 75 years
(DYNASIM)



% Change in Av. Assets for 62+ by Income (*to 2065; DYNASIM)*



Takeaways:

- We pair a strategic survey with a rational life cycle model to successfully calibrate, simulate, and use to predict potential Social Security reforms.
- Show Early Claimers will defer claiming the most with *Lump Sum*.
- Results sensible and such a reform could slightly enhance Social Security solvency.

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Thank you!

- *For more information:*

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- http://www.pensionresearchcouncil.org/

Books and working papers:

- http://www.pensionresearchcouncil.org/publications/books.php