Financial Literacy and Financial Decision Making

Presentation for the 2025 Behavioral Public Economics Boot Camp
Stanford University

Olivia S. Mitchell
The Wharton School, University of Pennsylvania
mitchelo@wharton.upenn.edu

Wharton
University of Pennsylvania

Motivation:

- Consumers must make *increasingly complex* financial decisions:
  - Education & career choices (e.g., student loans, what'll be compatible with AI? how long to work & when to retire?)
  - Spending & budgeting (e.g., needs vs wants, rainy-day accounts)
  - Saving and debt management (e.g., BNPL, buy/rent home?)
  - Investments and insurance (e.g., Stocks vs bonds? Crypto & PE? Robinhood or acorns? Annuities so you can't outlive your assets?)
  - Major life transactions (e.g, prenups, 529s, death/disability protection)
  - Estate & legacy planning
- To get it right takes financial literacy! **"The ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions."**

Relevance to Behavioral Public Economics?

- FinLit research highlights how *cognitive limitations, knowledge gaps, and biases* influence financial decision-making, and also indicates how/when public policy can help correct or compensate for these issues.

✓ Those lacking basic financial knowledge don't behave "rationally" as predicted by conventional econ models *(e.g., save too little, claim benefits too early, invest inappropriately, don't insure/insure too much, regret).*

✓ Decision errors help justify why nudges and defaults can make people better off *(e.g. retirement saving autoenrollment, autoescalation of contributions, default annuities in 401(k) plans).*

✓ Policymakers & employers must consider financial literacy & behavioral biases when designing programs *(e.g., commitment devices, framing, social security & pension contributions & payouts).*

My Research Agenda:

- Measure financial literacy/capability;
- Investigate links between financial knowledge and economic decisions;
- Evaluate consequences of financial illiteracy;
- Confirm causality;
- Model and evaluate policy options.

Big Three finlit questions *Lusardi/Mitchell 2011*

Interest Rate: Let's say you have $100 in a saving account paying 2% interest/year. How much would you have in the account at the end of 5 years?

<$102; =$102, >$102; DK; refuse

Inflation: Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy*: > today, = today; < today*

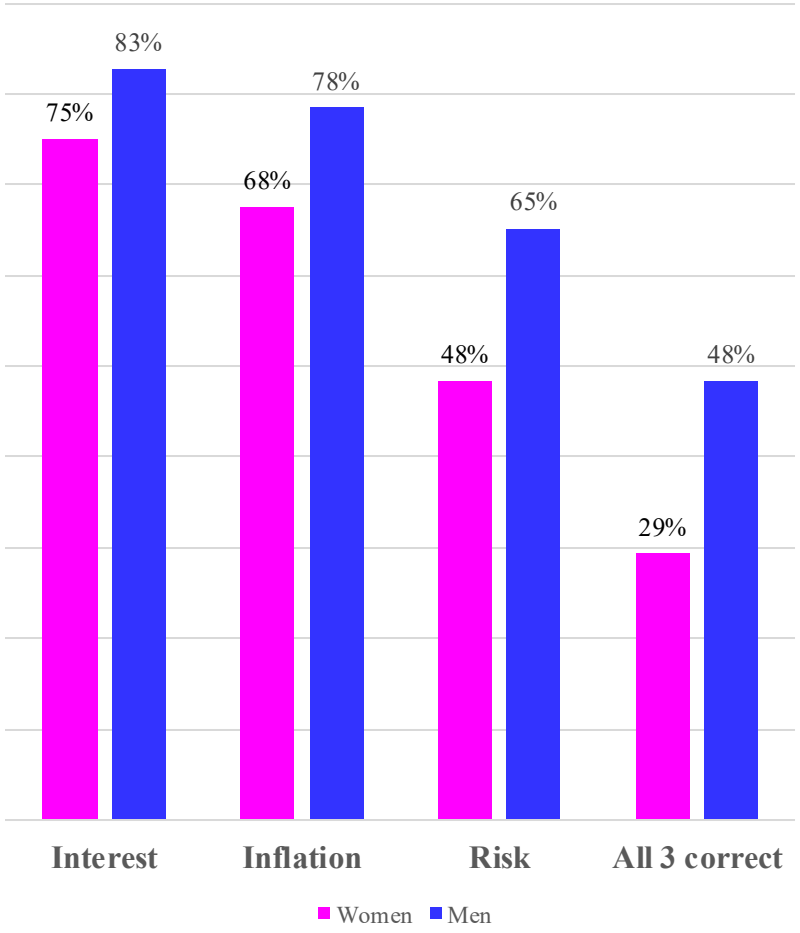
Risk Diversification: True or false? Buying a single company stock usually provides a safer return than a stock mutual fund.

How much do Americans know? *(2009 FINRA)*

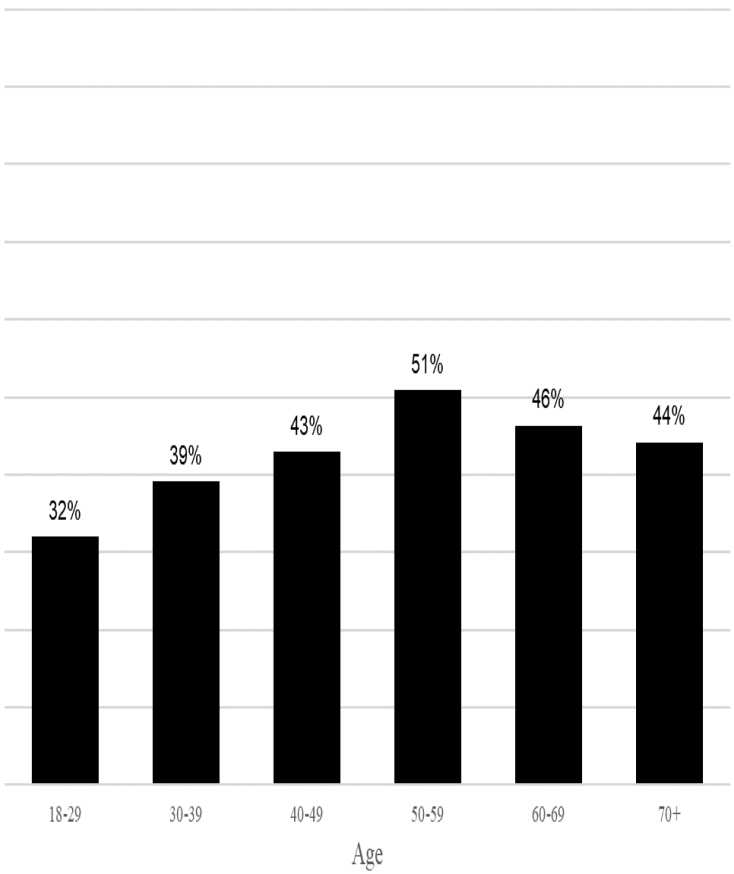
	Correct	*Incorrect*	*DK*	*Refuse*
Interest rate	65%	21%	13%	1%
Inflation	64%	20%	14%	2%
Risk diversif.	52%	13%	34%	1%

➔ Only 30% got all 3 questions right; < half (46%) got first two right.

How much do Americans know? *(2019 SCF)*

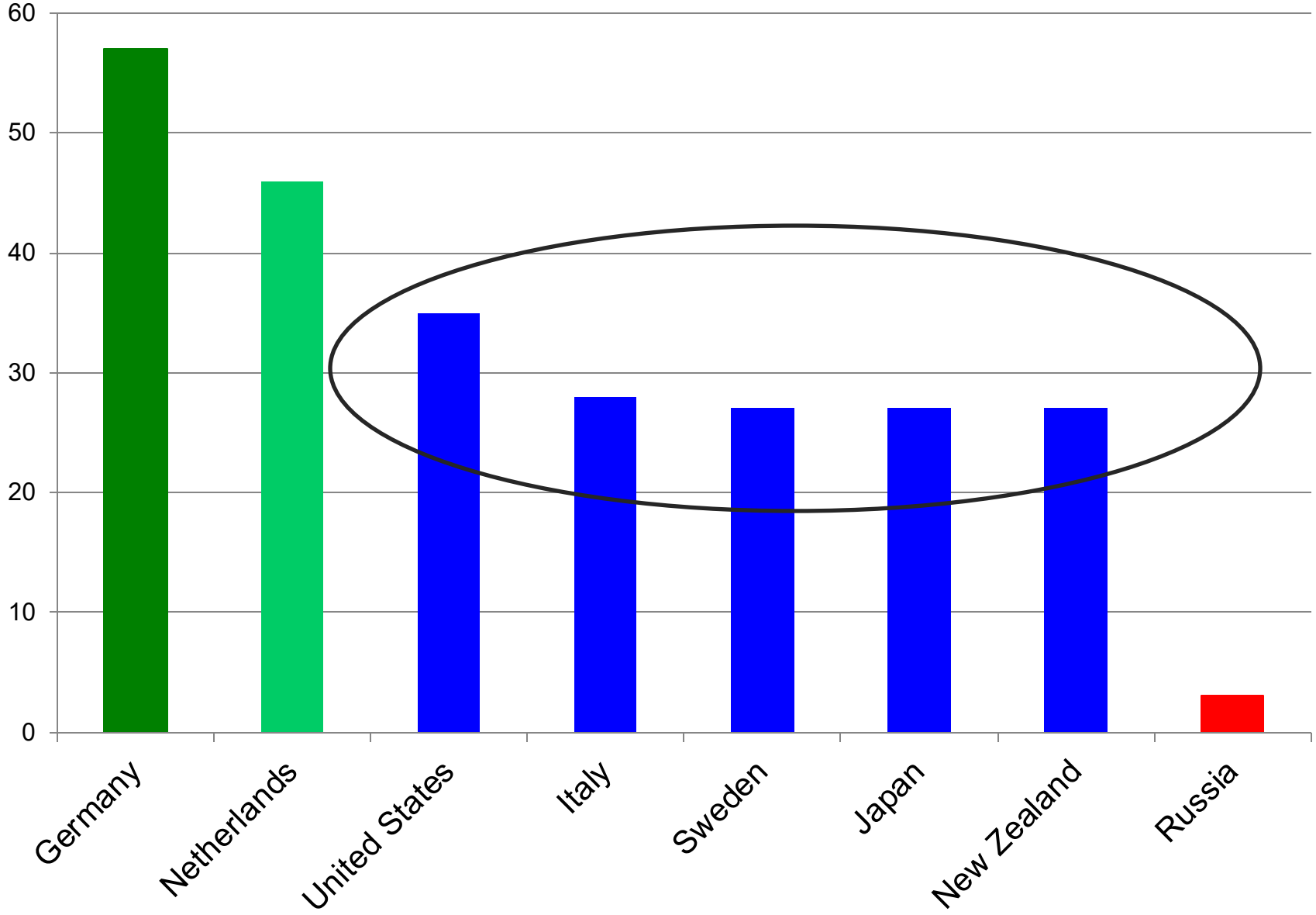


% correct by sex



% a;; Big Three correct by age

What about the rest of the world?



So what difference does it make for financial decisionmaking?

- The more financially literate are more likely to:
  - ✓Plan for retirement & accumulate more wealth;
  - ✓Participate more in the stock market;
  - ✓Better manage their debt;
  - ✓Are more resilient given economic shocks (e.g. pandemic);
  - ✓Are more likely to annuitize and are least likely to be swayed by framing (e.g. claim social security too young, take lump sums from pensions).

Yet do *correlations* between financial literacy and wealth reflect *causality?*

- Maybe not if unobserved factors & measurement error bias measured finlit effects.
- Must correct for endogeneity and measurement error.
- So we need a theoretical model to examine the link between:
  - Financial knowledge and economic decisions.
  - Consequences of financial illiteracy
  - Cost-effective policy options

Financial knowledge & wealth inequality:

- Conventional models have a hard time fitting:
  - Heterogeneity in wealth accumulation
  - Low % in equity and individual retirement accounts, and heterogeneity in wealth by education ,
- Financial knowledge strongly related to wealth holdings & both very heterogeneous.
- How does that relationship arise?
  - Because the wealthy enjoy higher returns on their investments.

Lusardi/Michaud/Mitchell (JPE): Financial Knowledge & Wealth Inequiality

- Financial knowledge a form of human capital :
  - Raises expected return on saving, lowers borrowing rate, may help reduce variance (diversification);
  - Is expensive to acquire in money, time, & utility terms.
- Explains large % of wealth heterogeneity:
  - Diff's in income paths by education groups create different incentives for investment;
  - In turn, produces differences in return exacerbating wealth inequality.
- Policy importance:
  - Policies that shift responsibility to consumers in a world of imperfect literacy could be harmful;
  - Policies that improve FK may have economic & welfare benefits.

Model sketch:

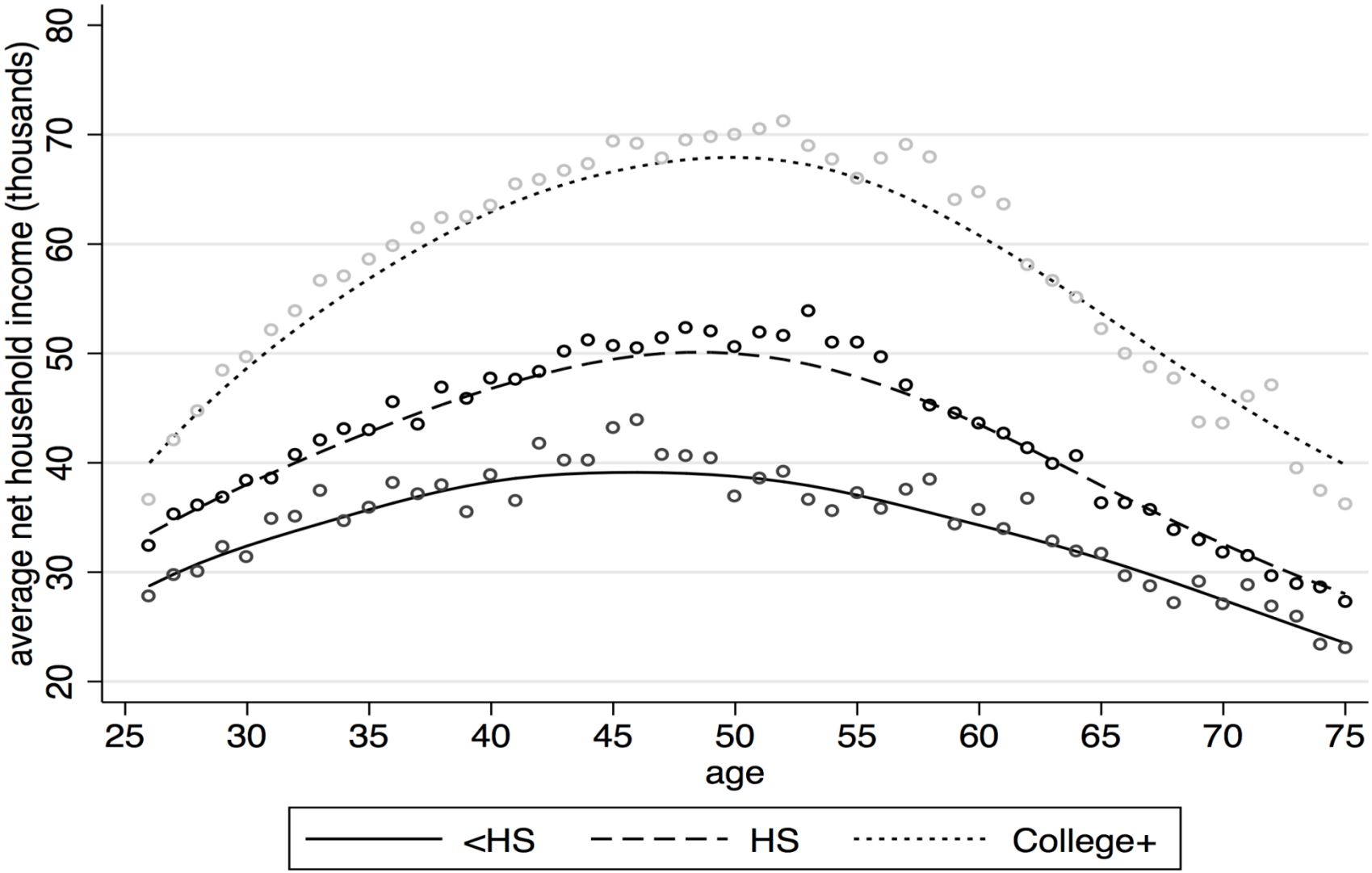
- Calibrate stochastic LC model w/ endogenous FK decisions.
- Use model to simulate FK & wealth inequality.

→ Explore responses to policy: how FK responds to mean-tested transfers, etc.

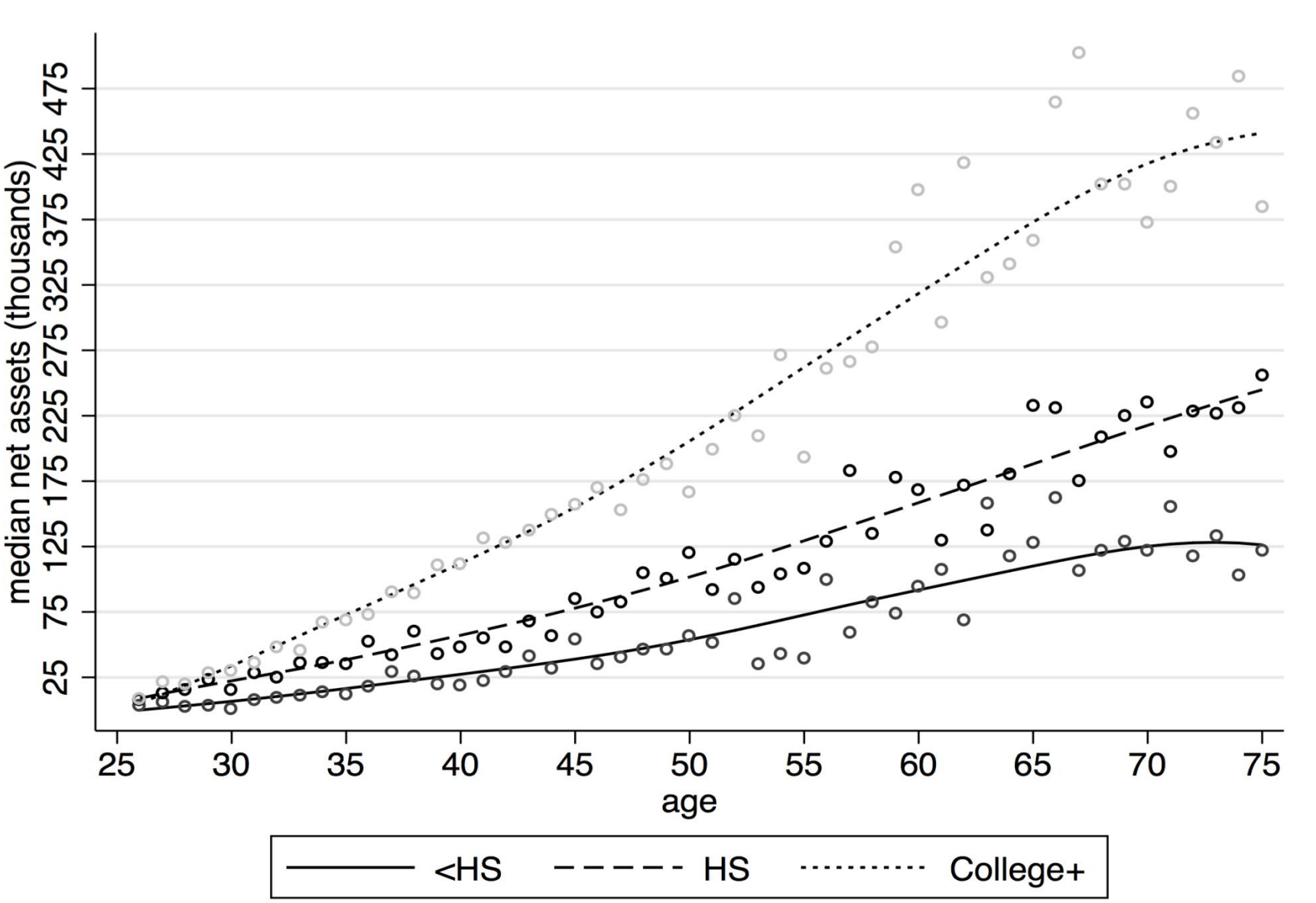
- Our model differs from prior literature :
  - FK accumulation in a world with imperfect markets, risky labor income, equity returns, uncertain mortality and OOP medical costs, and a realistic social insurance system.
  - Endogenous wealth inequality.

Labor Income Varies by Education Over LC

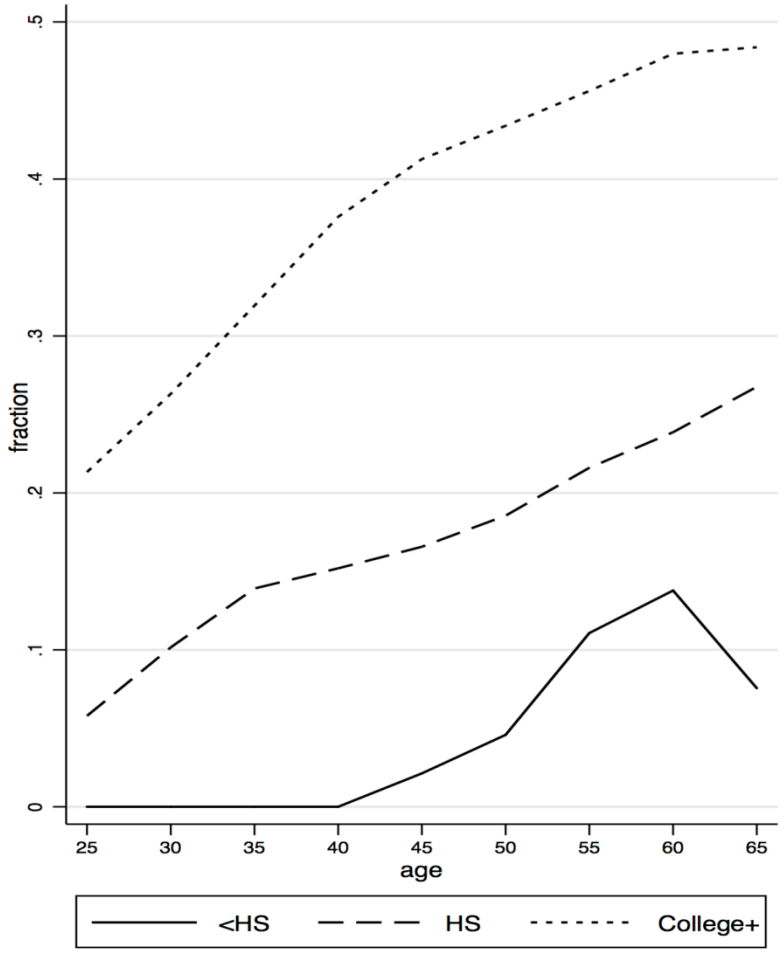
(PSID men <HS, HS, College+)

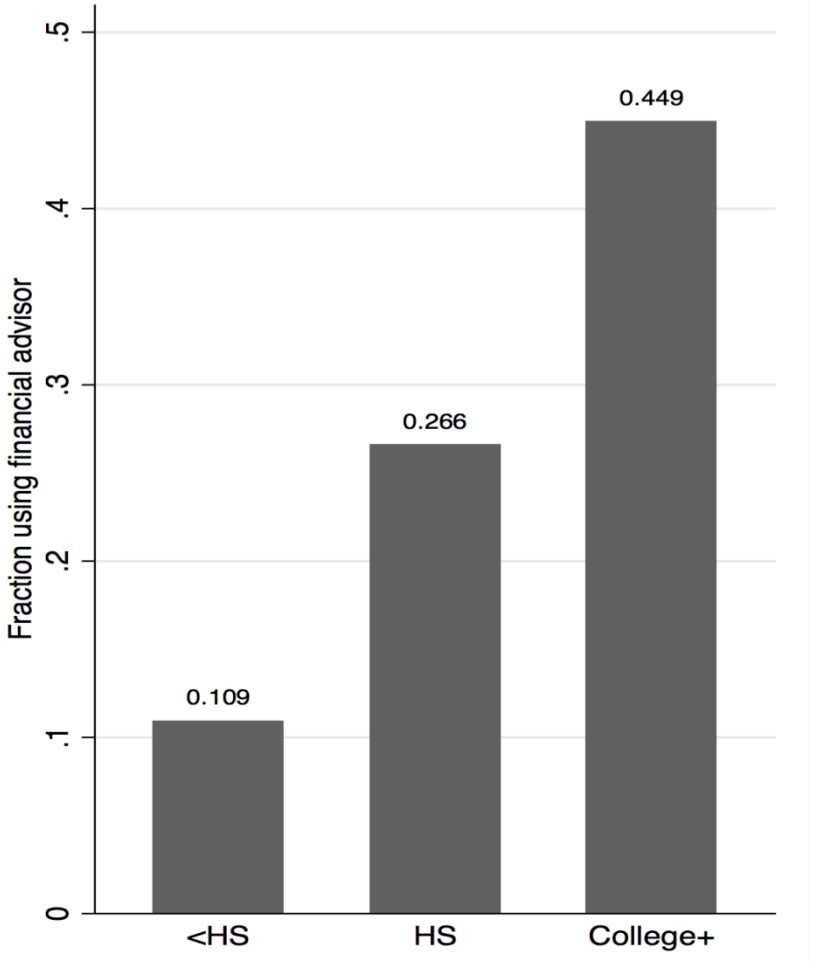


Median Net Assets by Education over LC



Fin Knowledge & Use of Fin Advice Vary by Education over LC





Our approach:

- Consumers max EU of life cycle consumption: function of household composition $n_t * u(c_t/n_t)$ where n_t =HH equiv scale.

- Given budget constraint w/ uncertainty:
  - Net of tax labor income subject to shocks y_t;
  - Stochastic OOP medical expenditures (when retired) oop_t;
  - Mortality tables;
  - Stochastic returns for sophisticated financial products > risk-free rate.

→ No pref heterogeneity.

Two FK technologies available:

- Simple technology pays risk-free return (no FK)

$$\overline{R} = 1 + \bar{r}$$

- Sophisticated technology pays an expected rate of return which depends on f_t

$$R(f_{t+1}) = \overline{R} + r(f_{t+1}) + \delta_{\varepsilon}\varepsilon_{t+1}$$

where $\varepsilon_t \sim N(0,1)$ iid shock; middle term is excess returns due to investment; δ is st.dev. of returns on sophisticated technology.

- To invest, must pay fixed costs c_d and allocate time $\pi_i(i_t)$
- κ_t = *1 if invest, = 0 else.*

FK evolves over time:

- Last period's knowledge ↑ by i, and ↓ by δ (due to forgetting &/or obsolescence):

$$f_{t+1} = \delta f_t + i_t$$

- Govt Transfers: tr_t with c_{min}= guaranteed income floor
  - ✓ Cannot buy sophisticated tech if at the govt min income level. Also this Lowers EV of consumption for lower-paid.
- Social Security progressive

Labor income and medical expenditures

- Labor income AR(1) with permanent and transitory components η_y

$$y_t = g_e(t) + \mu_t + v_t$$
$$\mu_t = \rho_e \mu_{t-1} + \varepsilon_t$$
$$\varepsilon_t \sim N(0, \sigma^2_\varepsilon), v_t \sim N(0, \sigma^2_v)$$

- OOP expenditures similar: ARI (1)

$$oop_t = h_e(t) + \eta_o$$

Other constraints:

- Cash on hand

$$x_t = a_t + y_t + tr_t - oop_t$$

- End of period assets:

$$a_{t+1} = \tilde{R}_\kappa(f_{t+1})(x_t + tr_t - c_t - \pi(i_t) - c_d I(\kappa_t > 0))$$

where

$$\tilde{R}_\kappa(f_{t+1}) = (1 - \kappa_t)\overline{R} + \kappa_t \tilde{R}(f_t)$$

The Household's Problem

$$V_d(s_t) = \max_{c_t, i_t, \kappa_t} n_{e,t} u(c_t / n_{e,t}) + \beta p_{e,t} \int_{\varepsilon} \int_{\eta_y} \int_{\eta_o} V(s_{t+1}) dF_e(\eta_o) dF_e(\eta_y) dF(\varepsilon)$$

$$a_{t+1} = \tilde{R}_\kappa(f_{t+1})(a_t + y_{e,t} + tr_t - c_t - \pi(i_t) - c_d I(\kappa_t > 0)), \; a_{t+1} \geq 0$$

$$f_{t+1} = \delta f_t + i_t$$

$$\tilde{R}_\kappa(f_{t+1}) = (1 - \kappa_t)\overline{R} + \kappa_t \tilde{R}(f_{t+1})$$

Value function solved by backward recursion.

- 3 consumer decision variables: 2 continuous (c_t,i_t), 1 discrete (κ)
- 5 state space variables : e, f_t, a_t, η_y η_o

Baseline Parameter Values

Relative risk aversion *(σ)*		1.6
Discount factor *(β)*		0.96
Risk-free return $(\bar{r})$		0.02
Max return for knowledge investment $r(f_{max})$		0.04
Inv'stmt prod'n f'n	π_0	50
$\pi(i) = 50*i^{1.75}$	π_1	1.75
Fixed cost of partic. in soph tech *(c_d)*		750
Depr. rate for fin knowledge *(δ)*		0.06
Min consumption floor *(c_{min})*		10,000

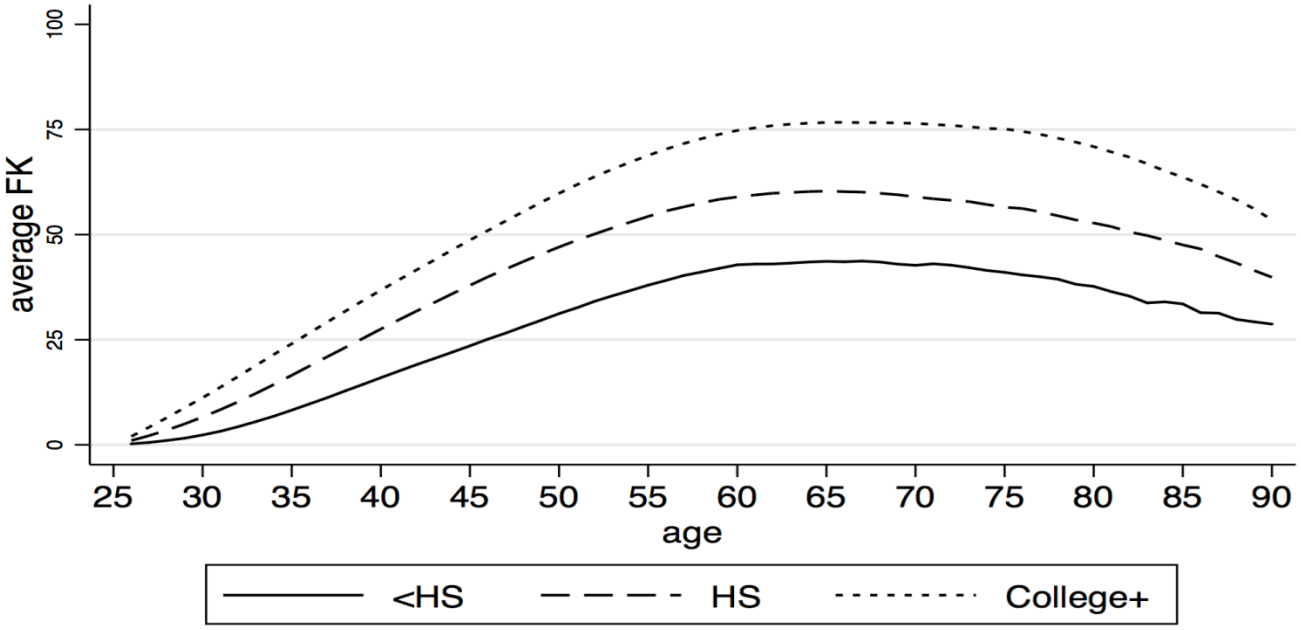
Simulated & Observed Results @ Retirement (65)

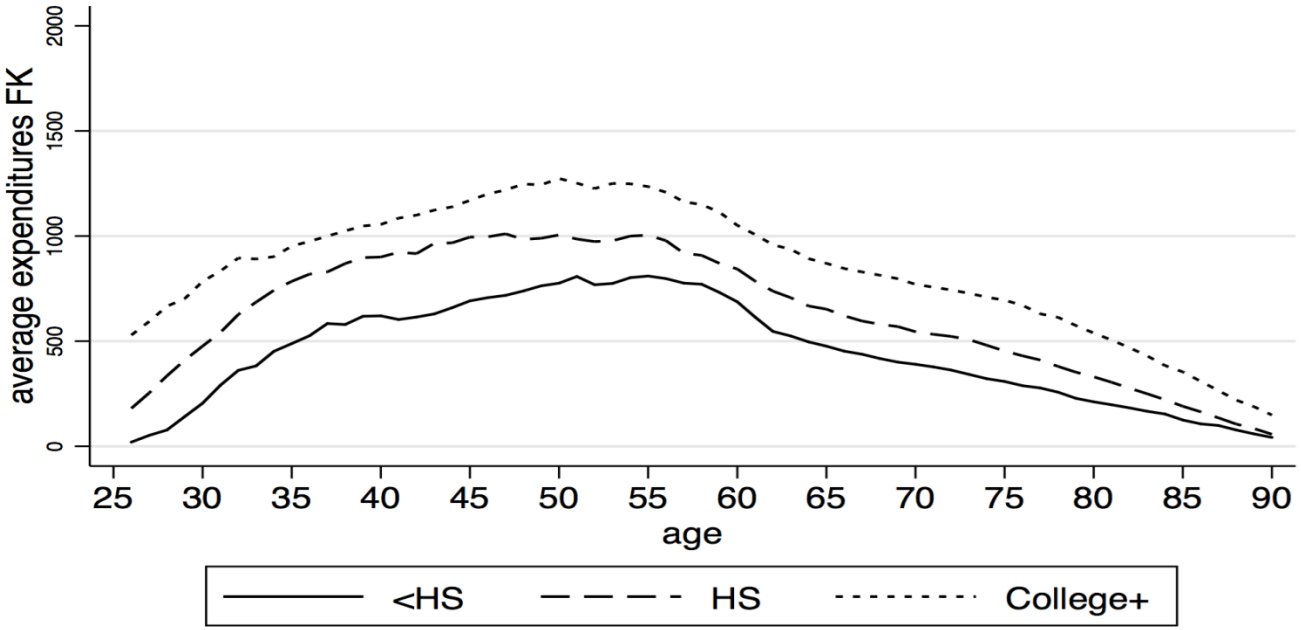
Baseline Simulation	<HS	College	Coll/<HS
Med. Wealth ($W)	95K	347K	3.66
Ave. Income ($Y)	32K	48K	1.49
W/Y Ratio	2.98	7.3	2.45
% Poor ($w_t < 2y_t$)	0.39	0.17	0.45
% Part.($\kappa_t > 0$)	0.45	0.78	1.74
Data (PSID)			
Med. Wealth ($W)	102K	365K	3.59
% Poor ($w_t < 2y_t$)	0.35	0.16	0.46
% Part. ($\kappa_t > 0$)	0.28	0.75	2.68
W/Y			2.41

Baseline: Av. Sim. LC FK Levels

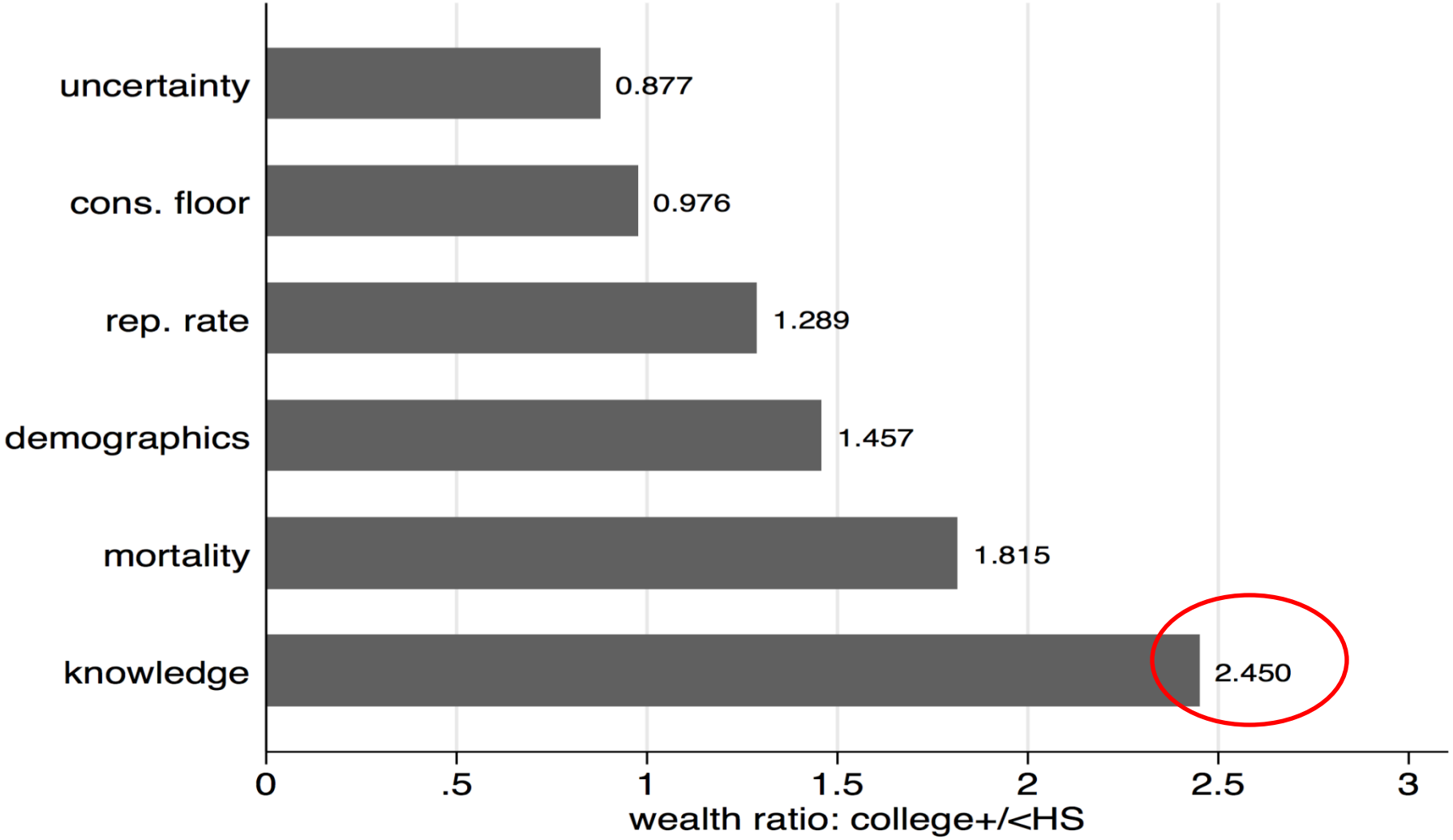
&

Spending on FK





Decomposition of W/Y Inequality across Education Groups at Retirement



Endogenizing Financial Knowledge Investment:

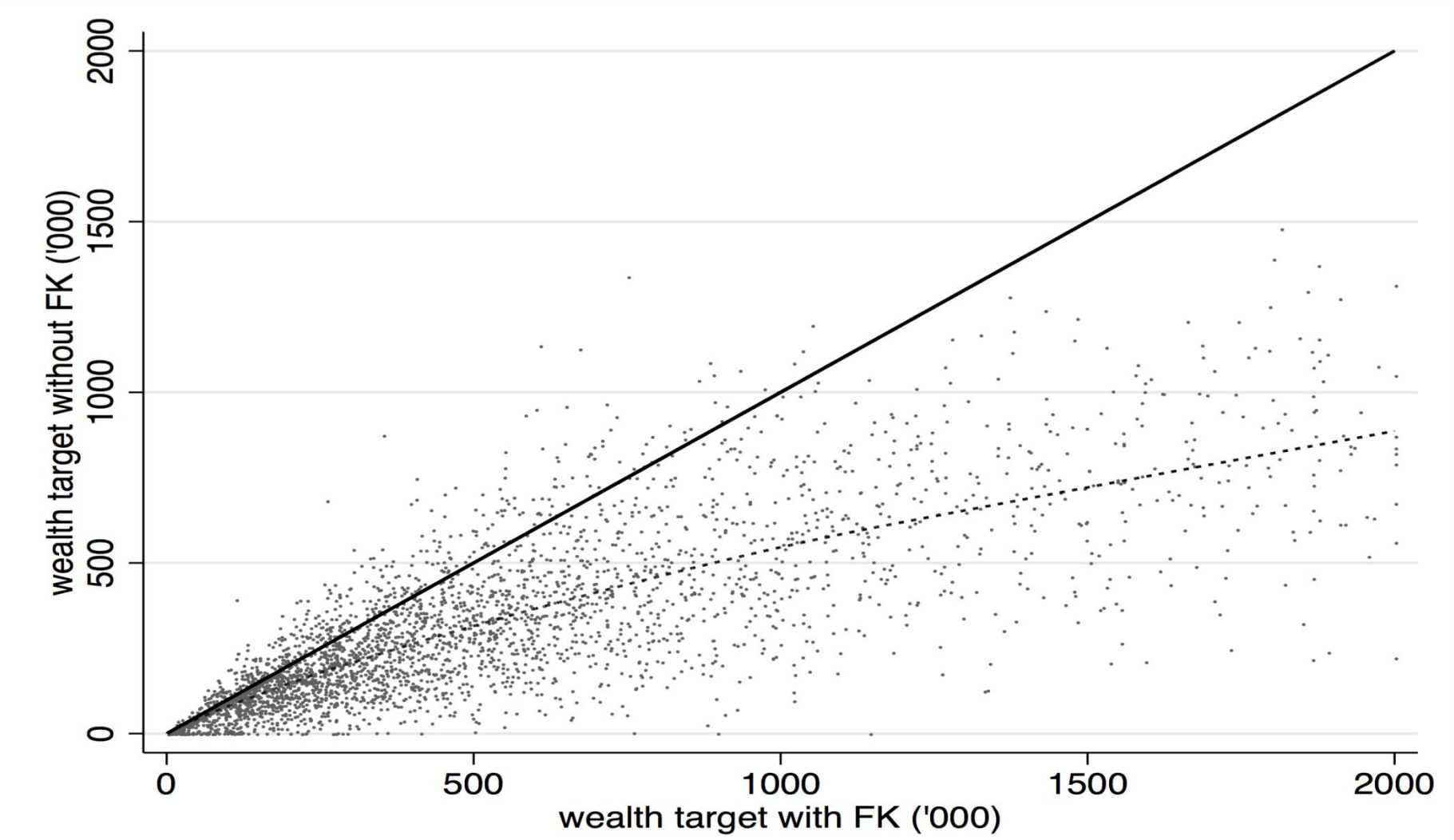
Median W/Y for college graduates vs HS dropouts (at retirement):

- With uncertainty alone: 0.88
- With consumption floor: 0.98
- Different replacement rates: 1.29
- Different demographics and mortality: 1.82
- Financial knowledge: 2.45

➔So financial knowledge accounts for 40% of cross-group wealth inequality.

Lusardi, Michaud, Mitchell 2014

Simulated predicted wealth at retirement: Baseline vs w/o FK



Two Policy Experiments

- Scenario 1: Lower income floor (0.5 c_{min})

  →Both wealth and financial literacy increase.

- Scenario 2: Lower retirement income 20%

  →Wealth and fin literacy increase, wealth inequality declines.

Baseline Simulation	<HS	College	Coll/<HS
Med. Wealth	95K	347K	3.66
W/Y	2.98	7.3	2.45
% Poor	0.39	0.17	0.45
% Partic.	0.45	0.78	1.74
% Low FK	0.54	0.21	0.39
Lower Cmin Flr			
Med. Wealth	109K	361K	3.32
W/Y	3.42	7.6	2.22
% Poor	0.36	0.16	0.45
% Partic.	0.47	0.7	1.65
Low FK	0.52	0.19	0.37
Lower Ret. Income			
Med. Wealth	125K	412K	3.29
W/Y	4.08	9.01	2.21
% Poor	0.29	0.09	0.31
% Partic.	0.49	0.8	1.65
Low FK	0.49	0.16	0.32

Program Evaluation of Employer-Provided FK Programs

- Fin program can cut e'e cost of investing in knowledge.
- Firm offers program & eligibility assigned randomly to all e'es of a given age.
- Compare each (simulated) e'e outcome with and without access to program.
- *Great advantage*: We can simulate counterfactuals! So can estimate selection bias.

Participant vs Nonparticipant Diff's

(conditional on being eligible):

- Participation in FK *endogenous.*
  - Participants have higher earnings, more initial knowledge, and more wealth at baseline;
  - Nonparticipants are poorer, earn less, and have little financial knowledge at baseline.
- Selection implies: Average program effectiveness measure assumes program *nonparticipants* could benefit as much as *participants,* but this is biased.

Illustration:

- If program evaluation assumes independent of retirement wealth, nonparticipants could be used to measure the counterfactual: program effect might be to boost retirement wealth up by 75%.

→But actually, effect is much smaller.

- So using nonparticipants as counterfactual grossly overestimates program effects.

What works?

1. *Financial education in school*: Diff rollouts by state/time allow better evaluations.
2. *Financial education in the workplace*: Not all offered FK will invest in it.
3. Must reaffirm learning to mitigate depreciation.

Conclusions:

- Financial knowledge is *economically important* for understanding differences in consumer financial decisionmaking.
- Makes sense for some to remain unsophisticated, and for effects to fade in later life.
- Program evaluation needs to acknowledge endogeneity of FK program participation.
- Safety nets can increase wealth inequality.

Thank you!

- *For more information:*

Wharton's Pension Research Council:

- http://www.pensionresearchcouncil.org/

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