



Financial Literacy around the World: Evidence, Theory, and Implications

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The growing importance of financial literacy

A new economic landscape

Major changes in many markets and institutions

➤ Changes in pension systems

- From DB to DC pensions and more individual and private accounts

➤ Changes in labor markets and education

- Labor mobility and investment in/cost of education

➤ Changes in financial markets

- Greater complexity
- More opportunities to borrow & in large amounts

The “risk shift”

Increase in individual responsibility

- **Individuals are responsible for saving and investing their retirement wealth**
 - Risk shift from employers and government to individuals (and from experts to individuals)
- **Individuals have to manage the risks related not just to wealth accumulation but also to wealth decumulation**
 - Longevity and other risks
- **These changes are happening across countries**

Research questions

Given these changes:

1. How well-equipped are people to deal with this new economic environment? Are they financially literate?
2. Who knows the most/the least?
3. Does financial literacy matter and how much?
4. What can be done to change current levels of financial literacy? (work in progress)

Measuring financial literacy across countries

How well-equipped are people?

New data collected over many years:

- 1. Financial Literacy around the World (FLAT World) project**
- 2. S&P Global Financial Literacy Survey (new data and truly global)**

Measuring financial literacy

What questions to ask

- **Theory: Saving (borrowing) and investing**
 - **Life-cycle model of saving**
 - **Portfolio choice**

Concepts:

- *Interest compounding*
- *Inflation*
- *Risk diversification*

These theories/concepts apply everywhere

Measuring financial literacy

Three questions

1. Numeracy/interest compounding
2. Inflation
3. Risk diversification

Being financially literate: How many can answer these 3 questions correctly, and how many can correctly answer 2 out of the 3 questions?

Measuring financial literacy

Three simple questions

- 1. “Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?”**

 - ☐ More than \$102
 - ☐ Exactly \$102
 - ☐ Less than \$102
 - ☐ Don't know
 - ☐ Refuse to answer
- 2. “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...”**

 - ☐ More than today
 - ☐ Exactly the same as today
 - ☐ Less than today
 - ☐ Don't know
 - ☐ Refuse to answer
- 3. “Do you think the following statement is true or false? *Buying a single company stock usually provides a safer return than a stock mutual fund.*”**

 - ☐ True
 - ☐ False
 - ☐ Don't know
 - ☐ Refuse to answer

Adding finlit questions to national surveys

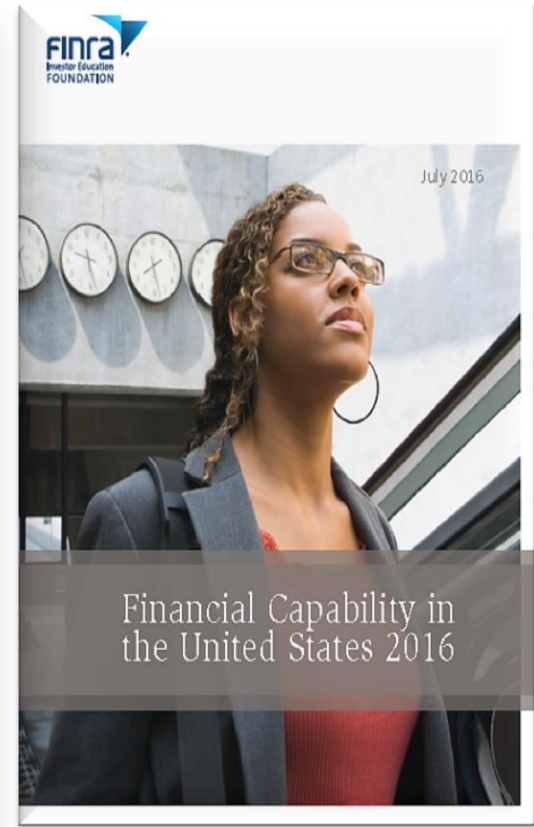
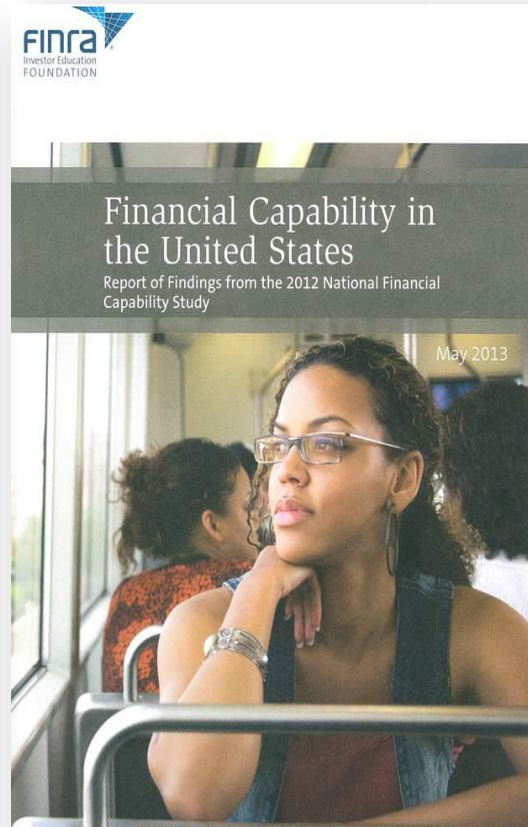
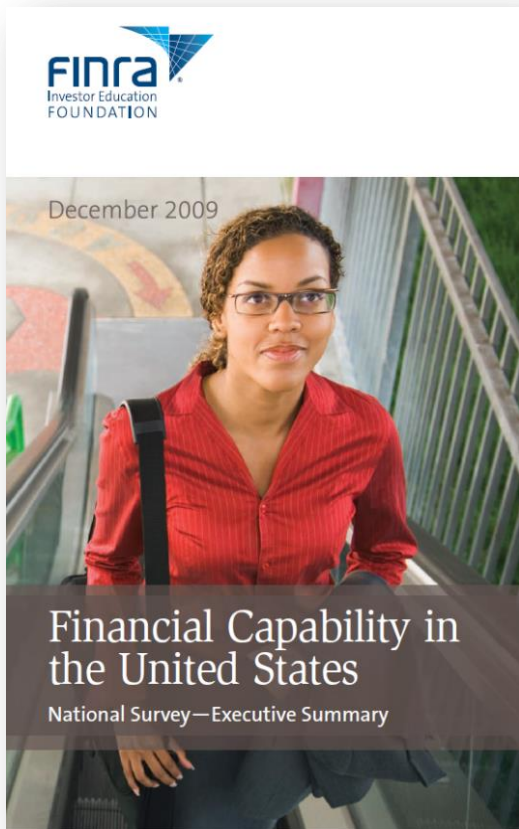
US surveys that have these questions

- 1. 2004 US Health and Retirement Study (age: 50+)**
- 2. 2007-2008 US National Longitudinal Study of Youth (age: 23-28)**
- 3. 2008 RAND American Life Panel (all age groups)**
- 4. 2009, 2012, and 2015 US National Financial Capability Study (all age groups)**

They are now added to the 2016 Survey of Consumer Finances

Collecting new data

The 2009 & 2012 National Financial Capability Study
The 2015 was released on July 12, 2016 at GW



Financial Literacy around the World (FLAT World)

Evidence from 15 countries:

- ❖ USA
- ❖ The Netherlands
- ❖ Germany
- ❖ Italy
- ❖ Russia
- ❖ Sweden
- ❖ New Zealand
- ❖ Japan
- ❖ Australia
- ❖ France
- ❖ Switzerland
- ❖ Romania
- ❖ Chile
- ❖ Canada
- ❖ Finland



How much do Americans know?

Distribution of responses across the U.S. population (2009 National Financial Capability Survey)

Distribution of Responses to Financial Literacy Questions (%)

	Responses		
	<i>Correct</i>	<i>Incorrect</i>	<i>DK</i>
Interest rate	65%	21%	13%
Inflation	64%	20%	14%
Risk diversif.	52%	13%	34%

NB: Only 30% correctly answer all 3 questions; less than half (46%) got the first two questions right.

How much do Canadians know?

Distribution of responses in the Canadian population (2012 CSA Investor Index Survey)

Distribution of Responses to Financial Literacy Questions (%)

	Responses		
	<i>Correct</i>	<i>Incorrect</i>	<i>DK</i>
Interest rate	78%	13%	9%
Inflation	66%	18%	16%
Risk diversif.	59%	10%	31%

NB: 42% correctly answered all three questions; 58% got the first two questions right.

How much do Japanese know?

Distribution of responses in the Japanese population (2010 SLPS)

Distribution of Responses to Financial Literacy Questions (%)

	Responses		
	<i>Correct</i>	<i>Incorrect</i>	<i>DK</i>
Interest rate	71%	15%	13%
Inflation	59%	11%	28%
Risk diversif.	40%	3%	56%

NB: Only 27% correctly answered all three questions; (49%) got the first two questions right.

How much do Dutch know?

Distribution of responses across the DNB Survey (2010 DNB Household Survey)

Distribution of Responses to Financial Literacy Questions (%)

	Responses		
	<i>Correct</i>	<i>Incorrect</i>	<i>DK</i>
Interest rate	85%	5%	9%
Inflation	77%	8%	14%
Risk diversif.	52%	13%	33%

NB: About half (45%) correctly answer all 3 questions; 73% got the first two questions right.

Findings

Similar patterns across countries

- **Financial illiteracy is widespread in the population**
 - Less than half of the population can answer three basic questions
- **Risk diversification is most difficult concept**
 - Similar pattern of response across countries
 - Prevalence of “do not know” answers
- **These findings are robust**
 - Evidence from bigger surveys and different questions

Measuring financial literacy globally

A global measure

1. **Core concepts**
2. **Universality**
3. **Generalizability**

The measure has to be applicable to every country, irrespective of economic structure and financial markets development

The S&P Global FinLit Survey

- *The S&P Global FinLit Survey* is the largest, most comprehensive measure of financial literacy.
- Interviewed more than 150,000 adults age 15+ in 148 countries
- S&P Global partnered with Gallup, GFLEC, and the World Bank to create the S&P Global FinLit Survey



The S&P Global FinLit Survey



The survey covers four topics:

- Numeracy
- Interest compounding
- Inflation
- Risk diversification

Being financially literate:

How many can answer 3 out of these 4 topics correctly

Measuring financial literacy

A global measure

Three basic questions plus interest compounding

Interest Compounding

Suppose you put money in the bank for two years and the bank agrees to add 15 percent per year to your account. Will the bank add more money to your account in the second year than it did in the first year, or will it add the same amount of money in both years? [**more**; *the same*; *don't know*; *refuse*]

Suppose you had \$100 in a savings account and the bank adds 10 percent per year to the account. How much money would you have in the account after five years if you did not remove any money from the account? [**more than 150 US dollars**; *exactly 150 US dollars*; *less than 150 US dollars*; *don't know*; *refused*]

Measuring financial literacy

Risk Diversification

Suppose you have some money. Is it safer to put your money into one business or investment, or to put your money into multiple businesses or investments? [*one business or investment; **multiple businesses or investments**; don't know; refuse to answer*]

Numeracy and knowledge of inflation

Numeracy/ simple Interest

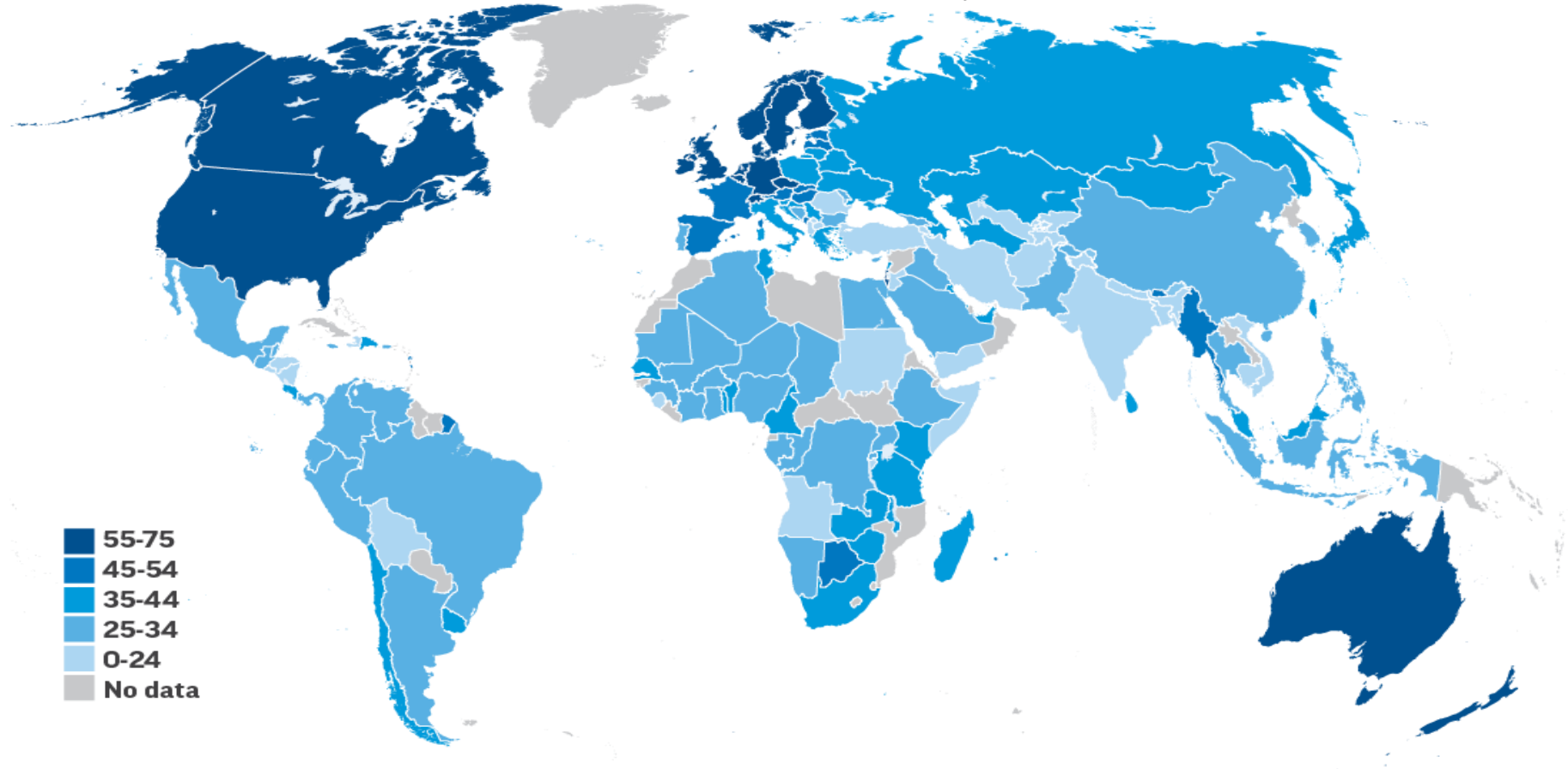
Suppose you need to borrow \$100. Which is the lower amount to pay back: \$105 or \$100 plus three percent? *[105 US dollars; **100 US dollars plus three percent**; don't know; refuse]*

Inflation

Suppose over the next 10 years the prices of things you buy double. If your income also doubles, will you be able to buy less than you buy today, the same as you can buy today, or more than you can buy today? *[less; **the same**; more; don't know; refuse]*

Financial literacy globally

% of adults who are financially literate



- Only 1 in 3 adults worldwide responded correctly to three out of four topics.

How countries score

Norway, Denmark, and Sweden lead the list with 71% of adults answering three out of four topics correctly.

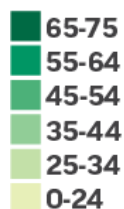
In the US, 57% answer three out of four topics correctly.

Country	at least 3 out of 4 topics answered correctly (%)
Norway	71%
Denmark	71%
Sweden	71%
Israel	68%
Canada	68%
UK	67%
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Jamaica	33%
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Somalia	15%
Afghanistan	14%
Albania	14%
Yemen	13%

Financial literacy in Northern and Southern Europe

% of adults who are financially literate

- Financial literacy varies a lot between Northern and Southern Europe
- Italy is at 37%, Portugal at 26% versus Germany (66%)



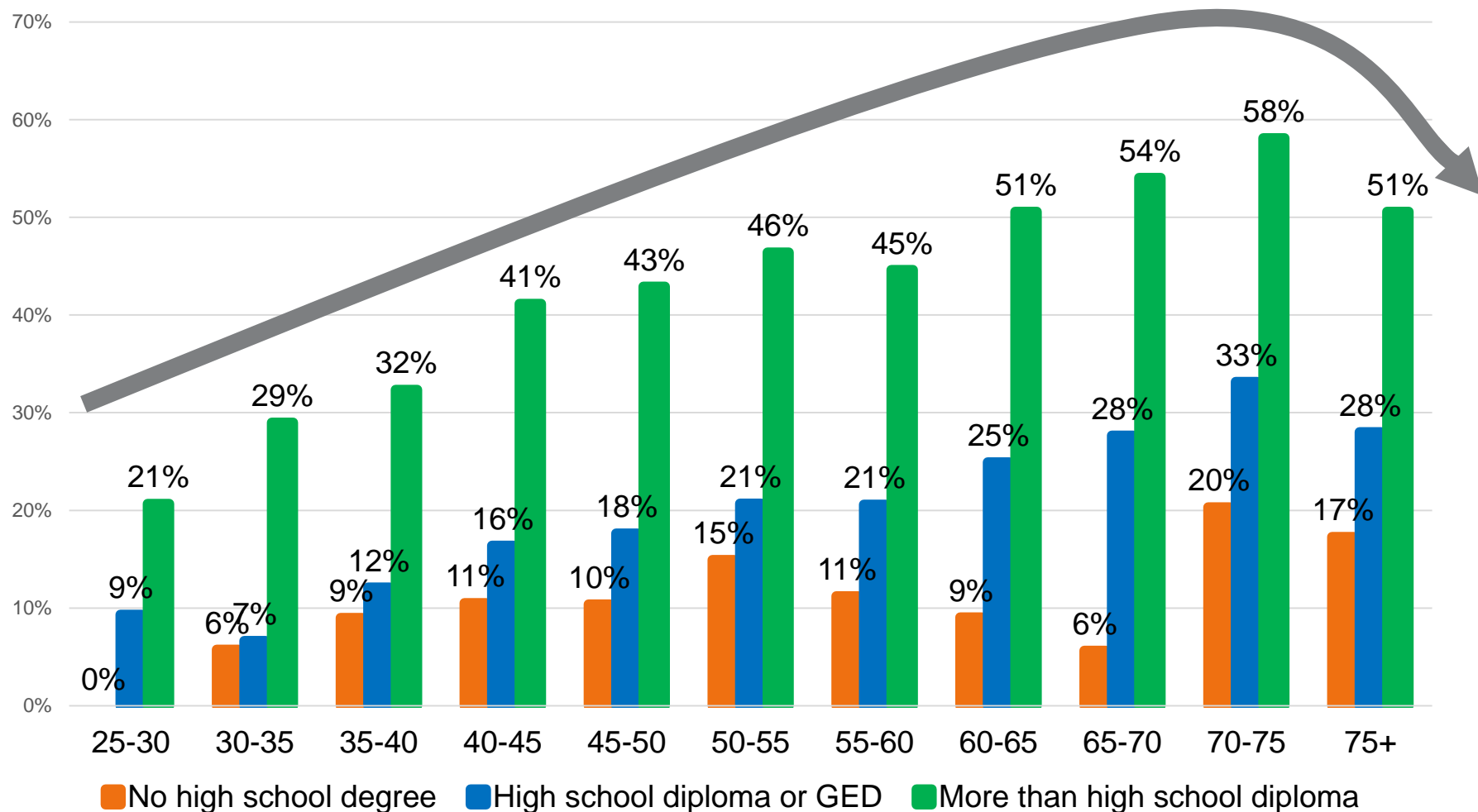
Second question: Who knows the most/the least?

Looking across age groups

- **Hump-shaped profile over the life cycle**
- **Similar findings across countries**

Financial literacy across age and education

2015 National Financial Capability Study
% of respondents answering 3 questions correctly



Third question: Does financial literacy matter?

Linking financial literacy to behavior

- **Financial literacy can be linked to saving, wealth, and retirement planning (JEL, 2014)**
- **Financial literacy can be linked to investment performance in 401(k) (JPEF, forthcoming)**
- **Financial literacy can be linked to wealth inequality (JPE, forthcoming)**

Financial literacy and wealth inequality

Adding financial literacy in an intertemporal model of saving

- Intertemporal model of saving with 4 sources of uncertainty and different age-earning profiles according to education
- Individuals also accumulate financial literacy
- Financial literacy improves returns on savings but investment in knowledge is costly
- We build a model which reproduces the heterogeneity in savings and financial literacy observed in the data.

Intertemporal model with financial literacy

The workings of financial literacy

- Two savings technologies: basic (safe return) and sophisticated (higher return).
- The ability of individuals to obtain the higher return with the sophisticated technology depends positively on their stock of financial knowledge.
- It is costly to invest in financial knowledge (time, fees, etc).
- Financial knowledge depreciates which adds to the opportunity cost of investing

What we do

- We present a calibrated life-cycle model with several sources of risk (earnings, medical expenditures, rate of return and mortality) which features endogenous financial knowledge accumulation:
 - We solve, calibrate, and simulate using the model, focusing on the role of financial knowledge accumulation to explain wealth inequality.
 - We explore the effect of changing retirement benefits and means-tested benefits on wealth and FK accumulation
 - We do a battery of robustness checks analyzing implications of the model
- We differ from existing literature:
 - Rich framework that incorporates many saving motives
 - Financial knowledge as a determinant of wealth inequality

Key Ingredients of Model

- Consumers seek to maximize expected utility facing uncertainty regarding:
 - Net household income while working
 - Rate of return on sophisticated technology
 - Out-of-pocket medical expenditures in retirement
 - Mortality
- They want to allocate consumption over the life-cycle and have 2 technologies to transfer resources across periods of their lives:
 - A basic technology, paying return r
 - A sophisticated technology, paying an excess expected return $r(f_{t+1})$.
 - This technology has a participation cost c_d

Investment in Financial Knowledge

- Financial knowledge evolves according to

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

- Investment i_t is costly: $\pi(i_t)$ convex (hence decreasing returns in the production of fin. knowledge).
- Depreciation δ occurs because i) people forget, ii) skill obsolescence.

Heterogeneity

- Allow for heterogeneity in resources and characteristics by education level (e):
 - earnings: $y_{e,t}$
 - medical expenditures, $oop_{e,t}$
 - mortality, $p_{e,t}$
 - household size: $n_{e,t}$
- No differences in preferences and technology to isolate role of financial knowledge.

Household Problem

$$\begin{aligned} V_d(s_t) &= \max_{c_t, i_t, \kappa_t} n_{e,t} u(c_t / n_{e,t}) \\ &\quad + \beta p_{e,t} \int_{\varepsilon} \int_{\eta_y} \int_{\eta_o} V(s_{t+1}) dF_e(\eta_o) dF_e(\eta_y) dF(\varepsilon) \\ a_{t+1} &= \tilde{R}_\kappa(f_{t+1})(a_t + y_{e,t} - oop_{e,t} + tr_t - c_t - \pi(i_t) - c_d I(\kappa_t > 0)) \\ f_{t+1} &= (1 - \delta)f_t + i_t \\ \tilde{R}_\kappa(f_{t+1}) &= (1 - \kappa_t)\bar{R} + \kappa_t \tilde{R}(f_{t+1}) \end{aligned}$$

We solve by backward recursion after discretizing the continuous state-variables. We impose $a_{t+1} \geq 0$.

Calibration

- Calibration uses plausible parameter values for preference and technology (with robustness analysis), using PSID
- Solve the model for each education group, then simulate a cohort of consumers
- All start without financial knowledge (to isolate effect of endogenous accumulation of knowledge)

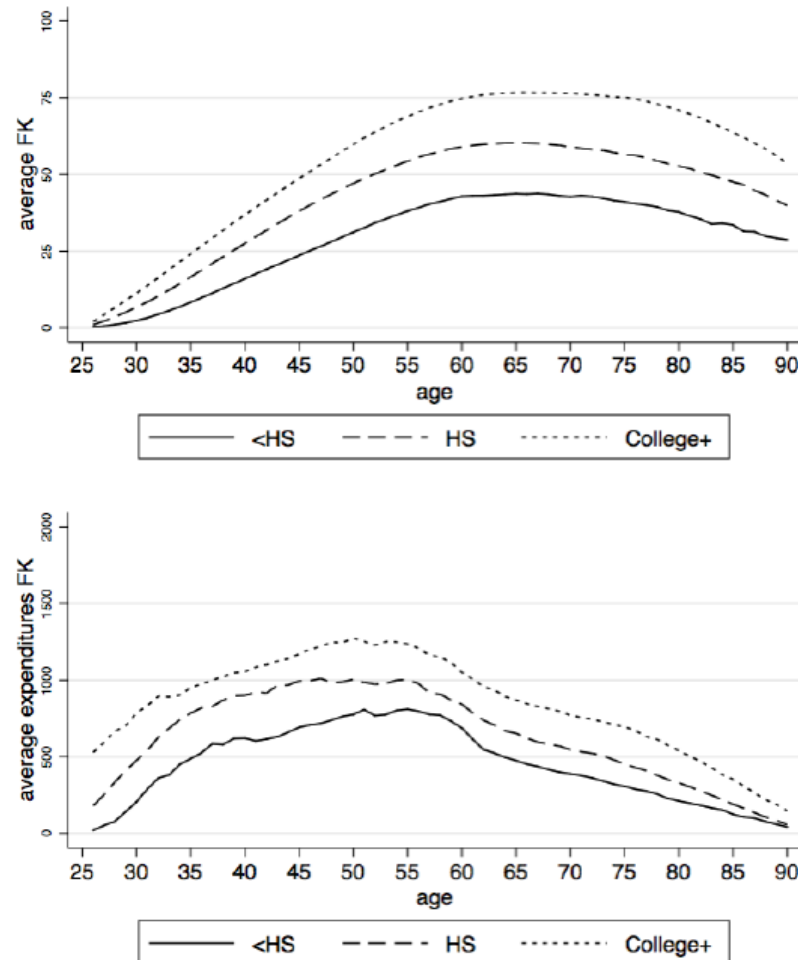
Baseline Parameters

Parameter	Definition	Value
σ	relative risk aversion	1.6
β	discount factor	0.96
\bar{r}	safe return	0.02
σ_ϵ	standard deviation returns	0.16
$r(f_{max})$	maximum excess return	0.04
π_0	productivity investment	50
π_1	concavity investment	1.75
c_d	participation cost	750
δ	depreciate rate	0.06
c_{min}	consumption floor	10,000
ρ_y	autocorrelation income	0.95
$\sigma_{y,\epsilon}^2$	variance innovation income (less HS, HS, college)	(.033,.025,.016)
ρ_o	autocorrelation out-of-pocket	0.901
$\sigma_{o,\epsilon}^2$	variance innovation oop	(.175,.156,.153)

Simulated and Observed Outcomes at Retirement

	<HS	HS	College	Ratio (College/<HS)
<i>Simulation</i>				
Median wealth	94746	177391	346805	3.66
Average Income	31780	38703	47485	1.494
Wealth-to-Income Ratio	2.981	4.583	7.303	2.45
Fraction Poor ($a_t < 2y_t$)	.387	.2903	.1742	.4501
Participation ($\kappa_t > 0$)	.4502	.6123	.7811	1.735
Share $E[\kappa_t \kappa_t > 0]$.9712	.9748	.9687	.9975
Low FK ($f_t < 25$)	.5382	.3665	.2092	.3888
<i>Data (PSID)</i>				
Median wealth	101872	193392	365392	3.587
Wealth-to-Income Ratio	3.21	4.99	7.695	2.40
Fraction Poor ($a_t < 2y_t$)	.3478	.3039	.1588	.4565
Participation ($\kappa_t > 0$)	.2817	.6289	.7538	2.676
Share $E[\kappa_t \kappa_t > 0]$.5834	.5231	.5787	.9919

Simulated Stock and Expenditures on Fin. Knowledge over the Life-Cycle



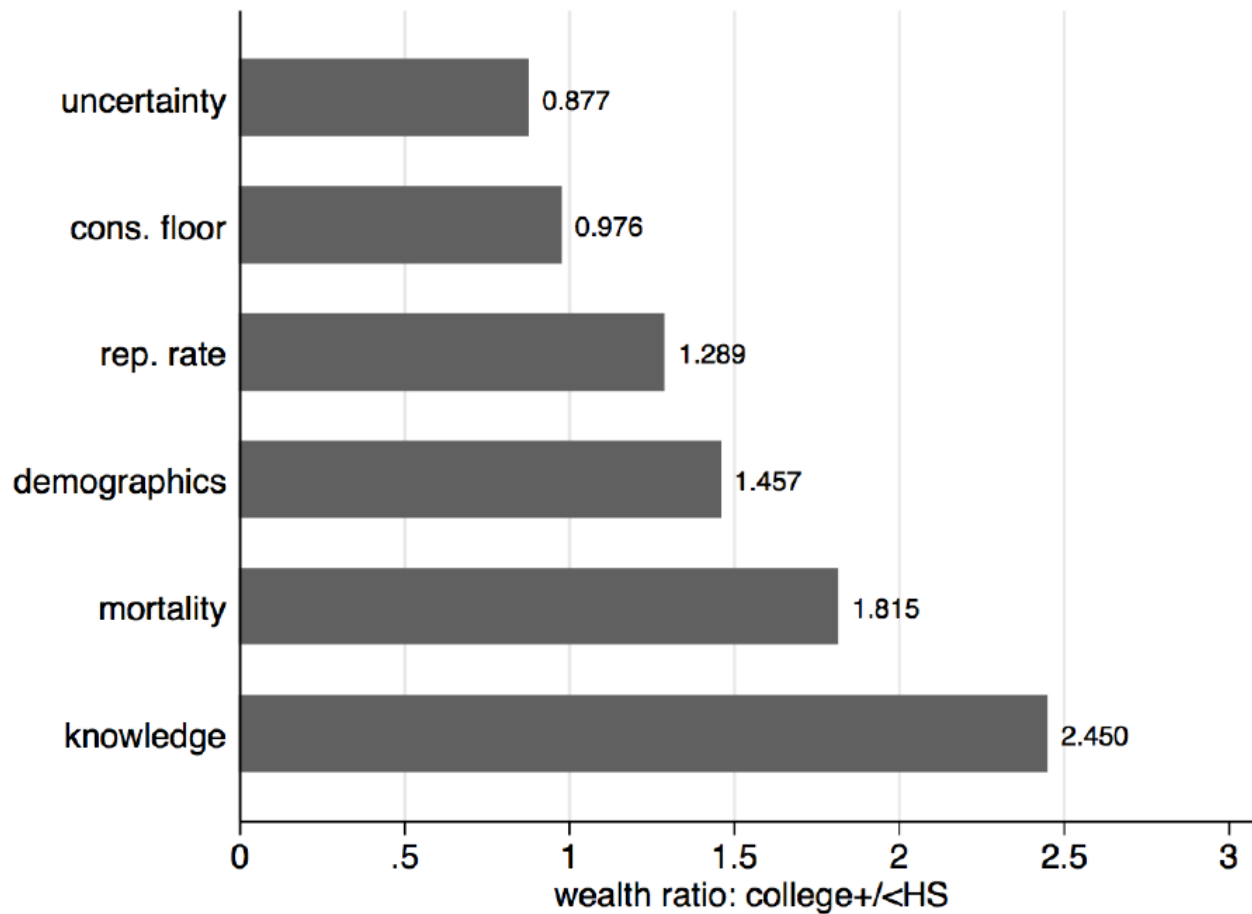
Quantitative Importance of Fin. Knowledge

- Many factors may explain wealth inequality (earnings, means-tested benefits, replacement rates, household size, mortality, financial knowledge)
- Outcome: median wealth to average lifetime income (college/<HS)
- Counterfactual:
 - We shut down all sources, except for earnings heterogeneity
 - Introduce back each source of heterogeneity

Quantitative Importance of Fin. Knowledge

- Consider the ratio of median a_t / y_t for college graduates to high school dropouts at retirement:
 - Uncertainty only: 0.87
 - With consumption floor: 0.97
 - Different replacement rates: 1.3
 - Differences in demographics and mortality: 1.8
 - Financial knowledge: 2.45

Quantitative Importance of Fin. Knowledge



Our findings

The importance of financial literacy

- The model generates an *optimal* amount of financial illiteracy
- The model mimics the pattern of financial literacy with age
- Financial literacy generates a lot of differences in wealth: 30-40% of wealth inequality can be attributed to financial knowledge

Policy Simulations

- Lower means-tested benefits from \$10,000 to \$5,000.
- Reduce expected retirement benefits by 20%.

Policy Simulations

	<HS	HS	College	Ratio (College/<HS)
<i>Baseline</i>				
Median wealth	94746	177391	346805	3.66
Wealth-to-Income Ratio	2.981	4.583	7.303	2.45
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Participation ($\kappa_t > 0$)	.4502	.6123	.7811	1.735
Low FK ($f_t < 25$)	.5382	.3665	.2092	.3888
<i>Reduced Floor (c_{\min})</i>				
Median wealth	108783	191395	360725	3.316
Wealth-to-Income Ratio	3.423	4.945	7.597	2.219
Fraction Poor ($a_t < 2y_t$)	.3555	.271	.1585	.4458
Participation ($\kappa_t > 0$)	.4655	.6181	.766	1.645
Low FK ($f_t < 25$)	.515	.3492	.192	.3728
<i>Reduced Retirement Income</i>				
Median wealth	125194	235167	412369	3.294
Wealth-to-Income Ratio	4.077	6.302	9.011	2.21
Fraction Poor ($a_t < 2y_t$)	.2907	.1771	.08989	.3092
Participation ($\kappa_t > 0$)	.485	.6613	.798	1.645
Low FK ($f_t < 25$)	.485	.2997	.1549	.3194

What can be done to change fin literacy

How these data can inform policy and programs

- **High levels of financial illiteracy**
 - In particular among the young
- **One size does not fit all**
 - Need for more targeted programs, particularly for some groups
- **Limited (one-time) financial education programs are not going to be effective**
 - Widespread financial illiteracy requires robust interventions

Programs in college

Teaching students

A new personal finance course at the George Washington University




Teaching Millennials about risk diversification




YouTube

- After being exposed to short videos, the performance on financial literacy questions improved
- While young were targeted, the videos affected all age groups

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Final thoughts

Enriching our models/understanding of fin. decision-making

➤ **Financial literacy is an additional factor to consider when looking at behavior**

- To be added to our models

➤ **Policy implications**

- How to equip people with the knowledge needed in the 21st century