# *Financial Literacy, Portfolio Choice, and Wealth Inequality: A General Equilibrium Approach*

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# **This Paper**: Financial Literacy in General Equilibrium

## Stylized Facts

Wealth Inequality

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Asset Return Heterogeneity

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- Dispersion in Financial Literacy
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## Financial Literacy ▸ SCF

- *Economic agent's "ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions"* (Lusardi and Mitchell, 2014)
- More literate individuals tend to experience higher asset returns (Clark et al., 2015; von Gaudecker, 2015)
- Little known on aggregate relationship between FinLit, investment outcomes & inequality

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- What are the effects of raising financial literacy in **partial vs. general equilibrium**?
  - *Key objects*: stock market participation, aggregate capital & wealth inequality
- How would such changes affect investment outcomes of **different wealth groups**?

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**Framework**: GE model with *portfolio choices* & *financial literacy accumulation*

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## Macroeconomic Mechanism

Dispersion in Financial Literacy ⇔ Asset Return Heterogeneity ⇔ Wealth Inequality

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# **Findings**: Aggregate and Redistributive Implications of Financial Literacy

**I. Framework**: life-cycle + incomplete market + general equilibrium model

- *Portfolio choice*: risk-free asset ("*bonds*") vs. risky asset ("*stocks*")
- *Financial literacy accumulation*: increases a household's risk-adjusted stock returns
- *Equilibrium*: aggregate capital income is distributed according to a HH's *relative* FinLit

  $\Rightarrow$ FinLit accumulation has spillover effects on *stock investment* & *equity premium*

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**III. Quantitative Results**: effects of subsidizing financial literacy costs

① Average FinLit $\uparrow$ $\Rightarrow$ short-run stock investment $\uparrow$ $\Rightarrow$ overall stock return $\downarrow$ in equilibrium

$\Rightarrow$ Stock market participation increases by **PE** $1.92\%\text{p}$ vs. **GE** $0.22\%\text{p}$

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② Redistribution of *capital incomes* from top to middle wealth quartiles

  $\Rightarrow$ Ratio of total wealth held by the top vs. other quartiles decreases by $1.9\%$

# Related Literature and Contribution

## Macroeconomics

- Heterogeneity in wealth returns amplifies **wealth inequality**
  - Gabaix et al. (2016), Cao and Luo (2017), Benhabib et al. (2019), Hubmer et al. (2021), Xavier (2021), Mihet (2022)
- Sources of **return heterogeneity**: type dependence vs. scale dependence
  - Fagereng et al. (2020), Bach et al. (2020), Gaillard and Wangner (2022)

## Household Finance

- **Financial literacy** is positively associated with investment outcomes
  - Calvet et al. (2007, 2009), von Gaudecker (2011), Van Rooij et al. (2011), McKay (2013), Clark et al (2015), Jappelli and Padula (2016), Lusardi et al (2017), Bianchi (2018), Gambacorta et al. (2023)
- Life cycle **portfolio choice** and equity participation puzzle
  - Merton (1969), Cocco (2005), Cocco et al. (2005), Gomes and Michaelides (2005), Yao and Zhang (2005), Yogo (2015), Fagereng et al. (2017), Catherine (2022), Athreya et al. (2023)

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## This Paper

- Develops a structural model to explain **equilibrium effects** of financial literacy accumulation
- Informs policy discussions on achieving **financial education parity** and bridging the **wealth gap**

# Model Overview

▸ Need Math? ▸ Choice Variables ▸ Recursive HHP ▸ Market Clearing

- **Life cycle**: a household is born at $t = 25$, retires at $t = t_R = 65$, dies at $t = T = 80$
  - *Stochastic* pre-retirement labor income + *deterministic* social security benefit formula
- **Portfolio choice**: a risk-free bond vs. a stock with idiosyncratic risks
  - *Frictions*: ① borrowing & short-sale const., ② per-period stock market participation cost
- **Financial literacy**: a form of human capital $\rightarrow$ increases risk-adjusted stock return
  - HH *accumulates* FinLit over time as ① FinLit depreciates; ② acquiring FinLit is costly

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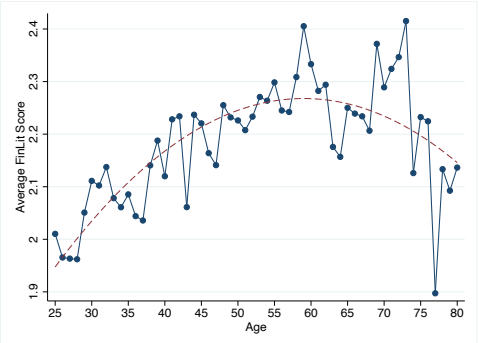
- **Market clearing**: (bonds = gov't debt) & (stocks = productive capital)
- ⋆ **What's new**: ***financial literacy in general equilibrium framework***
  - Assumption ①: HH's FinLit does *not* directly impact the production process
  - Assumption ②: aggregate capital income is distributed according to a HH's *relative* FinLit

  $\Rightarrow$ Individual HH's capital gain from FinLit comes at the loss of another's (*FinLit is a zero-sum!*)

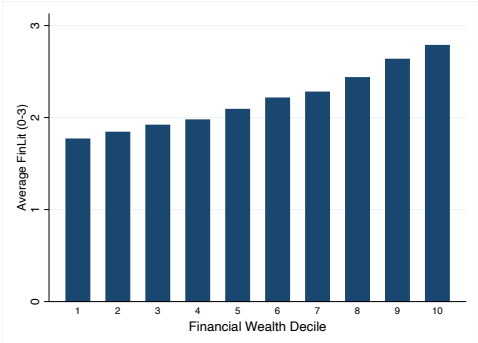
# Data: Age, Wealth, and Financial Literacy

Intro

- Financial literacy score in *Survey of Consumer Finances (SCF, 2016-2019)*
  = HH's understanding of ① risk diversification, ② inflation, ③ interest rate Big 3Q
- Life-cycle and distribution of financial literacy in the U.S.




(a) Hump-shaped life-cycle profile of FinLit




(b) Positive correlation between FinLit & wealth

# Quantifying the **Equilibrium Effects** of Financial Literacy

**Calibration**: Model matches U.S. average FinLit + stock market participation in SCF (2016-2019)

| **Key model fit:** | Data | Model |
|---|---|---|
| Avg. FinLit score | 2.19 | 2.18 |
| Participation rate | 54.1% | 54.6% |

| **Baseline Economy** | | | |
|---|---|---|---|
| Risk-free return | 2.32% | Market equity premium | 5.38% |
| Capital income tax | 9.77% | Equity premium for min. FinLit | 4.41% |

**Policy Experiment**: subsidizing 75% of FinLit costs (financing through capital income taxes)

⇒ **Decomposing the equilibrium effects** of the FinLit subsidy — on $K/Y$

- **PE** Partial equilibrium — *Short-run* outcomes *without* return adjustments — $2.2\% \uparrow$
- **HE** "Hypothetical" GE — + Asset market clears & subsidy "*from heaven*" — $0.4\% \uparrow$
- **GE** General equilibrium — + Gov't budget balance with capital income tax — $0.1\% \uparrow$

# **Comparative Statics**: Before and After the FinLit Subsidy

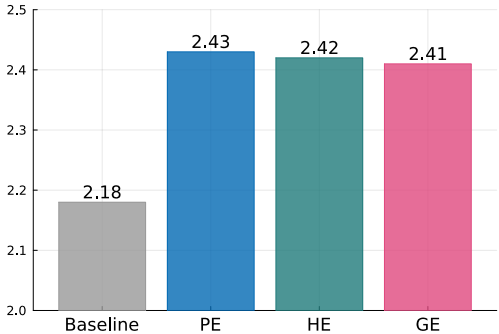
| | | Baseline (1) | ΔPE (2) | ΔHE (3) | ΔGE (4) |
|---|---|---|---|---|---|
| Avg. FinLit (out of 3) | $\mathbb{E}[f]$ | 2.18 | 0.25 | 0.23 | 0.22 |
| Risk-free return (%) | $r^b$ | 2.32 | | -0.01 | 0.08 |
| Market equity premium (%) | $r - r^b$ | 5.38 | | -0.06 | -0.10 |
| Base equity premium (%) | $\underline{r} - r^b$ | 4.41 | | -0.09 | -0.13 |
| Capital income tax rate (%) | $\tau^{r\star}$ | 9.77 | | -0.01 | 1.00 |
| Agg. stock investments | $\mathbb{E}[\kappa \cdot \mathcal{S}]$ | 4.40 | 0.15 | 0.03 | 0.01 |
| Capital-output ratio | $K/Y$ | 2.29 | 0.05 | 0.01 | 0.00 |

Note: The baseline returns and tax rate are in $\%$. Corresponding changes (compared to the baseline) are in $\%\text{p}$.

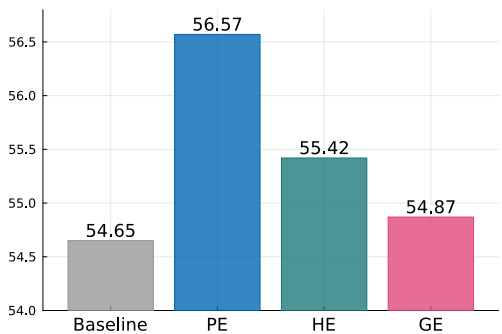
- The subsidy increases average FinLit by $10.16 - 11.26\%$ in all counterfactual scenarios
- **PE** Partial equilibrium — Raising FinLit boosts short-run stock investments
- **HE** "Hypothetical" GE — As markets clear, both *market* and *base* equity premia ▼
- **GE** General equilibrium — Capital income tax $\tau^r \Rightarrow r^b$▲ $\Rightarrow$ equity premia ▼

# **Key Finding** ①: FinLit Increases *Participation Rate* (PE vs. GE) Portfolio Share

(a) Average Financial Literacy




(b) Stock Market Participation Rate




- **HE** Stock investment ▲ ⇒ aggregate capital ▲ ⇒ capital return ▼ ⇒ avg. equity premium ▼
- **GE** To finance subsidy, capital income tax ▲ ⇒ bond return ▲ ⇒ avg. equity premium ▼

## **Key Finding** ②: Heterogeneous Effects across Wealth Quartiles

▸ PE vs. GE

| | Expected Equity Premium | | Stock Market Participation Rate | | Cond. Risky Portfolio Share | |
|---|---|---|---|---|---|---|
| | Baseline | Δ GE | Baseline | Δ GE | Baseline | Δ GE |
| Q1 | 4.93 | -0.11 | 0.00 | **0.00** | | |
| Q2 | 4.96 | 0.01 | 27.41 | 0.25 | 73.16 | 4.80 |
| Q3 | 5.26 | -0.01 | 91.17 | 0.62 | 92.44 | 0.81 |
| Q4 | 5.40 | -0.12 | 100.00 | **0.00** | 80.23 | -0.57 |
| Total | 5.14 | -0.06 | 54.65 | 0.22 | 84.43 | 0.70 |

- Expected equity premia decrease particularly for:
  - Q1: who cannot afford FinLit accumulation even when it is subsidized
  - Q4: who attained the maximum level of FinLit prior to the subsidy

⋆ Q2–Q3 increase stock investments on both *extensive* & *intensive* margins

⋆ Q4 reduces conditional risky portfolio share to compensate for the decline in equity premia

- Note: Q4 **always** vs. Q1 **never** participate → *evidence for participation subsidy*

# **Key Finding** ③: FinLit Subsidy Mitigates Wealth Inequality

Table: Share of financial assets held by each wealth group (%)

| Wealth Quartile | Total Wealth | | Bonds | | Stocks | |
|---|---|---|---|---|---|---|
| | Baseline | Δ GE | Baseline | Δ GE | Baseline | Δ GE |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Q1 | 1.52 | 0.01 | 5.77 | 0.05 | 0.00 | 0.00 |
| Q2 | 8.85 | 0.04 | 25.49 | -0.99 | 2.87 | 0.44 |
| Q3 | 23.82 | 0.35 | 13.25 | -0.99 | 27.62 | 0.81 |
| Q4 | 65.80 | -0.40 | 55.49 | 1.93 | 69.51 | -1.25 |
| Total | 100.00 | 0.00 | 100.00 | 0.00 | 100.00 | 0.00 |

- Middle wealth quartiles (Q2-Q3) shift toward stocks vs. top quartile (Q4) shifts toward bonds
- Share of total wealth held by Q4 decreases by $0.4\%$p

$\Rightarrow$ Small improvement in wealth parity (e.g. Gini index decreases from $56.3\%$ to $55.9\%$ )

# Conclusion

**Framework**: Dynamic GE with *portfolio choice* and *financial literacy accumulation*

**Key Findings**

- Equilibrium return adjustments attenuate the positive effects of FinLit on aggregate capital
- FinLit subsidy improves the middle wealth group's stock investments $\Rightarrow$ reduces wealth gap

**Contribution**

- Develops a GE framework that accounts for the zero-sum aspect of FinLit
- Provides counterfactual analyses of policies to raise FinLit
  - *Policy alternatives*: stock market participation subsidies for the bottom wealth group Detail

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# I. Framework

# Financial Literacy Premium on Stock Returns

Model Overview | Parameterization

⋆ *At the beginning of* $t \leq T$, *a* ***household-specific stock return*** *realizes:*

$$\tilde{r}(f_t) = \underline{r}^\star + r^X(f_t) + \sigma^X \eta_t, \ \eta \sim \mathcal{N}(0,1)$$

- FinLit *linearly* increases mean excess return $r^X \in [r^X(f_{\min}), r^X(f_{\max})] = [0, 0.01]$ CLM (2015)
- *Base* expected return for $f_{\min}$: $\mathbb{E}_\eta[\tilde{r}(f_{\min})] = \underline{r}^\star + r^X(f_{\min}) = \underline{r}^\star$ (equilibrium object)

⋆ ***Stock market clears*** *s.t. more literate HHs take a larger share of aggregate capital income:*

$$r^\star K^\star = \int \tilde{r}(f) a d\Gamma = \int \left(\underline{r}^\star + r^X(f) + \sigma^X \eta\right) \cdot a d\Gamma$$

- Marginal product of capital $r^\star = g_k(K, L) - \delta_K$ determined by a firm's FOC

⋆ *Aggregate effects of* ***policy interventions to raise average FinLit*** $F^\star = \int f d\Gamma$:

① Aggregate capital $K^\star \uparrow \Rightarrow$ average stock return $r^\star \downarrow$

② Average mean excess return $r^X(F^\star) \uparrow \Rightarrow$ base stock return $\underline{r}^\star \downarrow$

# Portfolio Choice and Financial Literacy Premium

▸ Model Overview

*At age $t \leq T$, a household chooses:*

① **Gross saving in financial assets**: $\mathcal{S}_{t+1}$

② **Share of wealth invested in stocks**: $\kappa \in [0, 1]$

- Borrowing & short-sale constraints + per-period fixed participation cost: $\theta > 0$

③ **Financial literacy**: $f_{t+1} = (1 - \delta_f) f_t + e_t$

- Depreciation rate $\delta_f \rightarrow e_t = (\text{FinLit acquired at age } t)$
- Resource cost for FinLit acquisition $\Phi(e_t) = \phi e_t^{\iota}$ with $\iota > 1$

*At the beginning of $t \leq T$, a **household-specific stock return** realizes:*

$$\tilde{r}(f_t) = \underline{r}^{\star} + r^X(f_t) + \sigma^X \eta_t, \ \eta \sim \mathcal{N}(0, 1)$$

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## Labor Income and Pension Benefit

Model Overview

- **Pre-retirement** $(t \leq t_R)$: Inelastic supply of *stochastic* efficiency units of labor

$$\log(l_{t+1}) = m_t + \rho \log(l_t) + \varepsilon_t$$

where $m_t = (\text{deterministic component at age t}), \rho \in (0,1), \varepsilon_t \sim \mathcal{N}(0, \sigma_l^2)$

- **Post-retirement** $(t > t_R)$: Deterministic pension benefit

$$\log(l_t) = \log \lambda + \log(l_{t_R}), \text{ w/ } \lambda \in (0,1)$$

- Government levies a labor income tax to fund the pension system

$\Rightarrow$ Disposable labor income net of housing cost $h_t$ and labor income tax $\tau^l$

$$w^\star \tilde{l} = \begin{cases} (1-h_t)(1-\tau^l) l_t & t \leq t_R \\ (1-h_t)\lambda l_{t_R} & t > t_R \end{cases}$$

# Recursive Household Problem

▸ Model Overview

$$V_t(\mathcal{X}_t, f_t; l_t, \eta_t) = \max_{c_t, \kappa_t, e_t} \left\{ (1-\beta) c_t^{1-1/\psi} + \beta \mathbb{E}_{l,\eta} \left[ V_{t+1}^{1-\gamma}(\mathcal{X}_{t+1}, f_{t+1}; l_{t+1}, \eta_{t+1}) \right]^{\frac{1-1/\psi}{1-\gamma}} \right\}^{\frac{1}{1-1/\psi}}$$

s.t.
$$\mathcal{X}_{t+1} = \underbrace{\left[\kappa_t \tilde{R}(f_{t+1}) + (1-\kappa_t) R^b\right]}_{\text{gross returns to wealth}} \underbrace{\left(\mathcal{X}_t - c_t - (1-\varphi_t)\Phi(e_t) - (1-\vartheta_t)\theta \cdot \mathbb{1}(\kappa_t > 0)\right)}_{\equiv \mathcal{S}_{t+1},\ \text{gross saving}} + \underbrace{w\tilde{l}_{t+1}}_{\text{labor inc}}$$

$$f_{t+1} = (1-\delta_f) f_t + e_t$$

$$\tilde{R}(f_{t+1}) = 1 + (1-\tau^r)\left(\underline{r} + r^X(f_{t+1}) + \sigma^X \eta_{t+1}\right),\ \eta \sim \mathcal{N}(0,1)$$

$$R^b = 1 + (1-\tau^r) r^b$$

$$\mathcal{X}_{t+1} \geq 0, \kappa_t \in [0,1]$$

- **Preferences**: Epstein-Zin with EIS $\psi$; risk aversion $\gamma$
- **States**: cash on hand $\mathcal{X}_t$, FinLit $f_t$ ($+$ stochastic labor $l_{t \leq t_R}$; stock return risks $\eta_t$)
- **Choices**: consumption $c_t$; wealth share invested in stocks $\kappa_t$; FinLit investment $e_t$
- **Frictions**: liquidity constraints; FinLit investment cost $\Phi(e_t)$; stock market participation cost $\theta$

  $\Rightarrow$ *Intertemporal optimization*: paying to accumulate $f$ today raises $\tilde{r}(f)$ tomorrow
- **Policy interventions**: ① ***FinLit investment subsidy*** $\varphi_t$; ② stock market participation subsidy $\vartheta_t$

## Stock Market Clears

▸ Model Overview ▸ Full GE DEF ▸ What if $A'(F) > 0$?

***Assumption* ①**: *FinLit does not impact the fundamental production capacity*

- Perfectly competitive firm w/ CRS production $Y = g(K, L) = AK^{\alpha}L^{1-\alpha}$

$$r^{\star} = g_k(K, L) - \delta_K, \; w^{\star} = g_l(K, L)$$

- Stocks serve as productive capital

$$K^{\star} = \int (\kappa \cdot \mathcal{S}) d\Gamma(\mathcal{X}, f; l, \eta, t)$$

***Assumption* ②**: *aggregate capital income is distributed according to a HH's relative FinLit*

$$r^{\star}K^{\star} = \int \left(\underline{r}^{\star} + r^{X}(f) + \sigma^{X}\eta\right) \cdot (\kappa \cdot \mathcal{S}) d\Gamma(\mathcal{X}, f; l, \eta, t)$$

***Equilibrium mechanism***: *As aggregate financial literacy $F^{\star} = \int f d\Gamma$ increases:*

- ⋆ HHs expect higher $\tilde{r}(\cdot) \Rightarrow$ stock investment ▲ $\Rightarrow$ $K^{\star}$▲ $\Rightarrow$ marginal product of capital $r^{\star}$▼
- ⋆ Aggregate mean excess return $r^{X}(F^{\star})$ ▲ $\Rightarrow$ *base* return $\underline{r}^{\star}$▼ *(FinLit is a zero-sum game!)*

## Government Budget Balance

Model Overview | Full GE DEF

- Gov't levies a labor income tax $\tau^l$ to finance the pension system:

$$\tau^l w^\star \int l_t d\Gamma_{t \leq t_R} = \lambda w^\star \int l_t d\Gamma_{t > t_R}$$

- Gov't supplies a risk-free bond with return $r^{b\star}$ s.t.

$$B^\star = \int (1-\kappa) \mathcal{S} d\Gamma(\mathcal{X}, f; l, \eta, t)$$

- Gov't levies a capital income tax $\tau^r$ on both assets to finance debt payments and subsidies

$$G^\star + r^{b\star} B^\star = \tau^{r\star} \int \left( r^{b\star}(1-\kappa) + \tilde{r}(f)\kappa \right) \mathcal{S} d\Gamma(\mathcal{X}, f; l, \eta, t)$$

$$G^\star = \int \Big( \varphi_t \Phi(e) + \vartheta_t \theta \cdot \mathbb{1}(\kappa_t > 0) \Big) d\Gamma(\mathcal{X}, f; l, \eta, t)$$

$\star$ **GE** Increase in gov't expenditure $G^\star \Rightarrow \tau^{r\star} \uparrow \Rightarrow B^\star \downarrow \Rightarrow r^{b\star} \uparrow \Rightarrow$ equity premium $\downarrow$

# II. Data and Calibration

# Quantification and Model Fit

Detail | Validation: reg on FinLit

**Internally calibrated**:

- Average financial literacy $\rightarrow$ financial literacy investment cost coefficient $\phi$
- Average participation rate $\rightarrow$ per-period fixed stock market participation cost $\theta$

**Externally calibrated**:

- FinLit premium on stock returns $r^X(f_{\max}) = 0.01$ from Clark et al. (2015) CLM (2015)
- Discount factor, EIS, risk aversion from Gomes and Michaelides (2005)

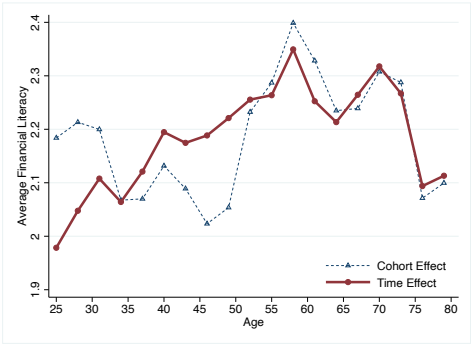
Table: Baseline Model Fit

| | Data | Model | |
|---|---|---|---|
| ***Distribution of financial literacy*** | | | |
| Avg. FinLit age 18-25 | 1.98 | 1.98 | ⋆ |
| Avg. FinLit age 26-80 | 2.19 | 2.18 | ⋆ |
| S.D. FinLit age 26-80 | 0.86 | 0.93 | |
| (Avg. FinLit 76-80)/(Avg. FinLit 71-75) | 0.91 | 0.93 | |
| ***Stock market participation*** | | | |
| Avg. saving rate (%) | 95.5 | 97.5 | |
| Avg. participation rate (%) | 54.1 | 54.1 | ⋆ |
| Conditional portfolio share in stocks (%) | 46.4 | 84.4 | |

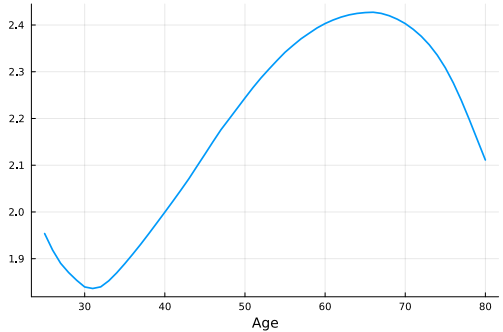
⋆ Internally calibrated. Data source: SCF 2016-2019.

# Validation: Life-cycle Profile of Financial Literacy

(a) Data (Target Average: 2.19)

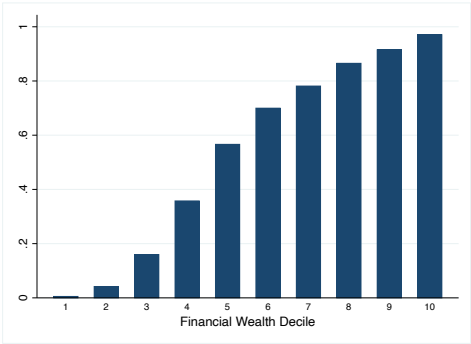



(b) Model (Simulated Average: 2.18)

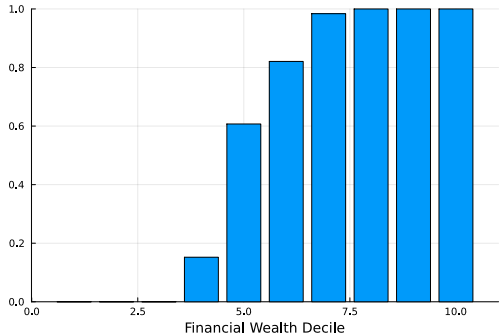


# Validation: Stock Market Participation by Wealth Groups

(a) Data (Target Average: $0.54$)




(b) Model (Simulated Average: $0.54$)



# Validation: FinLit & Stock Investments, Data vs. Model

Back

$$(\text{Investment Outcome})_i = c + \beta \cdot \text{FinLit}_i + \Gamma X_i + \varepsilon_i \text{ for household } i$$

| | Positive holdings of public equities? | | Conditional wealth share in stocks | |
|---|---|---|---|---|
| | Data | Model | Data | Model |
| | (1) | (2) | (3) | (4) |
| Financial literacy score (0-3) | 0.061*** | 0.089*** | 0.012* | 0.101*** |
| | (0.006) | (0.000) | (0.006) | (0.000) |
| ihs(net worth) | 0.012*** | 0.310*** | 0.004*** | -0.090*** |
| | (0.001) | (0.000) | (0.001) | (0.000) |
| ihs(income) | 0.096*** | 0.050*** | 0.007 | 0.141*** |
| | (0.008) | (0.000) | (0.005) | (0.000) |
| Mean value | 0.541 | 0.546 | 0.441 | 0.844 |
| R-sq. | 0.321 | 0.731 | 0.025 | 0.304 |
| No. Obs | 10997 | 2.75M | 6858 | 1.5M |

- Source: SCF 2016-2019. +p<0.10, *p<0.05, **p<0.01, ***<0.001. **Col (1), (3): Author's replication of Cupák et al. (2022)**.
- Controls: age, age sq., [Data: + business ownership, inheritance, HH size, kids, female, employed, education, race, marital status, year FE]

*1 unit increase in financial literacy is associated with:*

- Probability of holding public equities: $6.1\%\text{p} \uparrow$ in data, vs. $8.9\%\text{p} \uparrow$ in model
- Conditional wealth allocated into equity: $1.2\%\text{p} \uparrow$ data, vs. $10.1\%\text{p} \uparrow$ in model

# III. Quantitative & Policy Analyses

# Baseline vs. Counterfactual After FinLit Subsidy

Back Full Table

*Consider a subsidy on FinLit investment cost:* $\varphi = 0.75$, where $(\text{net cost}) = (1-\varphi)\Phi(e_t)$

Table: Comparative Statics

| | | Baseline (1) | ΔPE (2) | ΔHE (3) | ΔGE (4) |
|---|---|---|---|---|---|
| Avg. FinLit (out of 3) | $\mathbb{E}[f]$ | 2.18 | 0.25 | 0.23 | 0.22 |
| Risk-free return (%) | $r^b$ | 2.32 | | -0.01 | 0.08 |
| Avg. equity premium (%) | $r - r^b$ | 5.38 | | -0.06 | -0.10 |
| Base. equity premium (%) | $\underline{r} - r^b$ | 4.41 | | -0.09 | -0.13 |
| Capital income tax rate (%) | $\tau^{r\star}$ | 9.77 | | -0.01 | 1.00 |
| Stock / capital (level) | $\mathbb{E}[\kappa \cdot \mathcal{S}]$ | 4.40 | 0.15 | 0.03 | 0.01 |
| Capital-output ratio | $K/Y$ | 2.29 | 0.05 | 0.01 | 0.00 |

Note: The baseline returns and tax rate are in %. Corresponding changes (compared to the baseline) are in %p.

- Growth rate of average financial literacy between: $10.16 - 11.26\%$
- **PE** Increase in average financial literacy raises aggregate stock investment
- **HE** As markets clear, both *average* and *base* equity premia fall
- **GE** Capital income tax $\tau^r$ rises to finance subsidies; decreased saving motives $\rightarrow$ raise $r^b$

# FinLit Subsidy Effects in PE vs. GE

Equity Premium

⋆ *Consider a policy experiment:*

- To subsidize $75\%$ of each HH's financial literacy cost
- Financed by a constant capital income tax on both assets

⋆ *The proposed subsidy increases:*

[PE]

- *Average financial literacy* by $11.26\%$
- *Stock market participation rate* by $1.92\%\text{p}$
- *Cond. wealth share in stocks* by $1.05\%\text{p}$

# FinLit Subsidy Effects in PE vs. GE

▸ Equity Premium

⋆ *Consider a policy experiment:*

- To subsidize $75\%$ of each HH's financial literacy cost
- Financed by a constant capital income tax on both assets

⋆ *The proposed subsidy increases:*

| | [PE] | | + market clearing [Hypothetical EQM] |
|---|---|---|---|
| • *Average financial literacy* by | $11.26\%$ | vs. | $10.68\%$ |
| • *Stock market participation rate* by | $1.92\%\text{p}$ | vs. | $0.77\%\text{p}$ |
| • *Cond. wealth share in stocks* by | $1.05\%\text{p}$ | vs. | $0.60\%\text{p}$ |

⋆ *Financial literacy effect on stock market expansion is attenuated because:*

- **HE** Stock investment $\uparrow \Rightarrow$ stock price $\uparrow \Rightarrow$ stock return $\downarrow \Rightarrow$ avg. equity premium $\downarrow$

# FinLit Subsidy Effects in PE vs. GE

▸ Equity Premium

★ *Consider a policy experiment:*

- To subsidize $75\%$ of each HH's financial literacy cost
- Financed by a constant capital income tax on both assets

★ *The proposed subsidy increases:*

| | [PE] | | + market clearing [Hypothetical EQM] | | + finance w/ tax [Full GE] |
|---|---|---|---|---|---|
| • *Average financial literacy* by | $11.26\%$ | vs. | $10.68\%$ | vs. | $10.16\%$ |
| • *Stock market participation rate* by | $1.92\%\text{p}$ | vs. | $0.77\%\text{p}$ | vs. | $0.22\%\text{p}$ |
| • *Cond. wealth share in stocks* by | $1.05\%\text{p}$ | vs. | $0.60\%\text{p}$ | vs. | $0.70\%\text{p}$ |

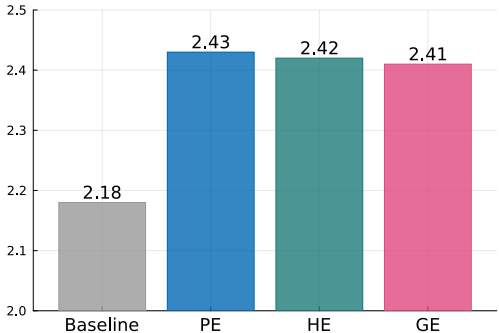
★ *Financial literacy effect on stock market expansion is attenuated because:*

- **HE** Stock investment $\uparrow \Rightarrow$ stock price $\uparrow \Rightarrow$ stock return $\downarrow \Rightarrow$ avg. equity premium $\downarrow$
- **GE** To finance subsidy, capital income tax $\uparrow \Rightarrow$ bond return $\uparrow \Rightarrow$ avg. equity premium $\downarrow$

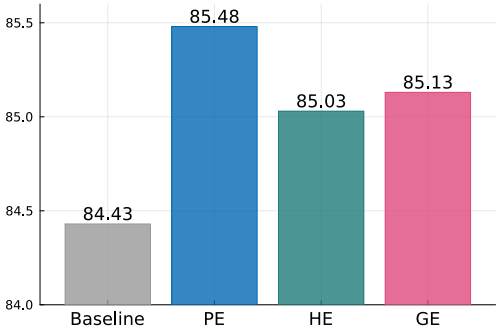
# **Key Finding** ①: FinLit Increases *Risky Portfolio Share* (PE vs. GE)

Back

(a) Average Financial Literacy




(b) Risky Portfolio Share Cond. on Participation




- **HE** Avg. equity premium ▼ ⇒ intensive margin of stock investments ▼ ⇒ portfolio share ▼
- **GE** Tax increases $r^b$ ⇒ marginal participants exit (⇒ higher portfolio share compared to HE)

# Heterogeneous Effects Across Wealth Quartiles: *Equity Premium*

Back

| Wealth Quartile | $\mathbb{E}[f]$ Average Financial Literacy | | | $\mathbb{E}[\tilde{r}(f)] - r^b$ Expected Equity Premium | | |
|---|---|---|---|---|---|---|
| | Baseline | Δ PE | Δ GE | Baseline | Δ PE | Δ GE |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Q1 | 1.56 | 0.07 | 0.07 | 4.93 | 0.02 | -0.11 |
| Q2 | 1.64 | 0.49 | 0.42 | 4.96 | 0.16 | 0.01 |
| Q3 | 2.56 | 0.40 | 0.38 | 5.26 | 0.13 | -0.01 |
| Q4 | 2.98 | 0.02 | 0.02 | 5.40 | 0.01 | -0.12 |
| Total | 2.18 | 0.25 | 0.22 | 5.14 | 0.08 | -0.06 |

- *Expected equity premium* $\mathbb{E}[\tilde{r}(f)] - r^b = \underline{r} + r^X(f)$ *falls for*:
  - Q1: who cannot afford FinLit accumulation even when subsidized; $r^X(f_{\min}) = 0$
  - Q4: who attained the maximum level of FinLit prior to the subsidy

# Heterogeneous Effects Across Wealth Quartiles: *Stock Investments*

Back

| Wealth Quartile | $\mathbb{E}[\mathbb{1}(\kappa > 0)]$ Participation Rate | | | $\mathbb{E}[\kappa \mid \kappa > 0]$ Cond. Risky Portfolio Share | | |
|---|---|---|---|---|---|---|
| | Baseline | Δ PE | Δ GE | Baseline | Δ PE | Δ GE |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Q1 | **0.00** | 0.00 | 0.00 | | | |
| Q2 | 27.41 | 4.89 | 0.25 | 73.16 | 6.57 | 4.80 |
| Q3 | 91.17 | 2.79 | 0.62 | 92.44 | 0.83 | 0.81 |
| Q4 | **100.00** | 0.00 | 0.00 | 80.23 | -0.21 | -0.57 |
| Total | 54.65 | 1.92 | 0.22 | 84.43 | 1.05 | 0.70 |

- Q2 and Q3 increase stock investments, while such increases are attenuated in GE
- Q4's expected equity premium declines → conditional risky portfolio share ▼
- Q4 **always** vs. Q1 **never** participate → *evidence for participation subsidy*

# FinLit Subsidy Mitigates Wealth Inequality

More policies

Table: Share of financial assets (%) held by each wealth groups:

| | Wealth | | Bond | | Stocks | |
|---|---|---|---|---|---|---|
| Wealth Quartile | Baseline (1) | Δ GE (2) | Baseline (3) | Δ GE (4) | Baseline (5) | Δ GE (6) |
| Q1 | 1.52 | 0.01 | 5.77 | 0.05 | 0.00 | 0.00 |
| Q2 | 8.85 | 0.04 | 25.49 | -0.99 | 2.87 | 0.44 |
| Q3 | 23.82 | 0.35 | 13.25 | -0.99 | 27.62 | 0.81 |
| Q4 | 65.80 | -0.40 | 55.49 | 1.93 | 69.51 | -1.25 |
| Total | 100.00 | 0.00 | 100.00 | 0.00 | 100.00 | 0.00 |

- Redistribution of top quartile's stock investment income to middle quartiles
  - ⇒ Q1-Q3 now holds $+0.4\%$p more of the economy's wealth
  - ⇒ Gini index decreases from $56.3\%$ to $55.9\%$

# Policy Alternatives: Age-Specific FinLit Subsidies & Participation Subsidy

Back

- $75\%$ FinLit subsidies ① for ages 25-80; ② for ages 61-25; ③ for ages 25-40
- $+\ 50\%$ stock market participation cost subsidy: ④ for ages 25-40

| | Baseline (I) | Counterfactual (II) | FinLit Age 25-80 ① | FinLit Age 61-65 ② | FinLit Age 25-40 ③ | + Participation Age 25-40 ④ |
|---|---|---|---|---|---|---|
| Risk-free return (%) | **2.32** | 2.31 | **2.40** | **2.39** | 2.31 | 2.31 |
| Avg. equity premium (%) | 5.38 | 5.33 | 5.28 | 5.34 | 5.35 | 5.35 |
| Base equity premium (%) | 4.41 | 4.32 | 4.28 | 4.36 | 4.36 | 4.36 |
| Capital income tax rate (%) | **9.77** | 9.76 | **10.76** | **10.27** | 10.06 | **10.06** |
| Wage | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| Avg. FinLit | 2.18 | 2.42 | 2.41 | 2.26 | 2.32 | 2.42 |
| S.D. FinLit | 0.93 | 0.84 | 0.84 | 0.89 | 0.89 | 0.84 |
| Participation rate (%) | **54.65** | 55.42 | **54.87** | 54.57 | **54.88** | **62.52** |
| Cond. risky portfolio share | 84.43 | 85.03 | 85.13 | 84.68 | 84.79 | 86.04 |
| Gini Index (%) | 56.34 | 56.03 | 55.97 | 56.18 | 56.24 | 55.38 |

# APPENDIX

# Xavier (2020): Wealth Returns from *SCF* Paper

$$R_\omega = \sum_c \omega_c R_c$$

- $R_c$ return on asset $c$, $\omega_c$ total wealth share
- Wealth = yield component + capital gain

| Wealth component | Yield | Capital gain | Return |
|---|---|---|---|
| Interest-earning assets | 2.1% | – | 2.1% |
| Public equity | 1.8% | 4.9% | 6.7% |
| Private businesses | 9.0% | 4.4% | 13.4% |
| Real estate | 4.2% | 1.1% | 5.3% |
| Debt | 2.7% | – | 2.7% |
| Other financial assets | – | 0.4% | 0.4% |
| Other nonfinancial assets | – | 1.9% | 1.9% |

Aggregate yearly return, average over 1990-2019

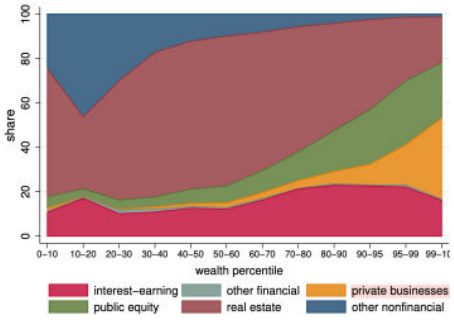
⇒ Aggregate U.S. annual return: **6.8%**

# Xavier (2020): Return Heterogeneity in the U.S.

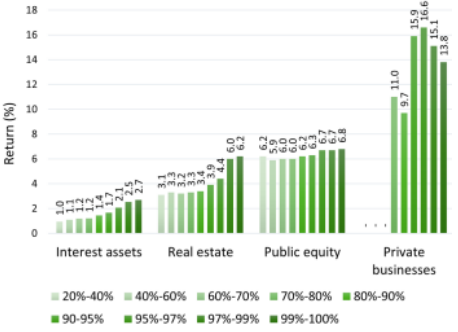
Slide 1 | Lit Review | Norway corr(a,r)

- From SCF (Left: 2019, Right: 1989-2019):

(a) Portfofolio Composition

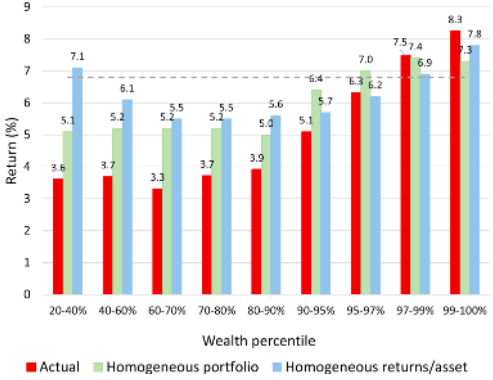



(b) Returns by Asset Class



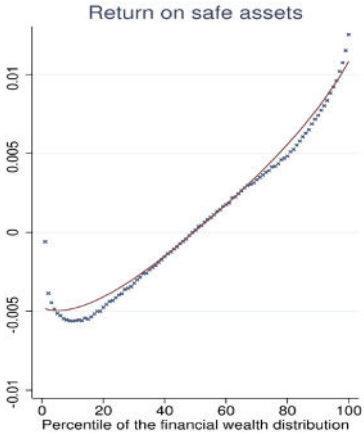
# Xavier (2020): Return Heterogeneity in the U.S. (Cont'd)

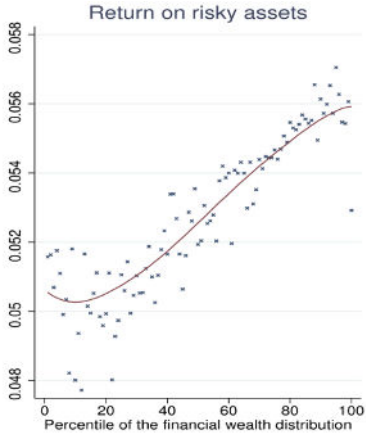
- For each wealth (percentile) group $i$ and asset class $c$,
  ***average wealth return*** $R_i = \sum_c \omega_{ic} R_{ic}$ where $\omega_{ic}$: total wealth share



# Fagereng et al. (2020)

Page 1 | Lit Review | U.S. corr(a,r) | Paper




- Persistent return heterogeneity: ssset returns increases with financial wealth

# Potential Channels for FinLit Premium

Lit Review

**Financial literacy is *positively* related to:**

- **Stock market participation**
  - van Rooij et al. (2011), Yoong (2011), Jappelli and Padula (2015), Cupak et al. (2022)
- **More effective investment decisions**
  - Calvet et al. (2007, 2009): avoiding underdiversification, inertia, disposition effect
  - Guiso and Jappelli (2008), von Gaudecker (2011) : portfolio diverstification
  - Bilias et al. (2010): limited resources $\rightarrow$ portfolio intertia
  - Bucher-Koenen and Ziegelmeyer (2014): selling off losing assets
  - Bhutta, Blair and Dettling (2021): higher propensity of having 3 months of liquid savings
- **Advanced retirement planning**
  - Bucher-Koenen and Lusardi (2011), van Rooij et al. (2011), Clark et al. (2015)

# Financial Literacy Questionnaires

Back

## *Survey of Consumer Finance (SCF)*: "Big Three" Questions

① **Risk Diversification** Buying a single company's stock usually provides a safer return than a stock mutual fund. *True, False, Do not know, Prefer not to say*

② **Inflation** Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? *More than today, Exactly the same, Less than today, Do not know, Prefer not to say*

③ **Interest Rate** 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, Do not know, Prefer not to say*

## *U.S. National Financial Capability Study (NFCS)*: "Big Five" Questions

④ **Mortgage** A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. *True, False, Do not know, Prefer not to say*

⑤ **Bond Price** If interest rates rise, what will typically happen to bond prices? *They will rise, They will fall, They will stay the same, There is no relationship, Do not know, Prefer not to say*

# SCF: Stock Market Exposure Increases with FinLit

Reg: category

$$(\text{Investment Outcome})_i = c + \beta \cdot \text{FinLit}_i + \Gamma X_i + \varepsilon_i \text{ for household } i$$

| | Positive holdings of public equities? | | Cond. fin. wealth share in stocks | | Cond. net worth share in stocks | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Financial literacy score (0-3)** | 0.061*** | **0.056*** ** | 0.012* | **0.007** | 0.013** | **0.010*** |
| | (0.006) | **(0.006)** | (0.006) | **(0.006)** | (0.004) | **(0.004)** |
| ihs(net worth) | 0.012*** | 0.011*** | 0.004*** | 0.004*** | 0.002*** | 0.002*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.000) |
| ihs(income) | 0.096*** | 0.094*** | 0.007 | 0.005 | 0.019*** | 0.018*** |
| | (0.008) | (0.008) | (0.005) | (0.005) | (0.003) | (0.003) |
| Above-average risk tolerance | | 0.072*** | | 0.064*** | | 0.039*** |
| | | (0.008) | | (0.007) | | (0.005) |
| Mean value | 0.541 | 0.541 | 0.441 | 0.441 | 0.191 | 0.191 |
| R-sq. | 0.321 | 0.326 | 0.025 | 0.036 | 0.074 | 0.082 |
| No. Obs | 10997 | 10997 | 6858 | 6858 | 6858 | 6858 |

- Source: SCF 2016-2019. +p<0.10, *p<0.05, **p<0.01, ***<0.001. **Col (1)-(4): Author's replication of Cupák et al. (2022)**.
- Controls: bus. ownership, inheritance, HH size, kids, age, age sq., female, employed, education, race, marital status, year FE

*Even after controlling for risk aversion, 1 unit increase in FinLit is associated with:*

- Probability of equity holding: $5.6\%\text{p} \uparrow$
- Conditional share of financial wealth (any assets) allocated into equity: $0.7\%\text{p}\ (1.0\%\text{p}) \uparrow$

# SCF: Stock Market Exposure Increases with FinLit (Categorical)

Back

$$(\text{Investment Outcome})_i = c + \sum_j \beta_j \cdot \mathbb{1}(\text{FinLit} = j) + \Gamma X_i + \varepsilon_i \text{ for household } i$$

| | Positive holdings of public equities? | | Cond. fin. wealth share in stocks | | Cond. net worth share in stocks | |
|---|---|---|---|---|---|---|
| *Ref. group: FinLit = {0,1}* | (1) | (2) | (3) | (4) | (5) | (6) |
| **FinLit=2** | 0.059*** | **0.058*** ** | 0.002 | 0.000 | -0.015+ | **-0.015+** |
| | (0.012) | (0.012) | (0.010) | (0.011) | (0.008) | (0.008) |
| **FinLit=3** | 0.138*** | **0.129*** ** | 0.022+ | 0.014 | 0.016+ | **0.012** |
| | (0.013) | (0.013) | (0.012) | (0.012) | (0.009) | (0.009) |
| ihs(net worth) | 0.011*** | 0.011*** | 0.004*** | 0.004*** | 0.002*** | 0.002*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.000) |
| ihs(income) | 0.096*** | 0.093*** | 0.007 | 0.005 | 0.019*** | 0.018*** |
| | (0.008) | (0.008) | (0.005) | (0.005) | (0.003) | (0.003) |
| Above-average risk tolerance | | 0.072*** | | 0.063*** | | 0.039*** |
| | | (0.008) | | (0.007) | | (0.005) |
| Mean value | 0.541 | 0.541 | 0.441 | 0.441 | 0.191 | 0.191 |
| R-sq. | 0.322 | 0.327 | 0.026 | 0.036 | 0.077 | 0.085 |
| No. Obs | 10997 | 10997 | 6858 | 6858 | 6858 | 6858 |

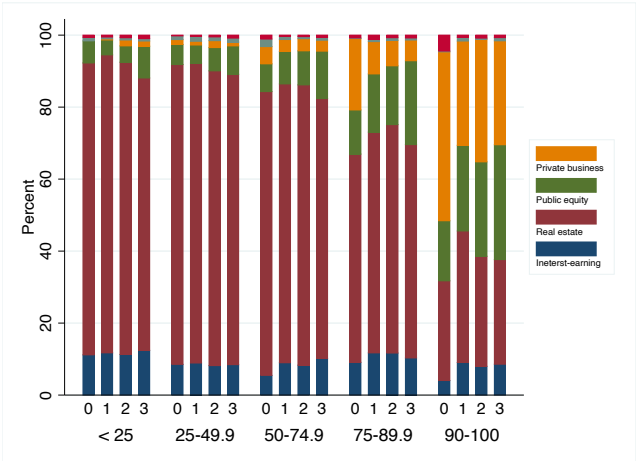
- Source: SCF 2016-2019. +p<0.10, *p<0.05, **p<0.01, ***<0.001. **Col (1)-(4): Author's replication of Cupák et al. (2022).**
- Controls: bus. ownership, inheritance, HH size, kids, age, age sq., female, employed, education, race, marital status, year FE

⇒ Financial literacy is positively correlated with *equity holdings*, both *extensive* and *intensive*

# SCF: Gross Portfolio Composition by FinLit + Networth

Back

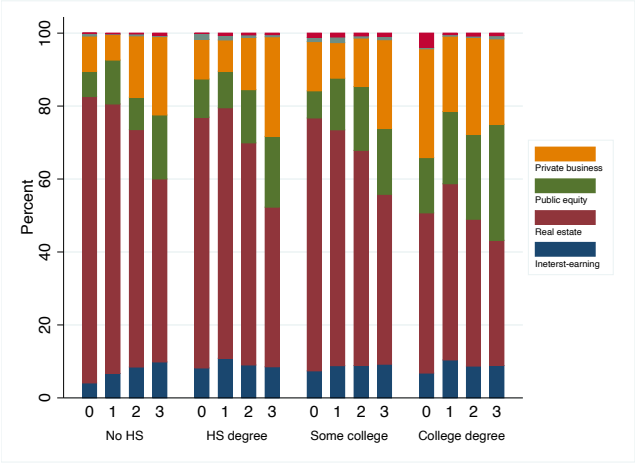
Wealth | Education | Age



# SCF: Gross Portfolio Composition by FinLit + Education

Back

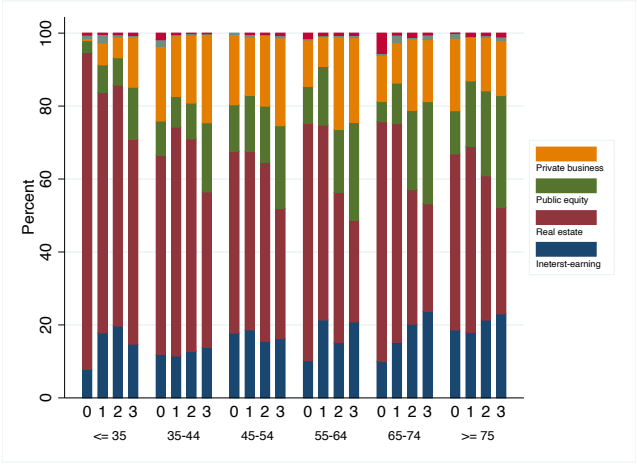
Wealth | Education | Age



# SCF: Gross Portfolio Composition by FinLit + Age

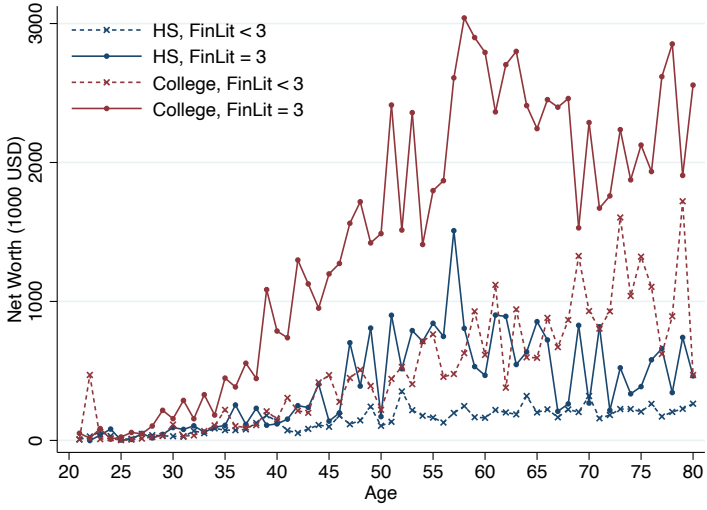
Back

Wealth Education Age



# SCF: Life-cyle Net Worth by FinLit & Education

Back



## Definition: General Equilibrium

Back

**A steady-state equilibrium consists of $(K^\star, F^\star, r^{b\star}, r^\star, \underline{r}^\star, \tau^{r\star})$ s.t.**

(1) Given $(r^{b\star}, r^\star, \underline{r}^\star, \tau^{r\star})$, household problem gives rise to $\Gamma(\mathcal{X}, f; l, \eta, t)$

(2) Firm's problem characterizes:

$$r^\star = g_k(F^\star, K^\star, L^\star) - \delta_K, w^\star = g_l(F^\star, K^\star, L^\star)$$

(3) Inelastic labor supply

$$L = \int l d\Gamma(\mathcal{X}, f; l, \eta, t < t_R)$$

(4) Aggregate financial literacy

$$F^\star = \int f d\Gamma(\mathcal{X}, f; l, \eta, t)$$

## Definition: General Equilibrium (cont'd)

Back

A steady-state equilibrium consists of $(K^\star, F^\star, r^{b\star}, r^\star, \underline{r}^\star, \tau^{r\star})$ s.t.

(5) Gov't budget constraints

$$\tau^l w \int l d\Gamma(\mathcal{X}, f; l, \eta, t < t_R) = \lambda w \int l d\Gamma(\mathcal{X}, f; l, \eta, t \geq t_R) \tag{1}$$

$$G^\star + r^{b\star} B^\star = \tau^{r\star} \int \left( r^{b\star}(1-\kappa) + \tilde{r}(f)\kappa \right) \mathcal{S} d\Gamma(\mathcal{X}, f; l, \eta, t) \tag{2}$$

(6) Market clearing conditions

$$B^\star = \int (1-\kappa) \cdot \mathcal{S} d\Gamma(\mathcal{X}, f, ; l, \eta, t) \tag{3}$$

$$K^\star = \int \kappa \cdot \mathcal{S} d\Gamma(\mathcal{X}, f, ; l, \eta, t) \tag{4}$$

$$r^\star K^\star = \int \left( \underline{r}^\star + r^X(f) + \sigma^X \eta \right) (\kappa \cdot \mathcal{S}) d\Gamma(\mathcal{X}, f, ; l, \eta, t) \tag{5}$$

# Parameterization

Back

| Parameter | | Value |
|---|---|---|
| ***Household Preference*** | | |
| Discount factor | $\beta$ | 0.96 |
| Elasticity of substitution | $\psi$ | 0.5 |
| Risk aversion | $\gamma$ | 5.0 |
| ***Labor process*** | | |
| Persistency | $\rho^l$ | 0.91 |
| Variance | $\sigma^l$ | 0.21 |
| Pension replacement rate | $\lambda$ | 0.36 |
| ***Financial literacy*** | | |
| Deprecation rate in literacy | $\delta_f$ | 0.02 |
| Investment cost: coefficient | $\phi$ | 0.22 |
| Investment cost: convexity | $\iota$ | 1.75 |
| ***Stock market*** | | |
| Mean excess return | $r^X(f_{\text{max}})$ | 0.01 |
| Standard deviation | $\sigma^X$ | 0.157 |
| Per-period fixed participation cost | $\theta$ | 0.09 |
| ***Production*** | | |
| Depreciation rate in capital | $\delta_K$ | 0.08 |
| Capital Intensity | $\alpha$ | 0.36 |
| Govt debt to GDP ratio | $B/Y$ | 0.82 |

## Clark, Lusardi, Mitchell (2015) ▸ Modeling: FinLit ▸ Calibration Strategy ▸ Paper

$$(\text{Investment Outcome})_i = c + \alpha \text{FinLit} + \beta X_i + \varepsilon_i$$

### FinLit & Portfolio Performance *(for Fed employees)*

***Compared to the least sophisticated (FinLit 0-1), the most sophisticated (FitLit 4-5):***

- Held 11.52% points more stock
- Anticipate earning 3.5 b.p. per month more in excess returns
- Had 40% higher portfolio volatility
- Held portfolios with about 1.71%p less idiosyncratic risk

- Controls: age, sex, whether married, salary, plan balance, years at Fed

# Clark, Lusardi, Mitchell (2015): Cont'd

Portfolio outcomes and financial knowledge:

| | Equity allocation | Monthly excess return | Monthly SD | %NSR |
|---|---|---|---|---|
| | *1* | *2* | *3* | *4* |
| Med. FinLit Index (2–3) | 2.506 (2.781) | 0.012 (0.011) | 0.118 (0.159) | −1.164 (0.818) |
| High FinLit Index (4–5) | 11.522*** (2.729) | 0.035*** (0.011) | 0.696*** (0.157) | −1.708** (0.801) |
| Age | −0.627*** (0.059) | −0.001*** (0.000) | −0.036*** (0.003) | 0.084*** (0.016) |
| Male | 4.027*** (1.103) | 0.019*** (0.004) | 0.294*** (0.065) | 0.277 (0.298) |
| Married | 2.089* (1.204) | 0.007 (0.005) | 0.103 (0.070) | −0.457 (0.339) |
| Salary ($10k) | 0.292* (0.162) | 0.000 (0.001) | 0.014 (0.010) | −0.045 (0.043) |
| Total balance ($100k) | 1.881*** (0.312) | 0.006*** (0.001) | 0.096*** (0.019) | −0.427*** (0.082) |
| Tenure | −0.558*** (0.070) | −0.001** (0.000) | −0.028*** (0.004) | 0.124*** (0.018) |
| *N* | 2,763 | 2,763 | 2,763 | 2,763 |
| $R^2$ | 0.157 | 0.058 | 0.148 | 0.058 |
| Mean of dep var (%) | 61.347 | 0.618 | 4.069 | 6.680 |
| SD of dep var (%) | 29.656 | 0.117 | 1.737 | 7.789 |

- Reference category: low FinLit (= 0–1 correct)
- Controls: age, sex, whether married, salary, plan balance, years at Fed

## What if $A' > 0$?

Back Plot Reg LitReview

- *Suppose financial literacy leads to productivity growth*
- Perfectly competitive firms w/ CRS production

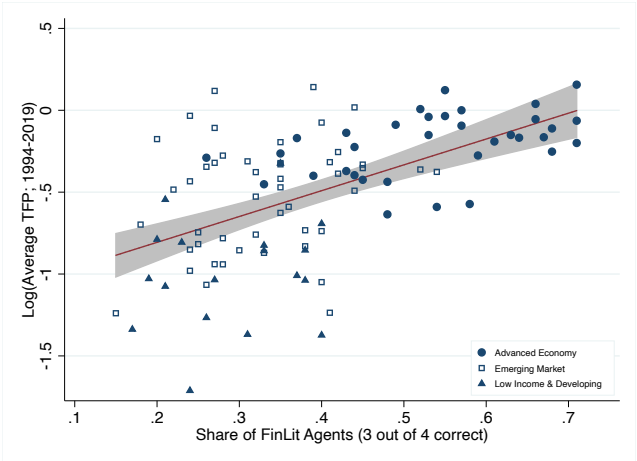
$$Y = g(F, K, L) = A(F)K^{\alpha}L^{1-\alpha} \text{ with } A'(\cdot) > 0$$
$$\Rightarrow r^{\star} = g_k(F, K, L), w^{\star} = g_l(F, K, L)$$

As average financial literacy $F$ increases:

- Literacy-return premium increases stock demands
  $\Rightarrow$ Larger capital supply $\Rightarrow$ market returns to stocks $r^{\star} \downarrow$ ("*total demand effect*")
- Higher average financial literacy translates into more efficient capital allocation
  $\Rightarrow$ Positive externality on TFP $\Rightarrow$ market returns to stocks $r^{\star} \uparrow$ ("*productivity effect*")

# Cross-Country FinLit & Log(TFP)

Back



# FinLit Enhances TFP

Back

- S&P global survey of population share of FinLit adults in 150 countries Data

$$\log\left(\overline{\text{TFP}}_{2014-2019}\right) = \beta_0 + \beta_1(\text{Share FinLit}_{2014}) + \gamma X + \varepsilon$$

| | All Countries | | | Advanced Market | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Share of FinLit Adults | 1.286*** | -0.049 | -0.060 | 0.857*** | 0.409** | **0.428**** |
| | (0.201) | (0.280) | (0.267) | (0.145) | (0.144) | (0.153) |
| Log(GDP per capita; avg 94-13) | | 0.254*** | 0.249*** | | 0.308*** | 0.275** |
| | | (0.037) | (0.054) | | (0.063) | (0.096) |
| Financial Development (94-13) | | | 0.034 | | | 0.071 |
| | | | (0.185) | | | (0.166) |
| R-sq. | 0.237 | 0.513 | 0.513 | 0.317 | 0.618 | 0.620 |
| No. Obs | 100 | 100 | 100 | 34 | 34 | 34 |

- Source: S&P Global FinLit Survey (2014), Penn World Table 10.0, IMF Financial Development Index (Scale 0-1). *p<0.05, **p<0.01, ***p<0.001

⋆ Discipline $A'(F)$ s.t. 1%p ↑ in pop. share of FinLit adults → 0.5% TFP growth

# Lit Review: Financial Development & Growth

Back

## Cole, Chien and Lustig (ReStud, 2011)

Paper

- Impact of heterogeneous trading technologies on asset prices & inequality
  - Active vs. passive traders, portfolio choice (bonds vs. stocks)
- Fraction of total wealth held by *active traders* determines asset prices
  - Actively respond to price variation & absorb aggregate risk created by non-participants

## Cole, Greenwood, Sanchez (Econometrica, 2016)

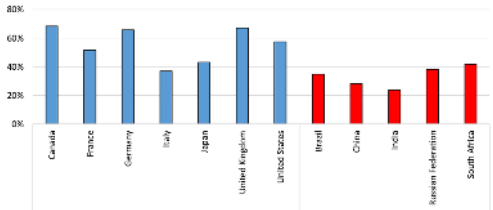
Paper

- Financial system in determining *technology adoption*
  - Intermediary's ability to monitor and control a firm's cash flow
- Contract between *financial intermediaries* and firms

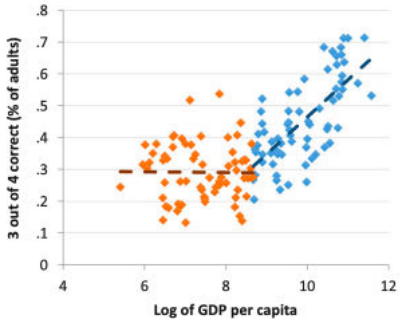
# Klapper & Lusardi (2020): Cross-country FinLit

Paper Back

- **Data**: 2014 S&P Global Survey including *financial literacy* questions on:
  ① risk diversification, ② inflation, ③ basic numeracy ④ interest compounding
- **DEF**: Agents are *financially literate* if they know at least 3 out of 4 concepts
- **Sample**: 150K nationally representative, randomly selected adults in 140 countries
- Women, the poor, and younger respondents are less literate
- Worldwide, just one in three adults are financially literate



# Klapper & Lusardi (2020): Country characteristics




- Country-level literacy is (+) correlated w/ regulation, (-) w/ uncertainty avoidance
- EU countries w/ lower diversification knowledge $\leftrightarrow$ smaller financial stability

# Counterfactual: Full Table

Back

| | | Baseline (1) | ΔPE (2) | ΔHE (3) | ΔGE (4) |
|---|---|---|---|---|---|
| Risk-free return (%) | $r^b$ | 2.32 | | -0.01 | 0.08 |
| Avg. equity premium (%) | $r - r^b$ | 5.38 | | -0.06 | -0.10 |
| Base. equity premium (%) | $\underline{r} - r^b$ | 4.41 | | -0.09 | -0.13 |
| Capital income tax rate (%) | $\tau^{r\star}$ | 9.77 | 0.00 | -0.01 | 1.00 |
| Stocks (level) | $\mathbb{E}[\kappa\mathcal{S}]$ | 4.40 | 0.15 | 0.03 | 0.01 |
| Capital-output ratio | $K/Y$ | 2.29 | 0.05 | 0.01 | 0.00 |
| Avg. FinLit | $\mathbb{E}[f]$ | 2.18 | 0.25 | 0.23 | 0.22 |
| S.D. Finlit | $\mathrm{S.D}[f]$ | 0.93 | -0.10 | -0.09 | -0.09 |
| Saving rate (%) | $\mathbb{E}[\mathbb{1}(\mathcal{S} > 0)]$ | 97.518 | 0.00 | 0.03 | 0.02 |
| Participation rate (%) | $\mathbb{E}[\mathbb{1}(\kappa > 0)]$ | 54.65 | 1.92 | 0.77 | 0.22 |
| Cond. portfolio share in stocks (%) | $\mathbb{E}[\kappa \vert \kappa > 0]$ | 84.43 | 1.05 | 0.60 | 0.70 |
| Gini index (%) | | 56.34 | -0.26 | -0.31 | -0.37 |