Health Heterogeneity, Portfolio Choice and Wealth Inequality

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Introduction

- Health and earnings/income/wealth inequality
  - Capatina and Keane (2023); De Nardi, Pashchenko and Porapakkarm (2022); Mahler and Yum (2022); Hosseini, Kopecky and Zhao (2021)

- Two channels
  1. **Health-longevity channel**: survival rates ⇒ household choices ⇒savings/wealth accumulation

  2. **Health-income/expenditure channel**: labor productivity, labor supply, health expenditure ⇒ savings/wealth accumulation

- Missing: **Health-wealth portfolio channel**

  - Wealth portfolio by health status → heterogeneous investment returns

  - Compounding of investment returns → larger wealth gap over time
    - Benhabib, Bisin and Zhu (2015); Gabaix et al. (2016); Benhabib, Bisin and Luo (2019)

This paper

- **Health-wealth portfolio channel**
  - Quantify dynamic effects of health on wealth portfolio over lifecycle
- **Empirical analysis:** data + regression
  - Document the long-term effects of **poor health at 45–55** $\Rightarrow$ risky asset share at 60–70
  - Reduced-form evidence from dynamic (panel) regression models using HRS data
- **Structural analysis:** model + counterfactual experiments
  - Stochastic lifecycle model: portfolio choice, health, and health insurance
  - Decompose effects of health on **portfolio choice** and **wealth gap**
  - Examine role of **health insurance** and wealth inequality

Findings

Empirical: **HRS data**

- Statistically significant differences of lifecycle patterns of risky asset share by **“health at age 45–55”**
- Health effect primarily via extensive/participation margin (in stock investments)

Structural: **Lifecycle model**

- Lifetime benefit/cost of good/bad health: considerable
  - annualized average benefit/cost: $7,100
- The health-wealth portfolio channel is large
  - counterfactuals: P90/P50 $\downarrow$ between 51–61%
- Expansion of either public or private health insurance
  - wealth gap (rich/poor): $\downarrow$ between 15–60%
  - wealth gap (healthy/sick): $\downarrow$ between 16–22%

Mechanism

- **Health-wealth portfolio** channel is quantitatively important
- Mechanism
  1. Bad health $\Rightarrow$ income losses and high expenditures $\Rightarrow \downarrow$ stock market participation
  2. Health heterogeneity $\Rightarrow$ Heterogeneity in wealth portfolio $\Rightarrow$ heterogeneous investment returns
  3. Compounding of investment returns $\Rightarrow$ larger wealth gap over time
  4. Expansion of health insurance $\Rightarrow \uparrow$ stock market participation $\Rightarrow \downarrow$ wealth gap

Related literature

- Macro-health economics
  - Capatina and Keane (2023); De Nardi, Pashchenko and Porapakkarm (2022);Hosseini, Kopecky and Zhao (2021); Mahler and Yum (2022); Chen, Feng and Gu (2022)
  - Jung and Tran (2023); Jung and Tran (2016); Capatina (2015); De Nardi, French and Jones (2010); Jeske and Kitao (2009); etc.
- Household finance ⇒ lifecycle portfolio choice models
  - Seminal works: Samuelson (1969); Merton (1971)
  - Surveys: Gomes (2020) and Gomes, Haliassos and Ramadorai (2021)
  - Recent related: Campanale, Fugazza and Gomes (2015); Fagereng, Gottlieb and Guiso (2017); Gomes and Smirnova (2021); Tischbirek (2019)
- Health+Investment Portfolio
  - Yogo (2016) focus on retirees and housing, model starts at 65
  - Lusardi, Michaud and Mitchell (2017) knowledge accum. for "sophisticated" assets, health only affects old
  - Hugonnier and Pelgrin (2013) endog. health, closed form but no lifecycle consideration

This paper: focus health at "45–55" on generating wealth gap via two assets at 65 + role of health insurance

Health-wealth portfolio channel: Empirical evidence

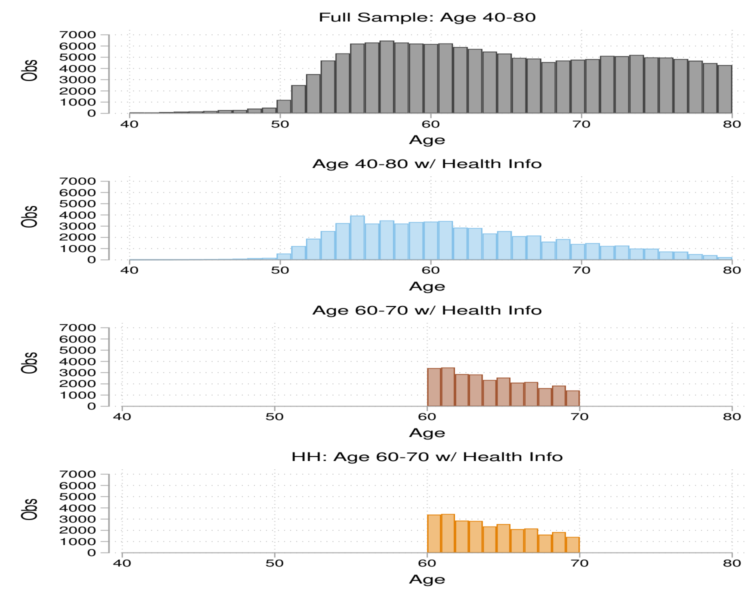
Health & Retirement Study (HRS) 1992–2018

- Financial wealth
  - Focus on financial wealth, abstract from housing
  - Collapse 20 asset categories into 2
    1. **safe assets** (checking/savings accts, money market funds, CDs, government savings bonds, T-bills, corporate, municipal and foreign bonds, as well as bond funds)
    2. **risky assets** (stocks and mutual funds)
  - IRAs limited info $\Rightarrow$ assign 45.8% of holdings to risky assets (Tischbirek, 2019)

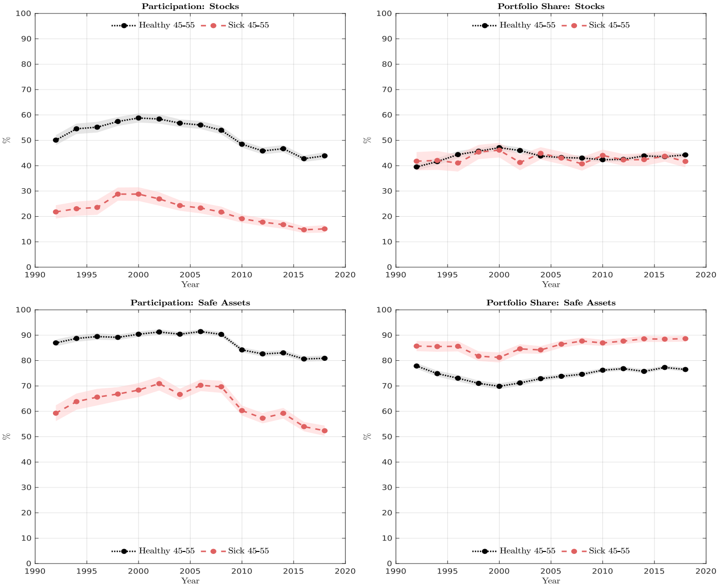
- Health status
  - Five states: 1 excellent, 2 very good, 3 good, 4 fair, 5 poor
  - Two groups by health status at **age 45–55:**
    - **Sick:** 4-fair and 5-poor
    - **Healthy:** 1-excellent, 2-very good, 3-good health

More details

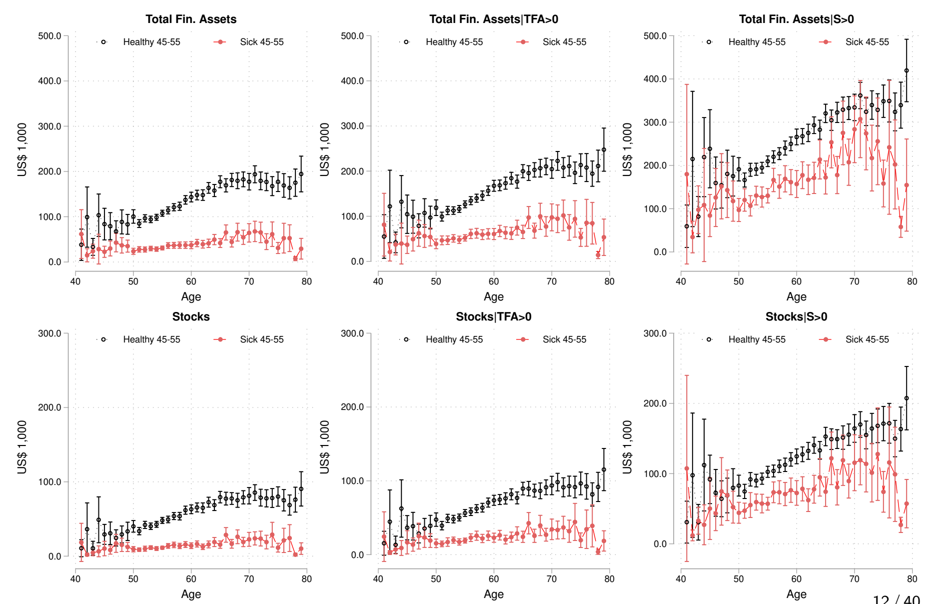
HRS: Full and restricted sample



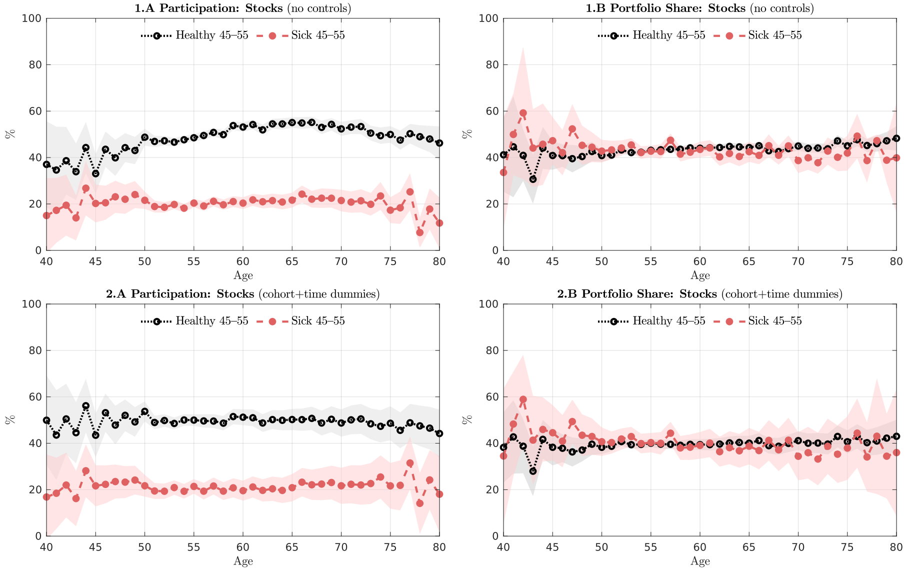
Asset holdings over time



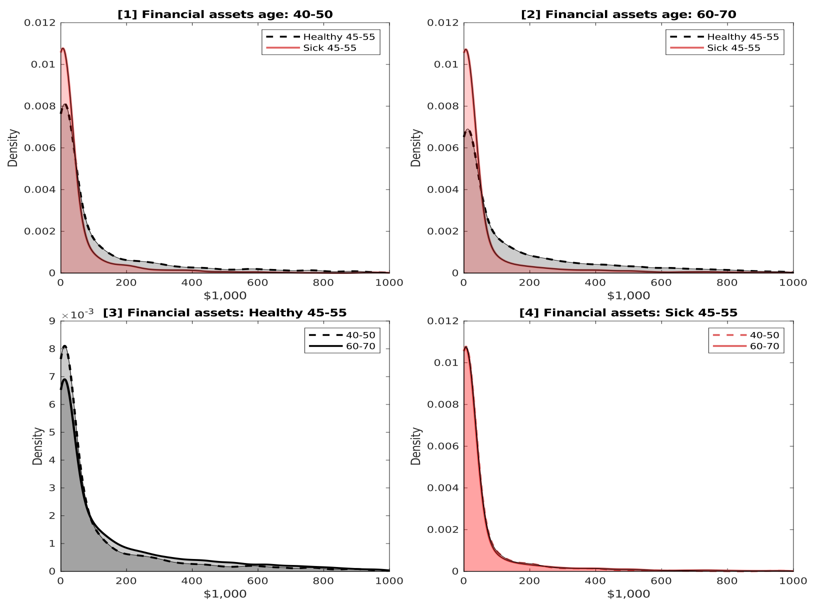
Asset holdings over the life cycle



Stock market activities over the life cycle



Wealth mobility over the life cycle



Reduced form: Poor health $\Rightarrow$ risky asset share

- The econometric model

$$y_{it} = \beta + \gamma \times 1_{\{\text{Sick } 45-55,\, i\}} + \delta \times Z_{it} + \varepsilon_{it}$$

  - y_{it} risky asset share (in financial portfolio) at 60–70
  - $1_{\{\text{Sick } 45-55,\, i\}}$ indicator "bad health in at least one survey wave between 45–55"
  - Z_{it} controls
  - ε_{it} error term

Stock share at 60–70

	(1)	(2)	(3)	(4)	(5)
Sick at 45_55	-0.044***	-0.042***	-0.053***	-0.003	-0.010
	(0.005)	(0.007)	(0.008)	(0.013)	(0.010)
Sick × Unemployed at 45_55	-0.001	-0.004	-0.010	-0.007	0.017
	(0.008)	(0.010)	(0.011)	(0.021)	(0.017)
Sick × Uninsured at 45_55	0.035***	0.020**	0.038***	0.017	0.020
	(0.007)	(0.009)	(0.011)	(0.024)	(0.022)
Observations	24900	24750	24900	11402	11387
R^2	0.239	0.217			0.020
Conditional P(Y>0)	No	No	No	Yes	Yes
Random Effects	No	No	Yes	Yes	No
Weighted	No	Yes	No	No	Yes

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

More details

Stochastic lifecycle model

Lifecycle model: portfolio choice, health & HI

- A stochastic lifecycle model of portfolio choice
  - Lifespan: Age 40–94
  - Three skill levels: No high school , High school and College
  - Two assets: Risky (stock) and safe (bond) assets
- Idiosyncratic shocks
  1. Health
     - Longevity
     - Health expenditure
     - Labor productivity
  2. Health insurance/employer type
  3. Labor
- Health insurance (HI)
  - Public HI: Medicaid & Medicare (w/ eligibility criteria)
  - Private HI: Employer sponsored HI (w/ community rating and tax deduct. premium)
- Government
  - Progressive inc. tax, payroll taxes, capital taxes (dividend, cap. gains & interest)
  - Soc. Security, Medicaid, Medicare, min. consumption program

Model details

Worker problem

- State vec: $x_j = \left\{\vartheta, a_j, \epsilon_j^{incP}, \epsilon_j^h, \epsilon_j^{\text{ehi}}\right\} \in \{1,2,3\} \times R \times \{1,2,3,4\} \times \{1,2,3,4,5\} \times \{0,1\}$
- Expectation $\Rightarrow \mathbb{E}_{\epsilon_{j+1}^{incP}, \epsilon_{j+1}^{h}, \epsilon_{j+1}^{\text{ehi}}, \epsilon_{j+1}^{s} | \epsilon_j^{incP}, \epsilon_j^h, \epsilon_j^{\text{ehi}}}$

$$V(x_j) = \max_{\{c_j, \ell_j, \alpha_j\}} \left\{ u(c_j, \ell_j) + \beta \mathbb{E} \left[\overbrace{\pi_j\left(h\left(\epsilon_j^h\right)\right)}^{\text{Health-longevity channel}} V(x_{j+1}) + \overbrace{\left(1 - \pi_j\left(h\left(\epsilon_j^h\right)\right)\right)}^{\text{Health-longevity channel}} u^{\text{beq}}(a_{j+1}) \right] \right\}$$

s.t.

$$a_{j+1} = \tilde{R}_{j+1} \begin{pmatrix} a_j + \overbrace{y_j\left(\ell_j, \vartheta, \epsilon_j^{incP}, \epsilon_j^h\right)}^{\text{Health-inc. channel}} + \text{tr}_j^{\text{si}} - \overbrace{o_j\left(m_j, \epsilon_{j,\vartheta}^{\text{ehi}}, y_j^{\text{agi}}, a_j\right)}^{\text{Health-exp. channel}} \\ \underbrace{-1_{\left[\epsilon_j^{\text{ehi}}=1\right]} \text{prem}_j^{\text{ehi}}}_{\text{Health-exp. channel}} \quad \underbrace{-\text{tax}_j}_{\text{Health-exp. channel}} \quad - (1+\tau^c)\, c_j - 1_{[\alpha_j > 0]}\, q \end{pmatrix}$$

$$\tilde{R}_{j+1} = \overbrace{\alpha_j\left(1 + \tilde{r}_{net,j+1}^{s}\left(\epsilon_{j+1}^{s}\right)\right) + (1-\alpha_j)\left(1 + \bar{r}_{net}^{b}\right)}^{\text{Health-wealth porfolio channel}}$$

$$\text{tax}_j = \text{tax}^y\left(y_j^{\text{tax}}\right) + \text{tax}^{\text{ss}}\left(y_j^{\text{ss}}; \bar{y}^{\text{ss}}\right) + \text{tax}^{\text{mcare}}\left(y_j^{\text{ss}}\right)$$

More Details

Retiree problem

- State vector: $x_j = \left\{\vartheta, a_j, \epsilon_j^h\right\} \in \{1,2,3\} \times R \times \{1,2,3,4,5\}$
- Expectation $\Rightarrow \mathbb{E}_{\epsilon_{j+1}^h, \epsilon_{j+1}^s | \epsilon_j^h}$

$$V(x_j) = \max_{\{c_j, \alpha_j\}} \left\{ u(c_j) + \beta \mathbb{E} \left[\overbrace{\pi_j\left(h\left(\epsilon_j^h\right)\right)}^{\text{Health-longevity channel}} V(x_{j+1}) + \overbrace{\left(1 - \pi_j\left(h\left(\epsilon_j^h\right)\right)\right)}^{\text{Health-longevity channel}} u^{\text{beq}}(a_{j+1}) \right] \right\}$$

s.t.

$$a_{j+1} = \tilde{R}_{j+1} \left(\begin{array}{c} a_j + \text{tr}_j^{\text{ss}}\left(\bar{y}^{\vartheta}\right) + \text{tr}_j^{\text{si}} - \overbrace{o_j\left(m_j, \epsilon_{j,\vartheta}^{\text{ehi}}, y_j^{\text{agi}}, a_j\right)}^{\text{Health-exp. channel}} \\ -\text{prem}^{\text{mcare}} \underbrace{-\text{tax}^y\left(y_j^{\text{tax}}\right)}_{\text{Healh-exp. channel}} - (1+\tau^c) c_j - 1_{[\alpha_j > 0]} q \end{array} \right)$$

$$\tilde{R}_{j+1} = \overbrace{\alpha_j\left(1 + \tilde{r}_{net,j+1}^s\left(\epsilon_{j+1}^s\right)\right) + (1 - \alpha_j)\left(1 + \bar{r}_{net}^b\right)}^{\text{Health-wealth porfolio channel}}$$

More Details

Calibration

Parameterization and calibration

- Data sources:
  - RAND-HRS for asset profiles, initial asset distribution
  - MEPS: labor supply, health shocks, health expenditures, coinsurance rates
  - Previous studies: income process, labor shocks

Calibration target: risky asset participation rate

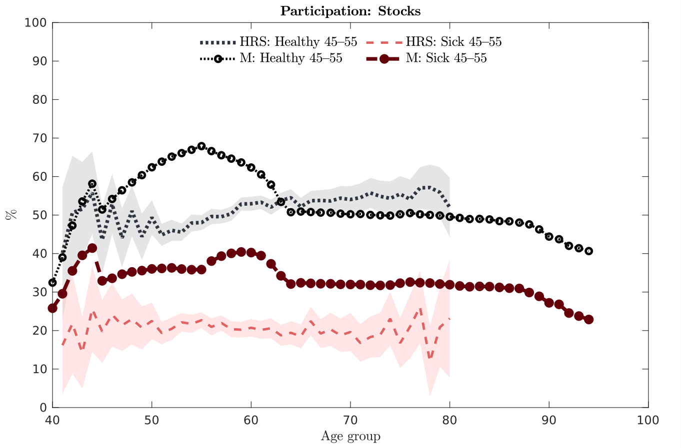
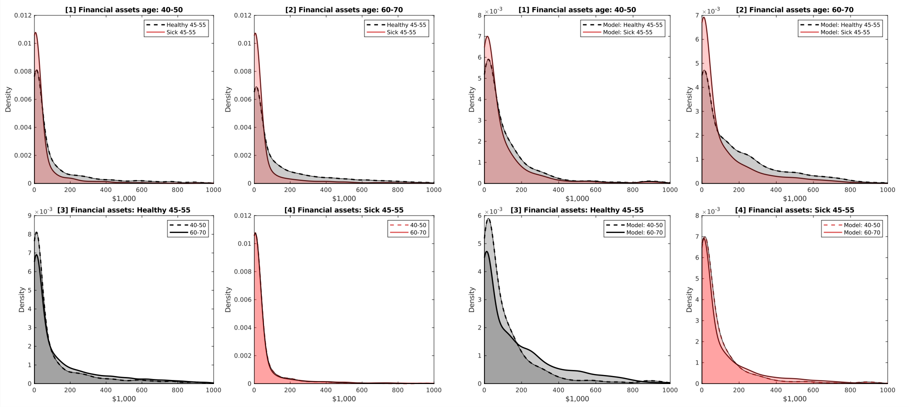


Figure 1: **Calibration target: Stock participation**

More calibration details
Model performance details

Bench. model: Dynamic shift of wealth (sick vs. healthy)

Data | Model



Bench. model: Risky assets by health at age 45–55

	Healthy at 45–55	Sick at 45–55
- Risky asset share α (at 65)	50%	31%
- Stock part. (at 40)	32%	26%
- Stock part. (at 65)	51%	32%
- Wealth-to-inc (at 65)	5.07	3.29

Asset shares HRS vs. model data

	HRS		Model	
	Stock Share	P(Stocks)	Stock Share	P(Stocks)
Sick at 45_55	0.002	-0.221***	0.007***	-0.274***
	(0.009)	(0.034)	(0.002)	(0.013)
Sick × Unemployed at 45_55	0.017	-0.126**	-0.005**	0.206***
	(0.015)	(0.050)	(0.002)	(0.014)
Sick × Uninsured at 45_55	0.028	0.109**	-0.005***	0.137***
	(0.017)	(0.053)	(0.002)	(0.014)
Unemployed at 45_55	0.008	-0.100***	0.005***	-0.338***
	(0.007)	(0.029)	(0.001)	(0.009)
Uninsured at 45_55	0.002	-0.352***	0.005***	-0.138***
	(0.007)	(0.027)	(0.001)	(0.009)
Age	0.005***	0.002	0.014***	-0.204***
	(0.000)	(0.007)	(0.000)	(0.001)
Healthy	0.005	0.195***	0.043***	8.896***
	(0.007)	(0.025)	(0.002)	(0.028)
Insured	-0.010	0.176***	-0.003*	0.659***
	(0.009)	(0.032)	(0.001)	(0.010)
High school degree		0.491***		0.260***
		(0.027)		(0.008)
College or higher	0.006	0.837***	-0.010***	1.371***
	(0.006)	(0.033)	(0.001)	(0.016)
Income	-0.000	0.001***	0.088***	3.428***
	(0.000)	(0.000)	(0.003)	(0.040)
Assets	0.000**	0.001***	0.015***	13.842***
	(0.000)	(0.000)	(0.001)	(0.038)
Observations	24900		1440621	

Quantitative Analysis

Counter factual: Benefits of good health

- Counterfactual
  1. Everybody draws good health (surprise shock)
  2. Everybody at age 45–55 draws good health

- Policy functions are not affected!

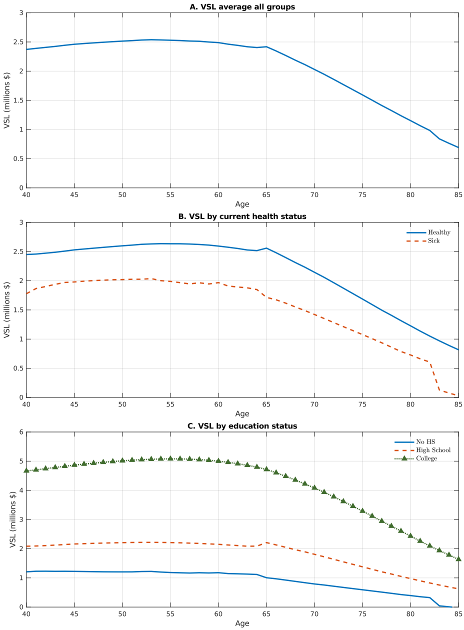
- Calculate lifetime benefit/cost of good/bad health (annual averages) following De Nardi, Pashchenko and Porapakkarm (2022)

$$\overline{\text{benefit}}_i = \left(\frac{1}{\sum_{j=1}^{J} 1_{\text{alive}_j}} \right) \sum_{j=1}^{J} 1_{\text{alive}_j} \times \left(\overbrace{\left(y_{ij}^{**} - oop_{ij}^{**}\right)}^{\substack{\text{net of med expens.} \\ \text{always healthy}}} - \overbrace{\left(y_{ij}^{*} - oop_{ij}^{*}\right)}^{\substack{\text{net of med expens.} \\ \text{benchmark}}} \right)$$

Counter factual: Benefits of good health

	All	By skill level Low	Medium	High
In good health between 45–55				
• % of time in bad health eliminated	8.89%	12.62%	8.10%	5.64%
• Medical cost $\downarrow$ + income $\uparrow$	\$2,803	\$3,839	\$2,466	\$2,178
• Welfare (CEV)	–	+9.72%	+8.11%	+5.55%
• Welfare (CEV) – Single asset model	–	+9.68%	+7.77%	+5.20%
In good health between 40–death				
• % of time in bad health eliminated	16.49%	23.26%	15.24%	10.15%
• Medical cost $\downarrow$ + income $\uparrow$	\$7,107	\$9,442	\$6,495	\$5,349
• Welfare (CEV)	–	+22.39%	+18.09%	+13.19%
• Welfare (CEV) – Single asset model	–	+22.37%	+17.76%	+12.85%

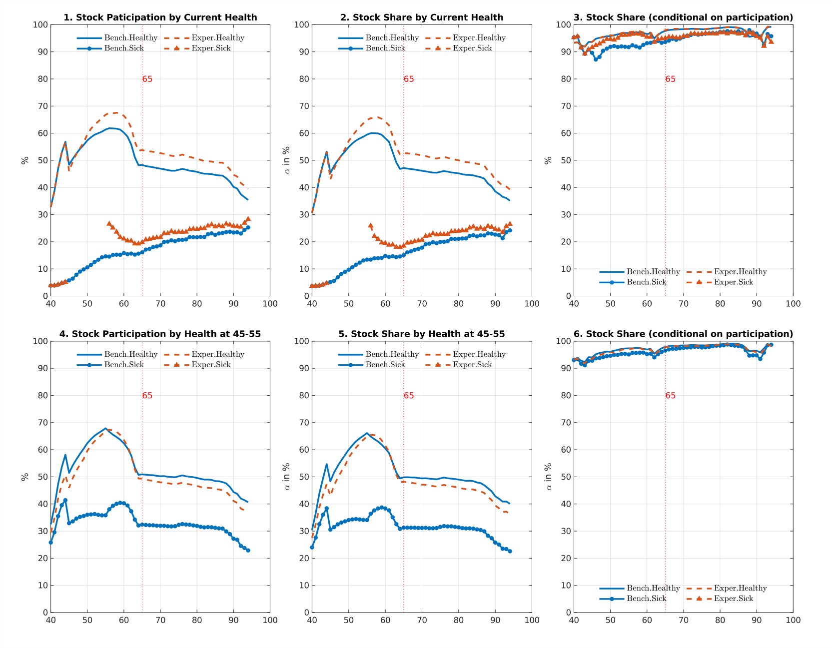
Notes: Good health conditions are defined as health states of excellent, very good and good. Skill types include: Low (No high school), Medium (High school) and High (College).



A. VSL average all groups
VSL (millions $)
Age
B. VSL by current health status
Healthy
Sick
VSL (millions $)
Age
C. VSL by education status
No HS
High School
College
VSL (millions $)
Age

VSL details

Good health at age 45–55



Counter factual: Health-wealth portfolio channel

- [A] 2 Asset Model
  1. Benchmark $\Rightarrow$ Health shocks + portfolio choice
  2. Remove bad health states (good health surprises)
     $\Rightarrow$ NO health shocks + portfolio choice
- [B] Remove portfolio choice $\Rightarrow$ single asset
  1. Health shocks + NO portfolio choice
  2. NO health shocks + NO portfolio choice
     (Removes **health-portfolio channel** completely)

Counter factual: Results

	[A] Two assets economy		[B] Single asset	
	Health shocks	NO h.s.	Health shocks	NO h.s.
Stock participation				
• at 40: sick 45-55	26%	NA	0%	0%
• at 40: healthy 45-55	32%	32%	0%	0%
• at 65: sick 45-55	32%	NA	0%	0%
• at 65: healthy 45-55	51%	56%	0%	0%
Assets	100	122.2	62.5	71.6
Labor participation	48.6%	67.0%	49.2%	65.4%
Hours (workers)	100	103.1	99.7	102.8
Consumption	100	105.2	98.0	101.7
Wealth-to-income (W/I)				
• W/I at 40: all	1.31	1.31	1.37	1.37
• W/I at 65: all	4.79	5.95	2.49	2.94
• W/I at 65: sick 45-55	3.46	5.95	1.90	2.94
• W/I at 65: healthy 45-55	5.72	5.95	2.91	2.94

Counter factual: Wealth inequality

	[A] Two assets economy		[B] Single asset	
	Health shocks	**NO h.s.**	**Health shocks**	**NO h.s.**
Wealth inequality				
• P90/P50: all age	9.19	4.93 (↓46.3%)	7.09 (↓22.9%)	5.33 (↓42.0%) (↓ 24.8%)
• P50/P25: all age	11.16	7.51 (↓32.7%)	6.99 (↓37%)	3.88 (↓65.2%) (↓ 44.5%)
• P90/P50 at 65	11.00	4.55 (↓58.6%)	7.31 (↓33.6%)	5.33 (↓51.6%) (↓ 27.1%)
• P50/P25 at 65	10.51	6.16 (↓41.4.7%)	6.99 (↓33.5%)	2.92 (↓72.2%) (↓ 58.2%)
• Wealth Gini	0.67	0.71	0.67	0.69

Counter factual: Health insurance expansion

- [A.1] Benchmark: Employer-sponsored health insurance (EHI) for workers; Medicare fo retirees; Medicaid for the poor
- [A.5] Medicare for all - expansion of Medicare for all workers and retirees
- [A.6] EHI for all workers - expansion of EHI for all workers while maintaining Medicare and Medicaid

Health insurance expansion (Partial eqm.)

	[A.1] Benchmark	[A.5] Medicare for all	[A.6] EHI for all workers
Assets	100	104.0	103.2
Stock participation			
• At 65: sick 45-55	32%	35%	35%
• At 65: healthy 45-55	51%	54%	53%
Wealth gap			
• All age: P90/P50	9.2	6.9 (↓ 24.5%)	7.3 (↓ 20.3%)
• All age: P50/P25	11.2	11.0 (↓ 1.1%)	10.4 (↓ 0.7%)
• At 65: P90/P50	11.00	8.3 (↓ 25.0%)	8.7 (↓ 20.7%)
• At 65: P50/P25	10.8	5.7 (↓ 47.5%)	7.6 (↓ 29.7%)
Welfare (CEV)	0	+1.92	+1.90

Notes: [A.5] Medicare for all - expansion of Medicare for all workers and retirees; and [A.6] EHI for all workers - expansion of EHI for all workers while maintaining Medicare and Medicaid.

Policy experiments details

Conclusion

Conclusion

- Study dynamic effects of health shocks on savings, portfolio choice and wealth accumulation over lifecycle
- Empirical analysis
  - Use HRS panel data to investigate health shocks $\Rightarrow$ savings portfolio
  - Dynamic (panel) regression models
- Structural model
  - Lifecycle model w/ savings (portfolio) decisions, health shocks and health insurance
  - Quantify long-run effects of bad health on portfolio choice and wealth gaps
  - Examine effects of health insurance reforms on wealth inequality at retirement

Future work

- Empirical analysis
  - Housing assets
  - Household structure
- Structural model
  - Structural estimation of lifecycle model
  - A full dynamic general equilibrium macro-health model
  - Endogenous health and medical spending

Thank you!

Supplementary material

Related literature I

- Lifecycle portfolio investment literature starting with Samuelson (1969); Merton (1971) and recent surveys in Gomes (2020) and Gomes, Haliassos and Ramadorai (2021)
- Health and wealth inequality
  - Medical expenditures and access to health insurance: De Nardi, French and Jones (2010); Nakajima and Telyukova (2022); Chen, Feng and Gu (2022); De Nardi, Pashchenko and Porapakkarm (2022)
  - Health on labor supply and productivity: Prados (2018); Capatina and Keane (2023); Hosseini, Kopecky and Zhao (2021)
  - Lifestyle behaviors: Mahler and Yum (2022)
- Wealth on proportion of risky assets has mixed results
  - positive effect: Wachter and Yogo (2010)
  - minor effect: Brunnermeier and Nagel (2008)
  - negative effect: Liu, Liu and Cai (2021)
- Additional channels
  - stock market entry/adjustment costs: Alan (2006); Bonaparte, Cooper and Zhu (2012); Fagereng, Gottlieb and Guiso (2017)
  - education: Cocco, Gomes and Maenhout (2005); Cooper and Zhu (2016)

Related literature II

- unemployment: Bagliano, Fugazza and Nicodano (2014); Bagliano, Fugazza and Nicodano (2019)
- household composition: Inkmann, Michaelides and Zhang (2022)
- demographics and composition of 401k: Egan, MacKay and Yang (2021)
- introduction of Pension Protection Act of 2006: Parker et al. (2022)
- longevity annuities: Zhou, Li and Zhou (2022)
- reverse mortgages: Nakajima and Telyukova (2017); Hambel, Kraft and Meyer-Wehmann (2022)
- cyclicality of skewness of income shocks: Catherine (2022)

- Estimated structural lifecycle models of portfolio choice and retirement: Yogo (2016); Fagereng, Gottlieb and Guiso (2017); Gomes and Smirnova (2021)
- Calibrated lifecycle models with liquidity costs of stocks and long-term bonds: Campanale, Fugazza and Gomes (2015) and Tischbirek (2019)
- Empirical lit. of **health spending** and **health insurance** on portfolio choice of **elderly:** Goldman and Maestas (2013); Ayyagari and He (2016)
  - Early life health status: Böckerman, Conlin and Svento (2021)
  - Current health status: Rosen and Wu (2004)
  - Subjective health status: Bressan, Pace and Pelizzon (2014)
  - Expected future health shocks: Edwards (2008)

Related literature III

- Empirical **financial literacy**
  - Cognitive abilities and investment decisions: Christelis, Jappelli and Padula (2010); Agarwal and Mazumder (2013); Gamble et al. (2015); Lindeboom and Melnychuk (2015); Mazzonna and Peracchi (2020); Shimizutani and Yamada (2020)
  - Role of financial advising: Rossi and Utkus (2020, 2021)

Back to literature

Health & Retirement Study (RAND-HRS) 1992–2018

- Health and Retirement Study (RAND-HRS) - panel data survey
- The majority of them are between 51–61 years
- Limit sample to heads of households and age group of 40–80 with wealth info
- In regressions we use reduced sample of 60–70 year olds
- Variables: labor market behavior, educational attainment, family background, government program participation, family life, health issues, assets, and income

HRS summary statistics I

	(1) w/H.Info Age:40-80	(2) Sick 45-55 A:40-80	(3) Alive60-70 A:40-80	(4) All A:60-70	(5) w/H.Info A:60-70	(6) Sick 45-55 A:60-70	(7) HlimWrk A:60-70
Sick at 45_55	0.30	1.00	0.27	0.27	0.27	1.00	0.65
Health Limits Work at 45_55	0.27	0.62	0.25	0.24	0.24	0.60	1.00
Health Limits Work	0.30	0.58	0.30	0.33	0.33	0.63	0.71
Spouse: Health Limits Work	0.24	0.32	0.24	0.26	0.26	0.36	0.34
Unemployed at 45_55	0.30	0.56	0.28	0.27	0.27	0.53	0.67
Uninsured at 45_55	0.29	0.35	0.28	0.27	0.27	0.34	0.32
P(Stocks)	0.42	0.20	0.45	0.45	0.45	0.22	0.28
P(Safe Assets)	0.79	0.62	0.81	0.81	0.82	0.65	0.70
Risky Assets ($1,000)	91.09	20.66	103.20	107.80	128.11	27.98	41.23
Safe Assets ($1,000)	95.04	30.30	104.61	110.00	127.84	40.95	52.74
Risky Asset Share	0.18	0.09	0.20	0.19	0.20	0.09	0.12
Safe Asset Share	0.61	0.53	0.62	0.62	0.62	0.56	0.58
Debt ($1,000)	7.03	7.26	6.68	5.27	5.83	5.31	5.70
Mortgage ($1,000)	48.70	28.30	47.62	36.16	45.81	26.78	29.36
Other home loans ($1,000)	4.42	1.99	4.74	3.73	4.82	2.33	3.32
Income Risk Aversion	3.20	3.26	3.19	3.28	3.24	3.32	3.28
Financial planning horizon	3.13	2.86	3.13	3.05	3.09	2.80	2.89
Prob. live to 75	61.59	48.71	62.32	63.00	62.28	49.39	54.08
Prob. live to 85	41.46	30.98	41.62	42.82	42.48	30.72	34.42
Age	59.91	58.63	61.47	64.64	64.16	63.92	63.98
Female	0.30	0.38	0.28	0.33	0.28	0.38	0.38
Married/Partnered	0.58	0.47	0.59	0.57	0.59	0.45	0.46
Nr. Children Alive	2.90	3.14	2.96	3.18	2.99	3.27	3.14
Black	0.21	0.30	0.20	0.20	0.19	0.28	0.26
Hispanic	0.13	0.21	0.12	0.11	0.11	0.19	0.13
No high school degree	0.25	0.42	0.25	0.29	0.25	0.44	0.36

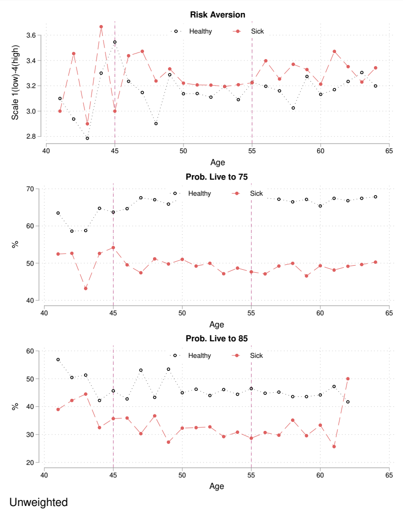
HRS summary statistics II

High school degree	0.52	0.47	0.51	0.49	0.51	0.46	0.50
College or higher	0.24	0.10	0.24	0.22	0.25	0.10	0.13
Labor income ($1,000)	33.80	16.36	32.20	21.20	25.01	10.16	8.73
Pre-govt HH income ($1,000)	85.88	45.48	86.10	74.86	84.15	42.58	48.60
Employed	0.52	0.36	0.48	0.32	0.37	0.21	0.17
Receives Social Security	0.72	0.76	0.84	0.90	0.88	0.91	0.93
Health Excellent	0.12	0.02	0.12	0.11	0.10	0.02	0.04
Health Very Good	0.28	0.07	0.29	0.28	0.29	0.08	0.13
Health Good	0.31	0.23	0.31	0.32	0.33	0.27	0.30
Health Fair	0.20	0.46	0.19	0.21	0.21	0.41	0.34
Health Poor	0.08	0.22	0.08	0.09	0.08	0.21	0.20
Initial Health Excellent	0.21	0.03	0.23	0.20	0.23	0.02	0.07
Initial Health Very Good	0.28	0.06	0.29	0.27	0.28	0.06	0.14
Initial Health Good	0.28	0.16	0.28	0.29	0.28	0.15	0.26
Initial Health Fair	0.16	0.52	0.14	0.16	0.14	0.52	0.29
Initial Health Poor	0.07	0.24	0.07	0.08	0.07	0.25	0.23
Healthy	0.72	0.32	0.73	0.71	0.72	0.37	0.46
Body Mass Index	28.92	30.44	28.77	28.47	28.97	30.48	29.98
Smoker	0.22	0.31	0.21	0.19	0.18	0.24	0.24
OOP health exp. ($1,000)	3.07	3.79	3.17	3.36	3.43	3.88	3.80
Total OOP exp. HH ($1,000)	5.00	5.39	5.22	5.37	5.68	5.68	5.47
Insured	0.84	0.81	0.85	0.88	0.88	0.88	0.90
Uninsured	0.16	0.19	0.15	0.12	0.12	0.12	0.10
Public health insurance	0.31	0.46	0.33	0.42	0.40	0.59	0.62
Private health insurance	0.52	0.34	0.52	0.46	0.48	0.29	0.28
Observations	75526	22387	61107	56374	25686	6819	6261

HRS summary statistics III

Back to HRS variable definitions

Preference/belief differences by type



Back to HRS variable definitions

Safe asset share

	(1)	(2)	(3)
Sick at 45_55	0.015*	0.008	0.008
	(0.009)	(0.010)	(0.012)
Sick × Unemployed at 45_55	-0.050***	-0.049***	-0.045**
	(0.012)	(0.016)	(0.017)
Sick × Uninsured at 45_55	-0.084***	-0.070***	-0.079***
	(0.012)	(0.017)	(0.017)
Observations	24900	24750	24900
R^2	0.057	0.049	
Conditional P(Y>0)	No	No	No
Random Effects	No	No	Yes
Weighted	No	Yes	No

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Back to risky asset share regression

Preferences

- Preferences

$$u\left(c_j, \ell_j; \bar{n}_j\right) = \frac{\left(\left(\frac{c_j}{\omega_{j,\vartheta}}\right)^{\eta} \times \left[\ell_j - 1_{[0<n_j]} \times \bar{n}_j\right]^{1-\eta}\right)^{1-\sigma}}{1-\sigma} + \bar{u}$$

- Warm-glow bequest

$$u^{\text{beq}}\left(a_j\right) = \theta_1 \frac{\left(a_j + \theta_2\right)^{(1-\sigma)\eta}}{1-\sigma}$$

Health

- Health:
  - 5 idiosyncratic (exogenous) health groups $\epsilon^h \in \{1, 2, 3, 4, 5\}$
  - Age dependent health expenditure $m\left(j, \vartheta, \epsilon^h\right)$
  - Health state:

$$h\left(\epsilon^h\right) = \begin{cases} \text{healthy} & \text{if } \epsilon^h \in \{\text{excellent, very good, good}\}, \\ \text{sick} & \text{if } \epsilon^h \in \{\text{fair, poor}\}. \end{cases}$$

- Survival probability: $\pi\left(h\left(\epsilon^h\right)\right)$

- Health and labor income shocks:

$$\Pr\left(\epsilon^h_{j+1} | \epsilon^h_j\right) \in \Pi^h\left(j, \vartheta\right) \ , \ \Pr\left(\epsilon^{incP}_{j+1} | \epsilon^{incP}_j\right) \in \Pi^{incP}_j$$

Health insurance

- **Workers:** exogenous employer HI

$$\epsilon^{\text{ehi}}_{j,\vartheta} = \begin{cases} 0 & \text{not privately insured,} \\ 1 & \text{privately health insurance,} \end{cases} \quad \text{for } j \leq J_w$$

- $\epsilon^{\text{ehi}}_{j,\vartheta}$ follows Markov process with $P\left(\epsilon^{\text{ehi}}_{j+1,\vartheta} | \epsilon^{\text{ehi}}_{j,\vartheta}\right) \in \Pi^{\text{ehi}}_{j,\vartheta}$
- Coinsurance: γ^{ehi}
- Premium: $\text{prem}^{\text{Ins}}_j$

- **Poor:** qualify for Medicaid w/ coinsurance γ^{maid} if $y^{\text{agi}}_j < y^{\text{maid}}$ and $a_j < a^{\text{maid}}$

- **Retired** $j > J_1$ have Medicare w/ coinsurance γ^{mcare} and premium $\text{prem}^{\text{mcare}}$

Out-of-pocket health spending

$$o_j\left(m_j, \epsilon^{\text{ehi}}_{j,\vartheta}, y^{\text{agi}}_j, a_j\right) =$$

$$= \begin{cases} \overbrace{1_{[\text{maid-yes}]}\gamma^{\text{maid}}}^{\text{primary HI}} \times m\left(j, \vartheta, \epsilon^h_j\right) & \text{if } \overbrace{\epsilon^{\text{ehi}}_{j,\vartheta} = 0 \wedge j \leq J_w}^{\text{working, no private HI}} \\ \overbrace{1_{[\text{maid-yes}]}\gamma^{\text{maid}}}^{\text{Medicaid is secondary HI}} \times \left(\overbrace{\gamma^{\text{ehi}}}^{\text{primary}} \times m\left(j, \vartheta, \epsilon^h_j\right) \right) & \text{if } \overbrace{\epsilon^{\text{ehi}}_{j,\vartheta} = 1 \wedge j \leq J_w}^{\text{working, with private HI}} \\ \overbrace{1_{[\text{maid-yes}]}\gamma^{\text{maid}}}^{\text{Medicaid is secondary HI}} \left(\times \overbrace{\gamma^{\text{mcare}}}^{\text{primary}} \times m\left(j, \vartheta, \epsilon^h_j\right) \right) & \text{if } \overbrace{j > J_w}^{\text{retired, with Medicare}} \end{cases}$$

Labor income

- Profile by health type: $\bar{e}_j = \bar{e}\left(j, \vartheta, h\left(\epsilon^h\right)\right)$
- Exogenous income shock: $e_j\left(\vartheta, \epsilon^h, \epsilon^{incP}\right) = \bar{e}_j\left(\vartheta,\ h\left(\epsilon^h\right)\right) \times \epsilon^{incP}$
- Labor income: $y_j\left(\ell_j, \vartheta, \epsilon_j^{incP}, \epsilon_j^h\right) = \widehat{w} \overbrace{\times e_j\left(\vartheta, \epsilon_j^{incP}, \epsilon^h\right) \times}^{\text{Health-dependent income}} (1 - \ell_j)$

Savings/Assets

- Two types of assets
  - risk-free bond b w/ real return r^b
  - risky stock s w/ return $\tilde{r}^s = r^b + \mu^s + \epsilon^s$
    and risk premium $\mu_s > 0$, stoch. return $\epsilon^s \sim N\left(0, \sigma^2_{\epsilon^s}\right)$
  - assume: $\tilde{r}^s = \frac{1+\tilde{g}+d}{1+\pi} - 1$
- Net returns (see Gomes, Michaelides and Polkovnichenko, 2009)

$$\bar{r}^b_{net} = \frac{1 + \left[\left(r^b + 1\right)(1+\pi) - 1\right]\left(1 - \tau^d\right)}{1+\pi} - 1$$

$$\tilde{r}^s_{\text{net}} = \frac{1 + \tilde{g}\left(\epsilon^s\right)\left(1 - \tau^g\right) + d\left(1 - \tau^d\right)}{1+\pi} - 1$$

- W/ exogenous parameters
  - d, $\tilde{g}$: dividend vs. capital gains
  - τ^d, τ^g: dividend vs. capital gains tax
  - π inflation
- Borrowing limit $b_{j+1} \geq \underline{b}$, stock holdings $s_{j+1} \geq 0$
- Transaction cost q_ϑ when investing in risky asset

Taxes and transfers

- Taxes
  - Labor income (Benabou 2002; Heathcote, Storesletten and Violante 2017)

$$\text{tax}^{y}\left(y_j^{\text{tax}}\right) = \max\left[0,\ y_j^{\text{tax}} - \lambda \times \left(y_j^{\text{tax}}\right)^{(1-\tau)}\right]$$

    - $0 < \tau < 1$ progressivity
    - λ scaling
  - Payroll: $\text{tax}^{\text{ss}}\left(y_j^{\text{ss}}; \bar{y}^{\text{ss}}\right)$ and $\text{tax}^{\text{mcare}}\left(y_j^{\text{ss}}\right)$
  - Consumption: τ^c
  - Capital: τ^d on dividends and τ^g on capital gains

- Transfers
  - Social Security: tr^{ss}
  - Medicare, Medicaid
  - Lump-sum transfers tr^{si} to guarantee $c_{\min}$

Back to model overview

Worker Problem I

- State vec: $x_j = \left\{\vartheta, a_{j,}, \epsilon_j^{incP}, \epsilon_j^{h}, \epsilon_j^{\text{ehi}}\right\} \in \{1,2,3\} \times R \times \{1,2,3,4\} \times \{1,2,3,4,5\} \times \{0,1\}$

Worker Problem II

- Expectation $\Rightarrow \mathbb{E}_{\epsilon^{incP}_{j+1},\epsilon^{h}_{j+1},\epsilon^{\text{ehi}}_{j+1},\epsilon^{s}_{j+1}|\epsilon^{incP}_{j},\epsilon^{h}_{j},\epsilon^{\text{ehi}}_{j}}$

$$V(x_j) = \max_{\{c_j,\ell_j,\alpha_j\}} \left\{ u(c_j,\ell_j) + \beta \mathbb{E} \left[\overbrace{\pi_j\left(h\left(\epsilon^h_j\right)\right)}^{\text{Health-longevity channel}} V(x_{j+1}) + \overbrace{\left(1-\pi_j\left(h\left(\epsilon^h_j\right)\right)\right)}^{\text{Health-longevity channel}} u^{\text{beq}}(a_{j+1}\right.\right.$$

s.t.

$$a_{j+1} = \tilde{R}_{j+1} \left(\begin{array}{c} a_j + \overbrace{y_j\left(\ell_j,\vartheta,\epsilon^{incP}_j,\epsilon^h_j\right)}^{\text{Health income channel}} + \text{tr}^{\text{si}}_j - \overbrace{o_j\left(m_j,\epsilon^{\text{ehi}}_{j,\vartheta},y^{\text{agi}}_j,a_j\right)}^{\text{Health-expenditure channel}} \\ \underbrace{-1_{\left[\epsilon^{\text{ehi}}_j=1\right]}\text{prem}^{\text{ehi}}_j}_{\text{Health-exp. channel}} \quad \underbrace{-\text{tax}_j}_{\text{Health-exp. channel}} \quad -(1+\tau^c)c_j - 1_{[\alpha_j>0]}q \end{array} \right)$$

$$\tilde{R}_{j+1} = \overbrace{\left(\alpha_j\left(1+\tilde{r}^s_{net,j+1}\right) + (1-\alpha_j)\left(1+\bar{r}^b\right)\right)}^{\text{Health-wealth portfolio channel}}$$

$$\text{tax}_j = \text{tax}^y\left(y^{\text{tax}}_j\right) + \text{tax}^{\text{ss}}\left(y^{\text{ss}}_j;\ \bar{y}^{\text{ss}}\right) + \text{tax}^{\text{mcare}}\left(y^{\text{ss}}_j\right)$$

$$\underline{b} \leq b_{j+1},\ 0 \leq s_{j+1}$$

Worker Problem III

- Total taxable income y_j^{tax} and payroll tax eligible income y_j^{ss}

$$
\begin{aligned}
y_j^{\text{tax}} = y_j &- 1_{[\text{in}_{j+1}=2]}\text{prem}_j^{\text{ehi}} \\
&- \max\left[0,\ o_j\left(m_j, \epsilon_{j,\vartheta}^{\text{ehi}}, y_j^{\text{agi}}, a_j\right) - 0.075 \times (y_j + r_b \times b_j + r_s \times s_j)\right]
\end{aligned}
$$

$$
y_j^{\text{ss}} = y_j - 1_{[\text{in}_{j+1}=2]}\text{prem}_j^{\text{ehi}}
$$

- Taxes

$$
\begin{aligned}
\text{tax}_j &= \text{tax}^y\left(y_j^{\text{tax}}\right) + \text{tax}^{\text{ss}}\left(y_j^{\text{ss}};\ \bar{y}^{\text{ss}}\right) + \text{tax}^{\text{mcare}}\left(y_j^{\text{ss}}\right) \\
\text{tax}^{ss}\left(y_j^{\text{ss}};\ \bar{y}^{\text{ss}}\right) &= \tau^{ss} \times \min\left[y_j^{\text{ss}};\ \bar{y}^{\text{ss}}\right] \\
\text{tax}^{\text{mcare}}\left(y_j^{\text{ss}}\right) &= \tau^{\text{mcare}} \times y_j^{ss}
\end{aligned}
$$

Worker Problem IV

- Transfers

$$\text{tr}_j^{\text{si}} = \max\left[0,\ c_{\text{min}} + o\left(m_j\right) - y_j^{\text{at}} - a_j\right]$$
$$y_j^{\text{at}} = y_j - \text{tax}_j$$

- Average past labor earnings:

$$\bar{y}^{\vartheta} = \int_{j \leq J_r} w \times e\left(x\right) \times n\left(x\right) d\Lambda\left(x_j\left(\vartheta\right)\right)$$

Back to worker problem

Retiree's Dynamic Optimization Problem I

- State vector: $x_j = \left\{\vartheta, a_j, \epsilon_j^h\right\} \in \{1,2,3\} \times R \times \{1,2,3,4,5\}$
- Expectation $\Rightarrow \mathbb{E}_{\epsilon_{j+1}^h, \epsilon_{j+1}^s | \epsilon_j^h}$

$$V(x_j) = \max_{\{c_j, \alpha_j\}} \left\{ u(c_j) + \beta \mathbb{E} \left[\overbrace{\pi_j\left(h\left(\epsilon_j^h\right)\right)}^{\text{Health-longevity channel}} V(x_{j+1}) + \overbrace{\left(1 - \pi_j\left(h\left(\epsilon_j^h\right)\right)\right)}^{\text{Health-longevity channel}} u^{\text{beq}}(a_{j+1}) \right] \right\}$$

s.t.

$$a_{j+1} = \tilde{R}_{j+1} \left(\begin{array}{c} a_j + \text{tr}_j^{\text{ss}}\left(\bar{y}^{\vartheta}\right) + \text{tr}_j^{\text{si}} - \overbrace{o_j\left(m_j, \epsilon_{j,\vartheta}^{\text{ehi}}, y_j^{\text{agi}}, a_j\right)}^{\text{Health-expenditure channel}} \\ -\text{prem}_j^{\text{mcare}} \underbrace{-\text{tax}^y\left(y_j^{\text{tax}}\right)}_{\text{Health-exp. channel}} - (1+\tau^c)\, c_j - 1_{[\alpha_j > 0]}\, q \end{array} \right)$$

$$\tilde{R}_{j+1} = \overbrace{\left(\alpha_j\left(1 + \tilde{r}_{net,j+1}^s\right) + (1-\alpha_j)\left(1 + \bar{r}^b\right)\right)}^{\text{Health-wealth portfolio channel}}$$

$$\underline{b} \leq b_{j+1}$$

$$0 \leq s_{j+1}$$

Retiree's Dynamic Optimization Problem II

$$y_j^{\text{tax}} = \text{tr}_j^{\text{ss}} - \max\left[0,\ \left(o_j\left(m_j\right) + \text{prem}^{\text{mcare}}\right) - 0.075 \times \left(r_b \times b_j + r_s \times s_j + \text{tr}_j^{\text{ss}}\right)\right]$$

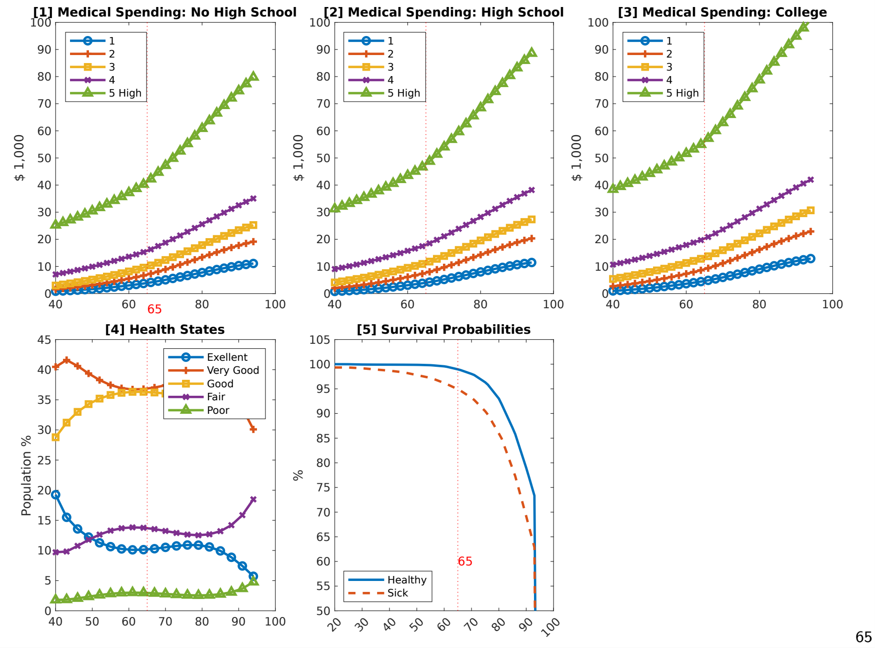
$$\text{tr}_j^{\text{si}} = \max\left[0,\ c_{\min} + o_j\left(m_j\right) + \text{prem}^{\text{mcare}} + \text{tax}^y\left(y_j^{\text{tax}}\right) - a_j - \text{tr}_j^{\text{ss}}\right]$$

Back to retired problem

Exogenous parameters

Parameter description	Parameter values	Source
Periods	$J = 55$	
Work periods	$J_w = 25$	Age 40–64
Years modeled	years $= 55$	Age 40–94
Relative risk aversion	$\sigma = 3$	Standard values between $2.5 - 3.5$
Survival probabilities	$\pi_j\left(h\left(\epsilon^h\right)\right)$ see online appendix	İmrohoroğlu and Kitao (2012)
Health Shocks	ϵ_j^h see online appendix	MEPS 1996–2018
Health transition prob.	Π_j^h see online appendix	MEPS 1996–2018
Persistent labor shock autocor.	$\rho = 0.977$	French (2005)
Risk premium	$\mu = 0.04$	Mehra and Prescott (1985)
Risk free rate	$r^b = 0.02$	McGrattan and Prescott (2000)
Variance of transitory labor shock	$\sigma^2_{\epsilon_1} = 0.0141$	French (2005)
Bias adjusted wage profile	$\bar{e}_j\left(\vartheta, h\left(\epsilon^h\right)\right)$ see online appendix	MEPS 1996–2018
Private employer HI	$\gamma^{\text{ehi}} = 0.31$	MEPS 1996–2018
Medicaid coinsurance	$\gamma^{\text{maid}} = 0.11$	MEPS 1996–2018
Medicare coinsurance	$\gamma^{\text{mcare}} = 0.30$	MEPS 1996–2018
Consumption tax	$\tau^c = 5\%$	IRS
Bequest parameter	$\theta_2 = \$500,000$	De Nardi (2004); French (2005)
Payroll tax Social Security	$\tau^{\text{ss}} = 10.6\%$	IRS
Payroll tax Medicare	$\tau^{\text{mcare}} = 2.9\%$	SSA (2007)
Tax progressivity	$\tau_1^i = 0.053$	Guner, Lopez-Daneri and Ventura (2016)
Dividend tax	$\tau^d = 25\%$	Gomes, Michaelides and Polkovnichenko (2009)
Capital gains tax	$\tau^g = 20\%$	Gomes, Michaelides and Polkovnichenko (2009)
Dividend yield	$d = 3.2\%$	Gomes, Michaelides and Polkovnichenko (2009)
Inflation	$\pi^i = 2.8\%$	Gomes, Michaelides and Polkovnichenko (2009)

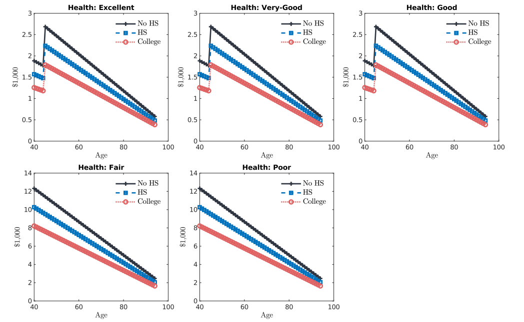
Exogenous health status



Internal (calibrated) parameters

Parameters	Values	Calibration target	Model	Data	Source
Discount factor	$\beta = 0.99$	Wealth-to-inc.65	4.79	4.6	HRS 1992–2018
Fixed cost of work	$\bar{n}_{j,\vartheta}$	Avge. work part.	Pan.2,Fig.2	Pan.2,Fig.2	MEPS 1996–2018
Pref. cons. vs. leis.	$\eta = 0.275$	Avge. hrs workers	Pan.3,Fig.2	Pan.3,Fig.2	MEPS 1996–2018
Inv. cost stocks	$q_{\vartheta,j} \in \left[\underline{q_{\vartheta}}, \bar{q}_{\vartheta}\right]$	Risky asset part.	Fig. 1	Fig. 1	HRS 1992–2018
Utility constant	$\bar{u} = 10$	VSL of workers	2.5 mill.$	1–16 mill.$	Viscusi (1993)
Prog. tax scaling	τ_0^i =1.016				Jung and Tran (2022)
Bequest parameter	θ_1	Asset hold. 90–94	Pan.4,Fig.2	Pan.4,Fig.2	HRS 1992–2018
Medicaid asset test	$\bar{a}^{\text{maid}} = \$75k$	Age 40–64 on Maid	Pan.2,Fig.3	Pan.2,Fig.3	MEPS 1996–2018
Medicaid income test	$\bar{y}^{\text{maid}} = \$5.5k$	Age 20–39 on Maid	Pan.2,Fig.3	Pan.2,Fig.3	MEPS 1996–2018
Consumption floor	$c_{\text{min}} = \$3.2k$	Frac. net-ass.$<$\$5k	20% (of popul.)	20%	Jeske and Kitao (2009)

Stock investment participation costs



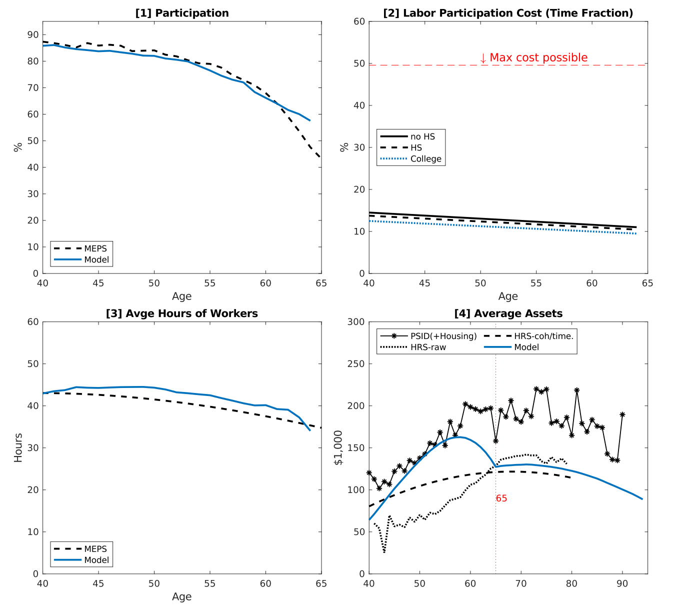


Figure 2: **Calibration targets**

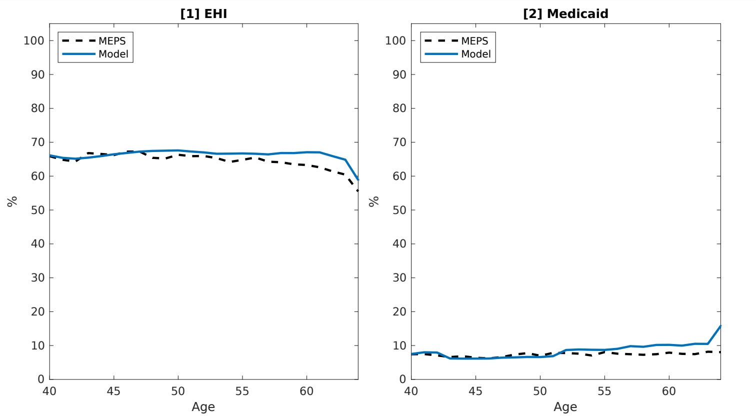


Figure 3: **Calibration targets (only Medicaid is a target)**

Back to calibration

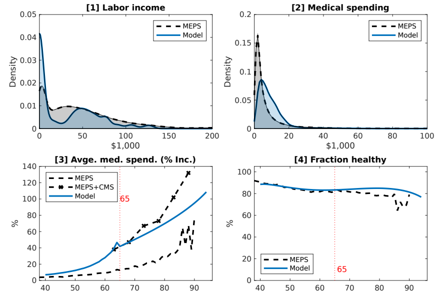


Figure 4: **Model performance (not calibration targets)**

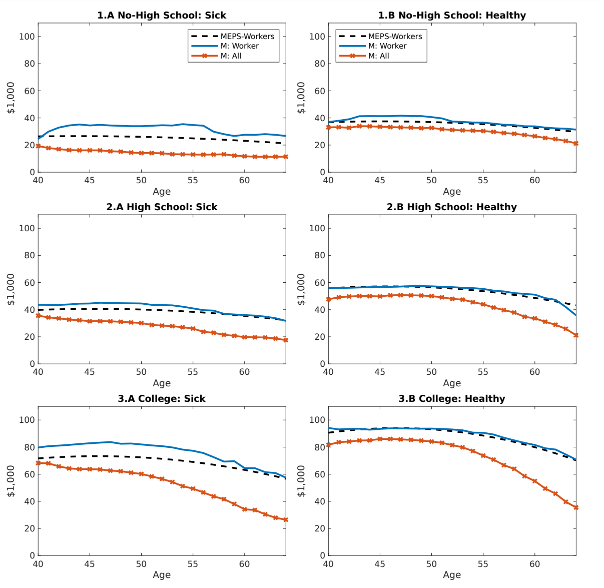


Figure 5: **Model performance: labor income by education and health**

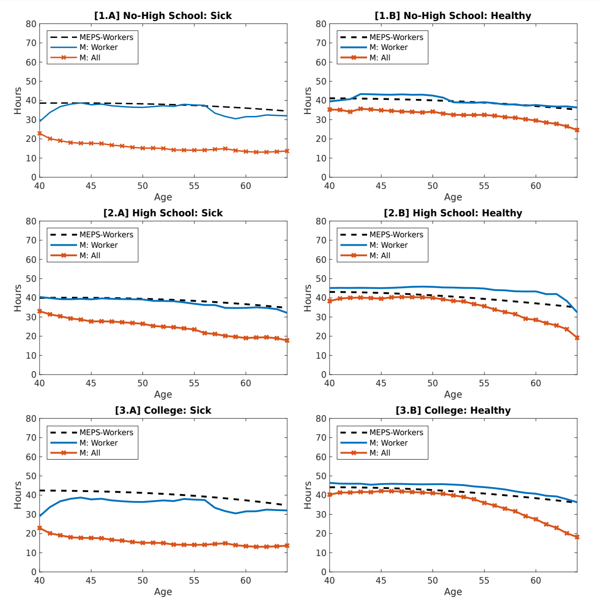


Figure 6: **Model performance: hours worked by education and health**

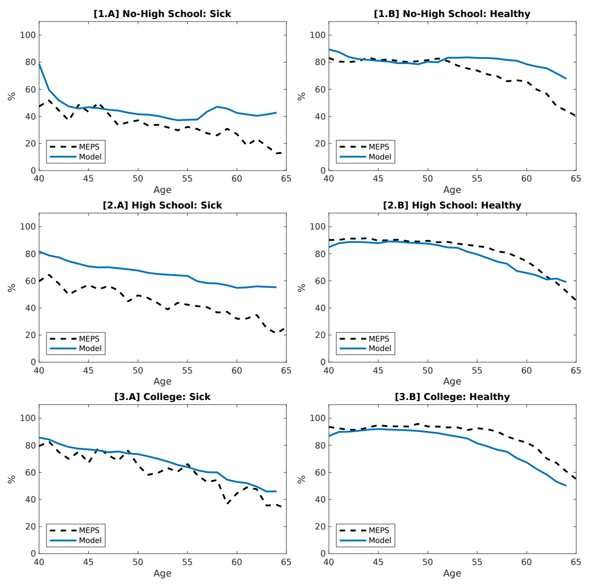


Figure 7: **Model performance: labor force participation by education and health**

Model performance (not targets)

Moments	Model	Data	Sources
Medical exp/income	16.5%	see Figure	MEPS 1996–2018
Gini medical spending	0.56	0.60	MEPS 1996–2018
Gini gross income	0.40	0.46	MEPS 1996–2018
Gini labor income	0.55	0.54	MEPS 1996–2018
Gini assets	0.67	0.69	HRS 1992–2018
Frisch labor supply elasticities	1.19–1.51	1.1–1.7	Fiorito and Zanella (2012)
Interest rate: r	5.9%	$5.2 - 5.9\%$	Gomme, Ravikumar and Rupert (2011)
Wealth: P90/P50 at 65	9.01	15.4	HRS 1992–2018

Back to calibration

Value of statistical life I

- The VSL is the monetary value corresponding to reduction in mortality risk that prevents **one** statistical death
- Follow Aldy and Smyth (2014)
  - Consider small increase in surv. probability $\Delta\pi_j\left(\varepsilon_j^h\right)$ so that surv. prob. is $\pi_j\left(\varepsilon_j^h\right)+\Delta\pi_j\left(\varepsilon_j^h\right)$
  - Using this new surv. prob. solve HH with otherwise identical paras $\Rightarrow V^*\left(\vartheta, a_{j,}, \epsilon_j^{\text{incP}}, \epsilon_j^h, \epsilon_j^{\text{ehi}}\right)$
  - Search additional wealth Δa_j so that

$$V\left(\vartheta, a_j+\Delta a_j, \epsilon_j^{\text{incP}}, \epsilon_j^h, \epsilon_j^{\text{ehi}}\right)=V^*\left(\vartheta, a_{j,}, \epsilon_j^{\text{incP}}, \epsilon_j^h, \epsilon_j^{\text{ehi}}\right)$$

  - Calculate VSL as

$$\text{VSL}_j\left(\vartheta, a_j, \epsilon_j^{\text{incP}}, \epsilon_j^h, \epsilon_j^{\text{ehi}}\right)=\frac{\Delta a_j}{\Delta\pi_j\left(\varepsilon_j^h\right)}.$$

Value of statistical life II

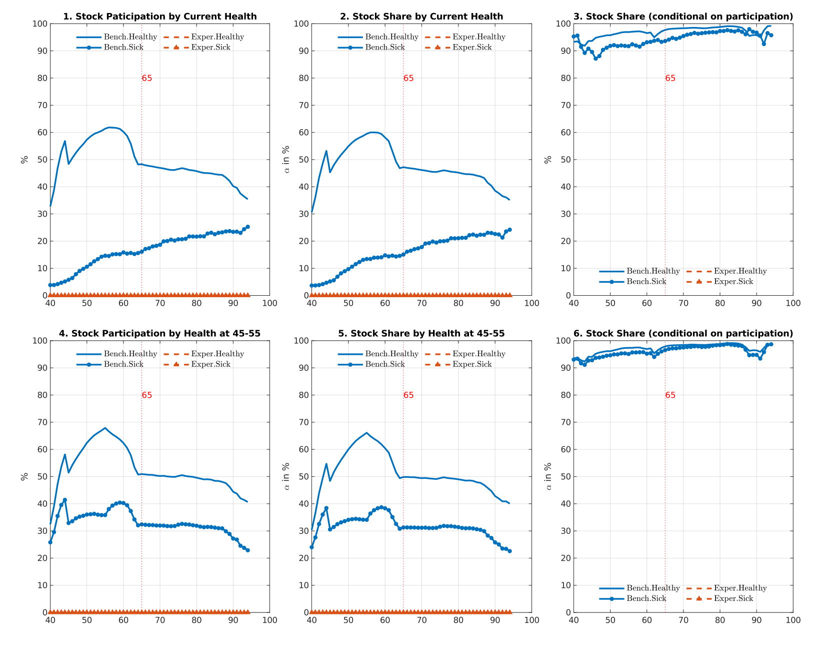
- Intuitively, the VSL is the marginal rate of substitution between wealth and survival probability
- VSL range between 1–16 million USD according to a survey by Viscusi (1993)
- We target 2.5 million USD for the working age population of 40–65 year olds

Back to VSL

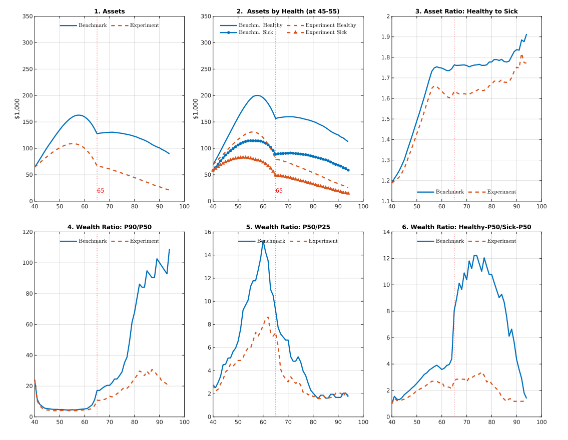
Policy experiments

- Expansion of Medicare to 20–64 year olds (UPHI)
- Expansion of EHI to all workers
- Medicare buy in for 55–64 year olds
- Expansion of Medicaid
- No insurance world

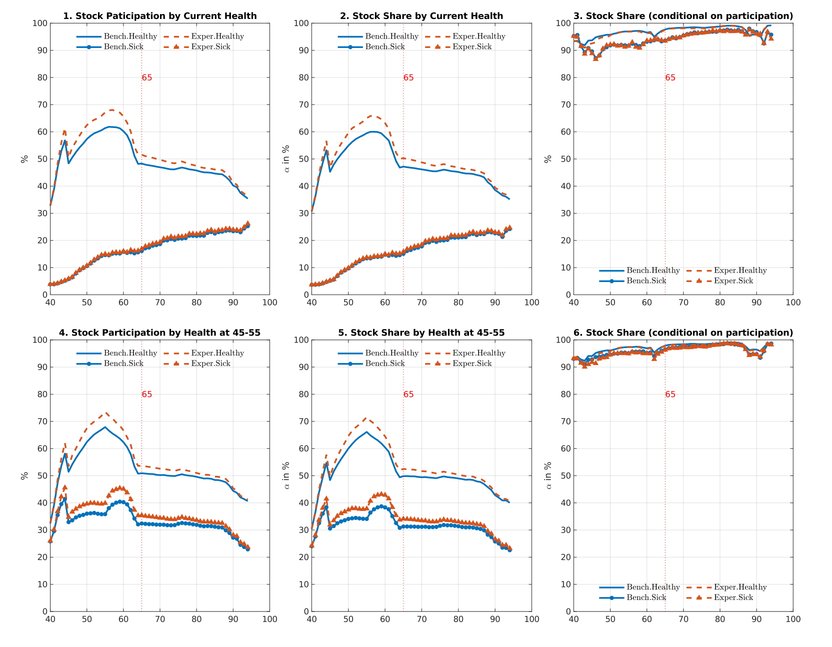
Exp. 1 (No stocks): Stock holdings



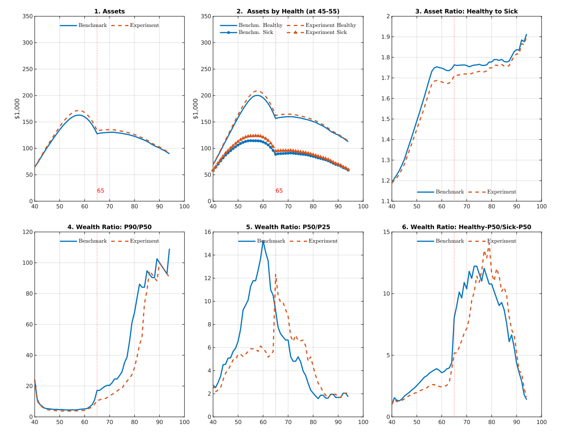
Exp. 1 (No stocks): Asset profiles



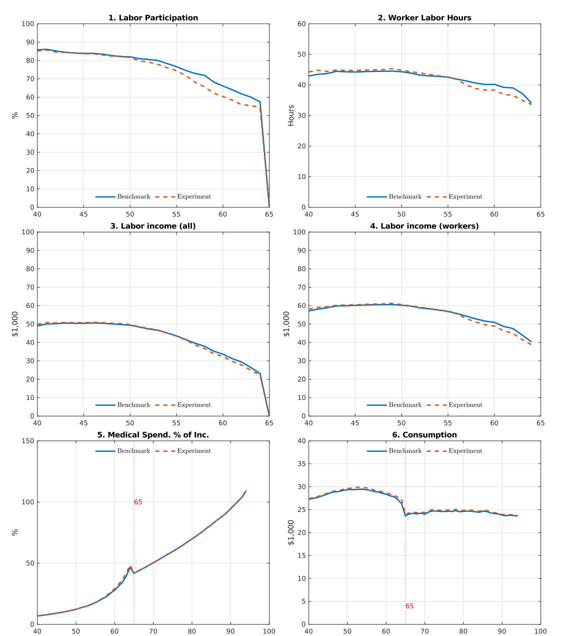
Exp. 2 (Medicare for all): Stock holdings



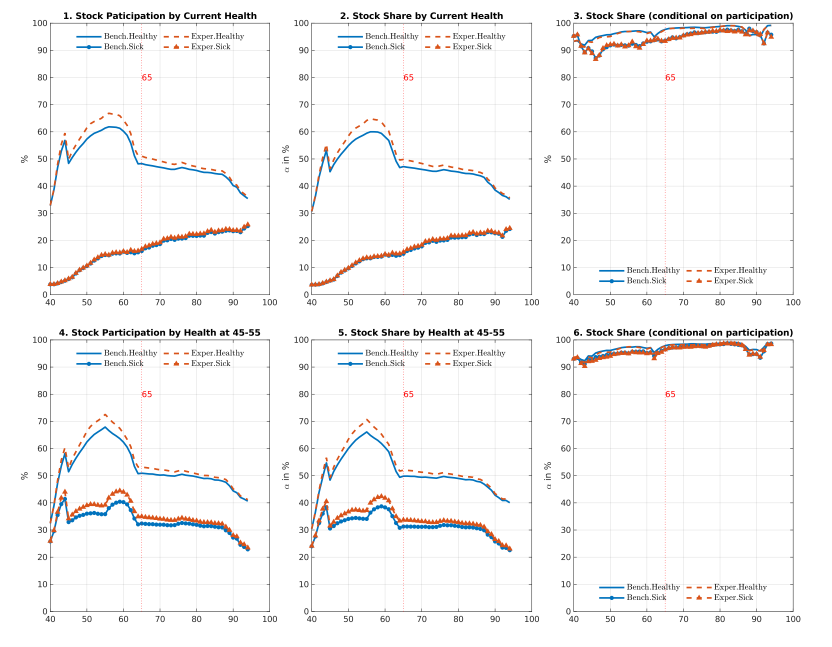
Exp. 2 (Medicare for all): Asset profiles



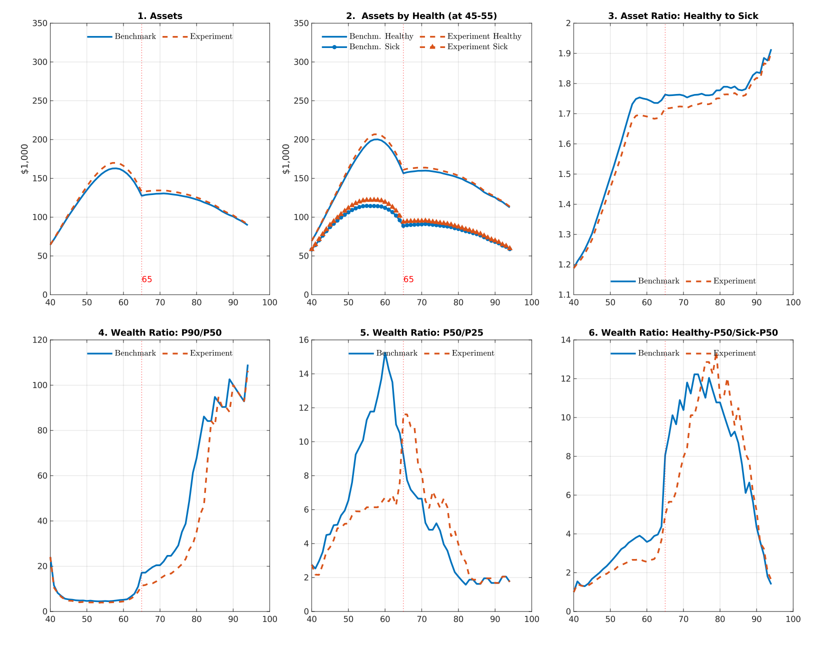
Exp. 2 (Medicare for all): Labor profiles



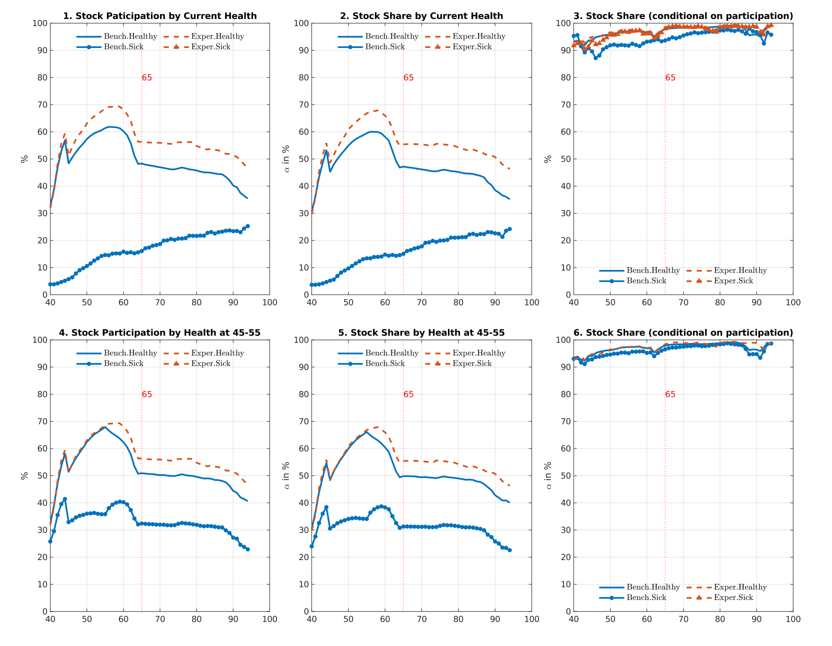
Exp. 4 (EHI for all workers): Stock holdings



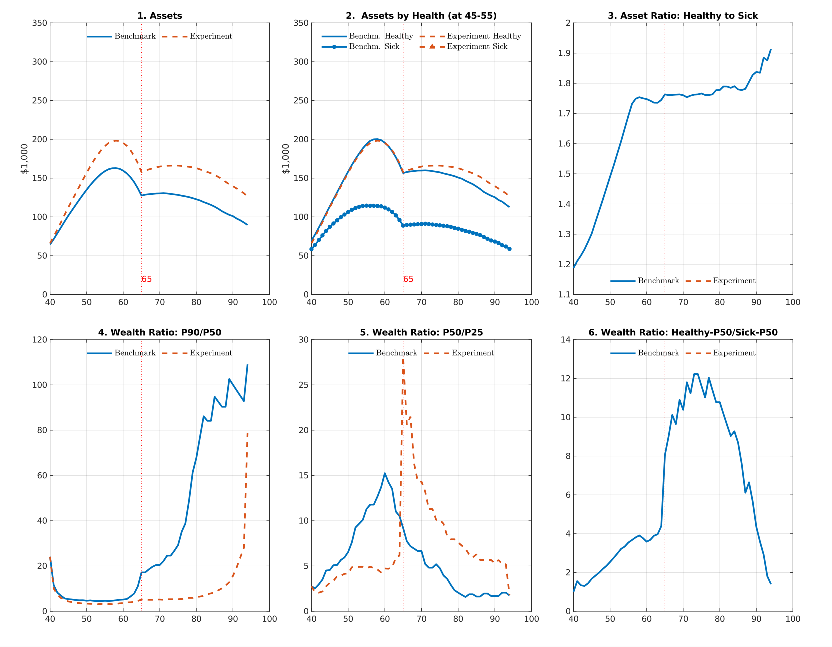
Exp. 4 (EHI for all workers): Asset profiles



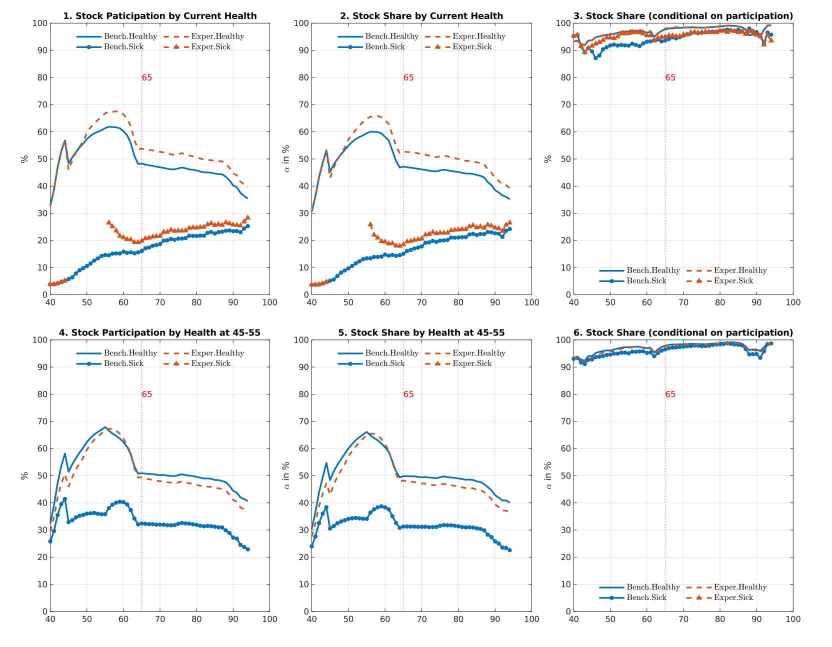
Exp. 7 (no bad health): Stock holdings



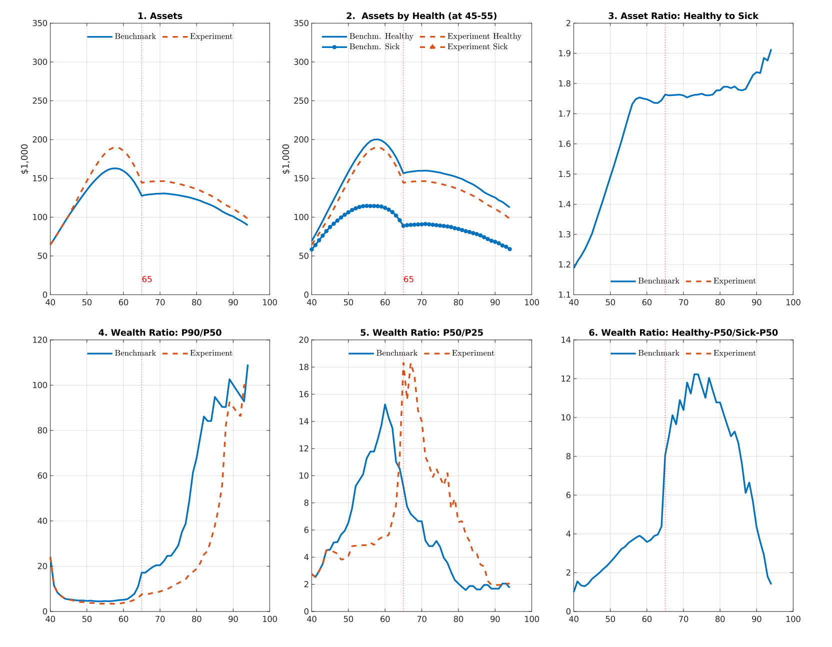
Exp. 7 (no bad health): Asset profiles



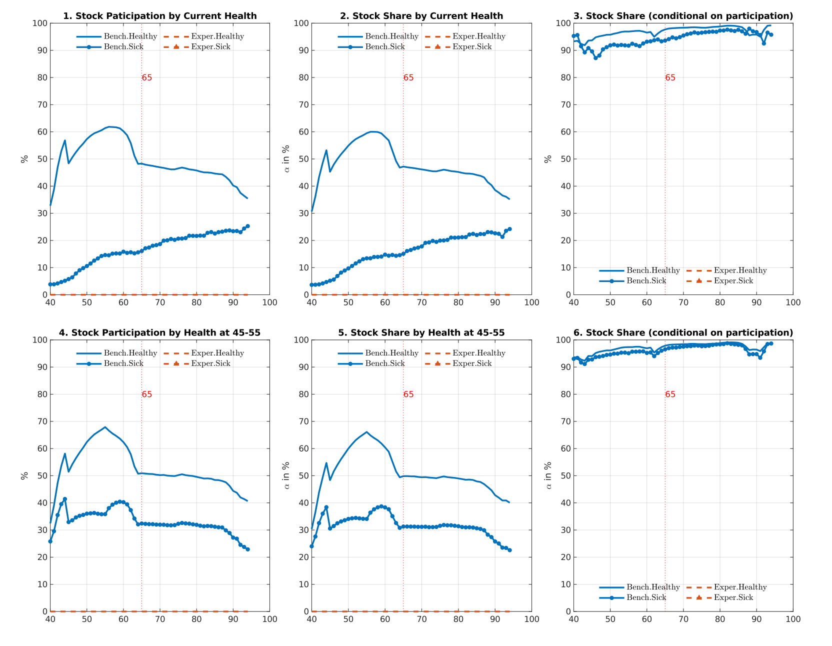
Exp. 8 (no bad health at 45–55): Stock holdings



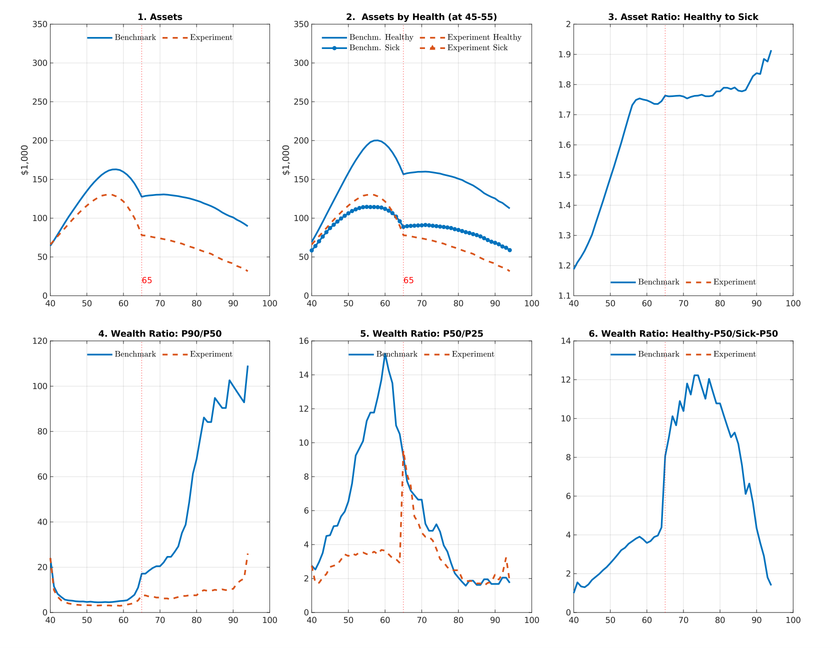
Exp. 8 (no bad health 45–55): Asset profiles



Exp. 9 (no bad health + no stocks): Stock holdings



Exp. 9 (no bad health + no stocks): Asset profiles



Experiments done

Back to results

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