Implications of Health Care Reform for Inequality and Welfare

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Main Question

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- Affordable Care Act (Obamacare): increase health insurance coverage
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- Affordable Care Act (Obamacare): increase health insurance coverage
  1. Penalty for the uninsured
  2. Premium subsidy based on income
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- Congressional Budget Office predicts
  - Lower uninsured rate
  - Higher distortions due to redistribution

Approach and Main Finding

This paper:

- Develop a general equilibrium model with insurance choice
- Replicate health insurance and medical service system
- Estimate structural parameters using micro data
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Main finding:

The rich are better off, but the poor are worse off

Mechanism - The Rich Gain, The Poor Lose

The rich gain:

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The poor lose:

- Before: Enjoy free care due to limited liability
- After: Penalty forces them to buy insurance

  $\Rightarrow$ Eat less by losing free riding opportunity

More Findings

- Wealth inequality decreases
  - The rich reduce precautionary savings
  - The poor have stronger saving motive

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  - The rich reduce precautionary savings
  - The poor have stronger saving motive
- Overall health improves
- Size of health care spending in GDP increases

Related Literature

- Facts about uninsured population in the United States: Gruber (2008)
- Health risk in incomplete markets models with heterogeneous agents: Jeske & Kitao (2009), Hansen et al. (2012), Pashchenko & Porapakkarm (2013) (link)
- Precautionary savings in response to health risk: Kotlikoff (1989), Kopecky & Koreshkova (2011), De Nardi et al. (2010)
- Social insurance distorts savings of the poor: Hubbard et al. (1995)

Road Map

1. Data - describe stylized facts
2. Model - develop a general equilibrium life-cycle model
3. Estimation - replicate pre-reform economy
4. Policy Experiment - implement Obamacare

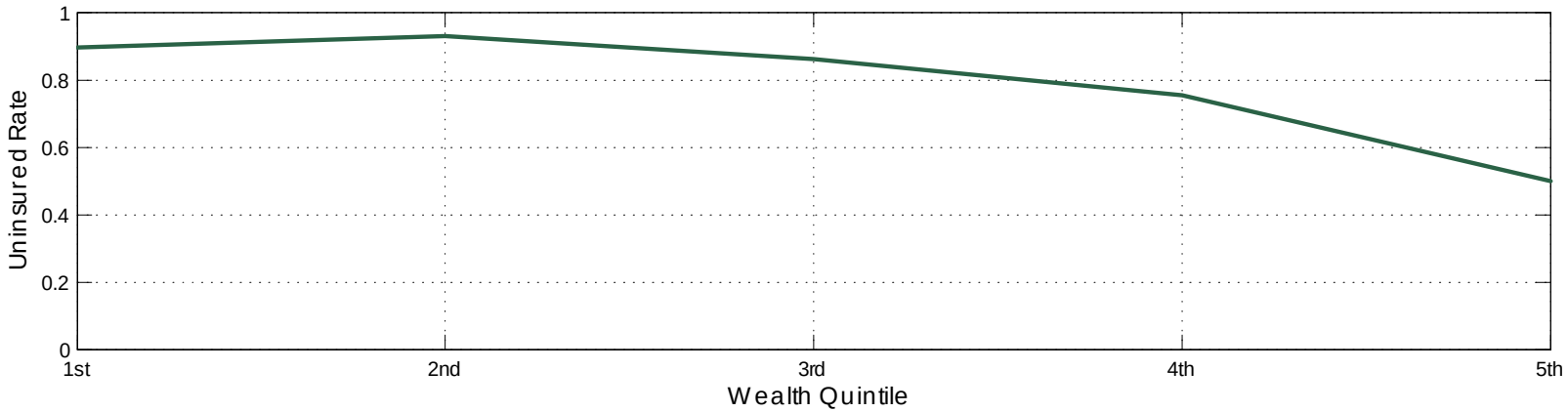
Data

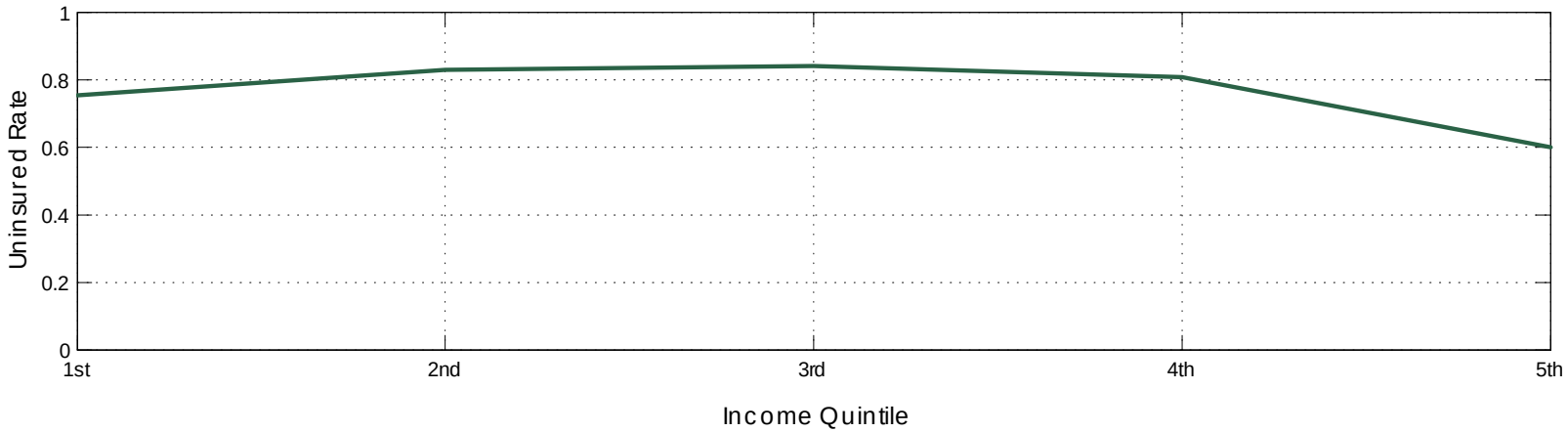
Data - Insurance Status

Insurance Status	
All Working Age	
Individual	5.0%
Uninsured	16.2%
Employer-based	66.3%
Public	12.5%
Active Participants	
Insured	23.5%
Uninsured	76.5%

Data - Uninsured Rate of Active Participants

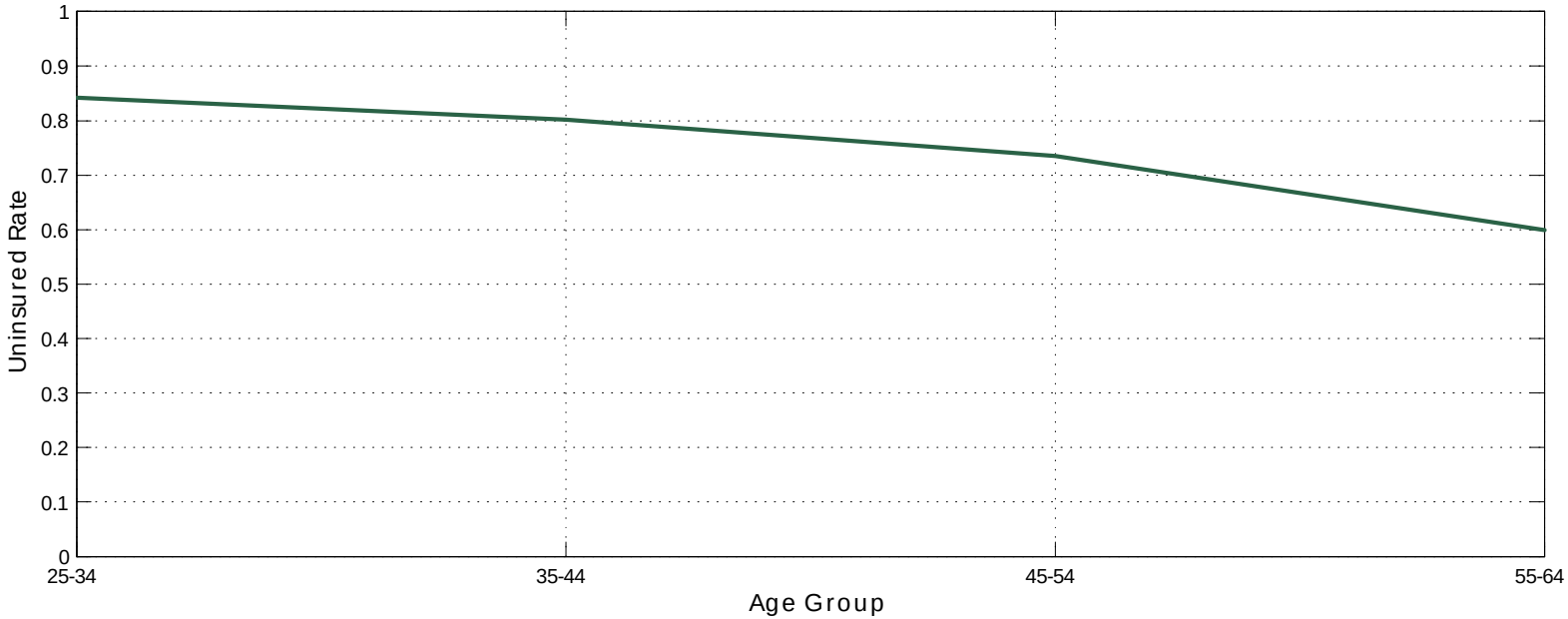
Uninsured rate of active participants along with wealth and income (link)





Data - Uninsured Rate of Active Participants

Uninsured rate of active participants along with age and health status



Health status	Uninsured rate
Bad	83.4%
Good	71.1%

Model

Model with Insurance Choice

Heterogeneous-agents life-cycle model with insurance choice

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Heterogeneous-agents life-cycle model with insurance choice

Main ingredients:

- Health as an expenditure shock
- Three types of insurance: Public, Employer-provided, Individual
- Actuarially unfair insurance premium
- Medical services market and limited liability

Environment

- Time is discrete

Environment

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- Agents:
  - Households
  - Medical service sector
  - Insurance companies
  - Firm
  - Government

Households

- J overlapping generations: enter the market at $j = 1$, die at $j = J$

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- Deal with the risks by health insurance i and savings a

Households - Health Insurance

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- Premium p. Reimburse schedule $\lambda : \mathbb{R}_{++} \longrightarrow [0, 1]$
- Access to *primary care*:
  - Better health status
  - Higher medical expenditure

Households - Timing

$$\text{State } s = \begin{pmatrix} \text{age } j \\ \text{medical expense } x \\ \text{health } h \\ \text{income } z \\ \text{public insurance eligibility } m \\ \text{group insurance offer } g \end{pmatrix}$$

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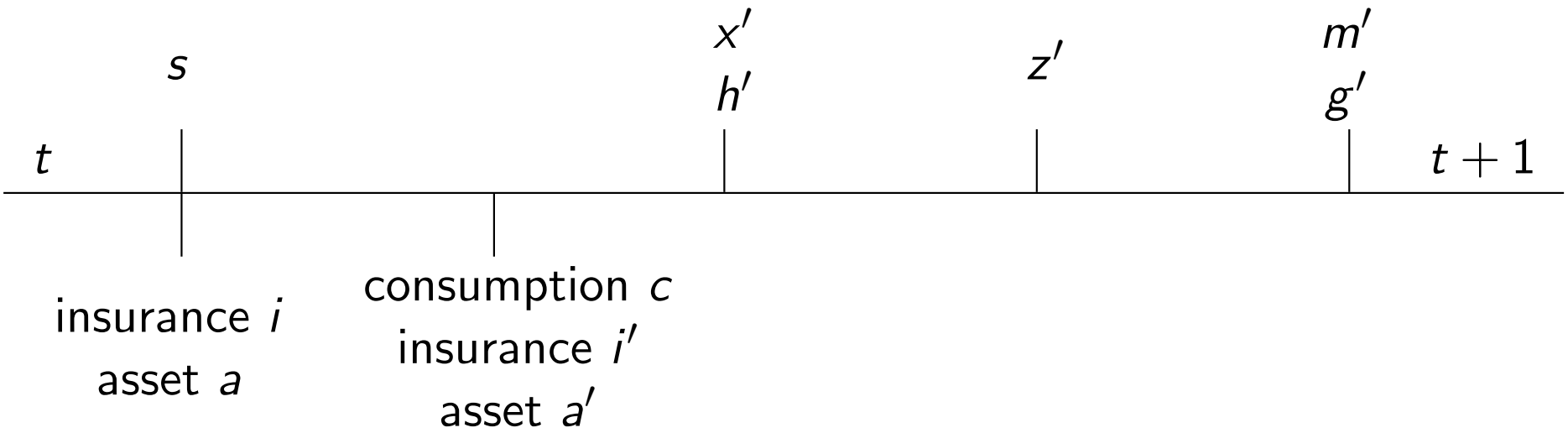

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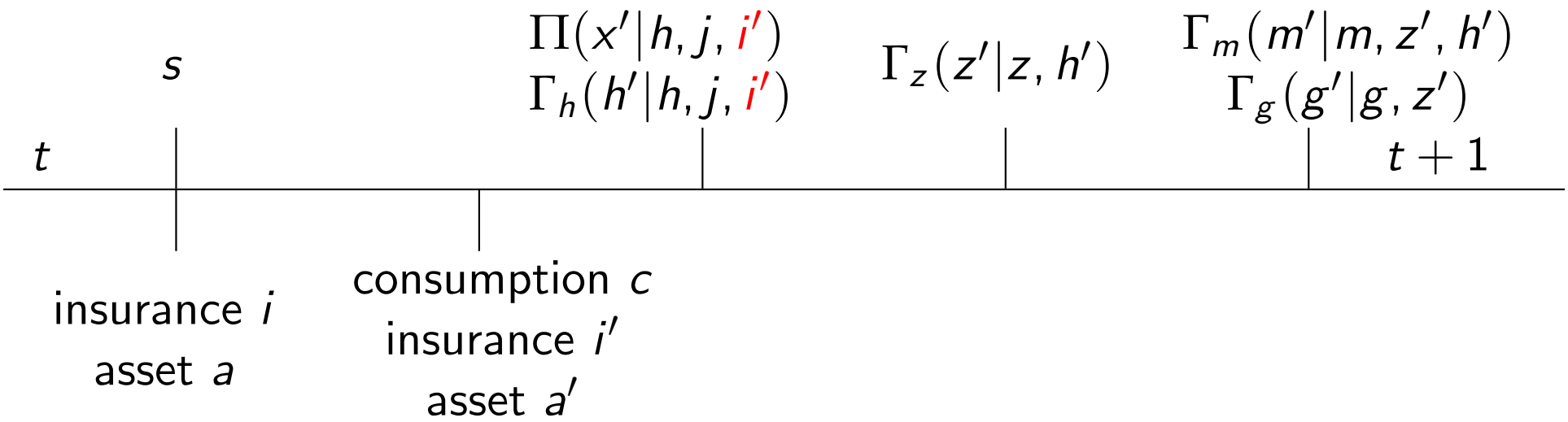

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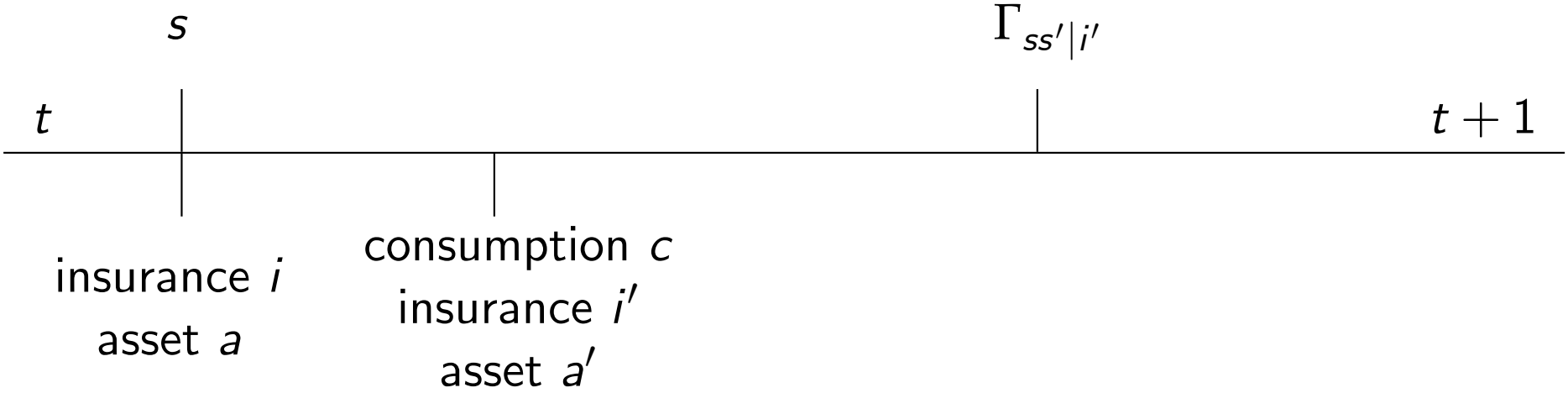

Households - Problem

Choose consumption c, asset a', insurance i' to

$$\begin{cases} \max & \textit{Utility} \\ \text{s.t.} & \textit{Budget Constraint:} \\ & \textit{Expenditure} = \textit{Income} + \underbrace{\textit{Savings net of Medical Expenses}}_{\text{Limited liability}} \end{cases}$$

Households - Problem

$$
\begin{cases}
V(a,i,s) = \max\limits_{c,a' \geq 0, i' \in \{0,1\}} & u(c) + \beta \sum \Gamma_{ss'|i'} V(a',i',s') \\
\text{s.t.} & c + a' + i' p(s) = (1-\tau) wz\varepsilon_j \\
& + \underbrace{max\{(1+r)a - [1-\lambda(qx)i]\, qx, 0\}}_{\text{Limited liability}}
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- After retirement age, get Social Security and insured by Medicare (link)

Medical Service Sector

- Competitive. Zero profit
- Transform one good into one medical service
- Charge qx due to limited liability where q is the mark-up

Medical Service Sector

- Competitive. Zero profit
- Transform one good into one medical service
- Charge qx due to limited liability where q is the mark-up
- Zero profit condition: (link)

$$\int \mathbb{E}_x \left[\underbrace{min\{(1+r)a + i\lambda(qx)qx, qx\}}_{\text{Revenue}} - \underbrace{x}_{\text{Cost}} \right] d\mu = 0$$

Insurance Companies

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- Premium:

$$p(j,h) = (1+r)^{-1}\mathbb{E}[\lambda(qx')qx'|j,h] + \phi$$

- Higher than the actuarially fair value due to ϕ

Firm

- Technology $F(K, L) = AK^{\theta}L^{1-\theta}$. Zero profit
- Pay the group insurance premium for employees with $g = 1$

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- Pay the group insurance premium for employees with $g = 1$
- Marginal profit conditions: (link)

$$\begin{aligned} r &= F_K(K, L) - \delta \\ w &= F_L(K, L) - \frac{\int p d\mu(g = 1)}{L} \end{aligned}$$

Government

- Proportional tax τ on labor income
- Finance Social Security, Medicaid and Medicare
- Balanced budget (link)

Stationary Equilibrium

A *stationary equilibrium* of this economy is a set of policies $\{c, a', i'\}$, a value function V, prices $\{w, r, p\}$, a mark-up of medical services q, government policies $\{\tau, ss\}$ and a stationary distribution μ such that

- Given prices, $\{c, a', i'\}$ and V solve the households' problem
- $\{w, r\}$ satisfy the firms' marginal profit conditions
- p satisfies the insurance companies' zero profit
- q satisfies the medical service sector's zero profit
- The government budget is balanced
- All markets clear
- The distribution is stationary

Main Mechanism: Why Uninsured?

- The poor may choose to be uninsured:
  - Implicit insurance though limited liability
  - Incentive to dissave

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- The poor may choose to be uninsured:
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- The rich may choose to be uninsured:
  - Not actuarially fair insurance premium
  - Incentive to save

Estimation

Estimation: Data

National-Level Panel Data:

1. Survey of Income and Program Participation (SIPP)
2. Medical Expenditure Panel Survey (MEPS)

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1. Survey of Income and Program Participation (SIPP)
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- Decision making unit: Health Insurance Eligibility Unit
- Head of HIEU of age 25-80
- Self-reported health as the measure of health

Estimation: Shock Process

- Joint process using SIPP: (link)
  - Health status h
  - Earnings z
  - Access to public and employer-provided insurance m, g

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- Distribution of medical expenditures x using MEPS
- Reimburse schedule λ using MEPS: for each insurance (link)

$$\log(oop) = \beta_0 + \beta_1 \log(MedEx) + \beta_2 \left(\log(MedEx)\right)^2 + \varepsilon$$

Estimation: Structural Parameters

- Key parameters for insurance choice:
  - Risk aversion: γ in $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$
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- Target moments:
  Joint distribution of insurance coverage of active participants
  - age j
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$$\min_{\gamma,\phi} \sum \pi_{j,z,a,h} [i_{Data}(j,z,a,h) - i_{Model}(j,z,a,h;\gamma,\phi)]^2$$

Estimation: Model Parameters

Remark	Parameter	Value	Target
max age	J	55	die at age 80
capital share	θ	0.33	-
SS replacement	ss	0.45	45% of ave. income
risk aversion	γ	**1.234**	joint dist. of coverage
fixed costs	ϕ	$**803**	joint dist. of coverage
discount factor	β	0.958	capital-output ratio: 3
TFP	A	0.965	average income $= 1$
depreciation	δ	0.082	interest rate: 3%

(link)

Policy Experiment

Key Provisions of Obamacare

- Penalty for the uninsured:

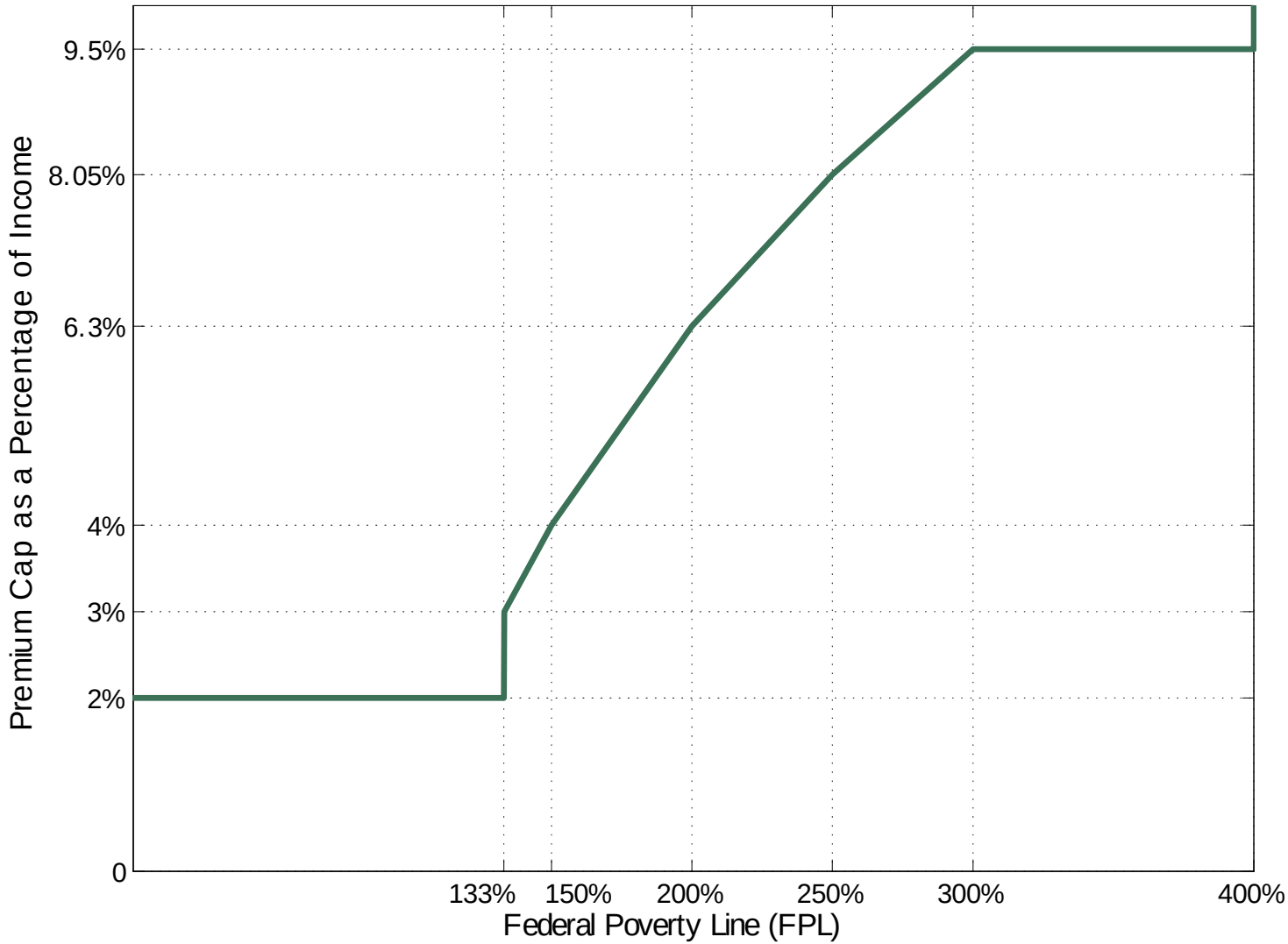
$$max\{2.5\% \text{ of income}, \$695\}$$

- Premium subsidy based on income, financed by income tax τ

- No rejection or price-discrimination based on health:

$$p(j) = (1+r)^{-1} \frac{\int \mathbf{1}_{i'=1} \mathbb{E}\left[\lambda(qx')qx'|j,h\right] d\mu(j)}{\int \mathbf{1}_{i'=1} d\mu(j)} + \phi$$

Premium Subsidy



Results: Aggregate Variables

	Before	After
Uninsured Rate: working age population	**19.8%**	**3.1%**
Uninsured Rate: active participants	**77.1%**	**11.9%**
Aggregate Output	1.126	1.133
Aggregate Capital	3.31	3.32
Interest Rate	3.00%	3.06%
Income Tax Rate	25.0%	25.9%
Mark-up in the Medical Services	**6.70%**	**1.62%**
Fraction of Healthy	**63.7%**	**70.3%**
Health Care Spending in GDP (age 25+)	**9.61%**	**9.85%**

Results: Welfare Effects

			Wealth	
Age	Income	Health	Bottom 25%	Top 25%
25-34	Low	Good	−0.15	1.00
		Bad	−0.21	0.97
	High	Good	−0.17	0.03
		Bad	−0.19	0.05
55-64	Low	Good	−0.21	0.98
		Bad	−0.44	1.02
	High	Good	−0.87	−0.44
		Bad	−0.88	−0.40
Total				0.19%
Fraction who gains				52.8%

Results: Wealth Inequality Decreases

	Before	After
Gini wealth: working age population	0.555	0.545
Gini wealth: active participants	0.653	0.634
Wealth (active participants)		
25%	\$2,820	\$4,979
50%	\$26,857	\$30,692
75%	\$106,032	\$104,182

Conclusion

- This paper investigates the implications of Obamacare
- The reform increases the insurance coverage
- The rich are better off, but the poor are worse off
- Wealth inequality decreases
- Overall health improves, but the health spending increases

Difference from Pashchenko and Porapakkarm (2013)

- Limited liability in the medical services market
- [PP] Means-tested public insurance
  $\Rightarrow$ Misjudge the uninsured population
- Estimation of risk aversion using micro data
- Primary care when insured

go back

After Retirement Problem

- Insured by Medicare
- State vector $s = (j, h, x)$

$$\begin{cases} V(a,s) = \max\limits_{c,a' \geq 0} & u(c) + \beta \sum \Gamma_{ss'} V(a', s') \\ \text{s.t.} & c + a' = ss + \max\{(1+r)a - [1 - \lambda(qx)]\, qx, 0\} \end{cases}$$

$$\begin{aligned} \text{where} \quad & \Gamma_{ss'} \\ = \quad & \Gamma_h(h'|h,j,i')\Pi(x'|h,j,i') \end{aligned}$$

go back

Hospital Revenue

Hospital revenue:

	Uninsured	Insured
Payment by agent	$\min\{(1+r)a, qx\}$	$\min\{(1+r)a, (1-\lambda(qx))qx\}$
$+$	$+$	$+$
Payment by insurer	N/A	$\lambda(qx)qx$
Hospital Revenue	$\min\{(1+r)a, qx\}$	$\min\{(1+r)a + \lambda(qx)qx, qx\}$

In sum

$$\begin{aligned} & (1-i)\min\{(1+r)a, qx\} + i\min\{(1+r)a + \lambda(qx)qx, qx\} \\ = \quad & \min\{(1+r)a + i\lambda(qx)qx, qx\} \end{aligned}$$

go back

Firm's Maximization Problem

- Randomly assign the employer-provided insurance after choosing L
- The firm's problem:

$$\max_{K,L} F(K,L) - wL - (r+\delta)K - \eta L$$

where η : expected marginal employer's contribution

- Wage rate:

$$\begin{aligned} w &= F_L(K,L) - \eta \\ &= F_L(K,L) - \frac{\int p d\mu(g=1)}{L} \end{aligned}$$

go back

Government Budget Constraint

$$
\begin{aligned}
& \tau \int wz\varepsilon d\mu(j < J_R) \\
= & \int ssd\mu(j \geq J_R) \\
+ & \int \mathbb{E}_x \left[x - \min\{(1+r)a + \lambda(qx)qx, qx\} \right] d\mu(m = 1, j < J_R) \\
+ & \int \mathbb{E}_x \left[x - \min\{(1+r)a + \lambda(qx)qx, qx\} \right] d\mu(j \geq J_R),
\end{aligned}
$$

go back

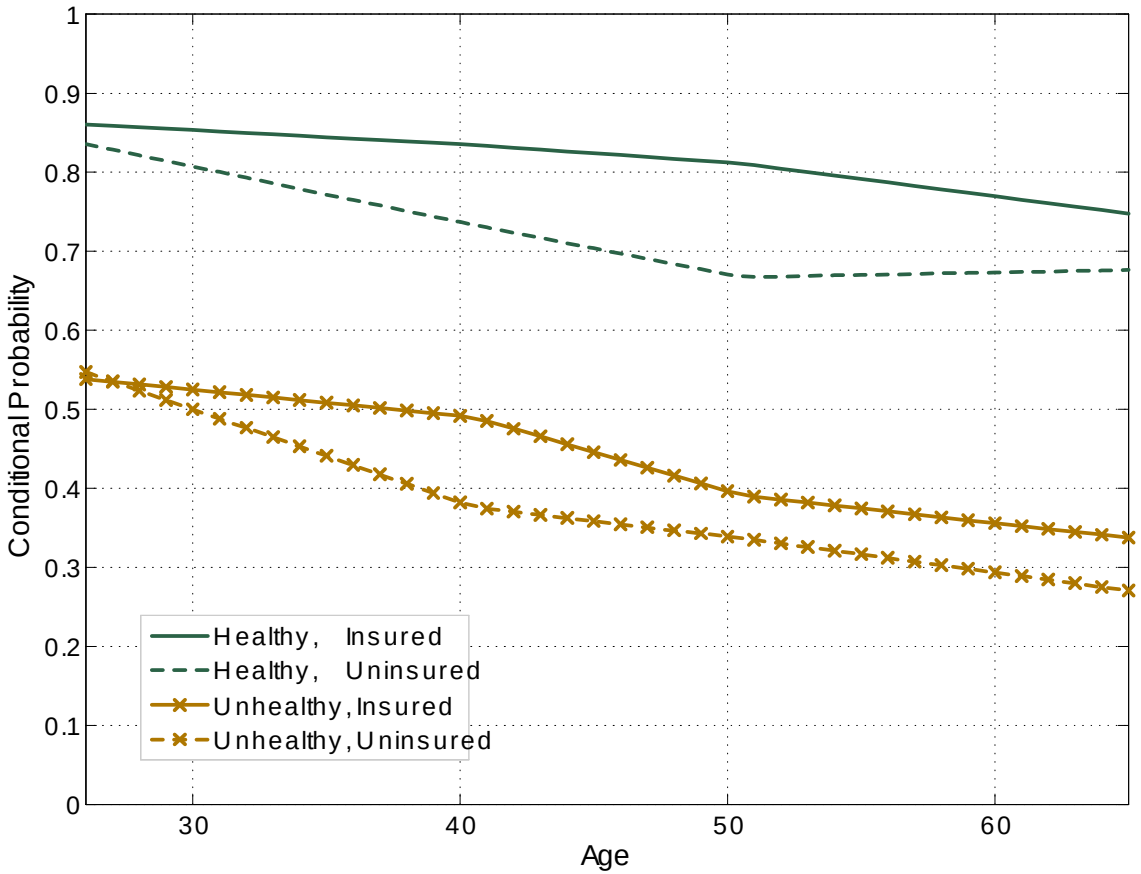
Wealth and Income Distribution of Active Participants

Percentile	Wealth	Income
20%	$0	$3,809
40%	$4,645	$10,484
60%	$50,040	$16,067
80%	$164,570	$24,158

go back

Estimation: Process for Health Status

Conditional probability of being healthy: $\Gamma(h'|h, j, i')$



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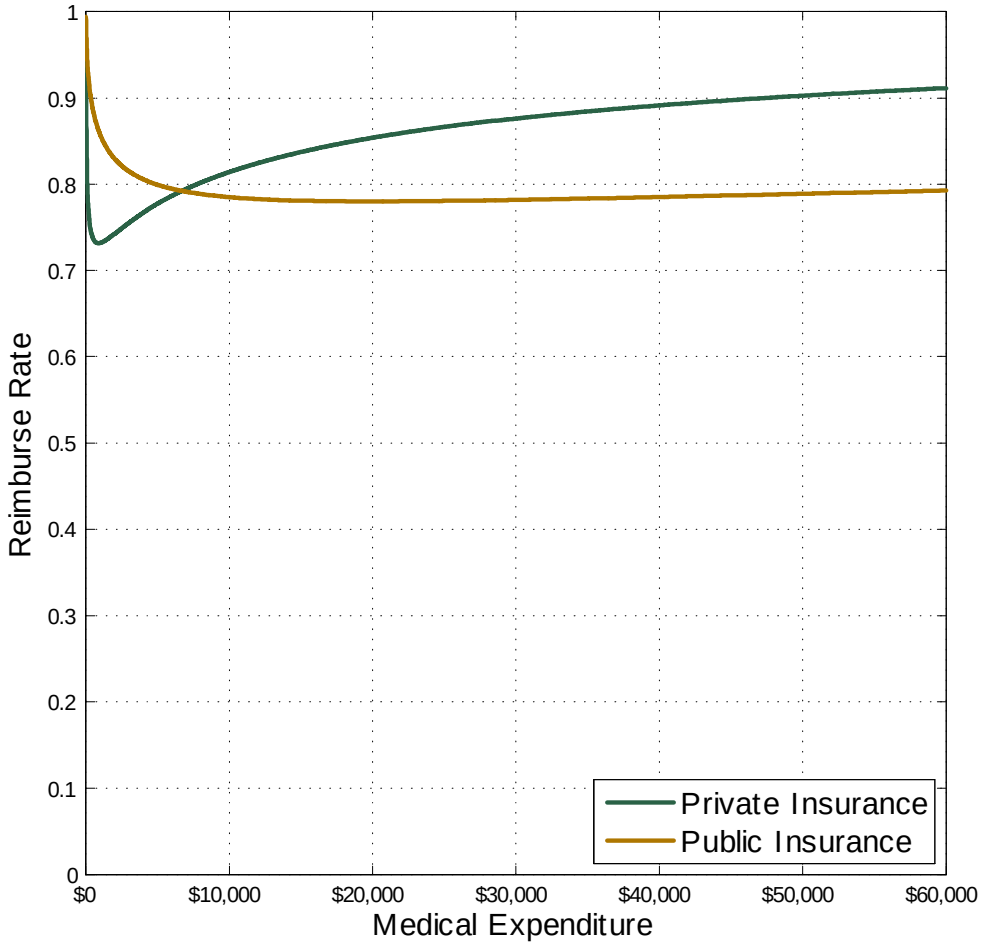
Estimation: Reimburse Schedule



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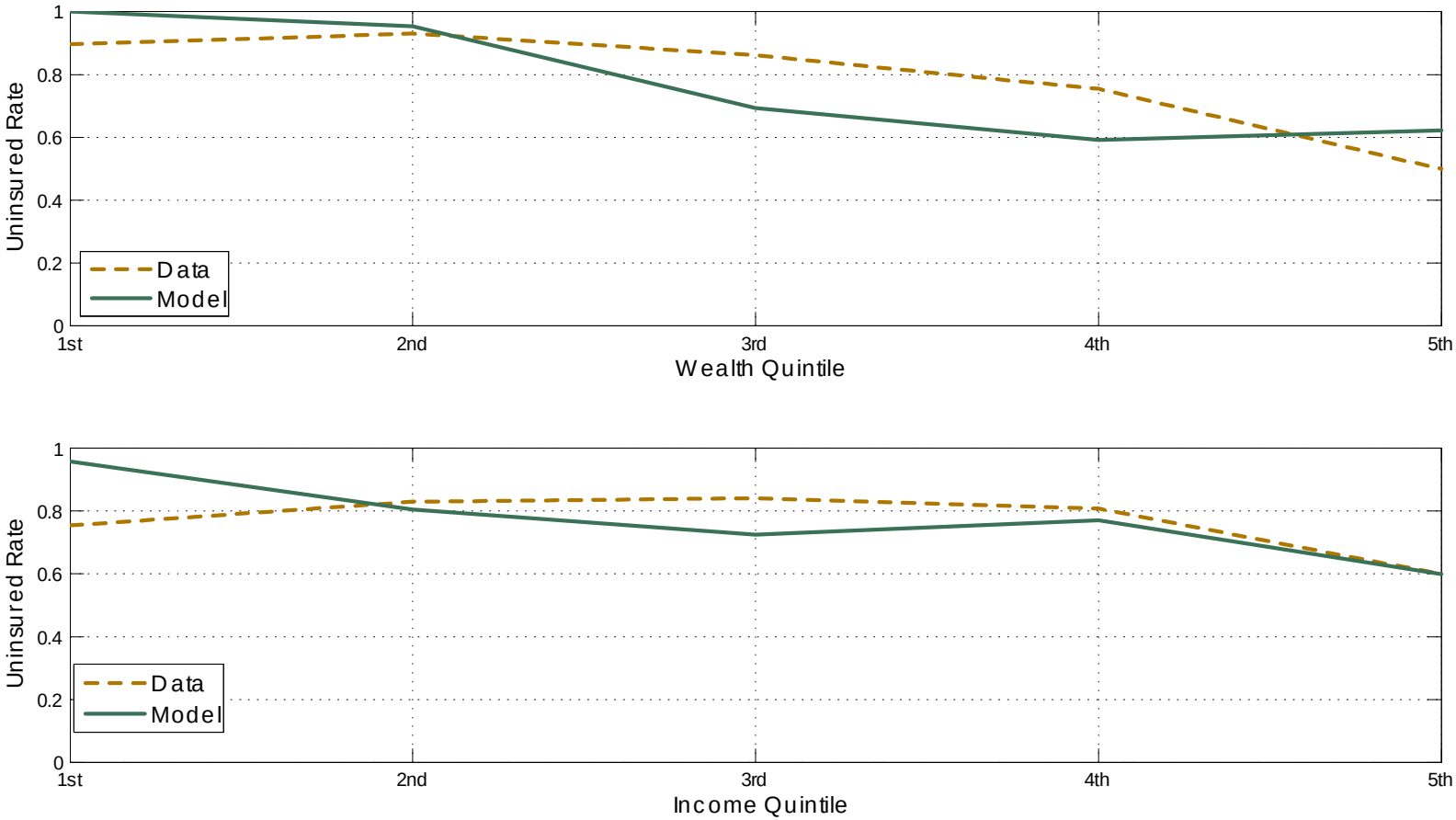
Estimation: Model Performance

Replicate coverage distribution (wealth, income)



Estimation: Model Performance

Replicate coverage distribution (age, health)

Uninsured Rate	Data	Model
Age 25-44	82.3%	81.4%
Age 45-64	67.9%	72.4%
Unhealthy	83.4%	88.4%
Healthy	71.1%	70.7%

Estimation: Model Performance

Replicate income and wealth distribution of the uninsured

	Data	Model
Income Percentile		
25%	\$5,720	\$3,852
50%	\$12,792	\$12,068
75%	\$19,832	\$20,127
Wealth Percentile		
25%	\$0	\$0
50%	\$6,027	\$13,137
75%	\$71,273	\$79,286

go back