The Effect of the Affordable Care Act on the Labor Supply, Savings, and Social Security of Older Americans

Eric French Hans-Martin von Gaudecker John Jones

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  $\Rightarrow$ Many may have worked in part for health insurance
- At age 65, everyone became eligible for Medicare
  - Low cost, high-quality group insurance
  - Severed job-insurance link

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  - French and Jones (2011)
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- People with strong job-insurance link tend to retire at the Medicare eligibility age (65)

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  - Work disincentives through income-based subsidies

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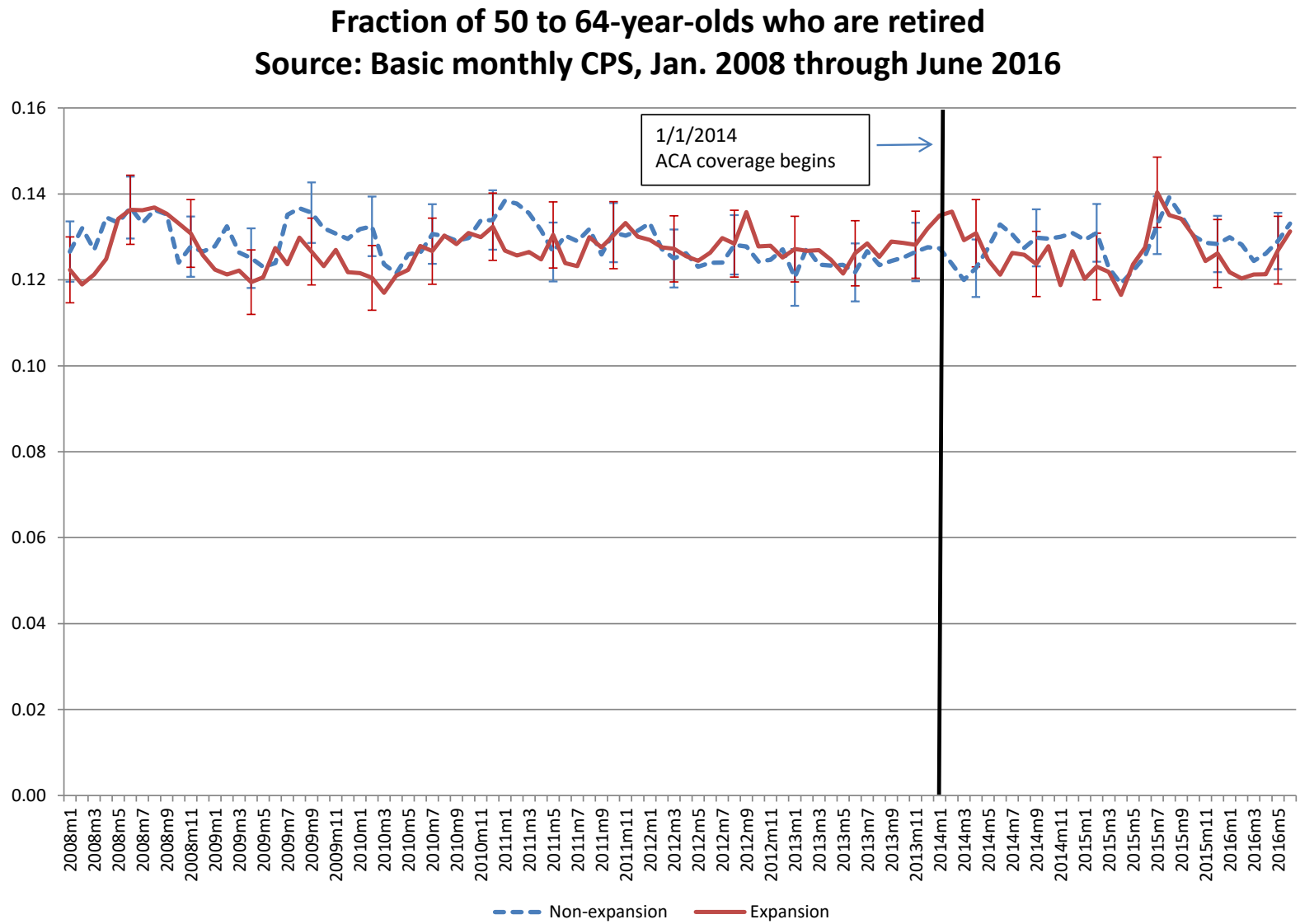
- Several papers compare retirement patterns in states with and without Medicaid expansions
- Small estimated effects on labor supply

The Medicaid Expansion and Retirement



From Levy, Buchmueller, and Nikpay (2017)

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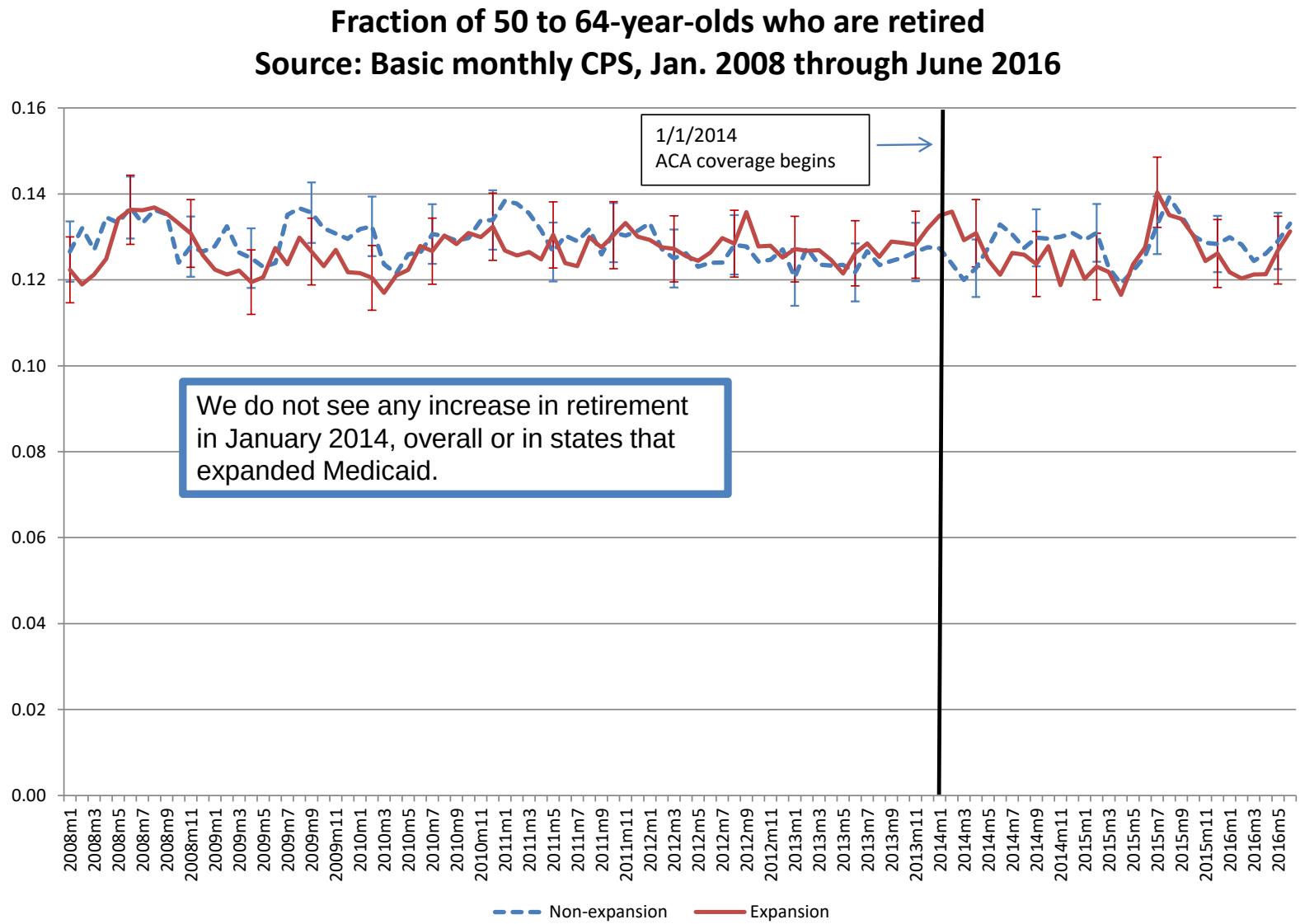

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Sources of Health Insurance Coverage

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Percent of US population ages 55-64.

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- Changes in coverage across states very heterogeneous
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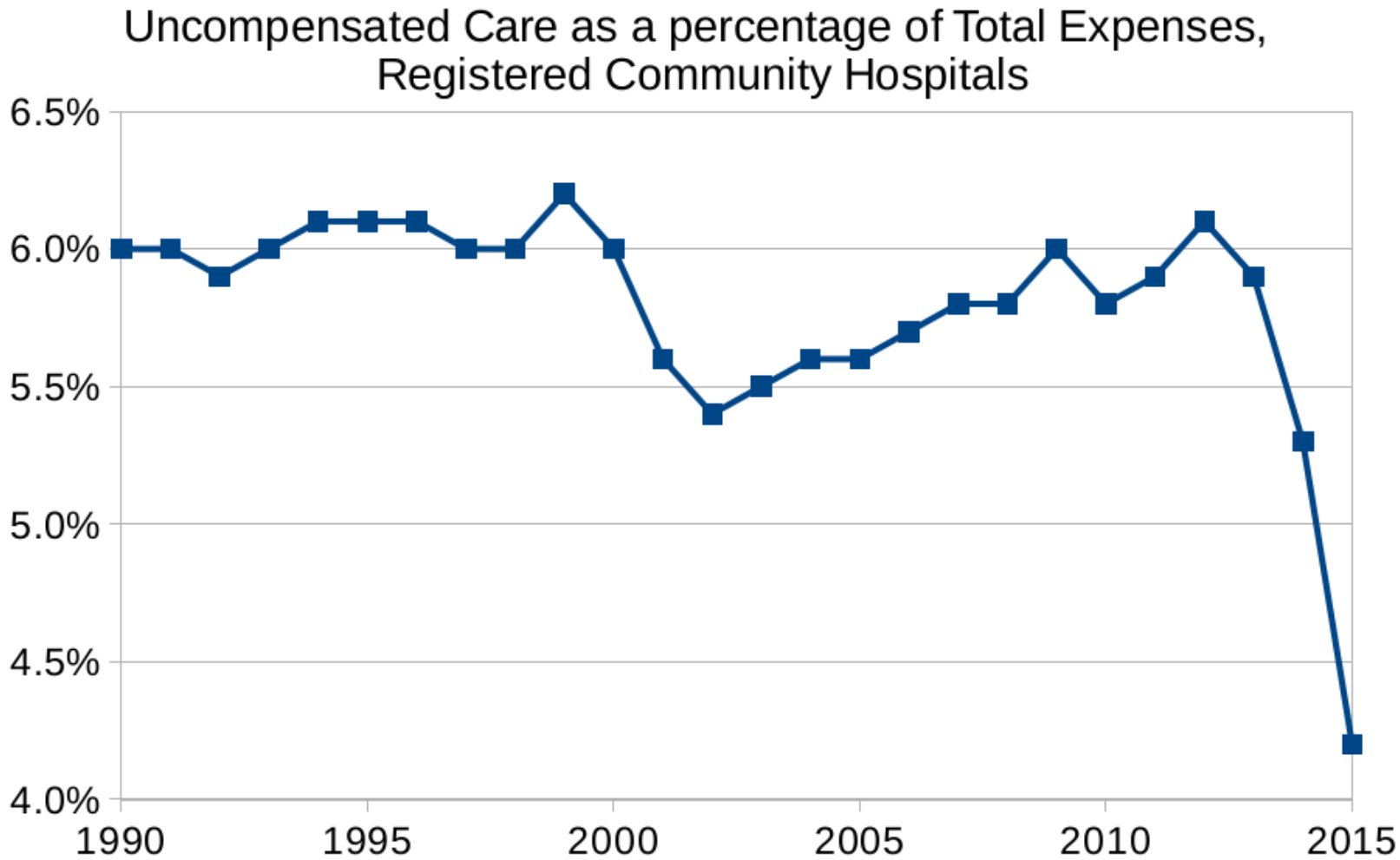
- Implicit insurance through default on medical bills
  - 6% of total medical bills are unpaid
  - Can be huge disincentive to labor supply and savings

Decline in use of uncompensated care



Source: Health Forum, AHA Annual Survey Data.

Our contribution

- We estimate a retirement model that accounts for:
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  - multiple insurance possibilities (uninsured, private non-group, employer-provided, Medicaid, Medicare, combinations)
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- Then use the model to predict the effects of the ACA
- Preliminary findings
  - Small aggregate disemployment effects, but very heterogeneous
  - Default on medical bills key for finding small effects

Data: households with a man aged 50+

- HRS (from 1992-2012)
  - Detailed information on labor supply, wages, health, and assets
  - Pension data used to estimate pension accrual rates and initial pension wealth.
  - Social Security earnings histories used to estimate initial Social Security wealth.
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  - Out-of-pocket medical spending
- MEPS (from 2000-2012).
  - Total billable medical spending
  - Detailed information on who paid for the care
  - Data obtained using data from self reports and providers

Household total medical spending

- The mean and variance of total medical spending are functions of health, marital status, and age.
- Households face transitory and persistent shocks to medical expenses.

$$\ln Z_t = \mu_z(H_t, SP_t, t) + \sigma_z(H_t, SP_t, t) \times \psi_t$$

ψ_t has a permanent and a transitory component

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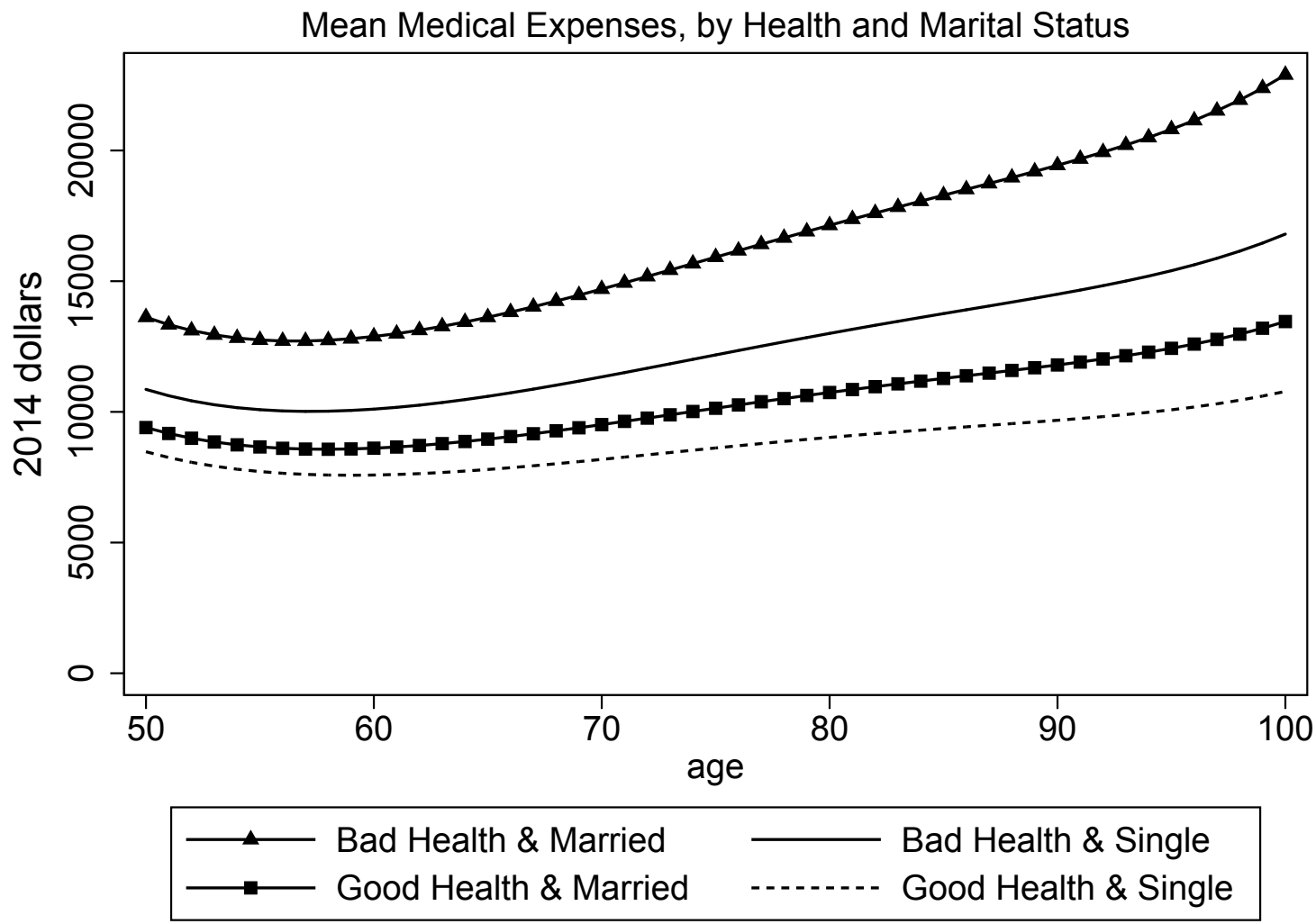

MEPS data, estimated using a fixed effects estimator

Household total and out-of-pocket medical spending

	Younger than 65		**65 and Older**	
	Total	OOP	Total	OOP
Mean	10,310	1,860	13,750	2,180
Median	4,780	1,060	6,900	1,310
90^{th} percentile	24,030	4,370	32,770	5,000
95^{th} percentile	38,470	6,130	48,660	7,000

MEPS data, OOP includes co-pays and deductibles, excludes premia

Health Insurance States

3 types of (employer-provided) health insurance

- **Retiree** = insurance you can hold onto after you leave your job
- **Tied** = insurance that ends shortly after you leave your job
- **Non-group** = no employer provided insurance

Health Insurance States and Possibilities

State	**Choice Set** | **not disabled, age** < 65
Retiree	Retiree
Tied	Tied
Non-Group	Uninsured, Private Non-Group

Transitions

Health Insurance States and Possibilities

State	**Possibilities | DI recipient or age>65, high income and assets**
Retiree	Retiree, Retiree + Medicare
Tied	Tied, Tied + Medicare
Non-Group	Uninsured, Private Non-Group, Medicare

Transitions

Health Insurance States and Possibilities

State	**Possibilities | DI recipient or age<65, low income and assets**
Retiree	Retiree, Retiree + Medicare, Medicare + Medicaid
Tied	Tied, Tied + Medicare, Medicare + Medicaid
Non-Group	Uninsured, Private Non-Group, Medicare, Medicare + Medicaid

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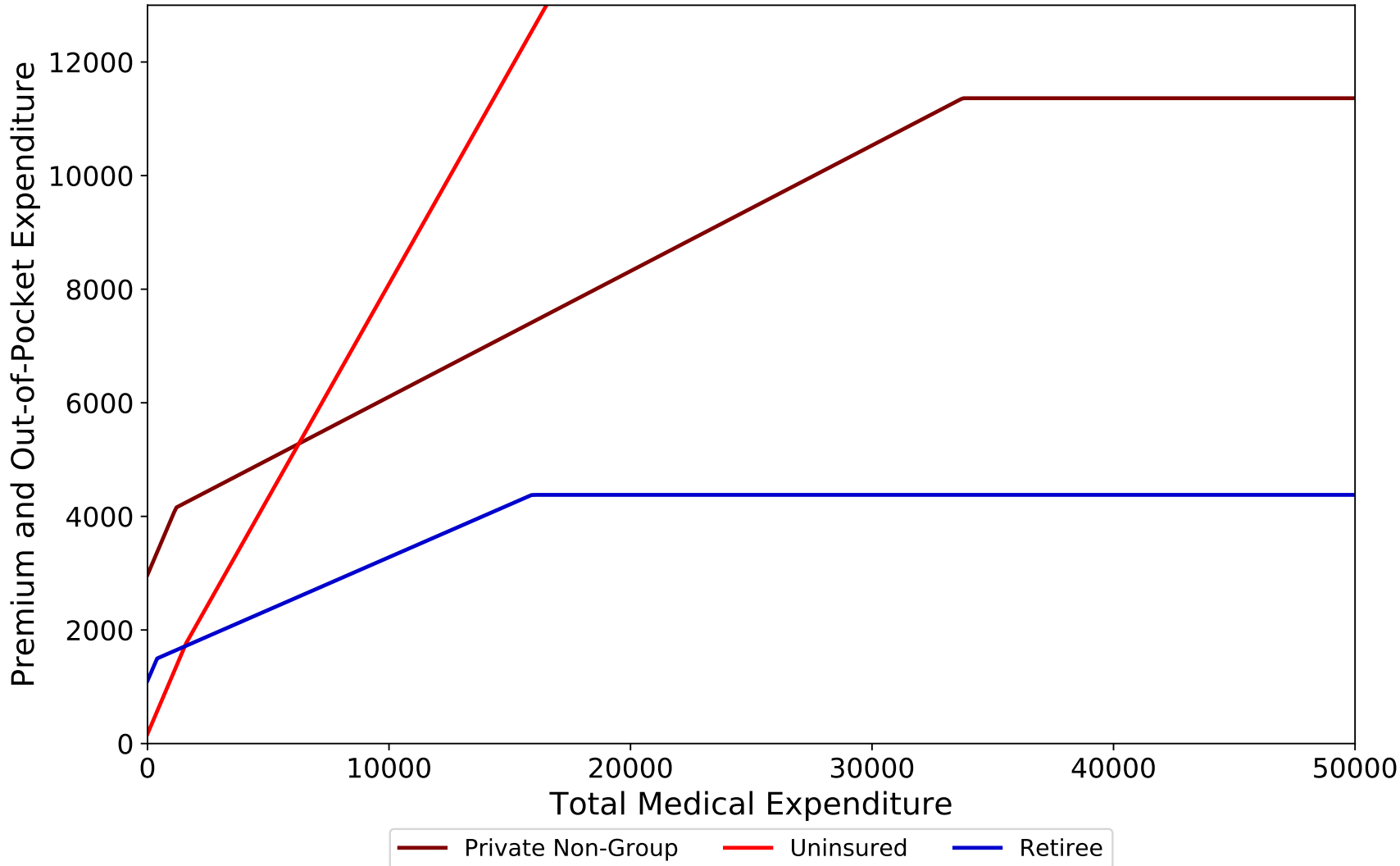
Health insurance budget sets

Four components to describe a health insurance contract

- Premium
- Deductible
- Co-pay
- Stop-loss

Budget sets by health insurance type, age < 65



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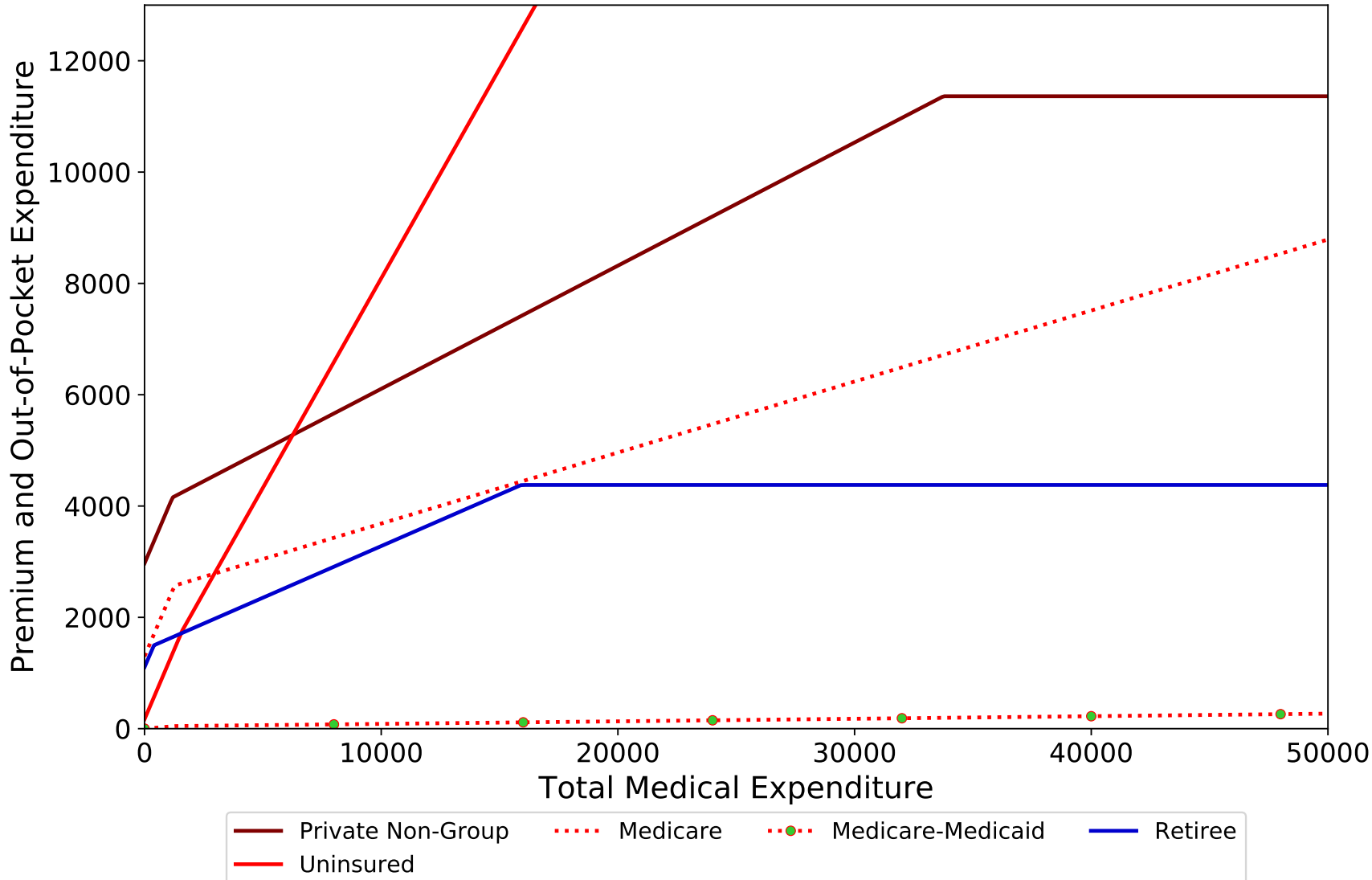

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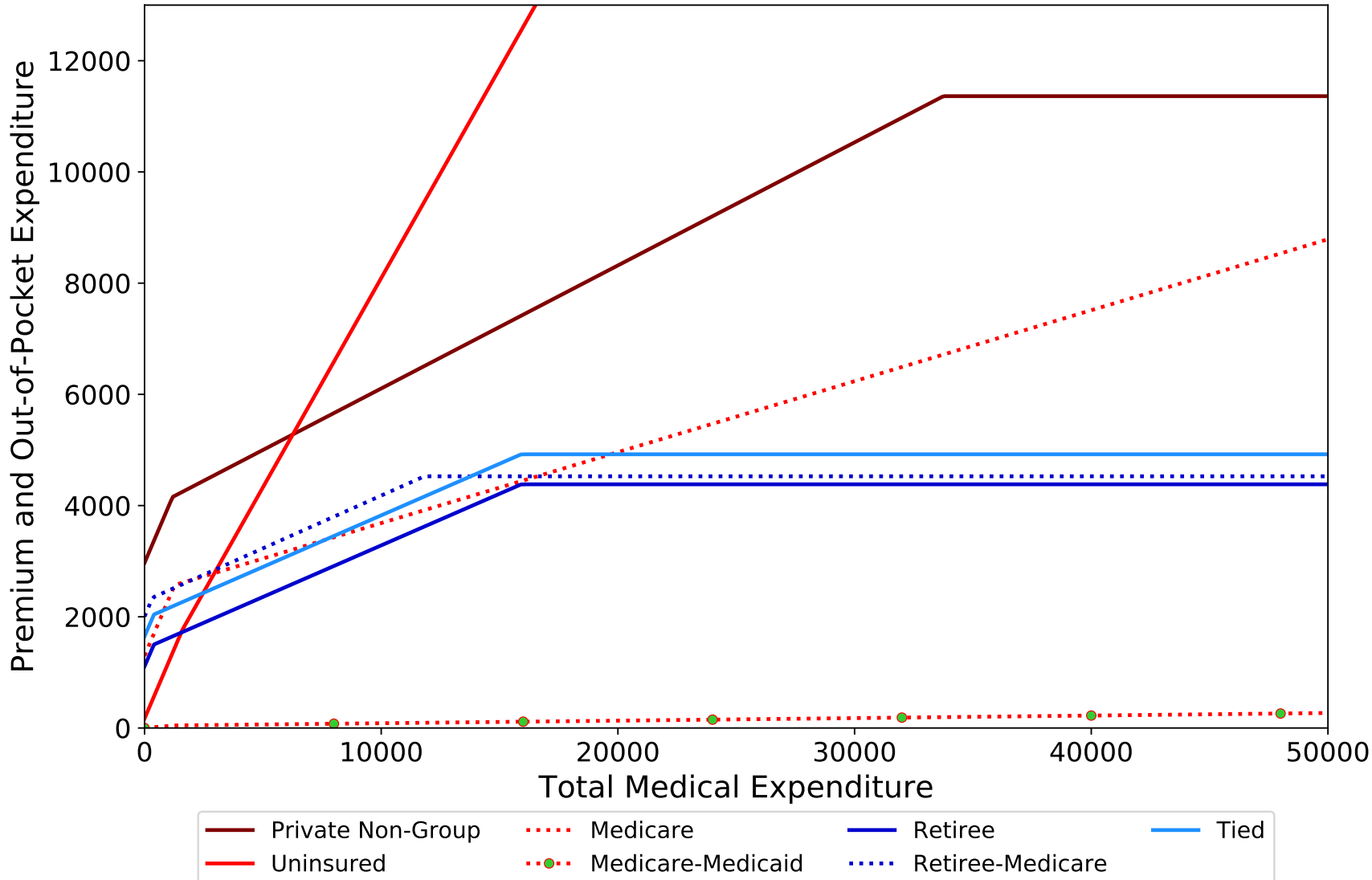

Insurance premia

Insurance premia are functions of

- insurance type
- age
- participation in the labor market
- marital status
- expected medical expenses (forecasted using lagged medical spending)

Life cycle model

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  - $expenditures_t$ includes: consumption; out of pocket medical expenses and insurance premia.
  - $transfers_t$ provide a "consumption floor" (Hubbard, Skinner, and Zeldes, 1995), capturing insurance provided via non-payment of medical expenses

Recursive Formulation

$$V_t(X_t) = \max_{C_t, N_t, B_t, I_t^+} \left\{ \frac{1}{1-\nu} \left(C_t^\gamma L_t^{1-\gamma} \right)^{1-\nu} + \beta(1 - s_{t+1}) \frac{\theta_B}{1-\nu} (A_{t+1} + \kappa)^{\gamma(1-\nu)} \right.$$
$$\left. + \beta s_{t+1} \int V_{t+1}(X_{t+1}) dF(X_{t+1} | X_t, t, C_t, N_t, B_t, I_t^+) \right\}$$
$$L_t = L - N_t - \phi_{Pt} P_t - \phi_{RE} RE_t - \phi_H H_t,$$

Choice Vars: C_t = equivalized consumption; N_t = hours worked; I_t^+ = insurance choice;
P_t = participation (=1 if $N_t > 0$); RE_t = re-entry (=1 if $N_{t-1} = 0$ and $N_t > 0$)

State Vars: $X_t = (A_t, B_{t-1}, AIME_t, I_t, H_t, \omega_t, \zeta_{t-1}, \Upsilon_t)$

Endogenous State Variables – Not Stochastic

A_t = assets; I_t = Health Insurance Type $\in \{retiree, tied, none\}$

B_{t-1} = whether already applied for Social Security benefits $\in$ {no, yes}

P_{t-1} = whether working last period $\in$ {no, yes}

$AIME_t$ = Average Indexed Monthly Earnings

Exogenous State Variables – Stochastic

H_t = health status $\in \{disabled, bad, good\}$

ω_t = persistent wage shock

ζ_{t-1} = persistent medical expense shock (realized after time-$t-1$ decisions)

Υ_t = marital status and spousal employment

Solution and estimation

- Method of Simulated Moments, two steps
  - Step 1: estimate parameters of total medical spending, health, mortality, coinsurance rates, etc.
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- Estimation is computationally intensive
  - We solve the model on GPUs (using Python and Numba)
  - Implementation is an order of magnitude faster than on a 100-node cluster

Computing on GPUs

- The acceleration of CPU power has slowed down
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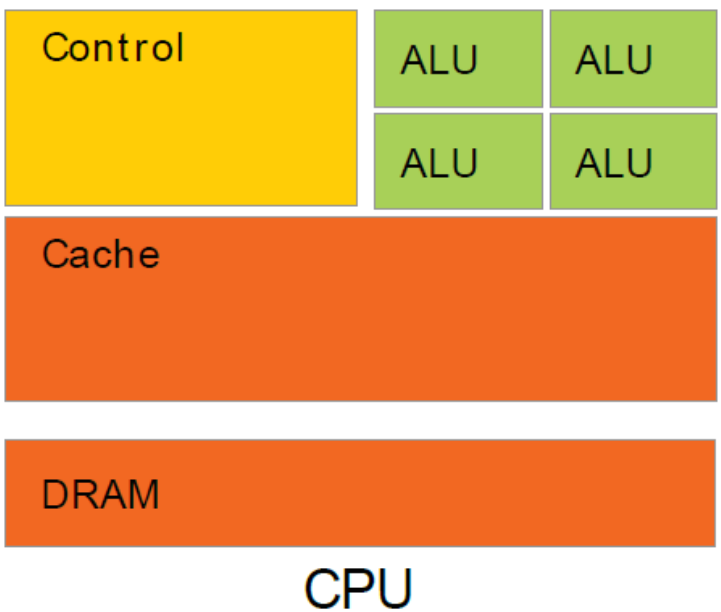
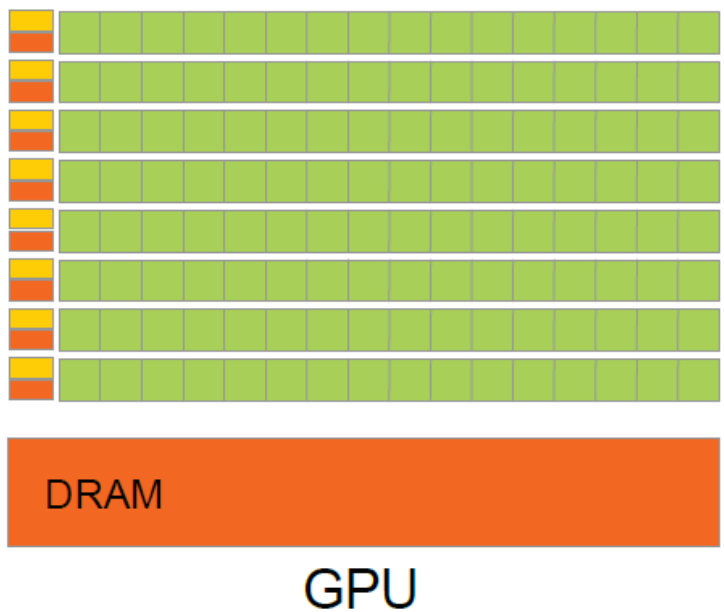
  - Less incremental demand: Modern CPUs are fast enough for day-to-day applications
- GPU power continues to accelerate
  - Demand for increased speed remains high: Computer games, (ultra) high-definition video
  - Increasingly used in high-performance computing

Computing on GPUs

Basic architecture:

- Many very small computing units (think of each deciding on the colors of a portion of the screen) $\rightarrow$ Massive parallelization
- Each unit is rather "dumb": Can do floating point operations, but weak at control flow (if/then, loops)
- Very efficient, very scalable for arithmetic calculations





Reproduced from: NVIDIA (2016)

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- CPU parallelization should occur as early as possible
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  - Example: Solve model at a particular parameter vector (Lee & Wiswall, 2007)

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- GPU parallelization should occur as late as possible
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  - Here: separate GPU functions for:
    1. Creating a sparse grid of feasible state-choice combinations
    2. Calculating contemporaneous quantities (within-period utility, end-of-period assets)
    3. Calculating continuation values
    4. Finding optimal choices
    5. Simulating agents' decisions

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- GPU programming is not user-friendly

Preference Parameter Estimates

$$U(C_t, L_t) = \frac{1}{1-\nu}\left(C_t^{\gamma} L_t^{1-\gamma}\right)^{1-\nu}$$

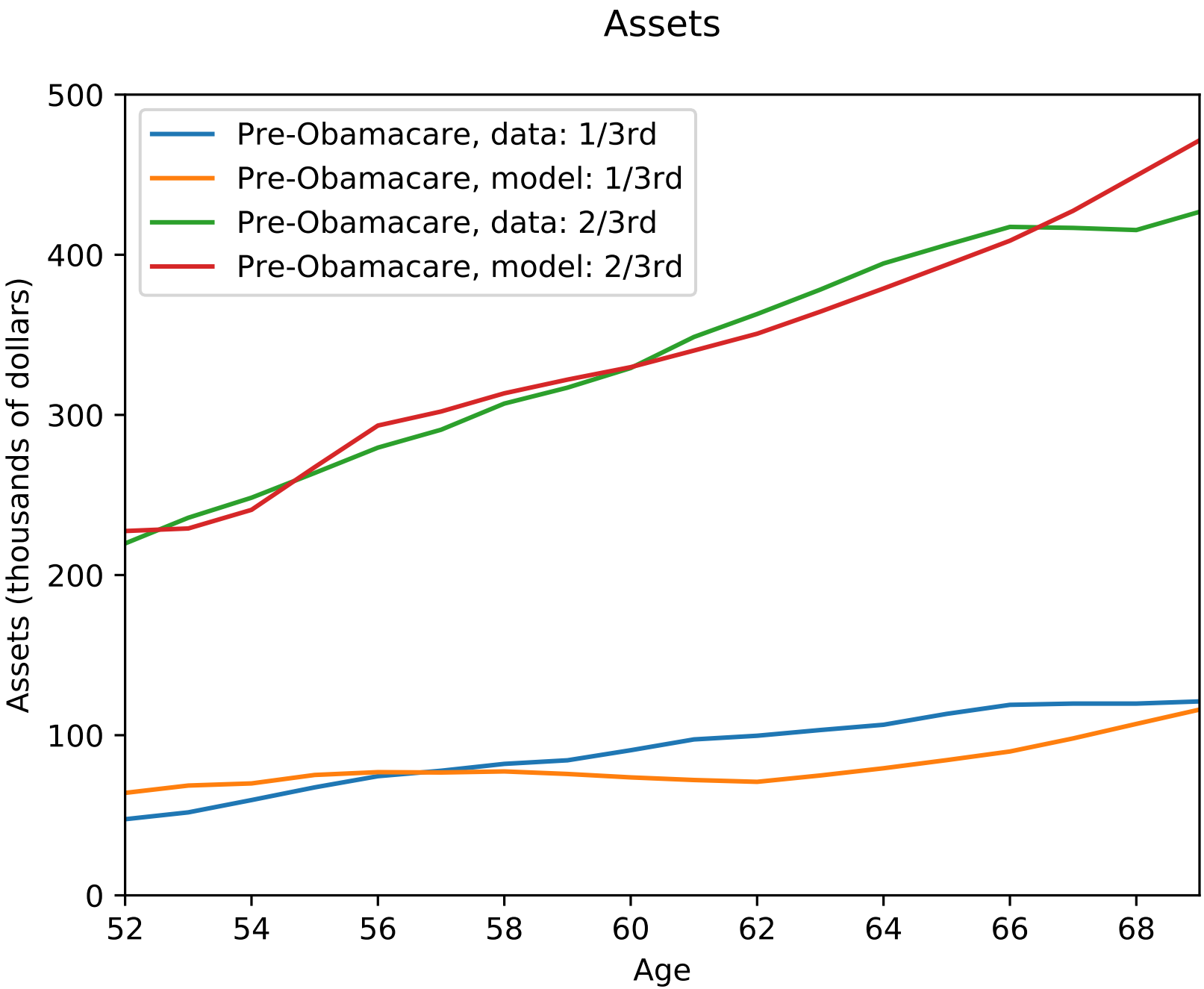
$$L_t = L - N_t - \phi_{Pt} P_t - \phi_{RE} RE_t - \phi_H H_t$$

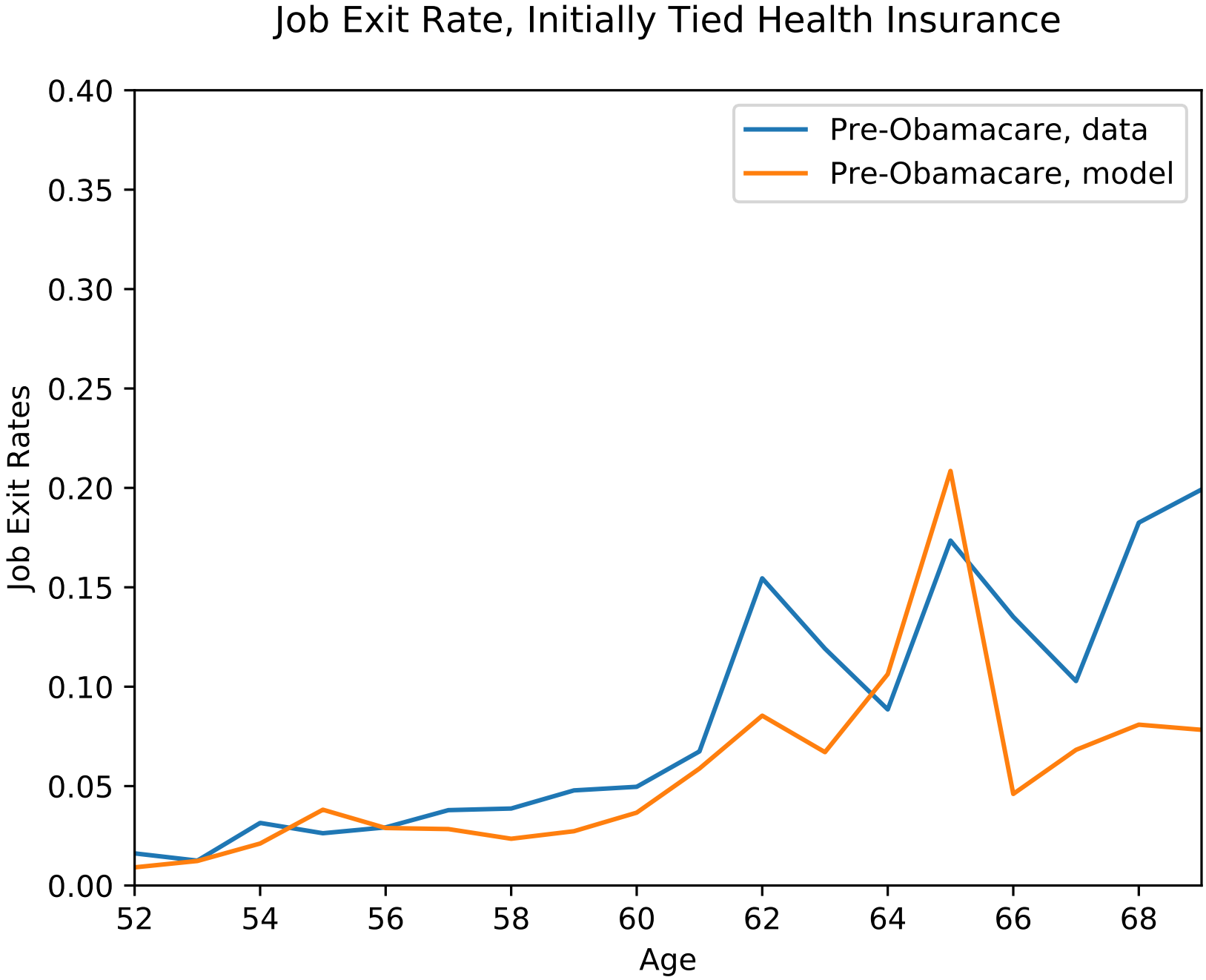
C_t = equivalized consumption, N_t = work hours, $P_t = 1$ if working,

$RE_t = 1$ if working this period, not last period, H_t = health status

		Preference type		
		1	2	3
γ	consumption weight	0.63	0.14	0.83
β	time discount factor	0.92	0.99	0.66
ν	coefficient of RRA		5.4	
L	leisure endowment		3,249	
ϕ_H	leisure cost of bad health		552	
ϕ_{P0}	fixed cost, intercept		514	
ϕ_{P1}	fixed cost, age trend (age-60)		78	
ϕ_{RE}	re-entry cost		156	

- Average Frisch labor supply elasticity, intensive margin: .3
- Labor supply elasticity bigger when including extensive margin
- Average coefficient of relative risk aversion, consumption: 3.4


Assets
Pre-Obamacare, data: 1/3rd
Pre-Obamacare, model: 1/3rd
Pre-Obamacare, data: 2/3rd
Pre-Obamacare, model: 2/3rd
Assets (thousands of dollars)
0
100
200
300
400
500
52
54
56
58
60
62
64
66
68
Age


Job Exit Rate, Initially Tied Health Insurance
Pre-Obamacare, data
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Job Exit Rates
0.00
0.05
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- Insurance policy restrictions
  - Community rating
  - Cap on out-of-pocket expenditures
  - Total medical expenditures $\geq 0.8 \times$ premiums
  - Insurer covers $\geq 70\%$ of expenses (baseline "Silver" policy)

Reforms we model: Privately purchased insurance

- Premium subsidiy
  - for households with income between 100% and 400% of Federal Poverty Level (FPL)
  - upper bound on how much households pay OOP for insurance, rising from 2% of income to 9.5%
  - any premia above the bound covered by government

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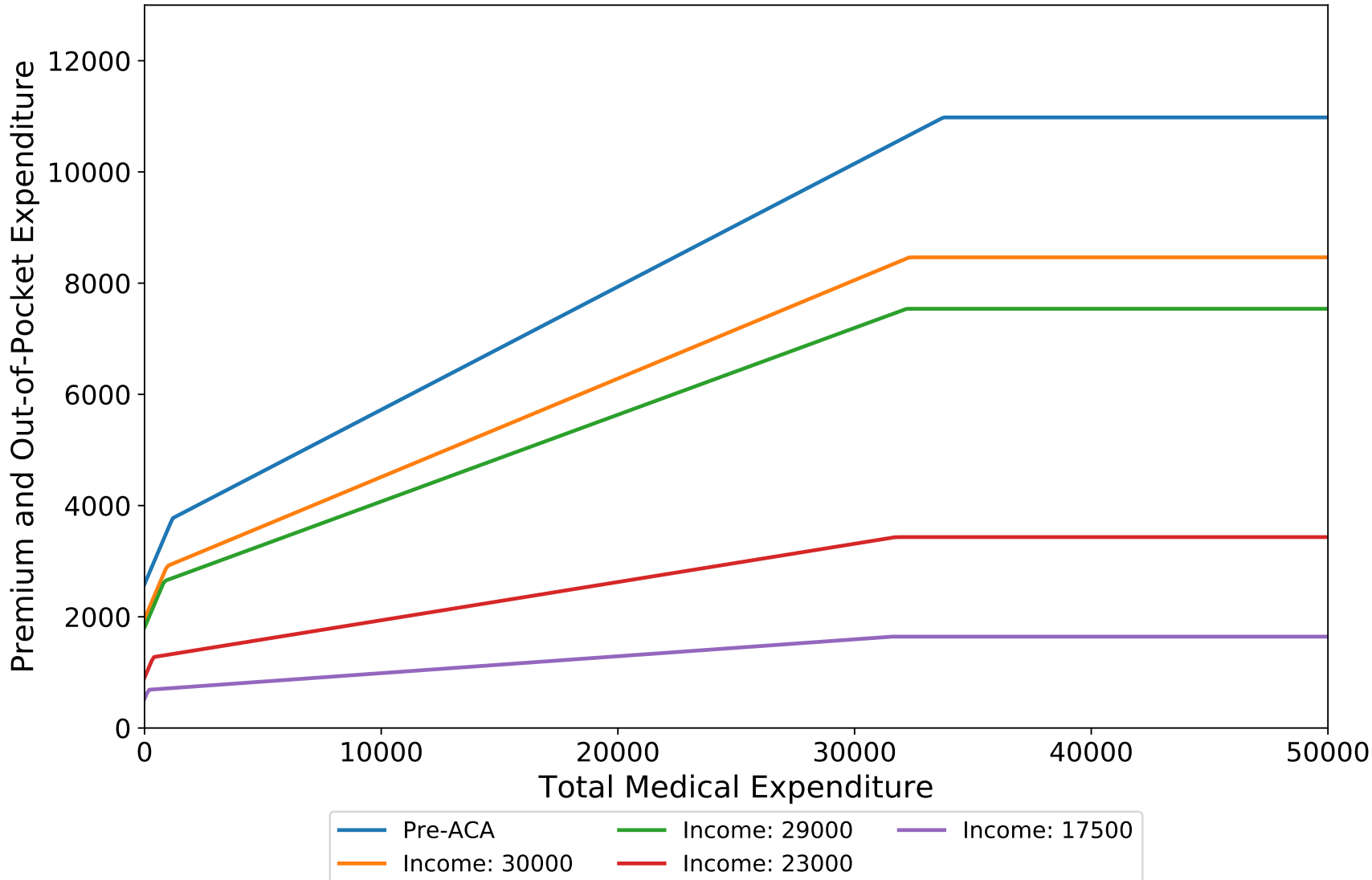
  - any premia above the bound covered by government
- Deductible and co-pay subsidies
  - For households with income $\leq$ 250% of FPL
  - As income falls, subsidies increase via reduced deductibles and co-pays

Effect of the ACA on premia, co-pays, deductibles



Reforms we model: Medicaid

- Pre-ACA
  - Households without dependents qualify for Medicaid only via disability
  - Income and (financial) wealth tests
- Post-ACA
  - Any household with income $\leq$ 138% of FPL qualifies
  - No wealth test
  - More than 30 states participate

Results: Effect of Obamacare

We present the statistics for

- Insurance Coverage
- Assets
- Employment

both

- Before Obamacare
- Year after Obamacare, using post-Obamacare decision rules
- Obamacare is unanticipated (an "MIT shock")

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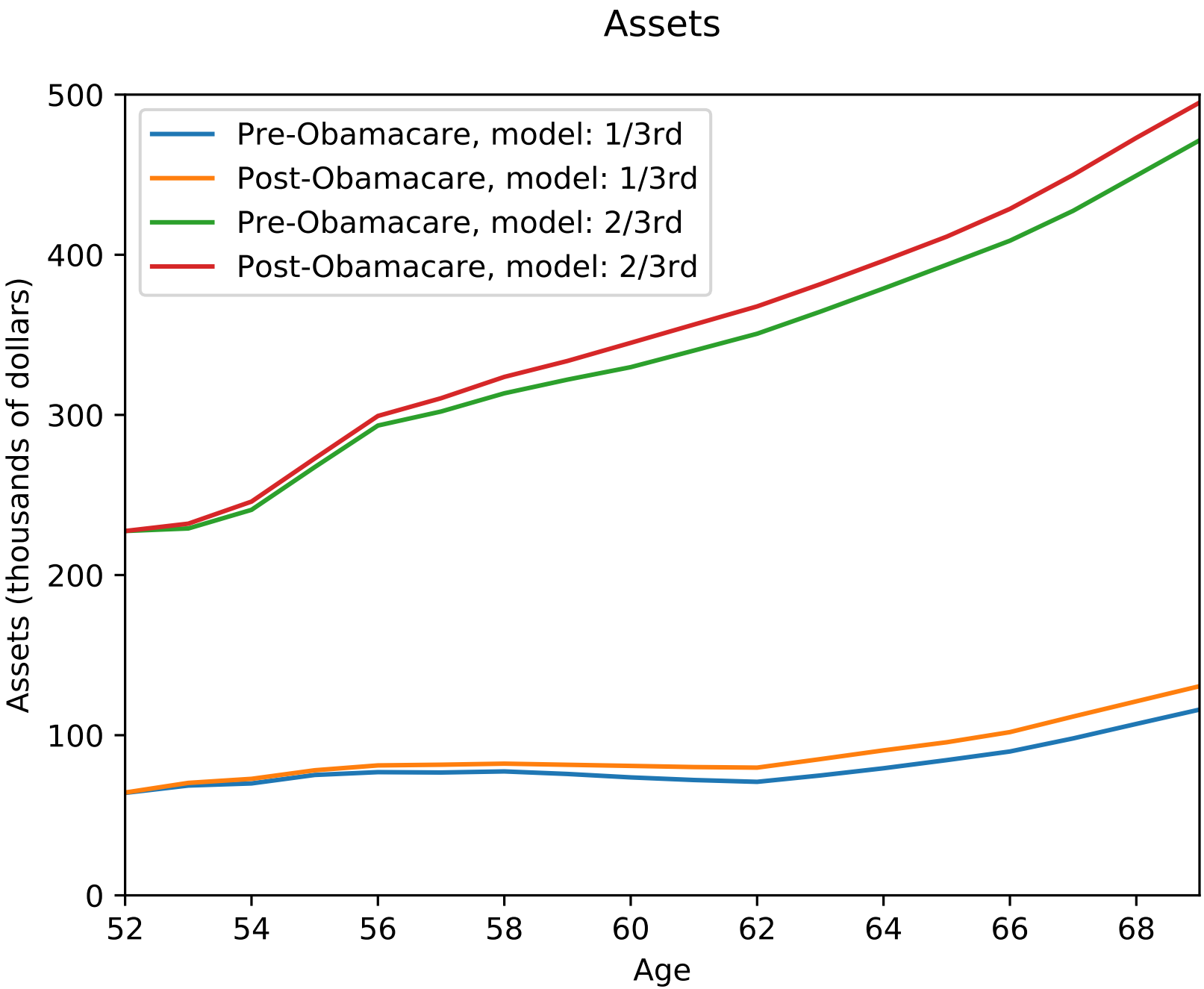
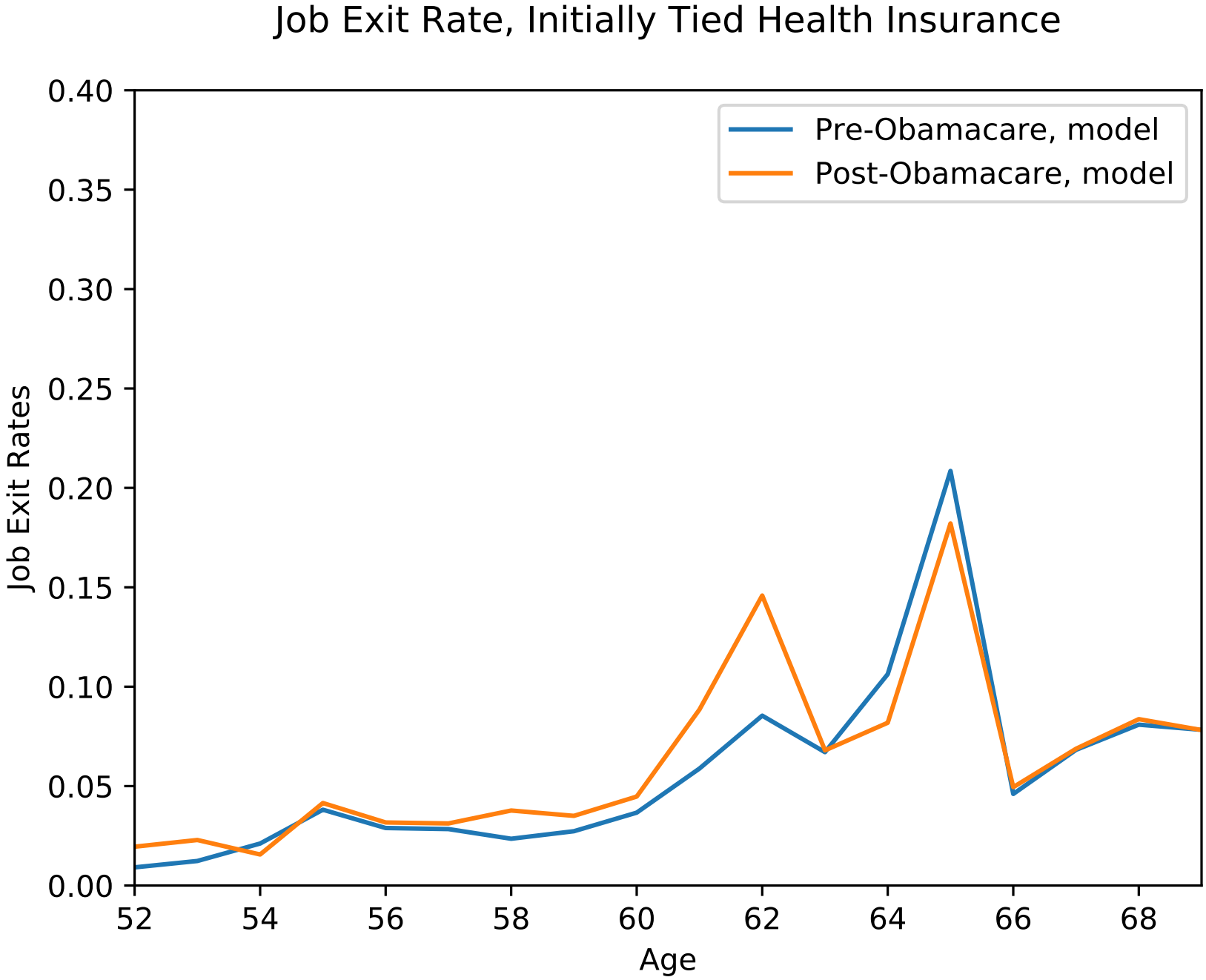
2015	**22**	**9**	**12**	**15**

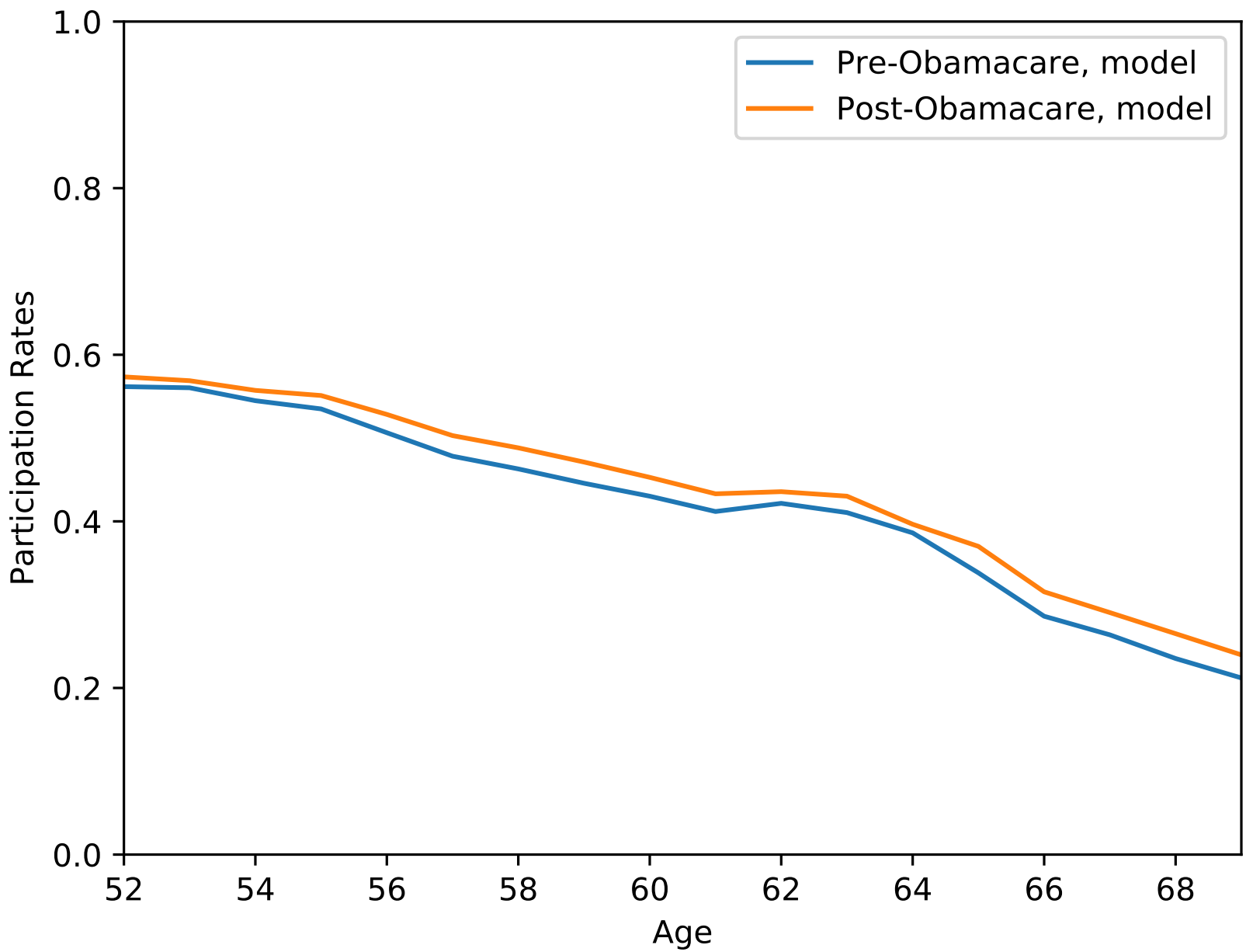
Percent of US population ages 55-64.

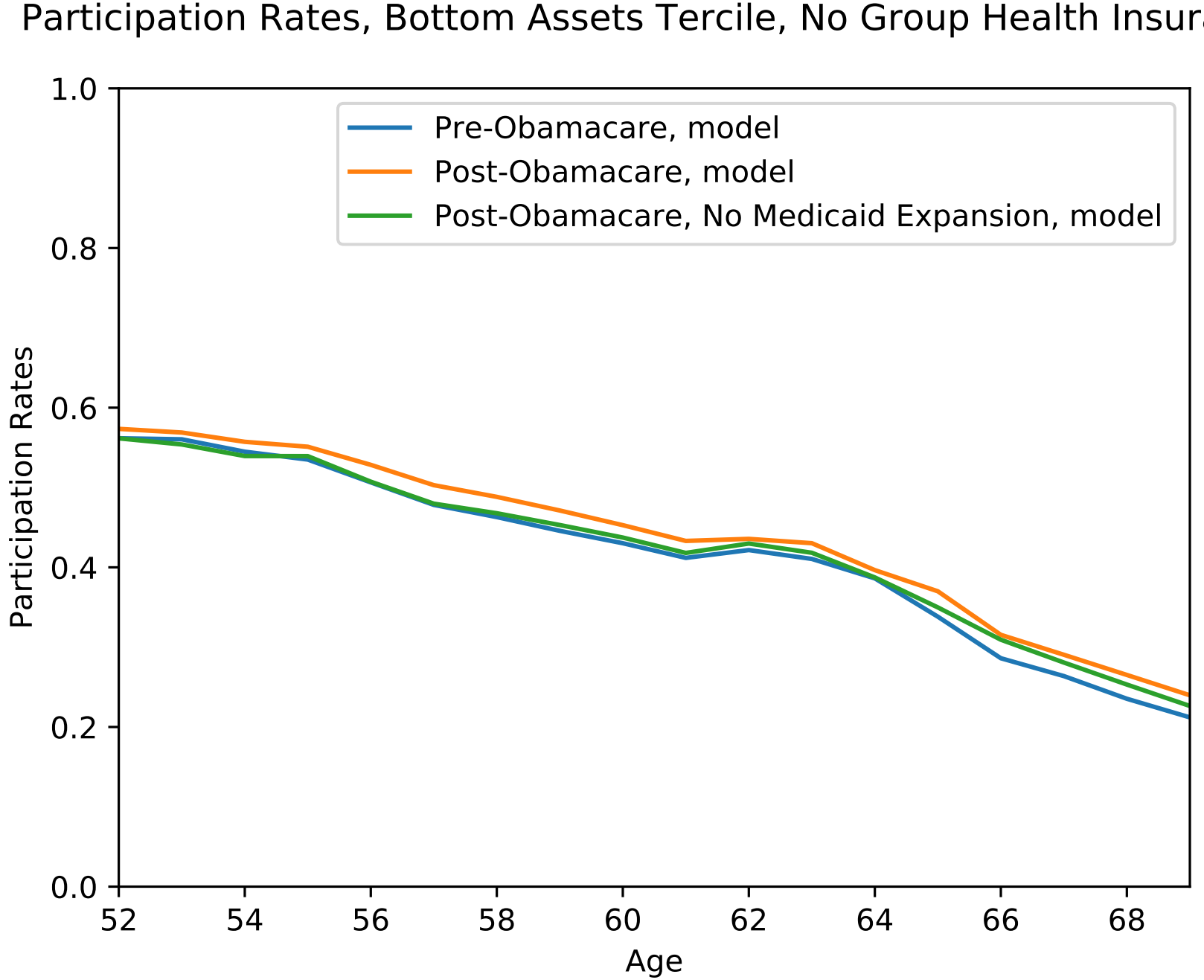

Assets
Pre-Obamacare, model: 1/3rd
Post-Obamacare, model: 1/3rd
Pre-Obamacare, model: 2/3rd
Post-Obamacare, model: 2/3rd
Assets (thousands of dollars)
0
100
200
300
400
500
52
54
56
58
60
62
64
66
68
Age

Employment Rates, 55-64, Model

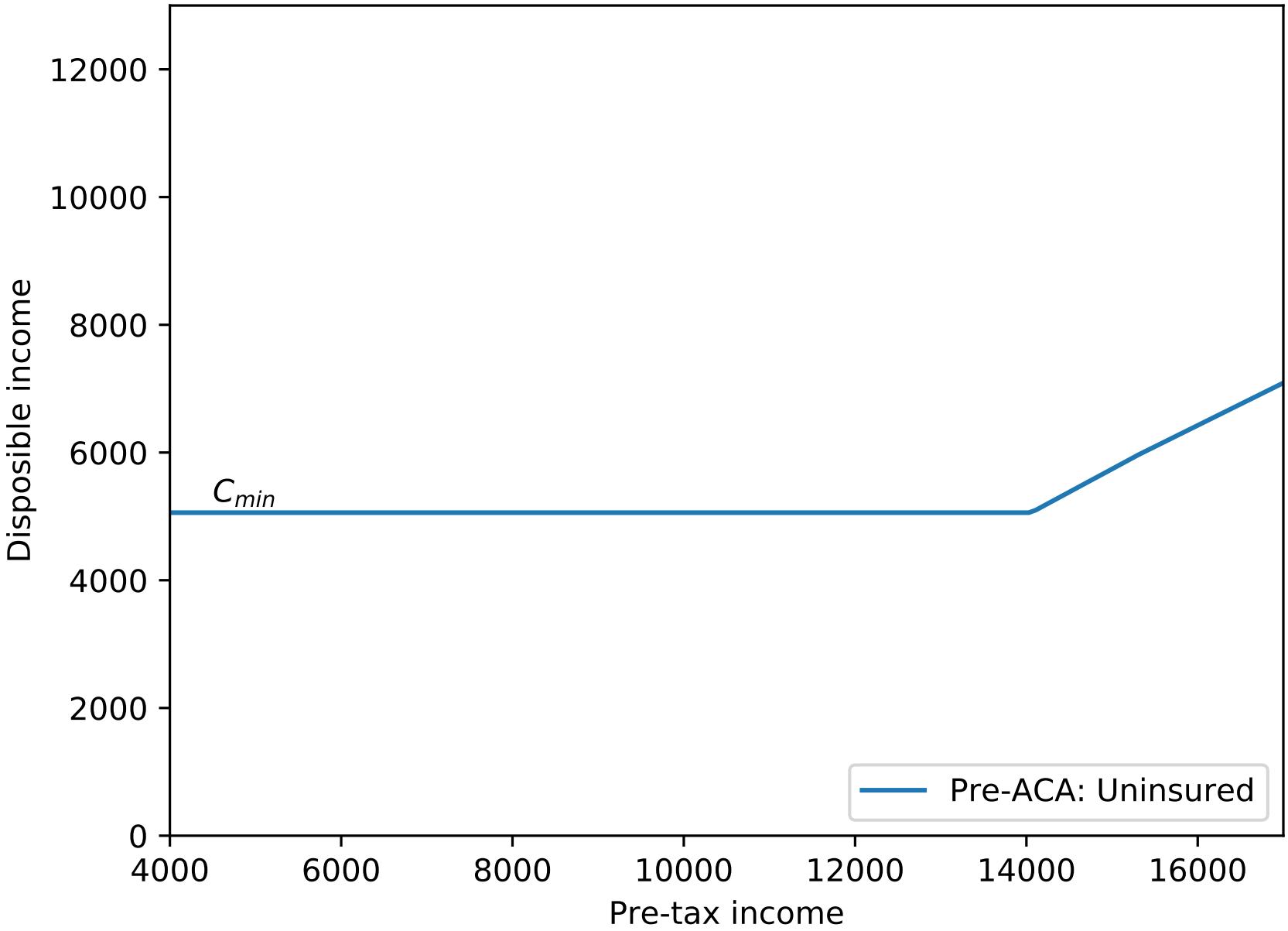
Pre-Obamacare	58.2
Obamacare, with expansion	57.6
Obamacare, without expansion	57.7


Job Exit Rate, Initially Tied Health Insurance
Pre-Obamacare, model
Post-Obamacare, model
Job Exit Rates
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
52
54
56
58
60
62
64
66
68
Age

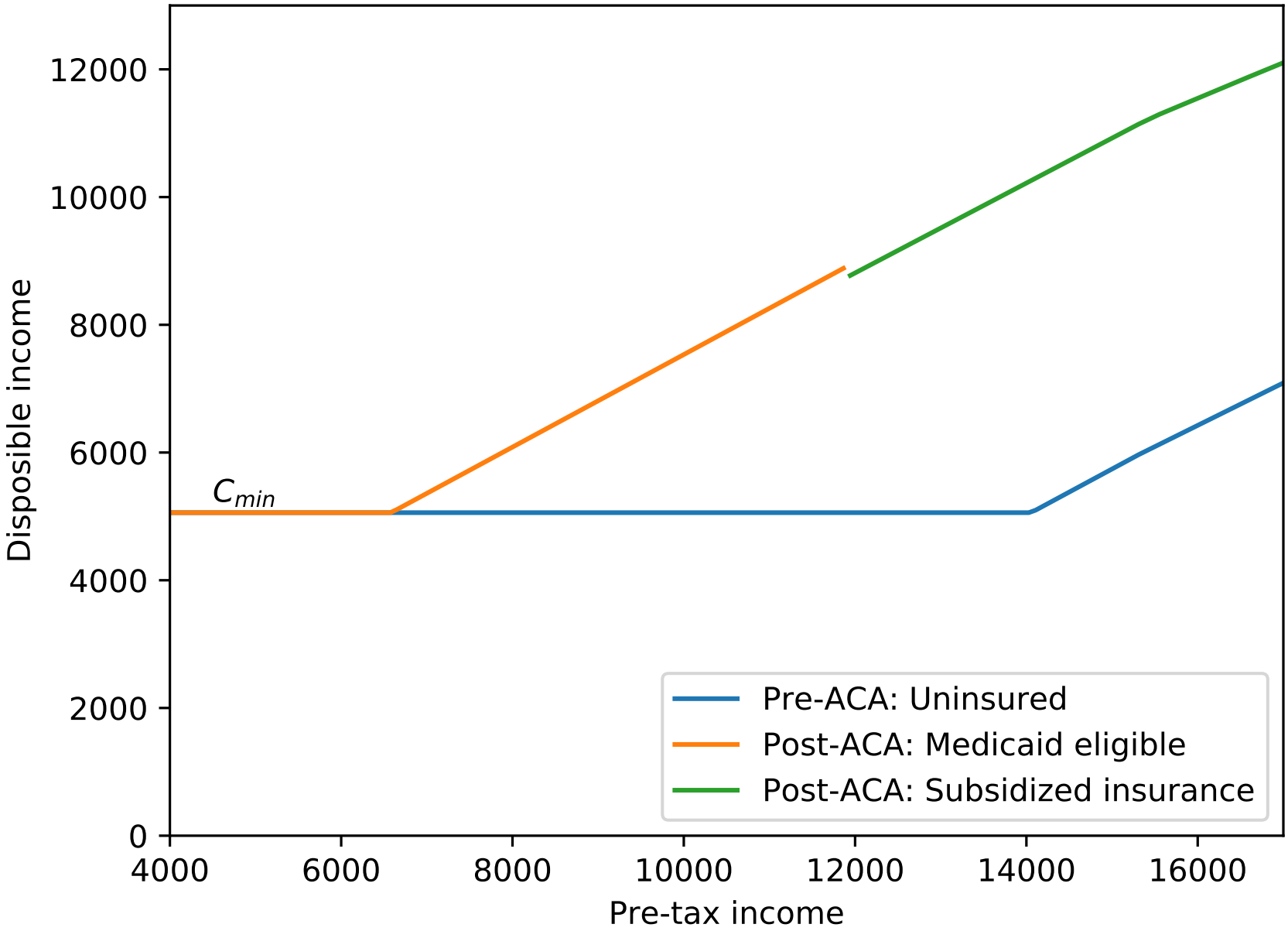

Participation Rates, Bottom Assets Tercile, No Group Health Insurance
Pre-Obamacare, model
Post-Obamacare, model
Participation Rates
1.0
0.8
0.6
0.4
0.2
0.0
52
54
56
58
60
62
64
66
68
Age


Participation Rates, Bottom Assets Tercile, No Group Health Insurance
Pre-Obamacare, model
Post-Obamacare, model
Post-Obamacare, No Medicaid Expansion, model
Participation Rates
1.0
0.8
0.6
0.4
0.2
0.0
52
54
56
58
60
62
64
66
68
Age

Budget Set of Person without EPHI, no assets, $8,000 total medical bills



Budget Set of Person without EPHI, no assets, $8,000 total medical bills



Conclusions

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  - But very heterogeneous effects across the income distribution
- Slightly positive effect of ACA on savings
- Default on medical bills as an alternative "insurance" mechanism key to understand effects

Elasticity of Labor Supply

Solve for (approximate) Frisch leisure elasticity analytically

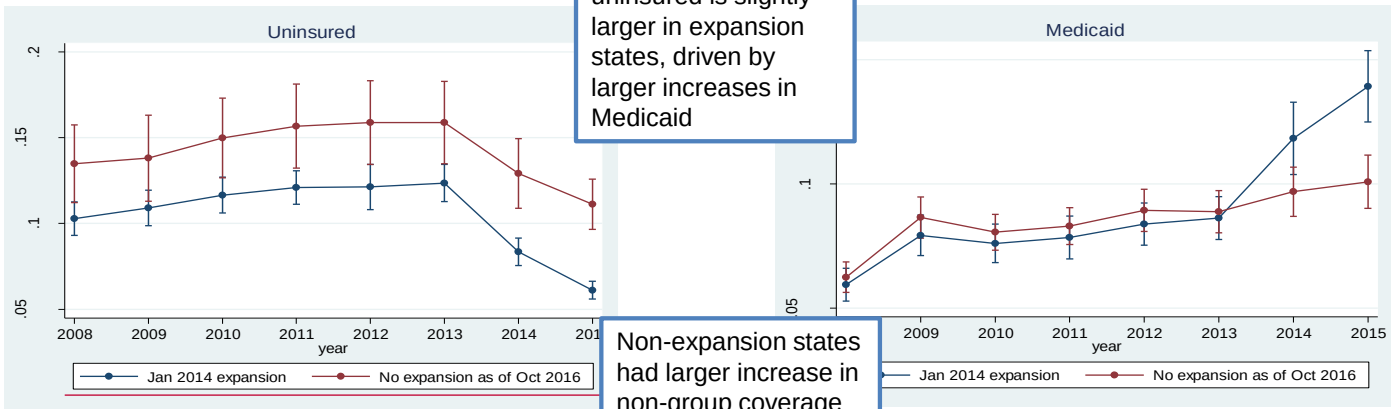
$$IES_l = \frac{\gamma(1-\nu)-1}{\nu}.$$

The Frisch labor supply elasticity is

$$IES_h = -\frac{h_t}{leisure_t} IES_l = -\frac{h_t}{L-h_t}\frac{\gamma(1-\nu)-1}{\nu} \tag{1}$$

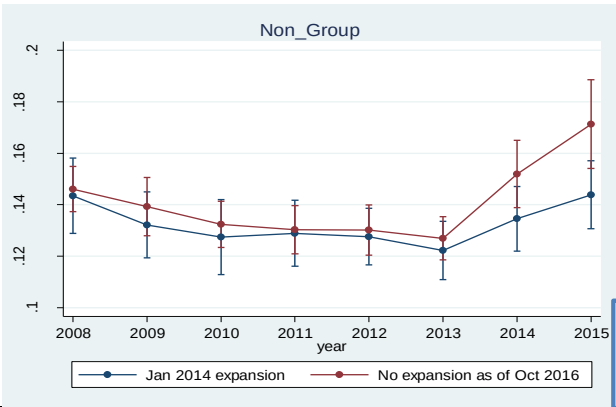
The Medicaid Expansion and Retirement

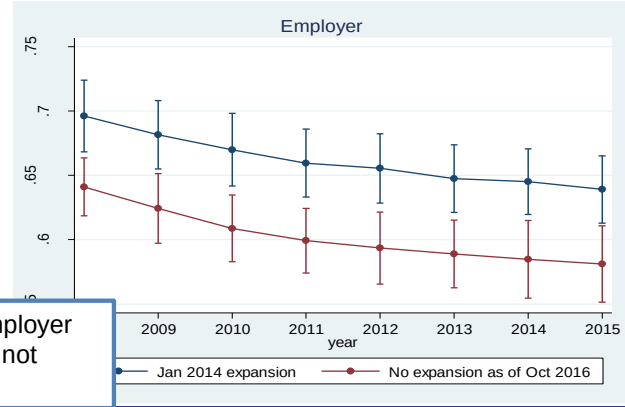
Sources of coverage, Expansion vs. non-expansion states
Individuals ages 55-64, American Community Survey



Significant drop in uninsured is slightly larger in expansion states, driven by larger increases in Medicaid

Non-expansion states had larger increase in non-group coverage





Decline in employer coverage did not change

From Levy, Buchmueller, and Nikpay (2017)

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Health Insurance State Transitions

Health Insurance States and Possibilities

I_{t-1}	$P_{t-1} = 1$	I_t	t	H_t = disabled	cat. needy Y_t, A_t	Payment sources
retiree	.	retiree	< 65	no	.	R
				yes	no	R + MC
			≥ 65	.	no	R + MC
		non-group	< 65	yes	yes	(MC +) MA
			≥ 65	.	yes	MC + MA
tied	yes	tied	< 65	no	.	T
			≥ 65	.	no	T + MC
		non-group	≥ 65	.	yes	MC + MA
	no	non-group	< 65	no	.	{U, P}
				yes	no	MC
					yes	(MC +) MA
			≥ 65	.	no	MC
					yes	MC + MA
non-group	.	non-group	< 65	no	.	{U, P}
				yes	no	MC
					yes	(MC +) MA
			≥ 65	.	no	MC
					yes	MC + MA