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

November 2017
Health Insurance and Labor Supply (pre ACA)

- Majority of U.S. households received health insurance through their employers
  - Low-cost, high-quality group insurance
  - For many, only available when working

- At age 65, everyone became eligible for Medicare
  - Low cost, high-quality group insurance
  - Severed job-insurance link
Health Insurance and Labor Supply (pre ACA)

- Majority of U.S. households received health insurance through their employers
  - Low-cost, high-quality group insurance
  - For many, only available when working
  - 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
Health Insurance and Labor Supply (pre ACA)

- Majority of U.S. households received health insurance through their employers
  - Low-cost, high-quality group insurance
  - For many, only available when working
    ⇒ 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
Health Insurance and Labor Supply (pre ACA)

▶ Previous evidence
  ▶ Rust and Phelan (1997)
  ▶ French and Jones (2011)

▶ Medicare has important effects on retirement
Health Insurance and Labor Supply (pre ACA)

- Previous evidence
  - Rust and Phelan (1997)
  - French and Jones (2011)

- Medicare has important effects on retirement

- People with strong job-insurance link tend to retire at the Medicare eligibility age (65)
The Affordable Care Act (ACA)

- Some key provisions

  1. Community-rated, subsidized private non-group insurance (for low income people)
The Affordable Care Act (ACA)

- Some key provisions

1. Community-rated, subsidized private non-group insurance (for low income people)

2. Medicaid expansion (for very low income people)
The Affordable Care Act (ACA)

- Some key provisions
  1. Community-rated, subsidized private non-group insurance (for low income people)
  2. Medicaid expansion (for very low income people)

- Most important aspects of the law for insurance coverage
  - Initially thought to be important for insurance coverage (CBO)
  - Empirically, no changes in employer-provided coverage
The Affordable Care Act (ACA)

- Some key provisions
  1. Community-rated, subsidized private non-group insurance (for low income people)
  2. Medicaid expansion (for very low income people)

- Most important aspects of the law for insurance coverage
  - Initially thought to be important for insurance coverage (CBO)
  - Empirically, no changes in employer-provided coverage

- Effects
  - Severed job-insurance link
The Affordable Care Act (ACA)

- Some key provisions
  1. Community-rated, subsidized private non-group insurance (for low income people)
  2. Medicaid expansion (for very low income people)

- Most important aspects of the law for insurance coverage
  - Initially thought to be important for insurance coverage (CBO)
  - Empirically, no changes in employer-provided coverage

- Effects
  - Severed job-insurance link
  - Work disincentives through income-based subsidies
Preliminary estimates from the ACA suggests modest employment effects of Medicaid expansions

- Some states expanded Medicaid (mostly 2014), some did not
Preliminary estimates from the ACA suggests modest employment effects of Medicaid expansions

- Some states expanded Medicaid (mostly 2014), some did not
- Several papers compare retirement patterns in states with and without Medicaid expansions
Preliminary estimates from the ACA suggests modest employment effects of Medicaid expansions

- Some states expanded Medicaid (mostly 2014), some did not
- Several papers compare retirement patterns in states with and without Medicaid expansions
- Small estimated effects on labor supply
The Medicaid Expansion and Retirement

Fraction of 50 to 64-year-olds who are retired
Source: Basic monthly CPS, Jan. 2008 through June 2016

From Levy, Buchmueller, and Nikpay (2017)
The Medicaid Expansion and Retirement

Fraction of 50 to 64-year-olds who are retired
Source: Basic monthly CPS, Jan. 2008 through June 2016

We do not see any increase in retirement in January 2014, overall or in states that expanded Medicaid.

From Levy, Buchmueller, and Nikpay (2017)
### Sources of Health Insurance Coverage

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th></th>
<th>Retiree or Tied</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>12</td>
<td>16</td>
<td>65</td>
<td>59</td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td></td>
<td>64</td>
<td>58</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Medicaid</th>
<th></th>
<th>Private non-group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.

From Levy, Buchmueller and Nikpay (2017)
## Sources of Health Insurance Coverage

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th>Retiree or Tied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>2015</td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Medicaid</th>
<th>Private non-group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.

From Levy, Buchmueller and Nikpay (2017)
### Sources of Health Insurance Coverage

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th>Retiree or Tied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td><strong>2013</strong></td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td><strong>2015</strong></td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Medicaid</th>
<th>Private non-group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td><strong>2013</strong></td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.

From Levy, Buchmueller and Nikpay (2017)
## Sources of Health Insurance Coverage

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th>Retiree or Tied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>2015</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Medicaid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2015</td>
<td>14</td>
<td>10</td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.

From Levy, Buchmueller and Nikpay (2017)
Sources of Health Insurance Coverage

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th>Retiree or Tied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>2015</td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Medicaid</th>
<th>Private non-group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2015</td>
<td>14</td>
<td>10</td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.

From Levy, Buchmueller and Nikpay (2017)
It is key to allow for multiple sources of insurance

- Changes in coverage across states very heterogeneous
  - States that did not expand Medicaid coverage had bigger take up of private coverage through exchanges
It is key to allow for multiple sources of insurance

- Changes in coverage across states very heterogeneous
  - States that did not expand Medicaid coverage had bigger take up of private coverage through exchanges

- 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

Uncompensated Care as a percentage of Total Expenses, Registered Community Hospitals

Source: Health Forum, AHA Annual Survey Data.
Our contribution

- We estimate a retirement model that accounts for:
  - medical expense uncertainty
  - the saving decision
  - multiple insurance possibilities (uninsured, private non-group, employer-provided, Medicaid, Medicare, combinations)
  - default on medical bills
Our contribution

▶ We estimate a retirement model that accounts for:
  ▶ medical expense uncertainty
  ▶ the saving decision
  ▶ multiple insurance possibilities (uninsured, private non-group, employer-provided, Medicaid, Medicare, combinations)
  ▶ default on medical bills

▶ Then use the model to predict the effects of the ACA
Our contribution

- We estimate a retirement model that accounts for:
  - medical expense uncertainty
  - the saving decision
  - multiple insurance possibilities (uninsured, private non-group, employer-provided, Medicaid, Medicare, combinations)
  - default on medical bills

- 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.
  - Out-of-pocket medical spending
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.
  - 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.

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

\( \psi_t \) has a permanent and a transitory component
Household total medical spending

Mean Medical Expenses, by Health and Marital Status

MEPS data, estimated using a fixed effects estimator
Household total and out-of-pocket medical spending

<table>
<thead>
<tr>
<th></th>
<th>Younger than 65</th>
<th>65 and Older</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>OOP</td>
</tr>
<tr>
<td>Mean</td>
<td>10,310</td>
<td>1,860</td>
</tr>
<tr>
<td>Median</td>
<td>4,780</td>
<td>1,060</td>
</tr>
<tr>
<td>90\textsuperscript{th} percentile</td>
<td>24,030</td>
<td>4,370</td>
</tr>
<tr>
<td>95\textsuperscript{th} percentile</td>
<td>38,470</td>
<td>6,130</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>State</th>
<th>Choice Set</th>
<th>not disabled, age &lt; 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retiree</td>
<td>Retiree</td>
<td></td>
</tr>
<tr>
<td>Tied</td>
<td>Tied</td>
<td></td>
</tr>
<tr>
<td>Non-Group</td>
<td>Uninsured, Private Non-Group</td>
<td></td>
</tr>
</tbody>
</table>
# Health Insurance States and Possibilities

<table>
<thead>
<tr>
<th>State</th>
<th>Possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retiree</td>
<td>Retiree, Retiree + Medicare</td>
</tr>
<tr>
<td>Tied</td>
<td>Tied, Tied + Medicare</td>
</tr>
<tr>
<td>Non-Group</td>
<td>Uninsured, Private Non-Group, Medicare</td>
</tr>
</tbody>
</table>
# Health Insurance States and Possibilities

<table>
<thead>
<tr>
<th>State</th>
<th>Possibilities</th>
<th>DI recipient or age&lt;65, low income and assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retiree</td>
<td>Retiree,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retiree + Medicare,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicare + Medicaid</td>
<td></td>
</tr>
<tr>
<td>Tied</td>
<td>Tied,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tied + Medicare,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicare + Medicaid</td>
<td></td>
</tr>
<tr>
<td>Non-Group</td>
<td>Uninsured, Private Non-Group,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicare,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicare + Medicaid</td>
<td></td>
</tr>
</tbody>
</table>
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

The graph depicts the premium and out-of-pocket expenditure against the total medical expenditure for different types of health insurance: Private Non-Group, Uninsured, and Retiree. The x-axis represents the total medical expenditure in thousands of dollars, ranging from 0 to 50,000. The y-axis represents the premium and out-of-pocket expenditure in thousands of dollars, ranging from 0 to 12,000.

- **Private Non-Group**: The line shows a steady increase as the total medical expenditure increases.
- **Uninsured**: The line shows a sharp increase at lower expenditure levels, indicating a sudden rise in expenditure as the total medical expenditure increases.
- **Retiree**: The line shows a gradual increase as the total medical expenditure increases, indicating a steady rise in expenditure.

The graph helps visualize how different health insurance types affect the premium and out-of-pocket expenditure at various levels of total medical expenditure.
Budget sets by health insurance type, age < 65
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

- **Utility:** (Equivalized) consumption, work hours, bequests
- **Choice variables:** consumption; work hours; Social Security benefit application; health insurance
Life cycle model

- **Utility:** (Equivalized) consumption, work hours, bequests

- **Choice variables:** consumption; work hours; Social Security benefit application; health insurance

- **Budget:** \( A_{t+1} = A_t + income_t - expenditures_t + transfers_t \)
Life cycle model

- **Utility:** (Equivalized) consumption, work hours, bequests

- **Choice variables:** consumption; work hours; Social Security benefit application; health insurance

- **Budget:** \( A_{t+1} = A_t + \text{income}_t - \text{expenditures}_t + \text{transfers}_t \)
  - \( A_{t+1} \) must be non-negative

\( \text{income}_t \) includes: labor income; asset income; pension benefits; Social Security benefits. Tax structure modeled in detail.

\( \text{expenditures}_t \) includes: consumption; out of pocket medical expenses and insurance premia.

\( \text{transfers}_t \) provide a "consumption floor" (Hubbard, Skinner, and Zeldes, 1995), capturing insurance provided via non-payment of medical expenses.
Life cycle model

- **Utility:** (Equivalized) consumption, work hours, bequests

- **Choice variables:** consumption; work hours; Social Security benefit application; health insurance

- **Budget:** $A_{t+1} = A_t + income_t - expenditures_t + transfers_t$
  - $A_{t+1}$ must be non-negative
  - $income_t$ includes: labor income; asset income; pension benefits; Social Security benefits. Tax structure modeled in detail.
Life cycle model

- **Utility**: (Equivalized) consumption, work hours, bequests

- **Choice variables**: consumption; work hours; Social Security benefit application; health insurance

- **Budget**: $A_{t+1} = A_t + income_t - expenditures_t + transfers_t$
  - $A_{t+1}$ must be non-negative
  - $income_t$ includes: labor income; asset income; pension benefits; Social Security benefits. Tax structure modeled in detail.
  - $expenditures_t$ includes: consumption; out of pocket medical expenses and insurance premia.
Life cycle model

- **Utility:** (Equivalized) consumption, work hours, bequests

- **Choice variables:** consumption; work hours; Social Security benefit application; health insurance

- **Budget:** $A_{t+1} = A_t + income_t - expenditures_t + transfers_t$
  - $A_{t+1}$ must be non-negative
  - $income_t$ includes: labor income; asset income; pension benefits; Social Security benefits. Tax structure modeled in detail.
  - $expenditures_t$ 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

\[ V_t(X_t) = \max_{C_t, N_t, B_t, I_t^+} \left\{ \frac{1}{1 - \nu} \left( C_t L_t^{1-\gamma} \right)^{1-\nu} + \beta(1 - s_{t+1}) \frac{\theta B}{1 - \nu} (A_{t+1} + \kappa)^{\gamma(1-\nu)} \right. \]

\[ + \beta s_{t+1} \int V_{t+1}(X_{t+1}) dF(X_{t+1}\mid X_t, t, C_t, N_t, B_t, I_t^+) \right\} \]

\[ L_t = L - N_t - \phi_{P_t} P_t - \phi_{RE} RE_t - \phi_{H} H_t, \]

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 ∈ \{retiree, tied, none\}
\( B_{t-1} = \) whether already applied for Social Security benefits ∈ \{no, yes\}
\( P_{t-1} = \) whether working last period ∈ \{no, yes\}
\( AIME_t = \) Average Indexed Monthly Earnings

Exogenous State Variables – Stochastic
\( H_t = \) health status ∈ \{disabled, bad, good\}
\( \omega_t = \) persistent wage shock
\( \zeta_{t-1} = \) persistent medical expense shock (realized after time-\( t - 1 \) decisions)
\( \Upsilon_t = \) 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.
  - Step 2: taking as given the estimated first-step parameters, choose preference parameters etc. to match asset, labor supply, insurance data using Method of Simulated Moments

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
Solution and estimation

- Method of Simulated Moments, two steps
  - Step 1: estimate parameters of total medical spending, health, mortality, coinsurance rates, etc.
  - Step 2: taking as given the estimated first-step parameters, choose preference parameters etc. to match asset, labor supply, insurance data using Method of Simulated Moments

- 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
  - Due to physical limits, Moore's law (transistors per die doubling every two years) no longer holds
  - Less incremental demand: Modern CPUs are fast enough for day-to-day applications
Computing on GPUs

- The acceleration of CPU power has slowed down
  - Due to physical limits, Moore's law (transistors per die doubling every two years) no longer holds
  - 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) → 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)
Computing on GPUs

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

- GPU parallelization should occur as late as possible
  - Each processor gets a simple task
  - 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

- GPU programming is not user-friendly
Computing on GPUs

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

- GPU parallelization should occur as late as possible
  - Each processor gets a simple task
  - 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
Computing on GPUs

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

- GPU parallelization should occur as late as possible
  - Each processor gets a simple task
  - 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

- 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

<table>
<thead>
<tr>
<th>Preference type</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \gamma )</td>
<td>0.63</td>
<td>0.14</td>
<td>0.83</td>
</tr>
<tr>
<td>( \beta )</td>
<td>0.92</td>
<td>0.99</td>
<td>0.66</td>
</tr>
<tr>
<td>( \nu )</td>
<td></td>
<td></td>
<td>5.4</td>
</tr>
<tr>
<td>( L )</td>
<td></td>
<td></td>
<td>3,249</td>
</tr>
<tr>
<td>( \phi_H )</td>
<td></td>
<td></td>
<td>552</td>
</tr>
<tr>
<td>( \phi_{P0} )</td>
<td></td>
<td></td>
<td>514</td>
</tr>
<tr>
<td>( \phi_{P1} )</td>
<td></td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>( \phi_{RE} )</td>
<td></td>
<td></td>
<td>156</td>
</tr>
</tbody>
</table>

- 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
Reforms we model: Privately purchased insurance

- **Individual mandate**
  - uninsured individuals pay tax penalty
  - rises to greater of {$695$ per year, 2.5% of income}
Reforms we model: Privately purchased insurance

- Individual mandate
  - uninsured individuals pay tax penalty
  - rises to greater of {$695 \text{ per year, } 2.5\% \text{ of income}$}

- Insurance policy restrictions
  - Community rating
  - Cap on out-of-pocket expenditures
  - Total medical expenditures $\geq 0.8 \times \text{ premiums}$
  - Insurer covers $\geq 70\%$ of expenses (baseline “Silver” policy)
Reforms we model: Privately purchased insurance

- Premium subsidy
  - 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
Reforms we model: Privately purchased insurance

- **Premium subsidy**
  - 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

- **Deductible and co-pay subsidies**
  - For households with income ≤ 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”)
<table>
<thead>
<tr>
<th>Sources of Health Insurance Coverage, Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Uninsured</strong></td>
</tr>
<tr>
<td>Expansion</td>
</tr>
<tr>
<td>2013</td>
</tr>
<tr>
<td>2015</td>
</tr>
</tbody>
</table>

| **Medicaid** | **Private non-group** |
| Expansion | Non-expansion | Expansion | Non-expansion |
| 2013 | 8 | 8 | 7 | 7 |

Percent of US population ages 55-64.
## Sources of Health Insurance Coverage, Model

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th></th>
<th>Retiree or Tied</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>24</td>
<td>24</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>2015</td>
<td>9</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td></td>
<td></td>
<td>Private non-group</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.
## Sources of Health Insurance Coverage, Model

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th>Retiree or Tied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>2015</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td><strong>Medicaid</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.
### Sources of Health Insurance Coverage, Model

<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th></th>
<th>Retiree or Tied</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>24</td>
<td>24</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>2015</td>
<td>9</td>
<td>18</td>
<td>57</td>
<td>59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Medicaid</th>
<th></th>
<th>Private non-group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>2015</td>
<td>22</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent of US population ages 55-64.
<table>
<thead>
<tr>
<th></th>
<th>Uninsured</th>
<th></th>
<th>Retiree or Tied</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>24</td>
<td>24</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>2015</td>
<td>9</td>
<td>18</td>
<td>57</td>
<td>59</td>
</tr>
<tr>
<td><strong>Medicaid</strong></td>
<td></td>
<td></td>
<td><strong>Private non-group</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expansion</td>
<td>Non-expansion</td>
<td>Expansion</td>
<td>Non-expansion</td>
</tr>
<tr>
<td>2013</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>2015</td>
<td>22</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
</tbody>
</table>

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
## Employment Rates, 55-64, Model

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Obamacare</td>
<td>58.2</td>
</tr>
<tr>
<td>Obamacare, with expansion</td>
<td>57.6</td>
</tr>
<tr>
<td>Obamacare, without expansion</td>
<td>57.7</td>
</tr>
</tbody>
</table>
Participation Rates, Bottom Assets Tercile, No Group Health Insurance

Pre-Obamacare, model
Post-Obamacare, model

- **Pre-Obamacare, model**
- **Post-Obamacare, model**
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

- Pre-ACA: Uninsured
- Post-ACA: Medicaid eligible
- Post-ACA: Subsidized insurance

![Graph showing disposable income vs. pre-tax income with three lines representing different insurance statuses.]
Conclusions

- Strong effects of ACA on insurance choice
Conclusions

- Strong effects of ACA on insurance choice
- Modest effects of ACA on employment
Conclusions

▶ Strong effects of ACA on insurance choice

▶ Modest effects of ACA on employment
  ▶ 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
Conclusions

- Strong effects of ACA on insurance choice
- Modest effects of ACA on employment
  - But very heterogeneous effects across the income distribution
- Slightly positive effect of ACA on savings
Conclusions

▶ Strong effects of ACA on insurance choice

▶ Modest effects of ACA on employment
  ▶ 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

\[ IES_h = -\frac{h_t}{\text{leisure}_t} IES_l = -\frac{h_t}{L - h_t} \frac{\gamma(1 - \nu) - 1}{\nu} \quad (1) \]
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)
### Health Insurance State Transitions

<table>
<thead>
<tr>
<th>$l_{t-1}$</th>
<th>$P_{t-1} = 1$</th>
<th>$l_t$</th>
<th>$t$</th>
<th>$H_t = \text{disabled}$</th>
<th>cat. needy $Y_t, A_t$</th>
<th>Payment sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>retiree</td>
<td>.</td>
<td>retiree</td>
<td>$&lt; 65$</td>
<td>no</td>
<td>.</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
<td>no</td>
<td>$R + MC$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\geq 65$</td>
<td>no</td>
<td>$R + MC$</td>
</tr>
<tr>
<td>non-group</td>
<td>$&lt; 65$</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>(MC +) MA</td>
<td>$MC + MA$</td>
</tr>
<tr>
<td></td>
<td>$\geq 65$</td>
<td>.</td>
<td>yes</td>
<td>yes</td>
<td>$MC + MA$</td>
<td>$MC + MA$</td>
</tr>
<tr>
<td>tied</td>
<td>yes</td>
<td>tied</td>
<td>$&lt; 65$</td>
<td>no</td>
<td>.</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
<td>no</td>
<td>$T + MC$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\geq 65$</td>
<td>.</td>
<td>yes</td>
<td>$MC + MA$</td>
<td>$MC + MA$</td>
</tr>
<tr>
<td>no</td>
<td>non-group</td>
<td>$\geq 65$</td>
<td>.</td>
<td>yes</td>
<td>yes</td>
<td>(MC +) MA</td>
</tr>
<tr>
<td></td>
<td>non-group</td>
<td>$&lt; 65$</td>
<td>no</td>
<td>.</td>
<td>yes</td>
<td>(MC +) MA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\geq 65$</td>
<td>.</td>
<td>no</td>
<td>$MC$</td>
<td>$MC + MA$</td>
</tr>
<tr>
<td>non-group</td>
<td>.</td>
<td>non-group</td>
<td>$&lt; 65$</td>
<td>no</td>
<td>.</td>
<td>${U, P}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
<td>no</td>
<td>$MC$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\geq 65$</td>
<td>yes</td>
<td>(MC +) MA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\geq 65$</td>
<td>no</td>
<td>$MC$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\geq 65$</td>
<td>yes</td>
<td>$MC + MA$</td>
</tr>
</tbody>
</table>