Local Market Equilibrium and the Design of the Public Health Insurance System\textsuperscript{*}\textsuperscript{†}

Naoki Aizawa and Chao Fu
University of Wisconsin
March 4, 2018

Abstract

We study the design of the public health insurance system and its impacts on the labor market and the health insurance market in an equilibrium setting with rich heterogeneities across local markets, workers and firms. We estimate the model exploiting variations across states and policy environments before and after the Affordable Care Act. The estimated model closely matches the distribution of insurance and employment status before and after the ACA. In counterfactual experiments, we study the impacts of the proposed Medicaid work requirement and block granting, which allow for state-specific Medicaid eligibility and coverage rules. Specifically, we evaluate their impacts on employment, adverse selection and premiums in private health insurance markets and the distribution of welfare.

\textsuperscript{*}We thank Shoya Ishimaru for excellent research assistant. We thank Mariacristina DeNardi, Eric French, Martin Hackmann, Tom Holmes, Jeremy Lise, Lee Lockwood, Matthew Notowidigdo, Amil Petrin, Chris Taber, and participants of many seminar/conferences for helpful comments.

\textsuperscript{†}Preliminary and Incomplete. All comments are welcome. Please do not circulate without authors' permission.
1 Introduction

Re-designing the public health insurance system has been one of the most debated policy issues under the Trump administration. Various policies proposals so far involve major changes to the 2010 Affordable Care Act (ACA). For example, from January 2018, each state government is allowed to impose work requirements on non-elderly individuals in order to be eligible for Medicaid. Moreover, there has been continuous discussions since the proposed American Health Care Act (AHCA) to introduce Medicaid “block granting,” which would cap federal spending on Medicaid in the form of lump sum transfers to each state and leave each state in charge of its own Medicaid eligibility and coverage rules. These policies could affect not only the current 75 million Medicaid beneficiaries, especially the millions made eligible by the ACA Medicaid expansion, but also the rest of the economy via their equilibrium impacts on the labor market and the insurance market. This paper aims at examining the potential impacts of such policies and providing information necessary for the optimal design of the public health insurance system.

To achieve this goal, one has to account for several complications. First, policies interact with one another; and an informative study of a policy should put it in the context with other related policies. For example, policies driving the recent increase in Medicaid enrollment include not only the expansion of Medicaid but also components like the individual mandate. Understanding how different policy components jointly increased Medicaid enrollment provides the basis for predicting counterfactual enrollment patterns should one or more of these components be changed. Second, impacts of public health insurance policies can be highly heterogeneous across individuals, firms and local markets. Understanding the distribution of policy impacts, rather than merely the average impact, allows one to evaluate existing and/or counterfactual policies based on various criteria, such as efficiency and equity. Third, health insurance policies, even if targeted at a sub-population, can lead to major equilibrium impacts. For example, Medicaid work requirement directly affects the labor supply decisions of low-income households, which may in turn affect labor market wages, and hence the labor market equilibrium. In addition, it may affect the risk pool on the private insurance market through self-selection into and out of the Medicaid-eligible group by individuals based on their health status and skill levels.

We develop an equilibrium model that takes into account the complications mentioned above. In the model, each local (state) market consists of a competitive labor market and a competitive private health insurance market. Markets are subject to sets of policies including

---

1 According to the Department of Health & Human Services, between 2013 and 2015, Medicaid enrollment increased by 10.3 million or 17.6%, mostly (9.1 million) among enrollees made eligible by the ACA medicaid expansion. Meanwhile, government expenditure on Medicaid also increased by 21% to a total of $554.3 billion.
various health-insurance-related regulations, which may vary across states and policy eras. Each state consists of heterogeneous firms and households, the distribution of which may differ across states. Households differ in their demographics, unobservable skill levels and tastes. A household chooses, for each adult member, among the options of full-time jobs with and without ESHI, part-time jobs with and without ESHI, and non-employment. It also makes decisions on Medicaid enrollment (if eligible) and private health insurance purchases. Firms differ in their productivity and the substitutability between different types of labor inputs. A firm chooses the number of workers to hire from each (skill, full/part time) category and whether or not to offer ESHI. Wages are determined competitively on the labor market. The insurance market is subject to the adverse selection problem, the severity of which may vary with public insurance policies, such as Medicaid eligibility rules. In equilibrium, health insurance premium satisfies the zero profit condition.

To estimate such a model, which allows for unobserved heterogeneity across households, firms and states, one needs data with rich variations. We utilize the opportunity provided by ACA and estimate the model using indirect inference, where we exploit ACA’s comprehensive design of various policy components, differential implementation across states, and significant impacts across the nation. In particular, ACA created rich variation in policy environments across time by introducing five major changes to the public health insurance system, i.e., imposing individual mandates and employer mandates, creating health insurance exchanges (HIX), subsidizing HIX premium and out-of-pocket expenses, and expanding Medicaid. Several components of the ACA are targeted at sub-groups of households and firms, creating variation in policy doses received by players within the same market. In addition, Medicaid expansion was implemented in some but not all states, leading to further policy variation across states within the same era.

Our data come from four major sources: the American Community Survey, the Current Population Survey, Medical Expenditure Panel Survey (MEPS), and the Kaiser Family Employer Health Insurance Benefit Survey (Kaiser). The first three are individual-level data sets on labor market (employment status, job status, wage), health, health insurance, and medical expenditure, while the fourth is a cross-sectional firm-level data set containing information about firms’ characteristics, health insurance coverage and states they belong to. For the purpose of model validation, we deliberately leave the post-ACA data for a non-random sample of states out of the estimation. The estimated model well matches the patterns in the data, including the hold-out sample, across demographic groups and states before and after the ACA.

Using the estimated model, we first examine how various health care policy components interact and affect the equilibrium, through the lens of ACA. We investigate the contribution of
each of the five major ACA components in generating the total ACA impact on the distribution
of market outcomes and the distribution of household welfare. Second, we study the impacts
of various designs of Medicaid, including the rules under ACA, Medicaid work requirement and
the proposed block granting. Our preliminary results suggest that the uninsured rate in states
that did not expand Medicaid would have been substantially decreased if Medicaid had been
expanded, mainly via a surge in Medicaid enrollment that would have been more significant
than that in expansion states. To study the impact of Medicaid work requirements, we impose
that individuals be employed in order to be eligible for Medicaid in addition to other existing
conditions (results to be updated).

Our paper contributes to two strands of the literature on the link between health insurance
systems and labor markets, one relying on experiments or quasi-experiments and the other on
structural models. One subset of the first strand of literature studies health care policies using
random experiments; for example, Finkelstein, Taubman, Wright, Bernstein, Gruber, New-
house, Allen, Baicker, and the Oregon Health Study Group (2012) and Baicker, Finkelstein,
Song, and Taubman (2013) on the impact of Medicaid on health and labor supply using the
Oregon Medicaid experiment. A second and larger subset of the first strand of literature often
utilizes policy variations via a difference in differences (DD) approach to study the impact of
health reforms. For example, Kolstad and Kowalski (2010) and Kolstad and Kowalski (2012)
on the Massachusetts health care reform, Garthwaite, Gross, and Notowidigdo (2013) on the Ten-
nessee Medicaid reform, and Kaestner, Garrett, Gangopadhyaya, and Fleming (2015), Gooptu,
Moriya, Simon, and Sommers (2016) and Leung and Mas (2016) on the early impact of the
ACA. In particular, the last three papers utilize the same policy variation as we do in this paper,
i.e., the cross-state variation in Medicaid expansion policies under the ACA. They find that
Medicaid expansion lowers the uninsured rate but has insignificant impacts on labor market
outcomes. Frean, Gruber, and Sommers (2016) employ a difference-in-difference-in-difference
estimation strategy that relies on variation across income groups, areas, and years to study the
ACA impacts on insurance coverage. In particular, they assess the relative contributions to in-
surance changes of the subsidized premiums for Marketplace coverage, the individual mandate,
and the expanded Medicaid eligibility.

The second strand of literature takes a structural approach. Using a microeconomic ap-
the existence of health insurance markets into labor search models. More recently, French,

\footnote{2See Currie and Madrian (1999) and Gruber (2000) for reviews of earlier work in this literature.}

\footnote{3We restrict our review to studies on the ACA. See Dey and Flinn (2005) for an example of earlier structural
papers in this literature, who estimate a search model with endogeneous ESHI to evaluate the extent to which
ESHI reduces job mobility and efficiency.}
Jones, and von Gaudecker (2017) estimate a life-cycle model of labor supply and consumption to evaluate the impact of the ACA on retirement, saving, and welfare. These studies estimate the models using pre-ACA data and then evaluate the potential impact of the ACA through counterfactual experiments.¹ Hackmann, Kolstad, and Kowalski (2014), Handel, Hendel, and Whinston (2015), and Tebaldi (2016) estimate equilibrium models of HIX. Other examples that use a calibration approach to study macroeconomic impacts of the ACA include Ozkan (2011), Cole, Kim, and Krueger (2012), Hansen, Hsu, and Lee (2012), Pashchenko and Pappakarm (2013) and Nakajima and Tuzemen (2015). Our paper well complements these earlier papers. First, by exploiting policy variations across states before and after ACA, we are able to study counterfactual policies with relatively less dependence on model structures.⁵ Second, designed to study the distribution of policy impacts and to provide information on the design of state-specific health care policies, our model incorporates rich heterogeneity across local markets, labor supply decisions at both the extensive and the intensive margins by heterogeneous households, and choices of heterogeneous labor inputs by firms with different production technologies.

This paper is also related to the large literature assessing the impact of government-provided in-kind benefits, in particular, the impact on labor supply decisions of work requirement imposed on welfare recipients (e.g., Keane and Moffitt (1998), Chan (2013) and Low, Meghir, Pistaferri, and Voena (2018)). We complement these studies by considering the equilibrium impacts of such policies on both health insurance and labor markets.

2 Background Information

2.1 ACA

We study the interaction of various health policy components via the lens of the Affordable Care Act, which consists mainly of five components. First, all individuals are required to have health insurance or pay a penalty (individual mandate); second, all firms with more than 50 full time employees are required to offer health insurance or pay a penalty (employer mandate); third, state-based health insurance exchanges (HIX) are established where individuals can purchase health insurance at a modified community-rated premium; fourth, the individuals purchasing health insurance from HIX can obtain income-based subsidies; fifth, free public

¹Pohl (2012) models geographical heterogeneity of the pre-ACA Medicaid in a static single agent labor supply model.

⁵One exception is Kowalski (2014), who uses variations before and after ACA in regulations on individual health insurance markets to study inefficiency in individual health insurance markets.
insurance through Medicaid is available if income is low enough. We provide more details of each component below.

**Individual Mandate** From 2014, individuals are required to be covered by a health insurance plan which meets minimum standards or pay a tax penalty.\(^6\) The amount of tax penalty depends on household income and household size. The penalty is scheduled to increase between 2014 and 2016: in 2016, the penalty will be the greater of (a) 2.5% of household income in excess of the 2015 income tax filing thresholds and (b) $695 per adult plus $347.50 per child, up to a maximum of $2,085 for the family.\(^7\)

**Employer Mandate** From 2015, every employers with more than 50 full-time-equivalent employees are required to provide a health insurance plan meeting minimum standards to those full time employees and their dependent children or to pay a tax penalty. The full time equivalent employee is defined as an employee working on averages at least 30 hours per week. Tax penalty is $2,000 (indexed for future years) for each full-time employee, with the first 30 employees excluded from the calculation.\(^8\)

**Health Insurance Exchanges** The state-based health insurance exchanges (HIX), or simply marketplace, are established since 2014. In each marketplace, an individual can purchase a health insurance plan from insurers only in his/her state. The design of health insurance plans are government-regulated and categorized into four plans with different levels of generosity: bronze, silver, gold, and platinum. Importantly, insurers need to offer the same plan to every consumer and insurance premium per individual is subject to modified community rating: premium can vary only based on age and smoking status, with the degree of variations set by the government.\(^9\)

**Income-Based Subsidies for Plans from HIX** Individuals may obtain both premium and coinsurance subsidies from the government if they purchase health insurance from HIX. Individuals are eligible for the subsidies if (1) they are unable to get affordable coverage through

---

\(^6\) Individual mandate will be abolished from 2019 due to the recent tax reform enacted in December 2017.

\(^7\) In 2014, it is the maximum of (a) 1% of household income; (b) $95 per adult, up to the maximum $695. More detailed can be found, for example, http://files.kff.org/attachment/issue-brief-the-cost-of-the-individual-mandate-penalty-for-the-remaining-uninsured

\(^8\) The more detail be can found: https://www.irs.gov/Affordable-Care-Act/Employers/Employer-Shared-Responsibility-Provisions

\(^9\) The regulations are set by the federal government, based on which state governments can set further restrictions. For example, the maximum premium ratio between the youngest and the oldest cannot exceed more than a factor of 3.
an eligible employer plan that provides the minimum value;\textsuperscript{10} (2) they are not eligible for any other government health insurance program (e.g., Medicaid); (3) their household income is below 400\% of Federal Poverty Line (FPL). The amount of subsidies varies by income, family size and states. In general, individuals and families whose household income for the year is between 100\% and 400\% of FPL for their family size may be eligible for the premium tax credit, and the subsidies decrease with income. If the household income is around 100\% of the FPL, subsidies are designed such that the maximum premium contribution of the household is equal to 2\% of household income; If the income is around 400\% of the FPL, it is 9\% of the household income.\textsuperscript{11} In addition, individuals purchasing the silver plan can obtain income-based tax credit, which serves as cost-sharing subsidies.

\textbf{Medicaid} \hspace{1em} The ACA specifies that Medicaid should expand to cover uninsured individuals with household income below 133\% of FPL. However, it is \textit{not} a legal requirement that states shall expand Medicaid. In 2015, 32 states (including Washington DC) expanded Medicaid to cover the sub-population as ACA specifies. In particular, most states in the northeast expanded Medicaid, while half of the states in the south did not expand Medicaid. Importantly, the eligibility and generosity of Medicaid under the ACA are specified by the federal government, which must be uniform across states.

\section*{2.2 Major Policy Proposals Post ACA}

\subsection*{2.2.1 Medicaid Work Requirement}

In January 2018, the Center for Medicare and Medicaid Services (CMS) issued a State Medicaid Director Letter providing new guidance that would impose work requirement as a new eligibility condition for Medicaid. Under this requirement, working-age individuals, with exemptions for the disabled or medically frail, shall verify their labor market activities such as employment, job search, or participation in job training programs, for a certain number of hours per week in order to receive Medicaid coverage. Each state eventually has the flexibility to set the specifics of requirement (e.g., number of working hours), subject to the approval from the CMS.\textsuperscript{12}

\begin{itemize}
\item \textsuperscript{10}ESHI plan is affordable if the annual premium for self-only coverage does not exceed 9.5\% of household income.
\item \textsuperscript{11}If states offer Medicaid to individuals whose income below 133\%, then they are not eligible to those subsidies. See additional details about premium subsidies, e.g., :https://www.irs.gov/Affordable-Care-Act/Individuals-and-Families/Questions-and-Answers-on-the-Premium-Tax-Credit
\item \textsuperscript{12}As of March 2018, the CMS has approved a work requirement waiver in Kentucky and nine other states that have submitted proposals to CMS.
\end{itemize}
2.2.2 AHCA

Among policy proposals aimed at replacing the ACA, AHCA is a major example. The following table summarizes the main differences between ACA and the proposed AHCA. Take Medicaid for example, under ACA, the federal government shall set Medicaid’s eligibility rules that are common among complying states, and match funding to states based on the number of enrollees. Under AHCA, state governments have the flexibility to design their own Medicaid eligibility rules and federal funds granted to states are based on a capped, per-capita basis.

<table>
<thead>
<tr>
<th></th>
<th>ACA</th>
<th>AHCA (proposed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligibility</td>
<td>138% poverty level</td>
<td>Up to each state</td>
</tr>
<tr>
<td>Federal funds</td>
<td>matching to states</td>
<td>Capped per-capita basis</td>
</tr>
<tr>
<td>HIX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{\text{premium}<em>{\text{m}}}{\text{premium}</em>{\text{young}}}$</td>
<td>$\leq 3$</td>
<td>$\leq 5$</td>
</tr>
<tr>
<td>Premium</td>
<td>Income-based subsidies</td>
<td>Age-based tax credits</td>
</tr>
<tr>
<td></td>
<td>↓ with income</td>
<td></td>
</tr>
<tr>
<td>Out-of-pocket</td>
<td>Tax credits</td>
<td>No</td>
</tr>
<tr>
<td>Individual Mandate</td>
<td>Yes</td>
<td>No, surcharge after a lapse</td>
</tr>
<tr>
<td>Employer Mandate</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 1: The Comparison between ACA and AHCA

3 Data

Our household-side data come from three sources: the American Community Survey (ACS), the March Current Population Survey (March CPS) and the Medical Expenditure Panel Survey (MEPS). We focus on the population of age 22 to 65. The ACS and CPS both provide information on households’ health insurance, labor market status, demographics and residential states. Given the inconsistency in the health insurance information in the CPS arising from the re-design of relevant questions (Pascale, 2015), we rely mainly on ACS and complement it with the CPS, which contains information on household members’ health status.

MEPS is a set of large-scale surveys of families and individuals, their medical providers, and employers across the United States. We use its Household Component (HC), a panel survey that features several rounds of interviewing covering two full calendar years. Key to our analyses, MEPS collects detailed information for each person in the household on demographic characteristics, health conditions, health status, use of medical services, charges and source of
payments, health insurance coverage, income, and employment. We use the restricted MEPS geocode data, which identifies 30 states with the remaining 20 states encrypted.

For the firm side, we use the Kaiser Family Employer Health Benefit Survey, a cross-sectional survey of firms representative of those with at least three workers. We focus on private-sector employers. Crucial to our analyses, it contains information on firm size, health insurance provision, as well as employee composition in terms of age, wage levels and full versus part time status.

3.1 Impacts of the ACA: Suggestive Evidence

We present suggestive evidence from the data on ACA’s early impacts on health insurance status and labor market outcomes, which will serve as part of the auxiliary models we use to estimate our structural model.

3.1.1 Time Series Patterns

Figures A-1 shows the aggregate uninsured rate between 2007 and 2015. Due to the financial crisis and the associated loss of jobs with ESHI, the uninsured rate rose between years 2009 and 2013 and peaked at 23% in 2010, while this fraction was below 20% in 2008. It dropped in 2014 to below 19% further down to around 15% in 2015, the former (latter) coincides with the start of the individual (employer) mandate. Figure A-2 shows that the aggregate uninsured rate trend separately for states that have expanded Medicaid under the ACA and those that have not. The over-time changes exhibit very similar patterns across these two types of states, with lower uninsured rates in Medicaid-expanding states in all years.

Figures A-3-8 show the corresponding patterns for Medicaid coverage, ESHI coverage, and individual health insurance coverage. The fraction of people enrolled in Medicaid has been rising over the years especially since 2014: it was 7% in 2007, and doubled in 2015. Relative to their counterpart, Medicaid-expanding states have had higher Medicaid enrollment rate throughout and much steeper increase since 2014. The fraction of individuals covered by ESHI dropped sharply since 2009 from a peak of over 69% to below 65% between 2010 and 2014. In the first year of employer mandate (2015), this rate rose to over 65%. Although Medicaid-expanding states have had a higher ESHI rate throughout, the fraction dropped in 2014, while the opposite is true in non-expanding states. Furthermore, the non-expanding states experienced a sharper increase in ESHI rate than the expanding states in 2015. The fraction of individuals covered by individual health insurance also doubled during this period of time, with around 10% coverage in 2015. Unlike the other coverage patterns, the difference between the expanding and non-
expanding states is much less obvious: the former states had a slightly lower fraction before 2014 and equal fraction in 2015.

Figures A-9-12 show patterns for labor market outcomes. We focus on the non-employed rate and the fraction of part-time workers among the employed. The non-employment rate peaked in 2010 at 26% and has been decreasing since 2011 and down to 23% by 2015. The fraction of part-time workers among those employed has been declining since 2010 from over 12% to around 10%. In Medicaid-expanding states, non-employment rate and part-time rate were higher over all years; the post-recession decrease of non-employment rate started in 2012 and continued until 2014, with a slight increase in 2015. In non-expanding states, the decrease of non-employment rate started in 2011 and continued into 2015, with a stagnant period between 2013 and 2014. Medicaid-expanding states also experienced a steeper decrease in part-time rate between 2014 and 2015.

3.1.2 Regression Results

We present further data evidence via regressions. Given the observed and unobserved differences across local labor markets, the policy impacts are likely to differ as well. To illustrate this point, we combine the ACS data for a year before the ACA (2013) and a year after (2015) to run regressions of the following form

\[
y_{ist} = X_{ist} \alpha_1 + d_s + X_{ist} \sum_{g=1,G} I(s \in g, t = 2015) [MEP_s \alpha_{2g} + (1 - MEP_s) \alpha_{3g}] + \epsilon_{ist}. \tag{1}
\]

\(y_{ist}\) is an outcome variable for individual \(i\) in state \(s\) and year \(t\), whose characteristics are given by \(X_{ist}\). \(d_s\) is a state fixed effect. The next terms in the regression capture the policy era impacts \((t = 2015)\) that are allowed to differ across state groups \(g = 1, \ldots, G\), where states are grouped based on low. Furthermore, the policy era impacts are allowed to differ across states within a group based on Medicaid expansion status in that state \(MEP_s \in \{0, 1\}\). Within each group, the state-group-specific vector of parameters \(\alpha_{2g}, (\alpha_{3g})\) summarizes the suggestive evidence of ACA’s impacts on different demographic groups \((X)\) in states that did (did not) expand Medicaid under the ACA. \(\epsilon_{ist}\) is an i.i.d. error term.

The results are shown in Tables A-1-3. Although they are included in the regressions, the coefficients associated with \(X\) and its interactions \(X\) with year fixed effects are not reported to save space. Table A-1 shows the result on one being uninsured. Consistent with the time series figures, the year fixed effects show a significant decline of the uninsured rate in 2015 relative to 2013. The coefficient associated with ACA’s Medicaid expansion \((\alpha_1)\) is small and insignificant for the default individual group (middle education, married with child). It is significantly
negative for the lowest education group and for singles, yet significantly positive for the highest education group and for those without children.

The three columns in Table A-2 report, respectively, outcomes of whether or not one is covered by Medicaid, by individual insurance, and by ESHI. Unsurprisingly, year fixed effects of 2014 and 2015 on coverage by Medicaid and individual health insurance are significantly positive and larger than previous years. Compared to their counterpart, those exposed to Medicaid expansion experienced significantly higher coverage by Medicaid except for the highest education group and those with children; however, they were less likely to be covered by individual health insurance except for the lowest-educated group and for singles. For ESHI, the pattern is somewhat different. Compared to 2011-2013, ESHI increased in 2014 but decreased again in 2015. The difference by Medicaid expansion status is insignificant for most groups, except that singles and those without children were more likely to be covered by ESHI under Medicaid expansion.

Table A-3 shows results on labor market outcomes. Those exposed to Medicaid expansion were slightly more likely to be non-employed, an effect that was similar across all demographic groups. Conditional on being employed, the probability that one worked part time was similar across Medicaid expansion status except for the highest-education group who were less likely to work part time under Medicaid expansion.

The regression results suggest rich heterogeneity in the impacts of the ACA. Within the same region, the impacts differ, qualitatively and quantitatively, across different demographic groups. For the same demographic group, the policy impacts differ across regions. For example, associated with the expansion of Medicaid, individuals with low education are more likely to be non-employed in the South, while less likely to be non-employed in other regions. In addition, with the expansion of Medicaid, they are much more likely to be insured, and in particular via Medicaid, in the South than in other regions.

4 Model

4.1 Environment

There are \( M \) labor markets defined by state and policy era (pre-ACA and ACA), each treated in isolation.\(^\text{13}\) On each market \( m \), there is a distribution of heterogenous firms and a distribution of heterogenous households. Firms produce homogenous goods using labor inputs, but with heterogeneous technologies. Each household is characterized by \((x, s, \chi, \epsilon)\), where \( x \) is a vector

\(^\text{13}\)We focus on heterogeneity across states and abstract from issues such as cross-state migration.
of observable characteristics of the household. Households heterogeneity is further captured by the following three vectors, which are unobservable to the researcher. The first is the vector of human capital of the workers in the household \((s)\); a worker’s human capital level is public information on the labor market and directly affects wages. The second is a household’s discrete type \((\chi)\), each of which has different preferences and is correlated with \(s\). Finally, \(\epsilon\) denotes a vector of choice-specific tastes that allow for within-type heterogeneity.

Each labor market \(m\) is perfectly competitive with a vector of market wages \(\{w_{shz}^m\}\) for each worker-job category, where a category is characterized by human capital level \(s\), part time or full time \(h \in \{P, F\}\) and employer insurance coverage \(z \in \{0, 1\}\). Exchanges on the labor market can only be based on \((s, h, z)\); and no discrimination based on \((x, \chi, \epsilon)\) is feasible. A firm makes decisions on the quantities of different labor inputs and the provision of health insurance. A household makes decisions on labor supply and health insurance status.

### 4.1.1 Insurance and Out-of-Pocket Health Expense

Each worker’s health insurance status is described by a vector \(INS \in \{0, 1\}^4\), where \(INS_1 = I(ESHI)\), \(INS_2 = I(\text{insured via spouse’s ESHI})\), \(INS_3 = I(\text{insured via Medicaid})\), \(INS_4 = I(\text{insured via health insurance exchanges})\). We assume that all four statuses are mutually exclusive, i.e., \(\sum_s INS_s \in \{0, 1\}\) and \(\sum_s INS_s = 0\) means no insurance. Let \(INS\) be the \(4 \times 2\) matrix of health insurance status of the couple.

A household’s out-of-pocket health expense is governed by

\[
OOP(x, INS, r, m, \zeta),
\]

a function of household characteristics \(x\), health insurance status \(INS\), private health insurance premium schedule \(r\), the market \(m\), and a shock \(\zeta\). The expense varies with \(r\) directly only when one is insured via private insurance plans. It may vary across \(m\) directly because, for example, health care costs differ across markets. Given the static nature of the model, we treat a health shock purely as an expenditure shock.
4.1.2 Household Preference

A household’s utility depends on joint consumption $C$, leisure and health insurance status, given by

$$u(C, h, \text{INS}; x, \chi).$$

where $h = [h, h']$ is the vector of labor supply status of the household. We allow households with different characteristics $(x, \chi)$ to view the trade-offs between consumption, leisure and health insurance status differently. We also allow for asymmetry between the couple, e.g., a household may have different preferences for which spouse (husband or wife) works full time if only one does so and for which spouse works with ESHI if only one does so.

The Role of Health Insurance

Health insurance affects household welfare through two channels in this model. First, it insures against medical expenditure risks: household out-of-pocket health expense $OOP(\cdot)$ depends on health insurance status $\text{INS}$. In addition, we also allow for the possibility that $\text{INS}$ may directly affect one’s utility $u(\cdot)$. For example, households may prefer ESHI over Medicaid for non-pecuniary reasons.

4.1.3 Production Function

Let $n_{js}$ be the number of employees with human capital level $s$ and working status $h$ hired by Firm $j$. Let $l_{js}$ be the Type-$(s, h)$ labor input in Firm $j$, which is the total amount of $k_s$ possessed by the $n_{js}$ employees. Firm $j$’s production is governed by the following modified CES function

$$Y_j = F(n_{js}; T_j, \rho_j) = T_j \left( A_j \sum_{s \geq s^*} B_{sF} l_{jsF}^p + (1 - A_j) \left( \sum_{s < s^*} B_{sF} l_{jsF}^0 + \sum_s B_{sF} l_{jsF}^0 \right) \right)^{\frac{\rho}{p}} \tag{2}$$

where $l_{js} = k_s n_{js}$.

The weight vector $B$ is common across firms with $B_{sh} + B_{sF} = 1$. Firms differ in $(T_j, A_j)$, the two of which may be correlated. $T_j$ denotes Firm $j$’s TFP, the weight $A_j$ determines the extent to which firm TFP complements high skilled workers ($s \geq s^*$) who works full time, relative to the other workers. This specification serves as one of the potential sources for sorting between firm productivity and worker skills, as well as a factor affecting firm’s ESHI provision choices via the correlation between workers’ skill and their demand for health insurance.
4.2 Household’s Problem

A household’s problem can be solved in two steps. First, it chooses labor supply status \((h, z)\), where each worker in the household can be non-working or working in one of the job categories, i.e., \(((h, z), (h', z')) \in \{(0, 0), \{P, F\} \times \{0, 1\}\}^2\). Second, it chooses its health insurance status \(\text{INS}\) given \((h, z)\). A household with \((x, m, \chi, s)\) solves the following problem

\[
\max_{(h, z) \in \{(0, 0), \{P, F\} \times \{0, 1\}\}^2} \{V(x, m, \chi, s, h, z) + \epsilon_{h,z}\},
\]

where \(V(\cdot, h, z)\) is the value function associated with the choice \((h, z)\), as we specify below. The last term, \(\epsilon_{h,z}\), is household’s taste associated with choice \((h, z)\), assumed to be drawn from a Type-1 extreme value distribution. Let \((h^*, z^*)_{(x,m,\chi,s)}\) be the solution to (3).

Each \(V(\cdot, h, z)\) involves choosing \(\text{INS}\) to maximize household expected utility given \((h, z)\), such that

\[
V(x, m, \chi, s, h, z) = \max_{\text{INS}} E_\zeta[u(C, h, \text{INS}; x, \chi)]
\]

s.t.

\[
C = \max \{y - OOP(x, \text{INS}, r, m, \zeta), \zeta\}
\]

\[
y = w_{shz}^m + w_{s'hz'r'}^m + b(x, m, r, w_{shz}^m + w_{s'hz'r'}^m, h, \text{INS})
\]

\[
\text{INS} \in \Omega(x, y, m, z).
\]

where households are guaranteed a minimum consumption level \(\zeta\). \(b(\cdot)\) is the net government transfer, which depends on market \(m\), household characteristics \(x\), income \((w_{shz}^m + w_{s'hz'r'}^m)\) and working status \(h\). In addition, via insurance premium subsidies and policies like individual insurance mandates, \(b(\cdot)\) may also depend on premium \(r\) and insurance status \(\text{INS}\). The set of feasible health insurance status \(\Omega(x, y, m, z)\) reflects the link between labor supply and \(\text{INS}\) as follows.

4.2.1 Health Insurance Choice Set \(\Omega(\cdot)\)

Household labor supply choice directly governs \(\text{INS}_1\) (ESHI) with \(\text{INS}_1 = z\); and one’s spouse can be covered by one’s employer only when \(z = 1\), that is, spousal coverage \(\text{INS}_2 = 0\) if \(z = 0\). If \(\text{INS}_1 = \text{INS}_1' = 0\) for both spouses, the household may be eligible for Medicaid governed by the eligibility function \(MC(x, y, m) \in \{0, 1\}\), which depends on household characteristics \(x\), household income \(y\) and the market \(m\) one lives in. Therefore, a household’s labor supply decision indirectly governs \(\text{INS}_3\) and \(\text{INS}_3'\) (Medicaid) via income. If \(\text{INS}_i\) and \(\text{INS}_i'\) are zeros

\[18\] We present the problem for a coupled household. The problem is simpler for singles, with \(h' = z' = 0\).

\[19\] \(w_{s0z}^m = 0\) for all \((m, s, z)\), i.e., labor income is zero when \(h = 0\).
for all $i = 1, 2, 3$, the household can decide whether or not to purchase private health insurance ($INS_4, INS'_4$).

In addition, we impose the following restrictions on INS, which are in line with the data facts for most households and simplify our analyses.

1) *Conditional on choosing* $(z, z') = 0$, if a household is eligible for Medicaid ($MC(x, y, m) = 1$), it chooses between using Medicaid ($INS_3 = INS'_3 = 1$) or staying uninsured ($INS = 0$).

2) If only one spouse works on a job with ESHI, the other spouse and children will be covered, e.g., $z = [1, 0]$ implies $INS_1 = 1$ and $INS'_2 = 1$.

3) If both spouses are covered by ESHI, they are indifferent between whose employer covers their children. As such, in expectation, the burden of child health insurance will be split evenly between the two employers.

4) $INS_4 = INS'_4$, so that private health insurance purchase are made for the entire household.

Given the above, when at least one spouse works on a job with insurance, the insurance status is fully determined. If neither spouse works on a job with coverage ($z = [0, 0]$), feasible choices depend on whether or not one is eligible for Medicaid $MC(x, y, m)$. One can choose to participate in Medicaid if eligible, otherwise, one needs to decide whether or not to buy private health insurance. In sum, the choice set of INS is given by

$$
\Omega (x, y, m, z = [1, 0]) = \{([1, 0, 0, 0], [0, 1, 0, 0])\},
$$
$$
\Omega (x, y, m, z = [0, 1]) = \{([0, 1, 0, 0], [1, 0, 0, 0])\},
$$
$$
\Omega (x, y, m, z = [1, 1]) = \{[1, 0, 0, 0]^2\},
$$
$$
\Omega (x, y, m, z = [0, 0]) = \begin{cases}
MC(x, y, m) \{[0, 0, 1, 0]^2, [0, 0, 0, 0]^2\} \\
(1 - MC(x, y, m)) \{[0, 0, 0, 1]^2, [0, 0, 0, 0]^2\}
\end{cases}.
$$

### 4.3 Firm’s Problem

Firm $j$ chooses the number of employees in each $(s, h)$ category $n_{jsh} \geq 0$, and whether or not to provide its employees with health insurance. For simplicity, we assume that a firm’s health insurance provision is the same for all of its employees with the same working status $h$. Consistent with the data, we also assume that ESHI is offered to part-time workers only if it is also offered to full-time workers. That is, $z_j = \{z_{jh}\}_{h \in \{P, F\}} \in \{(1, 1), (0, 1), (0, 0)\}$. In the following, we solve a firm’s problem without ESHI mandates. The solution with ESHI mandates is in the appendix.

---

20This is consistent with the data facts where almost no household in such cases opt for private insurance.
Firm $j$ solves the following problem,

$$\pi_j^* = \max_{\{z_{jh}, \{n_{jsh}\}_s\}_h} \left\{ Y_j - \sum_{h \in \{P,F\}} \sum_{s=1}^S n_{jsh} (w_{shz}^m + q^m z_{jh} \kappa_{sh}^m) + \eta_j \right\} ,$$

(6)

where $Y_j$ follows the technology (2), $q^m$ is the price of ESHI on Market $m$, $\eta_j$ is the an i.i.d. Type-1 extreme-value distributed shock associated with choosing $z_j$. The cost of hiring a worker involves wage payments and, if $z_h = 1$, the expected cost of ESHI. The latter involves expectation because households differ in their characteristics and hence demands for health insurance, which in turn leads to different labor supply decisions. A firm needs to infer the expected demand for health insurance from a worker with skill $s$ for his/her family, conditional on the fact that the household decides to let him/her work $h$ hours with ESHI. We denote this expected demand by $\kappa_{sh}^m$.

Firm $j$’s optimal decision $\{z_{jh}^*, \{n_{jsh}^*\}_s\}_h$ can be derived in two steps. First, given a particular vector of $z$, Firm $j$ chooses its optimal demand for each type of workers $\{n_{sh}^* (z)\}_sh$, which gives the maximum profit $\pi_j^* (z)$ conditional on $z$. Second, Firm $j$ chooses the $z$ associated with the highest profit. For a researcher, who has no information about $\eta_j$, the probability that a particular $z^*$ is chosen follows

$$\Pr(z_j = z^*) = \frac{\exp \left( \pi_j^* (z^*) \right)}{\sum_{z \in \{(0,0),(1,0),(1,1)\}} \exp \left( \pi_j^* (z) \right)} .$$

### 4.4 Private Insurance Premium

The private health insurance premium structure was much more complex on the pre-ACA market than it is on the post-ACA exchange market (HIX). We use the pre-ACA data only for estimating the model, which is then used to conduct counterfactual experiments with premium regulations similar to HIX. For this purpose, it suffices to take the observed pre-ACA equilibrium insurance premium as given. However, our counterfactual experiments are likely to change the distribution of buyers on the private health insurance market, and hence the health insurance premium. Although it is beyond this paper to incorporate a full-blown health insurance market into our model, we endogenize private insurance premiums in our counterfactuals to capture the key features of HIX, i.e., premiums can differ based only on age and that premiums are set

$$\kappa_{sh}^m = \int \kappa (x,m,\chi,s,s',\epsilon) dF \left( x,\chi,s',\epsilon|s,m,(h^*,z^*)_{(x,m,\chi,s,\epsilon)} = (h,1) \right) ,$$

(7)

where $\kappa (x,m,\chi,s,s',\epsilon)$ is the adult-equivalent measure of the unit of health insurance demanded by a household with characteristics $(x,m,\chi,s,s',\epsilon)$.
according to a standard age-rating curve.\textsuperscript{22}

In particular, we assume that in each market \( m \), HIX is perfectly competitive, as in Handel, Hendel, and Whinston (2015), and offers a single product, as in Hackmann, Kolstad, and Kowalski (2014). Let \( r^m_b \) be the base premium in market \( m \), and \( g(\cdot) \) be the exogenous age-rating curve, the premium structure is given by

\[
 r^m(x) = r^m(age) = g(r^m_b, age). \tag{8}
\]

Premiums differ across markets as the base premium adjusts to satisfy the break-even condition in each market, i.e., among those insured via HIX, their total insurance premium equals their total health expenditure net of reimbursement.

4.5 Equilibrium

\textbf{Definition 1} Given insurance premium structure (8), an equilibrium on Market \( m \) is a tuple

\[
 \{(h^*, z^*)_{(x,m,\chi,s,e)}, \{z^*_h, \{n^*_s\}_s\}_h(T,\rho), \{w^m_{shz}\}_shz, r^m_b\}_{(T,\rho)}\}
\]

that satisfies

(1) Household optimization: Given \( \{w^m_{shz}\}_shz \) and \( r^m(x) \), \((h^*, z^*)_{(x,m,\chi,s,e)}\) solves household optimization problem for each \((x,m,\chi,s,e)\).

(2) Firm optimization: Given \( \{w^m_{shz}\}_shz \) and \( r^m(x) \), \((z^*_h, \{n^*_s\}_s\}_h(T,\rho)\) solves firm optimization problem for each \((T,\rho)\).

(3) Equilibrium consistency:

1) wages \( \{w^m_{shz}\}_shz \) equate the aggregate demand and supply for each work-job category \((s,h,z)\);

2) health insurance base premium \( r^m_b \) and \( r^m(x) \) implied by (8) satisfy the break-even condition.

4.6 Further Empirical Specifications

To apply our model to the data, we make some further empirical specifications.

4.6.1 Household Characteristics

In the model, a worker’s human capital level \( s \) is observed by both the worker and the firm. The researcher observes neither human capital nor household types \((s,\chi)\), which we model as being correlated with \( x \) and states, such that

\[
 \Pr((s,\chi)|x,\text{state}) = \Pr(\chi|x,\text{state})\Pr(s|x,\chi),
\]

\textsuperscript{22} We abstract from the premium variation based on smoking history, which we do not have information on. See Orsini and Tebaldi (2015) for a study on premium variations across areas with different consumer age compositions.
where \( s \in \{1, 2, ..., S\}^2 \) and \( \chi \in \{1, 2\}^2 \).\(^{23}\)

**Type** Denote the components in \( x \) such that the sub-vectors \( x_1 \) and \( x_2 \) refer to the individual characteristics of Spouse 1 and Spouse 2 (e.g., education, age and gender) and that \( x_0 \) refers to other household level characteristics (e.g., the number of children). The type distribution for a single is given by

\[
Pr(\chi = 1|x, state = l) = \Phi(x_0\beta_0 + x_1\beta + \xi_l),
\]

i.e., the latent variable is i.i.d. normal. The term \( \xi_l \) is a state-specific constant that introduces state-level unobservables into the model.

To allow for matching on unobservables between spouses, we assume that the latent variables of the couple are bivariate normal with

\[
\begin{align*}
\text{means} & : (x_0\beta_0 + x_1\beta + \xi_l, x_0\beta_0 + x_2\beta + \xi_l), \\
\text{variances} & : (1, 1) \text{ and correlation: } \iota.
\end{align*}
\]

**Skill** The probability that a worker’s skill is of level \( s \) is given by the following discretized log-normal distribution:

\[
Pr(s|x, \chi) = \begin{cases} 
\Phi(\ln(k_s) - x'\lambda - \alpha_\chi) - \Phi(\ln(k_{s-1}) - x'\lambda - \alpha_\chi) & \text{for } 1 < s < S, \\
\Phi(\ln(k_s) - x'\lambda - \alpha_\chi) & \text{for } s = 1, \\
1 - \Phi(\ln(k_{s-1}) - x'\lambda - \alpha_\chi) & \text{for } s = S,
\end{cases}
\]

where \( \alpha_\chi \) is a type-specific parameter that allows for correlation between \( s \) and \( \chi \), with \( \alpha_1 \) normalized to zero. The mass points of the human capital amount \( (k_s) \) are assumed to be quantiles from \( \ln N(\bar{x}\lambda, 1) \), where \( \bar{x} \) is the population mean of \( x \). The distribution of a couple’s skill is given by

\[
Pr(s|x, \chi) = Pr(s|x, \chi) Pr(s'|x, \chi').
\]

Notice that a couple’s skill levels are correlated because 1) household characteristics \( x \) enter the skill distributions for both, and 2) types \( \chi \) and \( \chi' \) are correlated between spouses and type enters the skill distribution via \( \alpha_\chi \).

**Health Status** In the ACS, health status is not reported. To supplement the ACS with household health status information, we rely on the empirical distribution \( Pr(\text{Healthy}|x, state) \)

\(^{23}\)We set the total number of skill levels \( S = 5 \), which leads to 20 categories of jobs defined by \((s, h, z)\) on each market, and 10 unobserved groups of individuals defined by \((s, \chi)\).
from the CPS. The vector Healthy indicates health status of the couple with Healthy \in \{(1, 1), (1, 0), (0, 1), (0, 0)\}. For each household in the ACS, we simulate the vector of its members’ health status conditional on \( x \) and the state it lives in, according to the CPS distribution \( \Pr(\text{Healthy}|x, \text{state}) \).

4.6.2 Firm Technology

We allow for correlation between the two components of \((T_j, A_j)\), but the vectors are assumed to be i.i.d. across firms. The TFP of Firm \( j \) follows

\[
\ln(T_j) \sim N\left(\ln(\mu_T) - 0.5\sigma_T^2, \sigma_T^2\right),
\]

so that \( \mu_T = E[T_j] \). The weight \( A_j \in (0, 1) \) is distributed as

\[
\ln\left(\frac{A_j}{1 - A_j}\right) | T_j \sim N\left(\ln\left(\frac{\mu_A}{1 - \mu_A}\right) + \nu_A(\ln(T_j) - E[\ln(T_j)]), \sigma_A^2\right),
\]

where \( \nu_A \) captures the correlation between \( T_j \) and \( A_j \).

5 Estimation

5.1 Parameters Estimated outside of the Model

To reduce the computational burden, we estimate the following objects outside of the model: the out-of-pocket health expenditure function \( OOP(\cdot) \), government health-care-related policies and net transfer function. We provide a brief summary here and leave the details in the appendix.

A household’s out-of-pocket health expenditure consists of its health insurance premium \( r(x, m, \text{INS}) \) and out-of-pocket medical costs, which are estimated using data from MEPS. For \( r(x, m, \text{INS}) \), we use the observed average premium among households with \((x, m, \text{INS})\). A household’s out-of-pocket medical cost is the sum of its members’ gross medical costs minus the total deductible based on the most common health insurance plan. We estimate each household member’s gross medical cost as a stochastic function of one’s own characteristics and household characteristics, with the random variable drawn from a market-specific distribution.

We parameterize health-care-related government policies, including those implemented under the ACA, as precisely as we can. We specify the Medicaid eligibility and coverage rule \( MC(x, y, m) \) as a market-specific function of household characteristics and income. In particular, under ACA, Medicaid-expanding states followed eligibility rules specified by the federal
government; while non-expanding states could have their own Medicaid eligibility rules. We parameterize these policies based on information from Kaiser Family Foundation (2013) and CMS (2014).24

We break down the government net transfer function into its components and parameterize each of them, including household income tax, welfare benefits, HIX premium subsidies and tax penalties for the uninsured when individual mandates are imposed.

### 5.2 Parameters Estimated within the Model

Taking the realized equilibrium in the data as given, our estimation procedure does not require solving for the equilibrium. As a price taker, a household (firm) takes the equilibrium wage levels and health insurance premiums as given in making its optimal decision. Notice that \( \{w^m_{shz}\} \) are taken as given by households and firms but unobservable to the researcher (since \( s \) is not observable), we can treat \( \{w^m_{shz}\} \) as parameters to be estimated. Our structural model can be estimated in two stages.

Stage 1 estimates household-side parameters (\( \Theta^H \)) and the wage levels \( \{w^m_{shz}\} \) by matching model-predicted household decisions with the observed household choices.

Stage 2 takes households’ decision rules, parameter estimates in Stage 1, and ESHI price \( q^m \) as given, and estimates firm-side parameters (\( \Theta^F \)) by matching firms’ optimal decisions with the observed firm choices.25

In both stages, the estimation is via indirect inference, an approach that involves two steps: 1) compute from the data a set of “auxiliary models” that summarize the patterns in the data; and 2) repeatedly simulate data with the structural model, compute corresponding auxiliary models using the simulated data, and search for the model parameters such that the auxiliary models from the simulated data match those from the true. In particular, let \( \bar{\beta} \) denote our chosen set of auxiliary model parameters computed from data; let \( \hat{\beta}(\Theta) \) denote the corresponding auxiliary model parameters obtained from simulating a large dataset from the model (parameterized by a particular vector \( \Theta \)) and computing the same estimators. The structural parameter estimator is then the solution

\[
\hat{\Theta} = \arg\min_{\Theta} \left[ \hat{\beta}(\Theta) - \bar{\beta} \right]^TW[\hat{\beta}(\Theta) - \bar{\beta}],
\]

24 We abstract from asset testing for Medicaid, which would require detailed asset information and add non-trivial complications to the model. This extra layer of complication is unlikely to add much insight to our model or to change its implications significantly, given the fact that asset testing was abolished under ACA in all states and before ACA in most states.

25 As \( q^m \), we take the average ESHI premium reported by firms in Kaiser on each market \( m \).
where $W$ is a weighting matrix. We obtain standard errors for $\hat{\beta}(\Theta)$ by numerically computing $\partial \hat{\Theta} / \partial \Theta$ and applying the delta method to the variance-covariance matrix of $\hat{\Theta}$.

**The wage vector $\{w_{shz}^m\}$**: To keep the estimation tractable, we follow the literature and assume that wages for different skill levels can be approximated by a discretized log-normal distribution. In particular, we assume that the distribution is specific to each $(m, h, z)$ category, and that $\{\ln(w_{shz}^m)\}_{s=1}^S$ are quantiles from the distribution $N(\bar{w}_{mhz}, \sigma_{mhz}^2)$. That is, instead of estimating the high dimensional object $\{w_{shz}^m\}$, we estimate the vector $\{(\bar{w}_{mhz}, \sigma_{mhz})\}_{m,h,z}$.

### 5.3 Use of the Data

We divide the data into two parts, one for estimation and the other for model validation. The estimation sample includes the pre-ACA data of all of states, and the post-ACA data of all but the lowest-poverty-rate states. The post-ACA data for the lowest-poverty-rate states are held out for model validation. We use the data in this fashion for the following reasons. First, information of a state in at least one policy era is necessary to identify state-specific parameters; and information of multiple states in both policy eras is necessary to identify policy impacts without having to rely entirely on model structure. Second, it gives us more confidence in our counterfactual policy results if the model can match the post-ACA pattern in the non-randomly held-out states. Notice that one can construct the hold-out sample in a different way; the key for validation is that the hold-out sample should be non-trivially different from the estimation sample.\(^26\) We choose to group states by poverty rates and hold out the lowest poverty group because several major ACA components were targeted at low-income households, which makes it tougher for the model to fit the hold-out sample and hence increases model credibility if the validation holds.

### 5.4 Auxiliary Models

We choose auxiliary models to exploit the rich variation across states and policy eras, as well as the variation of policy doses across different households and firms. All auxiliary models we target in the estimation are calculated using the estimation sample only.

#### 5.4.1 Stage 1

We first estimate household-side parameters $(\Theta^H)$ and wage-level parameters, the former consisting of the parameters governing 1) utility function $(\Theta_u^H)$, 2) household type distribution

\(^{26}\) Holding out a random sample, which varies from the estimation sample due to sampling errors, does not serve the purpose of model validation: if one can fit the estimation sample, one can fit its counterpart.
and 3) skill distribution \((\Theta^H_x)\). The auxiliary models we target include:

1. From the ACS

   (a) The regressions as specified in equation (1).
   
   (b) Moments by policy era (before/after 2014), by demographics (single/coupled, with/without children), by education levels and by groups of Medicaid-expanding/non-expanding state groups.

      i. Insurance status: uninsured, insured via ESHI, insured via Medicaid
      ii. Job status: non-employed, employed full time
      iii. Earnings and earnings\(^2\) by insurance status, by part/full time status
      iv. Interactions of insurance status and job status.

2. From the CPS: differences in insurance status and in job status between people with good health and bad health.

State-era-specific policies, such as Medicaid and other welfare programs, affect a household’s decision by changing its budget constraints. Cross-sectional policy variations allows for comparison of decisions made by observationally equivalent households across states who face different constraints. This information can be used to identify household preferences if the distribution of household unobservables is the same across states.\(^{27}\) With state-specific distribution of household unobservables, one needs more than cross-sectional variation. Assuming that the distribution of household preferences and types is constant over time, we explore the variation introduced by ACA across both time and states.\(^{28}\)

5.4.2 Stage 2

The vector of firm side parameters \((\Theta^F)\) consists of the parameters governing 1) production function \((\Theta^F_p)\), 2) firm type distribution function \((\Theta^F_{T_p})\). The auxiliary models we target include:

1. mean, variance, and quantiles of the following firm-side variables

   (a) firm size,

\(^{27}\)Such identification strategies are pursued by Keane and Moffitt (1998) and Pohl (2012).
\(^{28}\)Chan (2013) uses policy variations across states and across time for identification in his study of welfare programs.
(b) fraction of full time workers,
(c) fractions of workers earning low wages and high wages.\(^{29}\)

2. covariance of the following variables:

(a) firm size and fraction of full time workers,
(b) firm size and fractions of workers earning low wages and high wages.

3. moments of the following variables by region and by policy era:

(a) the mean of the ESHI offering
(b) the mean of the ESHI offering only for full time employees,
(c) the covariance between the ESHI offering and firm size,
(d) the covariance between the ESHI offering and fraction of workers earning high wages.

4. moments from the household data based by region and by policy era.

(a) aggregate employment by skill types.

The identification of firm-side parameters will utilize both firm side optimization conditions and policy variations in the data. We discuss these details in Appendix. One important target is Moment (4), which imposes the equilibrium restriction that labor market should clear. Note that the geographical information in the Kaiser data is Census Region (northeast, midwest, south, and west). Thus, we consider that the firm-side parameters are Census Region specific.

6 Estimation Results (To be updated)

6.1 Parameter Estimates (Preliminary)

The full set of parameter estimates is reported in the appendix. Table 2 shows that Type 1 individuals have higher relative risk aversion compared with Type 2 individuals, and that the annual consumption floor is $300. Both the risk aversion and the consumption floor estimates are in line with other studies (e.g., De Nardi, French, and Jones (2016)). We also find that type 1 individuals tend to be more skilled conditional on observables, given our estimated

\(^{29}\)Kaiser Family Employer Health Benefit Survey only specifies three crude division of wage levels. We use $24,000 ($23,000) in 2012 (2015) as the upper bound to define low earnings and $55,000 ($58,000) in 2012 (2015) as the lower bound to define high earnings.
correlation $\alpha_{\chi=1}$. Moreover, we find that unhealthy individuals tend to face higher disutility of works, particularly if they work for full-time jobs.

Our model allows for state-specific distribution of household types, governed by $\Pr(\chi|x, \text{state})$, which differs across state observably via $x$ and unobservably via state-specific shifters as in (9). Although we do not take a stand on the source of the latter, using our estimates, we can examine how these state-specific type distributions are correlated with observed policy decisions, in particular, the decisions on ACA Medicaid expansion. We find that the correlation between $\Pr(\chi = 1|x_l, \text{state})$ and a state’s Medicaid expansion choice is 0.28, where $\chi = 1$ indicates more risk averse individuals, and $x_l$ is the mean of $x$ in state $l$. Thus, Medicaid was (weakly) more likely to have been expanded in states with a higher share of risk averse individuals, conditional on observables.

<table>
<thead>
<tr>
<th>CRRA coeff. for type 1</th>
<th>3.19</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRRA coeff. for type 2</td>
<td>2.39</td>
</tr>
<tr>
<td>consumption floor ($$1,000$)</td>
<td>0.03</td>
</tr>
<tr>
<td>the correlation between type 1 and skill ($\alpha_{\chi=1}$)</td>
<td>0.83</td>
</tr>
<tr>
<td>the disutility from bad health in full-time job</td>
<td>-0.56</td>
</tr>
<tr>
<td>the disutility from bad health in part-time job</td>
<td>-0.21</td>
</tr>
</tbody>
</table>

Table 2: Selected Worker-Side Parameter Estimates

<table>
<thead>
<tr>
<th>Parameters</th>
<th>North West</th>
<th>Midwest</th>
<th>South</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean(TFP)</td>
<td>22.68019</td>
<td>20.97017</td>
<td>21.28247</td>
<td>21.53015</td>
</tr>
<tr>
<td>sd of log(TFP)</td>
<td>0.87602</td>
<td>0.75157</td>
<td>0.77148</td>
<td>0.62974</td>
</tr>
<tr>
<td>median(A)</td>
<td>0.80727</td>
<td>0.90368</td>
<td>0.79829</td>
<td>0.84136</td>
</tr>
<tr>
<td>sd of log(A)</td>
<td>0.64627</td>
<td>0.66734</td>
<td>0.08187</td>
<td>0.25491</td>
</tr>
<tr>
<td>corr(A,T)</td>
<td>1.41176</td>
<td>1.28139</td>
<td>1.68195</td>
<td>1.59905</td>
</tr>
<tr>
<td>FC</td>
<td>0.27207</td>
<td>0.07085</td>
<td>0.09032</td>
<td>0.33936</td>
</tr>
<tr>
<td>scale_eta</td>
<td>0.0151</td>
<td>0.23952</td>
<td>0.16319</td>
<td>0.07844</td>
</tr>
</tbody>
</table>

Table 3: Selected Firm-Side Parameter Estimates

The firm-side parameters are reported in Table 3. An important feature is that the correlation between $(T_j, A_j)$, captured by $\nu_A$, is positive. This indicates that high productivity firms also demand high skilled workers.

6.2 Within-Sample Model Fit

Figures 1 and 2 show the model fit for changes in insurance status and employment distribution between 2012 and 2015. In general, the model is able to accurately capture the quantitative
patterns. Table 4 report the model fit of regression coefficients for insurance status used in our indirect inference procedure. In general, the model is able to capture the patterns well, both by Medicaid expansion states and by demographic types.

<table>
<thead>
<tr>
<th></th>
<th>Data</th>
<th>Model</th>
<th>Model</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEP=1</td>
<td>MEP=0</td>
<td>MEP=1</td>
<td>MEP=0</td>
</tr>
<tr>
<td>ACA</td>
<td>-0.01</td>
<td>0.00</td>
<td>-0.02</td>
<td>-0.01</td>
</tr>
<tr>
<td>ACA*lowE</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.03</td>
<td>-0.01</td>
</tr>
<tr>
<td>ACA*highE</td>
<td>-0.01</td>
<td>0.02</td>
<td>0.01</td>
<td>0.000</td>
</tr>
<tr>
<td>ACA*single</td>
<td>-0.12</td>
<td>-0.09</td>
<td>-0.05</td>
<td>-0.04</td>
</tr>
<tr>
<td>ACA*childless</td>
<td>-0.03</td>
<td>-0.00</td>
<td>-0.01</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

Table 4: Model Fit for Regression Coefficients for Being Uninsured

<table>
<thead>
<tr>
<th></th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2012</td>
<td>2015</td>
</tr>
<tr>
<td>ESHI offer rate</td>
<td>0.61</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Table 5: Aggregate Firm-Side Moments

6.3 Out-of-Sample Model Validation

Figure 3 reports the changes in insurance status for states whose post-ACA information is held out of the estimation, i.e., the 6 states with the lowest poverty rates. The model is able to
account for the major changes reasonably well.

7 Counterfactual Experiments

We use our estimated model to evaluate various designs of Medicaid programs via counterfactual policy experiments. We examine first, the impact of ACA Medicaid expansion in non-complying states; second, the impact of Medicaid work requirement; and finally, the benefit and cost of Medicaid block granting.
7.1 ACA Medicaid Expansion

Figure 4 reports the impact of ACA Medicaid expansion for both the complying and non-complying states. For each insurance status, the first four bars are model-predicted fractions of state population with this status in 2012 and in 2015 under the observed expansion choices, where the first two bars are for Medicaid expansion states and the third and fourth bars are for Medicaid non-expansion states. As clearly seen from this figure, Medicaid expansion states experienced a significant increase in Medicaid coverage, which did not happen in non-expansion states. Interestingly, the fraction of individuals holding individual insurance (IHI) substantially increased in non-expansion states, which contributed to the small difference in 2015 uninsured rates between Medicaid expansion and non-expansion states.

For each insurance status, the fifth bar is the counterfactual fraction of state population with this status in non-expansion states had they complied to ACA Medicaid expansion. Medicaid coverage would have been much higher in these states than that in expansion states. Although Medicaid coverage would have crowded out both IHI and ESHI, overall, we find that the uninsured rate would have been smaller in non-expansion states than that in expansion states. One underlying force is that the fraction of less skilled individuals is larger in non-expansion states, who would have been made eligible for Medicaid with ACA expansion. This result also gives a suggestive reason for the non-expansion decisions made these states, i.e., fiscal burdens associated with the counterfactual surge in Medicaid enrollment.\footnote{Although the federal government would initially cover the full cost of Medicaid under the ACA, the contribution of the federal government would gradually decrease over years.}

### Counterfactual: Medicaid Expansion to All States

![Counterfactual Experiment: Expansion of Medicaid for Medicaid non-expansion states](image_url)

\footnote{Although the federal government would initially cover the full cost of Medicaid under the ACA, the contribution of the federal government would gradually decrease over years.}
7.2 Medicaid Work Requirements (To be done)

In the spirit of work requirement as summarized in Section 2.2.1, we require that individuals be employed as another condition for receiving Medicaid in addition to other existing requirements.

8 Conclusion

References


Appendix

A1. Functional Forms
A1.1 Utility Function

We assume utility is separable in consumption, leisure and health insurance status. Let $n_x$ be the adult equivalent measure of household $x$, utility function is given by

$$u(C, h, INS; x, \chi) = \left(\frac{C/n_x}{1 - \gamma_x}\right)^{1-\gamma_x} - d_0 I (INS_3 + INS_3' \geq 1) - D(h, \chi, x).$$

The utility from consumption is assumed to be governed by a CRRA function, with household-type-specific parameter $\gamma_x$. $d_0$ captures household’s distaste for using Medicaid; $D(h, \chi, x)$ is the disutility from working, taking the following form

$$D(h, \chi, x) =$$

$$\begin{cases}
\sum_{l=P,F} [I(h = l) (D_h (x) + d_{x,l})] + I(kid > 0) (d_3 I(h \not= 0) + d_4 I(h = F)) & \text{if single} \\
\sum_{n=1}^2 \left\{ \sum_{l=P,F} [I(h_n = l) (D_h (x) + d_{x,l})] \right\} + I(kid > 0) (d_3 I(h \not= 0, h' \not= 0) + d_4 I(h = [F, F])) & \text{otherwise}
\end{cases},$$

where $d_{1P} = d_{1F} = 0$ as a normalization for Type 1. $D_P (x), D_F (x)$ capture the disutility of working as a function of observable characteristics, given by

$$D_l (x) = \varphi_{0l} + \sum_{e=1}^3 \varphi_{el} I(edu = e) + \varphi_{fl} I(female) + \varphi_{gl} I(age < age^*) + \varphi_{dl} I(unhealthy) \text{ for } l = P, F.$$

For a single with some child under age 6, she/he incurs $d_3 > 0$ as the additional disutility from working, which is increased by $d_4 > 0$ if the job is full time. For a coupled household, the disutility is summed over each spouse’s private disutility ($D_h (x) + d_{x,l}$) and the interaction of their choices in the case they have a young child: the couple incurs the cost $d_3$ if both are working and an additional $d_4$ if both are working full time.

A2. Firm’s Problem with Employer Mandates

With ESHI mandates, a firm with over a cutoff number (cut) full-time equivalent workers has to either provide ESHI to full time workers or pay a penalty $G(n)$ as a function of the firm’s hiring decision $n = \{n_{jsh}\}$. The mandate will be binding if the unconstrained choice under $z = (0, 0), n_{jsh}^*(0, 0)$, contains over cut full-time equivalent employees. In this case and only in this case, the previous solution to the firm’s problem needs to be modified: such a firm needs to compare the profit $\pi_j^*(0, 0)$ net of penalty $G(n_{jsh}^*(0, 0))$ with that from the following
constrained optimization problem

\[
\pi^c_j = \max \left\{ Y_j - \sum_{h \in \{P, F\}} \sum_{s=1}^{S} n_{js+h} u_{sh}^m \right\}
\]

s.t. \( \sum_{s} n_{jsF} + \tau \sum_{s} n_{jsP} < \text{cut} \),

where \( \tau \) is the full-time equivalent of a part-time worker. Denote by \( n^c_j \) the optimal solution to (11). The probability of ESHI choices is as follows

Case 1: \( \pi^c_j > \pi^*_j (0, 0) - G \left( n^*_j (0, 0) \right) \)

\[
\Pr(z_j = z') = \begin{cases} 
\frac{\exp(\pi^*_j (z'))}{\pi^c_j + \sum_{z \in \{(0,0),(1,1)\}} \exp(\pi^*_j (z))} & \text{for } z' \in \{(1,0),(1,1)\} \\
\frac{\exp(\pi^*_j (z'))}{\pi^c_j + \sum_{z \in \{(0,0),(1,1)\}} \exp(\pi^*_j (z))} & \text{for } z' = (0,0)
\end{cases}
\]

Case 2: \( \pi^c_j \leq \pi^*_j (0, 0) - G \left( n^*_j (0, 0) \right) \)

\[
\Pr(z_j = z') = \frac{\exp \left( \pi^*_j (z') - I \left( z = (0,0) \right) G \left( n^*_j (z') \right) \right)}{\sum_{z \in \{(0,0),(1,0),(1,1)\}} \exp \left( \pi^*_j (z) - I \left( z = (0,0) \right) G \left( n^*_j (z) \right) \right)}
\]

A3. Parameters Estimated outside of the Model (To be updated)

A3.1 Out-of-Pocket Health Expenditure

Total medical cost \((tc_k)\) for member \(k\) in household with \((x, INS,m)\) follows

\[
\ln \left( tc_k \right) \sim \ln N \left( \Gamma (x, k, INS, m), \sigma_m^2 \right),
\]

where both the mean and the variance vary with the market \(m\). The mean is given by

\[
\Gamma (x, k, INS, m) = \alpha_{0}^{TC} (INS, gender_k, adult_k) + \alpha_{1}^{TC} (INS, gender_k, adult_k) I (health_k = \text{bad}) + x' \beta^{TC} + \psi_m.
\]

The constant term \( \alpha_{0}^{TC} () \) and the additional cost for unhealthy individuals \( \alpha_{1}^{TC} () \) are allowed to differ across insurance status, gender and whether or not Member \(k\) is an adult. \( \beta^{TC} \) accounts for the correlation between cost and household characteristics \(x\), such as education and marital status. \( \psi_m \) is a state-specific parameter that accounts for geographical heterogeneity.
Then, we estimate the out-of-pocket expenditure as given by

$$\text{OOP}(\cdot) = f(TC, \text{INS}) + r(x, \text{INS}, m)$$

subject to

$$TC = \sum_k t_{ck},$$

where $f(\cdot)$ is the out of pocket medical expenditure given the realized total medical expenditure $TC$ and insurance coverage $\text{INS}$, and $r(\cdot)$ is the average health insurance premium among $(x, \text{INS}, m)$, both of which are calculated from the data.

A3.2 Government Net Transfer Function

$$b(x, m, r, w^m_{shz} + w^m_{shz'}, h, \text{INS}) = -T(x, m, w^m_{shz} + w^m_{shz'}, h) + WB(x, m, w^m_{shz} + w^m_{shz'}, h)$$

$$+ Sub(r, w^m_{shz} + w^m_{shz'}, h, \text{INS}) - PE(x, m, r, w^m_{shz} + w^m_{shz'}, h, \text{INS})$$

where $T$ is the total income tax function, $WB$ is welfare benefit function, $Sub$ is HIX premium subsidy function, and $PE$ is the tax penalty if individuals are uninsured and if individual mandates are implemented in $m$. Following Chan (2013) and Gayle and Shephard (2016), we parameterize the income tax schedule using NBER taxsim, and welfare eligibility using Welfare rules database from the Urban Institute.
9 Figures and Tables

9.1 Time Series Patterns

Figure A-1: Uninsured rate

Figure A-2: Uninsured rate: by Medicaid expansion

Figure A-3: Medicaid Enrollment

Figure A-4: Medicaid Enrollment: by Medicaid expansion
Figure A-9: Non-employment

Figure A-10: Non-employment: by Medicaid expansion

Figure A-11: Part-time among employed

Figure A-12: Part-time among employed: by Medicaid expansion
9.2 Figures: Firm Side Statistics

Figure A-13: Health Insurance Provision

Figure A-14: Health Insurance Provision by firm size (above vs below 50)

Figure A-15: Health Insurance Provision by firm size: Northeast

Figure A-16: Health Insurance Provision by firm size: Midwest
9.3 Tables: Difference in Difference Estimation
<table>
<thead>
<tr>
<th>Term</th>
<th>Coefficient</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAmedexp</td>
<td>0.004</td>
<td>(0.006)</td>
</tr>
<tr>
<td>ACA_medexp_ed_low</td>
<td>-0.028***</td>
<td>(0.005)</td>
</tr>
<tr>
<td>ACA_medexp_ed_high</td>
<td>0.020***</td>
<td>(0.005)</td>
</tr>
<tr>
<td>ACA_medexp_single</td>
<td>-0.046***</td>
<td>(0.004)</td>
</tr>
<tr>
<td>ACA_medexp_nochild</td>
<td>0.022***</td>
<td>(0.004)</td>
</tr>
<tr>
<td>y_2008</td>
<td>-0.004</td>
<td>(0.004)</td>
</tr>
<tr>
<td>y_2009</td>
<td>0.003</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2010</td>
<td>0.022***</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2011</td>
<td>0.037***</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2012</td>
<td>0.041***</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2013</td>
<td>0.033***</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2014</td>
<td>0.012**</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2015</td>
<td>-0.020***</td>
<td>(0.005)</td>
</tr>
</tbody>
</table>

Observations: 793660
Adjustment R-squared: 0.125
State Fixed Effects: YES
Quadratic Trend by Medicaid Expansion: YES

*p<0.10  ** p<0.05  *** p<0.01"
Table 2: Other Insurance Status

<table>
<thead>
<tr>
<th></th>
<th>Medicaid</th>
<th>INDHI</th>
<th>ESHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAmedexp</td>
<td>0.015***</td>
<td>-0.006*</td>
<td>-0.006</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>ACA_medexp_ed_low</td>
<td>0.025***</td>
<td>0.010***</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>ACA_medexp_ed_high</td>
<td>-0.029***</td>
<td>-0.000</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>ACA_medexp_single</td>
<td>0.019***</td>
<td>0.015***</td>
<td>0.012***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>ACA_medexp_nochild</td>
<td>-0.032***</td>
<td>-0.007***</td>
<td>0.011**</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2008</td>
<td>-0.003</td>
<td>0.001</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2009</td>
<td>0.002</td>
<td>0.002</td>
<td>-0.009*</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2010</td>
<td>0.019***</td>
<td>0.002</td>
<td>-0.043***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2011</td>
<td>0.017***</td>
<td>0.000</td>
<td>-0.055***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2012</td>
<td>0.021***</td>
<td>0.005*</td>
<td>-0.066***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2013</td>
<td>0.013***</td>
<td>0.009***</td>
<td>-0.053***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>y_2014</td>
<td>0.027***</td>
<td>0.015***</td>
<td>-0.046***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>y_2015</td>
<td>0.045***</td>
<td>0.051***</td>
<td>-0.057***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Observations</td>
<td>793660</td>
<td>793660</td>
<td>793660</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.075</td>
<td>0.014</td>
<td>0.162</td>
</tr>
<tr>
<td>State Fixed Effects</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Quadratic Trend by Medicaid Expansion</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

"* p<0.10    ** p<0.05   *** p<0.01"
Table 3: Labor Market Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Non-Employed</th>
<th>Part Time</th>
<th>Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAmedexp</td>
<td>0.011*</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>ACA_medexp_ed_low</td>
<td>0.004</td>
<td>-0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>ACA_medexp_ed_high</td>
<td>-0.005</td>
<td>-0.013***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>ACA_medexp_single</td>
<td>-0.005</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>ACA_medexp_nochild</td>
<td>-0.000</td>
<td>-0.006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>y_2008</td>
<td>0.004</td>
<td>-0.006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>y_2009</td>
<td>0.031***</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>y_2010</td>
<td>0.040***</td>
<td>0.013***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>y_2011</td>
<td>0.041***</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>y_2012</td>
<td>0.038***</td>
<td>0.013***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>y_2013</td>
<td>0.025***</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>y_2014</td>
<td>0.021***</td>
<td>-0.004</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>y_2015</td>
<td>0.014**</td>
<td>-0.004</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>793660</td>
<td>586835</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.066</td>
<td>0.034</td>
<td></td>
</tr>
<tr>
<td>State Fixed Effects</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Quadratic Trend by Medicaid Expansion</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

"* p<0.10  ** p<0.05  *** p<0.01"