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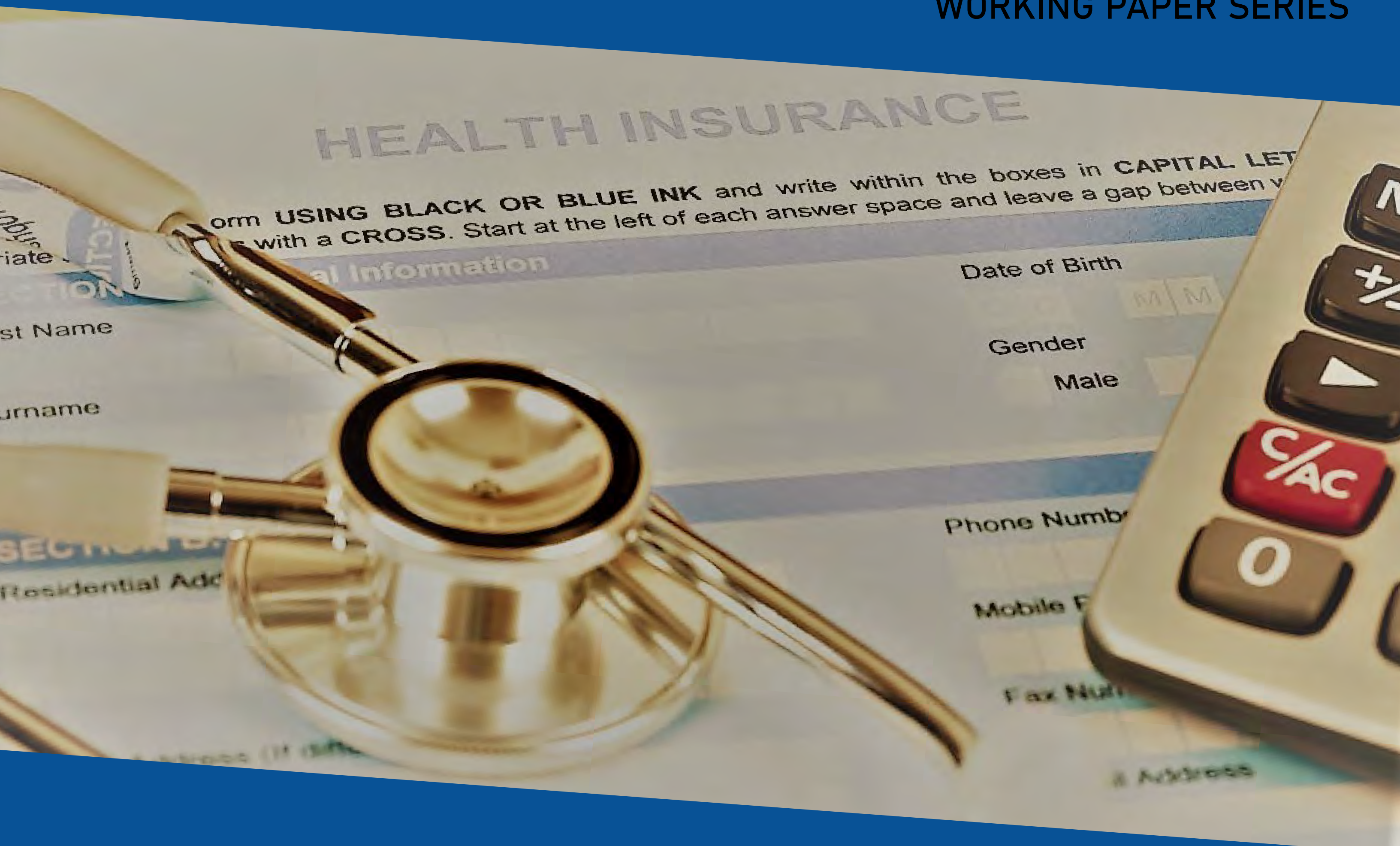

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A Pre-Committed Research Design Over the COVID-19 Recession and Recovery

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The Long-Run Effects of the Affordable Care Act: A Pre-Committed Research Design Over the COVID-19 Recession and Recovery
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Abstract

The long-run costs and benefits of social insurance expansions may not be realized until a program has been in place through a cycle of boom, bust, and recovery. In the case of the Affordable Care Act, the arrival of the program's inaugural bust and recovery have been hastened by the COVID-19 pandemic. In this context, our analysis begins by developing two facts. First, during the pre-pandemic boom, we show that the ACA's effects had largely stabilized by 2016. Second, we develop a new fact involving variations in the ACA's effects across industries. Specifically, we show that the ACA's effects differed dramatically across industries with lower versus higher levels of pre-ACA insurance coverage, and that this difference cannot be explained by differences in workers' incomes or other observable characteristics, nor by geographic differences in pre-ACA uninsured rates. Finally, we set the stage for pre-committed analysis of the ACA's effects over the remainder of the current cycle of boom, bust, and recovery. In so doing, we seek to advance the use of pre-committed research designs in observational settings.

JEL Codes: I13; H51; H53

Keywords: Affordable Care Act; Health Insurance; Social Insurance; COVID-19; Pre-Committed Research Designs

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1 Introduction

A primary goal of social insurance programs is to cushion households against otherwise uninsurable shocks. The Affordable Care Act (ACA), for example, improves insurance access for those who lose jobs during recessions. Because recessions occur irregularly, the ACA's benefits cannot be fully understood until we observe its performance during an economic downturn. Similarly, the distortions created by social insurance programs may take years to fully unfold. A cycle of boom, bust, and recovery is likely necessary before workers and firms respond fully to the ACA's inducements and implicit taxes.

Because of adjustment frictions, it is important for comprehensive analyses of social insurance programs to adopt a long-run perspective. To date, however, evaluations of the ACA's impacts have necessarily been short-run in nature. This reflects the fact that the U.S. experienced a 128-month economic expansion that began nearly a year prior to the adoption of the ACA and continued through February 2020. In this paper, we set the stage for pre-committed analyses of the ACA's effects over the dramatic churn linked to the ongoing COVID-19 pandemic.

Prior research on the ACA has focused on three dimensions along which the law sought to expand insurance coverage. The first is the Dependent Coverage Mandate, which allowed young adults ages 18 and older to remain on their parents' employer-sponsored private health insurance until age 26. The second is state Medicaid expansions to individuals in households with incomes up to 138 percent of the Federal poverty line. The third involves a mix of regulations, mandates, and subsidies that have reshaped the non-group insurance market and, to a lesser extent, the landscape of employer coverage offerings.

Research on the ACA's short-run effects have found its impacts on insurance coverage to be substantial (Akosa Antwi et al., 2013; Kaestner et al., 2017; Courtemanche et al., 2017; Frean et al., 2017; Soni et al., 2017). Additional analyses have found evidence of positive impacts on beneficiaries' financial well-being (Brevoort et al., 2017; Hu et al., 2018) and access to health care (Ghosh et al., 2017; Courtemanche et al., 2018a; Wherry and Miller, 2016), while effects on health outcomes are modest in some studies (Courtemanche et al., 2018b; Wherry and Miller, 2016) and more substantial in others (Miller et al., 2019). Intriguingly, there has been relatively little evidence of impacts of Medicaid expansion on either employer insurance offerings (Frean et al., 2017) or households' labor supply (Kaestner et al., 2017; Duggan et al., 2019; Moriya et al., 2016; Mathur et al., 2016; Duggan et al., 2020). These latter findings are surprising in that they imply smaller effects than were projected by the Congressional Budget Office (Elmendorf, 2010, 2011; Harris and Mok, 2015; Ellis, 2015). Specifically, CBO projected that several million individuals would, on net, lose employer provided coverage (Elmendorf, 2010) and that the ACA might reduce the number of employed persons by around 800,000 (Elmendorf, 2011). It is not yet knowable, however, whether this discrepancy reflects forecasting errors or the short-run nature of existing analyses.

This paper proceeds with three objectives. First, we update existing analyses of the short- to medium-run effects of the ACA's key provisions. Second, we explore a new dimension of heterogeneity in the impact of the ACA's key provisions: insurance coverage rates in the industries in which workers are employed. Third, we lay the groundwork for pre-committed analyses of the ACA's long-run effects.

Using data from the American Community Survey (ACS), we begin by extending existing analyses of the ACA's relatively short- to medium-run effects through 2018. Our initial analysis focuses on the ACA's Medicaid expansions. Consistent with Kaestner et al. (2017), Miller et al. (2019), and Ghosh et al. (2017), we find that Medicaid expansions have resulted in substantial increases in Medicaid coverage, moderately less coverage purchased through insurance exchanges, and modestly less employer coverage. On net, this combination of impacts delivers non-trivial declines in the likelihood that individuals lack insurance coverage. We observe that the short-to-medium-run effects of Medicaid expansions appeared to stabilize by 2016, with little additional change between 2016 and 2018.

Next, we augment prior work through a focus on variations in insurance coverage across industries. Past work has focused primarily on individuals with low levels of education or on geographic regions with low levels of coverage at baseline. We show that Medicaid expansions also had substantial impacts on coverage among individuals in industries with low baseline coverage rates. Importantly, differential impacts on low-coverage (relative to high-coverage) industries persist after re-weighting our samples of high- and low-coverage industries to match on individual-level income, education, other observable characteristics, and core-based statistical area (CBSA)-specific uninsured rates. That is, to shed evidence on whether differences in the ACA's impacts across industries were driven by observable differences in individuals' characteristics, we apply several sets of weights generated through a Coarsened Exact Matching procedure (Iacus et al., 2012). We find that substantial differences in the impact of Medicaid expansions remain after we re-weight based on sets of variables that include all key variables from prominent analyses of heterogeneity in the ACA's effects. This analysis thus documents a new dimension of heterogeneity in the ACA's impacts on the insurance landscape. Variations across industries may be quite important for documenting the ACA's long-run effects, as the COVID-19 recession has come with substantial, industry-level variations in the degree of economic disruption.

We also extend analyses of ACA provisions that took force nationally. This portion of our analysis, which uses sub-state variations in regions' exposure to the ACA's key provisions, most directly follows the approach taken by Courtemanche et al. (2017, 2018b). These earlier analyses of sub-state dimensions of the ACA's effects have long provided evidence of substantial insurance gains associated with the ACA's full set of provisions. Through 2018, we find that rates of uninsurance were reduced by roughly 45 percent in states that expanded Medicaid and 15 percent in states that had not expanded Medicaid. While most of these gains had materialized by 2016, modest additional gains accrued in 2017 and 2018.

Our final objective is to set the stage for analyses of the ACA's long-run effects. In doing so, we seek to make progress in the development of pre-committed research designs in non-experimental contexts. The COVID-19 pandemic creates circumstances that are uniquely suitable for designing pre-committed analyses of the "long-run" effects of the ACA's key provisions. By "long-run" effects, we refer to effects that capture the adjustment of insurance and labor markets following a period of substantial churn. The COVID-19 pandemic has severed employment relationships on an unprecedented scale. The "shape" and precise timing of recovery are uncertain. An initial employment recovery occurred in May and June of 2020, and to a lesser extent in July, August, and September. While employment rates are likely to remain below pre-pandemic levels for an extended period of time, substantial recovery towards those levels will likely continue over the last months of 2020 and first half of 2021.

Our pre-committed analyses take a standard "event-study" structure. That is, we pre-commit to updating analyses that dynamically track the effects of the ACA's provisions over time. Within this structure, our pre-committed analyses relate to specific, empirically testable hypotheses. With respect to the ACA's benefits, for example, we hypothesize that low-education individuals will experience smaller increases in their probability of being uninsured during the pandemic if they live in states that enacted ACA Medicaid expansions. While the direction of this effect may be fully expected, its magnitude is in need of quantification. With respect to the ACA's costs, we hypothesize that the bust and recovery associated with the pandemic will lead to greater declines in employer insurance offerings in states that enacted ACA Medicaid expansions. We further hypothesize that these effects will be particularly large in industries and geographic areas that are disproportionately impacted by both COVID-19 and the initial implementation of the ACA.

As detailed below, the tests of our pre-specified hypotheses will involve comparisons of coefficients within our event study specifications. We will treat the 2020 calendar year as a year of substantial economic downturn, and the 2021 and 2022 calendar years as years of recovery and/or returns towards pre-pandemic conditions. Key sensitivity checks within our pre-specified research design will involve controls for the severity of the COVID-19 pandemic itself. That is, we pre-commit to running a set of specifications that will investigate whether our long-run estimates of the effects of Medicaid expansions are sensitive to controlling for heterogeneity in the COVID-19 pandemic's direct impacts on health and economic well-being. Finally, we pre-commit to exploring heterogeneity in the long-run effects of the ACA by the magnitudes of industry-specific employment shocks caused by the COVID-19 epidemic.

Methodologically, our paper advances the use of pre-committed research designs in observational studies. Recent overviews of key developments in empirical methods have emphasized both pre-analysis plans and transparency in research methods (Currie et al., 2020; Christensen and Miguel, 2018). Christensen and Miguel (2018) note that pre-specified observational studies are exceedingly rare, but that "it would be desirable in our view for more prospective observational research to be conducted in a prespecified fashion."[1] To the best of our knowledge, this paper advances the first pre-analysis plans for asssessing the long-run effects of major entitlement program reforms.

The paper proceeds as follows. Section 2 provides background on key provisions of the ACA. Section 3 describes the data we analyze. Section 4 presents our basic empirical methodology. Section 5 presents our estimates of the effects of the ACA's Medicaid expansions through 2018. Section 6 lays out the empirical tests we commit to running in future years as we investigate the ACA's effects over the course of the COVID-19 pandemic and subsequent recovery. In Section 7 we conclude.

2 Background

The Patient Protection and Affordable Care Act (ACA) substantially reshaped the U.S. insurance landscape. While the ACA was passed and signed into law in March 2010, several of its most impactful provisions took effect in January 2014.[2] These include expansions to states' Medicaid programs, subsidies for purchasing non-group coverage, community-rating regulations, and tax penalties for failure to acquire insurance. An employer-side mandate, also linked to financial penalties, first took effect in 2015.

The ACA's Medicaid expansions are the law's most readily studied component. The ACA's Medicaid provisions expanded eligibility to all individuals in households with in-

[1] In the economics literature, the sparse available examples are concentrated in the minimum wage literature. They include an early pre-specified analysis by Neumark (2001), as well as more recent analyses by Clemens and Strain (2017) and by Neumark and Yen (2020).

[2] The Dependent Coverage Mandate (DCM) was adopted in September 2010.

comes less than 138 percent of the federal poverty line. As of August 2020, 12 states had declined to implement Medicaid expansions, while 38 states and the District of Columbia had moved forward. Among the expansion states, 24 had implemented their Medicaid expansions as of January 2014. The others moved forward in later years. We present this variation in the timing of states' Medicaid expansions in Figure 1. The Congressional Budget Office's (Elmendorf, 2010) initial forecast estimated that, if implemented nationwide, these expansions would extend coverage to roughly 16 million individuals as of 2018.

The ACA's other primary tool of coverage expansion is its subsidies for the purchase of insurance in the individual marketplace (i.e., the "insurance exchanges"). These provisions are also substantial. The Congressional Budget Office's (Elmendorf, 2010) initial forecast estimated that these subsides, coupled with regulation of the individual market, would extend coverage to roughly 23 million individuals as of 2018. This element of the ACA is more difficult to study than the Medicaid expansion due to the national level of its implementation. The subsidies do, however, have a steep income gradient. For individuals with incomes just above the poverty line, subsidies for purchasing a so-called "Silver" plan exceed 80 percent of such a plan's full premium in many geographic markets. The subsidies phase out as incomes rise to 400 percent of the poverty line. This income gradient creates substantial variations in the ACA's impacts across geographic areas, demographic groups, and industries.

Like the exchange subsidies, the ACA's individual and employer mandates were also implemented nationally. The individual-level mandate was implemented in 2014. The penalties associated with the mandate rose in magnitude from 2014 through 2016. The mandate was repealed as of 2019, however, through the 2017 Tax Cuts and Jobs Act. The employer mandate took effect in 2015 and, in contrast with the individual mandate, has not been repealed.

The employer mandate's rules are complex and its implementation somewhat opaque. Its key feature is that substantial penalties apply to large firms whose employees make use of the law's subsidies and who have not offered their employees an insurance benefit that qualifies as "affordable."

The national nature of the ACA's subsidies and mandates make it difficult to study their effects. Existing studies have made progress by exploiting their differential bite on areas with low levels of coverage at baseline (Courtemanche et al., 2017, 2018b; Duggan et al., 2019; Frean et al., 2017). As detailed below, we follow the approach taken by these past studies. Further, we add analyses that exploit variations in the ACA's effects across industries.

3 Data

The primary data source we use in our analysis is the American Community Survey (ACS). The ACS is the largest household survey data set with consistent documentation of individuals' insurance coverage throughout our analysis sample. We pool data from the years 2011 through 2018 and track the relationship between the ACA's key provisions and 4 distinct variables that relate to insurance coverage. These include indicator variables for whether an individual is covered by (i) Medicaid, (ii) employer provided insurance, (iii) other forms of private insurance, or (iv) for whether the individual is uninsured.

We focus our analysis on sub-groups of the population who are disproportionately likely to be impacted by the ACA's Medicaid expansions. Following much of the prior literature (Courtemanche et al., 2017; Kaestner et al., 2017), the first sub-sample on which we focus consists of individuals with no more than a high school education. The second sub-sample on which we focus is new to the literature on the ACA's effects. We add to the literature by analyzing insurance coverage among individuals employed in industries that had low rates of employer insurance coverage at baseline (2011-2013). In particular, we focus on industries in the lowest quartile of the coverage distribution. In Appendix Tables A.1 through A.4, we document the industries that fall into the lowest (Table A.1) through highest (Table A.1) quartile of insurance coverage rates in 2011-2013, prior to the implementation of the ACA's major provisions. In the lowest quartile of pre-ACA employer insurance coverage (25.0% to 57.5%), we find industries including child day care services, sporting goods, grocery stores, clothing stores, florists, beer and liquor stores, construction, home health care services, and warehousing. By contrast, in the upper quartile of coverage (pre-ACA employer insurance coverage rate of 78.4% to 92.0%), we find public utilities, elementary and secondary education, hospitals, finance and insurance, and scientific research and development.

We use several sets of ACS variables as controls. These include demographic characteristics, such as age and education. We also consider controls for other aspects of the households in which each individual resides. Finally, we consider macroeconomic and labor market data that proxy for the overall condition of a state's labor market. Specifically, we control for state-level unemployment rates (obtained from the Bureau of Labor Statistics), log income per capita (from the Bureau of Economic Analysis), and a median house price index (from the Federal Housing Finance Agency).

The primary policy variation in our analysis is driven by the ACA. The Kaiser Family Foundation is our source of data on the dates on which each state enacted an ACA Medicaid expansion. In some specifications, we use baseline (2013) rates of insurance coverage to capture a sub-state dimension of the ACA's potential impact. In these specifications, we follow the approach of Courtemanche et al. (2017, 2018b).

Finally, we are interested in variations driven by the labor market churn associated with COVID-19. As has been documented by Kahn et al. (2020), COVID-19's impact on labor demand exhibits variations both across industries and across states. Variation across industries is of interest in our analysis as a source of substantial labor market churn. However, variation across states is also a potential threat to our identification strategy, as detailed below. We thus consider control variables related to state-specific COVID-19 case and death rates (collected by the *New York Times*).[3]

4 Methodology

We present estimates of the ACA's effects from standard program evaluation models. The first is the basic difference-in-differences model described by equation (1).

$$\begin{aligned} Y_{i,s,t} = {} & \beta \text{Medicaid Expansion}_{s,t} + \mathbf{State_s}\alpha_1 + \mathbf{Time_t}\alpha_2 \\ & + \mathbf{X_{i,s,t}}\gamma + \varepsilon_{i,s,t}, \end{aligned} \tag{1}$$

where i indexes individuals, s indexes states, and t indexes years. Medicaid Expansion$_{s,t}$ is set equal 1 for all state-year combinations during which an ACA Medicaid expansion was in effect, and equal to 0 otherwise.

Our baseline specification includes state and time fixed effects (the vectors α_1, and α_2). The coefficient of interest, β, is therefore a difference-in-differences estimator of the effect of

[3] State-level COVID-19 case and mortality data are available at: `https://github.com/nytimes/covid-19-data`

Medicaid expansions on the outcome, Y. The fixed effects in equation (1) control for time-varying shocks at the national level as well as baseline differences in outcomes across states. The identifying assumption is that the outcome of interest would have followed similar trends across states if not for differences in their Medicaid expansion status.

We further control for a range of other factors ($\mathbf{X_{i,s,t}}$) that may have shaped insurance coverage during the time period covered by our analysis. To control for variation across states in the evolution of macroeconomic well-being, such as differences in economic recoveries following the Great Recession, we add controls for state-level unemployment rates (obtained from the BLS), per capita income (from the BEA), and a median house price index (from the FHFA). These controls are important because incomes and the generosity of employer insurance benefits tend to fluctuate with economic conditions, and the latter may be correlated with states' Medicaid expansion decisions.

We also present estimates using the event-study specification described by equation (2).

$$Y_{i,s,t,e(s,t)} = \sum_{e \neq -1} \delta_e 1\{\text{Medicaid Expansion}\}_{s,t} \times 1\{\text{Event Year}\}_{e(s,t)} \\ + \mathbf{State_s}\alpha_1 + \mathbf{Time_t}\alpha_2 + \mathbf{X_{i,s,t}}\gamma + \varepsilon_{i,s,t}. \tag{2}$$

Equation (2) differs from equation (1) in terms of the manner in which we specify the policy variation. The subscript e corresponds with "event time," meaning the number of years before or after a state implements a Medicaid expansion. In the summation, the omitted interaction between the Medicaid expansion indicator variable and the time dummy variables corresponds with the year prior to the implementation of a state's Medicaid expansion (i.e., the year for which $e(s,t) = -1$). Each δ_t can thus be described as a difference-in-differences style estimate of changes in insurance coverage rates in states that enacted Medicaid expansions relative to those that did not. Each estimate captures a differential change from year e relative to the omitted time period year $e(s,t) = -1$.

The event-study specification provides a standard check for the potential relevance of divergent pre-existing trends. Specifically, we can learn about the presence of divergent pre-existing trends by inspecting the estimates of δ_t for event years preceding the implementation of Medicaid expansions. It will tend to be reassuring if the pre-implementation δ_t coefficients are economically and statistically indistinguishable from 0. The smaller the confidence intervals on these estimates, the stronger the test.

A third specification we estimate uses variation in the ACA's impact across core-based statistical areas (CBSAs). The specification was developed by Courtemanche et al. (2017) and used for additional analysis in Courtemanche et al. (2018a,b). Using the event-study specification below, the basic idea is to use variation in baseline (2013) uninsured rates at the level of the CBSA to estimate the effects of the ACA's nationally implemented provisions:

$$
\begin{aligned}
Y_{i,a,s,t,e(s,t)} = & \sum_{e \neq -1} \gamma_t \text{Uninsured}_{a,s} \times 1\{\text{Medicaid Expansion}\}_{s,t} \times 1\{\text{Event Year}\}_{e(s,t)} \\
& + \sum_{e \neq -1} \theta_t \text{Uninsured}_{a,s} \times 1\{\text{Event Year}\}_{e(s,t)} \\
& + \sum_{e \neq -1} \delta_t 1\{\text{Medicaid Expansion}\}_{s,t} \times 1\{\text{Event Year}\}_{e(s,t)} \\
& + \mathbf{Area_{a,s}}\alpha_1 + \mathbf{Time_t}\alpha_2 + \mathbf{X_{s,t}}\phi + \varepsilon_{i,s,t} \qquad (3)
\end{aligned}
$$

In equation (3), a indexes the CBSA and $\mathbf{Area}_{a,s}$ is a set of dummy variables for each CBSA. As described by Courtemanche et al. (2017), the effects of ACA features other than the Medicaid expansion are estimated by θ_t. These are the coefficients on the interaction between $\text{Uninsured}_{a,s}$ and the event-year dummy variables ($1\{\text{Event Year}\}_{e(s,t)}$). In states that enacted Medicaid expansions, the additional effect of the expansion is estimated by γ_t. These are the coefficients on the interaction between $\text{Uninsured}_{a,s}$, $1\{\text{Medicaid Expansion}\}_{s,t}$, and the event-year dummy variables ($1\{\text{Event Year}\}_{e(s,t)}$). We follow Courtemanche et al. (2017) in presenting both the coefficients themselves and linear combinations that capture the effects of the ACA's provisions at the mean level of $\text{Uninsured}_{a,s}$, which is 20.5 percent.

Our goal in estimating equation (3) is to identify the causal effects of the ACA's key provisions on insurance coverage. As with our estimate of β from equation (1), the key assumption we must make for θ_t and γ_t to identify the ACA's effects has a "parallel trends" flavor. We must assume that baseline rates of uninsurance are not correlated with differential trends in our outcomes of interest. While we cannot test this assumption directly we can, once again, conduct two sets of checks. We investigate robustness to the inclusion of plausibly relevant covariates and we confirm that trends were parallel prior to the ACA's implementation.

5 Results

In this section we discuss our results. In section 5.1 we present time series on the evolution of key outcomes. In section 5.2 we present estimates of the effects of the ACA's Medicaid expansions using the basic difference-in-differences model of equations (1) and (2). In section

5.3 we present estimates of equation (3), which attempts to capture the effects of the ACA's full set of provisions.

5.1 Time Series Figures

In this section we present time series on the evolution of insurance coverage. We focus on coverage rates among individuals in groups that were most directly affected by the ACA's key provisions. To provide suggestive initial evidence on the impact of the ACA's Medicaid expansions, we present separate time series for individuals in states that implemented Medicaid expansions versus those that did not.

Figure 2 is organized as follows. The four panels in the first row present data on insurance coverage among individuals with no more than a high school education. Each panel corresponds with a different type of insurance coverage. The second row presents data on insurance coverage among individuals who were employed in industries with relatively low rates of coverage at baseline.

It is clear that Medicaid coverage did indeed expand far more in states that enacted Medicaid expansions than in states that did not. Among individuals with no more than a high school education, Medicaid coverage rose by roughly 7 percentage points between 2013 and 2016; in states that did not expand Medicaid it changed negligibly. We see similar changes in Medicaid coverage among individuals employed in industries that had insurance rates in the lowest quartile of the coverage distribution at baseline (measured in 2011-2013).

Differential changes in coverage for individuals employed in industries with high versus low rates of coverage at baseline may reflect contributions from a broad set of the ACA's provisions. Among individuals who lacked coverage at baseline, for example, those with the lowest incomes may be eligible for the ACA's Medicaid expansions. Many more, who earn incomes in excess of Medicaid eligibility thresholds, became eligible for subsidized coverage. Those with higher incomes would face higher penalties for failing to acquire coverage. Finally, as of 2015 these individuals' employers would risk incurring penalties if they failed to provide access to "affordable" coverage, as defined by the ACA.

In panel A of Figure 3, we present four time series on the fraction of individuals with any source of insurance coverage. The four time series are associated with the four quartiles of the distribution of workers as divided on the basis of their industries' baseline (2011-2013) coverage rates. Coverage gains after 2013 are much larger for individuals in industries that had lower rates of coverage at baseline. The scatter plot in Panel B shows the correlation between coverage changes and baseline coverage rates at the level of 4-digit industry codes. The negative correlation between coverage gains and baseline coverage rates is remarkably strong.

As presented in Figure 3, we have taken no steps to isolate the relevance of industry coverage offerings from other factors. That is, the patterns we observe in Figure 3 might be explained by correlations between industry and worker or locational characteristics that have been explored in past research on the ACA's effects. We thus take our analysis of the ACA's impact across industries a step further by using a coarsened exact matching (CEM) procedure.[4] We use this procedure as an approach to accounting for the fact that individuals

[4] We implement the coarsened exact matching (CEM) procedure described in Iacus et al. (2012) using the Stata package developed by Blackwell et al. (2009). This procedure increases balance between our samples of individuals in industries with high baseline coverage rates relative to those in industries with low baseline coverage rates. Among the low baseline coverage industries, individuals with high education and high income are less common. The CEM procedure up-weights individuals with less common characteristics. We create CEM weights to match both high early coverage to low early coverage and low early coverage to high

in industries with low baseline coverage rates also tend, on average, to have lower levels of education and lower levels of earnings than those in industries with high baseline coverage rates. Because there is substantial variation in both coverage and demographic characteristics across those employed in various industries, we can reweight samples to match "high" and "low" baseline coverage industries on these other characteristics.

In addition to presenting results that reweight by demographic characteristics, we present results that reweight by demographics plus average industry earnings, and by demographics plus average industry earnings plus geographic differences in baseline coverage rates. We do this so that our reweightings incorporate the primary demographic and geographic dimensions along which past work has analyzed heterogeneity in the ACA's effects.

In Figure 4, we present time series that have been reweighted using the exact coarsened matching procedure. In panels A and D of Figure 4, we reweight to account for education levels, average weeks of work, average hours worked per week, and annual income. In panels B and E, we add industry earnings to the set of characteristics on which we match. In panels C and F, we add geographic variations in baseline (2013) uninsured rates measured at the CBSA level. In panels A, B, and C, we re-weight the characteristics of individuals in the top quartile of the industry-specific insurance coverage distribution to match those in the bottom quartile. In panels D, E, and F we re-weight individuals in the bottom quartile

early coverage. Our first CEM procedure matches on 4 individual-level dimensions, namely personal income, education, weeks worked last year, and hours per week worked last year. We also provide estimates where we match on a 5th dimension, average industry earnings, as well as a 6th dimension, geographic variations in uninsured rates prior to the implementation of the ACA's Medicaid expansions and exchange subsidies. The patterns of weights associated with our 4-dimensional, 5-dimensional, and 6-dimensional CEM re-weightings are presented in tables A.6, A.7, and A.8, respectively. In each of these tables, Panel I illustrates how individuals with relatively high socioeconomic status (e.g., high incomes and high levels of education) are assigned low weights when reweighting the high baseline coverage sample to look more like the low baseline coverage sample. Conversely, Panel II of each table illustrates how individuals with relatively high socioeconomic status are assigned high weights when reweighting the low baseline coverage sample to look more like the high baseline coverage sample.

of the industry-specific insurance coverage distribution to match those in the top quartile. The figures are strongly suggestive that the ACA's full set of provisions had substantially larger effects on industries with low baseline coverage rates than on those with high baseline coverage rates. Reweighting with respect to demographic differences, differences in industry earnings, and geographic differences in baseline coverage rates has only a modest impact on the size of the differential coverage gains for individuals in industries with low rates of coverage at baseline.

Across Figures 2, 3, and 4, it is apparent that overall rates of insurance coverage rose substantially during our sample period. In our low-education samples, the fraction without insurance declined by roughly 9 percentage points averaged across the expansion and non-expansion states. In our sample selected on the basis of industry, the fraction without insurance also declined by an average of roughly 9 percentage points.

Finally, while coverage gains through Medicaid expansions were partially offset through other sources of coverage, overall coverage gains were greater in expansion states relative to non-expansion states. In both of the samples we analyze, the fraction uninsured declined by roughly 4 percentage points more in states that expanded their Medicaid programs. Also in both samples, this 4 percentage point relative gain is roughly half the magnitude of the relative increase in Medicaid coverage. This primarily reflects the fact that individuals in states that did not expand Medicaid were moderately more likely to obtain coverage with the assistance of subsidies through the ACA's exchanges.

5.2 Estimates of the Effects of the ACA's Medicaid Expansions on Insurance Coverage Through 2018

In this section we present estimates of the effects of the ACA's Medicaid expansions using the basic difference-in-differences models of equations (1) and (2). Figure 5 presents estimates of equation (2). The panels are organized in the same order as the panels of Figure 2.

The estimates in Figure 5 are in line with what one would tend to predict by looking at the time series in Figure 2. Among those with no more than a high school education, Medicaid expansions generated an additional 4 to 5 percentage point decline in the fraction uninsured within 3 years of the expansion's implementation. The equivalent figure for those employed in industries with low baseline coverage rates is just under 4 percentage points. As in the time series figures, these declines are driven by relative increases in Medicaid coverage that are on the order of 8 percentage points, coupled with moderate offsets in coverage through employers or through subsidized exchange coverage. The exchange coverage offset is relatively modest for the sample selected on the basis of education. This is related to the fact that a non-trivial fraction of the individuals in this sample are not employed, and thus do not have incomes sufficiently high to qualify for subsidies on the exchanges. Among the individuals employed in industries with low baseline coverage rates, by contrast, the vast majority have incomes that make them eligible for subsidies. In all cases, we find that the effects of the Medicaid expansions stabilize around two years after enactment (2016 for most Medicaid expansion states).

An examination of event-study analyses for those with a college education or more (Appendix Figure A.5, Panel I) and employed in industries in the highest quartile of baseline insurance coverage (Panel II) reflect much smaller impacts of state Medicaid expansions for these groups. This is expected, as individuals with higher education and working in industries with higher baseline coverage rates are far less likely to live in households with incomes less than 138 percent of the Federal poverty line. Notably, the effects that we detect for individuals with a college education or more are in line with what we would expect given the poverty rates of such individuals. For example, for those with a college degree or more, the poverty rate according to 2018 census data was 4.4 percent, while the estimated effect of the Medicaid expansion is approximately 2 percentage points. This is roughly the same ratio we find for those with a high school education or less, who have a poverty rate of 16.1 percent and for whom the estimated effect of Medicaid expansion on Medicaid coverage was roughly 8 percentage points.

Tables 2 and 3 present estimates of equation (1), which summarize the effects of states' Medicaid expansions in a single coefficient. The estimates are as one would expect based on Figures 2 and 3. For both the low education and low baseline coverage samples, Medicaid expansions generate a 7 percentage point gain in Medicaid coverage and a 2.5 to 4 percentage point decline in the fraction uninsured, depending on the sample and precise specification. The columns of each table reveal that these results are quite robust to whether the specifications include controls for the demographic characteristics of the individuals in the sample and proxies for variations in states' economic conditions. We find no evidence that these results are contaminated by sample selection bias, as state Medicaid expansions are not found to be systematically related to education, employment, or baseline (2013) industry-specific insurance coverage rates (see Appendix Table A.5).

Table 4 presents additional evidence on the relevance of industries' baseline coverage rates. In contrast with our earlier evidence on variations in coverage gains across industries, the analysis in Table 4 focuses on the effects of Medicaid expansions rather than on the effects of the ACA as a whole. All estimates in the table are of equation (1). Panels A and B contrast the effects of ACA Medicaid expansions on individuals in industries with low baseline coverage rates (panel A) to those in industries with high baseline coverage rates (panel B). Comparisons of column 1 to columns 2 through 4 reveal the extent to which estimates are sensitive to reweighting the samples using the coarsened exact matching procedures discussed in sub-section 5.1. In each instance, we reweight the sample of individuals from high baseline coverage industries to more closely resemble the sample from low baseline coverage industries.[5] Note that as we move from columns (1) through (4), the number of observations for each regression falls as we apply CEM weights to assure common support. Few observations are lost as we move from column 1 to column 2. This reflects the fact that, on key individual-level covariates, individuals employed in industries with low versus high baseline coverage rates share nearly complete common support. The sample declines considerably when moving from column 2 to column 3. This reflects the fact that average, industry-wide earnings is our primary matching variable along which individuals employed in industries with low versus high baseline coverage rates lack widespread common support.

The estimates in Table 4 reveal that Medicaid expansions had greater effects on individ-

[5]For our analysis of Medicaid expansions, reweighting the sample of individuals from high baseline coverage industries to more closely resemble the sample from low baseline coverage industries is the only direction in which reweighting makes sense. The reason for this is that individuals with middle or high levels of income are ineligible for Medicaid whether a state expanded Medicaid or not. Because the vast majority of individuals in industries with high baseline coverage rates have middle or high levels of income, reweighting the low baseline coverage sample yields a sample that, on a weighted basis, is largely ineligible for the program under analysis. By contrast, reweighting the high baseline coverage sample yields a sample with more potential exposure to Medicaid expansions. This allows us to answer the question of interest: do individuals with similarly high levels of potential eligibility, as determined primarily by income, experience weaker effects of Medicaid expansion if they are employed in an industry that had a high rate of employer coverage at baseline?

uals in industries with low rates of coverage at baseline relative to those in industries with high rates of coverage at baseline. Within the table, the most consistent and most important finding pertains to overall coverage. Whether we apply our reweighting methodolologies or not, we find that Medicaid expansions led overall coverage to rise just over two percentage points more among individuals in industries with low baseline coverage rates than among individuals in industries with high baseline coverage rates. When we apply no reweighting, the estimated effects of Medicaid expansions are a 3.3 percentage point gain in coverage for those in low baseline coverage industries and a 0.5 percentage point gain in coverage for those in high baseline coverage industries. The differential gain is thus 2.8 percentage points. When we apply our most extensive reweighting (column 4), the estimated effects are a 2.2 percentage point gain in coverage for those in low baseline coverage industries and a 0.2 percentage point gain in coverage for those in high baseline coverage industries. The differential gain is thus 2.0 percentage points.

What sources of coverage account for the differential effect of Medicaid expansions on individuals in industries with low rates of coverage at baseline relative to those in industries with high rates of coverage at baseline? Our estimates uniformly suggest that Medicaid coverage *per se* is an important source of the differential gain. The increase in Medicaid coverage for those in low baseline coverage industries exceeds the increase in Medicaid coverage for those in industries with high baseline coverage by at least 1 percentage point in each of our specifications. The evidence is mixed on whether there are additional contributions from other sources of coverage. While there is clearly a role for coverage through Medicaid *per se*, the evidence does not support taking a strong stand on the full set of sources underlying the overall differential coverage gains.

The findings in Table 4 represent an important contribution to the existing literature by documenting a new dimension along which the ACA had heterogeneous bite. Our analysis thus far has shown that individuals in industries with low rates of coverage at baseline benefited disproportionately from both Medicaid expansions and from the full set of provisions in the Affordable Care Act. Our reweighting procedures ensure that these results are not driven by a broad set of individuals' observable economic and demographic characteristics. This includes their income, education, weeks worked last year, hours per week worked last year, average earnings in their industry of employment, and geographic differences in baseline coverage rates. The analysis thus shows that baseline coverage in an individual's industry of employment is a novel, empirically relevant dimension of the ACA's impacts. That is, it is a dimension not captured by prior analyses of heterogeneity in the ACA's impacts across geographic areas and across socioeconomic groups.

5.3 Estimates of the Overall Effects of the ACA's Through 2018

In this section, we present estimates of equation (3), which attempts to capture the effects of the ACA's full set of provisions. As discussed in section 4, estimates of equation (3) capture variations in coverage gains both across states and within states. Estimates of variations in within-state coverage gains are generated using variations in the ACA's potential impact across commuting areas. As shown in Table 5, the estimates suggest that both the ACA's Medicaid expansions and other provisions had substantial impacts on coverage.

The interpretation of the estimates in Table 5 is somewhat subtle. Consider the estimates in rows 2 and 3 of column 3. The estimate in row 2 implies that in states that did not implement Medicaid expansions, a 10 percentage point lower baseline coverage rate predicts a 1.55 percentage point larger coverage gain after the ACA's key provisions went into effect. The estimate in row 3 implies that this differential coverage gain was an additional 2.9 percentage points larger in states that enacted Medicaid expansions. One way to interpret these estimates is to say that implementation of the full ACA (including the Medicaid expansions) reduced baseline differentials in the fraction uninsured by roughly 44 percent (0.15 plus 0.29). The entries in panel B convert the estimates from panel A into percentage point gains in coverage estimated at the mean level of the baseline fraction uninsured. Estimated at this mean of 20.3 percent, the gain in non-expanding states was roughly 3 percentage points while the gain in expanding states was roughly 9 percentage points.

The estimates in Table 5 are subject to more identification threats than our earlier estimates. In particular, it is crucial to make use of event-study estimators to check whether areas with relatively low baseline coverage rates were experiencing more rapid coverage gains prior to the implementation of the ACA's key provisions. The event-study estimates, as presented in Figures 11 and 12, reveal that this was not the case. This is consistent with the analysis of Courtemanche et al. (2017, 2018a,b) in support of this estimation framework.

6 Pre-Analysis Plan

In this section, we lay out our pre-analysis plan, including the specific hypotheses we propose to test. Our pre-committed analyses will occur within the "event-study" estimation frameworks described by equations (2) and (3). In one sense, the analysis is straightforward, as it involves updating estimates that dynamically track the effects of the ACA's provisions over time. Within this structure, our pre-committed analyses relate to specific, empirically testable hypotheses.

Our hypotheses involve key dimensions of the ACA's benefits and costs. With respect to the ACA's benefits, we hypothesize that low-education individuals and those last employed in low-coverage industries will experience smaller increases in their probability of being uninsured during the pandemic if they live in states that enacted ACA Medicaid expansions. With respect to the ACA's costs, we hypothesize that, in COVID-19's wake, low-education individuals and those employed in low-coverage industries will become less likely to have employer provided insurance in states that enacted Medicaid expansions than in those that did not. We further hypothesize that these effects will be particularly large in industries and geographic areas that are disproportionately impacted by both COVID-19 and the initial implementation of the ACA. Finally, while the focus of our analysis is on the long-run effects of the ACA on insurance coverage, in our pre-committed analysis we extend our set of outcomes to include employment.

Figures 6, 7, 8, 9, 10, 11 and 12 illustrate our key hypotheses. For ease of exposition, we limit the samples underlying these figures to states that never expanded their Medicaid programs and states that implemented Medicaid expansions in 2014. Because the "treatment" states in these samples implemented their Medicaid expansions during the same year, event time corresponds perfectly with calendar time. To date, ACS data have only been released through 2018. Estimates for 2019 through 2022 are thus hypothetical. The hypotheses we commit to testing involve the equality of coefficients associated with calendar years 2020, 2021, and 2022 relative to calendar years 2018 and 2019. As illustrated in the figures, our key hypotheses involve additional impacts of Medicaid expansion on coverage for our samples of individuals with no more than a completed high school education or who are employed in industries with low coverage rates at baseline.

The economic content of our hypotheses relate to the long-run dynamic effects of the ACA's key provisions. The key challenge for our pre-committed analyses is that variations in exposure to the ACA, as captured by our initial analyses, may also be correlated with variations in exposure to COVID-19. For our purposes, spatial correlation between ACA exposure and the pandemic's direct impact are a potential source of bias. Bias could also result from spatial correlations between ACA exposure and subsequent state-level policy changes. Designing robustness analyses that will test the relevance of these potential threats to identification requires applying subject matter knowledge. Importantly, the pandemic or policy environment may take turns for which it is not possible to pre-specify a fully satisfactory set of robustness checks. It is thus necessary to pre-specify a measure of discretion to account for unpredictable developments through additional robustness analyses.

Through September 2020, there were substantial variations in the COVID-19 pandemic's direct impacts on population health. Appendix Figure A.1 shows variation across states in cumulative COVID-19 cases per 100,000 individuals (panel A) and in COVID-19-related mortality rates (panel B). Spikes in new cases also varied substantially across time (panel C) with the largest outbreaks occurring in the Northeast coming first (March-April), followed by the South and Southwest (May-July), and then the Midwest (August-September). These geographic dimensions of the pandemic are relevant for our purposes because they reveal the extent to which Medicaid expansion states (Figure 1) are correlated with states hardest hit by COVID-19 (Appendix Figure A.1). While there is some evidence that states with the highest cumulative COVID-19 case and mortality rates were less likely to enact ACA

Medicaid expansions, there is substantial variation in COVID-19's bite across both expansion and non-expansion states.

In Appendix Figure A.2, we show cross-state variation in the peak decline in monthly employment over the period from January 2020 through August 2020. Again, while those states that were hardest hit by the COVID-19-related recession were more likely to expand Medicaid, there is substantial, overlapping variation in employment shocks across expansion and non-expansion states. In summary, there is sufficient spatial heterogeneity in the depth of COVID-19's health and employment shocks in both expansion and non-expansion states to permit us to disentangle the long-run effects of the ACA from the short-run effects of COVID-19 *per se*.

In light of the data discussed above, a key component of our pre-committed analysis is that we will investigate the robustness of our results to controlling for variations in both the health and employment impacts of the COVID-19 pandemic. Our controls for the pandemic's severity will attempt to balance between standard conserves of both "under-" and "over-" controlling. To construct controls for health shocks, we will interact measures of cumulative cases and cumulative deaths per capita with a sparse set time dummy variables. More specifically, the time dummy variables will include an indicator for 2020 and a single indicator for all subsequent years (namely 2021 and 2022). The case count and death rate variables will be continuous, time varying values corresponding with cumulative per capita counts as of the end of each calendar year. Controlling for this set of interactions will allow for the possibility that outbreaks of differing sizes impacted our outcomes of interest and that this relationship may evolve from 2020 to later years. We will similarly interact measures of each state's peak employment decline, in percent terms, the time dummy variables described above. Here again, the resulting control variables will allow for the possibility that outbreak-induced employment declines had impacts that evolved from 2020 through subsequent years. The strength of the conclusions we can draw will depend in part on the robustness of our estimates as we introduce control variables along these lines.

A final analysis of interest involves making use of cross-industry variations in the amount of labor market churn that has resulted from COVID-19. In our pre-committed analyses, we are interested in understanding the long run effects of the ACA's key provisions. We define this to mean the effects as they emerge following a period of substantial churn. Beyond the overall churn associated with COVID-19, variations in COVID-19's impacts across industries may also be informative. Analyzing such variations requires making a subtle distinction between variations of interest and sources of potential bias.

With respect to COVID-19's impacts, what constitutes a potential source of bias and what constitutes a variation of interest for our purposes? As noted above, variations in COVID-19's impacts across the geographic areas that constitute our "treatment" and "control" groups (e.g., states that did vs. did not enact Medicaid expansions), is a potential threat to the validity of our estimation frameworks. Variations of this sort motivate the control variables discussed above. Variation in COVID-19's impact across industries *within* our treatment and control groups, however, is of potential interest.

Across lower-paid, lower-coverage industries, there have been substantial variations in the COVID-19 pandemic's impacts. The pandemic's effects on restaurants, hotels, and drinking establishments, for example, has been remarkably large. The pandemic's effects on grocery stores, other essential retail, and retail trade more broadly, by contrast, has been less pronounced. Across the Leisure and Hospitality supersector as a whole, for example, employment declined (as measured using the Current Employment Statistics data) from 16.9 million in February to 8.5 million in April, or by 50 percent. Across the Retail Trade sector, by contrast, employment declined from 15.6 million in February to 13.3 million in April, or by 15 percent. In Appendix Figure A.3, we show monthly declines in employment for three industry sectors in the lowest quartile of insurance coverage: grocery stores, food service and drinking places, and leisure and hospitality using data from the Current Employment Statistics survey. We demonstrate that the COVID-19 epidemic hit the food service/drinking and leisure/hospitality sectors much harder than grocery stores, as the latter were classified as essential businesses during COVID-19-related shutdowns. During the recovery from COVID-19, it will thus of interest to compare the effects of Medicaid expansions on employees in the Leisure and Hospitality sector relative to employees in industries that have similar earnings profiles, but that experienced less severe disruption from COVID-19.

Our approach to analyzing the implications of variations in churn across industries will begin with the event-study specifications described by equations (2) and (3). Specifically, we will estimate equations (2) and (3) separately on each 3-digit and 4-digit NAICS industry code. For each industry, we will then calculate the change in the estimated impact of the ACA's Medicaid expansions (equation (2)) or of all ACA provisions (equation (3)) between 2019 and later years. We will then investigate how these estimates of the additional, long-run effects of the ACA's provisions relate to the amount of churn each industry experienced due to the pandemic. Our estimates of the amount of industry-specific churn will make use of high quality employment counts from the Quarterly Census of Employment and Wages. In comparing industries that experienced different degrees of churn, it will be important to either control for or match on each industry's average earnings so that our estimates are not contaminated by cross-industry variations in workers' exposure to the ACA's key provisions.

The uncertainties facing the design of this final piece of analysis are substantial. While it is presently possible to sketch an analysis plan with the above level of detail, we anticipate that this last piece of analysis may encounter hurdles that it is difficult for us to anticipate. This portion of our long-run study may thus require more discretion than our relatively straightforward updates to the event-study frameworks that are familiar from the existing literature on the ACA's effects.

7 Conclusions

Our analysis in this paper has pursued two objectives. First, we have updated and expanded on existing analyses of the short- to medium-run effects of the ACA's key provisions on insurance coverage. This analysis yields two findings. In the context of the early-to-mid-2010s economic expansion, we find that the ACA's impacts on insurance markets had largely stabilized as of 2016. Estimated effects evolved quite modestly over subsequent years. Our second finding is that the ACA had significantly heterogeneous effects across industries. Specifically, we show that the ACA had greater effects on individuals employed in industries with low rates of employer coverage at baseline. Further, we use a coarsened exact matching procedure to show that this finding cannot be explained by observable differences in the income, education, or other key characteristics of these industries' employees relative to the employees of industries with higher baseline coverage rates. We thus provide novel evidence that the ACA can be interpreted as filling gaps in the pre-existing landscape of employer-driven coverage.

Second, we lay the groundwork for pre-committed analyses of the ACA's long-run effects. The COVID-19 pandemic creates circumstances that are perhaps uniquely suitable for designing pre-committed analyses of the "long-run" effects of the ACA's key provisions. Because the COVID-19 pandemic has severed employment relationships on an unprecedented scale, it will provide evidence on the ACA's capacity to help those who lose jobs to maintain insurance coverage. The post-pandemic recovery will provide additional evidence on the ACA's effects on both employment and employer coverage following a period of substantial churn.

Through our development of a pre-analysis plan, we seek to make progress in the development of pre-committed research designs in non-experimental contexts. Pre-commitment plans have the methodological benefit of increasing transparency and reducing the threat of specification search (Christensen and Miguel, 2018). We highlight that pre-committed research designs may be particularly feasible and valuable for long-run analyses. Their feasibility arises out of the possibility of pre-specifying the extension of event-study designs that, given recent trends in research methods (Currie et al., 2020), researchers are likely to carry out for short- and medium-run analyses. The value of such efforts may be high, as the threat of specification search becomes increasingly worrisome in analyses of long-run effects.

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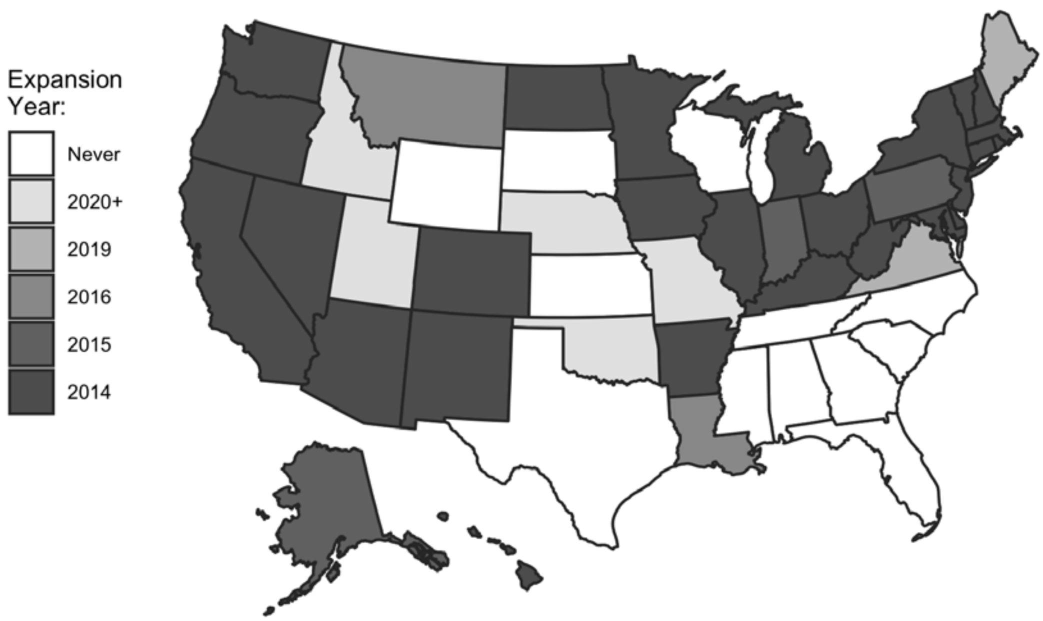
8 Figures and Tables

Figure 1
Patient Protection and Affordable Care Act (ACA)
State Medicaid Expansions, 2011-2018



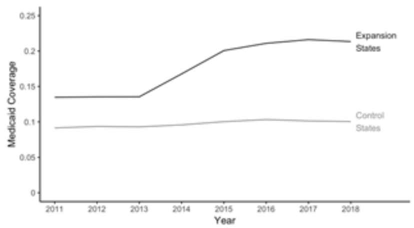
Notes: This figure illustrates the roll-out of ACA state Medicaid expansions. Data sourced from the Kaiser Family Foundation.

Figure 2

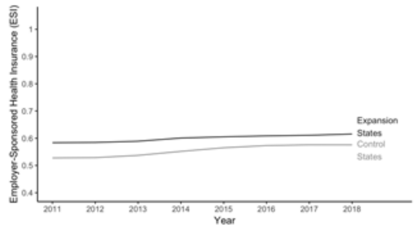
Expansion vs. Non-Expansion States, 2011-2018

Panel I: Individuals with High School Degree or Less

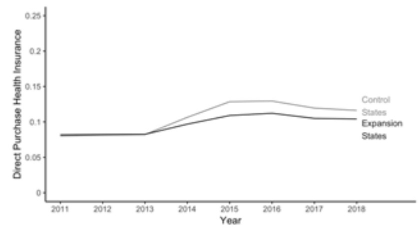
(a)
Medicaid Coverage



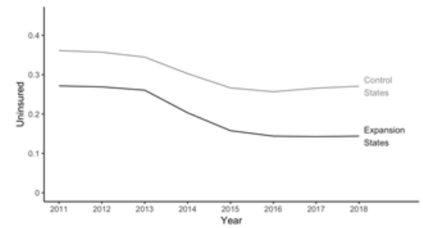
(b)
Employer Coverage



(c)
Individual Coverage

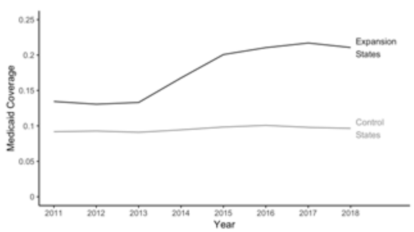


(d)
Uninsured

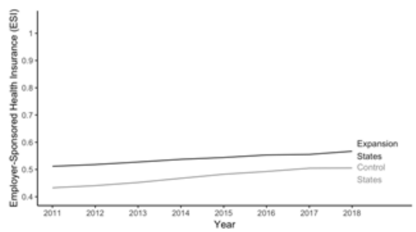


Panel II: Individuals Employed in Industries in Lowest Quartile of Pre-Treatment Insurance Coverage

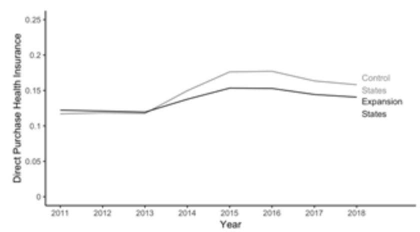
(e)
Medicaid Coverage



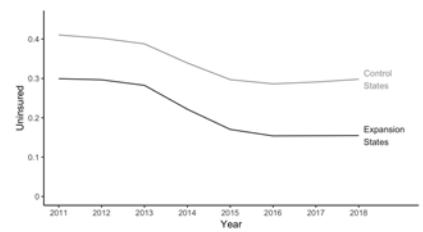
(f)
Employer Coverage



(g)
Individual Coverage



(h)
Uninsured



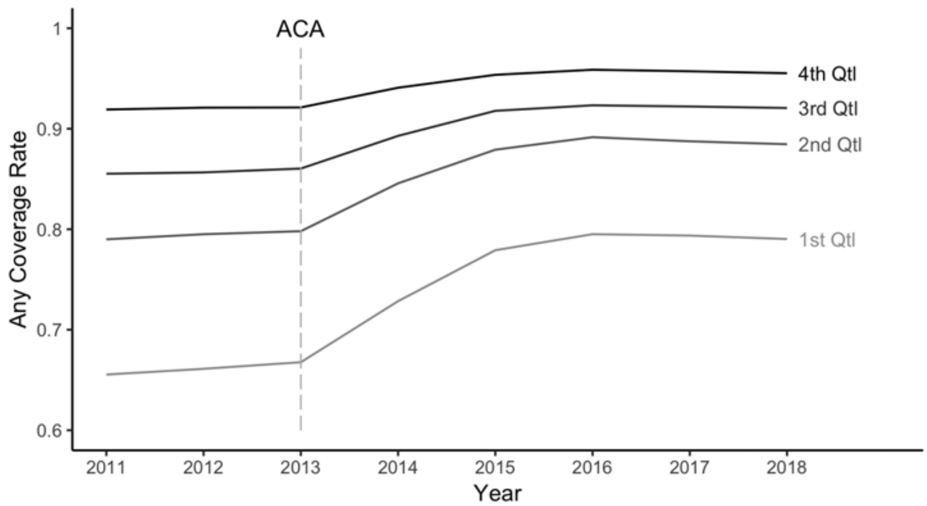
Notes: This figure illustrates the coverage rates for different types of insurance among individuals with a high school degree or less (panel I), and among individuals employed in industries in the lowest quartile of employer coverage rates between 2011 and 2013 (panel II). The dark line is the coverage rate among expansion states, while the light grey line is the coverage rate among control states. The main data source is the American Community Survey.

Figure 3

Changes in the Probability of Having Coverage across Industries

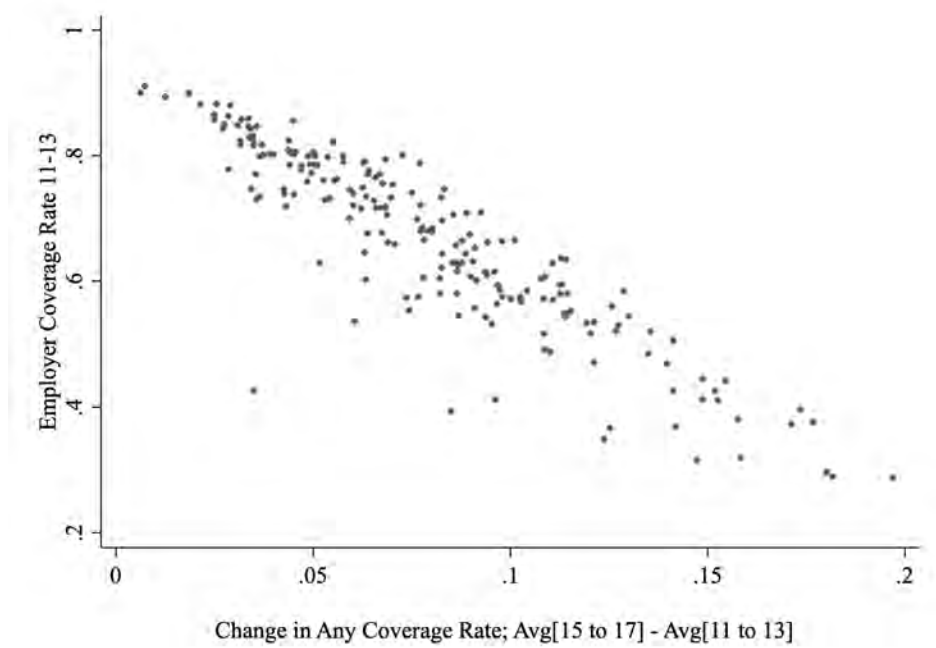
(a)

Time Series on Insurance Coverage across Industry Groups



(b)

Base Employer Coverage and Changes in Coverage of Any Type

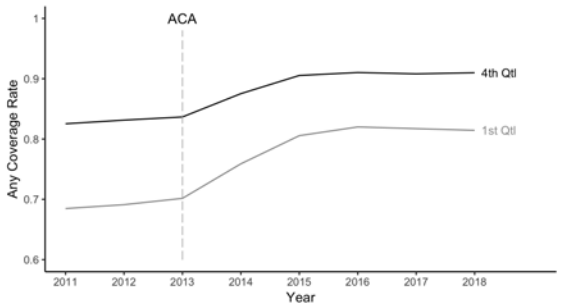


Notes: Panel A plots time series on insurance coverage across industry groupings defined on the basis of baseline coverage rates. Specifically, industries are divided into quartiles of the distribution of employer coverage rates at baseline, as estimated using data from the ACS. Appendix Tables A.1 through A.4 list the industries in each quartile. The scatterplot in Panel B plots changes in coverage rates against the baseline employer coverage rate. Each dot represents a distinct 4-digit industry code.

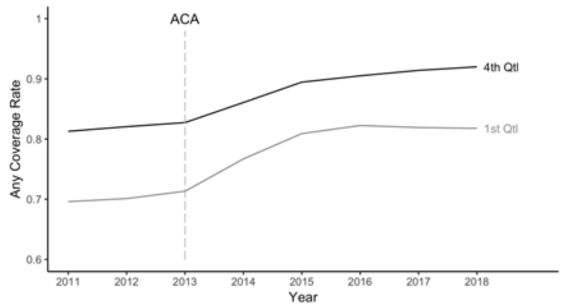
Figure 4
Any Coverage by Industry Baseline Coverage Rate Quartiles Over Time

Panel I: Weighting High Coverage to Match Low Coverage

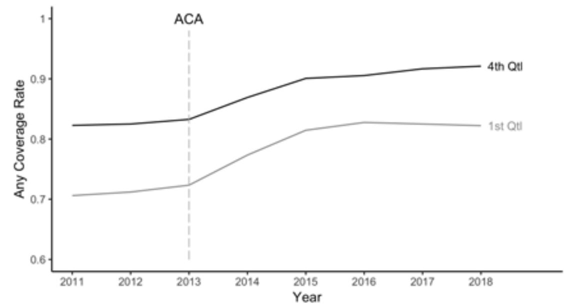
(a)
CEM 4 Weights



(b)
CEM 5 Weights

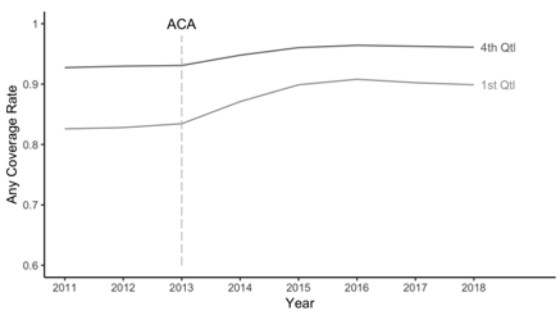


(c)
CEM 6 Weights

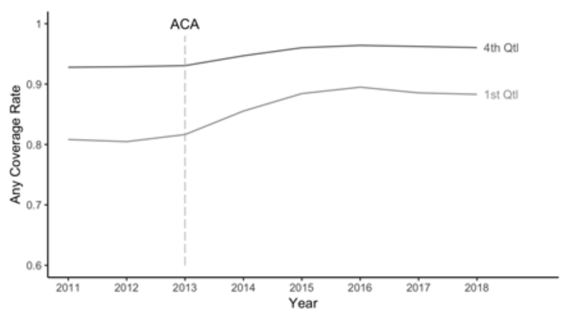


Panel II: Weighting Low Coverage to Match High Coverage

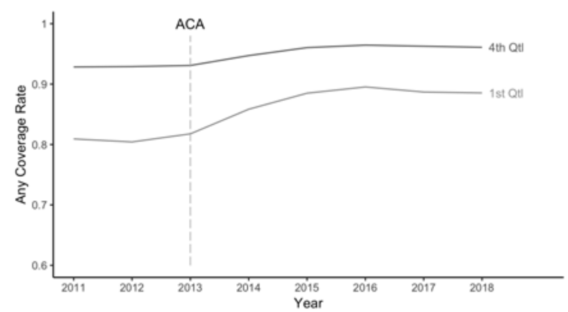
(d)
CEM 4 Weights



(e)
CEM 5 Weights



(f)
CEM 6 Weights



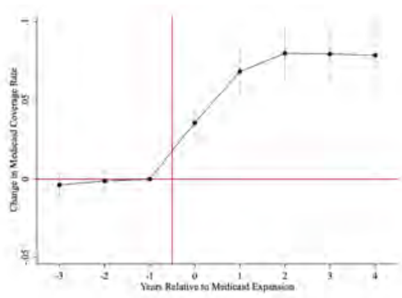
Notes: This figure illustrates changes in insurance coverage for individuals employed in industries in the first and fourth quartiles of baseline (2011-2013) employer coverage rates. In each panel, a coarsened exact matching procedure has been applied to match reweight samples for the first and fourth quartiles so that they match on selected economic and demographic characteristics. The matching procedure is described in the text in section 5.1. In Panel I, observations from the highest quartile are reweighted to match observations in the lowest quartile. In Panel II, observations from the lowest quartile are reweighted to match observations in the highest quartile. All weighting procedures match on income, education, weeks worked last year, and hours per week worked last year. CEM 5 and 6 also match on and average industry earnings. CEM 6 also matches on geographic variations in baseline uninsurance rate.

Figure 5

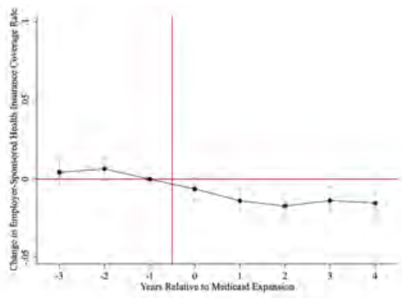
Event-Study Analysis of State Medicaid Expansion

Panel I: Individuals with High School Degree or Less

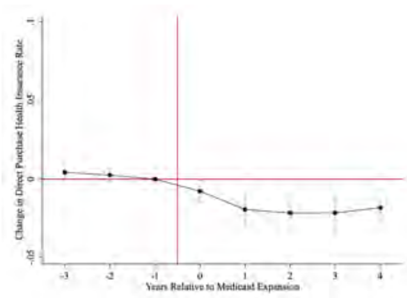
(a)
Medicaid Coverage



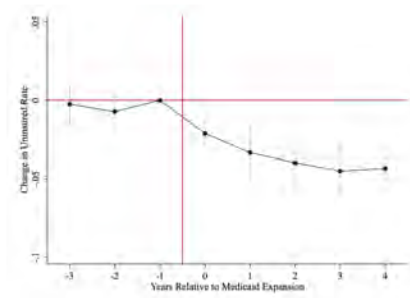
(b)
Employer Coverage



(c)
Individual Coverage

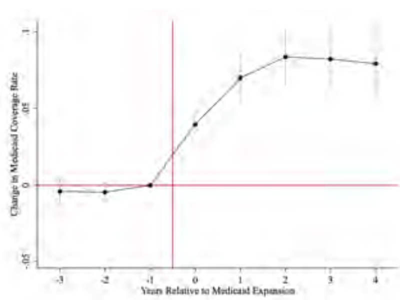


(d)
Uninsured

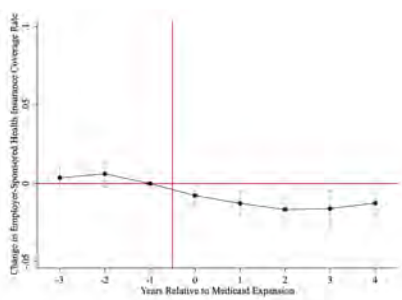


Panel II: Individuals Employed in Industries in Lowest Quartile of Pre-Treatment Insurance Coverage

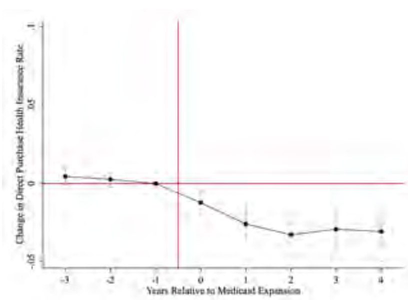
(e)
Medicaid Coverage



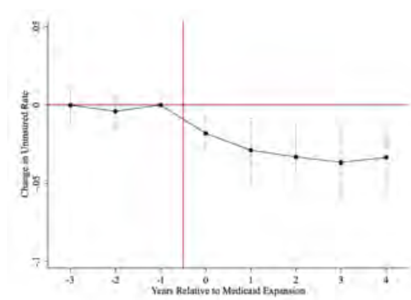
(f)
Employer Coverage



(g)
Individual Coverage



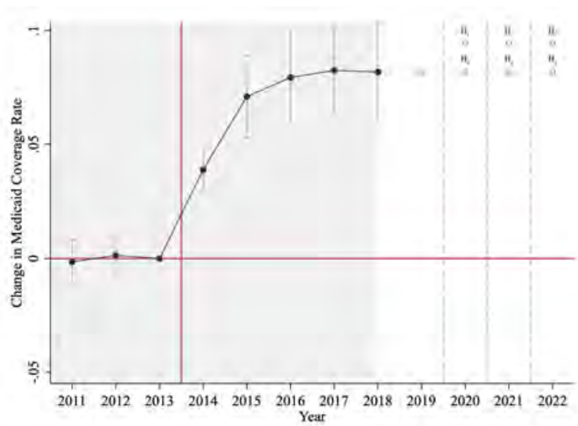
(h)
Uninsured



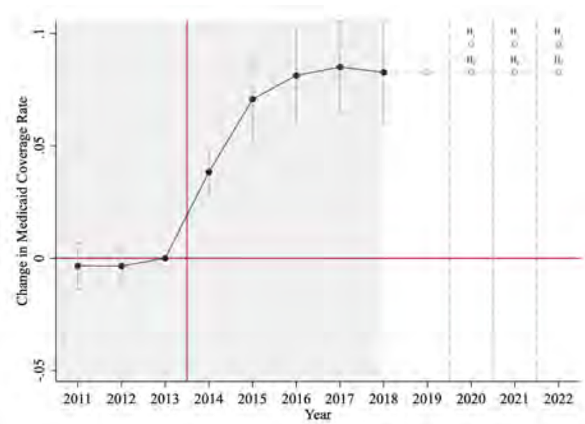
Notes: Weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent the 95 percent confidence intervals. Demographic controls include indicators for non-Hispanic white, black, Hispanic, female, and educational attainment (less than high school, high school degree, some college, and college degree). Economic controls include state-level per-capita income, the unemployment rate, and a housing price index. The estimates in this figure are the primary coefficients of interest from equation (2), as described in detail in the main text.

Figure 6
Pre-Committed Event-Study Design, 2014 Medicaid Expansion States and Medicaid Coverage

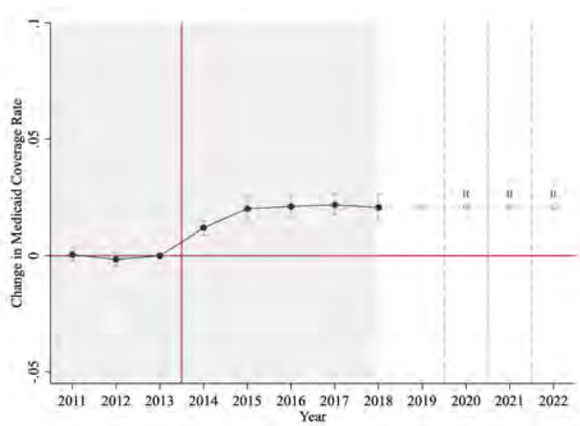
(a)
Individuals with High School Degree or Less



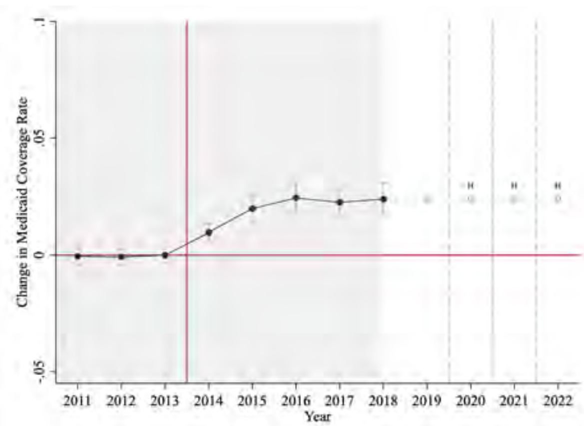
(b)
Individuals Employed in Industries in Lowest Quartile of Pre-Treatment Insurance Coverage



(c)
Individuals with College Degree or More



(d)
Individuals Employed in Industries in Highest Quartile of Pre-Treatment Insurance Coverage

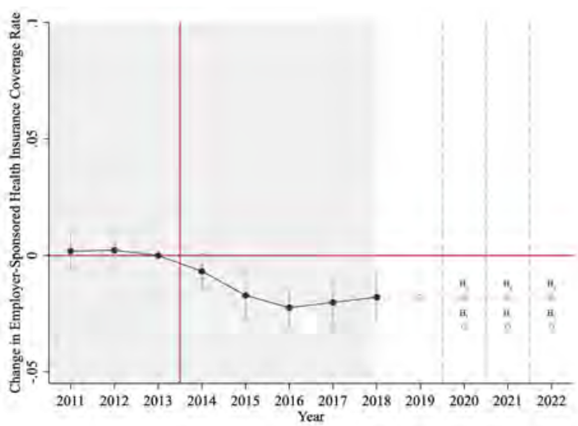


Notes: This figure presents weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent 95 percent confidence intervals. The estimates in the figure are the primary coefficients of interest from equation (2), as described in detail in the main text. The shaded region of the figure presents actual estimates for years extending from 2011 through 2018. The unshaded region presents hypothetical future estimates, including illustrations of our hypotheses regarding the ACA's implications for insurance coverage during the labor market's recovery from the COVID-19 pandemic.

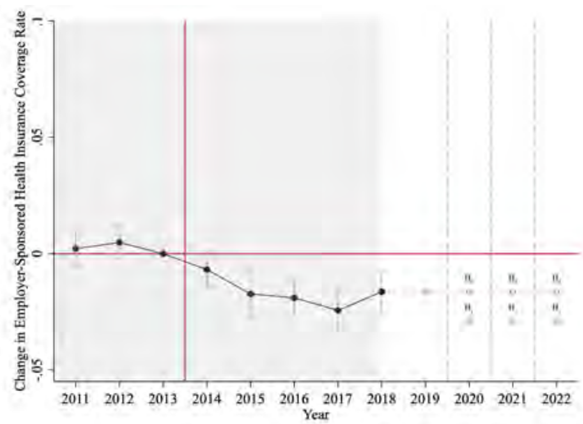
Figure 7

Pre-Committed Event-Study Design, 2014 Medicaid Expansion States and Employer Coverage

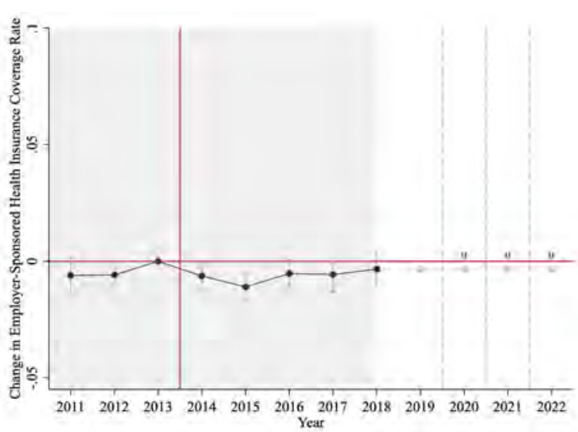
(a)
Individuals with High School Degree or Less



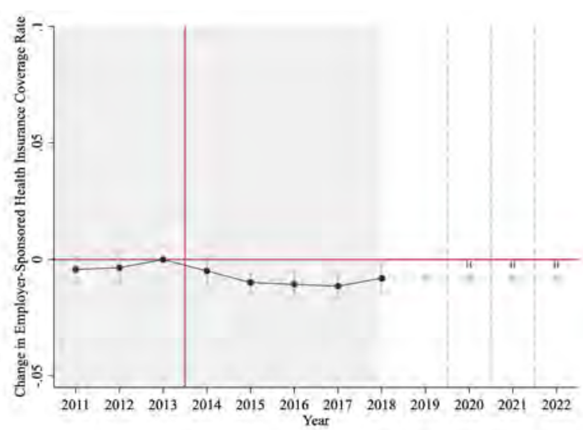
(b)
Individuals Employed in Industries in Lowest Quartile of Pre-Treatment Insurance Coverage



(c)
Individuals with College Degree or More



(d)
Individuals Employed in Industries in Highest Quartile of Pre-Treatment Insurance Coverage

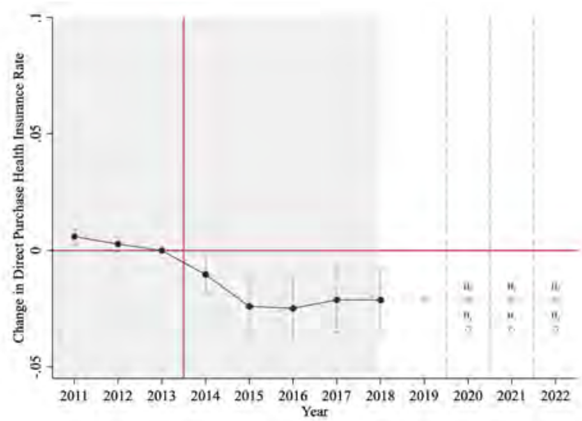


Notes: This figure presents weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent 95 percent confidence intervals. The estimates in the figure are the primary coefficients of interest from equation (2), as described in detail in the main text. The shaded region of the figure presents actual estimates for years extending from 2011 through 2018. The unshaded region presents hypothetical future estimates, including illustrations of our hypotheses regarding the ACA's implications for insurance coverage during the labor market's recovery from the COVID-19 pandemic.

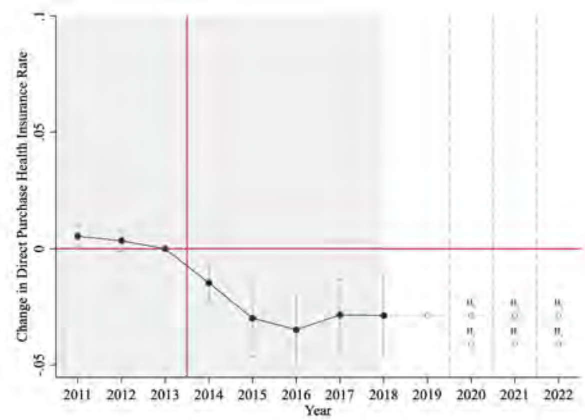
Figure 8

Pre-Committed Event-Study Design, 2014 Medicaid Expansion States and Individual Coverage

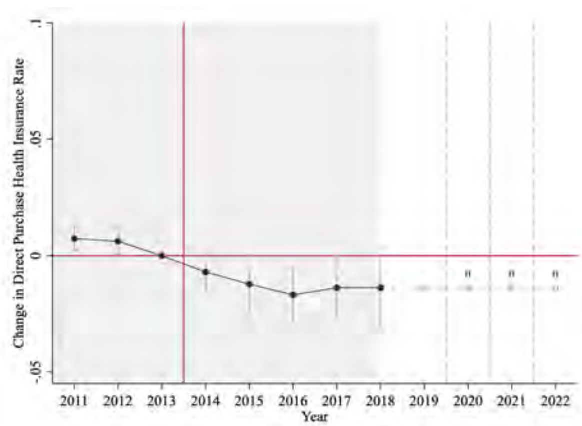
(a)
Individuals with High School Degree or Less



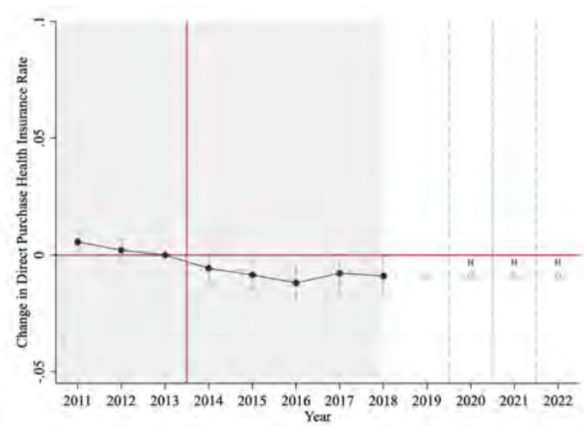
(b)
Individuals Employed in Industries in Lowest Quartile of Pre-Treatment Insurance Coverage



(c)
Individuals with College Degree or More



(d)
Individuals Employed in Industries in Highest Quartile of Pre-Treatment Insurance Coverage

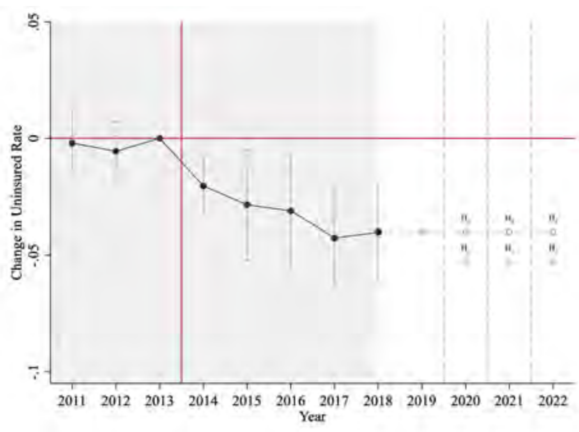


Notes: This figure presents weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent 95 percent confidence intervals. The estimates in the figure are the primary coefficients of interest from equation (2), as described in detail in the main text. The shaded region of the figure presents actual estimates for years extending from 2011 through 2018. The unshaded region presents hypothetical future estimates, including illustrations of our hypotheses regarding the ACA's implications for insurance coverage during the labor market's recovery from the COVID-19 pandemic.

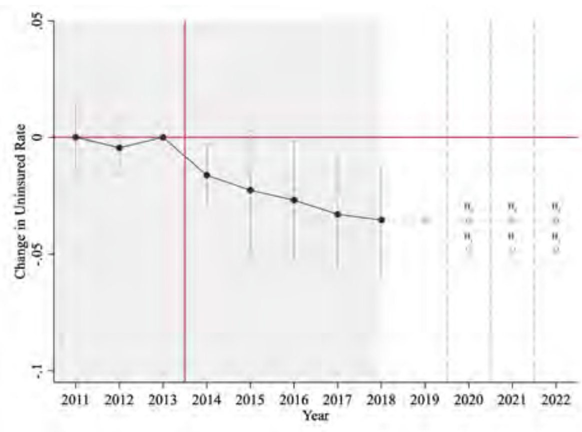
Figure 9

Pre-Committed Event-Study Design, 2014 Medicaid Expansion States and Uninsured

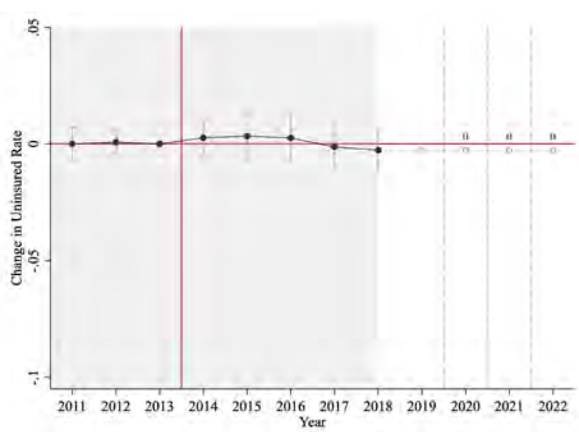
(a)
Individuals with High School Degree or Less



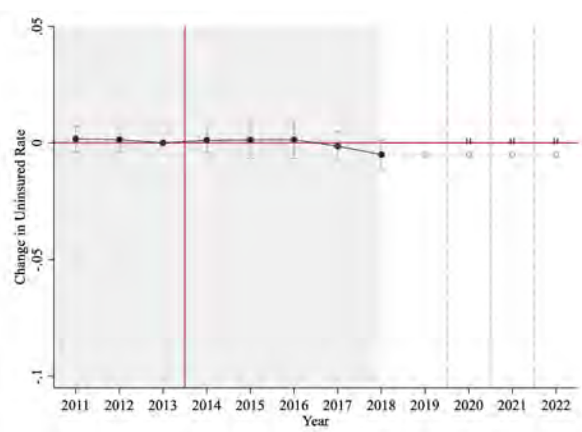
(b)
Individuals Employed in Industries in Lowest Quartile of Pre-Treatment Insurance Coverage



(c)
Individuals with College Degree or More



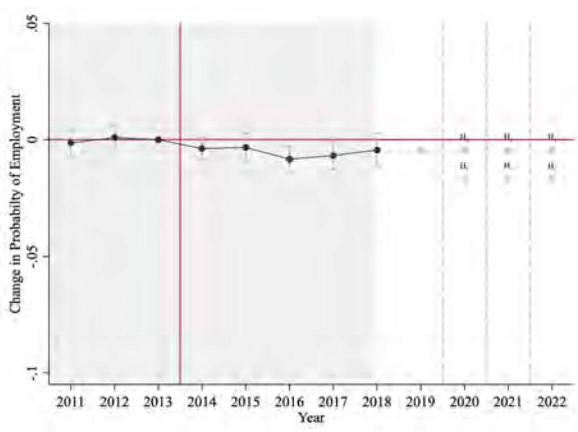
(d)
Individuals Employed in Industries in Highest Quartile of Pre-Treatment Insurance Coverage



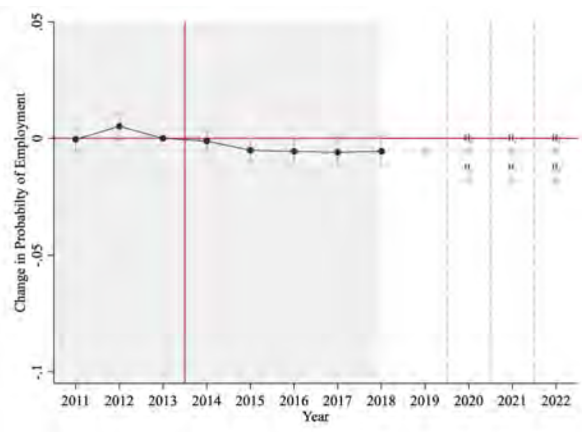
Notes: This figure presents weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent 95 percent confidence intervals. The estimates in the figure are the primary coefficients of interest from equation (2), as described in detail in the main text. The shaded region of the figure presents actual estimates for years extending from 2011 through 2018. The unshaded region presents hypothetical future estimates, including illustrations of our hypotheses regarding the ACA's implications for insurance coverage during the labor market's recovery from the COVID-19 pandemic.

Figure 10
Pre-Committed Event-Study Design, 2014 Medicaid Expansion States and Probability of Employment

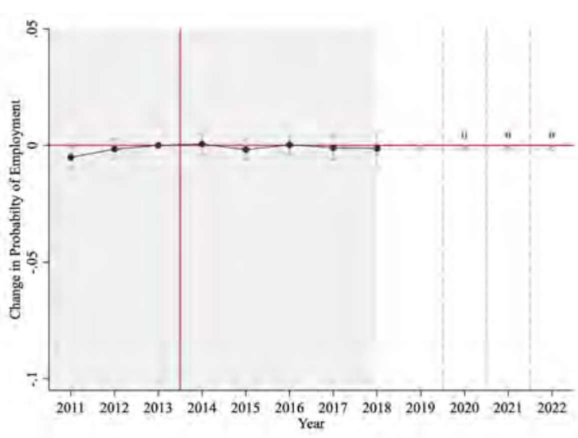
(a)
Individuals with High School Degree or Less



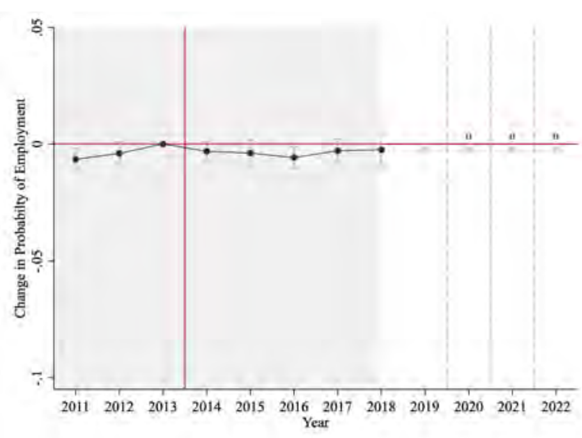
(b)
Individuals Employed in Industries in Lowest Quartile of Pre-Treatment Insurance Coverage



(c)
Individuals with College Degree or More



(d)
Individuals Employed in Industries in Highest Quartile of Pre-Treatment Insurance Coverage

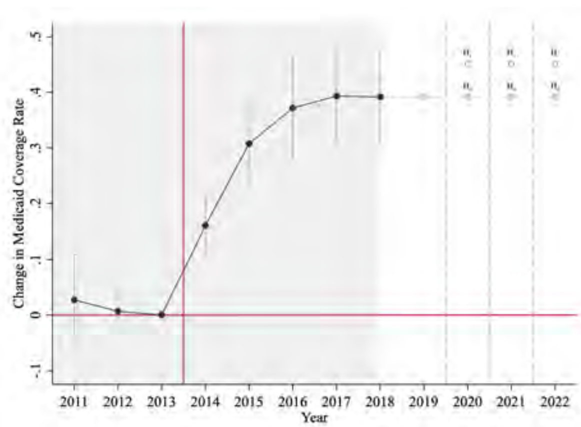


Notes: This figure presents weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent 95 percent confidence intervals. The estimates in the figure are the primary coefficients of interest from equation (2), as described in detail in the main text. The shaded region of the figure presents actual estimates for years extending from 2011 through 2018. The unshaded region presents hypothetical future estimates, including illustrations of our hypotheses regarding the ACA's implications for employment during the labor market's recovery from the COVID-19 pandemic.

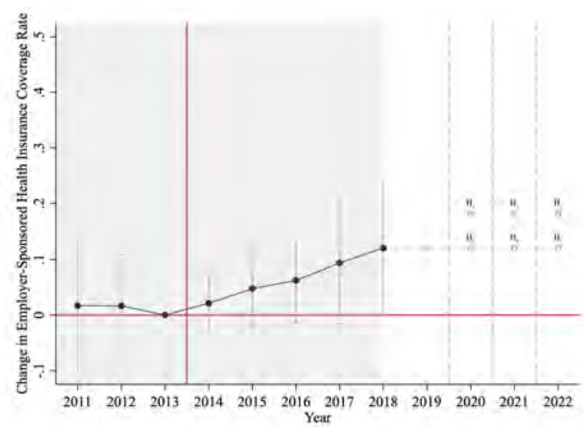
Figure 11

DDD Event-Study Analysis of State Medicaid Expansion

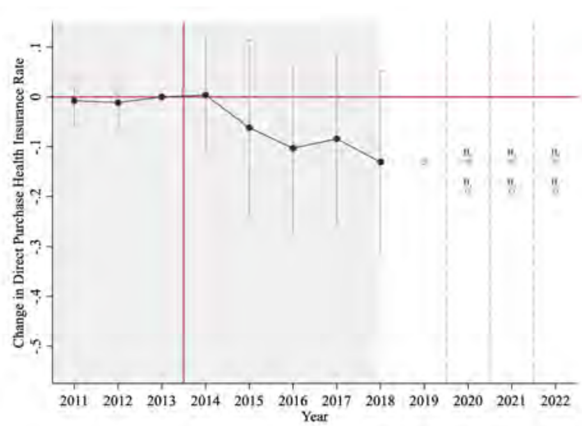
(a)
Medicaid Coverage



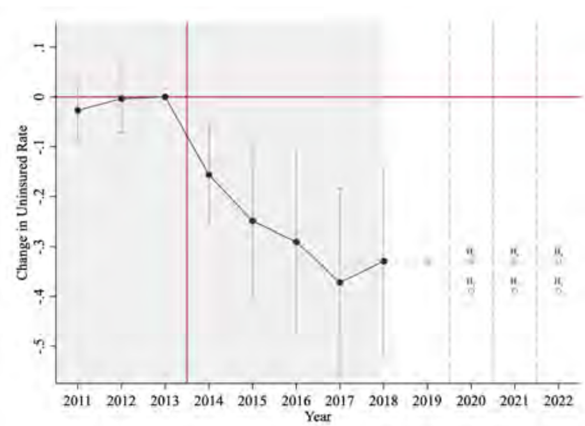
(b)
Employer Coverage



(c)
Individual Coverage



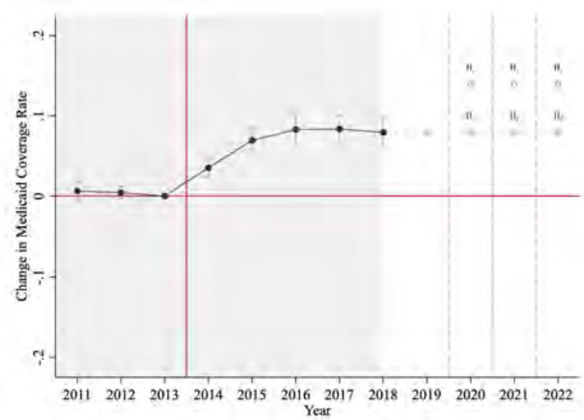
(d)
Uninsured



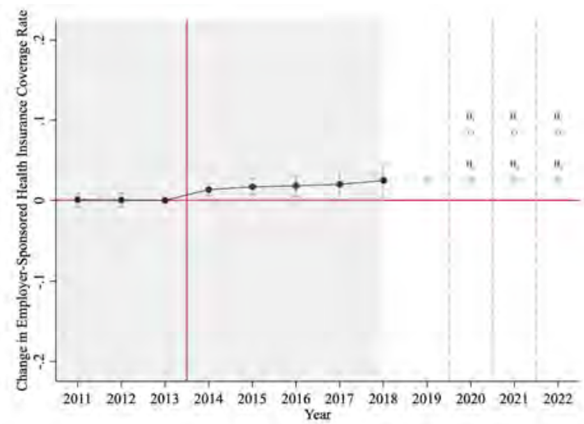
Notes: This figure presents weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent 95 percent confidence intervals. The estimates in the figure are from equation (3), as described in detail in the main text. The shaded region of the figure presents actual estimates for years extending from 2011 through 2018. The unshaded region presents hypothetical future estimates, including illustrations of our hypotheses regarding the ACA's implications for insurance coverage during the labor market's recovery from the COVID-19 pandemic.

Figure 12
Full effect of ACA from DDD Event-Study Analysis of State Medicaid Expansion

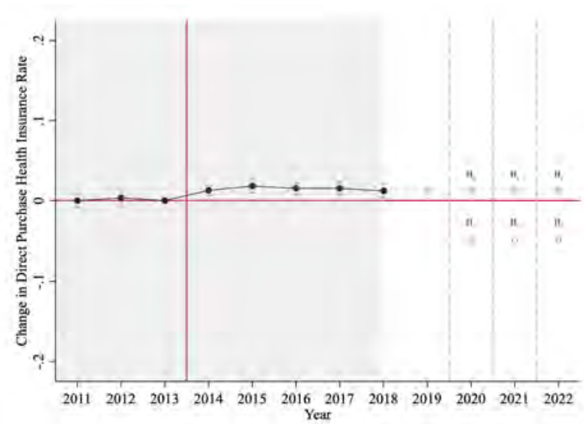
(a)
Medicaid Coverage



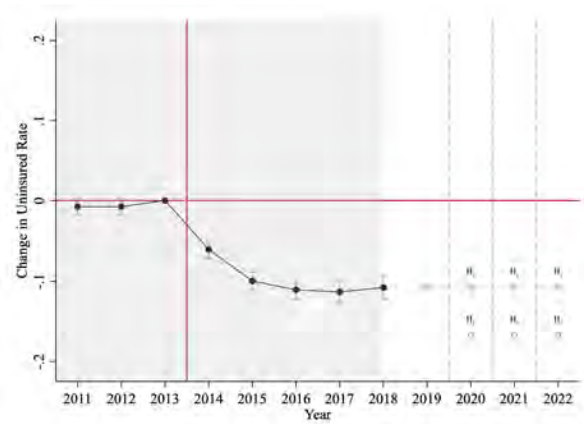
(b)
Employer Coverage



(c)
Individual Coverage



(d)
Uninsured



Notes: This figure presents weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent 95 percent confidence intervals. The estimates in the figure are from equation (3), as described in detail in the main text. The shaded region of the figure presents actual estimates for years extending from 2011 through 2018. The unshaded region presents hypothetical future estimates, including illustrations of our hypotheses regarding the ACA's implications for insurance coverage during the labor market's recovery from the COVID-19 pandemic.

Table 1

Descriptive Statistics, American Community Survey, 2011-2018

	Individuals with High School Degree or less				Individuals Employed in Industries with Low Pre-Treatment Insurance Coverage			
	Medicaid Expanding States		Non-Expanding States		Medicaid Expanding States		Non-Expanding States	
	Pre-Expand	Post-Expand	Pre-Expand	Post-Expand	Pre-Expand	Post-Expand	Pre-Expand	Post-Expand
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables								
Medicaid Coverage	0.128	0.220	0.088	0.098	0.125	0.219	0.086	0.095
Employer Coverage	0.523	0.535	0.462	0.500	0.458	0.481	0.375	0.423
Individual Coverage	0.078	0.092	0.069	0.107	0.113	0.127	0.099	0.147
Uninsured	0.288	0.175	0.388	0.304	0.316	0.191	0.440	0.338
Control Variables								
Age	41.1	41.3	41.0	41.0	40.1	40.5	40.0	40.2
Less than HS	0.266	0.266	0.291	0.275	0.188	0.185	0.221	0.205
HS Degree	0.734	0.734	0.709	0.725	0.350	0.344	0.351	0.353
Some College	0.000	0.000	0.000	0.000	0.320	0.316	0.310	0.311
College or More	0.000	0.000	0.000	0.000	0.142	0.154	0.118	0.131
Non-Hispanic White	0.591	0.536	0.538	0.510	0.612	0.562	0.559	0.534
Hispanic	0.238	0.287	0.255	0.274	0.222	0.264	0.252	0.272
African American	0.116	0.111	0.175	0.180	0.101	0.098	0.151	0.153
Female	0.409	0.405	0.404	0.397	0.380	0.387	0.374	0.379
Housing Price Index	363.4	443.3	260.7	318.7	367.5	453.1	261.1	321.0
Unemployment Rate	7.745	5.092	7.877	4.762	7.732	5.081	7.867	4.749
Per-Capita Income	46,131	53,543	40,096	45,134	46,385	53,979	40,183	45,246
N	1,065,095	1,272,536	474,431	745,610	740,790	920,611	311,213	516,377

*N*otes: Descriptive statistics generated from the 2011 through 2018 American Community Survey. Estimates are weighted using population weights. Low pre-treatment coverage industries are defined as industries in the bottom quartile of mean employer-sponsored health insurance by industry between 2011 and 2013. Unemployment rate is collected from the U.S. Bureau of Labor Statistics. Per-capita income is collected from the U.S. Bureau of Economic Analysis. Housing price index is collected from the Federal Housing Finance Agency.

Table 2

Difference-in-Differences Estimates of the Relationship Between State Medicaid Expansion and Health Insurance Coverage, Individuals with No More than a Completed High School Education

	(1)	(2)	(3)
	Panel I: Medicaid Coverage		
Medicaid Expansion$_s$×Post$_t$	0.067***	0.067***	0.062***
	(0.009)	(0.010)	(0.007)
	Panel II: Employer Coverage		
Medicaid Expansion$_s$×Post$_t$	-0.013**	-0.013***	-0.012***
	(0.005)	(0.005)	(0.004)
	Panel III: Individual Coverage		
Medicaid Expansion$_s$×Post$_t$	-0.013**	-0.013**	-0.016***
	(0.005)	(0.005)	(0.005)
	Panel IV: Uninsured		
Medicaid Expansion$_s$×Post$_t$	-0.040***	-0.040***	-0.034***
	(0.013)	(0.013)	(0.006)
Observations	5,786,647	5,786,647	5,786,647
State Year FE	Y	Y	Y
Demographic Controls		Y	Y
Economic Controls			Y

Notes: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1%. Weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Standard errors are clustered at the state level. Demographic controls include indicators for non-Hispanic white, black, Hispanic, female, and educational attainment (less than high school, high school degree, some college, and college degree). Economic controls include state-level per-capita income, unemployment rate, and housing price index. The estimates in this table are the primary coefficients of interest from equation (1), as described in detail in the main text. Low education is defined as individuals with a high school degree or less.

Table 3

Difference-in-Differences Estimates of the Relationship Between State Medicaid Expansion and Health Insurance Coverage, Individuals in Low Pre-Treatment Insurance Coverage Industries

	(1)	(2)	(3)
	Panel I: Medicaid Coverage		
Medicaid Expansion$_s$×Post$_t$	0.073***	0.072***	0.066***
	(0.009)	(0.009)	(0.007)
	Panel II: Employer Coverage		
Medicaid Expansion$_s$×Post$_t$	-0.019***	-0.018***	-0.015***
	(0.005)	(0.005)	(0.003)
	Panel III: Individual Coverage		
Medicaid Expansion$_s$×Post$_t$	-0.020***	-0.020***	-0.023***
	(0.007)	(0.007)	(0.006)
	Panel IV: Uninsured		
Medicaid Expansion$_s$×Post$_t$	-0.033**	-0.034**	-0.028***
	(0.013)	(0.014)	(0.007)
Observations	4,335,289	4,335,289	4,335,289
State Year FE	Y	Y	Y
Demographic Controls		Y	Y
Economic Controls			Y

Notes: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1%. Weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Standard errors are clustered at the state level. Demographic controls include indicators for non-Hispanic white, black, Hispanic, female, and educational attainment (less than high school, high school degree, some college, and college degree). Economic controls include state-level per-capita income, unemployment rate, and housing price index. The estimates in this table are the primary coefficients of interest from in equation (1), as described in detail in the main text. Low pre-treatment coverage industries are defined as industries in the bottom quartile of mean employer-sponsored health insurance by industry between 2011 and 2013

Table 4

Difference-in-Differences Estimates of the Relationship Between State Medicaid Expansion and Health Insurance Coverage, Individuals in Low Pre-Treatment Insurance Coverage Industries Versus Individuals in High Pre-Treatment Insurance Coverage Industries

	(1) ACS Weights	(2) CEM 4 Weights	(3) CEM 5 Weights	(4) CEM 6 Weights
Insurance Type	**Panel I**: Low Pre-ACA Industry Coverage Sample, Sensitivity of Estimates to CEM Weights Ensuring Common Support			
Medicaid Coverage	0.073***	0.069***	0.063***	0.061***
	(0.009)	(0.008)	(0.008)	(0.008)
Employer Coverage	-0.019***	-0.018***	-0.017***	-0.017***
	(0.005)	(0.005)	(0.005)	(0.004)
Individual Coverage	-0.020***	-0.020***	-0.018***	-0.016***
	(0.007)	(0.006)	(0.006)	(0.006)
Uninsured	-0.033**	-0.029**	-0.026**	-0.027**
	(0.013)	(0.013)	(0.012)	(0.010)
Observations	4,335,289	4,314,526	2,791,758	2,436,391
	Panel II: High Pre-ACA Industry Coverage Sample, Change in Estimates when Sample Reweighted to Approximate Low Pre-ACA Industry Coverage Sample			
Medicaid Coverage	0.019***	0.044***	0.042***	0.047***
	(0.002)	(0.006)	(0.007)	(0.007)
Employer Coverage	-0.005*	-0.017***	-0.016	-0.021**
	(0.003)	(0.005)	(0.011)	(0.010)
Individual Coverage	-0.007***	-0.010***	-0.024***	-0.019***
	(0.002)	(0.003)	(0.007)	(0.007)
Uninsured	-0.005	-0.013	0.006	-0.002
	(0.004)	(0.010)	(0.010)	(0.008)
Observations	3,254,381	3,250,821	1,895,427	1,778,054

*N*otes: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1%. Weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Standard errors are clustered at the state level. The estimates in this table are the primary coefficients of interest from equation (1), as described in detail in the main text. Low pre-treatment coverage industries are defined as industries in the bottom quartile of mean employer-sponsored health insurance by industry between 2011 and 2013. CEM 4 weights are generated to balance personal income, education, weeks worked last year, and hours per week worked last year across individuals in high and low baseline coverage industries. CEM 5 and 6 weights incrementally add average industry earnings and CBSA uninsured rates as additional matching dimensions.

Table 5
Difference-in-Difference-in-Differences Estimates of the Relationship Between Affordable Care Act Implementation and Health Insurance Coverage

	(1) Medicaid Coverage	(2) Employer Coverage	(3) Individual Coverage	(4) Uninsured
Medicaid Expansion$_s$ $\times$Post$_t$	-0.016**	-0.022***	0.000	0.030**
	(0.008)	(0.007)	(0.013)	(0.013)
Post$_t$$\times$Uninsured$_{as}$	0.007	0.018	0.121*	-0.155**
	(0.024)	(0.022)	(0.063)	(0.059)
Medicaid Expansion$_s$ $\times$Post$_t$$\times$Uninsured$_{as}$	0.326***	0.061	-0.064	-0.292***
	(0.042)	(0.039)	(0.073)	(0.066)
Implied effects of ACA at pre-treatment uninsured rates				
ACA without Medicaid Expansion	0.001	0.004	0.025*	-0.032**
	(0.005)	(0.005)	(0.013)	(0.012)
Medicaid Expansion	0.068***	0.013	-0.013	-0.061***
	(0.009)	(0.008)	(0.015)	(0.014)
Full ACA (with Medicaid Expansion)	0.070***	0.017**	0.012***	-0.093***
	(0.008)	(0.008)	(0.004)	(0.006)
Observations	13,545,825	13,545,825	13,545,825	13,545,825
Area and Year FE	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y
Economic Controls	Y	Y	Y	Y

*N*otes: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1%. Weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Standard errors are clustered at the state level. Demographic controls include indicators for non-Hispanic white, black, Hispanic, female, and educational attainment (less than high school, high school degree, some college, and college degree). The estimates in this table are the primary coefficients of interest from equation (3), as described in detail in the main text. Entries presented below the laboe "Implied effects of ACA at pre-treatment uninsured rates" are linear combinations of the coefficients presented earlier in the table. The pre-treatment uninsured rates used in this calculations are calculated at the local area level using 2013 ACS data, as described in greater detail in the main text.

Appendix

Figure A.1
COVID-19 Cases and Deaths Per Capita by State

(a)
Cumulative Cases per Capita

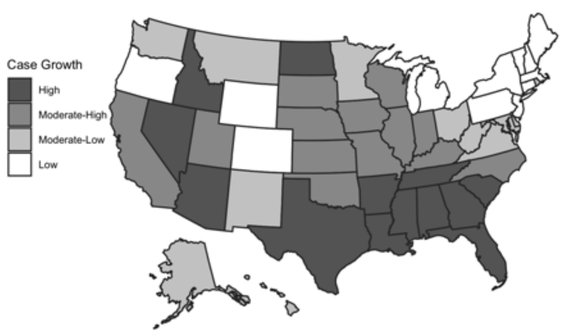
(b)
Cumulative Deaths per Capita

(c)
Average Growth in Cases per Capita

March and April

May and June

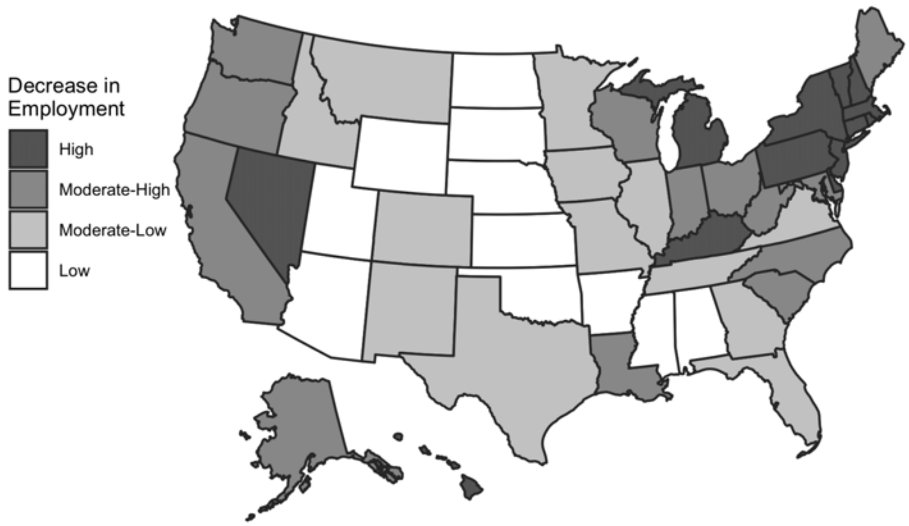
July to Current



Notes: Panels (a) and (b) illustrate cumulative COVID-19 cases and deaths per capita on September 15th as reported by the New York Times. Panel (c) illustrates average daily new cases per capita for 3 windows.

Figure A.2

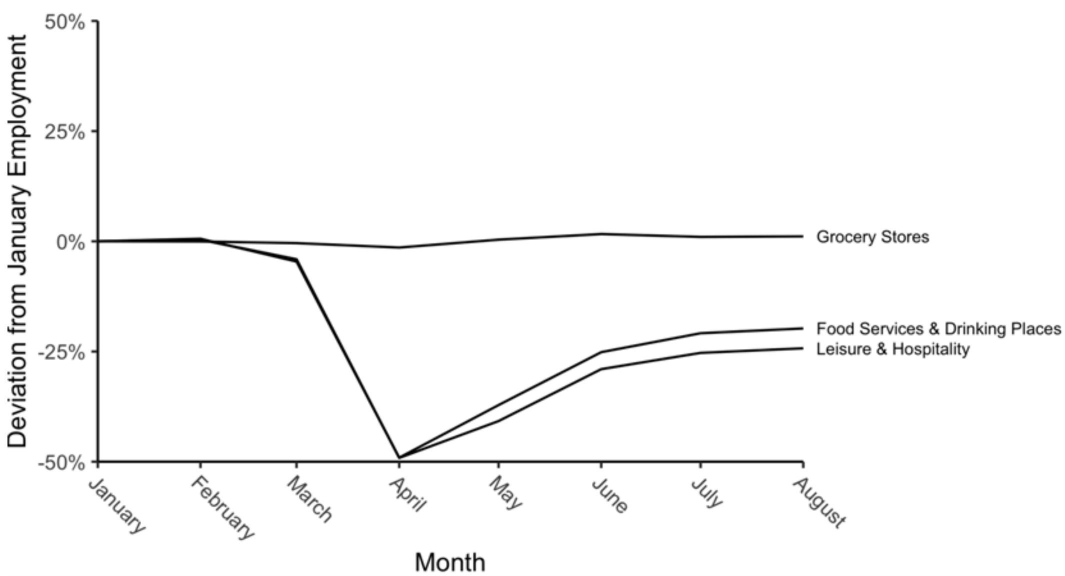
Variation in Employment Decreases by State



Notes: This figure illustrates the maximum employment decrease experienced by each state. Employment decreases are measured as the monthly change in the employment relative to the ratio in January of 2020. These values range from a decrease of 9% to a decrease of 24% . The monthly employment data used are collected from the Bureau of Labor Statistics.

Figure A.3

Variation in Employment Decreases by Sector



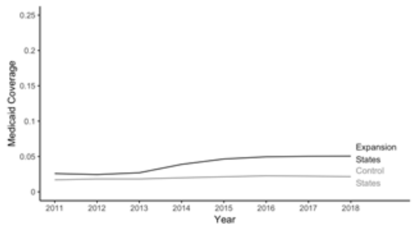
Notes: This figure illustrates monthly deviations in employment by sectors of employment with respect to January 2020. These data come from the Current Employment Statistics survey provided by U.S. Bureau of Labor Statistics retrieved from FRED, Federal Reserve Bank of St. Louis.

Figure A.4

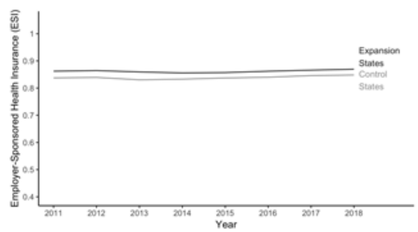
Expansion vs. Non-Expansion States, 2011-2018

Panel I: Individuals with College Degree or More

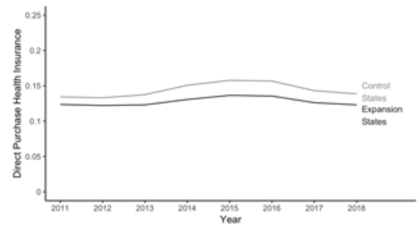
(a)
Medicaid Coverage



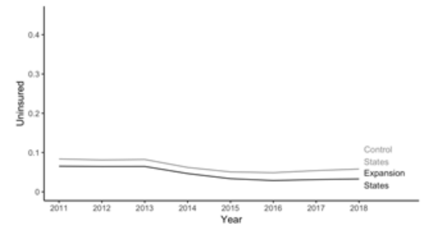
(b)
Employer Coverage



(c)
Individual Coverage

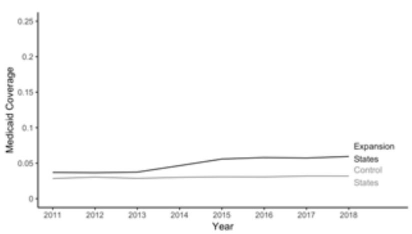


(d)
Uninsured

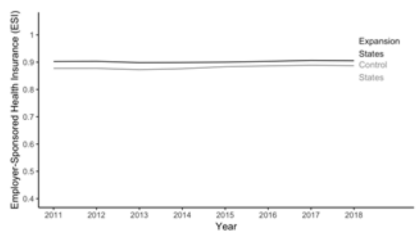


Panel II: Individuals Employed in Industries in Highest Quartile of Pre-Treatment Insurance Coverage

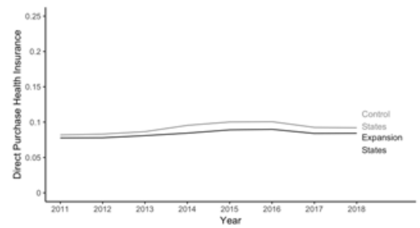
(e)
Medicaid Coverage



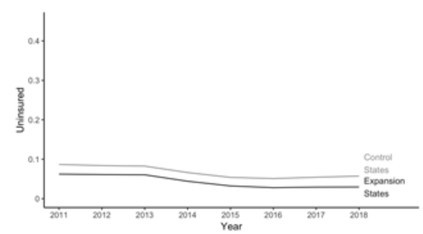
(f)
Employer Coverage



(g)
Individual Coverage



(h)
Uninsured



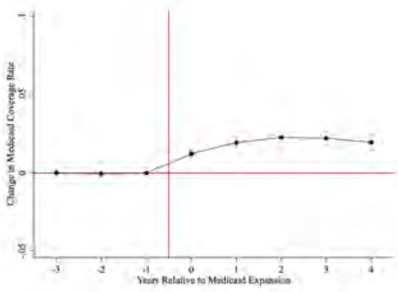
Notes: This figure illustrates the coverage rates for different types of insurance among individuals with a college degree or more (panel I), and among individuals employed in industries in the highest quartile of coverage between 2011 and 2013 (panel II). The dark line is the coverage rate among expansion states, while the light grey line is the coverage rate among control states. The main data source is the American Community Survey.

Figure A.5

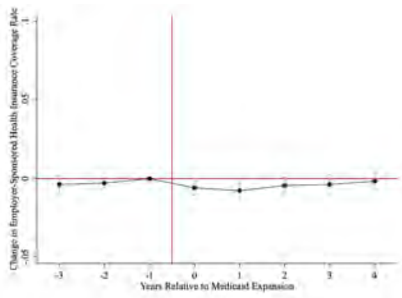
Event-Study Analysis of State Medicaid Expansion

Panel I: Individuals with College Degree or More

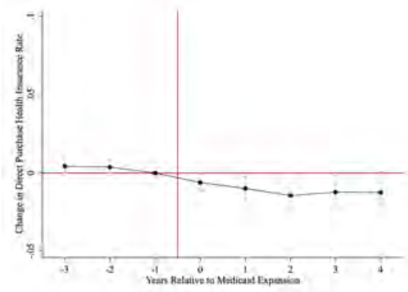
(a)
Medicaid Coverage



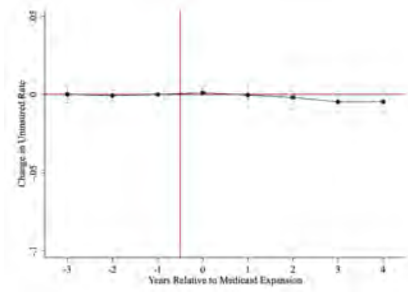
(b)
Employer Coverage



(c)
Individual Coverage

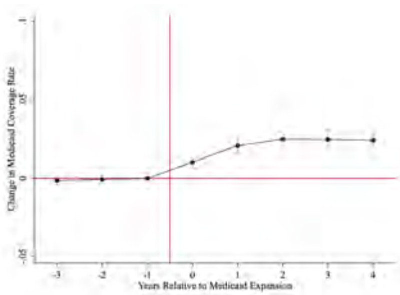


(d)
Uninsured

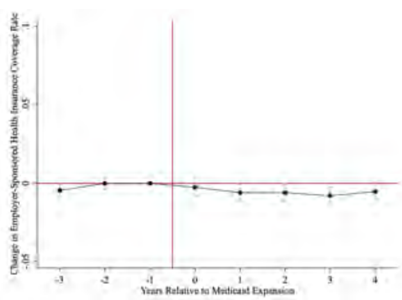


Panel II: Individuals Employed in Industries in Highest Quartile of Pre-Treatment Insurance Coverage

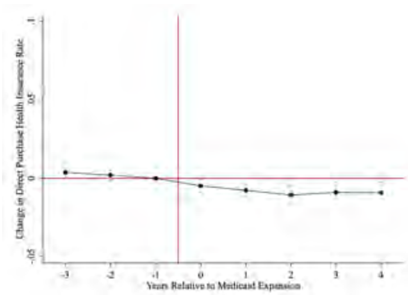
(e)
Medicaid Coverage



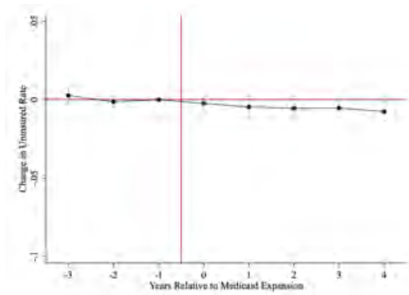
(f)
Employer Coverage



(g)
Individual Coverage



(h)
Uninsured



Notes: Weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Grey lines represent the 95 percent confidence intervals. Demographic controls include indicators for non-Hispanic white, black, Hispanic, female, and educational attainment (less than high school, high school degree, some college, and college degree). Economic controls include state-level per-capita income, unemployment rate, and housing price index. The estimates in this figure are the primary coefficients of interest from equation (2), as described in detail in the main text.

Table A.1

First (Lowest) Quartile of Industries By Employer Coverage Rate 2011-2013

NIACS Code	Early Coverage Rate	Industry Label
4853	28.77	Taxi and Limousine Service
7224	29.39	Drinking Places (Alcoholic Beverages)
8140	31.27	Private Households
1140	31.70	Fishing, Hunting and Trapping
5617	32.42	Services to Buildings and Dwellings
1110	35.44	Crop Production
1133	36.69	Logging
4533	37.22	Used Merchandise Stores
5613	37.70	Employment Services
4470	37.77	Gasoline Stations
1120	39.76	Animal Production and Aquaculture
7220	39.79	Food Services and Drinking Places
8123	39.93	Drycleaning and Laundry Services
8114	41.24	Personal and Household Goods Repair and Maintenance
1150	41.31	Support Activities for Agriculture and Forestry
8121	41.55	Personal Care Services
6216	42.68	Home Health Care Services
6243	42.83	Vocational Rehabilitation Services
8111	42.93	Automotive Repair and Maintenance
3150	45.02	Apparel Manufacturing
4531	47.34	Florists
8120	48.95	Personal and Laundry Services
2300	49.27	Construction
4452	49.32	Specialty Food Stores
4453	50.68	Beer, Wine, and Liquor Stores
6244	51.98	Child Day Care Services
5616	51.98	Investigation and Security Services
7211	52.08	Traveler Accommodation
7110	52.32	Performing Arts, Spectator Sports, and Related Industries
4230	52.99	Merchant Wholesalers, Durable Goods
4510	53.28	Sporting Goods, Hobby, Musical Instrument, and Book Stores
5122	53.44	Sound Recording Industries
4840	53.49	Truck Transportation
4530	53.57	Miscellaneous Store Retailers
4870	53.65	Scenic and Sightseeing Transportation
5614	54.22	Business Support Services
3140	54.26	Textile Product Mills
4930	54.37	Warehousing and Storage
8113	54.59	Commercial and Industrial Machinery Repair and Maintenance
4543	54.82	Direct Selling Establishments
3118	55.42	Bakeries and Tortilla Manufacturing
3160	55.57	Leather and Allied Product Manufacturing
4483	55.90	Jewelry, Luggage, and Leather Goods Stores
8112	56.27	Electronic and Precision Equipment Repair and Maintenance
4482	56.75	Shoe Stores
4520	57.19	General Merchandise Stores
4451	57.38	Grocery Stores
4481	57.44	Clothing Stores
6242	57.44	Community Food and Housing, and Emergency and Other Relief Services
3210	57.49	Wood Product Manufacturing

*N*otes: This table lists industries in the bottom quartile of employer sponsored health insurance from 2011 to 2013.

Table A.2

Second Quartile of Industries By Employer Coverage Rate 2011-2013

NIACS Code	Early Coverage Rate	Industry Label
6213	57.50	Offices of Other Health Practitioners
5414	57.51	Specialized Design Services
4200	57.54	Wholesale Trade
4413	58.00	Automotive Parts, Accessories, and Tire Stores
4542	58.03	Vending Machine Operators
5310	58.04	Real Estate
6230	58.17	Nursing and Residential Care Facilities
4420	58.73	Furniture and Home Furnishings Stores
4511	59.19	Sporting Goods, Hobby, and Musical Instrument Stores
3370	59.28	Furniture and Related Product Manufacturing
4243	59.33	Apparel, Piece Goods, and Notions Merchant Wholesalers
4512	59.92	Book Stores and News Dealers
5610	60.06	Administrative and Support Services
6231	60.41	Nursing Care Facilities (Skilled Nursing Facilities)
3211	60.43	Sawmills and Wood Preservation
5410	60.58	Professional, Scientific, and Technical Services
4232	60.79	Furniture and Home Furnishing Merchant Wholesalers
5320	60.92	Rental and Leasing Services
3133	61.06	Textile and Fabric Finishing and Fabric Coating Mills
3100	61.26	Manufacturing
6241	61.42	Individual and Family Services
7130	61.54	Amusement, Gambling, and Recreation Industries
5121	61.83	Motion Picture and Video Industries
4532	61.94	Office Supplies, Stationery, and Gift Stores
4460	62.34	Health and Personal Care Stores
7210	62.60	Accommodation
3116	62.80	Animal Slaughtering and Processing
6212	62.86	Offices of Dentists
5620	62.92	Waste Management and Remediation Services
4412	62.93	Other Motor Vehicle Dealers
3131	63.05	Fiber, Yarn, and Thread Mills
4541	63.20	Electronic Shopping and Mail-Order Houses
3113	63.23	Sugar and Confectionery Product Manufacturing
3114	63.60	Fruit and Vegetable Preserving and Specialty Food Manufacturing
4880	64.30	Support Activities for Transportation
3390	64.31	Miscellaneous Manufacturing
4251	64.58	Wholesale Electronic Markets and Agents and Brokers
3132	65.22	Fabric Mills
4441	65.70	Building Material and Supplies Dealers
4442	66.01	Lawn and Garden Equipment and Supplies Stores
3328	66.19	Coating, Engraving, Heat Treating, and Allied Activities
4231	66.28	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers
3212	66.34	Veneer, Plywood, and Engineered Wood Product Manufacturing
4411	66.52	Automobile Dealers
4431	66.59	Electronics and Appliance Stores
4244	67.40	Grocery and Related Product Merchant Wholesalers
3162	67.55	Footwear Manufacturing
8131	67.61	Religious Organizations
8122	68.13	Death Care Services
5615	68.39	Travel Arrangement and Reservation Services

*N*otes: This table lists industries in the second quartile of employer sponsored health insurance from 2011 to 2013.

Table A.3

Third Quartile of Industries By Employer Coverage Rate 2011-2013

NIACS Code	Early Coverage Rate	Industry Label
4850	68.46	Transit and Ground Passenger Transportation
3270	69.68	Nonmetallic Mineral Product Manufacturing
4233	69.73	Lumber and Other Construction Materials Merchant Wholesalers
5412	69.90	Accounting, Tax Preparation, Bookkeeping, and Payroll Services
3231	69.90	Printing and Related Support Activities
5111	70.57	Newspaper, Periodical, Book, and Directory Publishers
3261	70.84	Plastics Product Manufacturing
3252	70.84	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing
8130	70.89	Religious, Grantmaking, Civic, Professional, and Similar Organizations
4240	70.91	Merchant Wholesalers, Nondurable Goods
3110	71.30	Food Manufacturing
7120	71.50	Museums, Historical Sites, and Similar Institutions
3271	71.59	Clay Product and Refractory Manufacturing
4461	71.65	Health and Personal Care Stores
4920	71.77	Couriers and Messengers
5416	71.90	Management, Scientific, and Technical Consulting Services
5418	72.05	Advertising, Public Relations, and Related Services
3327	72.15	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
3322	72.79	Cutlery and Handtool Manufacturing
3256	72.82	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
2130	73.00	Support Activities for Mining
3320	73.25	Fabricated Metal Product Manufacturing
3272	73.27	Glass and Glass Product Manufacturing
1130	73.38	Forestry and Logging
3141	73.40	Textile Furnishings Mills
3366	73.53	Ship and Boat Building
4245	73.67	Farm Product Raw Material Merchant Wholesalers
6210	73.94	Ambulatory Health Care Services
6211	74.59	Offices of Physicians
4241	74.60	Paper and Paper Product Merchant Wholesalers
3315	74.63	Foundries
5411	74.69	Legal Services
2123	74.81	Nonmetallic Mineral Mining and Quarrying
5220	75.39	Credit Intermediation and Related Activities
4830	75.75	Water Transportation
6214	75.83	Outpatient Care Centers
3321	75.85	Forging and Stamping
5300	76.13	Real Estate and Rental and Leasing
3121	76.22	Beverage Manufacturing
3222	76.55	Converted Paper Product Manufacturing
6110	76.88	Educational Services
5182	77.00	Data Processing, Hosting, and Related Services
5150	77.04	Broadcasting (except Internet)
4236	77.17	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers
3360	77.42	Transportation Equipment Manufacturing
5191	77.48	Other Information Services
3122	77.69	Tobacco Manufacturing
4237	78.33	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers
4234	78.38	Professional and Commercial Equipment and Supplies Merchant Wholesalers
4235	78.40	Metal and Mineral (except Petroleum) Merchant Wholesalers

*N*otes: This table lists industries in the third quartile of employer sponsored health insurance from 2011 to 2013.

Table A.4

Fourth (Highest) Quartile of Industries By Employer Rate 2011-2013

NIACS Code	Early Coverage Rate	Industry Label
4238	78.47	Machinery, Equipment, and Supplies Merchant Wholesalers
3115	78.63	Dairy Product Manufacturing
3352	78.75	Household Appliance Manufacturing
3313	78.81	Alumina and Aluminum Production and Processing
3330	79.00	Machinery Manufacturing
3262	79.05	Rubber Product Manufacturing
3365	79.53	Railroad Rolling Stock Manufacturing
3253	79.74	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
5413	79.87	Architectural, Engineering, and Related Services
3350	79.91	Electrical Equipment, Appliance, and Component Manufacturing
4248	79.99	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers
4860	79.99	Pipeline Transportation
3255	80.02	Paint, Coating, and Adhesive Manufacturing
3335	80.17	Metalworking Machinery Manufacturing
3331	80.22	Agriculture, Construction, and Mining Machinery Manufacturing
4247	80.23	Petroleum and Petroleum Products Merchant Wholesalers
3310	80.38	Primary Metal Manufacturing
3333	80.55	Commercial and Service Industry Machinery Manufacturing
3314	80.63	Nonferrous Metal (except Aluminum) Production and Processing
3391	80.85	Medical Equipment and Supplies Manufacturing
5240	81.70	Insurance Carriers and Related Activities
5415	81.74	Computer Systems Design and Related Services
4910	81.86	Postal Service
3340	82.12	Computer and Electronic Product Manufacturing
2110	82.25	Oil and Gas Extraction
2121	82.31	Coal Mining
5170	82.59	Telecommunications
3241	82.86	Petroleum and Coal Products Manufacturing
3221	83.20	Pulp, Paper, and Paperboard Mills
6111	84.19	Elementary and Secondary Schools
5500	84.25	Management of Companies and Enterprises
2213	84.31	Water, Sewage and Other Systems
3341	84.55	Computer and Peripheral Equipment Manufacturing
5417	84.56	Scientific Research and Development Services
5200	84.78	Finance and Insurance
4810	84.96	Air Transportation
5221	85.50	Depository Credit Intermediation
6220	85.72	Hospitals
2122	85.75	Metal Ore Mining
3336	85.85	Engine, Turbine, and Power Transmission Equipment Manufacturing
3345	85.89	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
3250	86.29	Chemical Manufacturing
3364	87.99	Aerospace Product and Parts Manufacturing
3254	88.10	Pharmaceutical and Medicine Manufacturing
2212	88.26	Natural Gas Distribution
2200	89.16	Utilities
2211	89.35	Electric Power Generation, Transmission and Distribution
5112	89.95	Software Publishers
4820	90.05	Rail Transportation
2210	91.05	Utilities

*N*otes: This table lists industries in the top quartile of employer sponsored health insurance from 2011 to 2013.

Table A.5

Difference-in-Differences Estimates of the Relationship Between State Medicaid Expansion and Education and Employment Status

	(1)	(2)	(3)
	Panel I: High School Degree or less		
Medicaid Expansion$_s$×Post$_t$	0.001	0.001	0.002*
	(0.001)	(0.001)	(0.001)
	Panel II: Employed		
Medicaid Expansion$_s$×Post$_t$	0.002	0.002	-0.001
	(0.003)	(0.003)	(0.002)
	Panel III: Employed in a low Coverage Industry		
Medicaid Expansion$_s$×Post$_t$	-0.001	-0.001	-0.002**
	(0.001)	(0.001)	(0.001)
Observations	15,287,904	15,287,904	15,287,904
State Year FE	Y	Y	Y
Demographic Controls		Y	Y
Economic Controls			Y

*N*otes: * Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1%. Weighted least squares estimates generated using data from the 2011-2018 American Community Survey. Standard errors are clustered at the state level. Demographic controls include indicators for non-Hispanic white, black, Hispanic, female, and educational attainment (less than high school, high school degree, some college, and college degree). Economic controls include state-level per-capita income, unemployment rate, and housing price index. The estimates in this table are the primary coefficients of interest from equation (3), as described in detail in the main text. Low pre-treatment coverage industries are defined as industries in the bottom quartile of mean employer-sponsored health insurance coverage rates between 2011 and 2013

Table A.6

4 Dimension CEM Weights Summary

	Panel I: Weighting High Early Coverage to Match Low Early Coverage Means by CEM Weight Bins								
Weight Bin	[0,0.25)	[0.25,0.5)	[0.5,0.75)	[0.75,1)	[1,1]	(1,2)	[2,4)	[4,8)	[8, 66]
CEM weight	0.148	0.367	0.629	0.863	1.000	1.403	2.783	5.390	10.614
Hours per Week	43	44	41	39	37	39	37	32	31
Weeks Worked	5.7	5.6	5.4	5.4	4.9	5.1	5.0	4.1	4.1
Income	108,618	58,424	46,086	42,220	31,098	31,847	22,767	12,816	10,258
School	21.3	20.5	19.2	18.7	17.0	18.0	16.8	15.8	12.9
Industy Earnings	5,426	5,083	5,203	5,145	2,718	5,033	4,961	4,811	4,733
Early Cov Rate	83.522	83.879	83.837	83.735	46.446	83.682	83.604	83.616	83.458
High Early Cov	0.011	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000
Observations	1,209,769	529,762	363,792	289,725	4,314,526	433,471	280,633	131,228	28,445
	Panel II: Weighting Low Early Coverage to Match High Early Coverage Means by CEM Weight Bins								
Weight Bin	[0,0.25)	[0.25,0.5)	[0.5,0.75)	[0.75,1)	[1,1]	(1,2)	[2,4)	[4,8)	[8, 34]
CEM weight	0.156	0.359	0.615	0.874	1.000	1.365	2.726	5.713	9.387
Hours per Week	32	37	38	39	41	40	44	44	40
Weeks Worked	4.1	5.0	5.0	5.3	5.4	5.4	5.6	5.8	5.7
Income	12,160	21,883	29,117	34,825	66,390	44,013	58,401	94,612	127,752
School	14.7	16.7	17.6	18.3	19.6	18.8	20.2	20.9	21.1
Industy Earnings	2,462	2,641	2,795	2,857	5,206	2,978	3,063	3,135	3,222
Early Cov Rate	45.067	46.244	47.049	47.432	83.825	47.768	47.791	47.948	48.025
Low Early Cov	0.002	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000
Observations	1,354,943	1,036,883	501,896	304,626	3,250,821	637,093	257,596	175,724	61,769

*N*otes: This table provides means of matching variables by weight bin. The weights summarised in this table were constructed using the CEM matching procedure as described in the text in section 5.1. Columns 1 through 4 show descriptive statistics for individuals that received weight less than one while columns 6 through 9 show descriptive statistics for individuals that received weight greater than one. Column 5 shows descriptive statistics for individuals with high early coverage (panel I) or individuals with low early coverage (panel II). The 4 dimensions used for creating the CEM weights summarised in this table are hours worked per week last year, weeks worked last year, personal income, and years of schooling.

Table A.7

5 Dimension CEM Weights Summary

	Panel I: Weighting High Early Coverage to Match Low Early Coverage Means by CEM Weight Bins								
Weight Bin	[0,0.25)	[0.25,0.5)	[0.5,0.75)	[0.75,1)	[1,1]	(1,2)	[2,4)	[4,8)	[8, 2,161]
CEM weight	0.024	0.352	0.617	0.860	1.000	1.366	2.866	5.517	31.701
Hours per Week	39	39	40	39	38	40	43	43	38
Weeks Worked	5.1	5.5	5.3	5.6	5.1	5.5	5.0	4.8	5.0
Income	54,594	60,990	33,213	36,718	35,735	38,733	44,705	45,990	34,027
School	18.9	20.0	19.0	18.0	17.1	16.9	16.0	15.4	17.4
Industy Earnings	4,079	4,338	4,272	4,207	3,247	4,237	4,203	3,984	2,686
Early Cov Rate	67.710	84.718	84.584	84.440	48.636	84.050	83.690	83.195	82.090
High Early Cov	0.387	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000
Observations	3,966,309	246,058	156,375	100,021	2,791,758	180,743	82,067	30,108	27,912

	Panel II: Weighting Low Early Coverage to Match High Early Coverage Means by CEM Weight Bins								
Weight Bin	[0,0.25)	[0.25,0.5)	[0.5,0.75)	[0.75,1)	[1,1]	(1,2)	[2,4)	[4,8)	[8, 1,001]
CEM weight	0.019	0.349	0.614	0.869	1.000	1.405	2.843	5.166	19.160
Hours per Week	38	43	41	40	40	39	38	39	39
Weeks Worked	5.0	5.0	5.3	5.6	5.4	5.4	5.5	5.5	5.4
Income	44,600	44,549	41,739	36,041	52,918	34,922	57,077	75,158	51,003
School	17.7	15.9	16.9	16.9	19.5	18.4	19.8	20.3	20.0
Industy Earnings	3,569	3,983	4,035	3,969	4,150	3,994	4,091	4,078	3,988
Early Cov Rate	56.875	49.389	49.587	49.680	83.952	49.970	50.192	50.363	50.869
Low Early Cov	0.306	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000
Observations	4,442,056	346,726	195,753	167,355	1,895,427	269,324	127,321	75,260	62,129

*N*otes: This table provides means of matching variables by weight bin. The weights summarised in this table were constructed using the CEM matching procedure as described in the text in section 5.1. Columns 1 through 4 show descriptive statistics for individuals that received weight less than one while columns 6 through 9 show descriptive statistics for individuals that received weight greater than one. Column 5 shows descriptive statistics for individuals with high early coverage (panel I) or individuals with low early coverage (panel II). The 5 dimensions used for creating the CEM weights summarised in this table are hours worked per week last year, weeks worked last year, personal income, years of schooling, and average industry earnings.

Table A.8

6 Dimension CEM Weights Summary

	Panel I: Weighting High Early Coverage to Match Low Early Coverage Means by CEM Weight Bins								
Weight Bin	[0,0.25)	[0.25,0.5)	[0.5,0.75)	[0.75,1)	[1,1]	(1,2)	[2,4)	[4,8)	[8, 887]
CEM weight	0.020	0.353	0.626	0.875	1.000	1.391	2.807	5.440	28.778
Hours per Week	38	39	39	40	39	40	42	42	38
Weeks Worked	5.0	5.5	5.3	5.6	5.2	5.5	5.0	5.0	5.1
Income	52,149	63,797	35,797	36,550	36,902	38,969	43,789	44,817	32,908
School	18.6	20.1	19.0	18.1	17.2	17.1	16.2	15.5	17.3
Industy Earnings	3,969	4,339	4,325	4,173	3,320	4,236	4,194	3,984	2,769
Early Cov Rate	65.965	84.693	84.600	84.364	48.904	84.079	83.712	83.236	82.173
High Early Cov	0.438	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000
Observations	4,293,417	259,671	146,003	108,341	2,436,391	178,208	81,901	33,273	26,234

	Panel II: Weighting Low Early Coverage to Match High Early Coverage Means by CEM Weight Bins								
Weight Bin	[0,0.25)	[0.25,0.5)	[0.5,0.75)	[0.75,1)	[1,1]	(1,2)	[2,4)	[4,8)	[8, 356]
CEM weight	0.018	0.356	0.621	0.863	1.000	1.365	2.834	5.208	18.263
Hours per Week	38	42	40	40	40	40	39	39	40
Weeks Worked	4.9	5.0	5.4	5.6	5.4	5.5	5.5	5.5	5.5
Income	44,952	43,645	40,599	37,056	52,653	36,097	60,679	68,997	52,653
School	17.7	16.1	16.9	17.1	19.5	18.4	19.8	20.2	20.0
Industy Earnings	3,595	3,964	4,043	3,941	4,148	4,000	4,090	4,043	3,981
Early Cov Rate	57.387	49.396	49.660	49.663	83.996	49.974	50.213	50.401	50.846
Low Early Cov	0.317	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000
Observations	4,631,439	315,037	201,302	138,144	1,778,054	255,463	125,489	66,658	51,853

*N*otes: This table provides means of matching variables by weight bin. The weights summarised in this table were constructed using the CEM matching procedure as described in the text in section 5.1. Columns 1 through 4 show descriptive statistics for individuals that received weight less than one while columns 6 through 9 show descriptive statistics for individuals that received weight greater than one. Column 5 shows descriptive statistics for individuals with high early coverage (panel I) or individuals with low early coverage (panel II). The 6 dimensions used for creating the CEM weights summarised in this table are hours worked per week last year, weeks worked last year, personal income, years of schooling, average industry earnings, local area insurance rate.