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Jeffrey Clemens
University of California at San Diego

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Why Do Labor Unions Advocate for Minimum Wage Increases?[1]

Over the past decade, organized labor has played a significant role in advocating for minimum wage increases. Why might this be, given that the minimum wage may act as a substitute for the bargaining power offered by labor unions? In this paper, we study the interplay between minimum wages and union membership. We estimate that each dollar in minimum wage increase predicts a 5 percent increase (0.3 pp) in the union membership rate among individuals ages 16–40. Consistent with a classic "free-riding" hypothesis, however, we find that minimum wage increases predict declines in union membership among the minimum wage's most direct beneficiaries. Instead, increases in union membership occur among much broader groups that are not directly affected by the minimum wage.

JEL Classification: D71, D78, P16

Keywords: political economy, social choice, minimum wage, unionization

Corresponding author:
Michael R. Strain
American Enterprise Institute
1789 Massachusetts Avenue, NW
Washington, DC 20036
USA

E-mail: michael.strain@aei.org

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Section I: Introduction

Over the past decade, labor unions have emerged as advocates for historically high minimum wages. Since its inception in 2012, the "Fight for $15" movement has received substantial union support, ranging in intensity from simple expressions of solidarity to financial and organizational aid.[2] Notably, a realignment of labor unions in greater support of minimum wages has emerged in a number of industrialized economies, as observed by Ress and Spohr (2022) and described in far greater detail by Müller and Schulten (2020).

This rise in advocacy may appear puzzling. From the perspective of the minimum wage's beneficiaries, a higher minimum wage may substitute for a labor union's bargaining clout. On the other hand, advocacy for a policy as popular as the minimum wage may benefit unions by enhancing their reputation. Indeed, the last decade has seen an increase in unions' favorability ratings among the public.

Against this backdrop, we analyze the interplay between minimum wages and union membership. We first document that recent minimum wage increases have preceded increases in union membership, which may suggest that union advocacy for increasing the wage floor has borne fruit. Over the past decade, a one-dollar increase in a state's minimum wage predicts a 5 percent increase in union membership among people ages 16–40.

[2] The AFL-CIO's website, for example, includes "restoring the minimum wage to a living wage" in its statement of policy priorities for improving pay and benefits. (Accessed at the following link on May 5, 2020: https://aflcio.org/issues/better-pay-and-benefits). The Service Employees International Union (SEIU) has been relatively public regarding its operational and financial support for the Fight for $15. In a representative statement linking the fortunes of unions and the Fight for $15, SEIU President Mary Kay Henry wrote in 2019, "This movement will not stop until workers across the country win the $15 an hour and union rights they've demanded since Day One." (Accessed at the following link on April 10, 2020: http://www.seiu.org/2019/01/seius-henry-fight-for-15-and-a-union-is-winning-for-americas-working-people-changing-whats-possible.)

Our effort to estimate the causal effect of minimum wage increases on union membership rates faces three standard but non-trivial challenges. First, it is possible that minimum wage changes have been more likely to be enacted in states in which unions were already increasing in strength. The correlation between minimum wage increases and increases in union membership rates would, in this view, reflect reverse causality, through which strengthening unions achieved the policy outcome of an increased minimum wage. Second, the correlation could also be a product of economic conditions (e.g., a strengthening labor market), that might simultaneously lead to higher employment, higher union membership, and a broadly shared preference for raising minimum wages. Third, minimum wage changes might be enacted by states with generally progressive politics, and it is possible that such states have been affected by different forces that exerted independent influence on rates of union membership over the time period we analyze.

We investigate the relevance of these concerns through a standard set of best practice robustness checks. To investigate the relevance of pre-existing trends in union membership, we implement standard event study estimators that allow us to check for such trends directly. We find no evidence of divergent pre-existing trends in union membership when comparing states that enacted minimum wage increases to states that did not. We also investigate whether we obtain similar results when implementing synthetic control methods, which are designed to ensure that "treatment" and "control" states followed similar trajectories prior to the implementation of recent minimum wage increases. We find that these methods yield results very similar to our more basic, baseline approach.

We also investigate the relevance of economic shocks that might shape both union membership trends and preferences over minimum wage increases. To do so, we conduct a set

of checks for the relevance of proxies for changes in macroeconomic and housing market conditions. Controlling for such factors tends to produce a moderately stronger partial correlation between minimum wages and union membership rates. To check for the relevance of differences in states' baseline union membership rates, we implement multiple matching estimators, none of which qualitatively change our key findings or conclusions. Finally, we investigate whether minimum wage increases are associated with changes in other dimensions of state-level labor law, and we find that they are not. We present evidence that the relationship between minimum wage increases and union membership is not driven by other changes in states' policy and political landscapes which would have the potential to bias our estimates. Taken together, we find robust evidence that minimum wage increases had a causal impact on union membership rates over this time period.

Having established a relationship between minimum wage increases and greater union membership, we next attempt to discern between alternative theories of what might be driving this relationship. To do so, we consider precisely which groups of workers become more likely to be members of unions following minimum wage changes. While the overall relationship between minimum wages and union membership is positive, we find, consistent with evidence in Clemens and Strain (2023a), that minimum wage increases reduce union membership among the minimum wage's most direct beneficiaries. That is, consistent with free-riding, low-skilled workers in food service and retail appear to treat the minimum wage as a substitute for the services of unions. We find that this decline in union membership is more than offset, however, by increases among groups of workers that do not benefit directly from the minimum wage.

Our findings relate to several research literatures. First, our findings shed light on the channels through which an interest group like unions might accumulate members and influence.

Our findings suggest an important role for forces beyond the direct material well-being of an interest group's members. While the importance of material incentives is indisputable, they do not tell the entire story. Our findings are consistent with a role for what Wilson (1973) and Clark and Wilson (1961) call "purposive incentives." That is, an interest group can build its membership and influence by establishing a reputation for effective, public-spirited advocacy.

Second, our most direct contribution is to the literature on the determinants of union membership. A relevant segment of this literature has analyzed the effects of Right to Work laws, which allow workers to benefit from a union's presence without paying dues (Lumsden and Petersen, 1975; Ellwood and Fine, 1987; Moore, 1998). The fact that the minimum wage increases we analyze predict declines in the likelihood that the minimum wage's direct beneficiaries are union members suggests that the free-rider considerations raised by studies of Right to Work laws are relevant in our setting. Overall, however, we find evidence that union membership rises in the wake of minimum wage increases. Taken together, we find that union membership rates can be shaped by the enactment of popular labor market policies with which unions have actively associated themselves. Through this analysis, we contribute to the literature on what unions do (Freeman and Medoff, 1984), much of which has focused on union wage premiums and inequality (Freeman and Medoff, 1981; Hirsch and Schumacher, 2001; Card, 1996; Card, Lemieux, and Riddell, 2004; Farber, Herbst, Kuziemko, and Naidu, 2021). Our study connects more directly to discussions of unions as "a voice both at the work place and in the political arena" (Freeman and Medoff, 1979).

The studies most directly related to ours have investigated the relationship between the introduction of Germany's minimum wage and participation in collective bargaining. Bellman *et al.* (2021) find that the minimum wage resulted in a non-trivial increase in the rate at which firms

exit collective agreements, though a modest effect on overall participation in collective bargaining. Ress and Spohr (2022) find no effect of Germany's introduction of the minimum wage on membership among the minimum wage's direct financial beneficiaries. Relative to this recent work, our analysis differs with respect to both context and the econometric tools we are able to deploy. With respect to context, we analyze a far less centralized environment in which labor's role in the policy making process is less formalized than in countries where wage setting and other labor policies are jointly negotiated by representatives of key stakeholders or "social partners." The empirical setting we analyze has the benefit of providing rich variation in minimum wage policy across states, which enables us to deploy a mix of standard and more modern panel event study models in our analysis.

Our paper proceeds as follows. Section II discusses theories that can shed light on the decision to participate in groups. Section III describes the data we use to study the relationship between minimum wage changes and union membership rates. Section IV presents our empirical methodology. Section V presents our analyses of the effects of minimum wage increases on union membership. Section VI presents evidence that is relevant for assessing the plausibility of key theories of interest group membership. Section VII concludes.

Section II: What Factors Drive Participation in Interest Groups?

How do interest groups accumulate members and influence? Many strategies exist, and the effectiveness of these strategies will vary in nuanced ways across settings. Research in economics and political science has developed a number of insights into these issues. We do not

attempt to summarize those literatures exhaustively. Instead, we offer some lines of intuition that guide our thinking and can help to interpret our empirical analysis.

The most obvious method for interest groups to improve their standing is to improve their members' material well-being. That is, interest groups can provide services to their members (Buchanan, 1965; Olsen, 1965; Berman, 2000). Standard services delivered by labor unions would include higher wages, better benefits, and greater voice in the workplace (Freeman and Medoff, 1984). A recent paper by Murphy (2020) highlights the impact of unions on well-being through the provision of legal insurance against allegations of misconduct.

In our setting, a key question is whether a minimum wage increase raises the return to workers from becoming union members. This channel of direct improvement in material well-being may apply, for example, if minimum wages shift compensation structures for both minimum wage workers and higher skilled workers. The potential relevance of this channel can be investigated, in part, by asking whether minimum wage changes alter union wage premiums.

Because minimum wage increases apply to both union and non-union workers, it is quite possible for minimum wage increases to reduce union wage premiums. This raises a question of free riding; a non-union worker need not pay dues to benefit from a minimum wage increase for which the union advocated. The minimum wage's direct beneficiaries may thus become less, rather than more, likely to join unions. Minimum wage increases may substitute for the wage gain such workers might previously have obtained by joining the union. Membership rates among the minimum wage's direct beneficiaries provide an opportunity to explore the relevance of free riding linked to the direct material benefits of union membership.

Why might unions advocate for minimum wage increases despite risks of free riding? A variety of non-monetary motivations may be at work. Coalition politics, for example, can shape the strategies and tactics of unions as well as the outlooks of their members (Frymer and Grumbach, 2021). One possibility is that policy advocacy may bolster an interest group's cause by enhancing its public image. In complementary work (Clemens and Strain, 2023b), we find that recent minimum wage increases have shifted news coverage of organized labor, making it more likely to connect organized labor with the minimum wage, which is popular among members of the public.

In the analysis that follows, we assess the plausibility of the "public image" channel by analyzing the minimum wage's effects on union membership among relatively high-wage groups of workers. That is, we investigate union membership among workers who are not plausibly affected, either directly or indirectly, by the minimum wage itself. This includes highly educated workers and individuals who are employed in the public sector. We confirm in wage data that the wages of individuals in these groups are unaffected by minimum wage increases.

Section III: Data

In this section, we discuss the data sources used in our analysis. The policy variation of interest involves minimum wage changes. The primary outcome of interest is union membership. Control variables in our analysis include demographic characteristics, proxies for variations in macroeconomic conditions, and variables related to states' political landscapes and other labor market policies. We also analyze data on public perceptions of unions and novel data on news coverage of key events in the political and legislative histories of minimum wage increases.

Union Membership Rates

The primary dependent variable in our analysis is an indicator for an individual's union membership status. Union membership has long been tracked by the Current Population Survey (CPS) conducted by the Bureau of Labor Statistics (BLS). Specifically, individuals are asked about their union membership as part of the expanded battery of questions known as the Earnings Survey. These questions are asked of individuals during the fourth and eighth months of their participation, which occur 12 months apart from one another. These interviews are known collectively as the Outgoing Rotation Group (ORG) interviews of the CPS. To the best of our knowledge, these are the largest, continually running, nationally representative surveys in which individuals are asked about their membership in labor unions.

Additional Data from the CPS ORG Files

Our analysis uses several additional pieces of information from the ORG samples of the CPS. First, many of our specifications control for age and education, which are correlated with individuals' skills as well as with their likelihood of being a member of a union. These controls are of relevance to our analysis in large part because our analysis samples, while meant to be nationally representative, may exhibit nontrivial sampling variations given that we analyze variations across states and over time among population subgroups.

Second, we conduct several analyses of samples or dependent variables that are defined based on an individual's industry, occupation, or sector. The CPS collects information on "worker class," which refers broadly to the distinction between the public and private sectors. This division of workers is of interest to our analysis of union membership because private-

sector union membership has exhibited a substantial long-run decline while public-sector unionization has remained robust.[3] We also utilize information on workers' industries and occupations so that we can focus a subset of our analyses on individuals in minimum-wage-intensive segments of the labor market. Finally, we use CPS variables that contain information about individuals' wage rates, including whether a respondent is paid by the hour and whether their earnings or hourly wage rate is imputed by BLS (Clemens and Strain, 2022).

Effective Minimum Wage Rates and Legislative Events

Our data on states' effective minimum wage rates and on key dates in the legislative process draw on many sources. The effective minimum wage is the level of the binding wage floor, which in some cases is set by legislation and in others is determined through an automatic inflation adjustment.[4] Our primary source for key dates in the legislative process is the National Conference of State Legislatures. These dates have been cross-checked against myriad news articles, reports from state labor departments, and legislative texts. For state-by-month minimum wage rates, we use data compiled by Clemens, Hobbs, and Strain (2018). These minimum wage rates have been checked against the complementary database of Vaghul and Zipperer (2021). The map in Figure 1 illustrates which states enacted minimum wage increases during our sample period, while Table 1 presents information on implementation dates.

[3] According to the BLS (2015, 2019), the private-sector union membership rate has fallen from 17 percent in 1983 to 6.2 percent in 2019. The corresponding share of public-sector workers has remained steady at roughly one-third.
[4] Brummund and Strain (2020) study the employment effects associated with inflation indexed minimum wages. Clemens and Strain (2022) study the extent to which the minimum wage is binding on the margin.

Additional Control Variables

Our analysis incorporates data on macroeconomic covariates that may be relevant as control variables. As in our past work (Clemens and Strain 2017, 2018, 2021), we proxy for variations in housing markets using a statewide median house price index from the Federal Housing Finance Agency (FHFA). We proxy for aggregate economic performance using data on state income per capita from the Bureau of Economic Analysis (BEA). We also analyze data on states' political landscapes, from the National Conference of State Legislatures (NCSL), and data on assorted state labor market policies, which are updated and maintained by Sorens, Muedini, and Ruger (2008).

Summary Statistics

Table 2 presents summary statistics on our primary analysis samples. Among those ages 16–40, we observe that the share of individuals reporting union membership increased from an average of 6.6 percent from 2011–14 to 7.0 percent from 2015–19 in states that increased their minimum wages. In states that did not increase their minimum wages, the fraction unionized decreased slightly, from an average of about 3.9 percent to 3.7 percent. Employment, house prices, and income per capita all rose over this period. These variables increased more in states that had minimum wage changes than in those that did not.

Section IV: Estimation Frameworks

This section describes our empirical strategy for estimating the effect of minimum wage increases on union membership rates. For our primary analyses, we estimate two closely related specifications with moderately different strengths and weaknesses for the task at hand. The first regression we estimate is equation (1) below, in which we correlate union membership rates with continuous panel variation in states' effective minimum wage rates:

$$U_{i,s,t} = \beta_1 MW_{s,t} + \alpha_{1s} State_s + \alpha_{2t} Time_t + X_{i,s,t}\gamma + \varepsilon_{i,s,t}. \qquad (1)$$

All estimates of equation (1) include state and time fixed effects, so that β_1 can be interpreted as a difference-in-differences-style estimate of the relationship between changes in minimum wage rates and changes in the likelihood that an individual is a union member. The vector *X* contains sets of control variables that vary across the specifications we estimate. $U_{i,s,t}$ is an indicator for whether individual *i* residing in state *s* in time period *t* reports being a union member.

The goal of our empirical analysis is to provide causal evidence on whether there is an effect of minimum wage increases on union membership rates. Causal estimation of this effect faces nontrivial challenges. Overall economic activity, for example, may be correlated with a state's tendency to raise the minimum wage as well as with both the overall number of jobs and perhaps with the fraction of jobs that are likely to be union jobs. Our analysis also faces a threat of reverse causality. That is, a union movement that is growing in strength may be a movement that is simultaneously gaining new members and succeeding in its advocacy for minimum wage increases.

Although it is impossible to rule out all possible threats to causal identification, we can provide evidence on the relevance of threats that take several forms. First, within the framework

of equation (1) we explore the robustness of our estimates to controlling for proxies for broader macroeconomic conditions that could influence union membership. We do so by controlling for quarterly state income per capita and a quarterly index of quality-adjusted house prices. We similarly control for changes in states' political landscapes. Additionally, we use the framework of equation (1) to investigate whether changes in minimum wages correlate with changes in other labor market policies. To do so, we place state-year panel measures of other labor market policies on the left-hand-side of equation (1). The analysis thus provides evidence on whether variations in minimum wages predict variations in these other policy measures.

Second, we check for evidence on whether union membership rates began rising prior to the enactment of minimum wage increases. We do this by estimating the traditional event study specification below:

$$U_{i,s,t} = \sum_{p(s,t)\neq 0} \beta_{p(s,t)} Increased_s \times Event\ Year_{p(s,t)} + \alpha_{1s} State_s + \alpha_{2t} Time_t + X_{i,s,t}\gamma + \varepsilon_{i,s,t}. \quad (2)$$

Equation (2) differs from equation (1) with respect to the way variation in minimum wage regimes enters the specification. In equation (2), we interact a set of "event time" dummy variables with an indicator for whether a state implemented a minimum wage increase during our sample period. The event time dummy variables are coded to correspond with specific numbers of years relative to the enactment of a state's first minimum wage increase during the sample. We omit the interaction for the time period describing the year immediately prior to the first minimum wage in increase, which we define as year $p(s,t) = 0$. The coefficients of interest can thus be interpreted as differential changes in union membership rates from the year prior to the first minimum wage increase to the reference year. For reference years less than 0, the point estimates thus provide evidence on whether divergent trends in union membership had occurred

prior to the minimum wage increase's enactment. This provides evidence on the potential relevance of concerns related to endogenous policy. Estimates for years following the minimum wage increase track the dynamics with which union membership rates subsequently evolved.

Since the states in our sample enacted minimum wage increases in different years, estimates of equation (2) may suffer from "negative weighting" problems that can afflict event studies with heterogeneous treatment timing (Sun and Abraham, 2021; Goodman-Bacon, 2021). As a robustness check, we thus implement a recently proposed solution that is described by Baker, Larcker, and Wang (2022) as the "stacked regression estimator." As discussed in papers including Baker, Larcker, and Wang (2022), Cengiz et al (2019), and Clemens and Strain (2021), the stacked event study estimator avoids the "negative weights" problem through an attractive rearrangement of the data. In effect, the stacked event study rearranges the data so that treatment events are coded as though they occur simultaneously.[5] This rearrangement eliminates the staggered timing of treatment, which is the source of the negative weighting problem. To improve our ability to explore pre-treatment trends, we add data from 2010 to the samples for these analyses.

A final dimension of robustness on which we can provide evidence relates to a general difference between states that have implemented minimum wage increases and those that have not. States that have implemented minimum wage increases have disproportionately been states

[5] As discussed in Clemens and Strain (2021), the rearrangement of the data for estimating the stacked event study estimator proceeds as follows: "First, we create separate, event-by-cohort-specific data sets for each policy cohort, by which we refer to the group of states that implemented their first minimum wage increase during a particular year. Each cohort-specific data set consists of the relevant policy cohort plus the set of control states that implemented no minimum wage changes across the duration of our sample. Within each cohort-specific data set, time is specified in "event time" with respect to the number of years relative to the year in which the policy cohort implemented its first statutory minimum wage changes. We then append (or "stack") these policy-cohort data sets on top of one another. The stacked data set thus contains replicates of the observations associated with the control groups."

with high baseline union membership rates. We thus implement both equation (1) and equation (2) on subsamples that remove states with unusually high or low baseline union membership rates from the sample. Estimates on this sample involve states with similar baseline patterns of unionization, and thus provide evidence on the potential relevance of this final source of concern.

Further, we construct estimates using synthetic control methods. For this analysis, we impose as an inclusion criterion that the baseline union membership rate for a treatment state must be on the common support of the baseline union membership rate for the control states.[6] For treatment states that meet this criterion, we then construct separate synthetic control groups to match the baseline level and trajectory of the annual union membership rate for each of the states that enacted a minimum wage increase during our sample. In all cases, we construct the synthetic control groups from the sample of states that enacted no minimum wage increases. We then average the treated and synthetic control estimates for each year relative to the first minimum wage increase. To probe the robustness of our synthetic control estimates and mitigate concerns about "cherry picking" (Ferman, Pinto, and Possebom, 2020), we implement two approaches to constructing synthetic controls. In the first, we construct synthetic control groups using all values of the dependent variable (the union membership rate) for all time periods up to the period during which a state's first minimum wage increase was implemented. In the second, we exclude the union membership rate from the year preceding the minimum wage increase and include our macroeconomic covariates as well as the state employment-population ratio as predictors instead. Like the stacked event study estimator, our synthetic control estimator is immune from the weighting issues that can adversely affect the interpretability of traditional

[6] The states with minimum wage increases dropped from this procedure are Alaska, Hawaii, and New York as the unionization rates in these states are higher than the maximum unionization rate for the nonincreaser states for all pretreatment years.

event study estimates.

Estimating the Relationship Between Minimum Wage Increases on the Union Wage Differential

In addition to examining the effects of minimum wage changes on union membership rates, we also explore the relationship between minimum wage increases and differentials between union and nonunion wages. For this analysis, we estimate the following specification:

$$W_{i,s,t} = \beta_1 MW_{s,t} + \beta_2 U_{i,s,t} + \beta_3 MW_{s,t} \times U_{ist} + \alpha_{1s}\, State_s + \alpha_{2t}\, Time_t + X_{i,s,t}\,\gamma + \varepsilon_{i,s,t}. \qquad (4)$$

Similar to equation (1), equation (4) uses continuous variation in state minimum wages and includes state and time fixed effects. $W_{i,s,t}$ is the hourly wage rate of employed individual *i* in state *s* in time period *t*. $U_{i,s,t}$ is an indicator for whether the individual is a union member. The coefficient of interest, β_3, estimates the relationship between minimum wage increases and the wage differential for union relative to nonunion workers. Similar to our previous analyses, we include age and education controls as well as controls for state house prices and state income per capita. Since differences in wages vary greatly by industry and occupation, we also include industry and occupation fixed effects for all three-digit census occupation and industry codes. As discussed when we present estimates of equation (4), properly interpreting β_3 is difficult because, as shown through our estimates of equation (1), minimum wage increases predict changes in which workers belong to unions.

Section V: Estimates of the Relationship Between Minimum Wages and Union Membership

This section presents our analysis of the relationship between minimum wage changes and unionization rates. We begin with presentations of unadjusted data on the evolution of union membership rates and their correlation with changes in states' minimum wage rates. We then present our baseline regression analysis and robustness checks.

Initial Evidence on the Evolution of Union Membership Rates

Figures 2 and 3 provide a descriptive look at the evolution of union membership rates from 2011 through 2019. The scatterplot in Figure 2 presents state-level changes in minimum wages and union membership rates from the first years of our analysis sample (2011–14) to the later years of our analysis sample (2016 through the end of 2019). The relationship is distinctively upward sloping, revealing that minimum wage increases were positively correlated with changes in union membership rates.

The four panels of Figure 3 present time series on union membership rates. The figure reports separate time series for states that enacted minimum wage increases and those that did not. The panels differ with respect to the samples of states. Panel A reports time series that average across all states. From 2011 through 2019, the data reveal that union membership rates increased by roughly 0.4 percentage point (roughly 6 percent on a baseline mean of just over 6.5 percentage points) in states that enacted minimum wage increases. In states that did not enact minimum wage increases, union membership rates declined by roughly 0.3 percentage point (or roughly 9 percent on a baseline mean of 3.3 percentage points).

The sample used to construct Panel B is constrained to include states with baseline (i.e., 2011-2014) union membership rates between 2.5 percent and 7.5 percent. We analyze this second sample because states that enacted minimum wage increases were disproportionately likely to be states with high rates of union membership at baseline. Panel B reveals that we find trends similar to those observed in Panel A when we focus on states with more closely matched union membership rates in our baseline period. The divergence is, if anything, more striking. Membership rates rise by roughly 0.7 percentage point in states that enacted minimum wage increases while declining marginally in those that did not. In subsequent analysis we more formally match states that enacted minimum wage increases with other states using synthetic control methods.

In Panels C and D, we further explore the robustness of the relationship between minimum wages and unionization rates using synthetic control analysis. This analysis provides a further check for the potential relevance of differences in the baseline levels and trajectories of unionization rates in states that increased minimum wages relative to those that did not. As described in Section IV, we use two approaches to construct synthetic control groups in order to guard against "cherry picking" concerns. In Panels C and D, which present averages across the "treatment" and "synthetic control" groups using our two methods, we center all series on the year during which a given "treatment" state's minimum wage first increased.

Comparing our treatment and synthetic control groups, the differential movements in union membership rates are quite similar to those observed in Panels A and B. The series move in parallel from three years prior to each treatment state's first minimum wage increase through the year of the minimum wage increase itself. The series subsequently diverge. By the fourth year following the initial minimum wage increase, a differential of 0.8 percentage point has

emerged in Panel C, and of 0.6 percentage point in Panel D. The 0.6 percentage point differential is roughly 12 percent relative to the baseline mean of 5 percent.

Regression Estimates of the Relationship Between Minimum Wages and Union Membership

This section presents estimates of equations (1) and (2). The estimates serve two purposes. First, they quantify and put error bounds around the magnitude of the relationships presented in Figures 2 and 3. Second, they provide frameworks within which we can probe the case for interpreting associations between minimum wages and union membership rates as a causal impact of minimum wage increases.

Table 3 presents estimates of equation (1), which analyzes the relationship between union membership rates and continuous variation in the minimum wage. The estimate in column 1 reveals that, over our analysis sample, a one-dollar increase in a state's minimum wage predicts a 0.25 percentage point increase in union membership rates among individuals ages 16–40, or a 4.4 percent increase relative to the mean across all states. The p-value on the test for whether this estimate is statistically distinguishable from 0 is less than 0.01. Column 2 shows that the magnitude of the relationship between union membership and a one-dollar minimum wage increase declines modestly if we include exhaustive sets of age and education indicator variables as controls. Column 3 shows that the magnitude rises if we control for two proxies for the overall performance of states' economies—namely, the log of aggregate state income per capita and an index of median house prices. Finally, Column 4 shows that controlling for both the proxies for macroeconomic conditions and the demographic covariates yields a coefficient of 0.29 percentage points. This final specification, which is our baseline specification of equation (1),

implies that each dollar of minimum wage increase generated an increase in union membership rates of roughly 5.3 percent. The results in Table 4 show that our point estimates are modestly reduced when we restrict the sample to states that had baseline unionization rates greater than 2.5 percent and less than 7.5 percent.

In the regressions presented thus far, our analysis samples have consisted of individuals ages 16–40. Table 5 presents evidence on why. Specifically, it presents estimates from the most-controlled specification in Table 3 (namely, the specification that includes our macroeconomic covariates as well as our age and demographic covariates) on subsamples that partition the population ages 16–60 based on age. Each column presents estimates for a five-year age band. Estimates are regularly positive and strongly distinguishable from 0 for individuals ages 16–40; they are economically small and indistinguishable from 0 for individuals ages 41–60. The absence of changes in union membership among individuals ages 41–60 is unsurprising, as the likelihood of a worker experiencing their first union job declines dramatically as individuals age out of their 20s and 30s (Budd, 2010).[7] We thus focus our analysis on individuals in the first half of their careers. The estimates in Panel B reveal, as expected, that the direct effects of minimum wage increases on wages accrue primarily to the young, namely those between 16 and 25.[8]

In Figure 4 Panel A, we plot the coefficients and standard errors from our baseline event study specification, as described by equation (2). We observe two key facts. First, the coefficients in the pre-increase periods ("–3" through "0") are all statistically indistinguishable

[7] Budd (2010, pp 218) writes "By using an exponential model to extrapolate the trend in column 3 out to age 65, it can be estimated that no more than another 2.5 percent of workers are likely to experience unionization for the first time between age 40 and 65. This means that of those workers who are unionized anytime between ages 15 and 65, over 70 percent of them are first unionized by age 25, and 96 percent for the first time by age 40. If a worker has not been unionized by age 40 then it is unlikely that he or she ever will be."

[8] To prevent the estimated wage gains from being driven by wage values that could not plausibly be affected by the minimum wage, we censor the hourly wage variable at $25 in regression analyses where the dependent variable is hourly wages earned.

from zero. We thus see no evidence of divergence in the trends experienced by our treatment and control groups prior to the implementation of a state's first minimum wage change, which supports a causal interpretation of our estimates. Second, following the implementation of minimum wage increases, we observe a distinctive upward trajectory in union membership rates. Within three years of a state's first minimum wage increase, union membership rates have risen by 0.4 percentage points relative to states that enacted no increases during our sample period. Within four years, the differential increase is 0.5 percentage points. Both the three-year and four-year increases are statistically distinguishable from 0 at the 0.01 level. In Panel C, we use union coverage as the dependent variable rather than simply membership and find our results are very similar. We also find our results are little changed whether we include state-level macroeconomic covariates (Panels A and C) or exclude them (Panels B and D).

Figure 5 presents evidence on the robustness of the baseline event-study estimates presented in Figure 4 to using the stacked regression estimator. The panels of Figure 5 mirror the panels of Figure 4 with respect to their use of macroeconomic control variables and the definition of union membership. The estimates in Figure 5 are indistinguishable from the estimates in Figure 4. This provides evidence that the estimates of the traditional event study were not adversely impacted by the weighting issues that can apply when treatment is adopted with staggered timing across states.

Two points are of interest regarding the magnitudes of the point estimates we observe in Figures 4 and 5. First, the "medium run" estimate for years "3" and "4+" are in line with what one would expect to find based on the estimates in Table 3. Among states that enacted minimum wage increases over this period, the average increase enacted as of 2019 was on the order of $2. Our baseline estimate of equation (2), which appears in column 4 of Table 3, implies that a $2

minimum wage increase predicts a 0.58 percentage point increase in union membership. This is almost exactly in line with the medium-run effect we observe in Figures 4 and 5.

It is also of interest to consider the evolution of point estimates from years "1" and "2" to years "3" and "4+." The estimates suggest a gradually unfolding increase in the relationship between minimum wage increases and union membership. This is consistent with standard "stock" and "flow" dynamics emphasized in prior research on the determinants of union membership rates. The key point is that the overall union membership we observe in any given cross-section of CPS data is a stock. As has been observed in analyses of the relationship between union membership and Right to Work laws, the stock of union membership will tend to respond gradually through a policy change's effects on membership flows (Ellwood and Fine, 1987; Moore, 1998). This is consistent with what we observe. These dynamics also relate to why we observe impacts of minimum wage changes on union membership among individuals in the first half of their career, but not among those in the second half of their careers.

Finally, Appendix Tables A1, A2, and A3 provide evidence that the relationship between minimum wages and union membership rates is not driven by omitted factors related to the political ideology of the party in power. First, Table A1 shows that our results are robust to adding control variables for the party in control of state legislatures, of the governor's mansion, and for cases in which either Democrats or Republicans have unified control of state government.[9] While the partisan control of state government has a strong cross-sectional correlation with minimum wage policy, as shown in Table A2, we show in Table A1 that changes in partisan control are not contaminating our estimates. Second, we show in Table A3

[9] These variables come from the State and Legislative Partisan Composition Database from the National Conference of State Legislatures (NCSL, 2020).

that our identifying variation in minimum wages is largely uncorrelated with changes in other labor market regulations including Right to Work laws, paid leave, and the legality of noncompete agreements as measured in databases maintained by Sorens, Muedini, and Ruger (2008).

Section VI: Investigating Theories of Interest-Group Membership

In this section, we present evidence that speaks to the plausibility of alternative theories of interest-group membership. We do this by presenting analyses that divide the population into subsamples that (1) are directly affected by the minimum wage, (2) may be indirectly affected by the minimum wage, or (3) are not plausibly affected by the minimum wage. We also present evidence on the relationship between minimum wage increases and union wage differentials.

Analyses of Subgroups of Workers

In this section, we provide evidence on which types of workers and demographic groups are more likely to become members of unions in the wake of minimum wage increases. The subgroups we analyze differentiate between individuals who might be directly impacted by the minimum wage, who might benefit indirectly from the minimum wage, and whose employment and wages have no plausible connection to the minimum wage. To be more specific, we distinguish between public- and private-sector workers, between high- and low-education workers, and between workers employed in high- and low-wage industries.

We first explore the relationship between minimum wage increases and public- versus

private-sector union membership. This distinction is relevant for two reasons. First, public- and private-sector unions have been on different paths for decades; private-sector unions have declined, while public-sector unions have retained their strength. Second, minimum wage increases tend to affect neither the wages nor the employment of public-sector workers.

We estimate our full sample regression using dependent variables that differentiate between public- and private-sector union membership. These specifications are designed so that our overall estimate can be readily decomposed into public and private components. The estimates, which appear in Table 6, imply that public-sector union membership accounts for roughly half the overall increase we observe. For further context, note that public-sector union membership accounts for roughly half of all union membership among individuals ages 16–40 at baseline, but less than 15 percent of this group's employment.

In Panel B of Table 6, we add an education dimension to our analysis of both public- and private-sector union membership. Specifically, we analyze the relationship between minimum wage increases and public- versus private-sector union membership among individuals with a completed BA or more education. This sample thus consists of individuals whose wage rates are very rarely impacted directly by the minimum wage. The evidence reveals that minimum wage increases predict increases in this sample's union membership rates that are as large as the increases that occur for the full sample of individuals ages 16-40. The mechanism underlying these changes must thus involve factors other than the direct impact of minimum wages on workers' earnings.

Table 7 presents additional evidence that minimum wage increases are followed by increases in union membership that are not directly connected to the minimum wage's impact on wages. Specifically, Table 7 presents estimates of equation (1) for which we have divided the

sample into hourly workers (see columns 3 and 4) and salaried workers (see columns 5 and 6). Panel B reveals, as expected, that most of the minimum wage's beneficiaries are hourly workers. Although the precision of the estimates in Panel A are reduced by this split of the sample, the estimated relationship between minimum wage increases and union membership are similar in economic magnitude for these groups. Indeed, the estimates are modestly to moderately larger for salaried workers. Taken together, the results in Tables 6 and 7 provide evidence that a comprehensive theory of union membership will need to include nonmaterial factors.

Our next piece of analysis focuses on individuals employed in minimum-wage-intensive industries. Specifically, we focus on the food-service and retail industries. We present this analysis, which moderately refines analysis from prior work (Clemens and Strain, 2023a), in Table 8. Panel A presents estimates of the impact of minimum wage increases on these individuals' union membership rates and panel B presents estimates of the impact on hourly wages. Each column presents an analysis of a different age group.

The estimates in columns 1 and 2 focus on individuals who are employed in food-service and retail industries and who are between ages 16 and 19. These estimates reveal that young individuals in low-wage occupations are less likely to belong to unions following minimum wage increases. Note that this sample consists of individuals who are employed and who experience some of the largest wage gains in the wake of minimum wage increases. The decline in this group's union membership thus appears inconsistent with theories that view membership and payment of dues as a form of reciprocity. Relative to estimates from prior work (Clemens and Strain, 2023a), these estimates show that the decline in union membership among young individuals is concentrated among teenagers, and that indeed for the teenage population the estimated decline is statistically strong whether the specification incorporates controls for

macroeconomic conditions or not.

While the evidence in columns 1 and 2 is inconsistent with a reciprocity-oriented theory of union membership, it is consistent with "free riding." The free-rider problem has received attention in research on the effects of Right to Work laws on union membership. Right to Work laws tend to reduce union membership because they enable workers to benefit from union-negotiated wages without paying dues (Baird, 1998). More generally, these laws allow workers to sidestep union restrictions on who can work. For young retail and food-service workers, a minimum wage increase and union membership can be viewed as substitutable sources of bargaining leverage. Consequently, the minimum wage increase reduces the direct material benefit these individuals might obtain from joining a union.

Among older individuals in minimum-wage-intensive industries, we find no evidence of changes in union membership. Interestingly, while the estimates lack statistical significance, we tend to find a positive relationship between minimum wages and union membership for older workers in these industries. This is of interest because these individuals may benefit indirectly if minimum wage increases result in increases in employers' skill requirements (Clemens, Kahn, and Meer, 2021). Because the estimates are imprecise, however, the evidence is less strong than the evidence we see elsewhere.

Estimates of the Relationship Between Minimum Wage Increases and Union Wage Differentials

In this section, we present estimates of the relationship between minimum wage increases and union wage differentials. Effects of minimum wage increases on union wage differentials may shed light on the relevance of direct material interests for individuals' decisions to join

unions. That said, our estimates must be interpreted with caution due to concerns linked to selection. That is, we have shown that minimum wage increases predict increases in union membership rates. Observed changes in union wage differentials may thus be driven by changes in the composition of which workers are in unions.

Our estimates of the relationship between minimum wages and union wage differentials are in Table 9. In column 1, we estimate that the relationship between minimum wages and the union wage differential is negative across all employed workers. In columns 2 and 3, we estimate the relationship separately for private- and public-sector workers. Columns 4 and 5 focus on workers in low-wage industries, while columns 6, 7, and 8 focus on sub-samples differentiated by educational attainment. The relationship between minimum wage increases and union wage differentials is either negative or statistically indistinguishable from 0 for all of these groups.

The prevalence of a negative relationship between minimum wage increases and union wage differentials provides additional evidence that a narrow notion of material interest is unlikely to be the primary driver of changes in union membership. A key caveat to this interpretation is that union wage premiums may shift due to changes in the composition of union workers. That said, we see no evidence to suggest that increases in union membership among high-education individuals are driven by material benefit in the form of higher wages.

Section VII: Discussion and Conclusion

Our analysis has investigated the interplay between minimum wages and union membership. Unions have advocated extensively for recent minimum wage increases. In the wake of recent minimum wage legislation, we find that union membership has tended to rise

among individuals in the first half of their careers.

We use this setting to shed light on the plausible relevance of several models of membership in unions or other interest groups. Following minimum wage increases, we find that workers whose wages are not affected become more likely to join a labor union. By contrast, the direct beneficiaries of minimum wage increases become less likely to join. The latter finding points to the relevance of free-riding concerns emphasized in past research on the effects of Right to Work legislation on union membership. Together, these findings highlight that factors other than direct material benefit must be in play as a driver of the decision to become a union member in the wake of minimum wage increases.

What factors beyond direct material benefit might shape the decisions individuals make to join unions or other interest groups? An attractive candidate hypothesis comes from Wilson (1973) and Clark and Wilson (1961) who developed the idea of "purposive" incentives for joining organized groups. By "purposive" incentives, Clark and Wilson meant to distinguish carefully between the desire to associate with a group because one approves of the ends it pursues (a "purposive" incentive) from the desire to associate with a group because one enjoys the act of association itself in a more social sense (a "solidary" incentive). One of the primary examples Clark and Wilson (1961, pp. 135) give of the "ends" that might establish a group's purposive incentives is "the [organization's] demand for the enactment of certain laws." Successful advocacy for increases in the minimum wage readily fit this description, such that our analysis provides novel evidence of a case in which purposive incentives deliver in the form of increases in group membership.

A question of interest for future work is the question of what mechanisms shape the effectiveness of using policy advocacy as part of a strategy for recruiting members to an

organization's cause. In a companion paper (Clemens and Strain, 2023b), we provide evidence of a potential mechanisms through an analysis of newspaper coverage of organized labor. In that analysis, we find that the enactment of minimum wage increases generates substantial newspaper coverage. A systematic feature of that coverage is a shift in newspaper coverage of organized labor towards coverage that connects organized labor and minimum wages. Over time, newspaper articles about unions have become less likely to focus on strikes, which are viewed negatively by the public, and more likely to connect unions and minimum wages, which are viewed positively by the public. Sentiment analyses support this assessment, as articles that link unions and minimum wages generate substantially more favorable sentiment scores than do articles that link unions and strikes. Much remains to be learned, however, about the mechanisms on which the success of efforts to harness purposive incentives might ultimately hinge.

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Tables and Figures

Table 1. List of States with Minimum Wage Changes from 2011 to 2019, Year of First Statutory Increase, and Year of First Indexed Increase

State	Year of First Statutory Increase	Year of First Indexed Increase
Alaska	2016	
Arizona	2017	2012
Arkansas	2015	
California	2014	
Colorado	2017	2012
Connecticut	2014	
Delaware	2014	
District of Columbia	2014	
Florida		2011
Hawaii	2015	
Maine	2017	
Maryland	2015	
Massachusetts	2015	
Michigan	2014	
Minnesota	2014	
Missouri	2019	2013
Montana		2012
Nebraska	2015	
New Jersey	2014	
New York	2014	
Ohio		2012
Oregon	2016	2012
Rhode Island	2013	
South Dakota	2015	
Vermont	2015	2012
Washington	2017	2012
West Virginia	2015	

Note: Data on minimum wage changes come from Clemens, Hobbs, and Strain (2018), Vaghul and Zipperer (2021), and a number of complementary sources. The table lists states that enacted minimum wage changes over the course of our primary analysis sample. Unlisted states are those for which the minimum wage did not change between January 1, 2011, and December 31, 2019. Note that this excludes New Mexico, Nevada, and Illinois, which passed minimum wage legislation in 2019, but which did not enact a minimum wage increase until 2020, which is outside of our analysis sample. New York state passed legislation in March 2013 to increase its minimum wage on December 31, 2013. We assign the year of first statutory increase to 2014, reflecting that 2014 was the first year during which the increase was in effect.

Table 2. Sample Summary Statistics: CPS ORG and Supplemental Data for 2011-2014 and 2015-2019

	(1)	(2)	(3)	(4)
Years	2011-2014	2015-2019	2011-2014	2015-2019
Sample	Never Increased Min Wage		Increased Min Wage	
Employed	0.654	0.687	0.642	0.683
	(0.476)	(0.464)	(0.479)	(0.465)
Union Member	0.0389	0.0369	0.0660	0.0702
	(0.193)	(0.189)	(0.248)	(0.255)
Hourly Wage ($)	14.14	16.32	15.04	17.74
	(20.81)	(21.81)	(21.81)	(23.02)
Hours Worked per Week	23.88	25.30	23.03	24.79
	(20.84)	(20.64)	(20.50)	(20.34)
Age (years)	27.75	27.87	27.73	27.98
	(7.165)	(7.158)	(7.163)	(7.106)
House Price Index	281.2	339.2	386.1	496.7
	(51.43)	(57.83)	(114.3)	(144.3)
Income per Capita ($1000s)	41.97	48.00	47.37	56.38
	(4.625)	(5.433)	(6.995)	(9.119)
Effective Minimum Wage ($)	7.366	7.362	7.791	9.472
	(0.317)	(0.311)	(0.516)	(1.230)
Observations	213,860	272,827	287,141	320,523

Notes: This table reports summary statistics for two sample groups. Columns 1 and 2 report averages and standard deviations (in parentheses) for employed individuals, ages 16–40, living in states that had no minimum wage increases. Columns 3 and 4 report averages and standard deviations (in parenthesis) for employed individuals, ages 16–40, living in states with at least 1 minimum wage change between 2011 and 2019. Entries for employed, unionized, hourly wages, hours worked, and age summarize data from the Current Population Survey Outgoing Rotation Groups (CPS ORG). There are 8,120 observations with missing hourly wages. These observations are associated with individuals who are not paid hourly and did not report their usual hours worked. The house price index is the quarterly all-transactions state-level index published by the Federal Housing Finance Agency (FHFA). Income per capita is quarterly average state-level personal income per capita from the Bureau of Economic Analysis (BEA). The effective minimum wage variable is the maximum of the state and federal minimum wage for large employers, as assembled independently by Clemens, Hobbs, and Strain (2018) and Vaghul and Zipperer (2021) using a number of sources.

Table 3. Relationship Between Minimum Wage Increases and Union Membership Rates Among Individuals Ages 16-40, 2011-2019

	(1)	(2)	(3)	(4)
Dependent Variable	Individual is a Union Member			
Effective Minimum Wage	0.0025***	0.0019**	0.0032***	0.0029***
	(0.0008)	(0.0009)	(0.0006)	(0.0006)
House Price Index Divided by 1000			-0.0383*	-0.0410*
			(0.0208)	(0.0228)
Ln(Income per Capita)			0.0222	0.0147
			(0.0188)	(0.0206)
Age and education controls	No	Yes	No	Yes
Dependent variable mean	0.0546	0.0546	0.0546	0.0546
Adjusted R-squared	0.0144	0.0379	0.0144	0.0380
Observations	1,094,351	1,094,351	1,094,351	1,094,351

Notes: This table reports regression results examining the effect of minimum wage increases on the probability of union membership. The sample is from the CPS ORG and consists of all individuals ages 16 to 40. Columns 1 and 2 report the effect of minimum wage changes on the probability of union membership, and columns 3 and 4 report the effect of minimum wage changes on the probability of union membership controlling for quarterly state-level house prices and income per capita. Variable definitions and sources are discussed in the note to Table 2 (and in the paper). All specifications include month, year, month-year, and state fixed effects. Age and education controls consist of a dummy variable for each education group and age. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Relationship Between Minimum Wage Increases and Union Membership Rates Matching on Membership Rates from 2011-2014 Among Individuals Ages 16-40, 2011-2019

	(1)	(2)	(3)	(4)
Dependent Variable	Individual is a Union Member			
Effective Minimum Wage	0.0019**	0.0015	0.0029***	0.0028***
	(0.0009)	(0.0010)	(0.0006)	(0.0010)
House Price Index Divided by 1000			-0.0410*	-0.0564**
			(0.0228)	(0.0273)
Ln(Income per Capita)			0.0147	0.0308
			(0.0206)	(0.0257)
Matched on baseline membership rates	No	Yes	No	Yes
Dependent variable mean	0.0546	0.0512	0.0546	0.0512
Adjusted R-squared	0.0379	0.0306	0.0380	0.0306
Observations	1,094,351	732,098	1,094,351	732,098

Notes: This table reports regression results examining the effect of minimum wage increases on the probability of union membership. The sample is from the CPS ORG and consists of all individuals ages 16 to 40. Columns 1 and 2 report the effect of minimum wage changes on the probability of union membership, and columns 3 and 4 report the effect of minimum wage changes on the probability of union membership controlling for quarterly state-level house prices and income per capita. In columns 2 and 4, individuals are matched on average union membership rates from 2011-2014 using propensity score matching. Variable definitions and sources are discussed in the note to Table 2 (and in the paper). All specifications include month, year, month-year, state, age, and education fixed effects. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 5. Examining Heterogeneity in the Effect of the Minimum Wage on Union Membership and Hourly Earnings by Worker Age, 2011-2019

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A	Dependent Variable: Individual is a Union Member								
Effective Minimum Wage	-0.0005	0.0045***	0.0024*	0.0017	0.0042***	-0.0027	0.0007	-0.0002	-0.0010
	(0.0005)	(0.0012)	(0.0014)	(0.0018)	(0.0015)	(0.0017)	(0.0014)	(0.0016)	(0.0013)
House Price Index/1000	0.0246*	-0.0601	-0.0930***	0.0007	-0.0426	0.0513	-0.0491	0.0625	0.0419
	(0.0136)	(0.0428)	(0.0241)	(0.0398)	(0.0402)	(0.0421)	(0.0309)	(0.0410)	(0.0462)
Ln(Income per Capita)	0.0218	0.0428	0.0475	-0.0631	-0.0157	0.0493	0.0217	-0.0720	-0.0543
	(0.0156)	(0.0386)	(0.0295)	(0.0541)	(0.0403)	(0.0522)	(0.0512)	(0.0557)	(0.0416)
Age range	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
Dependent variable mean	0.0095	0.0374	0.0650	0.0780	0.0848	0.0896	0.0923	0.0907	0.0826
Adjusted R-squared	0.0090	0.0143	0.0249	0.0336	0.0357	0.0377	0.0359	0.0348	0.0310
Observations	218,543	208,437	221,318	226,362	219,691	222,103	235,101	248,878	244,212
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel B	Dependent Variable: Hourly Wages Earned								
Effective Minimum Wage	0.4367***	0.3775***	0.0543	0.0224	0.0613	-0.0738	-0.0402	0.0532	-0.0424
	(0.0512)	(0.0545)	(0.0609)	(0.0575)	(0.0673)	(0.0603)	(0.0691)	(0.0851)	(0.0506)
House Price Index/1000	1.2400	-1.2428	-0.4402	0.7218	2.0264	2.8909	3.2014**	-0.9344	0.0146
	(1.0124)	(1.4621)	(1.3230)	(1.5022)	(1.2825)	(1.9813)	(1.5848)	(1.9695)	(1.3864)
Ln(Income per Capita)	2.0938*	1.9266	3.7838*	-1.2681	-0.4589	-0.9986	-0.9716	-0.3639	1.9985
	(1.0506)	(1.4048)	(2.0019)	(1.9293)	(1.4979)	(2.7355)	(1.5352)	(2.1365)	(1.7320)
Age range	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
Dependent variable mean	9.55	12.11	14.67	15.79	16.24	16.47	16.69	16.90	16.94
Adjusted R-squared	0.2244	0.1928	0.1890	0.1960	0.1912	0.1637	0.1549	0.1433	0.1390
Observations	45,709	68,097	62,078	55,591	49,785	47,406	49,199	49,889	44,237

Notes: This table reports regression results examining the effect of minimum wage increases on the probability of union membership and hourly wages. The sample is from the CPS ORG and consists of all individuals ages 16 to 60. Each column reports estimates of the effect of minimum wage increases on union membership among workers within a 5-year age range. Panel A includes all respondents in the indicated age range, and panel B includes all respondents in the indicated age range who are employed, paid by the hour, and who do not have imputed wage rates. Variable definitions and sources are discussed in the note to Table 2 (and in the paper). All specifications include month, year, month-year, state, age, and education fixed effects. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Relationship Between Minimum Wage Increases and Union Membership Among Individuals Ages 16-40 Working in the Public or Private Sector, 2011-2019

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All Education	Any Union		Public Union		Private Union	
Effective Minimum Wage	0.0019**	0.0029***	0.0009*	0.0016***	0.0011**	0.0013***
	(0.0009)	(0.0006)	(0.0005)	(0.0004)	(0.0004)	(0.0004)
House Price Index Divided by 1000		-0.0410*		-0.0217		-0.0205
		(0.0228)		(0.0141)		(0.0134)
Ln(Income per Capita)		0.0147		-0.0012		0.0181*
		(0.0206)		(0.0160)		(0.0096)
Dependent variable mean	0.0546	0.0546	0.0254	0.0254	0.0297	0.0297
Adjusted R-squared	0.0379	0.0380	0.0383	0.0383	0.0154	0.0154
Observations	1,094,351	1,094,351	1,094,351	1,094,351	1,094,351	1,094,351
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: BA or Higher Education	Any Union		Public Union		Private Union	
Effective Minimum Wage	0.0023	0.0045**	0.0012	0.0029**	0.0011**	0.0017**
	(0.0015)	(0.0018)	(0.0012)	(0.0013)	(0.0004)	(0.0008)
House Price Index Divided by 1000		-0.0558		-0.0387		-0.0172
		(0.0445)		(0.0327)		(0.0195)
Ln(Income per Capita)		-0.0312		-0.0288		-0.0059
		(0.0560)		(0.0398)		(0.0221)
Dependent variable mean	0.0884	0.0884	0.0601	0.0601	0.0286	0.0286
Adjusted R-squared	0.0322	0.0323	0.0293	0.0293	0.0092	0.0092
Observations	298,449	298,449	298,449	298,449	298,449	298,449

Notes: This table reports regression results examining the effect of minimum wage increases on the probability of union membership. The sample is from the CPS ORG and consists of all individuals ages 16-40. Panel A includes all respondents. Panel B includes respondents BA or higher education. Columns 1 and 2 report the estimated effect of minimum wage changes on union membership among all workers, columns 3 and 4 report the estimated effect of minimum wage changes on union membership among public-sector workers, and columns 5 and 6 report the effect of minimum wage changes on union membership among private-sector workers. Variable definitions and sources are discussed in the note to Table 2 (and in the paper). All specifications include month, year, month-year, state, age, and education fixed effects. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 7. Relationship Between Minimum Wage Increases and Union Membership and Hourly Wages Earned Among Individuals Ages 16-40 Paid Hourly and Not Paid Hourly, 2011-2019

Panel A DV: Union Member	(1)	(2)	(3)	(4)	(5)	(6)
Sample	All		Paid Hourly		Not Paid Hourly	
Effective Minimum Wage	0.0019**	0.0029***	0.0013	0.0019	0.0016	0.0030***
	(0.0009)	(0.0006)	(0.0014)	(0.0012)	(0.0010)	(0.0008)
House Price Index Divided by 1000		-0.0410*		-0.0359		-0.0394
		(0.0228)		(0.0371)		(0.0240)
Ln(Income per Capita)		0.0147		0.0250		-0.0123
		(0.0206)		(0.0370)		(0.0228)
Dependent variable mean	0.0546	0.0546	0.0801	0.0801	0.0370	0.0370
Adjusted R-squared	0.0379	0.0380	0.0425	0.0425	0.0540	0.0540
Observations	1,094,351	1,094,351	449,977	449,977	644,374	644,374
Panel B DV: Hourly Wages	(1)	(2)	(3)	(4)	(5)	(6)
Sample	All		Paid Hourly		Not Paid Hourly	
Effective Minimum Wage	0.1118***	0.0842**	0.2282***	0.2000***	-0.0584**	-0.0563*
	(0.0251)	(0.0383)	(0.0223)	(0.0377)	(0.0248)	(0.0321)
House Price Index Divided by 1000		0.0633		-0.0790		-0.0222
		(1.0265)		(0.9651)		(0.8551)
Ln(Income per Capita)		1.3266		1.5384*		-0.0756
		(0.9951)		(0.8841)		(0.9856)
Dependent variable mean	16.0613	16.0613	13.6521	13.6521	20.3115	20.3115
Adjusted R-squared	0.4297	0.4297	0.3310	0.3310	0.2784	0.2784
Observations	440,522	440,522	281,260	281,260	159,262	159,262

Notes: This table reports regression results examining the effect of minimum wage increases on the probability of union membership and hourly wages earned. The sample is from the CPS ORG and consists of all individuals ages 16 to 40. Panel A includes all respondents ages 16-40. Panel B includes respondents who are employed, and do not have imputed wage rates. Columns 1 and 2 report the estimated effects of minimum wage changes on union membership and average hourly wages among all workers, columns 3 and 4 report the estimated effects of minimum wage changes on union membership and average hourly wages among workers paid hourly, and columns 5 and 6 report the estimated effects of minimum wage changes on union membership and average hourly wages among workers not paid hourly. Variable definitions and sources are discussed in the note to Table 2 (and in the paper). All specifications include month, year, month-year, state, age, and education fixed effects. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 8. Relationship Between Minimum Wage Increases, Union Membership, and Hourly Wages Earned Among Individuals Working in the Restaurant or Retail Industries, 2011-2019

Panel A DV: Union Member	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Ages 16–19		Ages 20–29		Ages 30–39		Ages 40–49	
Effective Minimum Wage	-0.0044***	-0.0050***	-0.0004	-0.0010	-0.0000	0.0031	0.0000	0.0011
	(0.0010)	(0.0017)	(0.0016)	(0.0013)	(0.0012)	(0.0020)	(0.0028)	(0.0023)
House Price Index / 1000		0.0304		0.0066		-0.0960*		0.0437
		(0.0650)		(0.0409)		(0.0568)		(0.0531)
Ln(Income per Capita)		-0.0094		0.0222		-0.0145		-0.1168**
		(0.0561)		(0.0414)		(0.0534)		(0.0556)
Dependent variable mean	0.0216	0.0216	0.0285	0.0285	0.0303	0.0303	0.0359	0.0359
Adjusted R-squared	0.0128	0.0128	0.0134	0.0134	0.0147	0.0149	0.0200	0.0201
Observations	29,811	29,811	78,841	78,841	51,967	51,967	44,409	44,409
Panel B DV: Hourly Wages	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Ages 16–19		Ages 20–29		Ages 30–39		Ages 40–49	
Effective Minimum Wage	0.5544***	0.5188***	0.4016***	0.3604***	0.2193***	0.1294	0.3107***	0.1516*
	(0.0252)	(0.0308)	(0.0360)	(0.0578)	(0.0759)	(0.1085)	(0.0600)	(0.0864)
House Price Index / 1000		1.6662**		-0.1443		2.2760		3.7794*
		(0.7045)		(1.1445)		(1.8713)		(1.9517)
Ln(Income per Capita)		-0.5979		2.2335		0.8160		2.0508
		(0.6377)		(1.4460)		(1.7322)		(2.1493)
Dependent variable mean	8.67	8.67	10.15	10.15	11.95	11.95	12.37	12.37
Adjusted R-squared	0.2983	0.2985	0.1970	0.1971	0.1503	0.1504	0.1198	0.1202
Observations	20,149	20,149	43,101	43,101	21,736	21,736	15,900	15,900

Notes: This table reports regression results examining the effect of minimum wage changes on the probability an individual reports being a union member and on hourly wages earned. The samples are from the CPS ORG and consist of all individuals working in the following industries: eating and drinking places (1990 Census industry code 641) and retail (1990 Census industry codes 580–691). Panel A includes all respondents in the indicated age range, and Panel B includes all respondents who are paid by the hour, and who do not have imputed wage rates. Columns 1 and 2 include all individuals ages 16–19, columns 3 and 4 individuals ages 20–29, columns 5 and 6 include individuals ages 30–39, and columns 7 and 8 include individuals ages 40–49. Variable definitions and sources are discussed in the note to Table 2 (and in the paper). All specifications include month, year, month–year, state, age, and education fixed effects. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 9. Relationship Between Minimum Wage Increases and the Union Wage Differential Among Employed Individuals Ages 16-40, 2011-2019

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	All Employed	Privately Employed	Publically Employed	Narrow Low Wage Industries	Broader Low Wage Industries	Less than High School	High School or Greater	College or Greater
Effective Minimum Wage	0.2390***	0.2466***	0.1396*	0.3595***	0.2922***	0.3616***	0.2192***	0.0755
	(0.0333)	(0.0322)	(0.0783)	(0.0326)	(0.0300)	(0.0538)	(0.0325)	(0.0501)
Union Member	4.7639***	4.9033***	3.7376***	0.5982	4.6910***	2.4003***	4.8105***	4.4803***
	(0.2381)	(0.2951)	(0.3618)	(0.4344)	(0.2859)	(0.7614)	(0.2284)	(0.4099)
Effective Minimum Wage	-0.2475***	-0.2734***	-0.1476***	0.0721	-0.2175***	0.0098	-0.2579***	-0.3124***
X Union Member	(0.0249)	(0.0348)	(0.0422)	(0.0499)	(0.0321)	(0.0683)	(0.0239)	(0.0438)
House Price Index/1000	0.9286	1.1700	-0.6474	1.3577*	1.2888*	1.4281	0.8185	0.3962
	(0.7632)	(0.7443)	(1.8498)	(0.6874)	(0.6422)	(1.2182)	(0.7428)	(1.2481)
Ln(Income per Capita)	0.0690	0.0679	-0.2064	0.4532	0.2376	0.8255	-0.1330	-0.1211
	(0.6154)	(0.6296)	(1.6761)	(0.7108)	(0.5260)	(1.3485)	(0.6144)	(1.0813)
Dependent variable mean	13.65	13.42	16.15	10.28	12.50	10.53	14.16	17.69
Adjusted R-squared	0.6251	0.6202	0.6279	0.4944	0.5873	0.5094	0.6165	0.5798
Observations	281,255	255,869	25,326	86,612	170,491	38,179	243,044	49,289

Notes: This table reports regression results examining the effect of minimum wage changes on the union wage differential. The samples are from the CPS ORG and consist of individuals ages 16-40 who are employed, paid by the hour, and do not have imputed wage rates. Column 1 includes all employed individuals, column 2 includes all individuals employed in the private sector, column 3 includes all individuals employed in the public sector, column 4 includes all individuals working in the following industries: eating and drinking places (1990 Census industry code 641) and retail (1990 Census industry codes 580-691), column 5 includes all individuals working in eating and drinking and retail industries as well as manufacturing, construction, and personal services industries, column 6 includes all employed individuals with less than a completed high school education, column 7 includes all employed individuals who completed high school, and column 8 includes all individuals who have completed a four-year college degree. Variable definitions and sources are discussed in the note to Table 2 (and in the paper). All specifications include month, year, month-year, state, age, and education fixed effects as well as fixed effects for all 1990 Census 3-digit industry and occupation codes. Age and education controls consist of a dummy variable for each education group and age. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

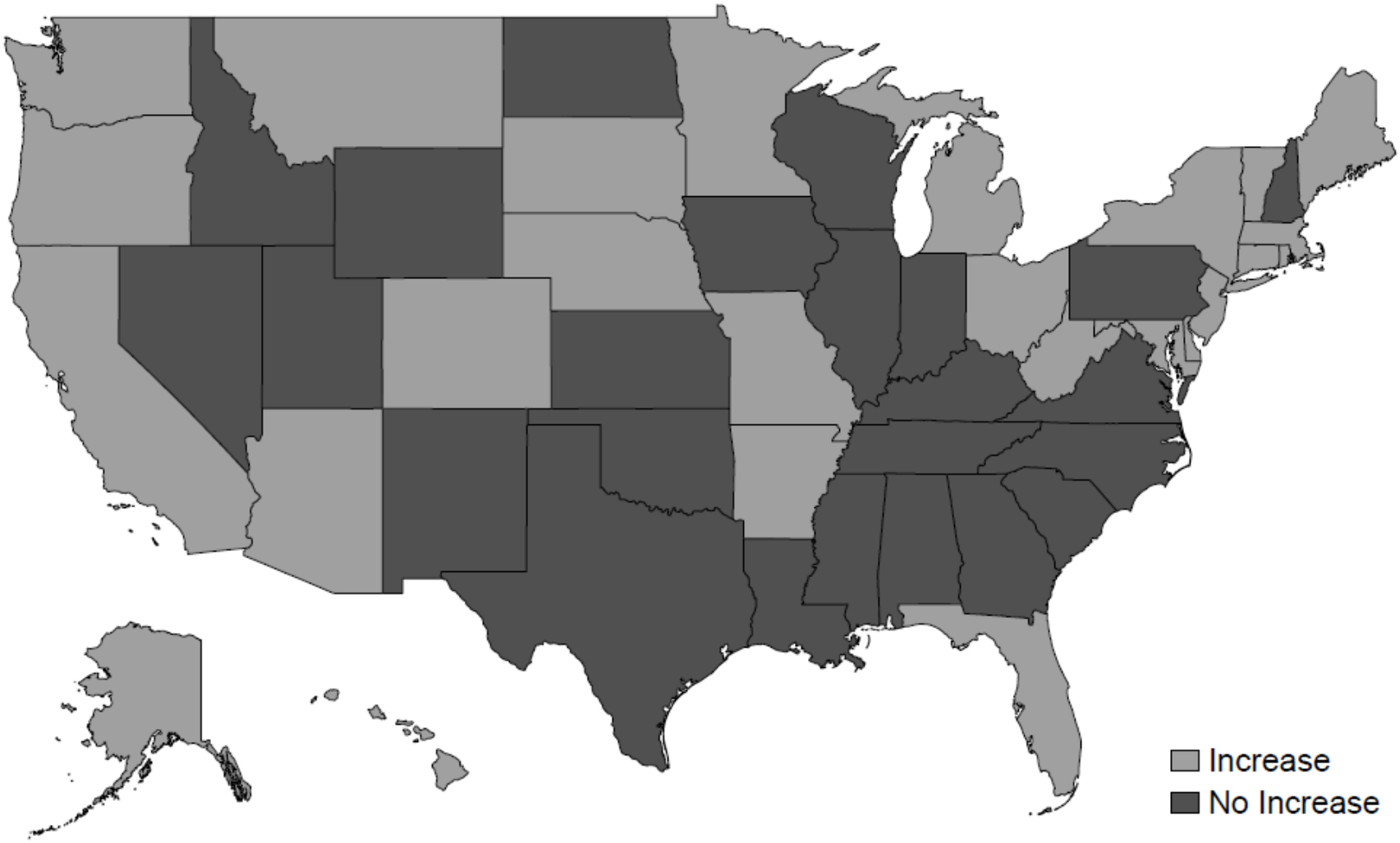

Figure 1. States Enacting Minimum Wage Increases 2011–19: This map shows states that did and did not have minimum wage increases between January 1, 2011, and December 31, 2019. Data on minimum wage changes come from Clemens, Hobbs, and Strain (2018), Vaghul and Zipperer (2021), and a number of complementary sources.

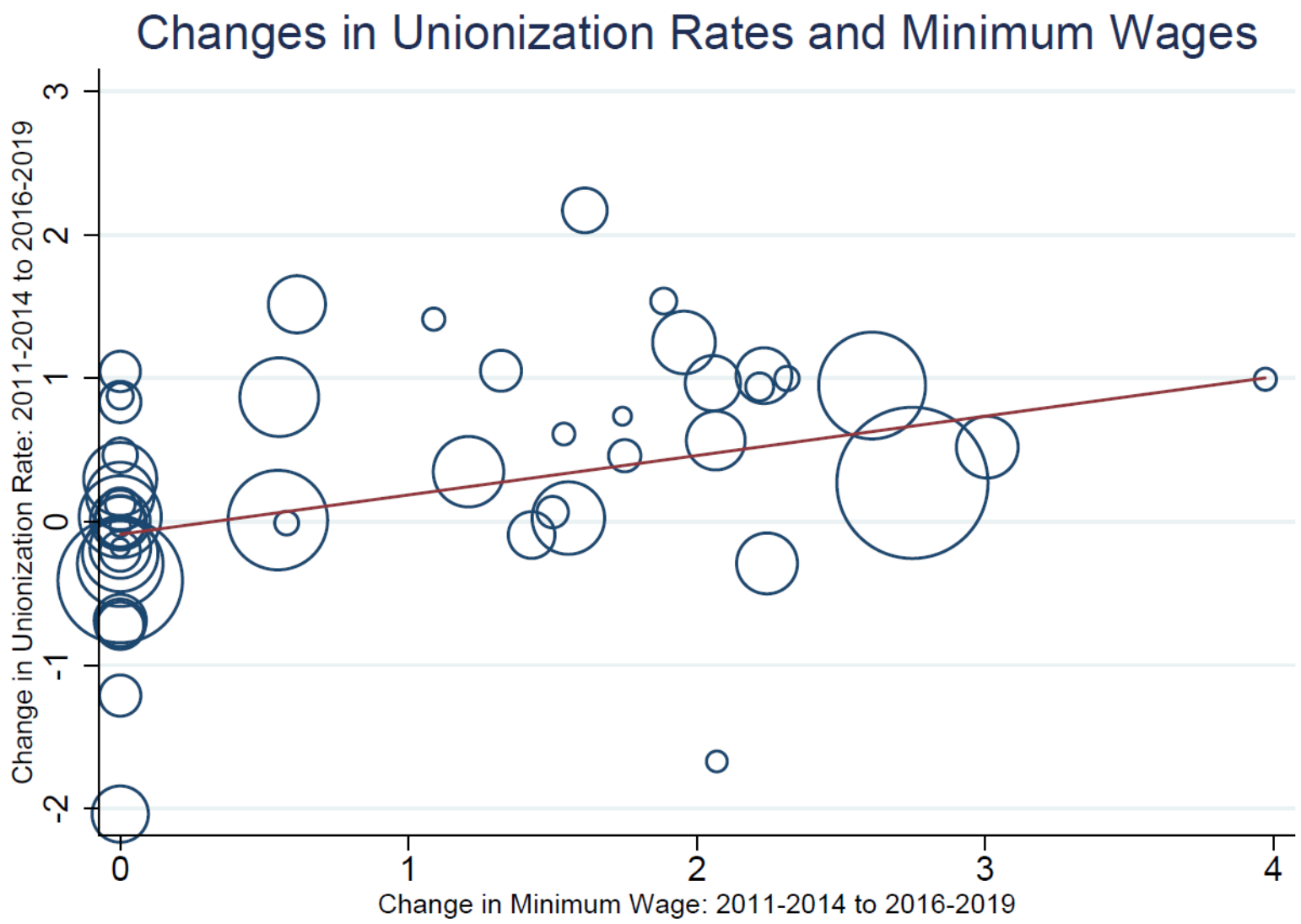

Figure 2. Changes in Unionization Rates and Changes in Minimum Wages. This figure plots the percentage point change in the unionization rate among individuals ages 16–40 against the change in the minimum wage in dollars between 2011–14 and 2016–19. Each bubble represents a state, and the size of the bubbles is proportional to state population. The red line represents the simple linear fit of changes in unionization rates against changes in minimum wages.

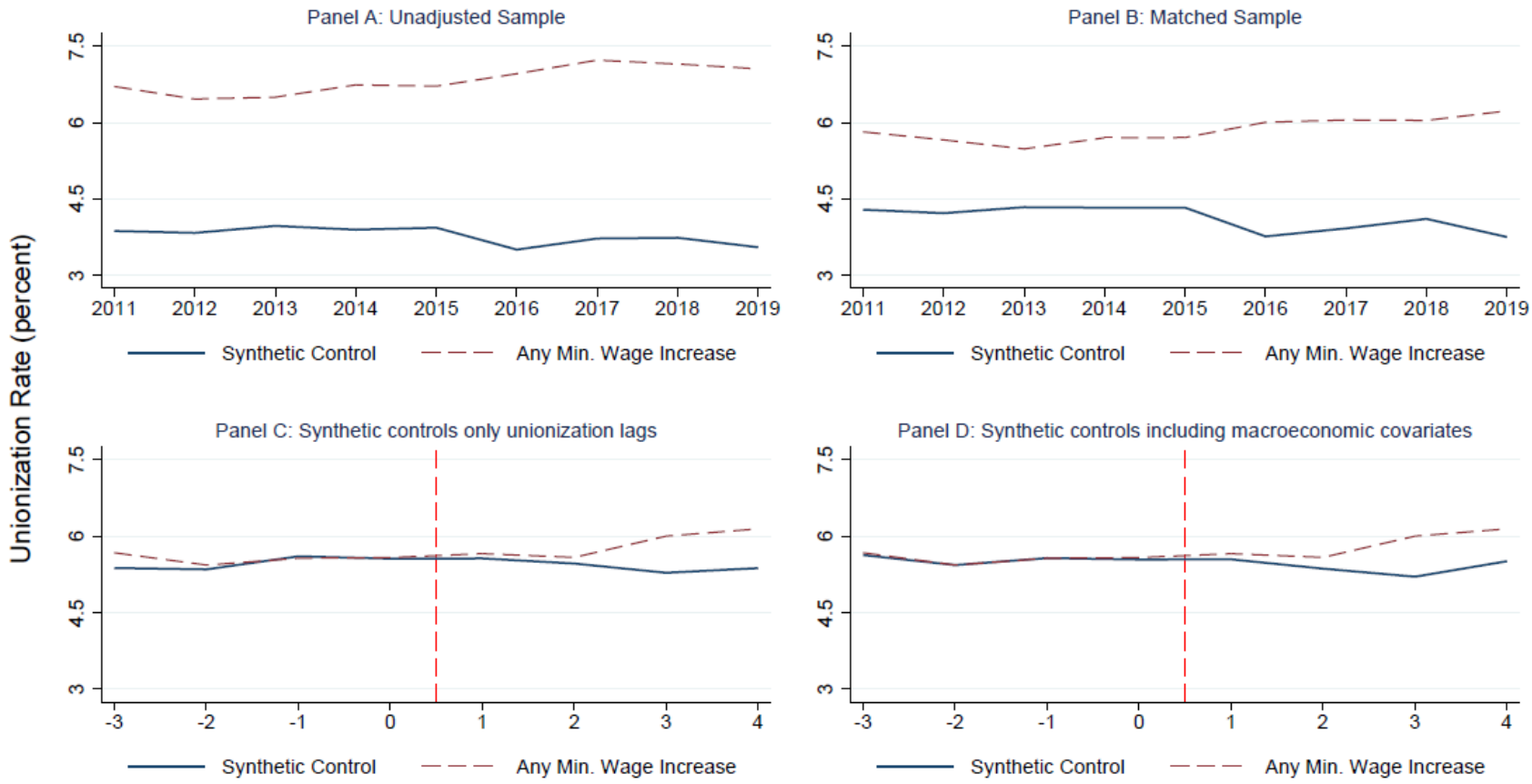

Figure 3. Time Series of Unionization Rates. This figure shows the evolution of unionization rates over time for individuals ages 16–40 in states that did versus did not increase minimum wages. Panel A displays unadjusted unionization rates from 2011 to 2019. Panel B restricts the sample of states to those with baseline unionization rates greater than 2.5 percent or less than 7.5 percent. Panels C and D display average unionization rates for increaser states relative to synthetic control groups constructed as described in the main text. In these panels, time 1 corresponds with the year of the treatment state's first minimum wage increase. The marcoeconomic covariates in Panel D include the state employment-population for individuals ages 16-40 in addition to the state house price index and income per capita series

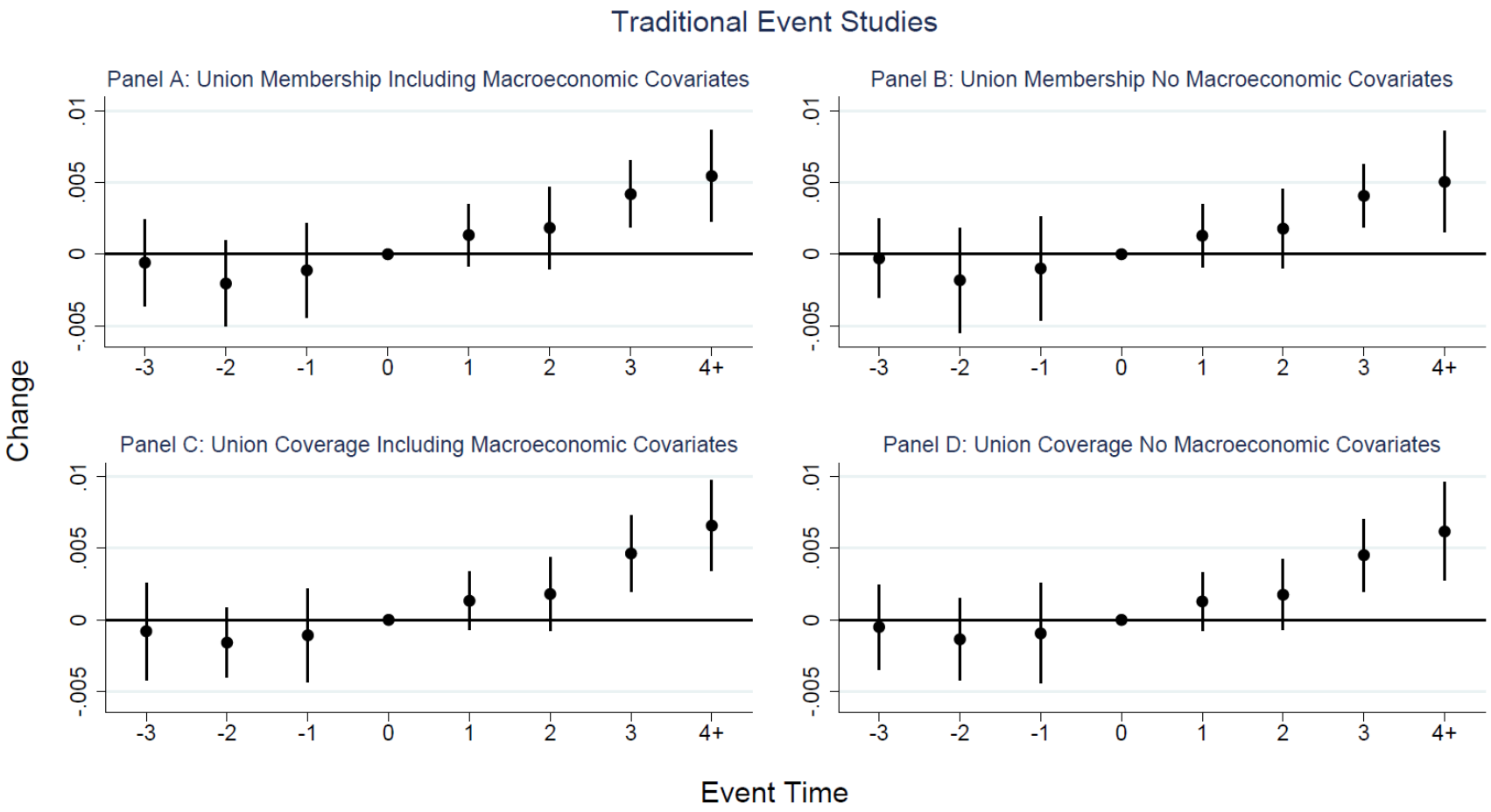

Figure 4. Event Study of Minimum Wage Increases on Union Membership and Union Coverage. This figure plots coefficients and 95 percent confidence intervals from event study regressions of union membership and union coverage on state minimum wage increases using the model described in equation (2). The sample for all panels consists of CPS ORG respondents ages 16-40. Panels A and B use an indicator for union membership as the dependent variable and Panels C and D display results using an indicator for either union membership or coverage. The macroeconomic covariates included in Panels A and C include quarterly, state-level controls for a housing price index and personal income per capita. Standard errors are clustered at the state level.

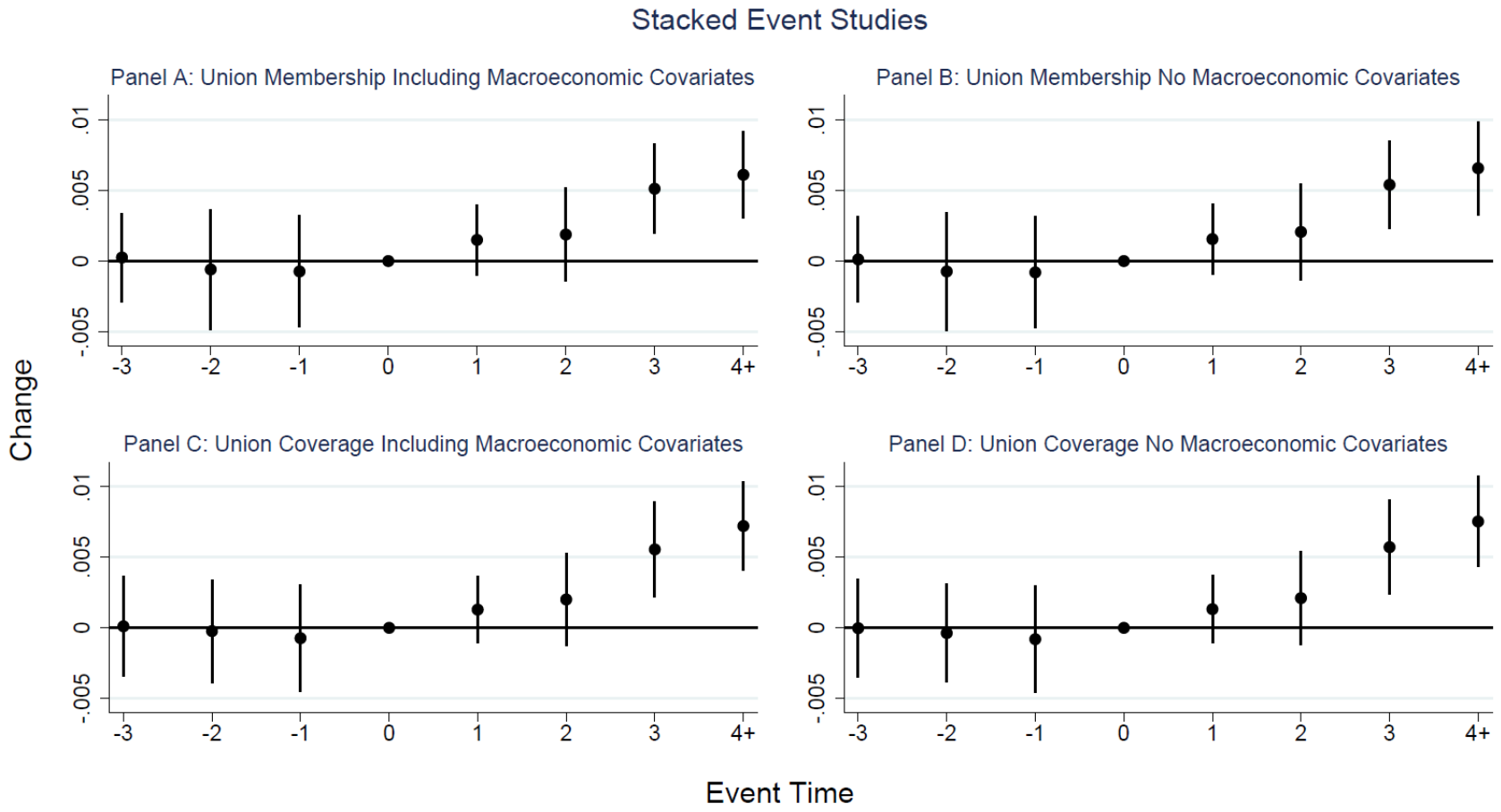

Figure 5. Stacked Event Studies of Minimum Wage Increases on Union Membership and Union Coverage. This figure plots coefficients and 95 percent confidence intervals from stacked event study regressions of union membership and union coverage on state minimum wage increases using the model described in equation (2). The sample for all panels consists of CPS ORG respondents ages 16-40. Panels A and B use an indicator for union membership as the dependent variable and Panels C and D display results using an indicator for either union membership or coverage. The macroeconomic covariates included in Panels A and C include quarterly, state-level controls for a housing price index and personal income per capita. Standard errors are clustered at the state level.

Appendix A. Robustness Analyses Involving State Politics and State Labor Law

Table A1. Relationship Between Minimum Wage Increases and Union Membership Controlling for State Government Control, Ages 16-40

	(1)	(2)	(3)	(4)	(5)
Dependent Variable			Union Member		
Effective Minimum Wage	0.0029***	0.0029***	0.0029***	0.0029***	0.0029***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
House Price Index/1000	-0.0410*	-0.0418*	-0.0411*	-0.0410*	-0.0426*
	(0.0228)	(0.0229)	(0.0228)	(0.0227)	(0.0229)
Ln(Income per Capita)	0.0147	0.0142	0.0147	0.0145	0.0148
	(0.0206)	(0.0213)	(0.0206)	(0.0210)	(0.0213)
Democratic control of legislature		0.0013			0.0027
		(0.0023)			(0.0043)
Split control of legislature		0.0022			0.0031
		(0.0025)			(0.0028)
Democrat governor			0.0003		0.0015
			(0.0012)		(0.0032)
Democrat governor and legislature				0.0000	-0.0006
				(0.0011)	(0.0032)
Republican governor and legislature				-0.0003	0.0017
				(0.0018)	(0.0037)
Dependent variable mean	0.0546	0.0546	0.0546	0.0546	0.0546
Adjusted R-squared	0.0380	0.0380	0.0380	0.0380	0.0380
Observations	1,094,351	1,094,351	1,094,351	1,094,351	1,094,351

Notes: This table reports regression results examining the effect of minimum wage increases on the probability of union membership. The sample is from the CPS ORG and consists of all individuals ages 16 to 40. Column 1 reports results from our baseline specification, in table 3, column 4. Column 2 includes controls for whether Democrats had a majority in the state legislature and whether control was split between Democrats and Republicans. Column 3 includes controls for whether the state governor was Democratic. Column 4 controls for whether Democrats or Republicans control both the governorship and the state legislature, and column 5 includes all controls. Information on state government control comes from the National Conference of State Legislatures. All specifications include year, month, year-month, state, age and education fixed effects. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table A2. Correlations Between Labor Market Policies and State Government Control

Main Variable	(1) Effective Minimum Wage	(2) Right to Work Law
Democrat control of legislature	0.535***	-0.633***
Split control of legislature	0.0459***	-0.184***
Democrat governor	0.395***	-0.604***
Democrat governor and legislature	0.506***	-0.551***
Republican governor and legislature	-0.438***	0.694***

Notes: This table reports correlations between the effective minimum wage in a given state (column 1) or whether a state has a right to work law (column 2), with whether the state legislature and/or governorship is controlled by Republicans or Democrats. Information on state government control comes from the National Conference of State Legislatures. Correlation coefficients are weighted by state population. *** p<0.01, ** p<0.05, * p<0.1

Table A3. Relationship Between State Labor Market Policies and Minimum Wage Variation

Dependent Variable	(1) Right-to-Work Law	(2) Prevailing Wage Law	(3) Mnadatory Worker Comp	(4) WC Covered Share	(5) Antidiscrimination	(6) Employer Verification	(7) Paid Family Leave	(8) Non-competes
Effective Minimum Wage	-0.0099	0.0044	0.0033	-0.0014	-0.0239	-0.0114	0.1094*	No
	(0.0175)	(0.0242)	(0.0035)	(0.0013)	(0.0207)	(0.0085)	(0.0566)	Variation
House Price Index/1000	-0.7860*	0.9787**	0.1393	0.0235	0.0191	0.0786	-1.1212	
	(0.4136)	(0.4837)	(0.1445)	(0.0189)	(0.1013)	(0.1626)	(1.3323)	
Ln(Income per Capita)	0.5675	-0.5803	-0.4178	-0.0478	0.5556	-0.3526	1.1635	
	(0.4572)	(0.4576)	(0.3949)	(0.0460)	(0.4927)	(0.3198)	(1.1538)	
Dependent variable mean	0.4648	0.6860	0.9075	0.9712	0.8276	0.1499	0.1982	0.8564
Adjusted R-squared	0.9377	0.9380	0.9776	0.9911	0.9747	0.9367	0.8746	1.0000
Observations	1,200,567	1,091,963	1,200,567	764,697	1,091,963	1,200,567	1,200,567	1,200,567

Note: This table reports regression results examining the effect of minimum wage variation on the probability that states also have enacted other labor legislation. The coefficients are from estimates of equation (1), which is described in the main text. Each column reports results from a regression with the indicated labor law as the dependent variable. Labor law data are from Sorens, Muedini, and Ruger (2008). To maintain a weighting structure comparable to that used in our analyses of union membership rates, we assign labor law to individuals ages 16 to 40 in the CPS ORG files for 2010-2019 and run regressions using individuals in the CPS ORG as observations. Standard errors are clustered at the state level. Differences in sample sizes across columns reflect differences in the years and states for which labor law data were available. Column 1 reports results for state Right to Work laws. Column 2 reports results for whether a state has a prevailing wage law. Column 3 uses a law requiring that employers pay worker compensation. Column 4 uses the share of workers covered by unemployment insurance also covered by worker's compensation. Column 5 uses an indicator for whether a state has additional employer antidiscrimination laws. Column 6 uses an indicator for whether private employers are required to verify workers are legal residents. Column 7 uses an indicator for whether a state has a paid family leave policy, and Column 8 uses an indicator for whether states allow noncompete agreements for broad groups of workers. All specifications include year-month, state, age, and education fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.