**Right-to-Work Laws’ Effect on Occupational Safety and Health**

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Capstone Paper

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# I. Introduction

 Labor market studies have largely concluded that Right to Work (RTW) laws decrease union participation rates and that unions improve labor conditions and the enforcement of labor protection laws (Moore, 1998; Weil, 2003). Thus, it is to be expected that the implementation of a RTW law would impact labor conditions and protections in a state in which it is enacted. This hypothesis, however, has yet to be sufficiently proven empirically. Since RTW laws have gained popularity in recent years, studies of the effect that the laws have on labor conditions would be valuable to enhance the understanding of the total effects of RTW laws. This analysis focuses upon RTW laws’ impact on occupational safety and health.

The effect of RTW laws on occupational safety and health outcomes is studied empirically through the use of difference-in-difference regression analysis and U.S. Department of Labor occupational safety and health and labor market data. The hypothesis is that states which enact a RTW law have greater rates of negative occupational safety and health outcomes, like fatal occupational injuries, after the enactment of the RTW law compared to before the law’s enactment. Further, the effect of RTW laws on compliance to the Occupational Safety and Health Act (OSHA) is examined using difference-in-difference regression analysis and Occupational Safety and Health Administration enforcement data and labor market data. I predict that compliance to OSHA in a state which enacts a RTW law will decrease after the enactment of the law.

# II. Background

A RTW law is a piece of legislation which prohibits worksites from having a mandatory condition of employment that employees must join or pay dues to the workers’ union or labor organization (LaJeunesse, 2013). As of the beginning of 2018, a total of twenty-eight states have passed such a law either by statute or as an amendment to the state’s constitution. The first was enacted in 1944, but there has been a rapid resurgence in states considering and implementing such legislation. Since the beginning of 2012, six states have implemented a RTW law. Given the prevalence of RTW laws and the recent trend of adoption, it is of great importance to understand all effects of the policy. (National Right to Work Committee, 2016)

 The Occupational Safety and Health Act of 1970 created the Occupational Safety and Health Administration, which is tasked with implementing and enforcing rules and regulations regarding the safety and health of workers in most industries (Occupational Safety and Health Administration, n.d. - a). In any given year, there are approximately 100,000 OSHA compliance inspections throughout the United States (U.S. Department of Labor, 2018). States have the option to conduct OSHA compliance inspections themselves or allow the federal Occupational Safety and Health Administration to conduct inspections (Occupational Safety and Health Administration, n.d. - b). All OSHA enforcement data is published and publicly available. In addition, data on occupational safety and health outcomes, such as fatal occupational injuries, is collected by the U.S. Department of Labor.

# III. Literature Review

 Two sets of previous literature, one studying the effect of RTW laws on unionization and the other testing the impact unions have on labor conditions and labor protection laws, are examined in this paper. This study attempts to bridge the gap between the two sets of literature by empirically testing the potential linkage between RTW law enactment and labor conditions. The labor condition, and policy area for the related labor protection law, of particular interest is occupational safety and health. The risk of serious injury or death due to a lack of concern for occupational safety and health in the workplace, together with the well-documented effect that unions have on OSHA enforcement and compliance, contributed to the decision to focus upon occupational safety and health as opposed to another labor condition.

The first part of this literature review is the discussion of the theoretical basis and empirical evidence for the impact that RTW laws have on unionization. According to Moore (1998), there are three main theoretical hypotheses regarding the effects of RTW laws on unionization. First, the taste hypothesis claims that the laws are only adopted in states that have a strong anti-union sentiment and do not have a significant union presence even before the law is passed. It is called the taste hypothesis because an econometric model which tests the significance of RTW laws on unionization should find that the RTW law dummy variable is insignificant once the researcher controls for tastes and preferences of the state through the use of state fixed effects. This hypothesis is not as likely to hold today as in the past because states with historically high union participation rates have adopted RTW laws in recent years.

Second, the free-rider hypothesis states that a RTW law will decrease union membership rates as workers at union-represented workplaces continue to reap the benefits of working in a workplace with union representation without paying into the union, leading to the union’s eventual disbandment due to a lack of resources to provide effective union services. Third, the bargaining power hypothesis asserts that RTW laws weaken unions’ bargaining power by allowing workers to be free from union repercussions if they break from the union, thus making strikes less likely to succeed. The decreased bargaining power of unions decreases the likelihood that unions can win significant economic benefits for their members, therefore decreasing the demand for union services. (Moore, 1998)

In summary, the taste hypothesis argues that RTW laws will have no true effect on unionization, but both of the other hypotheses contend that the law does reduce union membership rates. These three hypotheses, however, are not mutually exclusive. Consequently, researchers turned to empirical studies to test the effect that RTW laws have on unionization. (Moore, 1998)

Much of the substantive empirical research regarding the effect of RTW laws on unionization was conducted following the mid-1980s. Prior to that time, most studies used cross-sectional data at the state or metropolitan statistical area level. These studies were plagued by issues such as small sample size, omitted variable bias, and simultaneity concerns. Much of the research following the mid-1980s utilized state-year panel data to study the impact of RTW laws on unionization, particularly the effect on union organizing activity. One of the first of this new breed was Ellwood and Fine’s (1987) study of the impact of RTW laws on the flow of workers into unions. Ellwood and Fine found a significant reduction in union organizing activity, at least in the first ten years after a state-level RTW law was passed, and estimated that the reduction in union organizing activity would result in a 5 to 10 percent decline in union membership in the long run. In Moore’s (1998) review of the literature, he concluded that RTW laws may cause a 3 to 8 percent reduction in unionization in the long run. (Moore & Newman, 1985; Moore, 1998)

Moore (1998) stated that there is a general consensus that RTW laws have a negative effect on unionization, but also argued for further studies using unconventional data, such as micro-level individual decision information, or methods, like difference-in-difference models. Bruno et al.’s (2015) nationwide, micro-level study found that RTW laws have a significant negative impact on union membership, implying that a person living in a state with a RTW law has a lower probability of being a union member than an identical person in a state without a RTW law. The presence of a RTW law was predicted to decrease the probability that an individual is a union member by between 1.5 and 9.9 percentage points. Eren and Ozbeklik (2016) utilized a synthetic control method to test the effect of Oklahoma’s adoption of a RTW law on union participation and a variety of state economic outcome measures, such as the employment rate and average wages. The authors confidently concluded that the RTW law led to decreased private sector unionization rates, but their results did not show a significant causal relationship between RTW laws and the other dependent variables studied, such as total employment rate and private-sector average wages. Rowe (2016) used difference-in-difference regression models to analyze the effect of RTW laws on unionization in three states which recently adopted such a law: Indiana, Michigan, and Wisconsin. RTW laws were found to decrease the likelihood that any given individual is a member of a union by between 1.4 to 2.2 percent.

Next, this literature review continues on to the theoretical basis and empirical evidence of the impact that unions have on labor conditions and labor protection laws. Richard Freeman and James Medoff presented a new perspective on labor unions in their influential book *What Do Unions Do?* when it was published in 1984. The authors argued that labor unions are more than labor monopolists that raise wages above competitive levels; unions are also vehicles of workers’ collective voice, delivering societal benefits to both members and non-members. Workplace conditions, particularly safety and health, are often worksite public goods, which requires workers to voice their demand for a desired level of the good (Weil, 2003). A union eliminates the potential problems related to achieving desired levels of public goods by having a collective voice which will speak for all workers without singling any individual out for retribution by the employer. Unions have historically used the power of workers’ collective voice to advocate for improved labor conditions and protections at the worksite and to legislatures across the country (Freeman & Medoff, 1984; Ehrenberg & Smith, 2012; Morantz, 2017).

Unions also often play the role of educator, teaching workers about best practices, such as occupational safety and health precautionary measures, as well as the labor protection regulations that exist and the process to report a violation (Kauffman, 2015). Since unions act as a voice for workers and protect workers from wrongful termination, union presence in a workplace increases workers’ willingness to request corrective action by the employer or report labor law violations to enforcement agencies. Thus, unions dually reduce the cost of reporting labor protection law violations by reducing the cost of gathering information and the cost of employer retaliation. As a result, unions and labor protection regulations are best thought of as complements since regulators are assisted in their oversight duties by workers who report wrongdoings. Thus, a decline in union presence in workplaces reduces the ability of regulators to enforce labor protection laws. The historical role of unions in this field and the demise of unions across the nation has led modern researchers, like Havlin (2016), to attempt to find a substitute for unions, such as nonprofit organizations focused upon workers’ rights. (Mishel & Walters, 2003; Weil & Pyles, 2005; Weil, 2010)

Empirical research on labor protection laws has widely concluded that unions have a substantial influence on the implementation of labor laws. In a broad study of labor protection law compliance, Weil and Pyles (2005) found that collective workplace agents, such as labor unions, encourage workers to report violations. Labor protection laws are enforced at the workplace level, at least in part, by conducting an inspection in response to a complaint filed by an employee. The authors found this practice to be beneficial as they concluded that the rate of violation reporting by workers is far too low. In addition, the authors found that labor unions are particularly absent in those industries with low complaint rates and high compliance problems.

Budd and Brey (2003) and Kramer (2008) conducted research on the implementation of the Family and Medical Leave Act of 1993 and found that union members were more likely to have knowledge of rights provided by the new law. The results of these studies support the assertion that unions are educators of employees, especially when there is new pertinent information. Furthermore, Trejo (1991, 1993) found that workers belonging to unions were more likely to receive the legally required premium pay for overtime work than those not belonging to a union. While there is a base incentive to prevent poor labor conditions of avoiding private legal battles over workplace injuries and deaths, unions add more potential costs of a poor workplace environment. Given union members’ greater willingness to report violations and increased level of knowledge, employers with a unionized workforce may be highly motivated to avoid labor law violations in order to prevent the filing of complaints, government inspections, and penalty fines.

Weil (1991, 1992, 2001) found rather different results when testing the effect of unions on compliance to OSHA. Weil’s studies found that unionized workplaces had a greater probability of inspection, even when controlling for whether the inspection was triggered by a complaint, but had minimal difference or lower rates of compliance than non-unionized workplaces. One possible explanation for lower rates of compliance in unionized workplaces is the greater likelihood of exercising walk-around rights during OSHA compliance inspections, meaning that workers joined the OSHA compliance officer during his or her inspection and possibly identified potential hazards. Workers in unionized workplaces were more likely to exercise their walk-around right during OSHA compliance inspections than non-unionized workplaces, increasing the likelihood that the compliance officer would find a violation. Weil (1992) even stated that there exists a de facto “two-tiered” occupational safety and health regulatory system, one for workplaces without union presence and a much more stringent tier for workplaces with union presence.

Since it is accepted that RTW laws negatively affect unions and unions affect labor conditions and labor protection laws, then it is plausible that RTW laws impact labor conditions and labor protection law enforcement. Loomis et al. (2009) and Zullo (2011) both studied the impact of RTW laws on the rate of fatal occupational injuries. Loomis et al. performed two Poisson regression models using cross-sectional, state-level data for 1980 and 1995. For both years, the presence of a RTW law was a statistically significant predictor of greater fatal occupational injury rates. Zullo used state-level panel data for the years 2001 through 2009 to study the effect of RTW laws on fatal occupational injury rates in the construction sector. The time period used does not include any changes in RTW status at the state level. Zullo utilized a random-effects model to identify the interaction effect of RTW laws and union density on fatal occupational injury rates. The model which does not include the union density variable or the interaction term finds RTW laws to have a statistically insignificant effect. When including the union density and interaction term variables, the RTW law variable remains insignificant, but the interaction term is significant at the 5 percent significance level. This result indicates that the effect of unions on fatal occupational injury rates is stronger in states without RTW laws. One potential issue with both of these studies is the inclusion of variables for union density and presence of a RTW law in the same model as this could result in endogeneity bias.

This paper seeks to further the literature on the impact of RTW laws on occupational safety and health. While Loomis et al. (2009) and Zullo (2011) studied the impact of existing RTW laws on fatal occupational injury rates, no pre-post study has yet been published examining the impact of the adoption of a RTW law on occupational safety and health. To provide this analysis, state-level panel data spanning a multitude of years including the adoption of state-level RTW laws is utilized. Additionally, this study analyzes the impact of RTW laws on OSHA compliance, adding a new element to the literature concerning RTW laws.

# IV. Methodology

To find a causal effect of RTW laws through the analysis of labor conditions before and after the implementation of the law, the difference-in-difference method of regression analysis is utilized. Difference-in-difference regression analysis allows for the study of the differential effect of an exogenous event, such as a change in government policy, in comparison to a control group (Wooldridge, 2013). This methodology could significantly add to the previous literature by capturing the adjustment impact of RTW law implementation. In addition to this methodology’s superior ability to perform policy analysis, it has the added benefits of limiting the possibility of omitted variable bias and controlling for other possible endogeneity issues with its two forms of fixed effects in unit of observation and unit of time. Panel data sets of state-years are utilized, meaning that the fixed effects are at the state and year levels. Thus, the models used address the taste hypothesis of RTW law theory, which states that RTW law impact studies will only find statistically significant results when researchers fail to control for states’ tastes and preferences.

A total of three regressions are performed testing the effect of RTW laws on unionization, fatal occupational injury rates, and OSHA violation rates. The regressions on unionization and fatal occupational injury rates use the same state-year level data set. Data on all 50 states for the years 1992 through 2016 is used in these first two regressions. The third regression on OSHA violation rates also uses state-year level data, but was limited to 4 states over the period 1988 to 2015.

The first regression performed is a test of the effect of RTW laws on unionization. In performing this regression, an attempt is made to replicate the findings of past research that have shown that RTW laws do have a significant effect on union participation rates. To allow for seamless comparisons between the results and implications of this model and the models of interest to the hypothesis, this regression utilizes the same data set as the model on fatal occupational injury rates. This model employs difference-in-difference regression analysis in the following format:

1. $Union\_{it}=β\_{0}+S\_{i}+T\_{t}+β\_{1} RTW\_{it}+β\_{2} X\_{it}^{'}+u\_{it}$

 $Union\_{it}$ is defined as the percentage of workers who are represented by or are members of a union in state i at time t, $S\_{i}$ represents a vector of state fixed effects, and $T\_{t}$ represents a vector of year fixed effects. $RTW\_{it}$ is equal to one if state i at time t has a RTW law. Because this equation controls for time and state fixed effects, the coefficient $β\_{1}$ can be interpreted as a difference-in-difference estimate, or the coefficient of greatest interest in this model as the significance of this term determines whether there is sufficient evidence that the RTW law had an effect on unionization. $X\_{it}^{'}$ is a vector of additional control variables, including variables for population rates of self-employment, marriage, rural living status, parenthood, sex, race, ethnicity, employment industry, education, and age.

 The primary analyses of interest are in regards to occupational safety and health outcome measures and the level of compliance to the occupational safety and health labor protection law, OSHA. These two analyses are completed together to thoroughly investigate the research question of RTW laws’ impact on occupational safety and health. The reader of an article investigating only RTW laws’ impact on occupational safety and health outcome measures could reasonably ask if there is a finding of a relationship between the RTW law and OSHA compliance. Thus, the impact of RTW law implementation on both occupational safety and health outcome measures and OSHA compliance is examined and presented to provide a more thorough analysis of the effect that RTW laws have on occupational safety and health.

 For the effect that RTW laws have on occupational safety and health, the outcome measure rate of fatal occupational injury is used as the dependent variable. This model utilizes data on all 50 United States over the time period 1992 to 2016, the only years for which the Bureau of Labor Statistics (BLS) offers publicly available fatal occupational injury data. The model follows:

1. $Rate of Fatal Occupational Injury\_{it}=β\_{0}+S\_{i}+T\_{t}+β\_{1} RTW\_{it}+β\_{2} X\_{it}^{'}+u\_{it}$

$Rate of Fatal Occupational Injury\_{it}$ is defined as the number of fatal occupational injuries per 100,000 employed persons in state i at time t. The explanatory variable vectors have the same definitions as those used in the first regression. Again, because this equation controls for time and state fixed effects, the coefficient $β\_{1}$ can be interpreted as the difference-in-difference estimate. The significance of this term determines whether there is sufficient evidence that the RTW law’s implementation had an effect on the rate of fatal occupational injury. $X\_{it}^{'}$ is a vector of additional control variables, including variables for population rates of self-employment, marriage, rural living status, parenthood, sex, race, ethnicity, employment industry, education, and age.

The final model of interest examines the effect of RTW laws on OSHA enforcement, particularly through the rate of violations, using a case study of one state which recently adopted a RTW law: Oklahoma. The time period of interest is the 28-year period of 1988-2015 for which the U.S. Census Bureau’s Statistics of U.S. Businesses publicly provides the number of establishments by state. The reasoning for the choice of Oklahoma is twofold. First, the state’s time of RTW law enactment in 2001 lies roughly in the middle of the time period of data availability. This allows for near-equal amounts of data before and after the state’s implementation of the RTW law. Second, the state and several states near Oklahoma rely on the federal government to conduct OSHA compliance inspections, rather than having their own OSHA enforcement office. Further, all states included in this group (Arkansas, Louisiana, Oklahoma, and Texas) belong to the same regional OSHA enforcement office, thus increasing the likelihood that the establishments in these states are treated equally during enforcement inspections. All three states other than Oklahoma had a RTW law in effect during the entire period of the study, making Oklahoma the only state of this group that had a change in the variable for RTW status.

This model focuses upon the effect that the implementation of a RTW law has on the rate of violation, which is the number of inspections, at the establishment level, resulting in at least one violation per 100,000 establishments in state i at time t. The model is written as follows:

1. $Rate of Violation\_{it}=β\_{0}+S\_{i}+T\_{t}+β\_{1} RTW\_{it}+β\_{2} X\_{it}^{'}+u\_{it}$

Again, the coefficient $β\_{1}$ will be the focus of this model as the significance of the term determines whether there is sufficient evidence that the RTW law had an effect on the rate of violation. The additional control variables, represented by the vector $X\_{it}^{'}$, include a variable for the number of inspections that took place in each state-year and variables for population rates of self-employment, marriage, rural living status, parenthood, sex, race, ethnicity, employment industry, education, and age.

# V. Data

 There are two state-year data sets, one covering 50 states and the time frame 1992 to 2016 and another for 4 states over the period 1988 to 2015. The 50-state data set is used to perform the regressions on the effect that RTW laws have on unionization and fatal occupational injury rates, and the 4-state data set is employed in the regression on the effect that RTW laws have on OSHA violation rates.

The explanatory variables used in both data sets to control for differences in states’ labor force, as well as the unionization dependent variables, originated from the Bureau of Labor Statistics’ Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC). The data from the CPS ASEC was collected for every year included in each of the two state-year data sets. Since the CPS is conducted at the individual level, the data was collapsed to the state-year level for use as a proxy measurement of labor force description variables. For example, the survey data for a given state, say Alabama, in the year 2015 was aggregated and averaged for each of the labor force description variables collected, such as the percentage of employed persons whom work in the construction industry. This creates an estimate of the true percentage of employed persons whom worked in the construction industry in Alabama in the year 2015. Since the variables of interest are only in reference to those persons employed, the CPS data was limited to those persons whom were employed at the time that they completed the survey.

 A listing of all variables included in the 50-state data set is provided in Table 1, along with a description of the variable and its source. Two non-CPS-derived variables, Fatal Occupational Injury Rate and RTW Law, are included in this data set. The Fatal Occupational Injury Rate was derived from the BLS’s Census of Fatal Occupational Injuries and Local Area Unemployment Statistics. It is calculated for each state-year as follows:

1. $Fatal Occupational Injury Rate\_{it}=\frac{Fatal Occupational Injuries\_{it}}{Employment\_{it}}\*100,000$

The RTW Law variable was created using a timeline of RTW law adoption produced by the National RTW Committee, a pro-RTW group. A state is coded as having a RTW law beginning in its first full year of application.

Table 1. Variables for 50-State 1992-2016 Data Set

|  |  |  |
| --- | --- | --- |
| **Variable** | **Description (in state "i" at time "t")** | **Source** |
| Union Membership Rate | Percent of employed persons whom are members of a union | CPS |
| Union Representation Rate | Percent of employed persons whom are represented by a union | CPS |
| Fatal Occupational Injury Rate | Number of fatal occupational injuries per 100,000 employed persons | Census of Fatal Occupational Injuries; Local Area Unemployment Statistics |
| RTW Law | Existence of a Right to Work Law, starting at the first full year of existence | National RTW Committee |
| Self-employed | Percent of employed persons whom are self-employed | CPS |
| Married | Percent of employed persons whom are married | CPS |
| Rural | Percent of employed persons whom live outside of a metropolitan statistical area | CPS |
| Children | Percent of employed persons whom have at least one child living with them | CPS |
| Male | Percent of employed persons whom are male | CPS |
| White | Percent of employed persons whom are White | CPS |
| Black | Percent of employed persons whom are Black | CPS |
| Asian-Pacific Islander | Percent of employed persons whom are Asian or Pacific Islander | CPS |
| Other Race | Percent of employed persons whom are a race other than solely White, Black, Asian, or Pacific Islander | CPS |
| Hispanic | Percent of employed persons whom are Hispanic | CPS |
| Construction | Percent of employed persons whom work in the construction industry | CPS |
| Manufacturing | Percent of employed persons whom work in the manufacturing industry | CPS |
| Public Admin. | Percent of employed persons whom work in the public administration industry | CPS |
| Transportation | Percent of employed persons whom work in the transportation industry | CPS |
| Utilities | Percent of employed persons whom work in the utilities industry | CPS |
| Education (industry) | Percent of employed persons whom work in the education industry | CPS |
| Telecommunications | Percent of employed persons whom work in the telecommunications industry | CPS |
| No HS Diploma | Percent of employed persons whom have an education of less than a high school degree | CPS |
| HS Diploma | Percent of employed persons whom have an education of a high school degree | CPS |
| Some College | Percent of employed persons whom have an education of some college or an associate's degree | CPS |
| College Graduate | Percent of employed persons whom have an education of a college degree | CPS |
| Graduate Degree | Percent of employed persons whom have an education of greater than a college degree | CPS |
| Under Twenties | Percent of employed persons whom are younger than 20 years old | CPS |
| Twenties | Percent of employed persons whom are between the ages of 20 and 29 | CPS |
| Thirties | Percent of employed persons whom are between the ages of 30 and 39 | CPS |
| Forties | Percent of employed persons whom are between the ages of 40 and 49 | CPS |
| Fifties | Percent of employed persons whom are between the ages of 50 and 59 | CPS |
| Sixties Plus | Percent of employed persons whom are 60 years old or older | CPS |

 Summary statistics across all state-year data entries for this data set are provided in Table 2, below. It should be noted that all variables, other than Fatalities Rate and RTW Law, have data presented in the XX% form. For example, the variable Male has a mean of 52.82497. Thus, the average state-year result is that 52.82497 percent of a state’s working population in a single year were of the male sex. There are some variables which have a minimum value of zero, meaning that no person surveyed in a particular state in a given year held that characteristic, despite the survey being representative at the national level. For example, the variable Hispanic holds a minimum value of zero because no one surveyed in Vermont in 1993 identified themselves as Hispanic. This issue does involve the two union dependent variables, but the zero value occurs only twice in the 1,250 observation data set. Further, both states affected, South Carolina in 1999 and Mississippi in 2014, consistently have low values for the two variables, so the bias is likely insignificant. Although this issue could bias the results, the affected variables remain in the models because, for each affected variable, relatively few state-years have a zero value and the omission of a non-zero value is random.

Table 2. Summary Statistics for 50-State 1992-2016 Data Set

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Obs | Mean | Std. Dev. | Min | Max |
| Union Representation Rate | 1,250 | 13.6609 | 6.2795 | 0 | 31.8115 |
| Union Membership Rate | 1,250 | 12.1951 | 6.1955 | 0 | 29.5771 |
| Fatalities Rate | 1,250 | 5.0137 | 2.9705 | 0.8598 | 34.7827 |
| RTW Law | 1,250 | 0.4384 | 0.4964 | 0 | 1 |
| Self-employed | 1,250 | 11.1137 | 2.6004 | 5.1407 | 22.0611 |
| Married | 1,250 | 60.7041 | 3.4457 | 49.4331 | 71.8770 |
| Rural | 1,250 | 27.1156 | 20.2521 | 0 | 79.6161 |
| Children | 1,250 | 45.8638 | 3.0737 | 37.0071 | 55.9031 |
| Male | 1,250 | 52.8250 | 1.6922 | 47.9064 | 58.3925 |
| White | 1,250 | 84.7849 | 12.2625 | 19.1821 | 100.0000 |
| Black | 1,250 | 8.8830 | 8.5464 | 0 | 36.3433 |
| Asian-Pacific Islander | 1,250 | 3.9829 | 8.6708 | 0 | 72.3285 |
| Other Race | 1,250 | 2.3492 | 3.2813 | 0 | 23.8575 |
| Hispanic | 1,250 | 7.6564 | 8.8043 | 0 | 45.4538 |
| Construction | 1,250 | 6.6264 | 1.4715 | 3.1906 | 13.0494 |
| Manufacturing | 1,250 | 13.4801 | 5.0265 | 2.2879 | 28.2376 |
| Public Admin. | 1,250 | 4.9304 | 1.8307 | 1.9505 | 14.9543 |
| Transportation | 1,250 | 4.1901 | 1.0397 | 1.0866 | 8.9303 |
| Utilities | 1,250 | 1.3858 | 0.6819 | 0.1285 | 4.4540 |
| Education | 1,250 | 9.0945 | 1.5736 | 4.0422 | 14.5513 |
| Telecommunications | 1,250 | 0.9606 | 0.5220 | 0 | 3.8103 |
| No HS Diploma | 1,250 | 10.6208 | 3.0317 | 3.7284 | 21.3928 |
| HS Diploma | 1,250 | 31.1487 | 4.9476 | 18.7989 | 47.6677 |
| Some College | 1,250 | 29.4263 | 3.8609 | 20.2543 | 40.5872 |
| College Graduate | 1,250 | 19.2081 | 3.6507 | 8.4461 | 30.0209 |
| Graduate Degree | 1,250 | 9.5962 | 3.0461 | 3.0820 | 22.3709 |
| Under Twenty | 1,250 | 4.5331 | 1.3705 | 1.4523 | 9.9980 |
| Twenties | 1,250 | 20.4612 | 2.4311 | 13.0425 | 30.0974 |
| Thirties | 1,250 | 23.6343 | 3.6361 | 16.0186 | 34.4512 |
| Forties | 1,250 | 24.2298 | 2.5468 | 16.2645 | 34.3574 |
| Fifties | 1,250 | 18.3434 | 3.5377 | 9.8724 | 28.7514 |
| Sixties Plus | 1,250 | 8.7981 | 2.7867 | 2.2170 | 18.2976 |

 A listing of all variables included in the 4-state data set is provided in Table 3, along with a description of the variable and its source. Three non-CPS-derived variables (Violations Rate, RTW Law, and Inspections) are included in this data set. The Violations Rate was derived from the Department of Labor’s Enforcement Data and Census Bureau’s Statistics of U.S. Businesses. It is calculated for each state-year as follows:

1. $Violations Rate\_{it}=\frac{Inspections resulting in a violation\_{it}}{Establishments\_{it}}\*100,000$

The Inspections variable was also created using data from the Department of Labor’s Enforcement Data. The RTW Law variable in the 4-state data set has the same origin and derivation as the variable in the 50-state data set.

Table 3. Variables for 4-State 1988-2015 Data Set

|  |  |  |
| --- | --- | --- |
| **Variable** | **Description (in state "i" at time "t")** | **Source** |
| Violations Rate | Number of inspections resulting in at least one violation per 100,000 establishments | Department of Labor Enforcement Data; Statistics of US Businesses |
| RTW Law | Existence of a Right to Work Law, starting at the first full year of existence | National RTW Committee |
| Inspections | Number of OSHA compliance inspections | Department of Labor Enforcement Data |
| Self-employed | Percent of employed persons whom are self-employed | CPS |
| Married | Percent of employed persons whom are married | CPS |
| Rural | Percent of employed persons whom live outside of a metropolitan statistical area | CPS |
| Children | Percent of employed persons whom have at least one child living with them | CPS |
| Male | Percent of employed persons whom are male | CPS |
| White | Percent of employed persons whom are White | CPS |
| Black | Percent of employed persons whom are Black | CPS |
| Asian-Pacific Islander | Percent of employed persons whom are Asian or Pacific Islander | CPS |
| Other Race | Percent of employed persons whom are a race other than solely White, Black, Asian, or Pacific Islander | CPS |
| Hispanic | Percent of employed persons whom are Hispanic | CPS |
| Construction | Percent of employed persons whom work in the construction industry | CPS |
| Manufacturing | Percent of employed persons whom work in the manufacturing industry | CPS |
| Public Admin. | Percent of employed persons whom work in the public administration industry | CPS |
| Transportation | Percent of employed persons whom work in the transportation industry | CPS |
| Utilities | Percent of employed persons whom work in the utilities industry | CPS |
| Education (industry) | Percent of employed persons whom work in the education industry | CPS |
| Telecommunications | Percent of employed persons whom work in the telecommunications industry | CPS |
| No High School Diploma | Percent of employed persons whom have an education of less than a high school degree | CPS |
| HS Diploma | Percent of employed persons whom have an education of a high school degree | CPS |
| Some College | Percent of employed persons whom have an education of some college or an associate's degree | CPS |
| College Graduate | Percent of employed persons whom have an education of a college degree | CPS |
| Graduate Degree | Percent of employed persons whom have an education of greater than a college degree | CPS |
| Under Twenties | Percent of employed persons whom are younger than 20 years old | CPS |
| Twenties | Percent of employed persons whom are between the ages of 20 and 29 | CPS |
| Thirties | Percent of employed persons whom are between the ages of 30 and 39 | CPS |
| Forties | Percent of employed persons whom are between the ages of 40 and 49 | CPS |
| Fifties | Percent of employed persons whom are between the ages of 50 and 59 | CPS |
| Sixties Plus | Percent of employed persons whom are 60 years old or older | CPS |

Summary statistics across all state-year data entries for this data set are provided in Table 4, below. It should be noted that all variables, other than Violations Rate, RTW Law, and Inspections, have data presented in the XX% form, like the summary statistics for the 50-state data set. Again, this data set suffers from the issue that some control variables have a minimum value of zero, meaning that no person surveyed in a particular state in a given year held that characteristic. The logic behind the inclusion of the affected variables is that, for each affected variable, relatively few state-years have a zero value and the omission of non-zero values is random.

Table 4. Summary Statistics for 4-State 1988-2015 Data Set

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Obs | Mean | Std. Dev. | Min | Max |
| Violations Rate | 112 | 561.7656 | 250.8150 | 265.4947 | 1449.2480 |
| RTW Law | 112 | 0.8750 | 0.3322 | 0 | 1 |
| Inspections | 112 | 1686.9290 | 1702.4660 | 288 | 6709.0000 |
| Self-employed | 112 | 11.5368 | 1.8858 | 6.9616 | 17.1333 |
| Married | 112 | 63.0648 | 3.6890 | 52.0229 | 69.9205 |
| Rural | 112 | 25.6069 | 15.6520 | 0 | 59.5371 |
| Children | 112 | 47.5375 | 2.3754 | 40.9382 | 53.4190 |
| Male | 112 | 53.9316 | 1.7255 | 49.6260 | 57.1412 |
| White | 112 | 81.0920 | 5.9616 | 67.7518 | 90.3522 |
| Black | 112 | 13.7785 | 7.3553 | 3.8041 | 29.8081 |
| Asian-Pacific Islander | 112 | 1.9089 | 1.2452 | 0.1499 | 5.5454 |
| Other Race | 112 | 3.2206 | 4.3731 | 0 | 17.8030 |
| Hispanic | 112 | 10.1245 | 12.0960 | 0.4346 | 38.3573 |
| Construction | 112 | 7.2019 | 1.3690 | 4.5485 | 12.0405 |
| Manufacturing | 112 | 13.4983 | 3.9779 | 7.3627 | 25.0911 |
| Public Admin. | 112 | 4.9006 | 1.1371 | 1.9505 | 8.1029 |
| Transportation | 112 | 4.6462 | 0.7755 | 2.8152 | 7.1777 |
| Utilities | 112 | 1.6843 | 0.6994 | 0.3297 | 4.1336 |
| Education (industry) | 112 | 8.3991 | 1.2163 | 5.4330 | 12.2133 |
| Telecommunications | 112 | 1.0727 | 0.4434 | 0.0770 | 2.6332 |
| No HS Diploma | 112 | 14.1421 | 3.4584 | 6.6624 | 22.6101 |
| HS Diploma | 112 | 34.7513 | 5.0534 | 25.0252 | 47.5075 |
| Some College | 112 | 27.3440 | 3.6290 | 17.3686 | 34.0523 |
| College Graduate | 112 | 16.2100 | 2.8416 | 8.1820 | 23.8047 |
| Graduate Degree | 112 | 7.5526 | 1.5957 | 3.3456 | 12.3665 |
| Under Twenty | 112 | 4.6188 | 1.1165 | 2.0174 | 7.3060 |
| Twenties | 112 | 22.4686 | 2.2097 | 16.2548 | 28.7533 |
| Thirties | 112 | 24.6409 | 3.2597 | 18.8901 | 32.1130 |
| Forties | 112 | 23.2055 | 1.9644 | 18.6425 | 27.8019 |
| Fifties | 112 | 16.8995 | 2.9596 | 11.5855 | 23.4238 |
| Sixties Plus | 112 | 8.1667 | 2.2346 | 5.0463 | 15.0350 |

# VI. Results

The first regression performed is a test of the effect of RTW laws on unionization. As a sensitivity test, this analysis was performed using both a variable for the percent of employed persons whom are members of a union and another for the percent whom are simply represented by a union. Additionally, both the results of a simple version of the model, without additional control variables, and the full version of the model, with additional control variables, are provided. The results of these regressions, excluding the state and time fixed-effects variables, are in Table 5, below.

Table 5. Regression Results: Impact of RTW Laws on Unionization

|  |  |  |
| --- | --- | --- |
|   | Dependent Variable: Union Representation Rate | Dependent Variable: Union Membership Rate |
|   | Model 1 | Model 2 | Model 3 | Model 4 |
| Independent Variables | Coefficients (robust standard errors in parentheses) |
| Intercept | 16.1121\*\*\*\* | 15.0187 | 14.7939\*\*\*\* | 9.6211 |
|   | (1.206855) | (15.40481) | (1.101119) | (15.03473) |
| RTW Law | -1.7028\*\* | -1.1603 | -1.9081\*\*\* | -1.4583\* |
|   | (0.9429535) | (0.9939961) | (0.8738668) | (0.9312665) |
| Self-employed |   | 0.0113 |   | 0.0346 |
|   |   | (0.0743384) |   | (0.070028) |
| Married |   | -0.0488 |   | -0.0481 |
|   |   | (0.050118) |   | (0.0481789) |
| Rural |   | -0.0135 |   | -0.0163 |
|   |   | (0.0127556) |   | (0.011353) |
| Children |   | 0.0253 |   | 0.0114 |
|   |   | (0.0536461) |   | (0.0493751) |
| Male |   | 0.0610 |   | -0.0034 |
|   |   | (0.0830057) |   | (0.0782994) |
| White |   | -0.0055 |   | 0.0032 |
|   |   | (0.0723887) |   | (0.0694814) |
| Black |   | 0.0115 |   | -0.0222 |
|   |   | (0.1091545) |   | (0.1032721) |
| Asian-Pacific Islander |   | 0.1296\* |   | 0.1251\* |
|   |   | (0.0833382) |   | (0.0809493) |
| Hispanic |   | -0.0594 |   | 0.0177 |
|   |   | (0.0646472) |   | (0.0594289) |
| Construction |   | 0.2198\*\*\* |   | 0.2092\*\*\* |
|   |   | (0.1019718) |   | (0.0974535) |
| Manufacturing |   | 0.0604 |   | 0.0781\*\* |
|   |   | (0.045054) |   | (0.042231) |
| Public Admin. |   | 0.1771\* |   | 0.1152 |
|   |   | (0.1120691) |   | (0.1030964) |
| Transportation |   | 0.1630 |   | 0.1332 |
|   |   | (0.1371535) |   | (0.1309067) |
| Utilities |   | -0.0090 |   | -0.0714 |
|   |   | (0.2055465) |   | (0.1963642) |
| Education (industry) |   | 0.3343\*\*\*\* |   | 0.2722\*\*\*\* |
|   |   | (0.0906117) |   | (0.0822175) |
| Telecommunications |   | 0.1811 |   | 0.1580 |
|   |   | (0.2497596) |   | (0.2387803) |
| HS Diploma |   | 0.1006 |   | 0.0645 |
|   |   | (0.0811333) |   | (0.0746858) |
| Some College |   | 0.0126 |   | -0.0009 |
|   |   | (0.0813995) |   | (0.0749564) |
| College Graduate |   | -0.0098 |   | -0.0210 |
|   |   | (0.0919408) |   | (0.085126) |
| Graduate Degree |   | 0.2056\*\* |   | 0.1797\*\* |
|   |   | (0.1135962) |   | (0.1049761) |
| Twenties |   | -0.1544 |   | -0.0176 |
|   |   | (0.1311948) |   | (0.1267009) |
| Thirties |   | -0.1866 |   | -0.0735 |
|   |   | (0.1342795) |   | (0.1289983) |
| Forties |   | -0.0804 |   | 0.0340 |
|   |   | (0.1433606) |   | (0.1393967) |
| Fifties |   | -0.1382 |   | -0.0112 |
|   |   | (0.1464874) |   | (0.142469) |
| Sixties Plus |   | 0.0204 |   | 0.0614 |
|   |   | (0.1601871) |   | (0.1519375) |
| State Fixed Effects | INCLUDED | INCLUDED | INCLUDED | INCLUDED |
| Time Fixed Effects | INCLUDED | INCLUDED | INCLUDED | INCLUDED |
| Number of Observations | 1250 | 1250 | 1250 | 1250 |
| R-squared | 0.8149 | 0.8229 | 0.8312 | 0.8368 |
| Notes: |  |  |  |  |
| \*\*\*\* = significant at 1% |  |  |  |  |
| \*\*\* = significant at 5% |  |  |  |  |
| \*\* = significant at 10% |  |  |  |  |
| \* = significant at 15% |  |  |  |  |

 Both regressions without additional control variables find statistically significant evidence that RTW laws have a negative impact on unionization. Specifically, there is a predicted 1.703 percent decrease in the union representation rate and a 1.908 percent decrease in the union membership rate when a RTW law is enacted. Additional control variables lessen the statistical strength of the evidence that RTW laws impact unionization. There is, however, weak statistical evidence at the 15 percent significance level that RTW laws have a negative impact on union membership when controlling for other labor force descriptor variables. Despite the weak statistical connection, these results are sufficient in suggesting that the hypothesis has solid standing.

Table 6. Percent of Union Representation and Membership in States Which Adopted a RTW Law During Period of Study

|  |  |  |  |
| --- | --- | --- | --- |
| State | First Full Year with RTW Law | Percent of Workers Represented by a Union (Average of decade before RTW law) | Percent of Workers Whom Are Union Members (Average of decade before RTW law) |
| Indiana | 2013 | 13.813 | 12.949 |
| Michigan | 2014 | 19.776 | 19.006 |
| Oklahoma | 2002 | 9.5214 | 8.663 |
| Wisconsin | 2016 | 14.347 | 13.331 |

Table 6, above, provides the percent of employed persons whom are members of a union and the percent whom are represented by a union in the states which adopted a RTW law during the time period of this study. The percentages are averages of the respective rates during the decade prior to RTW law implementation. The full model’s predicted 1.458 percent decrease in the union membership rate is small in comparison to Michigan’s 19.006 percent of union membership, but accounts for a cut of nearly one-fifth of Oklahoma’s pre-RTW law union membership rate.

 Turning to the analyses on occupational safety and health, the second regression of this analysis tests the effect of RTW laws on fatal occupational injury rates. Like the previous regression, both the results of a simple version of the model, without additional control variables, and the full version of the model, with additional control variables, are provided. The results of these regressions, excluding the state and time control variables, are in Table 7, below.

Table 7. Regression Results: Impact of RTW Laws on Fatal Occupational Injuries Rate

|  |  |
| --- | --- |
|   | Dependent Variable: Fatal Occupational Injuries Rate |
|   | Model 1 | Model 2 |
| Independent Variables | Coefficients (robust standard errors in parentheses) |
| Intercept | 6.6702\*\*\*\* | -8.7052 |
|   | (0.5607397) | (9.70787) |
| RTW Law | 0.5072 | 0.7261\*\* |
|   | (0.3742073) | (0.3827667) |
| Self-employed |   | -0.0061 |
|   |   | (0.0368072) |
| Married |   | -0.0456\* |
|   |   | (0.0310739) |
| Rural |   | 0.0319\*\*\*\* |
|   |   | (0.0088442) |
| Children |   | -0.0416 |
|   |   | (0.032354) |
| Male |   | 0.0074 |
|   |   | (0.037872) |
| White |   | 0.0435 |
|   |   | (0.0615312) |
| Black |   | 0.1535\*\*\* |
|   |   | (0.0714439) |
| Asian-Pacific Islander |   | -0.0661\*\* |
|   |   | (0.0387706) |
| Hispanic |   | 0.0815\*\*\* |
|   |   | (0.0398107) |
| Construction |   | -0.0054 |
|   |   | (0.0450247) |
| Manufacturing |   | -0.0484\*\* |
|   |   | (0.02578) |
| Public Admin. |   | 0.0995 |
|   |   | (0.0748457) |
| Transportation |   | -0.0332 |
|   |   | (0.0692816) |
| Utilities |   | 0.0227 |
|   |   | (0.1171592) |
| Education (industry) |   | -0.0341 |
|   |   | (0.0489147) |
| Telecommunications |   | -0.0750 |
|   |   | (0.1728823) |
| HS Diploma |   | -0.0086 |
|   |   | (0.0443844) |
| Some College |   | 0.0359 |
|   |   | (0.0393949) |
| College Graduate |   | 0.0716\* |
|   |   | (0.0442626) |
| Graduate Degree |   | 0.1396\*\*\* |
|   |   | (0.0620278) |
| Twenties |   | 0.0378 |
|   |   | (0.0824681) |
| Thirties |   | 0.1209 |
|   |   | (0.0934495) |
| Forties |   | 0.1436\* |
|   |   | (0.0935382) |
| Fifties |   | 0.1616\*\* |
|   |   | (0.0849332) |
| Sixties Plus |   | 0.0994 |
|   |   | (0.0796813) |
| State Fixed Effects | INCLUDED | INCLUDED |
| Time Fixed Effects | INCLUDED | INCLUDED |
| Number of Observations | 1250 | 1250 |
| R-squared | 0.7915 | 0.8086 |
| Notes: |  |  |
| \*\*\*\* = significant at 1% |  |  |
| \*\*\* = significant at 5% |  |  |
| \*\* = significant at 10% |  |  |
| \* = significant at 15% |  |  |

 Only the regression with additional control variables finds the RTW law variable as having a statistically significant impact on fatal occupational injury rates. For the full model, there is a predicted increase in fatal occupational injuries per 100,000 workers of 0.726 persons when a RTW law is implemented. For reference, the state of Maryland had an estimated 3,037,763 employed workers in 2016 (United States Bureau of Labor Statistics, 2018 - b). This finding suggests that if Maryland had adopted a RTW law in 2016, then there would have been an estimated 22 additional fatal occupational injuries in the state in 2017.

 As a sensitivity test of these results, the same model is used on a smaller sample. While still using the same data set, the states used were limited from the original 50 states to the 4 states that are studied in the analysis of OSHA compliance. The results, excluding the state and time control variables, are in Table 8, below.

Table 8. Regression Results: Impact of RTW Laws on Fatal Occupational Injuries Rate Using Only Data on the 4 States Included in OSHA Violations Rate Model

|  |  |
| --- | --- |
|   | Dependent Variable: Fatal Occupational Injuries Rate |
|   | Model 1 | Model 2 |
| Independent Variables | Coefficients (robust standard errors in parentheses) |
| Intercept | 7.3020\*\*\*\* | 33.3394\* |
|   | (0.8319583) | (20.33923) |
| RTW Law | 0.3717 | 1.2556 |
|   | (0.7516681) | (1.131939) |
| Self-employed |   | 0.1485 |
|   |   | (0.1300151) |
| Married |   | -0.0376 |
|   |   | (0.0781035) |
| Rural |   | -0.0181 |
|   |   | (0.0284373) |
| Children |   | 0.0883 |
|   |   | (0.0822323) |
| Male |   | -0.0469 |
|   |   | (0.1396623) |
| White |   | -0.0222 |
|   |   | (0.1051506) |
| Black |   | -0.1150 |
|   |   | (0.1652701) |
| Asian-Pacific Islander |   | 0.2400 |
|   |   | (0.240977) |
| Hispanic |   | 0.0783 |
|   |   | (0.1277738) |
| Construction |   | -0.0440 |
|   |   | (0.1252689) |
| Manufacturing |   | -0.1931\*\*\* |
|   |   | (0.0886483) |
| Public Admin. |   | -0.2949\* |
|   |   | (0.1824102) |
| Transportation |   | 0.1340 |
|   |   | (0.1735141) |
| Utilities |   | 0.0858 |
|   |   | (0.3490886) |
| Education (industry) |   | -0.0711 |
|   |   | (0.1061612) |
| Telecommunications |   | 0.5588 |
|   |   | (0.5010872) |
| HS Diploma |   | -0.0509 |
|   |   | (0.1280926) |
| Some College |   | 0.0934 |
|   |   | (0.135051) |
| College Graduate |   | -0.2587\* |
|   |   | (0.154355) |
| Graduate Degree |   | -0.1034 |
|   |   | (0.2005412) |
| Twenties |   | -0.3368\* |
|   |   | (0.220615) |
| Thirties |   | -0.1974 |
|   |   | (0.225356) |
| Forties |   | -0.0816 |
|   |   | (0.1934164) |
| Fifties |   | -0.0485 |
|   |   | (0.1955823) |
| Sixties Plus |   | 0.0821 |
|   |   | (0.2446585) |
| State Fixed Effects | INCLUDED | INCLUDED |
| Time Fixed Effects | INCLUDED | INCLUDED |
| Number of Observations | 100 | 100 |
| R-squared | 0.6263 | 0.8197 |
| Notes: |  |  |
| \*\*\*\* = 1% |  |  |
| \*\*\* = 5% |  |  |
| \*\* = 10% |  |  |
| \* = 15% |  |  |

 Although the RTW law variable does not retain statistical significance with the new data specification, it is possible that this occurred due to the use of a much smaller sample size and decreased variation in the data, which can be seen from data summary statistics. For example, the variable for rate of fatal occupational injury had a substantial decrease in variation as the 50-state data had a minimum value of 0.860 and maximum value of 34.783, but the 4-state data had a minimum value of 3.754 and a maximum value of 13.473. The predicted impact of the RTW law variable in this sensitivity test remained positive, suggesting that RTW laws do increase the rate of fatal occupational injuries. Since the directionality of the results remains the same and the coefficient held a relatively small p-value of 0.273, despite being from a much smaller sample with less variation, this sensitivity test increased the confidence in the results of the full, 50-state regression.

 Finally, the third regression tests the effect of RTW laws on OSHA violation rates. Again, both the results of a simple version of the model, without additional control variables, and the full version of the model, with additional control variables, are provided. The results of these regressions, excluding the state and time control variables, are in Table 9, below.

Table 9. Regression Results: Impact of RTW Laws on OSHA Violations Rate

|  |  |
| --- | --- |
|   | Dependent Variable: Violations Rate |
|   | Model 1 | Model 2 |
| Independent Variables | Coefficients (robust standard errors in parentheses) |
| Intercept | 1225.166\*\*\*\* | -1572.064 |
|   | (97.937) | (1713.142) |
| RTW Law | -1.2723 | 225.6157\*\*\*\* |
|   | (38.29607) | (74.58551) |
| Inspections |   | 0.0942\*\*\*\* |
|   |   | (0.0273579) |
| Self-employed |   | -4.2158 |
|   |   | (8.493479) |
| Married |   | -10.2051\* |
|   |   | (6.617677) |
| Rural |   | 6.4398\*\*\* |
|   |   | (2.752362) |
| Children |   | 11.1937\*\* |
|   |   | (6.064276) |
| Male |   | 22.4125\*\*\* |
|   |   | (9.992033) |
| White |   | 14.1683\* |
|   |   | (8.682803) |
| Black |   | 49.1074\*\*\*\* |
|   |   | (11.85991) |
| Asian-Pacific Islander |   | 3.1919 |
|   |   | (19.3322) |
| Hispanic |   | 18.8033\*\*\* |
|   |   | (8.58465) |
| Construction |   | 15.0200 |
|   |   | (10.49728) |
| Manufacturing |   | 0.0639 |
|   |   | (6.040059) |
| Public Admin. |   | 12.9510 |
|   |   | (15.13768) |
| Transportation |   | 14.7113 |
|   |   | (13.70209) |
| Utilities |   | -12.1239 |
|   |   | (23.09079) |
| Education (industry) |   | -0.0242 |
|   |   | (9.685158) |
| Telecommunications |   | 25.6293 |
|   |   | (30.52382) |
| HS Diploma |   | -12.0604 |
|   |   | (9.171684) |
| Some College |   | -13.8345\*\* |
|   |   | (8.086234) |
| College Graduate |   | -6.6218 |
|   |   | (11.57453) |
| Graduate Degree |   | -4.1107 |
|   |   | (11.5083) |
| Twenties |   | -16.0312 |
|   |   | (13.08254) |
| Thirties |   | -12.8094 |
|   |   | (15.32172) |
| Forties |   | 23.1068\* |
|   |   | (14.44599) |
| Fifties |   | 6.7805 |
|   |   | (13.78222) |
| Sixties Plus |   | 32.0095\*\* |
|   |   | (17.31372) |
| State Fixed Effects | INCLUDED | INCLUDED |
| Time Fixed Effects | INCLUDED | INCLUDED |
| Number of Observations | 112 | 112 |
| R-squared | 0.8703 | 0.9542 |
| Notes: |  |  |
| \*\*\*\* = significant at 1% |  |  |
| \*\*\* = significant at 5% |  |  |
| \*\* = significant at 10% |  |  |
| \* = significant at 15% |  |  |

 As seen in the analysis regarding fatal occupational injury rates, only the regression with additional control variables finds the RTW law variable as having a significant impact on OSHA violation rates. For the full model, there is a predicted increase of 225.616 OSHA inspections resulting in a violation per 100,000 establishments when a RTW law is implemented. This coefficient is found to be statistically significant even at the 1 percent significance level. Given that the mean state-year observed OSHA violation rate for this data set is 561.766 inspections resulting in a violation per 100,000 establishments, the full model’s results suggest that the adoption of a RTW law would account for a nearly 50 percent increase in a state’s violation rate, holding all else constant.

# VII. Limitations

There are a number of limitations that accompany the chosen methodologies and data sources. The first two are in regards to the use of state-year panel data. First, the limited consideration of state-level RTW laws leaves out the possibility that local governments have passed such a law in a state without a state-wide RTW law. Second, the use of the annual time unit of measurement could limit the observation of minute changes due to the adoption of a RTW law. It is possible that the use of a shorter time period, such as a month, could produce different results. Similarly, the coding of the RTW law as being present in the first full year of application and not in the year in which it was ratified could have a slight impact on the regression results.

An additional limitation is associated with the regression on rate of violation as there are at least two countering effects of RTW laws on OSHA compliance. Historically, unionized workplaces had a greater probability of inspection and received more stringent OSHA inspections (Weil, 1991, 1992, 2001). So, a decrease in the number of unionized workplaces could result in less violations per 100,000 establishments, indicating greater compliance to OSHA, even if this is not truly the case. However, it is also possible that a decrease in the number of unionized workplaces would result in more violations per 100,000 establishments, since there would be more workplaces without a collective voice to advance occupational safety and health. This limitation would cause a negative bias on the regression results, but the full model still finds the RTW law variable coefficient to be positive and statistically significant.

# VIII. Implications of Results

 The results of this study, and the lack of published research on the impact of RTW laws on labor conditions and labor protections, suggest that the total effects of RTW laws are still not well understood, despite the policy’s recent popularity. Policymakers in deliberations over the implementation of a RTW law ought to more fully consider the secondary effects, including the possible negative impact on occupational safety and health, as the effects may oppose other policy goals. For example, the findings of this analysis indicate that RTW laws partially counter the effectiveness of current government programs which advance occupational safety and health. Further, if occupational safety and health is a focus of a state government, either in fatal occupational injury mitigation or enhancement of OSHA compliance, then the results of this study suggest that policies which assist the growth of union membership are beneficial to an extent.

 Regardless of RTW law status, a more thorough understanding of the prevalence and effectiveness of private and public occupational safety and health interventions at the federal, state, and local levels may be desirable. This could include such items as the analysis of the effect of union-led safety trainings and an examination of OSHA compliance effectiveness and efficiency. Studies using micro-level data could be useful to further the understanding of the impact of such interventions and government policies, like RTW laws. Finally, although this paper focused upon occupational safety and health, RTW laws’ impact on all labor conditions and compliance to all labor protection laws remains an area in need of further research.

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