EXHIBIT

S-7

LIUNA'S RESPONSE TO STAFF'S FIRST SET OF DATA REQUESTS

Attachment Staff 1-4(a)

November 30, 2021

The Impact of Unions on Construction Worksite Health and Safety

Evidence from OSHA Inspections

ILEPI
ILLINOIS ECONOMIC POLICY INSTITUTE

ILLINOIS LABOR & EMPLOYMENT RELATIONS
PROJECT FOR MIDDLE CLASS RENEWAL

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Executive Summary

Construction consistently ranks as one of the most dangerous industries in the United States. This report assesses whether there are differences in safety outcomes between union and nonunion construction worksites by analyzing Occupational Safety and Health Administration (OSHA) violations in the industry.

Prior research has found that the unionized construction sector delivers higher wages, finances most of the industry's skilled craft training, and has fewer occupational fatalities than the nonunion alternative.

- Union construction workers earn 10 to 20 percent more than nonunion workers.
- Joint labor-management (union) apprenticeship programs train the vast majority of all construction apprentices in the United States, including 97 percent in Illinois.
- Previous research has found that a 1 percent increase in unionization is linked with a 3 percent decrease in occupational fatalities.

An analysis of over 37,000 OSHA inspections in the construction industry in 2019—including more than 2,800 at union worksites and nearly 34,200 at nonunion worksites—reveals that union worksites have significantly fewer health and safety violations.

- Inspections at union worksites are more likely to occur due to referrals while inspections at nonunion worksites are more likely to occur due to employee complaints.
- Nationally, union worksites are 19 percent less likely to have an OSHA violation and have 34 percent fewer violations per inspection. Even though unions represent 14 percent of construction industry workers, union worksites only account for 5 percent of OSHA violations in construction.
- In each of the major construction sectors, union worksites are less likely to have an OSHA violation (100 percent). They have fewer violations per inspection in all but one sector (88 percent).
- In each of the 10 OSHA regions, union worksites are less likely to have an OSHA violation (100 percent). They have fewer violations per inspection in all but one region (90 percent). The share of OSHA violations occurring at union worksites is also smaller than the share of all construction industry workers represented by unions in each of the 10 regions (100 percent).
- In Illinois, union worksites are 13 percent less likely to have an OSHA violation and have 52 percent fewer violations per inspection. Despite unions representing 34 percent of construction industry workers in Illinois, union worksites only account for 8 percent of all OSHA violations in the state.
- After accounting for construction sector and the scope, type, region, and month of inspection, union worksites average 31 percent fewer health and safety violations (0.5 fewer per inspection).

The unionized construction industry attracts, develops, and retains skilled workers through a rigorous system of registered apprenticeship training, family-sustaining wages and benefits, and high levels of standards for craftsmanship and safety. By ensuring safer worksites, the union construction industry improves productivity, reduces burdens on state workers' compensation systems, and promotes healthier communities.

Because union worksites are safer than nonunion worksites in the construction industry, policies could be enacted to promote more unionization in sectors and states where no such policies currently exist. These include passing or strengthening state prevailing wage laws, expanding the use of project labor agreements, and enacting responsible bidder criteria as well as repealing so-called "right-to-work" laws—which weaken unions and have been shown to result in fewer apprentices, lower levels of worker productivity, and more on-the-job fatalities.

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Introduction

Construction consistently ranks as one of the most dangerous industries in the United States. The Occupational Safety and Health Administration (OSHA) designates construction as a high-hazard industry due to its wide range of activities involving building, alteration, and repair. While the rate of construction-related injuries industrywide has declined over recent decades, almost half of all workers in construction occupations are still subject to hazardous machinery and unsafe conditions on a weekly basis.

Federal law dictates that all workers are guaranteed the right to safe workplaces, and employers are required to take steps to reduce the risk of on-the-job injuries, illnesses, and death. In order to ensure a safe work environment, the Occupational Safety and Health Administration at the U.S. Department of Labor, conducts inspections of worksites throughout the country to ensure compliance with federal safety standards. OSHA investigators research their selected worksite, enter and tour the worksite, and interview employees and staff before announcing the results of the investigation (OSHA, 2016). Worksites that fail to comply with federal health and safety standards can receive violations and fines. Depending on the severity of the violation, fines can reach a maximum of $136,532 for willful or repeated violations. Higher and more frequent occurrences of violations are signs of an unsafe workplace.

This report, conducted jointly by researchers at the Illinois Economic Policy Institute and the Project for Middle Class Renewal at the University of Illinois at Urbana-Champaign, assesses the frequency and quantity of OSHA violations among union and nonunion worksites in the construction industry in 2019, when a total of 14 percent of private sector construction industry workers were represented by unions (BLS, 2021). The economic research on the value of unions and collective bargaining are first presented before data on OSHA violations are shown. The analysis is expanded further by exploring specific sectors of construction as well as specific geographic areas, including Illinois. Results from a statistical technique called a “regression” are reported before a concluding section recaps key findings and offers potential policy options.

Economic Research on the Value of Unions and Collective Bargaining

Collective bargaining enables workers to assemble into unions and associate with their colleagues to negotiate contracts with their employers that establish the terms and conditions of employment. Collective bargaining is a method for formalizing labor-management relations, with workplace decisions made jointly by employers and employees, rather than unilaterally by one party. This process fosters democratic workplaces, with workers having a voice in decisions over working conditions and having the ability to elect representatives to bargain on their behalf.

The Impact of Unions on Worker Wages and Benefits

Numerous studies have found that collective bargaining boosts wages for workers, particularly for low-income employees, middle-class workers, and People of Color (Callaway & Collins, 2017; Bivens et al., 2017; Long, 2013; Walters & Mishel, 2003). On average, union households earn between 10 percent and 20 percent more than nonunion households—an income premium that has been consistent since the 1930s (Farber et al., 2018). Perhaps even more striking than the pay gap between union and non-union workers is the difference in benefits received between the two. Union members are much more likely to have access to health insurance, retirement plans, and sick leave. Fully 95 percent of union workers have access to health care coverage, 94 percent have access to retirement plans, and 91 percent have access to paid sick leave compared with just 68 percent health care access, 67 percent retirement plan access, and 73 percent paid

sick leave access for nonunion workers (BLS, 2019). Unions have also been found to reduce poverty, lower worker turnover, and reduce taxpayer costs for government assistance programs (Nunn et al., 2019; Sojourner & Pacas, 2018).

Conversely, a recent study that compared states with so-called "right-to-work" laws—which effectively weaken unions—found that average worker wages were 3 percent lower, health insurance coverage was 5 percent lower, and worker productivity was 17 percent lower than in states with free collective-bargaining laws (Manzo & Bruno, 2021). The pay penalty associated with so-called "right-to-work" laws is even larger for essential workers, including 11 percent lower wages for construction and extraction workers.

While union membership has declined nationally since the late 1970s, construction remains one of the most unionized private-sector industries in the United States and continues to offer pathways into the middle class for blue-collar workers. For example, in Minnesota, union construction workers earn 32 percent more than nonunion construction workers, on average. However, the union wage premium is highest for the lowest-income construction workers. Unions boost wages by between 44 percent and 50 percent for the lowest-earning construction workers and by just 15 percent for the highest-earning construction workers. Additionally, only 3 percent of union construction workers earn less than $15 per hour compared with 14 percent of nonunion construction workers (Manzo et al., 2021).

The Impact of Unions on Apprenticeship Training in Construction

Registered apprenticeships are industry-driven programs in which employers and unions train and develop skilled workers who are in high demand. Participating apprentices get the opportunity to "earn while they learn" and obtain portable, nationally-recognized credentials at minimal or no out-of-pocket cost. Employers, unions, joint labor-management programs, and governments all sponsor apprenticeship programs, which cover tuition costs and offer structured, on-the-job training and certified classroom instruction tailored to meet the needs of employers. In return for these investments, businesses across the country gain access to pools of skilled workers who meet industry standards for productivity and safety. Robust registered apprenticeship programs have proven to be effective at lowering the youth unemployment rate and raising wages (Bertschy et al., 2009; Ryan, 2001; Ryan, 1998; Clark & Fahr, 2002). One study performed a cost-benefit analysis of registered apprenticeship programs in 10 U.S. states that differed across labor market characteristics and found that apprenticeship participants earned $124,000 more in wages and fringe benefits over the course of their careers than similar non-participants (Reed et al., 2012).

Apprenticeship training is particularly important in the construction industry (Olinsky & Ayres, 2013). Registered apprenticeship programs in construction include health and safety courses, such as how to identify and report health and safety standards, use scaffolding, work safely with hazardous materials, operate machinery and forklifts, prevent silica exposure, and prevent burns on construction and demolition projects (e.g., CLDC, 2021; ASIP, 2019).

Construction apprenticeship programs are sponsored either jointly by labor unions and employers who are signatories to collective bargaining agreements (joint labor-management programs) or solely by employers. Joint labor-management programs are cooperatively administered with standards, trainee wages, and apprentice-to-worker ratios established in collective bargaining agreements (CBAs). Funding for training in joint labor-management apprenticeship programs is financed by "cents per hour" contributions that are part of the total wage and fringe benefits package negotiated with signatory contractors. Under this system, investments in training the next generation of skilled tradespeople are institutionalized, included in project bids and paid by project owners.

By contrast, employer-only programs are sponsored by an employer or group of employers—usually through a trade association—who unilaterally determine program content, set entry requirements, and monitor trainee progress. Funding for employer-only programs relies on voluntary contributions from contractors, who often have an incentive to forgo long-term workforce training investments in order to slash labor costs in their effort to win project bids.

Through registered apprenticeship programs, the construction industry operates "the largest privately-financed system of higher education in the country" (Philips, 2014). Nearly all of this investment, however, comes from joint labor-management programs cooperatively administered by labor unions and signatory employers due to the lack of institutionalized training investments in the nonunion segment of the industry. Joint labor-management programs account for 97 percent of all active construction apprentices in Illinois, 94 percent in Indiana, 82 percent in Ohio, 82 percent in Wisconsin, 79 percent in Kentucky, 78 percent in Michigan, and 63 percent in Oregon (Manzo & Bruno, 2020; Philips, 2015a; Manzo & Duncan, 2018; Onsarigo et al., 2017; Philips, 2015b; Duncan & Manzo, 2016; Bilginsoy, 2017; Stepick & Manzo, 2021). Research also indicates that joint labor-management programs tend to have high standards, requiring about 30 percent more average hours of training than the typical bachelor's degree at public universities in order to produce skilled construction workers who are significantly less likely to suffer on-the-job injuries (Manzo & Bruno, 2020; Stepick & Manzo, 2021).

The Impact of Unions on Workplace Safety

Unions have historically played a prominent role in the enactment of a broad range of labor laws and programs covering areas as diverse as overtime pay, minimum wage, health and retirement coverage, unemployment insurance, workers' compensation, leave for care of newborns and sick family members, and occupational health and safety rules. The intent of these policies has been to protect workers by implementing standards and by ensuring that workers can access support in times of need (Weil, 2003).

Union members are more likely to have a safer work environment in part because the protection of the union enables workers to speak up about safety violations without fearing whistleblower retaliation. Union contracts can also include language on purchasing personal protective equipment (PPE) and reducing excessive shifts, promoting safer jobsites. Previous studies have found that unions greatly improve OSHA enforcement because workers in unionized settings are much more likely to exercise their "walkaround" rights, accompanying an OSHA inspector to point out potential violations. Unions raise the probability of OSHA inspections by 10 percent and increase the length of the inspection (Walters & Mishel, 2003). Despite a higher chance of being inspected by OSHA, research has found that a 1 percent increase in unionization is associated with a 3 percent decline in the rate of occupational fatalities (Zoorob, 2018). Another 2011 report concluded that states with low construction union density have a fatality rate that is higher by between 3 and 7 deaths per 1,000 construction workers compared to states with high construction union density (Zullo, 2011). Furthermore, 86 percent of construction fatalities occur at nonunion worksites in New York and nonunion workers account for 87 percent of all construction deaths in Massachusetts (Obernauer, 2020; Laing et al., 2019).

Union Worksites Have Significantly Fewer OSHA Violations than Nonunion Worksites

In 2019, OSHA conducted more than 37,000 inspections at construction worksites throughout the country—including 2,855 at union jobsites and 34,186 at nonunion jobsites. The data comes directly from OSHA and includes information on the location of the worksite, the union status of the worksite, the scope of the inspection, whether the inspection was planned or was the result of a complaint or referral, the number of

violations determined during the inspection, and the specific sector of construction (OSHA, 2021a).[1] Compared with the nonunion segment of the industry, inspections at union worksites were more likely to occur due to referrals, including from government agencies, whistleblowers, or authorized representatives of employee bargaining units. Nonunion worksites were slightly more likely to be inspected as a result of an employee complaint or a planned inspection by OSHA (Figure 1).

Figure 1: OSHA Inspections at U.S. Construction Jobsites by Union Status and Type of Inspection, 2019

Type of Inspections	Union Worksites		Nonunion Worksites		Union Difference
	Number of Inspections	Share of Inspections	Number of Inspections	Share of Inspections	
Inspections	2,855	100.0%	34,186	100.0%	--
Complaint	317	11.1%	4,378	12.8%	**-1.7%**
Planned	1,282	44.9%	18,140	53.1%	**-8.2%**
Referral	430	15.1%	4,378	12.8%	**+2.3%**
All Other Types	826	28.9%	7,290	21.3%	**+7.6%**

*Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a). All union differences are statistically significant at ***p≤|0.01|.*

Results are analyzed by four-digit and three-digit North American Industry Classification System (NAICS) codes, which are used by federal agencies to classify businesses in the United States (Census, 2021). The eight construction sectors with at least 1,000 inspections are:

- residential building construction;
- nonresidential building construction, which includes the construction of schools and shopping malls;
- utility system construction, which includes the construction of water lines and power lines;
- highway, street, and bridge construction;
- foundation, structure, and building exterior contractors, such as roofers and siding contractors;
- building equipment contractors, such as electrical and plumbing contractors;
- building finishing contractors, such as painters and flooring contractors; and
- other specialty trade contractors, including those primarily engaged in site preparation activities.

National Results

The data offer direct evidence that union worksites are safer and healthier for construction workers in the United States of America (Figure 2). During the 2,855 visits to union worksites, OSHA investigators found at least one health and safety violation on 1,314 occasions, or 46 percent of the time. Union worksites averaged 1.0 total violations per OSHA inspection. By contrast, visits to nonunion jobsites resulted in at least one health and safety violation 65 percent of the time and an average of 1.6 violations per OSHA inspection. Accordingly, union worksites are 19 percent less likely to have an OSHA violation and have 34 percent fewer violations per inspection. Furthermore, in 2019, a total of 14 percent of workers in the construction industry were represented by unions, including both blue-collar construction workers and white-collar employees such as architects and engineers (BLS, 2021). Even though unions represent 14 percent of workers in the construction industry, union worksites only account for 5 percent of all health and safety violations in construction.

Construction worksites with OSHA violations are more likely to suffer workplace injuries, which can impose costs on businesses and taxpayers. Workplace fatalities, injuries, and illnesses cost the industry billions of dollars per year. Employers that take preventative and proactive steps to lower the risk of injuries and illnesses experience fewer lost-time days off by employees, greater levels of output, and decreased medical

[1] The data does not include information on the number of employees at each location. Firm size is correlated with union density, meaning that unions are more likely to be present in larger companies (Buchmueller et al., 2002).

expenses. Safer workplaces also reduce the burden on state's workers' compensation systems, saving money for both businesses and taxpayers (OSHA, 2021b). By promoting safer worksites, the union construction industry improves productivity and promotes healthier communities.

Figure 2: OSHA Inspections and Violations at U.S. Construction Jobsites by Union Status, 2019

Geography	Union Worksites			Nonunion Worksites			Union Difference	
	Total Count	Violations Rate	Average Violations	Total Count	Violations Rate	Average Violations	Violations Rate	Average Violations
United States	2,855	46.0%	1.04	34,186	64.6%	1.59	**-18.6%**	**-34.4%**

Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a).

Results by Construction Sector

The results are generally consistent when dividing the data into specific construction sectors (Figure 3). Union worksites are less likely to have an OSHA violation in all eight of these major construction sectors (100 percent), ranging from 1 percent less likely in highway, street, and bridge construction to 23 percent less likely for foundation, structure, and building exterior contractors. Union worksites also have fewer violations per inspection in seven of the eight construction sectors (88 percent), ranging from 17 percent fewer violations in nonresidential construction to 47 percent fewer violations for foundation, structure, and building exterior contractors.

Figure 3: OSHA Inspections and Violations at Construction Jobsites by Union Status and Sector, 2019

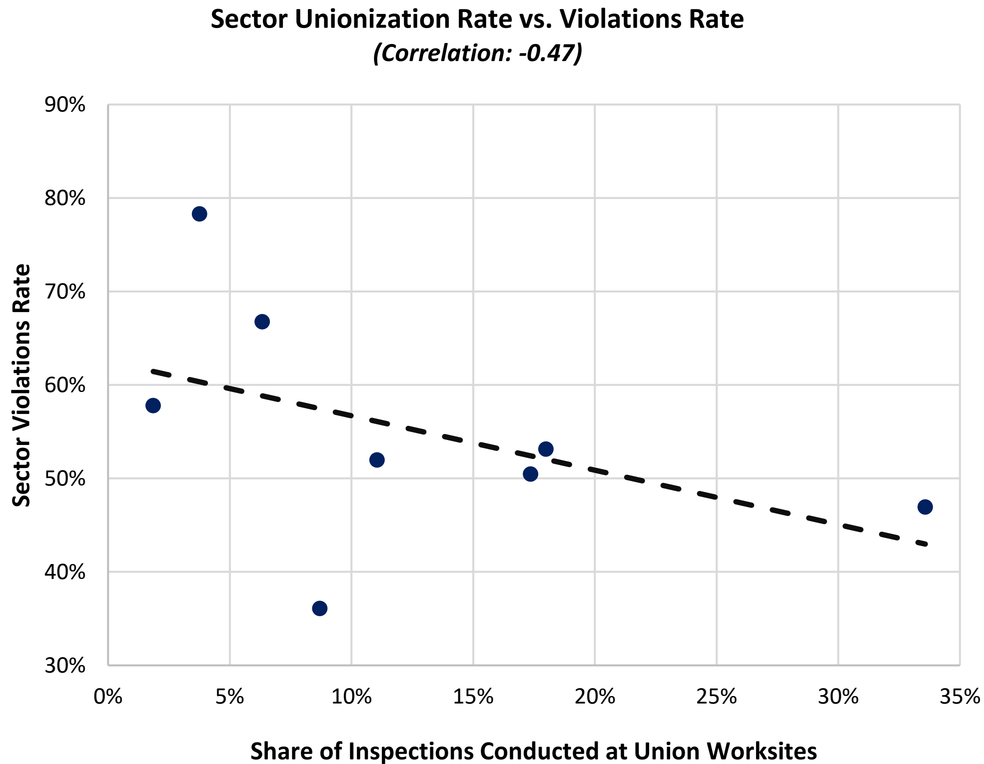
Construction or Contractors	Union Worksites			Nonunion Worksites			Union Difference	
	Total Count	Violations Rate	Average Violations	Total Count	Violations Rate	Average Violations	Violations Rate	Average Violations
Residential Building	83	51.8%	1.16	4,374	57.8%	1.45	**-6.0%**	**-20.2%**
Nonresidential Building	408	35.0%	0.61	4,283	36.2%	0.74	**-1.1%**	**-17.3%**
Utility System	312	51.6%	1.04	1,422	53.4%	1.25	**-1.8%**	**-17.4%**
Highway, Street, and Bridge	464	46.6%	1.86	915	47.2%	1.42	**-0.7%**	**+30.4%**
Foundation, Structure, Exterior	603	55.7%	1.07	15,993	79.2%	2.03	**-23.4%**	**-47.0%**
Building Equipment	544	40.6%	0.71	2,590	52.6%	1.02	**-12.0%**	**-30.9%**
Building Finishing	156	48.1%	1.02	2,307	68.1%	1.62	**-20.0%**	**-36.9%**
Other Specialty Trades	280	41.8%	0.88	2,255	53.3%	1.23	**-11.5%**	**-28.8%**

Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a).

The sectors with the lowest levels of unionization also have the highest rates of health and safety violations (Figure 4). The share of inspections that occur at union worksites is lowest amongst residential building contractors (2 percent), foundation, structure, and building exterior contractors (4 percent), and building finishing contractors (6 percent). The violations rate in these three sectors ranges from 58 percent to 78 percent. On the other hand, the share of inspections that occurred at union worksites is highest in the highway, street, and bridge (34 percent), utility system (18 percent), and building equipment (17 percent) construction sectors. The violations rate in these three sectors ranges from 47 percent to 53 percent. Overall,

the correlation between the sectoral rate of unionization and the sector rate of violations is 0.5, a moderate association that indicates that greater levels of unionization are linked with fewer workplaces with at least one health and safety violation (Figure 4).

Figure 4: Sector Violations Rate by Share of Inspections Conducted at Union Jobsites, 2019

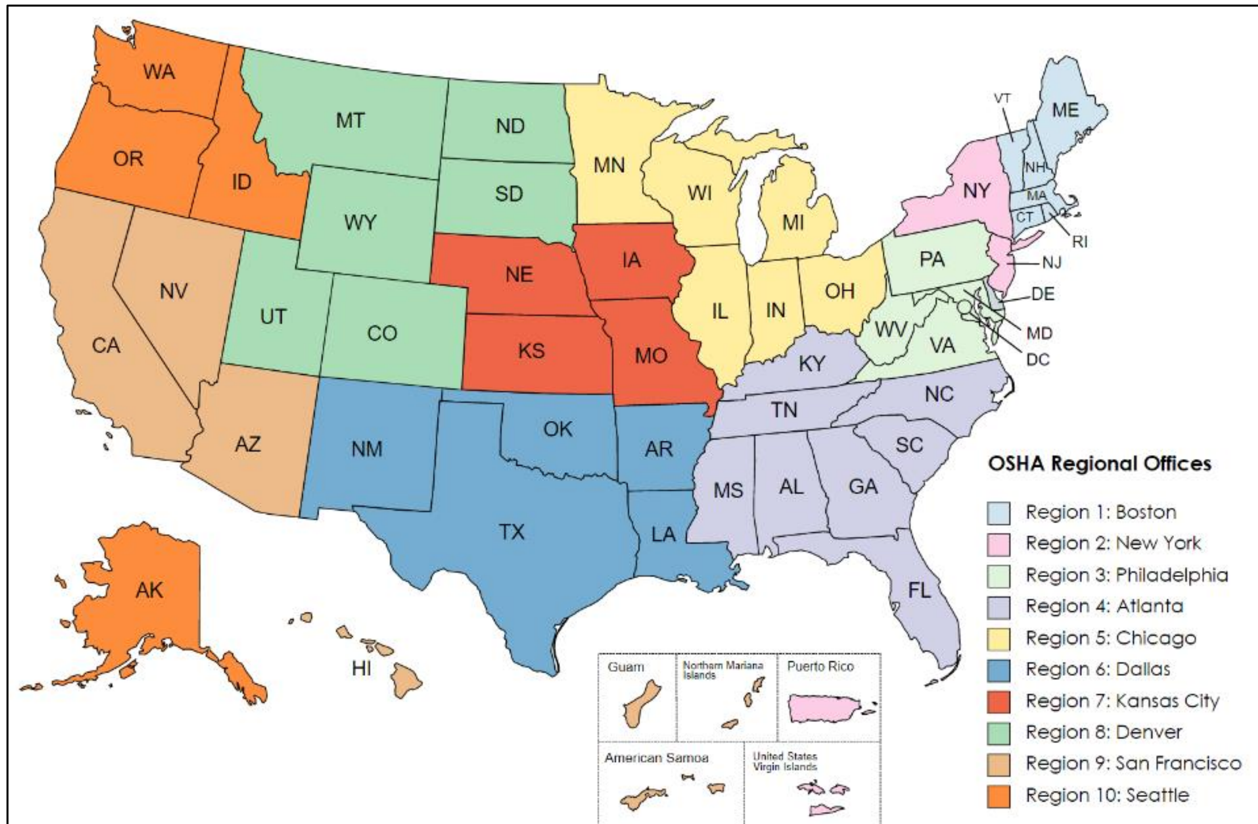


Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a).

Results by Region

The data can be broken down geographically using OSHA's 10 regional offices (Figure 5). In all 10 regions (100 percent), union worksites are less likely to have an OSHA violation, ranging from 4 percent less likely in Region 8—which covers Colorado, Montana, South Dakota, North Dakota, Utah, and Wyoming—to 25 percent less likely in Region 10—which covers Alaska, Idaho, Oregon, and Washington (Figure 5). Similarly, in nine of the 10 regions (90 percent), union worksites have fewer violations per inspection, ranging from 5 percent fewer in Region 8 to 62 percent fewer in Region 3—which covers Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia (Figure 6).

Figure 5: OSHA Regions and Offices by U.S. State



Source: "OSHA Offices by State" (OSHA, 2021c).

Figure 6: OSHA Inspections and Violations at Construction Jobsites by Union Status and Region, 2019

OSHA Geography	Union Worksites			Nonunion Worksites			Union Difference	
	Total Count	Violations Rate	Average Violations	Total Count	Violations Rate	Average Violations	Violations Rate	Average Violations
United States	2,855	46.0%	1.04	34,186	64.6%	1.59	**-18.6%**	**-34.4%**
Region 1	128	48.4%	1.16	1,846	63.1%	1.35	**-14.6%**	**-13.8%**
Region 2	359	49.0%	2.23	2,748	69.5%	1.67	**-20.5%**	**+33.4%**
Region 3	217	41.9%	0.67	4,391	61.4%	1.74	**-19.4%**	**-61.6%**
Region 4	74	51.4%	0.91	6,004	68.0%	1.63	**-16.6%**	**-44.4%**
Region 5	1,175	42.6%	0.76	6,120	62.1%	1.64	**-19.5%**	**-53.6%**
Region 6	26	61.5%	0.96	3,017	68.3%	1.36	**-6.8%**	**-29.2%**
Region 7	116	45.7%	1.04	1,296	64.0%	1.55	**-18.4%**	**-32.8%**
Region 8	15	53.3%	0.87	1,905	57.1%	0.91	**-3.8%**	**-5.2%**
Region 9	459	55.6%	1.16	3,138	65.5%	1.77	**-9.9%**	**-34.6%**
Region 10	286	39.9%	0.77	3,721	64.4%	1.67	**-24.5%**	**-54.0%**

Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a).

Across the board, the share of OSHA violations that occur at union worksites is smaller than the share of construction industry workers who are represented by unions (Figure 7). Nationally, 14 percent of both blue-collar workers and white-collar employees in the construction industry are represented by unions but just 5 percent of all health and safety violations occur at union worksites. In Region 5—which is the most unionized area and includes Illinois, Indiana, Ohio, Michigan, Wisconsin, and Minnesota—24 percent of construction industry workers are represented by unions and union workplaces account for just 8 percent of all health and safety violations. Even in Region 6—which is the least unionized area and includes Texas, Louisiana, Arkansas,

Oklahoma, and New Mexico—unions represent nearly 4 percent of construction industry workers but union workplaces account for less than 1 percent of all health and safety violations (Figure 7).

Figure 7: Shares of Union Construction Workers and of OSHA Violations at Union Jobsites by Region, 2019

OSHA Geography	Construction Industry Workers Represented by Unions, 2019	Share of Inspections at Union Construction Worksites, 2019	Share of Violations at Union Construction Worksites, 2019
United States	13.6%	7.7%	5.2%
Region 1	15.2%	6.5%	5.6%
Region 2	24.1%	11.6%	14.9%
Region 3	11.4%	4.7%	1.9%
Region 4	5.4%	1.2%	0.7%
Region 5	24.1%	16.1%	8.2%
Region 6	3.7%	0.9%	0.6%
Region 7	19.3%	8.2%	5.7%
Region 8	8.0%	0.8%	0.7%
Region 9	18.5%	12.8%	8.7%
Region 10	22.7%	7.1%	3.4%

Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a) and Current Population Survey Outgoing Rotation Groups (CPS-ORG) data for 2019 (EPI, 2021).

Results for Illinois and Neighboring Midwest States

Results are similar when only investigating Illinois and surrounding Midwest states (Figure 8). In 2019, OSHA inspected 1,405 construction worksites in Illinois, including 206 union worksites and 1,199 nonunion worksites. Union worksites experienced at least one violation 60 percent of the time and averaged 1.0 violations per inspection while nonunion worksites were cited with a violation 73 percent of the time and averaged 2.1 violations per inspection. As a result, union worksites are 13 percent less likely to have an OSHA violation and have 52 percent fewer violations per inspection in Illinois.

Figure 8: OSHA Inspections and Violations at Construction Jobsites by Union Status in the Midwest, 2019

Geography	Union Worksites			Nonunion Worksites			Union Difference	
	Total Count	Violations Rate	Average Violations	Total Count	Violations Rate	Average Violations	Violations Rate	Average Violations
Illinois	206	60.2%	1.00	1,199	73.1%	2.09	**-13.0%**	**-52.2%**
Iowa	31	58.1%	0.94	193	49.7%	1.13	**+8.3%**	**-17.6%**
Indiana	134	32.1%	0.78	453	56.7%	2.19	**-24.6%**	**-64.2%**
Kentucky	19	31.6%	0.47	306	49.7%	1.12	**-18.1%**	**-57.9%**
Michigan	463	34.8%	0.71	2,177	49.2%	1.40	**-14.4%**	**-49.1%**
Minnesota	198	47.5%	0.71	573	53.1%	1.18	**-5.6%**	**-39.9%**
Missouri	61	50.8%	1.34	571	71.6%	1.78	**-20.8%**	**-24.5%**
Ohio	108	50.0%	0.68	1,202	77.3%	1.73	**-27.3%**	**-60.9%**
Wisconsin	66	37.9%	0.59	516	70.7%	1.44	**-32.9%**	**-59.0%**

Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a).

Of the nine Midwest states analyzed, union worksites are less likely to have a violation in eight states (89 percent) and have fewer violations in all nine states (100 percent). In particular, Indiana and Wisconsin are states where union construction worksites are significantly safer than nonunion construction worksites. In Indiana, union worksites are 25 percent less likely to have an OSHA violation and have 64 percent fewer violations per inspection. In Wisconsin, union worksites are 33 percent less likely to have an OSHA violation and have 59 percent fewer violations per inspection. Unions have *at least* 50 percent fewer violations per inspection in Illinois, Indiana, Kentucky, Ohio, and Wisconsin (Figure 8).

Furthermore, union construction worksites account for a disproportionately smaller share of all health and safety violations in eight of the nine Midwest states analyzed (89 percent). Only in Iowa is the share of OSHA violations on union worksites (12 percent) higher than the share of construction industry workers represented by unions (10 percent). On the other hand, in Illinois, 34 percent of construction industry workers are represented by unions and just 8 percent of all health and safety violations occur at union worksites.

Figure 9: Shares of Union Construction Workers and of OSHA Violations at Union Jobsites by State, 2019

Geography	Construction Industry Workers Represented by Unions, 2019	Share of Inspections at Union Construction Worksites, 2019	Share of Violations at Union Construction Worksites, 2019
Illinois	34.1%	14.7%	7.6%
Iowa	10.1%	13.8%	11.8%
Indiana	25.5%	22.8%	9.5%
Kentucky	11.8%	5.8%	2.5%
Michigan	24.2%	17.5%	9.7%
Minnesota	20.2%	25.7%	17.2%
Missouri	30.7%	9.7%	7.4%
Ohio	18.1%	8.2%	3.4%
Wisconsin	18.0%	11.3%	5.0%

Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a) and Current Population Survey Outgoing Rotation Groups (CPS-ORG) data for 2019 (EPI, 2021).

Regression Results

Finally, this analysis uses a "regression" to parse out the unique impact of union workplaces. An advanced but common technique, a regression describes "how much" a variable is responsible for a change in the outcome. Consequently, a regression can help determine how much union workplaces reduce health and safety violations in the construction industry. After accounting for major construction sector, whether the inspection was complete or partial, whether the inspection was a complaint or planned or a referral, the region where the inspection was held, and the month of the inspection, union worksites average 0.5 fewer violations (Figure 10). This finding is statistically significant at the 99-percent level of confidence. Since nonunion worksites average 1.6 violations per inspection, this means that union worksites have 31 percent fewer OSHA violations, on average, after controlling for other observable factors.

Figure 10: Regression Impact of Being a Union Worksite on Average Violations Per OSHA Inspection, 2019

Impact on the Number of Violations During an OSHA Inspection	Robust Ordinary Least Squares Regression	
	Average Effect	(Standard Error)
Union Worksite	**-0.496*** **	**(0.038)**
OSHA Region: 2	+0.208***	(0.052)
OSHA Region: 3	+0.192***	(0.045)
OSHA Region: 4	+0.013	(0.041)
OSHA Region: 5	-0.011	(0.042)
OSHA Region: 6	-0.158***	(0.042)
OSHA Region: 7	-0.067	(0.055)
OSHA Region: 8	-0.549***	(0.042)
OSHA Region: 9	+0.546***	(0.049)
OSHA Region: 10	+0.195***	(0.047)
2362: Nonresidential Building	-0.673***	(0.035)
2371: Utility System	-0.125**	(0.051)
2372: Land Subdivision	-0.640**	(0.260)
2373: Highway, Street, and Bridge	+0.299***	(0.082)
2379: Other Heavy and Civil Engineering	+0.190	(0.361)
2381: Foundation, Structure, and Exterior	+0.557***	(0.033)
2382: Building Equipment	-0.438***	(0.039)
2383: Building Finishing	+0.154***	(0.046)
2389: Other Specialty Trade	-0.154***	(0.043)
Scope: Complete	+1.692***	(0.026)
Scope: Partial	+1.452***	(0.017)
Type: Complaint	+0.337***	(0.032)
Type: Planned	+0.448***	(0.023)
Type: Referral	+0.309***	(0.031)
Month: February	+0.051	(0.050)
Month: March	-0.029	(0.046)
Month: April	-0.016	(0.045)
Month: May	-0.032	(0.047)
Month: June	-0.005	(0.045)
Month: July	-0.030	(0.045)
Month: August	-0.039	(0.045)
Month: September	-0.111**	(0.046)
Month: October	-0.010	(0.046)
Month: November	-0.000	(0.046)
Month: December	-0.049	(0.061)
Constant Term	-0.358***	(0.056)

*Source: Authors' analysis of Occupational Safety and Health Administration inspection data at establishments with construction industry NAICS codes (230000 to 239999) in 2019 (OSHA, 2021a). ***p≤|0.01|; **p≤|0.05|; *p≤|0.10|. N= 37,041. R^2= 0.12.*

Conclusion and Potential Policy Options

Across the United States, union construction worksites are safer than nonunion construction worksites. This is in part because the union construction industry trains its workforce in rigorous joint labor-management apprenticeship programs that prioritize safety and productivity. Not only does the union construction industry attract, develop, and retain skilled workers who are productive and safe, its workers are more aware of and more empowered to exercise their labor rights to promote safer workplaces. The result is that union jobsites are less likely to incur health and safety violations.

Steps could be taken to promote unionization in sectors and states where no such policies currently exist. This includes passing, strengthening, or expanding state *prevailing wage laws*, which are minimum wages for

different types of skilled construction work on taxpayer-funded and ratepayer-funded construction projects which have been found to boost apprenticeship training, boost construction worker earnings, and increase the chances that work is performed by in-state contractors (Bilginsoy, 2005; Philips, 2014; Manzo & Duncan, 2018). Using more *project labor agreements* (PLAs), which are local pre-hire agreements covering all crafts on large, complex construction projects that establish comprehensive employment terms and safe working conditions, would also promote access to skilled labor and uniform work rules that improve efficiency and safety (Kotler, 2009). Enacting *responsible bidder provisions* based on objective criteria and verifiable standards for contractors bidding on infrastructure projects can not only serve as an "insurance policy" for project owners and taxpayers, but also support apprenticeship training programs (Waddoups & May, 2014; Sonn & Gebreselassie, 2010). Finally, repealing so-called "right-to-work" laws which weaken unions and produce lower wages for workers, fewer active apprentices and less-productive workers for contractors, and more on-the-job fatalities and lower life expectancies would also tend to improve safety at construction worksites (Manzo & Bruno, 2021).

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LIUNA'S RESPONSE TO STAFF'S FIRST SET OF DATA REQUESTS

Attachment Staff 1-4(b)

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The Effect of Prevailing Wage Law Repeals and Enactments on Injuries and Disabilities in the Construction Industry

Zhi Li[1], Chimedlkham Zorigtbaatar[1], Gabriel Pleités[1], Ari Fenn[1], and Peter Philips[1]

Abstract

State prevailing wage law repeals have been shown to lower wages and benefits—including benefits providing safety training and associated with worker retention in construction. This study tests whether prevailing wage repeals affect construction injury rates and/or the prevalence of disabilities among construction workers. Controlling for time trends in injuries and disabilities, differences between construction industry subsectors, the business cycle, and time-invariant differences between states, we find that repealing state prevailing wage laws increase construction injury rates across various types of injuries from 11.6% to 13.1% as the seriousness of injuries increases. Disabilities increase by 7.5% to 8.2% depending on the model specification. Conjoining an analysis of the effects of prevailing wage law repeals on injury rates with disability rates in construction provides alternative measures of the effects of prevailing wage laws on construction workplace safety, which addresses a well-known problem of underreporting construction injuries.

Keywords

prevailing wage, repeal, injuries, disabilities, construction

Introduction

Prevailing wage laws regulate the payment of wages and benefits on public works. Prevailing wage regulations set wages and, in most cases, benefits by blue-collar

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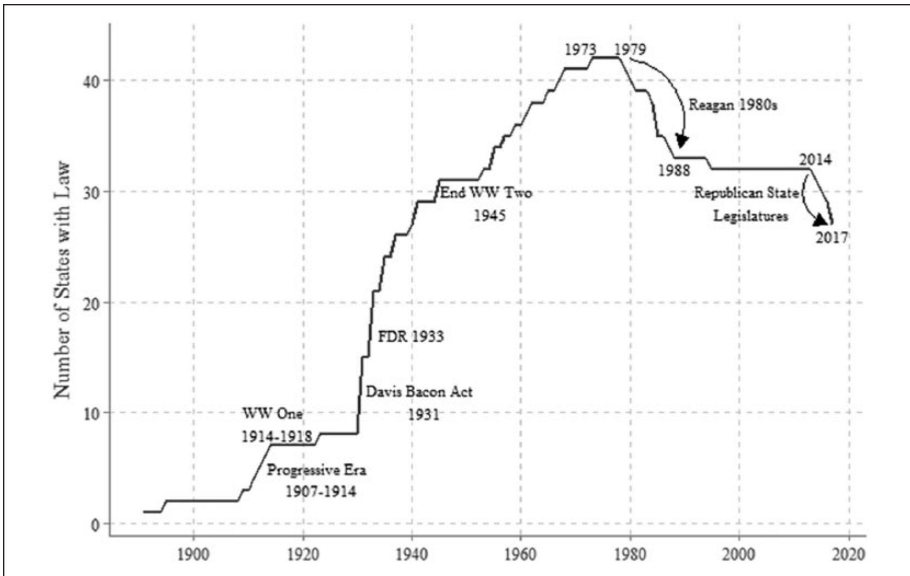

Figure 1. Number of states with prevailing wage laws, 1891 to 2017.
Note. WW = World War; FDR = Franklin D. Roosevelt.

construction craft for journey workers and apprentices. Federal projects are governed by the Davis Bacon Act (1931), while currently 27 states plus the District of Columbia have prevailing wage laws regulating state and local government projects (U.S. Department of Labor, 2018). The first state law was enacted in Kansas in 1891; eight states had adopted prevailing wage laws prior to the Great Depression. By 1945, 30 states and the District of Columbia had prevailing wage laws, and at the peak in 1973, all but nine states primarily in the South and upper plains states had prevailing wage laws (Figure 1). Starting in 1979 and through the Reagan presidency, nine states repealed their prevailing wage laws. Oklahoma's Supreme Court invalidated that state's law in 1995 while Vermont enacted a prevailing wage law in 1998 (Philips, Mangum, Waitzman, & Yeagle, 1995). Since the increased Republican control of various state legislatures after 2010, five states have repealed their prevailing wage laws. These legal changes have kept prevailing wage laws at the forefront of public works construction policy debates for several decades.[1]

Research has shown that the repeal of state prevailing wage laws leads to lower construction wages in those repeal states (Belman & Voos, 1995; Clark, 2005; Harris, Mukhopadhyay, & Wiseman, 2017; Kelsay, 2015; Kessler & Katz, 2001; Manzo, Bruno, & Littlehale, 2014; Petersen, 2000; Philips, 1998; Philips et al., 1995; Price, 2005) and reduces voluntary benefits (Fenn, Li, Pleites, Zorigtbaatar, & Philips, 2018). Voluntary benefits comprise employer-provided health insurance, employer contributions to pensions, holiday/vacation pay, and other benefits including collectively bargained contributions to apprenticeship training (Bilginsoy, 2003), OSHA10, OSHA30, and other training programs.[2]

But, the loss of voluntary benefits can also lead to a loss of industry-specific experience in construction. Previous research (Andrietti & Hildebrand, 2016; Dorsey, 1995; Gustman & Steinmeier, 1993; Kim & Philips, 2010) has shown that decreases in employer-provided health insurance, and a fortiori, portable, union/multi-employer -provided portable health insurance, decreases worker attachment to the construction industry with a consequent loss of construction industry–specific worker experience. Apprenticeship training, safety training, and the accumulation of industry-specific human capital through work experience are channels through which construction worksites become safer (X. Dong, Entzel, Men, Chowdhury, & Schneider, 2004; Sokas, Jorgensen, Nickels, Gao, & Gittleman, 2009).

The potential loss of safety training associated with the repeal of prevailing wage laws has led others to propose a link between prevailing wage repeals and construction injury rates (Belman & Voos, 1995; Kelsay, 2015; Philips, 1998; Philips et al., 1995). Azari-Rad (2005) was the first study to systematically estimate this potential effect finding that the presence of prevailing wage laws reduces total construction injuries by 8.25%. We extend Azari-Rad's 1976 to 1999 data by 17 years finding comparable effects on injuries from repealing prevailing wage laws. In addition, this study is the first to estimate a link between prevailing wage law repeals and the prevalence of disabilities in construction.

Data

Injuries

The Bureau of Labor Statistics (BLS) provides annual injury rate data for construction by industry subsector, state, and year over the s 1976 to 1995 in mimeo and 1996 to 2016 digitally (U.S. BLS, 2018). We have selected seven construction subindustries that have remained definitionally similar when the BLS switched from Standard Industry Codes (SIC) to the North American Industry Code System (NAICS) in 2003. Our subindustries include residential building construction (NAICS 2361), masonry contractors (NAICS 23814), roofing contractors (NAICS 23816), electrical contractors (NAICS 23821), plumbing and HVAC contractors (NAICS 23822), painting and wall covering contractors (NAICS 23832), and carpentry contractors (NAICS 23835).

For each of these industries, the BLS reports a total injury rate and component rates based on increasing injury severity. We analyze (a) total injury rates; (b) injuries that resulted in no lost work; (c) days away, restricted or job transfer (DART); and (d) injuries resulting in lost work-days when an injury compelled the worker to be absent from work for one or more days (a subset of DART injuries).

Injury rates in construction tend to be counter cyclical (X. S. Dong, Wang, & Herleikson, 2010). As the economy turns down and contractors shed workers, contractors tend to retain their more valued employees who, overall, are more experienced, better trained, and less likely to become injured. Furthermore, as work becomes scarce and the press to finish projects relaxes, the pace of work slows making construction worksites safer. In addition, during periods of high unemployment, workers

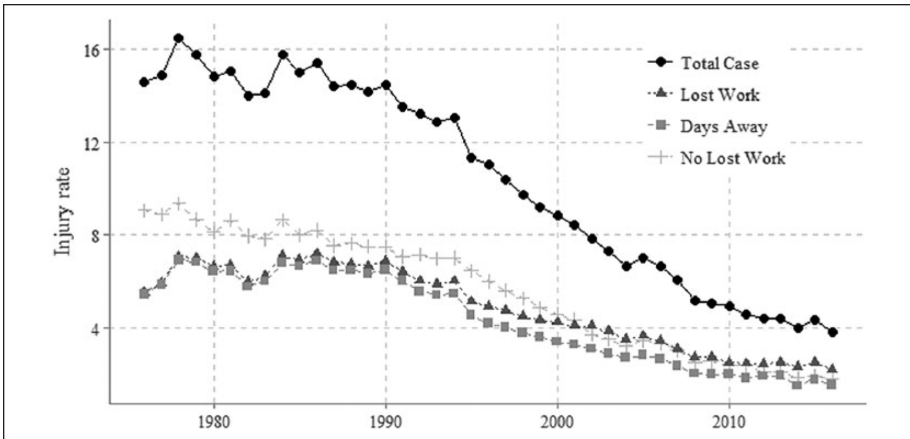

Figure 2. Trends in injury rates, 1976 to 2016.

are sometimes reluctant to report injuries that might risk dismissal. To control for these effects in our regression models, we use the state unemployment rate to capture the construction business cycle.

It is well documented that overall, in the United States, workplace injuries have declined over time (U.S. BLS, 2017) subsequent to the enactment of OSHA regulations and coincident advances in knowledge regarding workplace safety technologies and management (Conway & Svenson, 1998; Friedman & Forst, 2007). This is also true in construction (National Research Council, 2009). Figure 2 shows the long-term decline in construction injuries by injury type. Much of this decline in reported injuries is real, associated with the establishment of OSHA in 1970 and the rise in medical costs since the early 1970 driving up worker compensation premiums and incentivizing safety (Lengagne, 2016). However, some of this decline may be due to injury costs incentivizing the underreporting of workplace injuries.

Research shows that injuries are substantially underreported in construction (X. S. Dong et al., 2011). Workers may fail to report their injuries because they perceive the injury to be minor, an expected outcome of construction work, or the worker may fear of the consequences that may ensue from reporting an injury (Taylor Moore, Cigularov, Sampson, Rosecrance, & Chen, 2013). Reasons employers fail to report a workplace injury include a range of record keeping problems and failures, the view that the injury was not work related, and/or a willful failure to report (Rappin, Wuellner, & Bonauto, 2016). A study of union carpenter apprentices found that safety programs that incentivize safety and/or penalize injury incidences result in workers underreporting their injuries (Lipscomb, Nolan, Patterson, Sticca, & Myers, 2013). State variation in the generosity of worker compensation insurance programs may affect the behavior of both workers and employers. Longer waiting periods before receiving worker compensation benefits may discourage, and better benefits may encourage, workers in reporting injuries. Higher worker compensation premiums may incentivize employers

to suppress injury reporting, but higher premiums may also encourage safety innovations at the jobsite (Mendeloff & Burns, 2013). Thus, there is both noise and a downward bias in the measurement of workplace injuries.

However, for our purposes, once controlling for the overall downward trend in reported injuries, these reporting biases may not be problematic if the underreporting of injuries is not correlated with the passage or repeal of prevailing wage laws. In this case, underreporting simply adds noise to the data that may deter finding underlying statistically significant relationships.

It is possible that injury underreporting is correlated with an enactment or repeal of prevailing wage laws. It may be that repealing prevailing wage laws encourages injury underreporting by reducing the prevalence of collective bargaining and worker contractual protections. Or it may be that repealing prevailing wage laws by lowering wages reduces the costs of worker compensation and reduces contractor incentives to underreport. One of the advantages of examining the relationship between self-reported disabilities and prevailing wage repeals is that this provides an alternative test of the effects of prevailing wages on construction worksite safety relatively independent from the BLS injury-underreporting puzzle.

Disabilities

The U.S. Census provides decennial self-reported responses to questions regarding disability from 1970 to 2000 and annual disability data from the American Communities Survey thereafter (Ruggles, Genadek, Goeken, Grover, & Sobek, 2017). The disability question changes over time with the primary survey change occurring in 2000. This basic change was an increase in the types of disabilities the survey suggested that the individual might have. This raises the possibility that more disabilities might be reported due to more possibilities being identified in the survey question. Therefore, in our regression analysis, we enter a dummy variable equaling one for all years from 2000 onward. While our injury data are annual, our disability data are decennial until 2000. So, for the sake of comparability, we limit our post-2000 disability data to the years 2010 and 2016.

Workers in the construction industry that report a disability need not have acquired that disability while working construction. However, because construction is a physically demanding industry, it is unlikely that workers who have become disabled elsewhere are subsequently attracted to construction work. Presumably, most disabled construction workers became disabled while participating in the construction industry, but their disability might not have come from the construction work itself.

We calculate a disability rate by counting within each state for each year the number of construction workers reporting any kind of disability and dividing by the number of persons in the construction industry (in units of 100 workers) for that state and year. This calculation differs from the BLS injury rate which is injuries per 100 full-time equivalent workers—that is, per 100 units of 2,080 hr worked. So our injury rate is benchmarked against hours worked while our disability rate is benchmarked against a headcount.

The same channels that link injuries to the business cycle may also link unemployment to reported disabilities (Autor & Duggan, 2006). Fewer injuries in a year of high unemployment may mean fewer disabilities occurring during that year. However, in contrast to injuries which are an occurrence within a year, disabilities in our data are a health status that may last for multiple years and not first occur in the census year in which the disability is reported. Furthermore, high rates of unemployment may incentivize workers to claim disability benefits. So, the relationship between unemployment and reported disabilities may be either positive or negative. And the connection between past disabilities and the contemporary unemployment rate may be attenuated leading to no statistically significant relationship. Consequently, we provide two disability models—one including the state unemployment rate (U.S. BLS) and one excluding unemployment.

Self-reported disabilities to the U.S. Census Bureau are not caught up in the web of incentives associated with worker compensation premia and worksite safety programs. Thus, some of the puzzles associated with interpreting BLS injury rate data are less present in the interpretation of disability data. It is possible that more generous worker compensation programs may encourage more worker disability claims (Meyer, Viscusi, & Durbin, 1995). So there remains the possibility that the repeals of prevailing wage laws are positively correlated with increasing the generosity of worker compensation benefits leading to an artificial increase in disabilities. However, the politics of prevailing wage repeals are not typically associated with a movement to improve worker compensation benefits making this potential measurement problem less likely. For instance, Indiana, which repealed its prevailing wage law in 2015, implemented worker compensation cost containment measures in 2014 (Jones, 2014). According to ProPublica, of the seven states that repealed their prevailing wage laws between 2013 and 2018 (Arkansas, Indiana, Kentucky, Michigan, Tennessee—building construction but not roads, West Virginia, Wisconsin), five had lower worker compensation benefits in 2014 relative to the previous decade, one remained the same and one raised their benefits. There is little evidence that prevailing wage repeals go hand in hand with improved worker compensation benefits. Thus, a test of the relationship between prevailing wage repeals and the prevalence of disabilities in construction probably provides results that are independent of concerns regarding reporting error (Qui & Grabell, 2017; U.S. Department of Labor, 2018).

Assuming a linkage between workplace injuries and disabilities, and assuming that the decline in reported construction injuries is real and not simply an artifact of incentives to underreport injuries, then we would expect a consequent decline in self-reported disabilities among construction workers. We therefore enter a time trend into both our injury and disability models hypothesizing that, all other things being equal, if actual injury rates trend downward in construction, then disabilities will follow suit.

State Prevailing Wage Regulations

Between 1970 and 2016, there have been 13 state prevailing wage law repeals, nine between 1979 and 1988—primarily in Southern, Plains, and Mountain states—and four from 1995 to 2016 primarily in the upper South and Midwest. There have been

Table 1. Descriptive Statistics.

Injury type/disability	Total injury	No lost work	Lost work	Days away	Disability
Cases/100 people	10.79 (5.86)	5.94 (3.59)	5.05 (2.92)	4.58 (2.93)	7.29 (2.28)
Repeal	0.14	0.14	0.14	0.14	0.15
Enact	0.004	0.004	0.004	0.004	0.026
Unemployment rate	6.11 (2.03)	6.09 (2.03)	6.11 (2.03)	6.1 (2.02)	5.92 (2.22)
n	5,920	5,683	5,914	5,784	306

Note. No state-level unemployment rate for 1970 reduces the disability sample when unemployment is included.

two enactments: Minnesota in 1973 and Vermont in 1998 (Philips et al., 1995; U.S. Department of Labor, 2018). Two states repealed their laws in 2017 (Wisconsin and Kentucky) and 2018 (Michigan), outside our period of analysis.

Descriptive Statistics

Table 1 shows injuries are lower as the measure of injury severity increases. The disability rate is not directly comparable to the injury rates because the measure of exposure to possible injuries is employment and not hours worked. While 14% of the injury observations entail repeals, only 0.4% involve enactments; in the case of disabilities that are based on decennial data, 15% of observations entail repeals and 2.6% enactments. The average unemployment rate is about 6.1% but varies slightly with the varying sample sizes for different injury types. The injury sample sizes vary slightly with different measures of severity due to some states and industry subsectors reporting only aggregate injuries. The sample for disabilities is about 10% of the size of the injury samples because the disability data are decennial and for the entire construction industry while the annual injury data include construction subsectors.

Figure 3 illustrates our test strategy by showing the average total injury rates for electrical and plumbing contractors in Kansas from 1976 to 1986 prior to the repeal of Kansas's prevailing wage law in 1987 comparing it to the average total injury rates from 1987 to 2016 after Kansas repealed its law. Figure 3 benchmarks this change by showing the average total injury rates for the adjacent states of Iowa (which never had a prevailing wage law) and Missouri (which during our time period always had a prevailing wage law). While these two states did not change their policies over our entire period of analysis, we nonetheless break their average injury rates into the time before and after Kansas repealed its law. In all three states for both electricians and plumbers, total injury rates fell, but the fall in Kansas was smaller than in either of the two states that maintained their prevailing wage policy during this period. This suggests that repealing Kansas's prevailing wage law slowed the decline in their total injury rate compared with adjoining states. Our injury models test whether this pattern for three states is generalizable across all states controlling

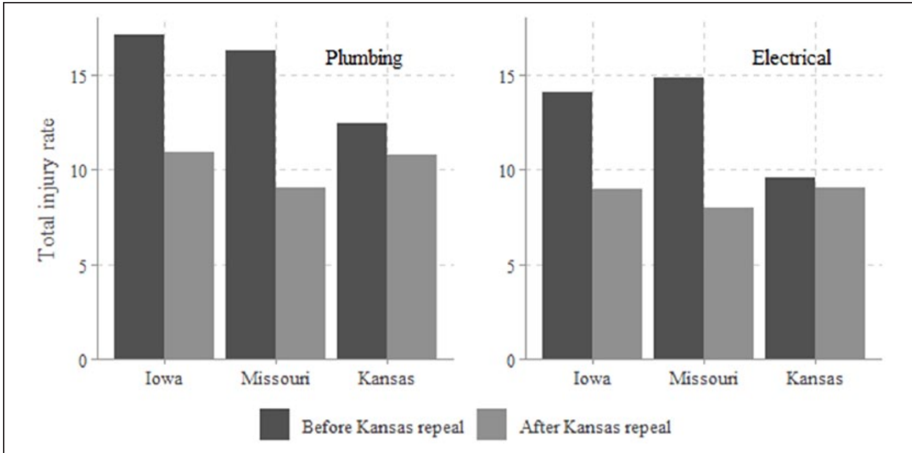

Figure 3. Average total injury rate for electricians and plumbers before and after Kansas repealed its prevailing wage law in 1987.
Note. This graph compares average total injury rate for plumbing and electrical contractors in Iowa, Missouri, and Kansas before and after Kansas repealed the law. Kansas repealed the law in the year 1987.

for the unemployment rate, differences between construction industry subsectors, and the general decline in reported injuries. In our models, we select three samples: all states, repeal and always-had-law states, and repeal and never-had-law states. This is analogous in Table 3 to comparing Kansas to both states, then Kansas to Missouri, then Kansas to Iowa.

In a similar manner, Figure 4 looks at total disability rates before and after repeal. Because the disability data are decennial, our example test comprises the six states that repealed their prevailing wage laws after 1980 and before 1990. For these states (Arizona, Colorado, Idaho, Kansas, New Hampshire, and Utah), we report average disability rates before repeals (1970 and 1980) and after repeals (decennially 1990 to 2010 plus 2016). For comparison, we present the average disability rates for those states that never had a prevailing wage law throughout our period and states that always had a prevailing wage law over our period. In Figure 4, we exclude states that repealed their law prior to 1981 or after 1989. While disability rates fell for states with unchanging legal regimes, disability rates for construction workers in states that repealed their prevailing wage laws rose. Our disability model tests whether this pattern holds once all states are included and time trends and state unemployment rates are controlled for.

Model and Results

Our data are a long panel data set. Following Fenn et al. (2018), we use Feasible Generalized Least Squares (FGLS) estimation which allows the use of first-order autoregressive processes and permits the error terms in the model to be heteroskedastic

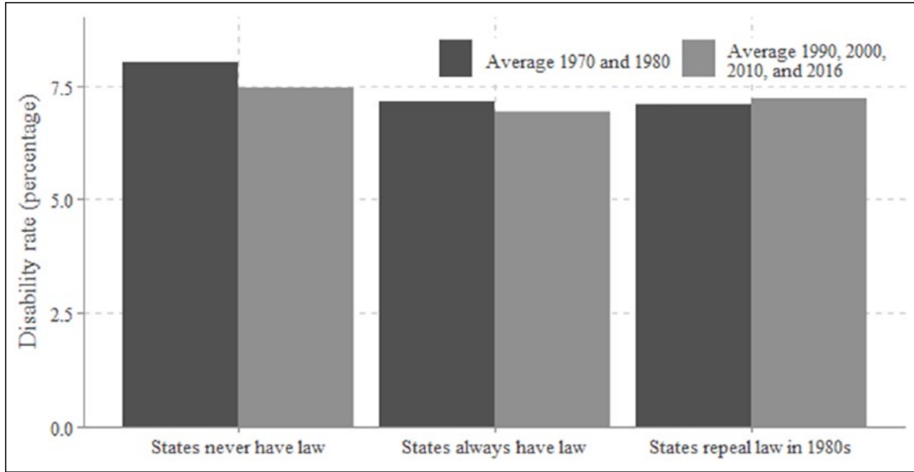

Figure 4. Average disability rates for states that always had, never had, and repealed their prevailing wage laws before and after the repeals.
Note. This graph compares the average disability rate of three groups of states. The three groups include states who never have the law during the whole period, states who always have the law during the whole period, and the states who repeal the law in the 1980s, which include Colorado, Idaho, Kansas, Louisiana, New Hampshire, and Utah.

(Cameron & Trivedi, 2010). More specifically, this method produces panel and cross-section corrected standard errors specifying the error terms to be independent with a variance of $E\left(u_{it}^2\right) = \sigma_i^2$ that can be different for each state over time. As error terms are possibly correlated and observations could very well depend on previous periods in a longitudinal data, the use of FGLS estimations with heteroskedastic disturbances will address these distributional issues of cross-sectional correlations and variances as well as time series autocorrelations.

We estimate the effect of prevailing wage law repeals on injury rates by state and year for seven construction industry subsectors, the prevalence of disabilities among all construction employees in the construction industry by state and year controlling for long-term trends in these health measures, differences among states using state dummy variables, long-term trends in injuries and disabilities using a year trend, an indicator variable marking when the Census expanded its list of disability questions, and a dummy variable indicating if and when a state repealed its prevailing wage law.

The equation for the FGLS is as follows:

$$Y_{it} = \alpha + B_1 X_{it}^1 + \ldots + B_k X_{it}^k + u_{it},$$

where Y_{it} is the injury or disability rate in a construction subindustry in the case of injuries and overall construction in the case of disabilities in a state i and year t; $X_{it}^1 =$ 1 in a state i and year t if that state i had currently or previously repealed its prevailing

wage law, otherwise zero; $X_{it}^{2} = 1$ in a state and year if state i had currently or previously enacted a prevailing wage law, otherwise zero; X_{it}^{3} = state i overall unemployment rate in year t; $X_{it}^{4} = 1$ in the disability model for all states and years after 1999 when the Census expanded its list of disability questions; X_{it}^{5} = indicator of year t; and u_{it} is an error term for state i in time t.

Following the literature on the effect of prevailing wage repeals on blue-collar construction worker income, we include in all our models, but do not report, time-invariant state dummy variables to capture relevant differences in state construction industries that are unchanging across the 1972 to 2016 period of analysis.

Results

Repeals. Table 2 shows the results for our models predicting injuries and disabilities tested against our full sample of years and states. Table 3 shows the same models but limits the sample to states that kept their prevailing wage laws and states that repealed their laws. Table 4 shows the injury models tested against a sample of states that never had the law and repeal states. Table 4 omits the disability models because in this subsample, the disability observations are too few.

All the injury models include a time trend, dummy variables for industry subsectors, unreported state dummy variables and the state unemployment rates. The disability models are for construction as a whole with no subindustries, have unreported state dummy variables, include a time trend, and, in one model, include and, in one model, exclude state unemployment rates. When included, across all models, the state unemployment rates are always negatively related to injuries and disabilities. These results are statistically significant and substantial. A doubling of the unemployment rate leads to a roughly 25% decline in injury and disability rates. Both injury and disability rates decline over time at rates of 2% to 5% per year.

The time trends in the injury models are all negative and statistically significant, as one would expect from examining Figure 2. However, if all the decline in reported injuries in Figure 2 were artifacts of increased incentives overtime to underreport injuries (say due to rising worker compensation costs), then there would be no expectation that construction worker disabilities would trend downward over time. In both the disability models, we, in fact, find statistically significant negative time trends in reported disabilities. These downward trends of about 2% per year are roughly similar to the 4% per year decline in reported injury rates. This suggests that despite well-known underreporting issues and moral hazard incentives in injury rates, the downward trend in construction injuries over decades is real and not an artifact of reporting problems.

Table 5 provides a summary of results for injury rates while comparing our results to Azari-Rad[3] (Azari-Rad, 2005). In all of our samples, the increase of injury rates associated with prevailing wage repeals rises with the severity of the injury measure. Azari-Rad finds this as well suggesting that repeals increase the overall danger of construction work as well as increasing injury rates.

Table 2. FGLS Regression Models Predicting Injury and Disability Rates (Full Sample).

	(1)	(2)	(3)	(4)	(5)	(6)
	Total injury	No lost work related injury	Lost work related injury	Injury results in absence from work	Disability	Disability
Repeal	0.102***	0.110***	0.123***	0.123***	0.0722***	0.0789***
	(3.04)	(2.80)	(3.31)	(3.06)	(2.82)	(4.18)
Enact	−0.163	−0.0983	−0.113	−0.303**	0.0841	−0.0267
	(−1.48)	(−0.70)	(−0.95)	(−2.18)	(0.95)	(−0.38)
Year	−0.0413***	−0.0486***	−0.0339***	−0.0442***	−0.0259***	−0.0226***
	(−71.64)	(−69.58)	(−55.17)	(−63.10)	(−27.80)	(−27.00)
Unemployment	−0.250***	−0.266***	−0.246***	−0.241***		−0.229***
	(−13.33)	(−11.58)	(−11.72)	(−10.42)		(−13.69)
Masonry	0.279***	0.260***	0.347***	0.353***		
	(12.26)	(9.88)	(14.37)	(13.42)		
Roofing	0.521***	0.442***	0.600***	0.606***		
	(20.81)	(14.53)	(22.71)	(21.60)		
Electrical	0.106***	0.299***	−0.117***	−0.164***		
	(5.13)	(12.44)	(−5.20)	(−6.50)		
Plumbing	0.338***	0.526***	0.151***	0.116***		
	(17.40)	(22.94)	(7.31)	(5.10)		
Painting and wall	−0.158***	−0.174***	−0.135***	−0.0624		
	(−4.55)	(−4.32)	(−3.63)	(−1.62)		
Finish carpentry	0.309***	0.333***	0.314***	0.355***		
	(9.75)	(9.43)	(9.71)	(10.04)		
Data change					0.897***	0.823***
					(30.96)	(38.05)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	84.73***	98.49***	69.29***	89.61***	53.18***	47.14***
	(73.56)	(70.71)	(56.41)	(64.02)	(28.94)	(28.54)
n	5,901	5,663	5,895	5,763	306	255
Wald χ^2	8,391	7,399	5,564	6,528	1,622	3,089
$p > \chi^2$	0	0	0	0	0	0

Note. t statistics in parentheses. In this set of regression, we include all states. All the dependent variables and unemployment rate are the logged value. Injury data are annual from 1976 to 2016. Disability data are 1970, 1980, 1990, 2000, 2010, and 2016, but in regression (6), because of the absence of state-level unemployment rates, 1970 is omitted. Minnesota enacted the law in 1973, so in regression (6), this state does not have an enact effect. Florida repealed the law in 1979, so in regression (6), this state does not have a repeal effect. Disability measures the number of persons who report having any kind of disability among 100 persons in the construction industry. Data change refers to 2000 change in the Census American Community Survey disability questions. The omitted occupation is workers employed by residential building contractors. FGLS = Feasible Generalized Least Squares.
*$p < .1$. **$p < .05$. ***$p < .01$.

Results for our full sample and the sample that excludes never-had states are similar to each other and modestly higher than Azari-Rad's estimated effects. However, our sample that excludes always-had states using never-had states as the lone benchmark yields substantially higher repeal effects on injuries.

This is so for two related reasons. In comparison with the sample with always-had-law states as the benchmark (Table 3), the results for all injury rate models using the sample with never-had states as the benchmark (Table 4) systematically have larger constants and more steeply declining injury rate time trends. This means that the never-had states begin

Table 3. FGLS Regression Models Predicting Injury and Disability Rates (Sample Excludes States That Never Had the Law).

	(1)	(2)	(3)	(4)	(5)	(6)
	Total injury	No lost work related injury	Lost work related injury	Injury results in absence from work	Disability	Disability
Repeal	0.0926***	0.0939**	0.120***	0.118***	0.0659**	0.0747***
	(2.76)	(2.37)	(3.21)	(2.92)	(2.50)	(3.91)
Year	−0.0406***	−0.0472***	−0.0339***	−0.0440***	−0.0251***	−0.0221***
	(−65.51)	(−62.39)	(−50.93)	(−57.51)	(−23.78)	(−23.81)
Unemployment	−0.258***	−0.275***	−0.266***	−0.253***		−0.232***
	(−12.75)	(−11.03)	(−11.65)	(−9.99)		(−11.85)
Masonry	0.278***	0.269***	0.352***	0.364***		
	(11.43)	(9.60)	(13.57)	(12.90)		
Roofing	0.523***	0.429***	0.618***	0.615***		
	(19.37)	(12.87)	(21.56)	(19.91)		
Electrical	0.0706***	0.275***	−0.150***	−0.195***		
	(3.19)	(10.67)	(−6.16)	(−7.15)		
Plumbing	0.308***	0.495***	0.131***	0.101***		
	(14.81)	(20.07)	(5.84)	(4.05)		
Painting and wall	−0.163***	−0.173***	−0.140***	−0.0592		
	(−4.43)	(−4.11)	(−3.48)	(−1.44)		
Finish carpentry	0.315***	0.341***	0.330***	0.382***		
	(9.19)	(8.76)	(9.20)	(9.59)		
Data change					0.878***	0.813***
					(26.95)	(34.44)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	83.24***	95.85***	69.30***	89.18***	51.71***	46.20***
	(67.31)	(63.43)	(52.08)	(58.35)	(24.79)	(25.19)
n	4,945	4,736	4,944	4,828	246	205
Wald χ^2	7,957	6,266	4,856	5,512	1,282	2,505
$p > \chi^2$	0	0	0	0	0	0

Note. t statistics in parentheses. In this set of models, the states which repealed their law during the regression period and the states that always have the law are included. For model (6), there is no repeal effect for Florida because it repealed its law in 1979 (see also notes in Table 2). FGLS = Feasible Generalized Least Squares.
$^{*}p < .1$. $^{**}p < .05$. $^{***}p < .01$.

with higher injury rates but these are declining faster than the always-had states which begin with lower injury rates, but these rates decline more slowly. Thus, the repeal effect on injuries appears sharper when measured against the set of never-had states experiencing faster declines from higher initial rate levels.

Underreporting could confound our injury results if the repeal of prevailing wage laws discourages under-reporting. However, to the extent that repealing prevailing wage laws reduces the practice of collective bargaining, repeals are likely to lead to greater underreporting of injuries. The loss of union protections is likely to discourage workers from reporting injuries while encouraging contractors to ignore or informally

Table 4. FGLS Regression Models Predicting Injury and Disability Rates (Sample Excludes States That Always Had the Law).

	(1) Total injury	(2) No lost work related injury	(3) Lost work related injury	(4) Injury results in absence from work
Repeal	0.158***	0.194***	0.169***	0.194***
	(4.49)	(4.70)	(4.37)	(4.63)
Year	−0.0449***	−0.0543***	−0.0362***	−0.0486***
	(−46.49)	(−47.65)	(−35.37)	(−41.29)
Unemployment	−0.174***	−0.184***	−0.156***	−0.144***
	(−6.02)	(−5.30)	(−4.81)	(−4.04)
Masonry	0.317***	0.292***	0.384***	0.364***
	(8.98)	(7.19)	(10.42)	(8.72)
Roofing	0.548***	0.505***	0.647***	0.664***
	(14.96)	(11.43)	(17.06)	(16.47)
Electrical	0.232***	0.410***	0.0207	−0.0781*
	(7.09)	(10.86)	(0.59)	(−1.95)
Plumbing	0.419***	0.607***	0.250***	0.196***
	(13.34)	(16.63)	(7.91)	(5.49)
Painting and wall	−0.0816	−0.0903	−0.0338	0.0228
	(−1.62)	(−1.61)	(−0.60)	(0.38)
Finish carpentry	0.384***	0.349***	0.426***	0.447***
	(7.64)	(6.35)	(8.58)	(8.29)
State dummies	Yes	Yes	Yes	Yes
Constant	91.56***	109.6***	73.40***	98.10***
	(47.62)	(48.34)	(36.05)	(41.81)
n	2,358	2,285	2,357	2,303
Wald χ^2	3,548	3,493	2,316	2,838
$p > \chi^2$	0	0	0	0

Note. t statistics in parentheses. In this set of regressions, only the states which repealed the law during the regression period and the states that never had the law are included. Disability regressions excluded due to limited sample size. (see also notes in Table 2). FGLS = Feasible Generalized Least Squares.
$^{*}p < .1$. $^{**}p < .05$. $^{***}p < .01$.

Table 5. Summary Injury Results and Comparison With Azari-Rad.

	Total	No lost work	Total lost work	Days away from work
Total sample	10.7	11.6	13.1	13.1
Excludes never-had states	9.7	9.8	12.7	12.5
Excludes always-had states	17.1	21.4	18.4	21.4
Azari-Rad (1976 to 1999 data)	8.3	7.1	9.8	10.2

treat injuries workers do report. Thus, if repeals reduce collective bargaining, and if reduced collective bargaining encourages the underreporting of injuries, then, absent any real effect of repeals on injuries, we would expect to find repeals associated with a decline in reported injuries. The fact that we find repeals associated with an increase in reported injuries suggests that either (a) underreporting is not associated with repeals or (b) our estimated effect of repeals on the increase in actual injuries is underestimated by the amount that underreporting has hypothetically increased after repeals.

In the case of disabilities, in our full sample, controlling for time trends and a change in how disability questions were asked, repeals raised self-reported disabilities by 7.5% when not controlling for the unemployment rate and 8.2% controlling for unemployment. When the sample is restricted to repeal and always-had states, repeals raised disabilities by 6.5% not controlling for unemployment, and 7.5% controlling for unemployment. In the case of disabilities, the sample that excludes always-had states is too small for model estimation.

Enactments. Our injury data spanning the years 1976 to 2016 include only one prevailing wage enactment (Vermont in 1998) while our disability data spanning 1970 to 2016 include a second enactment (Minnesota 1973). With these limited legal changes, we were unable to discover statistically significant relationships except for lost days away from work where enactment reduced this injury rate by a statistically significant and meaningful 26%.[4] These results held whether or not the unemployment rate was included in the model.

Conclusion

Prevailing wage policies are the current focus of an intense public policy debate. The scientific literature on prevailing wage policy has focused on the effects of repeals on wages, benefits, and the direct cost of public construction. Following Azari-Rad, this article expands the analysis of the effects of repealing prevailing wage laws to workplace safety.

Prevailing wage repeals have been shown to reduce construction worker wages and benefits. Because the financing of worker safety training is among these reduced benefits, and the loss of health care benefits have been shown to reduce worker retention within the industry, we are not surprised that our empirical results are consistent with the hypothesis that prevailing wage repeals also increase construction workplace dangers. Our finding that injury rates rise from 11% to 13% as the severity of injuries increases is consistent with Azari-Rad and suggests that prevailing wage repeals increase not only the prevalence of injuries but their severity. Our finding that subsequent to repeals disability rates rise from 7.5% to 8.2% depending on model specification is consistent with the finding that prevailing wage repeals increase actual injuries and that these results are not an artifact of underreporting driven by moral hazard incentives within the worker compensation system and worker safety programs. These workplace safety issues are an additional consideration when evaluating the advisability of enacting or repealing state prevailing wage policies.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Notes

1. For a fuller review of the economic effects of prevailing wage laws, see Duncan and Ormiston (2018).
2. The 2012 Economic Census questionnaire for construction states: "Employer's cost for fringe benefits: Voluntarily provided fringe benefits (Include such items as payments for life insurance, medical insurance, pensions, welfare benefits, and union-negotiated benefits)" https://www2.census.gov/programs-surveys/economic-census/2012/questionnaires/forms/cc23601.pdf (Form CC-23601).
3. The percentages shown in Table 5 differ slightly from the coefficients shown in the regression tables due to the transformation of the estimated coefficients into percentages using the formula percent = $(\exp(b) - 1) \times 100$.
4. For consistency, we retain Feasible Generalized Least Squares (FGLS) in Models 5 and 6 despite having only six time periods separated by decades (five when we include unemployment). In unreported regressions, we replicate Models 5 and 6 using fixed-effect regressions with clustered robust errors. The results are comparable with FGLS estimating a 10% increase in disabilities with prevailing wage repeals. The estimate for the effect of enacting prevailing wage laws is again statistically insignificant.

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LIUNA'S RESPONSE TO STAFF'S FIRST SET OF DATA REQUESTS

Attachment Staff 1-4(c)

Prevailing Wage Laws: What Do We Know?

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Prevailing Wage Laws:
What Do We Know?

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By Kevin Duncan and Russell Ormiston

Introduction

In recent years, states and municipalities have been increasingly engaged in heated, often partisan, debates over the future of prevailing wage laws. In addition to the repeal of state prevailing wage laws in West Virginia and Kentucky, there have been high-profile political challenges in several states including Wisconsin and Nevada. Numerous city councils and county commissioners have been concurrently engaged in similar debates regarding local prevailing wage ordinances. References to economic studies often accompany these calls for legislative action, as advocates on both sides of the debate can point to papers supporting their position. The lack of consensus among researchers, however, is mostly attributable to differences in empirical methodology and scientific rigor. To improve the clarity of future public policy debates on prevailing wage laws, this paper summarizes the current state of research on these policies, highlighting recent academic findings and identifying empirical shortcomings inherent in a number of oft-cited non-academic studies.

Federal prevailing wage laws are governed by the Davis-Bacon Act of 1931, which mandates that construction contractors and subcontractors hired on federally funded or assisted contracts valued at $2,000 or more "must pay their laborers and mechanics employed under the contract no

less than the locally prevailing wages and fringe benefits for corresponding work on similar projects in the area," (U.S. Department of Labor, n.d.). The primary, long-standing goal of the Davis-Bacon Act has been to protect communities from the deterioration of local labor standards that may occur if large government projects—often awarded to the lowest bidder—attract contractors from lower-wage areas (U.S. Department of Labor, 2015). In addition to federal contracts, 29 states and numerous cities and counties have enacted similar ordinances to cover corresponding state and local projects. The goals of these regional regulations are varied, from preserving local labor standards to ensuring a qualified and safe workforce on public projects through the promotion of apprenticeship training.

While prevailing wage laws are present across federal, state and local jurisdictions, there are considerable differences in how each determines a local area's "prevailing wage." For federal projects, the Davis-Bacon Act requires the U.S. Department of Labor to conduct wage surveys for detailed job classifications and type of work. Similar wage surveys are used in a majority of states with prevailing wage laws, however some exceptions exist. For example, Vermont bases its prevailing wage on the Bureau of Labor Statistics' Occupational Employment Statistics and requires an additional 42.5 percent in fringe benefits. Other states, such as Massachusetts, Pennsylvania and New Jersey, establish wage and benefits rates in accordance with local collective bargaining agreements. Whether labor union compensation rates directly establish a locality's prevailing wage or merely influence it through the calculation of an average rate, organized labor's influence has resulted in clear fault lines between prevailing wage's strongest advocates (union contractors and employees) and opponents (select non-union contractors).

The ongoing political dialogue on prevailing wage laws requires a comprehensive research review to inform debate and guide future legislative action. Focusing on research published since 2000, this paper summarizes research studies that address the four most debated issues surrounding the effects of prevailing wage laws: (a) construction costs, (b) education and training, (c) workplace safety, and (d) the racial composition of the labor force. This study will prioritize research published in academic journals or working papers, as these studies represent the most thoughtful and rigorous analyses. Published academic papers have been through the peer-review process where anonymous independent experts critically evaluate the methodologies and conclusions of each study before it can be accepted for publication. In contrast, unpublished studies and advocacy research—often cited in public debates over prevailing wage laws—can suffer from undetected or unexplained methodological defects that produce inaccurate or misleading conclusions.

Construction Costs

Among policymakers and researchers, the predominant interest in prevailing wage laws has been in understanding their effect on public construction costs. The most common public argument supporting the repeal of existing prevailing wage laws has been that doing so will save taxpayers money. This logic assumes that repeal will lead to lower wages and, as a result, lower labor costs on public projects. However, this argument ignores fundamental differences between high-wage and low-wage construction. This includes skill and productivity differences between high-wage and low-wage workers, greater use of capital as labor costs increase, increased rates of training and safety among high-wage workers, and other issues tied to variations in the quality of labor,

capital and management. These effects have the potential to offset some, if not all, of the cost increases associated with higher wage and benefit rates.

The potential of cost offsets in the presence of higher wages in the construction industry renders simple arguments inconclusive in predicting the impact of prevailing wage laws on the cost of public projects. As a result, researchers must address this question empirically. The most credible approach to estimate the cost impact of prevailing wage laws has been to examine the effects on a project-by-project basis. By identifying a pool of public construction projects with common features across jurisdictions and years, researchers can use regression analysis to control for many of the differences inherent in unique projects (e.g., square feet, number of stories) and therefore isolate the cost differential attributable to the presence of a prevailing wage law.

Regression analysis represents the dominant empirical tool in economists' toolbox for a reason: it allows researchers to separate the effects of multiple variables on a singular outcome (e.g., construction costs). However, accurate estimation of these effects requires particular attention paid to the variables included in the empirical model and overall study design. As demonstrated in Belman et al. (2010), regression models that do not adequately account for critical physical differences between construction projects will result in inaccurate estimates of the cost effects of regulation (i.e., omitted variable bias). Researchers have addressed these concerns by analyzing three narrow classifications of public projects—public schools, highways and public housing—that minimize the inherent differences between projects and, as a result, produce more unbiased estimates of the cost effects of prevailing wage laws.

School Construction

Public school construction has been the primary focus of academic and non-academic studies on the cost effect of prevailing wage laws. In addition to providing researchers with a considerable volume of projects to study over time, public school construction features substantial commonality in their characteristics (e.g., classroom space, gymnasiums) across jurisdictions, allowing the potential cost impact of prevailing wage laws to be isolated more easily. The two most extensive studies examined public school construction in the United States between 1991 and 1999. Azari-Rad, Philips and Prus (2002) used data from F.W. Dodge data to examine the accepted bid costs for 4,974 public and private schools across the country, building a regression model that controls for school size, type (elementary/middle/high), season in which construction started, local market conditions, and a series of variables to isolate the effects of state prevailing wage laws from the potential cost differences between public and private schools.[1] The results indicated that prevailing wage laws do not have a statistically significant impact on construction costs.

In a follow-up study, Azari-Rad, Philips and Prus (2003) augmented their analysis of school construction costs by examining how they may be affected by the "strength" of a respective state's prevailing wage law. These regulations differ across states on the basis of the minimum contract threshold, the breadth of work and occupations covered, the enforced wage rate, and a variety of other factors. To those ends, Thieblot (1995) developed a scoring system for state

[1] The use of accepted bid costs from F.W. Dodge—instead of collecting data on final costs—is common practice within construction research. Given that bid costs do not include potential change orders or cost overruns, the use of bid costs instead of actual costs represents a potential shortcoming of these studies. However, in the absence of evidence that these would differ across jurisdictions on the basis of prevailing wage laws, there is no reason to assume that the use of bid costs would bias the results.

prevailing wage laws that allowed the authors to categorize a state's policy as "strong" or "weak." Analyzing 4,653 public schools built between 1991 and 1999, Azari-Rad, Philips and Prus (2003) demonstrated that the presence of state prevailing wage laws, whether they be strong or weak, have no statistically significant impact on school construction costs.

Vincent and Monkkonen (2010) followed a similar approach in a study of the effect of state regulations on school construction costs. Analyzing final bid costs for 2,645 public schools built between 1995 and 2004, the authors used a regression model to estimate the cost impact of state prevailing wage laws, state siting regulations and the availability of state funds for school construction. Controlling for size, number of stories, type of school, and local conditions, the authors estimated that state prevailing wage laws raised school construction costs by 8-13 percent, an effect that was statistically significant. In addition to finding results contrary to previous research, the study also contended that state policies were additive, as school construction in states with three regulations was estimated to cost nearly 30 percent more than in states with no policies.

Duncan, Philips and Prus (2014) examined the relationship between school construction costs in British Columbia and the Skill Development and Fair Wage Policy. Enacted in 1992, the policy represented a *de facto* prevailing wage law by establishing a wage and benefit floor for large construction projects funded by the provincial government. Using bid cost data on 498 schools built between 1989 and 1995, the authors developed a regression model that controlled for school size, number of stories, location in Vancouver, and a number of other variables. The results indicated that, after controlling for these factors, there was no statistically significant

difference in the construction costs of public schools in British Columbia before and after the policy was enacted. In an earlier study, Bilginsoy and Philips (2000) also examined the effects of Skill Development and Fair Wage Policy on school construction costs in British Columbia between 1989 and 1995. In a sample of 54 schools located within close geographical proximity, the study demonstrated that the enactment of the policy had no statistically significant effect on school construction costs in the area.

While the papers summarized above were published in academic journals, three other oft-cited, non-peer reviewed studies have employed a regression approach and F.W. Dodge data to examine the effects of prevailing wage laws on school construction costs; none of them found statistically significant cost effects. Examining 358 schools built in the Mid-Atlantic Region of the United States between 1991 and 1997, Prus (1999) did not find statistically significant differences between school construction costs between states with and without a prevailing wage law; the author also found no significant difference in bid costs between 124 Maryland schools based on the presence of local prevailing wage laws. The Ohio Legislative Service Commission (2002) examined the 1997 exemption of school construction from Ohio's prevailing wage law by investigating school construction costs within the state between 1992 and 2001. Separate regressions on large new projects (n=256), small new projects (n=194) and additions (n=646) failed to uncover any statistically significant difference in bid costs before and after the exemption.[2] Kelsay (2015) studied 266 schools built in West Virginia and five neighboring states

[2] The Ohio Legislative Service Commission (2002) report posited that the school construction exemption in the state's prevailing wage law saved the state 10.7 percent; however this estimate was derived from three regression models in which none of the prevailing wage coefficients were even close to statistical significance. The decision to explicitly dismiss concerns over statistical significance (p. 60) is at odds with normal statistical practice as found in peer-reviewed journals or introductory econometrics textbooks.

between 2006 and 2013 and, using regression analysis, also found that the presence of a state prevailing wage law had no significant impact on the construction costs of new public schools.[3,4]

The use of regression analysis to model school construction costs is not without methodological concerns.[5] However, it is revealing that every academic study of the cost effects of prevailing wage laws in the last 15 years has employed regression analysis. It is additionally compelling that seven of the eight studies that examined public school construction using this approach failed to uncover a statistically significant link between prevailing wage laws and school construction costs; this includes four of five peer-reviewed articles. However, the narrative of prevailing wage laws raising school construction costs persists due to the pervasiveness of non-academic research that relies on a simplistic empirical approach that produces upward-biased estimates: the "wage differential" method.

A recent example of this approach, Rosaen and Taylor (2015), estimated the cost impact of Michigan's prevailing wage law by multiplying (a) the wage premium associated with prevailing wages relative to lower-cost market alternatives (25 percent) and (b) the percentage of construction costs attributable to wages and benefits (24 percent). The subsequent product—6.1

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[3] In addition to his analysis of the effects of state prevailing wage laws on the cost of public school construction, Kelsay (2015) expanded his analysis to the construction of all non-residential buildings (n=1082) for which data was available through F.W. Dodge in a six-state area between 2006 and 2013. After controlling for building types and public construction, the study found that the presence of a state prevailing wage law had no statistically significant effect on public construction costs. Kelsay, Wray and Pinkham (2004) employed a comparable methodology in an examination of construction costs of 3,082 projects built across a 12-state area between 1993 and 2002, with results similarly finding no significant difference in construction costs based on the presence of a state prevailing wage law.

[4] In an examination of school construction costs in Pennsylvania, Wial (1999) also used regression modeling to indicate that changes in the calculation of the state's prevailing wage had no statistically significant cost effects. While the model specification mirrored those used in later studies, the paper buried this discussion in a footnote and did not present the results of the model's estimation.

[5] In addition to omitted variable bias identified by Belman et al. (2010), Dickson-Queada et al. (2015) also suggests that causality may be a concern in studies of prevailing wage as these policies are more prevalent in higher-cost markets (i.e., endogeneity bias).

percent—is touted as the increase in public construction costs attributable to the presence of a prevailing wage law; multiplying that by the $21 billion spent by the state of Michigan on applicable school construction between 2003 and 2012, the authors posit that the state's prevailing wage law cost taxpayers an additional $1.267 billion over those ten years. A number of other non-academic studies utilize variants on this approach; they typically report that state and federal prevailing wage laws increase public construction costs on all projects by 8-36 percent (Vedder, 1999; Kersey, 2007; Gardner and Ruffner, 2008; Glassman et al., 2008; Vermont Legislative Joint Fiscal Office, 2014). The most recent academic study to employ this method—Keller and Hartman (2001)—suggested that Pennsylvania's prevailing wage law increased public school construction by 2.25 percent.

Studies relying on the wage differential approach, however, suffer from methodological defects that render them misleading as critical analyses of the cost impact of prevailing wage laws. First, by simply comparing the prevailing wage to some arbitrary lower rate, this method is built upon the assumption that prevailing wage laws *must* increase construction costs. However, as described above, most academic studies fail to find statistically significant evidence supporting that position. As a result, the wage differential approach rules out the potential cost offsets attributable to contractors hiring fewer and more skilled workers or substituting capital for more expensive labor.

Overlooking these cost offsets is misguided given the results of Atalah (2012, 2013), which offer evidence that contractors bidding on school construction projects are able to offset higher wages with increased capital substitution and a more-skilled workforce. In the former study, the author

examined 8,093 bids on public school construction projects in Ohio between 2000 and 2007 following the 1997 exemption of public school construction from the state's prevailing wage law. Comparing the bid cost per square foot between union contractors—who presumably pay the highest local wage rates—and non-union contractors, the author found no statistically significant difference between the bids statewide. The only significant difference occurred in an examination of Southern Ohio, with the author finding that bids from non-union contractors were significantly *higher* than their union counterparts. In the latter study, the author employed the same data set and approach but instead compared union and non-union bids within each trade. While within-trade samples tended to be small, the study found no statistically significant difference between bids from union and non-union contractors for most trades.[6]

A second methodological defect of the wage differential method is that most studies compare prevailing wages to the average wage for all construction workers in a state, including those working in residential construction. But residential construction workers are typically drawn from a different subset of craft workers—who are typically less skilled and earn less—than those employed elsewhere in the construction industry. As a result, an analysis of this issue by the Minnesota Office of the Legislative Auditor (2007) led it to conclude that the wage differential method "may overstate the possible savings from repeal of state prevailing wage laws," (p. 77).

Finally, the starting assumption of the wage differential method also implicitly presumes that any construction cost increases are necessarily and completely borne by taxpayers. In contrast,

[6] Of the 18 trades examined, Atalah (2013) did find statistically significant differences between the bids of union and non-union contractors in five trades: plumbing, HVAC, existing conditions, earthwork and electrical. However, there was not uniformity in the direction of the difference, as non-union contractors exhibited higher bids in two trades while union contractors offered higher bids in three trades.

Duncan and Lantsberg (2015) demonstrate that contractor profits and material costs are lower in states with prevailing wage laws, offering a reminder that the burden of cost increases—if they exist—may be shared between contractors and the government. Previous studies relying on the wage differential method have ignored this outcome, further overstating the presumed cost effects of prevailing wage laws. Taken together, it is clear that the methodological defects of the wage differential method demonstrate an incomplete understanding of construction labor markets that produces inaccurate estimates of the cost effects of prevailing wage laws.

In sum, the most advanced studies published in recent years offer limited evidence supporting the hypothesis that prevailing wage laws increase school construction costs. A review of the literature demonstrates a clear dichotomy in empirical methodologies utilized across studies. The differences between these approaches are critical. While there have been numerous non-academic studies touting substantial cost effects of prevailing wage laws, they rely on a simplistic approach—the wage differential method—that demonstrates a deficient understanding of construction markets that renders them ineffective at best and, at worst, misleading. More rigorous analyses using the preferred method of economists—regression—is far more tempered, as seven of eight studies utilizing this approach have failed to find statistically significant evidence indicating that prevailing wage laws have any effect on school construction costs.

Highway Maintenance

While research examining the cost effects of prevailing wage laws has primarily focused on public school construction, Vitaliano (2002) analyzed the effect of these regulations on highway

expenditures in a study on the economic efficiency of state departments of transportation. Using data from 1996, the author built a six-variable regression model of highway costs that included an indicator of whether the state had a prevailing wage law. The results demonstrated that prevailing wage law increased overall state costs by 8 percent, an effect that was statistically significant. However, total state-level expenditures on highways depend on a number of important factors not included into the regression model, including the amount of new highway construction ordered and the level of law enforcement staffing on the roadways. Without these critical variables, the resulting omitted variable bias substantially weakens the credibility of the established link between prevailing wage laws and increased costs.

To resolve the omitted variable problem, Duncan (2015a, 2015b) examined the cost impact of the federal Davis-Bacon Act on highway maintenance in Colorado between 2000 and 2011. Resurfacing projects on state highways (state funding) and interstate highways (federal funding) in Colorado are built according to the same standards, using the same material, employ the same types of workers, and feature the same requirements of contractors except for two additional policies that govern federal projects: the Davis-Bacon Act and the Disadvantaged Business Enterprise Program. Using a regression model to control for a variety of other factors—such as location, year and type of terrain—that may affect project cost, the author found no statistically significant evidence suggesting that these two federal policies had any impact on project bid cost or the number of bidders. Duncan (2015b) expanded the analysis to examine whether bids were more aggressive when contractors switched from federal projects to less-regulated state projects; the results again failed to find any indication suggesting that the two federal policies had any statistically significant impact on contractor bids.

Public Housing Construction

As the single academic study examining the cost effect of prevailing wage laws on public housing construction, Dunn, Quigley and Rosenthal (2005) analyzed the construction of 205 new public housing projects that were approved and completed between 1997 and 2002. Applications for projects subsidized by the California Low Income Housing Tax Credit offered detailed information on project costs and characteristics, including a question that allowed the authors to confirm that a contractor was required to pay prevailing wages on account of governmental subsidies. Building extensive regression models, the authors estimated that prevailing wage laws increased project costs by 9 to 11 percent using ordinary least squares and, further demonstrating the importance of methodological choice, 19 to 37 percent when using an instrumental variables approach.

Multiple California government agencies prepared a more recent, unpublished study that examined the factors that influence the cost of building affordable rental housing in the state (California Department of Housing and Community Development et al., 2014). Collecting data from 400 applications to the California Tax Credit Allocation Committee of projects that were completed between 2001 and 2011, the study estimated a substantial regression model of project costs that included the numerous characteristics of the project—including housing type, number of units, parking space and other variables—and an indicator of whether the contractor declared that they had paid prevailing wages on the project. The results suggest that prevailing wage laws increased project costs by 11 percent, an outcome that was statistically significant with 95

percent confidence. However, the authors noted that the magnitude and statistical significance of the prevailing wage variable was particularly sensitive to the specification of the model.[7]

There are a number of reasons potentially explaining the divergence of the results on public housing from research on school construction and highway maintenance that failed to find any cost effects of prevailing wage laws on public projects. First, as outlined in Dunn, Quigley and Rosenthal (2005), the results may be California-specific given that the state has among the most stringent—and most well-enforced—prevailing wage laws in the country. Second, residential construction projects are predominantly the domain of non-union contractors. Given that labor costs as a proportion of total costs were calculated to be 43 to 44 percent on these California projects—significantly higher than the industry average—it may be that the absence of certain types of contractors from the bidding process (e.g., more capital-intensive) led to statistically significant cost effects of prevailing wage regulations. Finally, complicating the narrative, the Minnesota Office of the Legislative Auditor (2007) noted that during the time of the first study, some affordable housing projects covered by prevailing wage laws were also covered by additional requirements of the Department of Housing and Urban Development (HUD). If HUD requirements are associated with increased construction costs and omitted from the models employed, then these studies may overstate the cost impact of prevailing wages.[8]

[7] While the study's primary regression results indicate that prevailing wages increased construction costs by 11 percent, the paper indicated that alternative regression specifications featured decreased magnitude and statistical significance of the prevailing wage variable (California Department of Housing and Community Development et al., 2014; p. 32). Further, the prevailing wage effect "varied very widely" across regions, leading the authors to contend that the prevailing wage effect across regions was "inconclusive" and may be influenced by omitted variable bias (p.37).

[8] Another potential complication in these California studies is that prevailing wage laws require weekly payroll certification. This type of state vigilance and enforcement may, by itself, represent an adequate deterrent for contractors who lower costs by engaging in illegal labor practices such as worker misclassification, wage theft, or the hiring of undocumented laborers. If the residential sector of the construction industry features a disproportionate

Summary

The analysis of academic and non-academic research on the cost effects of prevailing wage laws reveals two critical findings. First, a majority of the most credible studies indicate that prevailing wage regulations do not have a statistically significant impact on construction costs for two of the largest areas of public construction: schools and highways. However, as evidenced by the California studies on public housing, exceptions may exist. Second, this review has demonstrated the importance of study methodology in developing accurate cost estimates of prevailing wage laws. Analyses relying on the wage differential method, in particular, feature debilitating methodological defects that yield inaccurate and potentially misleading conclusions about the cost impact of prevailing wage laws in construction markets. In contrast, it is revealing that every article on this subject that has been published in an academic journal within the past 15 years has used a regression-based empirical approach.

The use of regression, however, is not without its potential pitfalls. Estimating accurate cost effects of prevailing wage laws requires that the empirical model sufficiently control for variables that may conflate with the presence of government regulations. As an example, the study by Fraundorf, Farrell and Mason (1984) is often referenced in public debates to assert that prevailing wage laws increase public construction costs. However, their regression analysis of the costs of 215 diverse projects built in 1977-78 implicitly attributed the *entire* cost differential between public and private construction to the presence of prevailing wage. In a similar, more

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number of such contractors, then at least part of the increased cost effects found in these studies would likely be attributable to the decline in cost-saving, but illegal, employment practices.

recent analysis of 3,120 projects built in the Midwest in 1993-2001, Kaboub and Kelsay (2014) correct this specification error and isolate the cost effects of prevailing wage laws from the cost premium attached to public construction projects. Their results suggest that while public projects cost 20-30 percent more to construct than private projects, prevailing wage laws did not have a statistically significant impact. Concerns in both studies, however, arise when using only a limited number of explanatory variables to explain construction costs of widely-dissimilar projects; this increases the likelihood that the results suffer from omitted variable bias. These types of concerns are minimized when examining narrow classifications of public projects, which likely explain why researchers have predominantly examined this question using this approach over the past 15 years.

Education and Training

Construction costs on public works are dependent on market conditions. In addition to changes in the price of raw materials (e.g., asphalt, wood), construction costs are contingent on the state of construction markets overall. For example, Azari-Rad, Philips and Prus (2002) demonstrated that an increase in the number of active construction projects in a city raises construction costs on public projects. This "bidding up" process of contractor services extends to the availability of skilled laborers in a region, as skill shortages can increase construction costs and create delays on time-sensitive projects (Shane, Molenaar, Anderson and Schexnayder, 2009). Despite these distortions, skill shortages in construction have persisted as a public policy concern for decades

(e.g., Weinberg, 1969). These shortages largely occur due to structural disincentives for training among many contractors given the transitory nature of employment of their workers.[9]

Prevailing wage laws, however, represent one of the few public policies that incentivizes worker training in the construction industry. First, these regulations allow for employer contributions to training funds to be counted as a part of the compensation required under the law. Second, these regulations promote apprenticeship programs by allowing enrolled workers to be paid at rates less than the prevailing wage during their apprenticeships. In the lone academic study dedicated to this issue, Bilginsoy (2005) examined the impact of state prevailing wage laws on apprenticeship training between 1989 and 1995 across the 36 states for which data was available through the U.S. Bureau of Apprenticeship Training. Employing regression analysis, the study found that apprenticeship enrollment was 6 to 8 percent higher in states with prevailing wage laws, a statistically significant outcome. The results also indicated that apprenticeship enrollment was higher as the 'strength' of the prevailing wage law increased. Further, the author demonstrated that apprenticeship program completion rates were significantly higher in states with prevailing wage laws.

While a positive relationship between prevailing wage laws and apprenticeship opportunities was expected, disentangling the magnitude of the policy impact is more complicated. Prevailing wage laws are more prevalent in states with higher unionization rates (Dickson-Queada et al., 2013). The enrollment model utilized by Bilginsoy (2005) excluded controls for state union density

[9] While concerns about skill shortages have been prevalent in construction for decades, the damage wrought by the Great Recession on the construction industry has greatly exacerbated the problem. A steep decline in construction demand caused industry employment to decline by 25 percent between 2006 and 2010 (Paciorek, 2015), with contractors responding to economic instability by retaining older, more experienced and skilled workers while demonstrating a reluctance to hire and train younger workers (Janicki and McEntarfer, 2015).

rates by trade; as a result, the prevailing wage variable represents a partial proxy for a state's increased unionization rate.[10] Given that union training programs enroll significantly more apprentices than their non-union counterparts (Bilginsoy and Glover, 2005), some portion of the estimated impact of state prevailing wage laws on apprenticeship enrollment is more likely a reflection of a state's increased union density. While this methodological argument intimates that the size of the policy impact is overstated in Bilginsoy (2005), an older unpublished study—Philips et al. (1995)—suggests that the effect may, in fact, be much larger. Using a state-level regression approach, this previous study demonstrated that the repeal of state prevailing wage laws was associated with a 44 percent decrease in the ratio of apprentices to journeyworkers in the 1970s and 1980s.

Workplace Safety

The debate over public policy in the construction industry is complicated by its high rates of workplace injuries and jobsite fatalities; the industry was responsible for one in five job-related deaths in the United States in 2014.[11] Policymakers, therefore, have a responsibility to consider how the rules that govern the construction of a public project may imperil the workforce tasked with its completion. To be clear, prevailing wage laws typically do not include safety requirements. However, such regulations may indirectly improve safety at the jobsite by facilitating collective bargaining and, subsequently, apprenticeship training.

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[10] Bilginsoy (2005) acknowledged this shortcoming, noting that data on state union density rates by trade is simply not available to researchers. The data from the U.S. Bureau of Apprenticeship Training also did not signify whether an apprentice was enrolled in a union or non-union apprenticeship program, further weakening the author's ability to infer causality.

[11] See "Fatal Occupational Injuries by Industry and Event or Exposure, all United States, 2014" via the Bureau of Labor Statistics at http://www.bls.gov/iif/oshwc/cfoi/cftb0286.pdf.

While research on this topic has been limited, the evidence to date generally suggests that prevailing wage laws are associated with improved workplace safety. Among the few published studies on the topic, Azari-Rad (2005) represents the most empirically rigorous to date. In an analysis of the construction industry between 1976 and 1999, the study indicates that non-fatal injury rates were 7 to 10 percent lower in states with a prevailing wage law. This conclusion mirrors the findings of a pair of recent studies that have yet to be published in academic circles. Most prominently, Dickson-Queada, et al. (2013) showed that, between 2008 and 2010, the average fatality rate in construction was lower in states with strong prevailing wage laws (8.53 deaths per 100,000 workers) when compared to states that never had such a policy (12.67 deaths). Philips (2014) found that construction workers reported 12 percent more disabilities (hearing, vision, memory loss, etc.) in states without prevailing wage laws compared to states with such a policy between 2009 and 2011. While these latter two studies did not employ a regression approach, it is telling that every study within the past 20 years point to the same conclusion: prevailing wage laws are empirically associated with decreased injury and fatality rates.

Given the paucity of recent research in this area, debate over the impact of prevailing wage laws on workplace safety continues to be shaped by a pair of older studies that are rooted in analyses of the 1981 repeal of Utah's prevailing wage law. Philips et al. (1995) employed a regression model to examine injury rates for plumbers and pipefitters in the United States between 1978 and 1991. The results demonstrated that states with prevailing wage laws had lower rates of total workplace injuries—and lower rates of serious injuries—compared to states that had either never

had the law or had repealed their law, effects that were statistically significant. While that outcome is consistent with more recent studies, Thieblot (1996) attempted to explicitly refute Philips et al. (1995) by citing summary statistics from the construction industry as a whole from 1975-1978 to suggest that states without prevailing wage laws had lower injury rates than states with the regulation. However, in addition to relying on older data, Thieblot (1996) did not allow for regional and economic differences that were demonstrated to be important influences on safety in the multivariate approach (i.e., regression) used by Philips et al. (1995).

The more recent consensus that prevailing wage laws are empirically associated with improved workplace safety is unsurprising. Prevailing wage laws are more prevalent in states that have higher union densities in construction (Dickson-Queada et al., 2013). As demonstrated in the academic research, union construction firms feature significantly lower injury and fatality rates than their non-union counterparts (Donado, 2015; Zullo, 2011).[12] There are myriad reasons that union contractors have better safety records, including higher training and apprenticeship rates (Bilginsoy, 2005), an increased willingness of union workers to report OSHA violations (Weil, 1991a, 1991b), and a workplace culture that more greatly emphasizes safety concerns (Gillen et al., 2002). Therefore, even in the absence of required safety regulations, there is strong evidence that prevailing wage laws support practices and institutions that contribute to lower injury and

[12] As a potential counterpoint, Roistacher, Perine and Shulz (2008) compared fatal injuries between union and non-union workers at building sites in New York City. In this non-published study, the authors found that 29 percent of fatalities were union members. Given that this was approximately equal to the unionization rate of the city's construction workforce (30 percent), the authors argued that unions failed to adequately promote safety. A clear shortcoming in this approach, however, is that it ignores differences in occupation. If union workers are more likely to be in perilous occupations—such as ironworkers—this may explain the larger number of fatalities in the organized sector. The importance of occupation was controlled for in Miller et al. (2013), which limited its focus to carpentry contractors in St. Louis, Mo. The study demonstrated that there were, on average, 4.77 OSHA violations per non-union worksite compared to 1.57 violations at union sites; the difference is statistically significant.

fatality rates, in part, by advantaging relatively safer union and non-union contractors in the bidding process.

Racial Composition of the Construction Workforce

During a time when policymakers were most concerned with ensuring workers' purchasing power, the Davis-Bacon Act of 1931 was originally advanced as a policy designed to protect local contractors and workers from being undercut by low-wage, outside competitors. Thieblot (1975), however, inferred an alternative motivation. Citing Congressional testimony, the author suggested that the Davis-Bacon Act was also motivated by the racial animus of Northern legislators who were trying to prohibit out-of-state contractors—featuring African-Americans in their employ—from competing with local contractors and their higher-cost white employees on federally funded construction projects. This hypothesis has been the subject of fierce debate within academic and non-academic circles without a clear consensus (Gallaway and Vedder, 1999; Azari-Rad and Philips, 2002; Bernstein and Leonard, 2009).

Although the original *intent* of the federal law remains an open question—and an issue that is outside the scope of this paper—the academic debate on the existence of any current discriminatory *effect* was stimulated by an exchange between Thieblot (1999, 2003) and Azari-Rad and Philips (2003). In the first study, Thieblot (1999) used state-level employment data from the 1990 U.S. Census to compare state ratios of (a) the proportion of the construction sector composed of African-Americans to (b) the proportion of all workers who were African-American. The results, based entirely on summary statistics, indicated that African-Americans

were more underrepresented in the construction labor force in states with a prevailing wage law compared to states without such regulations.[13] In a direct challenge to this study, Azari-Rad and Philips (2003) used the same methodology and data to demonstrate that racial difference between "have law" and "no law" states was entirely driven by regional differences; after removing Southern states from the analysis, the results demonstrated no difference in African-American representation in construction on the basis of state prevailing wage laws. While Thieblot (2003) reiterated his initial conclusions, the lesson drawn from this exchange was clear: any rigorous analysis of the issue must control for differences between states—and workers—that may distort the empirical relationship between prevailing wage laws and African-American employment in construction.

In order to control for differences between states and potentially affected workers, two emerging, yet-to-be-published studies utilize individual-level data from the Current Population Survey (CPS) to offer potentially definitive evidence suggesting that prevailing wage laws have not had a discriminatory *effect* on construction labor markets within the last 30+ years.[14,15] Belman,

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[13] Thieblot (1999) also suggested that African-Americans were more underrepresented in states with "strong" prevailing wage law (ratio=0.69) when compared to states with an "average" (0.65) or "weak" law (0.62). The author, however, does not test for the statistical significance of these differences; given that the miniscule gaps between these categories occur within a small sample, it is extraordinarily unlikely that these differences are significant at any reasonable level. As a result, the study's stated conclusion on this issue is, at best, misrepresented.

[14] Keyes (1982) compared the minority unemployment rate in the eight states without a prevailing wage law (at the time) to the national minority unemployment rate for January 1982. Curiously, while the study contends that the results show the discriminatory effect of state prevailing wage laws, the data indicate that half of the states have an unemployment rate above the national average and half have a rate below the national mark. Given the inconsistency between the study's results and conclusions, the arbitrary selection of states and its other empirical shortcomings—it ignores all other differences between states—this study offers more questions than answers regarding the effect of prevailing wage laws on minority employment.

[15] Vedder and Gallaway (1999) used summary statistics from the U.S. Census to claim that Davis-Bacon Act decreased opportunities for African-American employment in construction between the 1920s and 1930s, however their approach ignored all other factors that may explain employment changes, including the Great Depression. The study also uses a summary approach to assert discriminatory effects of prevailing wage laws due to lower underrepresentation of African-Americans in higher-paying construction occupations in 1960 when compared in 1990, however the latter period was characterized by a considerable *weakening* of state prevailing wage laws—nine

Ormiston and Petty (2016) analyze worker-level data from the Current Population Survey between 1977 and 2006 to examine how state prevailing wage laws affect African-American employment in the construction industry. This study investigates the issue from two perspectives. The authors first explore how state prevailing wage laws affect the racial composition of the construction industry. Alternatively, the authors also examine how the presence and relative strength of prevailing wage regulations influence the industrial choice of African-American workers within a state. The results across both regression models provide a consistent story: perceived discrimination attributable to state prevailing wage laws in simple models completely dissipates in regression estimates that control for a state's racial composition and economic conditions of its construction industry.

Manzo, Lantsberg and Duncan (2015) reach even stronger conclusions. In an analysis of worker-level data from the Current Population Survey between 2004 and 2013, the authors build a two-step regression model of respondents' occupational choice. The authors find that, after controlling for individual demographics, strong or average state prevailing wage laws *increase* the likelihood that non-Latino minority workers enter a blue-collar construction occupation by 5.6 percentage points, a value that is statistically significant. While these two recent papers have yet to be published in academic journals and use different model specifications, it is revealing that neither found evidence suggesting that prevailing wage laws have a discriminatory *effect* against African-Americans.

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states repealed theirs between 1979 to 1988—implying that the decline in status was attributable to something besides prevailing wage laws.

Conclusion

The debate over prevailing wage laws has been fueled, in part, by the conflicting conclusions presented by a stream of academic and non-academic studies published over the past 15 years. A number of these studies, however, suffer from methodological shortcomings that offer, at best, misguided interpretations of the economic effects of prevailing wage laws. Through a critical analysis of the literature, this paper concludes that:

- The most methodologically advanced studies indicate that prevailing wage laws do not increase public construction costs, although some exceptions—such as public housing in California—may exist.

- Although the number of studies is limited, recent research indicates that prevailing wage laws promote worker training and increased safety.

- While the original *intent* of prevailing wage laws remains open for debate, the most advanced studies on the topic indicate that these regulations do not currently have a discriminatory *effect* against African-Americans.

In addition to summarizing the recent literature on prevailing wage laws, this study also highlights the fundamental importance of analyzing these issues using the most appropriate empirical methodologies. For instance, while numerous studies claim that prevailing wage laws substantially increase public construction costs, most of the papers arriving at this conclusion

rely on a flawed empirical approach—the "wage differential" method—that demonstrates a clear misunderstanding of construction labor markets. Further, studies that depend entirely on summary statistics—such as Thieblot (1999)—ignore other socioeconomic and public policy factors; this empirical oversimplification leads to an increased likelihood of misinterpreting the economic impact of prevailing wage laws. These concerns are largely mitigated—if not completely resolved—by more careful studies that feature properly specified multivariate empirical approaches; the importance of empirical methodology cannot be understated.

While the primary goal of this paper was to provide a critical summary of the most credible and up-to-date research on prevailing wage laws, this literature review also was designed to provide a road map to present and future researchers interested in this topic. Prevailing wage analyses in recent decades have largely been the domain of a narrow group of economists; additional voices offering new insights are encouraged to join the discussion. In addition to strengthening existing areas of research, there are numerous unexplored research topics that could significantly expand the collective wisdom about the impact of prevailing wage laws. Most prominently, research has yet to examine the effect of prevailing wage laws on the on-time completion of public projects, an area of critical concern for policymakers. For instance, if a school construction project is not completed before the start of an academic year, this can impose a significant cost on a school district in a way that is not captured in the calculation of the explicit costs of construction. Another unexplored research area is that of downstream maintenance, including the costs of tear-outs or required renovations attributable to poor initial construction quality. Because the issue of prevailing wage laws is intimately tied to the questions of labor, capital, and management quality, these regulations may (or may not) promote on-time, high-quality construction.

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