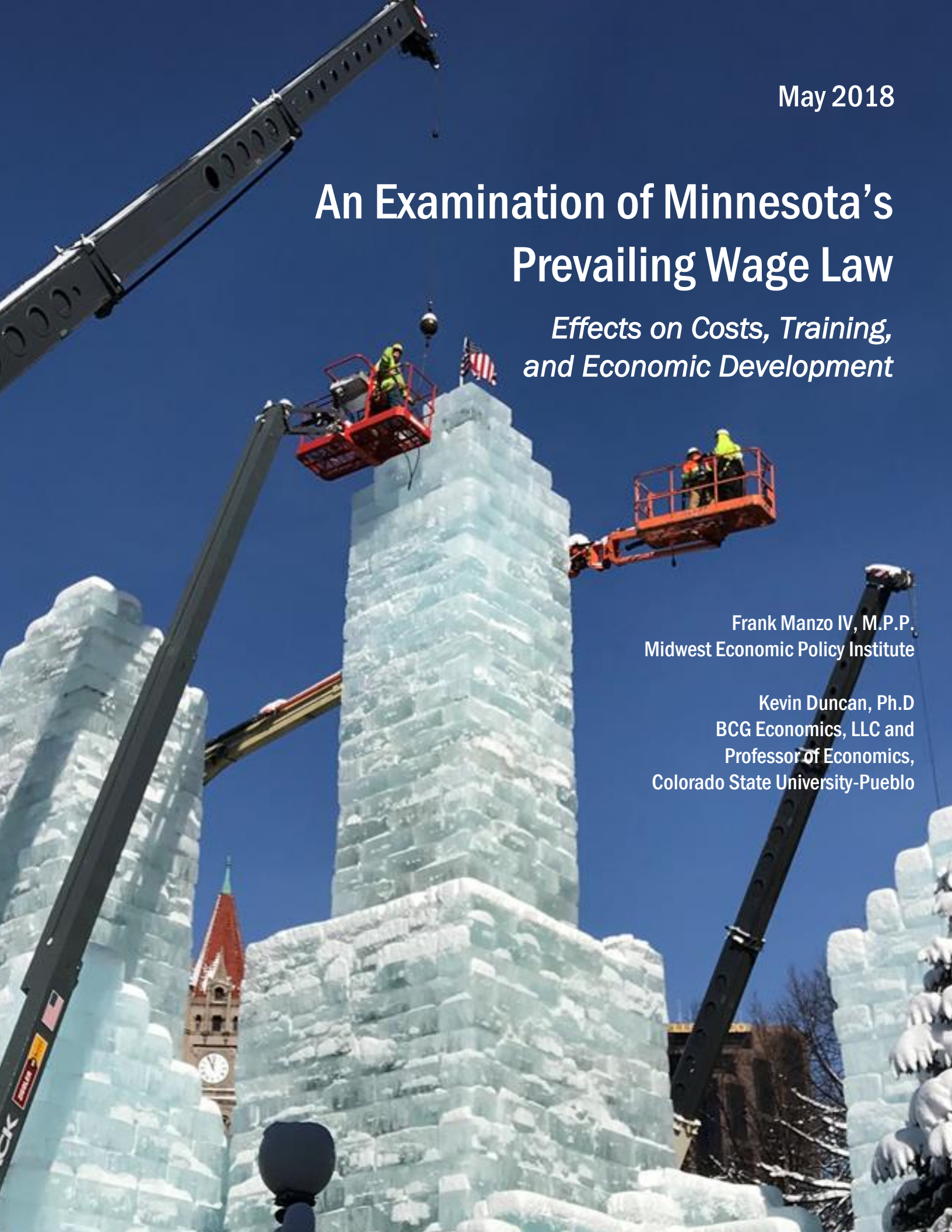

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An Examination of Minnesota's Prevailing Wage Law

Effects on Costs, Training, and Economic Development

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Executive Summary

The Minnesota Prevailing Wage Act provides minimum wages for construction workers employed on public projects. The main purpose of a prevailing wage law is to protect local construction standards in the required low-bid environment. Prevailing wage laws create a level playing field for all contractors by ensuring that public expenditures maintain and reflect local area standards for wages and benefits.

The Minnesota Prevailing Wage Act keeps construction costs stable.

- 72 percent of peer-reviewed studies conducted since 2000 find that prevailing wage laws have no effect on the cost of public construction projects.
- Labor costs are a low and historically declining share of total project costs– about 23 percent.
- Four economic studies since 1999 analyzing 2,183 bids on public projects find that prevailing wage has no effect on bid competition.
- A new analysis of 640 contractor bids on school construction projects in the Minneapolis-St. Paul metropolitan area finds that winning bids based on the payment of prevailing wages are no more costly than bids that do not require prevailing wages.

The Minnesota Prevailing Wage Act is an effective job skills advancement policy.

- Economic research finds that prevailing wage laws increase apprenticeship training, boost worker productivity, and reduce injury rates– helping to address the skilled labor shortage in construction.
- 93 percent of all registered apprentices in Minnesota are enrolled in joint labor-management programs– including the vast majority of African-American, Latino, and veteran apprentices.
- In 2015, the 10 largest joint labor-management apprenticeship programs had $29.8 million in annual revenue and $68.5 million in total assets while the program associated with the employer-only Associated Builders and Contractors had just $297,000 in revenue and $290,000 in total assets.

The Minnesota Prevailing Wage Act provides pathways into the middle class and boosts the economy.

- Economic research finds that prevailing wage laws foster middle-class careers that attract talented young workers to the construction trades.
- Minnesota's prevailing wage law increases blue-collar construction worker incomes by 5.2 percent.
- Minnesota's prevailing wage law expands health insurance coverage by 5.0 percentage points and increases the share of construction workers with pension plans by 5.3 percentage points.
- Minnesota's prevailing wage law reduces the share of construction workers who receive food stamp assistance by 2.1 percentage points.
- When school districts in the Twin Cities area include prevailing wages on projects, local contractors account for a 10 percent higher market share– with tax dollars staying in the local economy.
- By protecting work for in-state contractors and their employees, Minnesota's prevailing wage law improves the state economy by $981 million and generates $37 million in state and local tax revenue every year.
- Compared to Indiana, which recently repealed its prevailing wage law, per-worker productivity has grown 7.7 percentage-points faster and worker turnover rates have fallen further in Minnesota.

Minnesota's prevailing wage law produces positive impacts on the broader Minnesota economy. By protecting local standards, prevailing wage supports work for local contractors and their employees. The Minnesota Prevailing Wage Act is the best deal for taxpayers.

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Introduction to Prevailing Wage in Minnesota

> *"It is in the public interest that public buildings and other public works be constructed and maintained by the best means and highest quality of labor reasonably available and that persons working on public works be compensated according to the real value of the services they perform."*
>
> – Minnesota Prevailing Wage Act, Minnesota Statutes § 177.41 (1973)

The Minnesota Prevailing Wage Act supports blue-collar construction workers employed on public construction projects. Prevailing wage serves as a regional economic policy on Minnesota's publicly-funded projects that requires contractors to pay construction workers at least the wages and benefits that prevail in the local market. By preventing public bodies from awarding bids to contractors that pay less than the privately-established local market rate, the Minnesota Prevailing Wage Act ensures that workers can afford to live in the area where they are building a road, bridge, park, school, or other public project.

The main purpose of a prevailing wage law is to protect local construction labor standards in the competitive bidding process. Public construction bidding is different from private-sector construction. Public bodies in Minnesota are required to select the lowest bidder. In the low-bid model, contractors aim to lower their bids however possible, including through cutthroat reductions in worker wages, benefits, and apprenticeship training or benefits. Thus, long-term investments in workers through training, health, and well-being are often jettisoned by contractors to win bids on short-term projects.

Large infusions of government spending into an area, along with a contract award process that rewards the lowest bidder, may also attract contractors from areas with low wages and low skills. Any appreciable infusion of low-wage contractors could result in the erosion of local standards. In fact, Minnesota's prevailing wage law was enacted in 1973 in response to an incident in which out-of-state workers, who earned much less than local workers, were hired for a University of Minnesota farm project (Minnesota DLI, 2017a). Prevailing wage laws level the playing field for contractors by taking labor costs out of the equation, incentivizing them to compete based on core competencies and efficiencies in construction rather than on undermining middle-class compensation standards.

According to Minnesota's prevailing wage law, any construction project funded in whole or in part by state funds is covered by the policy (Minnesota DLI, 2017b). For example, state-funded construction involving highways, roads, wastewater treatment plants, public utilities, colleges, and parks and recreation improvements are covered by the policy. Other statutes allow municipalities and school districts to require the payment of local prevailing wages when state funding is not involved (Minnesota Statutes § 471.345).

The Department of Labor and Industry conducts an annual voluntary survey of construction industry stakeholders to determine state prevailing wage rates (Minnesota DLI, 2017c).

Surveys are sent to all segments of the construction industry to ascertain prevailing wage rates on construction projects in Minnesota. The Department recognizes six general categories, which cumulatively cover all the labor codes of trade and equipment used in construction. These are laborers; special trades (such as electricians, carpenters, and plumbers); operators of special equipment; operators of heavy and highway equipment; operators of commercial power equipment; and truck drivers (Minnesota DLI, 2017d).

Prevailing wage and benefit rates are based on the most common wage paid for a job classification in a county (Minnesota DLI, 2017b). Rates may be the same in neighboring counties, but typically vary between regions. Prevailing wages are required on state-funded projects with a value of $2,500 if a single trade is involved and $25,000 if multiple trades are involved (WHD, 2017).

Previous research has concluded that the Minnesota Prevailing Wage Act benefits the public. In 2006, policy researchers from Brevard College, the University of Illinois at Urbana-Champaign, the University of Minnesota, and Indiana University– South Bend found that the survey method used to gather data and ascertain prevailing wage rates in Minnesota was both valid and reliable, and that prevailing wage strengthens apprenticeship programs, reduces injury rates, and decreases project cost overruns. Minnesota's prevailing wage law, they estimated, boosts construction worker income in the state by between $193 million and $901 million and, as a result, improves tax revenues by between $38 million and $178 million annually (Jordan et al., 2006).

This report aims to update and expand upon that previous research from a decade ago. This study examines the effects of Minnesota's prevailing wage law on the cost of public construction, apprenticeship programs, and economic development outcomes– including impacts on worker incomes, government assistance programs, and the broader Minnesota economy. The results of this study indicate that Minnesota's prevailing wage law keeps construction costs stable, is an effective job skills advancement policy, and provides pathways into the middle class for blue-collar construction workers. Accordingly, Minnesota's prevailing wage law has positive effects on the state economy.

SECTION ONE: PUBLIC CONSTRUCITON COSTS

Peer-Reviewed Research on the Effect of Prevailing Wage Laws on Construction Costs

The preponderance of peer-reviewed research has concluded that prevailing wage laws have no impact on total construction costs (Duncan & Ormiston, 2017; Mahalia, 2008). Why don't prevailing wage laws increase construction costs? To begin, labor costs are a low and historically declining percentage of total costs in the construction industry– approximately 23 percent of all building costs in the United States (Census, 2012a). Next, peer-reviewed research indicates that, when wages rise in construction, contractors respond by utilizing more capital equipment and by hiring skilled workers in place of their less-productive counterparts (Balistreri et al., 2003; Blankenau & Cassou, 2011). Finally, recent evidence reveals that contractors also respond to higher wages by reducing expenditures on materials, fuels, and rental equipment and by accepting marginally lower profit margins (Duncan & Lantsberg, 2015). Since labor costs represent a small portion of overall costs, only minor changes are needed to offset the effect of prevailing wage laws.

Since 2000, there have been 18 studies on the effect of federal, state, and local prevailing wage policies on the cost of public projects that have been published in peer-reviewed academic journals. Peer review is the process of establishing credibility by submitting research to a group of anonymous, independent experts who critically evaluate the methodologies and conclusions before it can be accepted for publication. By contrast, studies that have not undergone peer review can suffer from errors, methodological defects, and misleading conclusions.

> **Labor costs are a low share of total costs in construction– just 23%.**

Of the 18 peer-reviewed studies on prevailing wage laws since 2000, 11 pertain to school construction costs, which is a key focus among economic researchers. Public school construction is more homogenous than other types of public works projects, which makes it easier to isolate the potential cost impact of prevailing wage laws. In addition to these 11 studies on school construction costs, three evaluate highway costs, two are focused on affordable housing, and two investigate public and municipal buildings. In total, 13 of these peer-reviewed studies (72 percent) find that prevailing wage laws have no effect on the cost of public construction projects, including 9 out of the 11 peer-reviewed studies (82 percent) on the impact of prevailing wage laws on school construction costs. The earliest peer-reviewed studies that used regression analyses to assess the effect of prevailing wage laws on school construction costs were authored by Professors Azari-Rad, Philips, and Prus. These economists examined more than 4,000 schools built across the United States and did

not find any statistically significant cost difference between schools built in states with prevailing wage laws and those constructed in states without prevailing wage laws (Azari-Rad et al., 2002; Azari-Rad et al., 2003).

Five studies have taken advantage of the introduction of a prevailing wage policy in British Columbia, Canada to compare school construction costs. British Columbia's Skill Development and Fair Wage Policy is similar to the relatively strong prevailing wage laws in states like Minnesota, Illinois, and Washington. Professors Bilginsoy and Philips were the first to examine the Skill Development and Fair Wage Policy. After accounting for the construction business cycle, the number of competitors, the project type, and a time trend, the authors find that school construction costs under the policy were not statistically different from costs of schools built prior to the introduction of prevailing wage (Bilginsoy & Philips, 2000).

Professors Duncan, Philips, and Prus examined the effect of British Columbia's prevailing wage policy by including a control group of private school projects (Duncan et al., 2014). This analysis indicates that, before the introduction of prevailing wage, public schools were more expensive to build than comparable private schools. The cost differential, however, was unchanged after the wage policy was enacted. These authors have also used British Columbia data to examine the effect of prevailing wage laws on productivity and efficiency. They found that public school projects were between 16 and 19 percent smaller than comparable private structures, in terms of square feet per project expenditure, before prevailing wage was introduced. This size differential did not change after the policy was in effect (Duncan et al., 2006). These results suggest that prevailing wage standards do not alter labor or other input utilization in a way that significantly affects projects. The authors further found that the policy, which implemented new apprenticeship training requirements, increased the average efficiency of public projects after 17 months, from 94.6 percent to 99.8 percent (Duncan et al., 2009). This improvement in overall construction efficiency is consistent with stable total costs. A similar pattern was observed with respect to cost efficiency (Duncan et al., 2012). Taken together, these studies of prevailing wages in British Columbia provide a comprehensive analysis which concludes that prevailing wages do not increase construction costs.

In two studies conducted in 2013, Professor Atalah introduced a new approach to test the hypothesis that prevailing wages increase school construction costs. Based on the examination of over 8,000 bids on 1,496

school projects in Ohio, the studies compare bids of contractors who are signatories to collective bargaining agreements and pay union wage and benefit rates to those submitted by open-shop contractors who typically pay lower rates. While schools are exempt from Ohio's prevailing wage law, union rates prevail for other construction funded by the state– meaning that the union-nonunion comparison offers an indirect test of the impact of prevailing wage. A comparison of average bid costs per square foot indicates that there is no statistically significant difference between union and nonunion contractors across the state; this is the case when evaluating all bids or just winning bids (Atalah, 2013a). When analyzing bids submitted by different trades, the average bid cost per square foot was not higher for 15 of the 18 trades (83 percent) that paid union rates (Atalah, 2013b). Professor Atalah's studies largely find that the payment of union wage rates is not associated with increased construction costs.

In addition to these studies that focus on school construction, three peer-reviewed studies have investigated the effect of prevailing wage laws on highway construction costs and four others have examined the impact on affordable housing and municipal projects (Vitaliano, 2002; Duncan, 2015a; Duncan, 2015b; Dunn et al., 2005; Palm & Niemeir, 2017; Kim et al., 2012; Kaboub & Kelsay, 2014). The majority of these studies also conclude that prevailing wage laws have no impact on total construction costs.

> **72% of all peer-reviewed studies conducted since 2000 find that prevailing wage laws have no effect on the cost of public construction projects.**

Finally, it is worth noting four additional studies that utilize regression analyses but have not been subject to peer review (Onsarigo et al., 2017; Kelsay; 2015; Philips, 2014; Ohio LSC, 2002). The four studies observe a total of 1,893 school projects in the Midwest and Mid-Atlantic regions. All four studies find that state prevailing wage laws have no statistically significant impact on total construction costs.

Research on the Effect of Prevailing Wage Laws on Bid Competition

Many opponents of prevailing wage laws assert that the wage policy reduces the level of bid competition, leading to higher costs on public projects. This claim is often made in the absence of any empirical evidence (e.g., Leef, 2010). However, there have been three peer-reviewed studies since 1999 and one recent report that empirically examine the effect of prevailing wage laws on the level of bid competition– an important determinant of construction costs (Figure 1).

Four recent studies evaluating more than 2,000 bids find that prevailing wage does not reduce bid competition.

All four economic studies conclude that prevailing wage standards do not reduce the number of bidders on public projects. In an examination of 565 bids on public works projects in five northern California cities, Professors Kim, Kuo-Liang, and Philips found no evidence that prevailing wage policies affect the number of bidders (Kim et al., 2012). Evaluating 497 bids on highway construction projects in Colorado, Professor Duncan found that the level of bid competition does not differ between federally-funded projects, which require the payment of prevailing wages and adherence to the Disadvantaged Business Enterprise policy, and state-funded projects, which are not subject to either of these policies (Duncan, 2015a). Similarly, Professor Bilginsoy analyzed 452 bids on school construction projects in British Columbia, Canada, and discovered that the introduction of prevailing wage standards was associated with an increase in bid competition that diminished over time (Bilginsoy, 1999). Finally, while a 2017 study on Ohio's prevailing wage law has not been peer-reviewed, the authors found that prevailing wage standards are actually associated with *increased* bid competition, based on 669 bids on school construction projects in the state (Onsarigo et al., 2017). All of these studies– investigating 2,183 total bids on public projects in four distinct states or provinces– find that prevailing wage standards do not reduce bid competition and do not increase construction costs.

Figure 1: Recent Studies on the Impact of Prevailing Wage on Contractor Bid Competition

Author(s)	Year	Project Focus	Projects	Geography	Effect
Onsarigo et al.	2017	School Construction	669	Ohio	+0.27 bids
Duncan	2015	Highways	497	Colorado	No Effect
Kim et al.	2012	Municipal	565	California	No Effect
Bilginsoy	1999	School Construction	452	British Columbia	+8.4 bids*

Source: Individual studies listed in table. *Bilginsory's (1999) prevailing wage effects diminish by -0.2 bids per year over time.

The Impact of Prevailing Wage on School Construction Costs in Minnesota: Evidence from the Twin-Cities Metropolitan Area

Minnesota statutes allow school districts to apply state prevailing wage and benefit rates to projects that do not involve state funding. Data from school construction projects in the seven-county Minneapolis-St. Paul metropolitan area are analyzed to determine whether projects requiring the payment of prevailing wage and benefits are more costly than projects that are not covered by the wage policy. Included in the seven-county region are Anoka, Hennepin, Ramsey, Washington, Carver, Scott, and Dakota Counties. The school construction cost data were obtained from applicable school board meeting minutes, construction manager bid tabulations, and from Dodge Data and Analytics, an organization that collects and distributes construction project information to industry stakeholders (Dodge, 2017).

Specifically, 640 subcontractor low bids submitted to construction managers between 2015 and 2017 were evaluated. Construction managers assist school districts with the design, planning, and management of construction. For the projects included in this study, construction managers did not self-perform any construction work, but instead assumed responsibility for work subcontracted to other construction establishments. Consequently, subcontractors submitted bids for specific project tasks, such as asphalt paving, carpentry, and concrete work. Subcontractor bids ranged between $4,000 and more than $12 million and included work on the construction of new schools, renovations, additions, and remodeling. The data also include information on overall project size and complexity, the address of the winning contractor, and whether the winning contractor was signatory to a collective bargaining agreement.

This study takes advantage of the fact that prevailing wage standards were applied on some school construction projects but not required on others in the metropolitan area. Of the 640 bids, prevailing wage standards were applied on 286 low bids. The remaining 354 low bids did not require the payment of prevailing wages. A full description of the data and statistical methods employed can be found in the Appendix.

The school project data and statistical analyses provide an opportunity to examine the effect of prevailing wage standards on school construction costs, taking into consideration other factors that may also affect costs– such as the size and complexity of the overall project, the specific type of work conducted, whether the winning contractor was from the metro area or party to a collective bargaining agreement, and if the project involved new construction work.

Three different regressions indicate that Minnesota's prevailing wage law has no statistically significant effect on school construction costs. The suggestive results range from a 1.8 percent decrease in school

project costs to a 2.6 percent increase in school project costs, but none are significant at the 95-percent level of confidence (Figure 2). A statistically insignificant result implies that any measured cost difference is due to chance and that the relationship between costs and the wage policy is not causal. Thus, with a high degree of certainty, it is accurate to conclude that the cost of building schools in the Twin Cities metropolitan area is not related to, or affected by, prevailing wage standards (Figure 2).[2]

This finding is consistent with the preponderance of peer-reviewed research regarding the effect of prevailing wages on construction costs. Additional results also indicate that the bids of winning contractors who are signatories to collective bargaining agreements are not statistically different from the bids of nonunion contractors.

An analysis of 640 subcontractor low bids finds that prevailing wage has no effect on school construction costs.

Furthermore, other information obtained from the school construction data indicate that the use of prevailing wage standards result in a greater share of public construction work awarded to local contractors. While 640 subcontractor low bids had complete information required for the regression analyses, there are 681 projects with sufficient information to determine the value of construction work awarded to contractors with business addresses inside or outside of the seven-county metropolitan area. Prevailing wage standards were applied to 315 of these low bids, with the remaining 366 low bids not covered by the wage policy. Based on this larger sample, the total bid value was approximately $339 million (Figure 3).

When Twin Cities area school districts choose to include prevailing wage on projects, local contractors account for a 10% higher market share.

Fully 74 percent of the total bid values of school projects requiring the payment of prevailing wages was won by metro-based contractors (Figure 3). For projects in the seven-county area that did not require the payment of prevailing wages, only 64 percent of the combined low bid values was awarded to contractors with business addresses located within the seven-county metro area. This difference indicates that, when a school district located within the seven-county Twin Cities metropolitan area chooses to include prevailing wage standards, about 10 percent more of the value of the project is completed by local contractors and workers, on average. This result corroborates the economic finding that prevailing wage standards protect work for local contractors.

[2]These findings did not change when the measures of contractor characteristics– such as whether the winning contractor was a union contractor or from outside of the metro area– were not included in the estimate. Please see the Appendix for details.

Figure 2: Summary of Regression Results on the Effect of Applying Prevailing Wage Standards on School Project Costs in the Seven-County Twin Cities Region, 2015-2017

Impact	Regression Type	Effect	Standard Error
ln(price of winning bid)	OLS regression	+0.026	(0.08)
ln(median winning bid)	Quantile (Median) regression	-0.018	(0.12)
ln(price of winning bid)	Endogenous Treatment Effects regression	-0.014	(0.33)

Source: Authors' analysis of School District Board Meeting minutes and Dodge Data and Analytics (Dodge, 2017). None of the results are statistically significant at p<|0.10|. All models include a sample size of 640 winning bids on school construction projects. For more information, please see the Appendix.

Figure 3: Share of School Construction Work Completed by Local Contractors in the Seven-County Twin Cities Region, by Prevailing Wage Status, 2015-2017

Summary Statistics	School Projects with Prevailing Wage	School Projects without Prevailing Wage
Number of school construction projects	315	366
Cumulative bid value of all school projects	$139 million	$200 million
Value awarded to metro-based contractors	$103 million	$128 million
Share of value awarded to metro-based contractors	74%	64%

Source: Authors' analysis of School District Board Meeting minutes and Dodge Data and Analytics (Dodge, 2017).

SECTION TWO: APPRENTICESHIP TRAINING

Research on the Effect of Prevailing Wage Laws on Apprenticeship Training

Construction is the most volatile major industry in the United States. The construction industry is seasonal, with major projects built and repaired during peak months. The construction industry is also cyclical, with more activity during the upswing in the business cycle when market conditions are favorable. Finally, when workers complete a project, there is often a period of unemployment while they look for another job. This inherent instability of building activity creates strong disincentives for employers and employees to invest in the type of training that leads to a highly skilled, efficient, and safe workforce. There is little incentive for contractors to incur the expenses associated with training because there is no guarantee that the trained worker will be retained and it is likely that at some point a trained employee may work for a competing contractor. From the worker's perspective, there is also little incentive to incur the costs of training out-of-pocket due to the possibility of prolonged spells of unemployment.

The end result is a "market failure" in which insufficient worker training is provided in construction without proactive public policies. Unlike manufacturing, where the product and the production processes are uniform, the majority of construction output is not standardized. Most building sites, designs, and logistics vary from project to project and require skilled workers who can build customized infrastructure. Broadly-trained craft workers, who complete a mix of on-the-job training and in-class theoretical education through registered apprenticeship programs, are needed.

Prevailing wage laws correct the market failure of insufficient worker training in construction.

A state prevailing wage law helps to correct this market failure by reflecting local market-based standards for wages, benefits, and training contributions in the community where the project is being built. Economic research shows that state prevailing wage laws increase apprenticeship training in the construction industry. Economist Cihan Bilginsoy has found that apprenticeship enrollments are 6 to 8 percent higher in states with prevailing wage and that apprentices complete their on-the-job and classroom training at a faster rate in these states (Bilginsoy, 2005). Another study found that the apprenticeship share of the construction workforce is 14.4 percent in states with prevailing wage laws compared to 7.7 percent in states without prevailing wage laws (Dickson Quesada et al., 2013). The result is that workers are more productive due to prevailing wage laws. Productivity per construction worker is 14 to 33 percent higher in states that have the wage policy (Philips, 2014). Prevailing wage promotes a skilled workforce that completes high-quality public construction projects on

time and under budget. This skilled workforce remains stable for public construction needs because prevailing wages strengthen private apprenticeship investments by recognizing existing training standards.

Conversely, economic research conducted after the repeal of prevailing wage have shown a strong correlation with a decrease in worker training. After Utah repealed its law, the rate of apprenticeship training declined to historical lows (Azari-Rad et al., 2003). Registered apprenticeships fell by 38 percent in Kansas following repeal (Philips, 2014). After repeal of Colorado's prevailing wage law in 1985, apprenticeship training decreased by 42 percent. In fact, in an analysis of nine states that repealed their prevailing wage laws from 1979 to 1988, researchers found that repeal was associated with a decrease in training by 40 percent and caused workplace injuries to rise by 15 percent (Philips et al., 1995). More recent data reveals that job-related disabilities are 12 percent higher and fatality rates are 18 percent higher in states without prevailing wage laws (Philips, 2014; Dickson Quesada et al., 2013).

> **Job-related disabilities are 12% higher and job-related fatality rates are 18% higher in states without prevailing wage laws.**

Apprenticeship Training in Minnesota: A Comparison of Joint Labor-Management and Employer-Only Programs

The Office of Apprenticeships at the U.S. Department of Labor works in conjunction with approved State Apprenticeship Agencies to set basic standards for programs that meet federal requirements for formal apprenticeship and prevailing wage work. Within this framework, sponsors have freedom to determine program content, applicant qualifications, and other aspects of the program (DOLETA, 2017). Apprenticeship data from the Minnesota Department of Labor and Industry is available through a Minnesota Government Data Practices Act open records request. The data– covering the three-year period from July 2014 through July 2017– contains information on active apprenticeships, enabling comparisons between joint labor-management programs and non-joint employer-only programs.

93% of construction apprentices in Minnesota are enrolled in joint labor-management programs.

In the non-joint segment of the construction industry, apprenticeship programs are sponsored by a single contractor or by groups of "open shop" employers. These employers unilaterally determine program content, set entry requirements, select apprentices, and monitor trainee progress. Sponsoring contractors typical pay directly for the costs of training apprentices.

By contrast, in the joint labor-management sector, apprenticeship training is cooperatively determined and managed by labor organizations and signatory contractors. Funding for training in joint labor-management programs is financed by a "cents per hour" rate that is part of the total wage and benefit package negotiated privately with contractors. The important distinction is that, under the joint labor-management system, the costs of training the next generation of workers are included in a project bid and paid by the project owner.

Three-year apprenticeship data for Minnesota are reported in Figure 4. While there were a larger number of employer-only programs (212 programs) that were active at any point during the three-year period compared to joint labor-management programs (68 programs), a significant majority of registered apprentices in Minnesota are enrolled in joint labor-management programs. Between July 2014 and July 2017, more than 30,600 active apprentices were enrolled in joint labor-management programs compared to about 2,400 trainees in employer-only programs. In total, approximately 93 percent of all

registered apprentices were enrolled in joint labor-management programs (Figure 4).

Figure 4 also breaks down active apprentices by demographic characteristics. Regardless of racial background, more than nine out of every 10 apprentices belong to joint labor-management programs. Joint programs, however, account for a greater share of people of color than nonjoint programs. Joint labor-management programs train 92 percent of all white apprentices, 92 percent of all African-American apprentices, 95 percent of all Latino and Latina apprentices, and 98 percent of apprentices from other racial backgrounds in Minnesota.

The two other demographic characteristics described by the Minnesota Department of Labor and Industry are gender identification and veteran status. Once again, joint labor-management programs account for a clear majority of active apprentices from these groups. By gender identification, about 94 percent of all male apprentices and 79 percent of all female apprentices are enrolled in joint labor-management programs.

Additionally, of the more than 1,800 veterans in registered apprenticeship programs between July 2014 and July 2017, over 1,500 were enrolled in joint labor-management programs (84 percent).

Financial information is publicly available for tax-exempt nonprofit organizations through Form 990 reports submitted to the Internal Revenue Service (IRS), including for those involved in educational activities such as apprenticeship training (ProPublica, 2017). Figure 5 presents financial data for the 10 largest joint labor-management apprenticeship programs, by active apprentices, and the non-joint apprenticeship program for the Associated Builders and Contractors (ABC) of Minnesota and North Dakota.

The Associated Builders and Contractors' training program in the state is called the Construction Education Foundation of Minnesota. Employer-only training programs associated with ABC chapters are typically characterized by task-driven and modular training with a lower priority placed on the full-scope craft training characteristic of joint labor-management training programs. In Fiscal Year 2015, the ABC's apprenticeship program had approximately $297,000 in annual revenue, $290,000 in total assets, and reported one employee (CEF, 2015). The Construction Education Foundation of Minnesota had 150 active apprentices between July 2014 and July 2017, or an average of 50 per year (Figure 5).

Figure 4: Characteristics of Joint Labor-Management Apprenticeship Programs and Non-Joint Employer-Only Training Programs in Minnesota, July 2014 to July 2017

Minnesota Registered Apprenticeships Category or Characteristic, 2014-2017	Joint Labor-Management Programs	Employer-Only Programs	Total for All Registered Programs	Joint Labor-Management Share
Number of programs	68	212	280	24.3%
Number of active apprentices	**30,658**	**2,448**	**33,106**	**92.6%**
Male apprentices	28,902	1,973	30,875	93.6%
Female apprentices	1,756	475	2,231	78.7%
White non-Latino apprentices	24,625	2,127	26,752	92.0%
African-American apprentices	2,049	177	2,226	92.0%
Latino or Latina apprentices	1,952	108	2,060	94.8%
Apprentices of other racial backgrounds	2,032	36	2,068	98.3%
Veteran apprentices	1,518	301	1,819	83.5%

Source: Minnesota Department of Labor and Industry's "Gender/Ethnicity/Veteran Reports" from July 2014 through July 2017. Information obtained through a Freedom of Information Act (FOIA) open records request.

By contrast, the 10 joint labor-management programs with the highest amounts of enrolled apprentices had a combined $29.8 million in annual revenue, $68.5 million in total assets, and 252 employees in Fiscal Year 2015 (Figure 5). These resources are used to train nearly 6,700 active apprentices per year, as 20,032 apprentices were registered in these programs over the three-year period. The program operated by the International Union of Operating Engineers Local 49 and the Associated General Contractors (AGC) of Minnesota had the highest amount of assets, at $20.0 million (IUOE 49, 2015). The program operated by the North Central States Regional Council of Carpenters and signatory contractors had the highest annual revenue, at $7.5 million (Carpenters, 2015).

These data illustrate the disparity in training resources between joint labor-management training programs and those offered by the local ABC chapter. Compared to the 10 largest joint labor-management programs, the ABC's Construction Education Foundation of Minnesota has just 1.0 percent as much funding and 0.4 percent as much in total assets. Put simply, joint labor-management apprenticeship programs account for the vast majority of human capital investment in Minnesota's construction industry.

These findings are consistent with the preponderance of research indicating that joint labor-management apprenticeship programs are characterized by larger numbers and more training resources. Across the United States, 79 percent of all apprenticeship graduates in construction come from joint labor-management programs (Bilginsoy, 2017). In the Midwest, joint labor-management programs have an even larger role in training construction workers. The shares of active apprentices in joint labor-management programs are 98 percent in Illinois, 94 percent in Indiana, 95 percent in Wisconsin, 82 percent in Ohio, and 79 percent in Kentucky (Manzo & Bruno, 2016; Philips, 2015a; Philips 2015b; Onsarigo et al., 2017; Duncan & Manzo, 2016). In Illinois, joint labor-management programs account for 99 percent of all privately-funded

apprenticeship expenditures and return $11 in economic and tax benefits per dollar invested over the long run (Manzo & Bruno, 2016).

Addressing the high demand by contractors for skilled labor requires support for policies that improve apprenticeship training. In a January 2018 survey of Minnesota construction firms by the Associated General Contractors, fully 72 percent reported that they are having a difficult time filling craft worker positions and 57 percent said that worker shortages are the biggest concern facing their company (AGC, 2018). By strengthening private apprenticeship investments, Minnesota's prevailing wage law is an essential policy to help meet the current demand for skilled workers.

> Joint labor-management apprenticeship programs account for the vast majority of human capital investment in Minnesota's construction industry.

Figure 5: Financial Information of the Ten Largest Joint Labor-Management Programs Compared to the Associated Builders and Contractors' Employer-Only Program in Minnesota, FY2015

Program Sponsor	Type	Total Revenue	Total Assets	Total Employees	Average Apprentices*
Construction Laborers Education JAC	Joint	$3,815,458	$9,089,178	22	2,986.0
Carpenters and Joiners JAC	Joint	$7,531,357	$10,451,716	59	931.0
Metro Area Roofers Local 96 JAC	Joint	$599,009	$1,830,149	4	535.3
Metro Sheet Metal JAC	Joint	$1,946,606	$4,664,418	24	488.3
Minneapolis Electrical JATC	Joint	$3,711,851	$6,578,581	32	473.3
Operating Engineers Local 49 JAC	Joint	$6,320,862	$19,978,166	31	298.0
St. Paul Pipefitters JAC	Joint	$2,386,737	$9,473,542	35	281.0
Limited Energy System JAC	Joint	$853,451	$929,734	15	255.7
Bricklayers Local 1 Minnesota JAC	Joint	$1,289,201	$2,865,315	27	241.3
Minneapolis Plumbers JAC	Joint	$1,311,469	2,685,332	3	187.3
10 Largest Joint Programs	**Joint**	**$29,766,001**	**$68,546,131**	**252**	**6,677.3**
Construction Education Foundation (ABC)	**Non**	**$296,803**	**$289,640**	**1**	**50.0**

Source: Authors' analysis of Form 990 tax information submitted to the Internal Revenue Service and listed publicly at ProPublica (2017). Data from Minnesota Department of Labor and Industry's "Gender/Ethnicity/Veteran Reports" are cross-referenced with Form 990 financial information from Fiscal Year 2015. *July 2014 through July 2017 data divided by three years.

SECTION THREE: ECONOMIC DEVELOPMENT

Research on the Effect of Prevailing Wage Laws on Economic Outcomes

In addition to ensuring that the next generation of construction workers is trained, state prevailing wage laws foster good, middle-class careers for construction workers. There is a significant disparity in wages paid to blue-collar construction workers between states with prevailing wage laws and states without the wage policy (Philips, 2014). A recent economic analysis found that prevailing wage statistically increases blue-collar construction worker earnings by about 16 percent per year. Effects are largest, however, among the poorest individuals, increasing earnings by about 18 percent for low-income construction workers– while having no effect on the salaries of managers and supervisors in the industry (Manzo et al., 2016a). By stabilizing the wage floor, prevailing wage laws have been found to reduce the number of blue-collar construction workers earning less than the official poverty line by 30 percent and reduce income inequality in the construction industry by as much as 45 percent (Manzo et al., 2016a; Manzo & Bruno, 2014).

By supporting middle-class lifestyles for blue-collar workers, prevailing wage laws encourage skilled individuals to join the construction trades (Philips, 2014). A January 2018 survey by the Associated General Contractors found that 64 percent of construction firms in Minnesota increased base pay in 2017 in order to retain or recruit skilled hourly craft professionals (AGC, 2018). With 72 percent of contractors reporting that they are experiencing difficulty in hiring skilled labor and extremely low unemployment in Minnesota, weakening or repealing the prevailing wage law would have a negative effect on worker wages and benefits, hurting recruitment into the construction trades.

> **Prevailing wage laws improve apprenticeship training, promote a strong middle class, and have positive impacts on public budgets.**

By improving apprenticeship training and safety, promoting a strong middle class, incentivizing skilled workers to enter the construction industry, and keeping construction costs stable, prevailing wage laws have a positive impact on public budgets. Because they earn higher incomes, blue-collar construction workers in states with prevailing wage laws contribute more in tax revenues than their counterparts in states without the law. In fact, the absence of prevailing wage standards reduces income tax and property tax revenues from blue-collar construction workers by 17

percent while raising the number of workers on government assistance programs (Philips & Blatter, 2017). Blue-collar construction workers in states without effective prevailing wage laws are statistically more likely to rely on Supplemental Nutrition Assistance Program (SNAP) food stamps and qualify for Earned Income Tax Credit (EITC) assistance (Manzo et al., 2016a).

Prevailing wage also produces critical social benefits. For example, veterans are more likely to populate the construction trades and to own construction firms than non-veterans. Any given blue-collar construction worker is 1.9 percentage-points more likely to be a military veteran in states that have strong or average prevailing wage laws. In addition to increasing veteran employment in blue-collar construction occupations, strong or average prevailing wage laws boost the annual incomes of veteran blue-collar construction workers by up to 11 percent, increase employer-provided health coverage for veterans by as much as 15 percent, and reduce veteran poverty by between 24 and 31 percent for those working in construction (Manzo et al., 2016b).

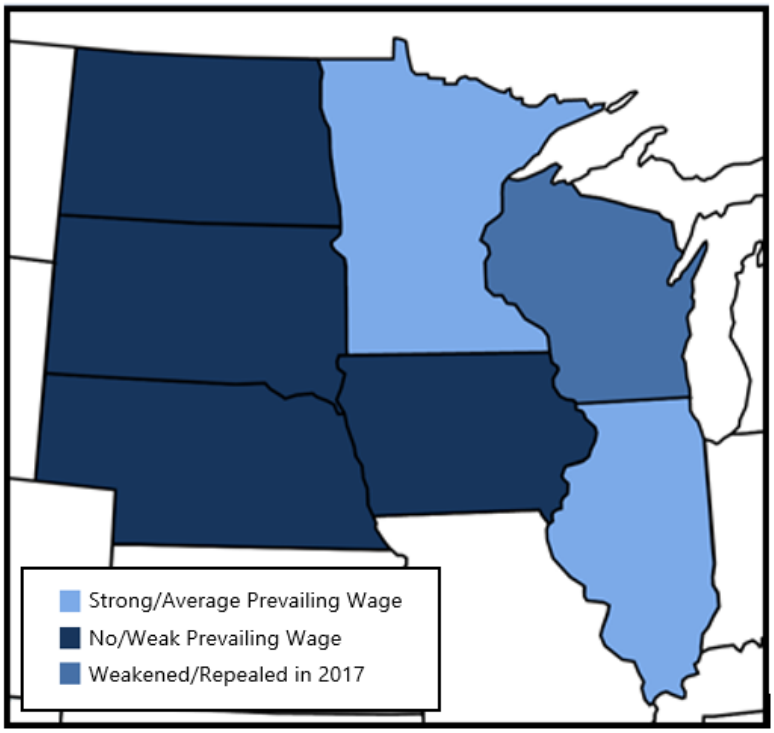
Economic research has found that prevailing wage helps workers of all races. While the empirical evidence has established this time and again, opponents of prevailing wage occasionally rely on spurious claims of racial disparities in the law. No racial disparities exist. In fact, prevailing wage levels the playing field for contractors and prohibits them from paying less than the local living wage to any group of workers, helping to reduce pay discrimination in construction.

For example, peer-reviewed studies have found no relationship between prevailing wage laws and the racial composition of the construction labor force. After accounting for individual factors such as age, gender, residence in a metropolitan area, marital status, educational attainment, and union coverage, there is no evidence that African-American workers are discriminated against as a result of prevailing wage laws (Belman & Philips, 2005). Another recent working paper, the most comprehensive analysis to date on African-American representation in construction, finds that any perceived discrimination attributable to prevailing wage laws completely disappears once a state's racial composition and economic conditions are considered (Belman et al., 2018; Duncan & Ormiston, 2017).

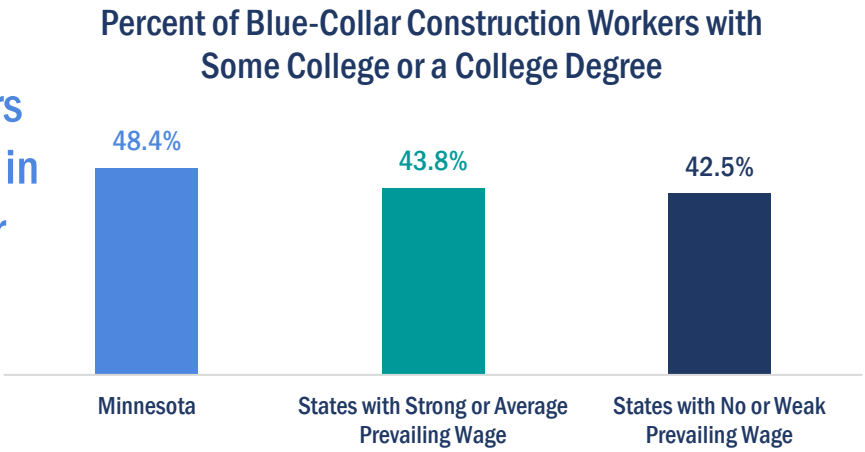
The Effect of Prevailing Wage on Construction Worker Incomes and Reliance on Public Assistance in Minnesota

This section compares labor market outcomes for construction workers residing in a seven-state region with Minnesota at the heart (Figure 6). The states are categorized by those with *strong or average* prevailing wage laws and those with *weak or no* prevailing wage policies. In 1995, Armand Thieblot rated state-level prevailing wage laws based on factors including coverage thresholds, type of work covered, and the determination of wage rates; this methodology is used to assess state prevailing wage laws in the seven-state region (Thieblot, 1995). States with strong or average prevailing wage laws include Minnesota and Illinois. States with weak or no laws include Iowa, North Dakota, South Dakota, and Nebraska. Wisconsin had a strong prevailing wage law that was weakened on January 1, 2017 to exclude projects funded by local governments and then fully repealed later in 2017 (Bauer, 2017). Thus, Wisconsin observations starting in January 2017 are classified as occurring in weak or no law states.

Figure 6: Map of Minnesota and Six Neighboring States Used in Analysis, 2008-2017



Construction workers are highly educated in states with strong or average prevailing wage laws.



The data included in this report are from the Annual Social and Economic Supplement (ASEC) to the March *Current Population Survey* (Flood et al., 2017). The *Current Population Survey* is a random poll of households, jointly sponsored by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics. Figure 7 provides summary statistics for all employed blue-collar construction workers in the dataset, by state of employment. Blue-collar construction workers are defined as all workers employed in "construction occupations," such as construction laborers, operating engineers, electricians, carpenters, plumbers, pipefitters, and painters.

The blue-collar construction workforce is better-educated in states with strong or average laws than in states with weak or no laws (Figure 7). The share of blue-collar construction workers with a college degree or some college-level instruction (which can include apprenticeship training) is 43.8 percent in states with strong or average prevailing wage laws compared to just 42.5 percent in states with weak or no laws. In Minnesota, fully 48.4 percent of blue-collar construction workers have a college degree or have some college-level training.

Personal economic and health outcomes are very different in states with strong or average prevailing wage laws compared with those in states without effective prevailing wage laws (Figure 7). The average real wage and salary income for blue-collar construction workers was nearly $49,600 in states with strong or average prevailing wage laws in the region, or about $8,600 more than their counterparts in states with weak or no laws (about $40,900). In Minnesota, blue-collar construction workers earned nearly $7,000 more annually (over $47,900) than their counterparts in states with weak or no laws. Similarly, 75.9 percent of blue-collar construction workers in Minnesota were covered by a private health insurance plan and 44.4 percent had a pension plan at work. By contrast, in neighboring states without effective prevailing wage laws, only 70.8 percent of construction workers were covered by a private health insurance plan and just 37.4 percent had a pension plan at work. Private health insurance and pension coverage are significantly higher in states with strong or

average prevailing wage laws than in states with weak or no prevailing wage laws.

Other important data reported in Figure 7 indicate that blue-collar construction workers in states with weak or no prevailing wage laws are more likely to be impoverished, more likely to receive Supplemental Nutrition Assistance Program (SNAP) food stamp assistance, and more likely to have worse health conditions. Fewer blue-collar construction workers earned an annual income that placed them below the official poverty line (6.9 percent) in states with strong or average prevailing wage laws than in those without (7.7 percent). Accordingly, fewer blue-collar construction workers relied on food stamps in states with strong or average prevailing wage laws (5.6 percent) than in states with weak or no laws (8.2 percent). Minnesota's construction workers are 0.9 percentage-point less likely to earn less than the poverty line (6.8 percent), 2.7 percentage-points less likely to receive SNAP food stamp assistance (5.5 percent), and 4.5 percentage-points more likely to be in "excellent" health (31.6 percent) than their peers in neighboring states with weak or no prevailing wage laws.

While the summary statistics of Figure 7 report "what is," the remainder of this section investigates "how much" strong or average prevailing wage legislation is responsible for these outcomes. A *difference-in-differences* regression model is utilized to understand the impact of Minnesota's prevailing wage law. This technique, a "curve fitting" method, allows researchers to account for other factors that may influence market outcomes, separating out the unique and

Figure 7: Information on Construction Workers in Minnesota and Six Neighboring States, 2008-2017

Summary Statistics	Minnesota	States with Strong or Average Prevailing Wage (including MN)	States with No or Weak Prevailing Wage
Employed construction worker observations	703	2,235	2,347
Weighted annual construction workers	109,306	439,921	160,780
Demographics			
White, non-Latino	89.2%	76.6%	82.3%
People of color (non-white)	10.8%	23.4%	17.7%
Female	1.7%	2.4%	3.5%
High school degree or less	50.6%	55.1%	56.4%
Some college, no degree	15.8%	19.5%	19.2%
College degree	32.6%	24.3%	23.3%
Income, Healthcare, and Poverty			
Real wage and salary income*	$47,920	$49,587	$40,945
Usual hours worked per week last year	41.3	40.5	41.4
Covered by private health insurance plan	75.9%	74.0%	70.8%
Has a pension plan at work	44.4%	42.1%	37.4%
Lives below official poverty line	6.8%	6.9%	7.7%
Worker receives SNAP food stamp assistance	5.5%	5.6%	8.2%

Source: *Current Population Survey,* Annual Social and Economic Supplement (2008-2017). *Reported only for those workers with positive earnings.

independent effect of a strong or average prevailing wage law relative to the overall labor market in each state. The analyses include all observations of employed workers in the seven states over 10 years, investigating how strong or average prevailing wage laws impact blue-collar construction workers through an "interaction term." A statistically significant finding is an indication that the relationship may be causal. The models include ordinary least squares (OLS), quantile, and probit regression models.

A strong or average prevailing wage law produces positive impacts on labor market compensation outcomes in Minnesota. Based on the regional model, a strong or average prevailing wage increases annual blue-collar construction worker incomes by 5.2 percent on average (Figure 8). In addition, strong or average prevailing wage laws increase the probability that a blue-collar construction worker is covered by a private health insurance plan by 5.0 percentage points and the probability that he or she has a pension plan at work by 5.3 percentage points on average. All of these results are statistically significant at the 95-percent level of confidence. These results are also consistent with a national study by Manzo, Lantsberg, and Duncan, which found that prevailing wage laws were associated with higher annual incomes and greater health and pension coverage for blue-collar construction workers (Manzo et al., 2016a). By maintaining prevailing wage, Minnesota significantly expands private health and retirement coverage, thereby reducing costs to taxpayers as blue-collar construction workers remain self-sufficient instead of relying on public social insurance programs.

Construction workers in prevailing wage states have better wages, are more likely to have health insurance, and are less likely to rely on government assistance.

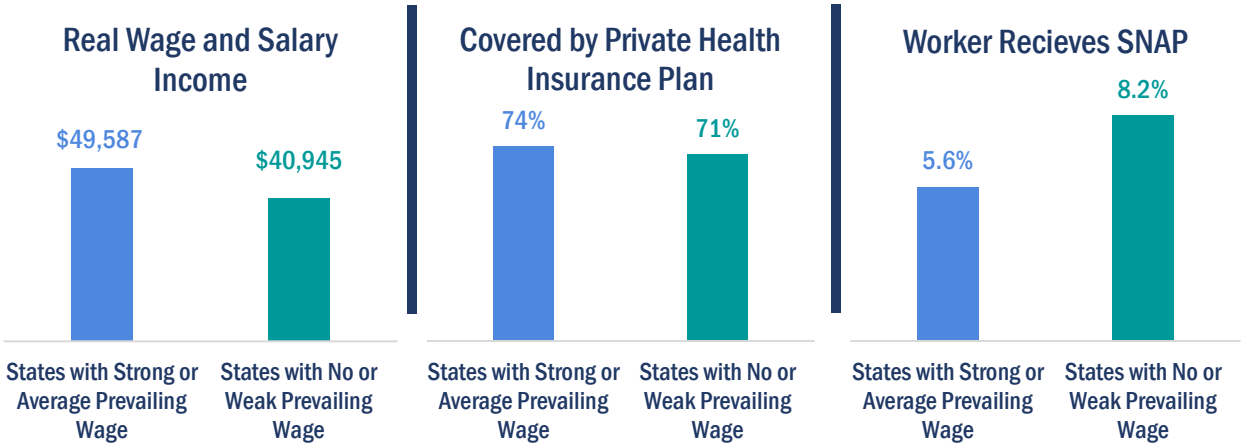
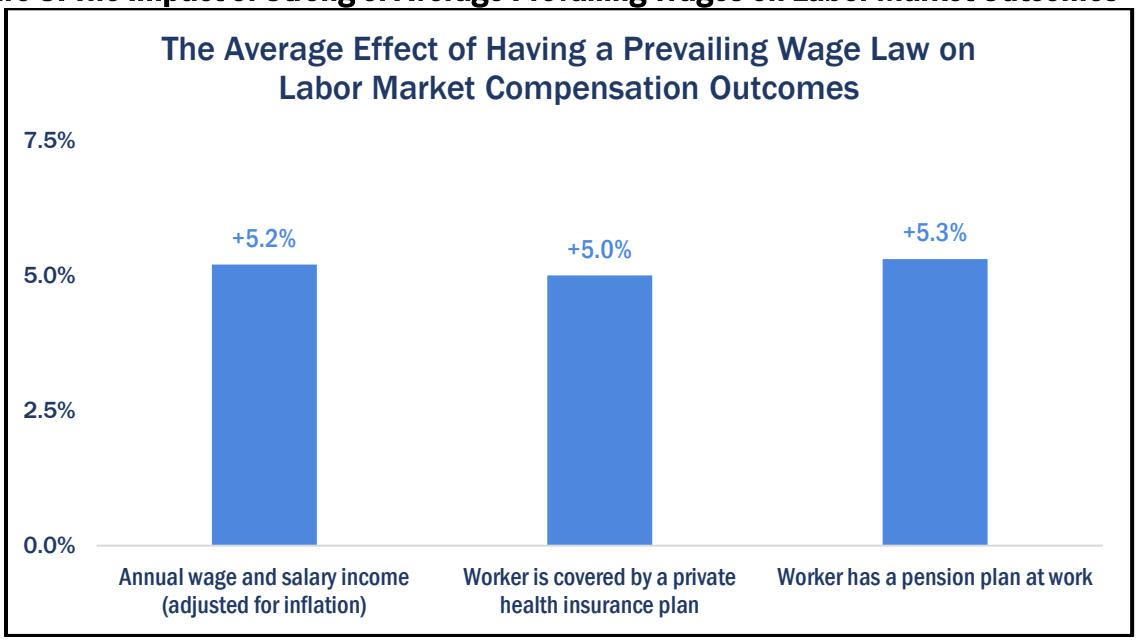


Figure 8: The Impact of Strong or Average Prevailing Wages on Labor Market Outcomes



Source: Authors' analysis of the *Current Population Survey*, Annual Social and Economic Supplement (2008-2017). For full regression results in .txt format, please contact author Frank Manzo IV at fmanzo@illinoisepi.org. All results are significant at p<|0.05|.

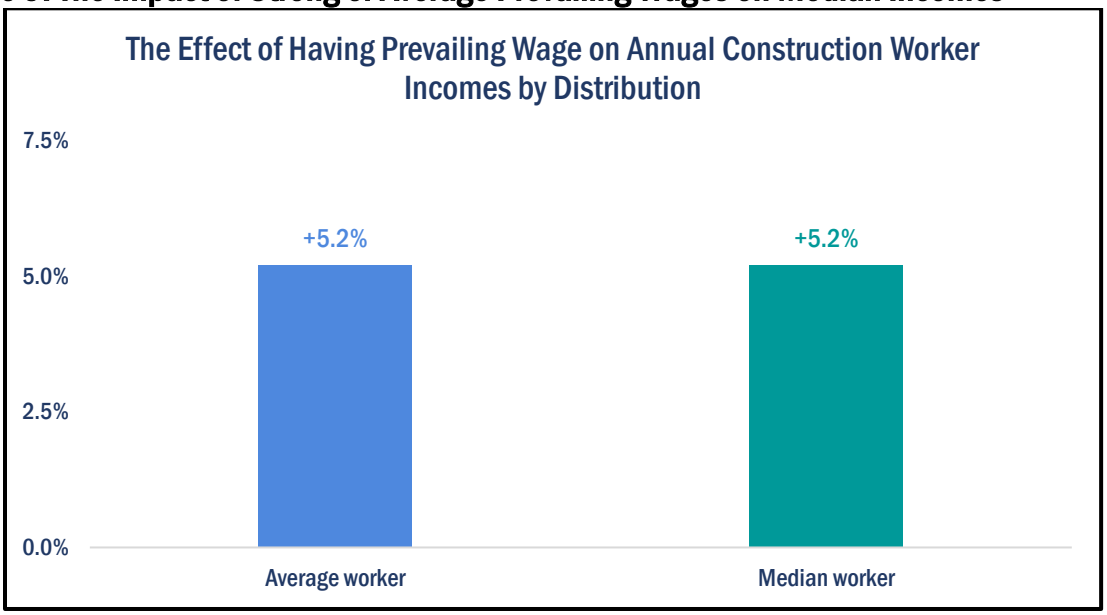
Prevailing wage increases blue-collar construction worker incomes by 5.2%.

Strong or average prevailing wage laws promote a strong middle class (Figure 9). Figure 9 presents results from a second analysis of prevailing wage on the median incomes of blue-collar construction workers. This model, a quantile regression, is a another way of evaluating the effect of strong or average prevailing wage laws that reduces the influence of outliers. The effect on the median blue-collar construction worker, at a 5.2 percent is consistent with the effect on the average worker. Taken together, these effects– which are all statistically significant at the 95 percent level of confidence– demonstrate that repeal of prevailing wage would result in an across-the-board pay cut for middle-class construction workers in Minnesota.

Strong or average prevailing wage laws increase worker earnings and improve employee benefits, resulting in more construction workers in the middle class. These economic benefits have spillover effects on government assistance programs.

As shown in Figure 10, the regional analysis provides statistical evidence that strong or average prevailing wage laws are associated with a 2.1 percentage-point decrease in the number of construction workers who qualify for and receive SNAP food stamp assistance. Minnesota's prevailing wage law helps reduce the financial burden on taxpayers in the state, because fewer construction workers need to rely on government assistance programs such as food stamps.

Figure 9: The Impact of Strong or Average Prevailing Wages on Median Incomes



Source: Authors' analysis of the *Current Population Survey*, Annual Social and Economic Supplement (2008-2017). For full regression results in .txt format, please contact author Frank Manzo IV at fmanzo@illinoisepi.org. All results are significant at p<|0.05|.

Figure 10: The Impact of Strong or Average Prevailing Wages on Food Stamp Recipiency

Impact on the Probability of Receiving Food Stamps	Average Marginal Effect
Strong or Average Prevailing Wage Law (Interaction)	–2.1%

Source: Authors' analysis of the *Current Population Survey*, Annual Social and Economic Supplement (2008-2017). For full regression results in .txt format, please contact author Frank Manzo IV at fmanzo@illinoisepi.org. Result is significant at p<|0.01|..

Figure 11 aggregates the findings to predict the number of affected workers in Minnesota due to the prevailing wage law. Figure 11 provides only a "static" assessment and assumes that nothing else would be different in an alternative scenario without prevailing wage. The top-line number is the average annual number of blue-collar construction workers in Minnesota from 2008 through 2017. These estimates do not include workers in extraction occupations, who are often grouped with construction workers, or white-collar employees in the construction industry.

The rest of the table incorporates the data to illustrate how Minnesota benefits by having a strong prevailing wage law, reported in percentage values and total worker values. Note that, given the finding by Professors Meyer and Mittag that government assistance is underreported by the *Current Population Survey* Annual Social and Economic Supplement (ASEC), Figure 11 likely provides conservative estimates (Meyer & Mittag, 2015).

Figure 11: Estimated Social Impact of Maintaining the Prevailing Wage Law in Minnesota

Economic or Budget Outcome for Blue-Collar Construction Workers	Actual (2008-2017)	If Minnesota Did Not Have Prevailing Wage	Estimated Benefit
Average workers in blue-collar construction occupations	109,300	109,300	--
Construction workers receiving SNAP food stamp assistance	5.5% *6,000*	7.6% *8,300*	–2.1% *-2,300*
Construction workers with a pension plan at work	44.4% *48,500*	39.1% *42,700*	+5.3% *+5,800*
Construction workers covered by private health insurance plan	75.9% *83,000*	70.9% *77,500*	+5.0% *+5,500*

Source: Authors' analysis of the *Current Population Survey*, Annual Social and Economic Supplement (2008-2017). All estimates rounded to the nearest hundred.

The data reveal that Minnesota's strong prevailing wage law prevents thousands of Minnesota construction workers from relying on government assistance programs (Figure 11). The average annual income of Minnesota's blue-collar construction workforce is 5.3 percent higher due to the state's prevailing wage law. For 2,300 of these workers, the pay raise associated with prevailing wage is so significant that they no longer qualify for Supplemental Nutrition Assistance Program (SNAP) food stamp assistance. In addition, the state's prevailing wage law increases health insurance and pension plan coverage for thousands of blue-collar construction workers in Minnesota. In fact, an estimated 5,800 construction workers have pension plans and 5,500 have private health insurance coverage due to Minnesota's prevailing wage law. By improving pension and health coverage, Minnesota's prevailing wage law prevents thousands of blue-collar construction workers from relying on public retirement and public health programs, further reducing costs to taxpayers.

> **Minnesota's prevailing wage law disproportionately benefits veterans who populate the trades at higher rates.**

It may be worth noting that, separate from Minnesota' prevailing wage law, construction trades unions also positively impact public budgets in Minnesota. A recent 2018 working paper by Professor Aaron Sojourner and José Pacas at the University of Minnesota finds that "union membership has a large, positive net fiscal impact." Union members, they find, contribute approximately $1,100 more in federal income taxes, state income taxes, and local property taxes while receiving about $180 less in public benefits such as food stamps, Medicaid, and welfare payments than

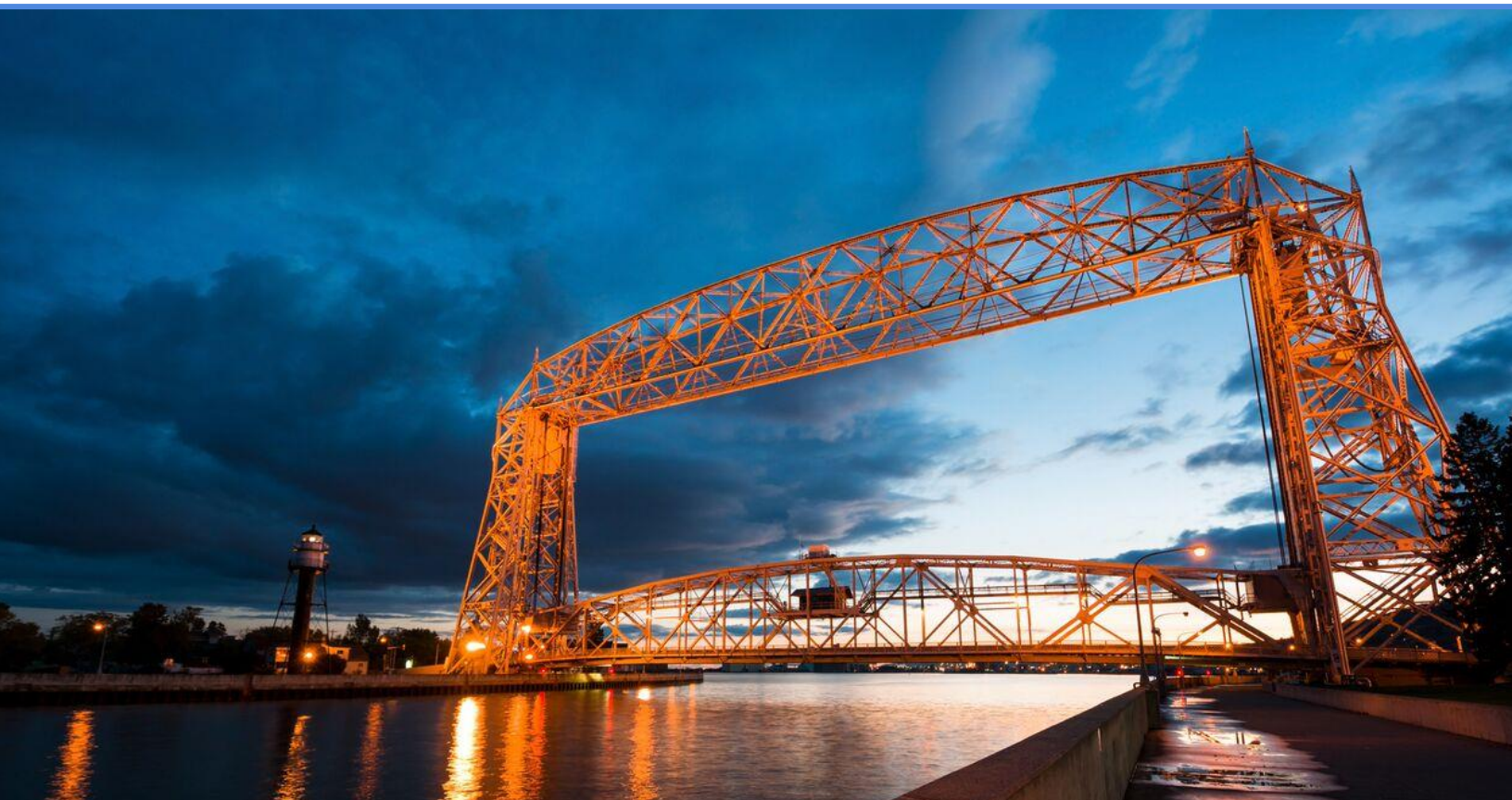
comparable non-union workers (Sojourner & Pacas, 2018).

Lastly, Figure 12 summarizes conclusions from a previous report on the benefits of prevailing wage to military veterans in Minnesota (Manzo et al., 2016c). In Minnesota, 10.9 percent of all construction firms with paid employees are owned by veterans, compared to 8.0 percent of all non-construction companies– a 2.9 percentage-point difference. Thanks to Minnesota's prevailing wage law, nearly 2,400 blue-collar veterans have pursued careers in construction occupations, as prevailing wage standards have improved the attractiveness of working in construction. Similarly, over 400 veterans are covered by employer-provided health plans and 100 veterans earn more than the poverty line as a result of Minnesota's prevailing wage law (Figure 12). Minnesota's strong prevailing wage law disproportionately benefits veterans who populate the trades at higher rates than non-veterans, and who increasingly utilize apprenticeship programs to transition into civilian careers.

Figure 12: Estimated Impact of Maintaining the Prevailing Wage Law on Veterans in Minnesota

Economic or Budget Outcome for Military Veterans in Construction	Actual (2015)	If Minnesota Did Not Have Prevailing Wage	Estimated Benefit
Total military veterans employed as blue-collar construction workers	10,600	8,200	+2,400
Total military veterans in construction without health insurance coverage	3,200	3,600	–400
Total military veterans in construction earning less than the official poverty line	100	200	–100

Source: Manzo et al., 2016c.



The Impact of Minnesota's Prevailing Wage Law on the Minnesota Economy

Prevailing wage laws are intended to protect local construction labor standards from distortions associated with publicly-funded construction (Montana DLI, 2017). Large infusions of government spending into an area, along with a contract award process that rewards the lowest bidder, may attract contractors from areas where construction worker wage rates and skill levels are comparatively low. Competition between these nonlocal and local contractors may result in the erosion of local construction standards. Concern over the use of low-wage, out-of-state construction workers on a University of Minnesota project was the motivation for Minnesota's wage policy in 1973 (Minnesota DLI, 2017a). Prevailing wage laws create a level playing field for all contractors by ensuring that public works expenditures maintain and support local area standards.

By protecting local wages, prevailing wage laws also protect work for local contractors and construction workers. The policy allows local contractors to submit competitive and profitable bids based on the wage rates needed to attract local workers possessing the skills required of the project. Local contractors thus have an advantage over out-of-area, out-of-state, and foreign competitors. When local companies and workers are employed on a project applying the payment of prevailing wages, more project funds remain in the local economy and stimulate additional economic activity. Without adequate prevailing wage protection, more work is completed by out-of-area contractors with more project funds, jobs, income, spending, and economic activity leaking out of the local economy.

Evidence of this benefit is illustrated by the examination of 681 subcontractor low bids on school projects built within the seven-county Minneapolis-St. Paul metro area since 2016, revealing that 74 percent of total bid values for prevailing wage projects were awarded to metro-based contractors (Figure 3). For projects in the seven-county area that did not apply prevailing wage standards, only 64 percent of combined bid values were awarded to local contractors. This difference indicates that, when a school district located within the seven-county metro area chooses to include prevailing wages, about 10 percent more of the project value will be awarded to contractors located within the metro area.

Several studies and publicly-available data also support the claim that prevailing wage laws are associated with more work for local contractors and construction workers. An examination of library construction in Santa Clara County, California reveals that 39 percent of subcontractors employed on prevailing wage projects were county-resident businesses. The corresponding figure when prevailing wages did not apply was 23 percent. Since local contractors are three times more likely to use local construction workers, more labor income and spending remained in the county when prevailing wages applied (Duncan, 2011). Another study

illustrates how the weakening and eventual repeal of Indiana's prevailing wage law benefited low wage, out-of-state construction workers in Kentucky (Manzo, 2016). Along the southern border with Kentucky, public works construction employment in Indiana decreased by about 800 jobs after the wage policy was weakened. Along the bordering counties in Kentucky, public works construction employment grew by about 800 jobs over the same period. Average construction wages were lower in Kentucky, suggesting that weakening the wage policy resulted in greater demand for low wage, out-of-state workers. Finally, data from the *Economic Census of Construction* indicates that states with weak or no prevailing wage laws have about 2.4 percent more of the total value of construction completed by contractors from other states, compared to states with average or strong wage policies (Census, 2012b). This is a 2.4% reduction in the value of all public *and* private construction– and is statistically significant.

The amount of work completed by out-of-state contractors depends on the presence of prevailing wage laws, the size of a state's construction industry, the size of the industry in neighboring states, and the skills of a state's construction workforce. Minnesota has a prevailing wage law, a border with Canada that limits competition, and is relatively large compared to many of its neighbors. As a consequence, 95.2 percent of the total value of construction is completed by Minnesota-resident contractors (Figure 13).

Because of the relative size of Minnesota's construction industry and the state's prevailing wage law, a small amount of construction value– 4.8 percent– is completed by contractors from other states (Figure 13). Contractors from Wisconsin, North Dakota, Iowa, Illinois, Michigan, and South Dakota, are responsible for all of Minnesota's construction work completed by contractors from other states (Census, 2012b). If the state did not have prevailing wage standards, Minnesota contractors would be expected to experience increased competition from out-of-state builders for two reasons. First, inadequate prevailing wage protection opens state-funded construction to deleterious competition from fly-by-night contractors from neighboring states with low wages. Second, the absence of prevailing wage may result in less work for local contractors participating in joint labor-management apprenticeship programs, which are responsible for the preponderance of worker training in construction. This reduces training resources, reduces infrastructure quality, and harms the recruitment of technologically-proficient workers with high skill levels.

Figure 13: Value of Construction Work Completed in Minnesota by Contractors from Neighboring States

State	Work Completed in Minnesota *	Percent of Minnesota Construction Value
Wisconsin	$893,000,000	2.6%
North Dakota	$312,000,000	0.9%
Iowa	$171,000,000	0.5%
Illinois	$164,000,000	0.4%
Michigan	$138,000,000	0.4%
South Dakota	$60,000,000	0.1%

Source: Authors' analysis of the *Economic Census of Construction* (Census, 2012a) using IMPLAN (IMPLAN, 2017). *Adjusted to 2017 dollars.

Economic data indicates that Minnesota's strong prevailing wage law increases the market share by 2.4 percent for state-resident contractors. Based on the most-recent data from the *Economic Census of Construction*, 2.4 percent is equal to about $802 million (in constant 2017 dollars) in construction work in Minnesota (Census, 2012a). In the absence of adequate prevailing wage standards, this $802 million in construction work would be completed by out-of-state or foreign contractors.

Minnesota's prevailing wage law performs an important economic development function by protecting and retaining construction spending in the state. This additional spending circulates throughout the economy, benefiting industries that are not related to the construction industry. When measuring the economic impact of the $802 million in protected construction work, it is important to net out spending that would remain in the state regardless of whether in-state or out-of-state contractors perform the work. After removing the cost of supplies, materials, power, fuel, and other cost components (34.2 percent of total construction costs in Minnesota), as well as construction worker income that would remain in Minnesota regardless of who does the work (2.9 percent of total construction costs), the net effect of $802 million in retained construction is $505 million.[2]

The economic impact of this additional in-state work is measured with the IMPLAN economic impact software using data for the State of Minnesota (IMPLAN, 2017). This economic impact analysis is based on the multiplier, or ripple effect, associated with the retention of construction incomes and spending in Minnesota's economy. IMPLAN measures the inter-industry relationships within an economy, measuring market transactions between businesses and households. The results are reported in constant 2017 dollars. For background on IMPLAN, and its connection to the University of Minnesota, please see the Appendix.

The impact results obtained from IMPLAN are reported in Figure 14. The net benefit of $505 million in protected construction business and spending results in an overall increase in economic activity in Minnesota of approximately $981 million. The corresponding employment increase is about 7,200 jobs. Specifically, Minnesota's prevailing wage law saves or creates about 5,000 direct jobs in the construction industry and supports 2,200 additional jobs through in-state construction worker spending in sectors such as retail, service, and restaurants. The increase in economic activity is also associated with an approximate $37 million increase in state and local tax revenue. This is a statewide impact that is experienced each year.

[2] According to information from the Colorado Building Trades Council, traveling construction workers typically spend about 20 percent of their earning supporting themselves while working away from home. Based on data from the *Economic Census of Construction*, wage income (excluding required and voluntary benefits) is, on average, 14.6 percent of construction costs in the states that neighbor Minnesota (weighted by a neighboring state's portion of work completed in Minnesota). If 20 percent of this income is spent supporting out-of-state workers during their time in Minnesota, approximately $23 million is also netted out because this amount would remain in the state if local workers completed the project.

Figure 14: Economic Impact of Construction Work Supported by Minnesota's Prevailing Wage Law

Category	Direct Effect	Total Impact
Economic Activity	+$505 million	+$981 million
Jobs	+4,350 jobs	+7,200 jobs
State and Local Tax Revenue	–	+$37.2 million

Source: Authors' analysis of the *Economic Census of Construction* (Census, 2012a) using IMPLAN data for the of Minnesota (IMPLAN, 2017).

Figure 15: Industry-Level Economic Impacts of Construction Work Supported by Minnesota's Prevailing Wage Law, Selected Industries

Industry	Revenue/Income Gain ($)	Employment Gain (Jobs)
Wholesale trade	+$45.0 million	+192
Retail trade (general, non-store, clothing, gas, etc.)	+$29.6 million	+212
Imputed rent, owner-occupied dwellings	+$24.8 million	–
Real estate	+$12.9 million	+79
Hospitals	+$11.2 million	+69
Restaurants (full and limited service)	+$10.0 million	+130
Offices of physicians	+$5.8 million	+34

Source: Authors' analysis of the *Economic Census of Construction* (Census, 2012a) using IMPLAN data for the of Minnesota (IMPLAN, 2017).

The total economic impact is the sum of all industry-level impacts. The impacts for selected industries are reported in Figure 15. For example, with the additional construction business supported by Minnesota's prevailing wage law, sales for wholesale and retail businesses in the state increase by over $70 million, creating about 400 jobs in these industries per year. The overall increase in economic activity also raises home values, reported through the $25 million annual increase in imputed rental value should home owners rent out their dwellings. Real estate is particularly sensitive to economic activity and the boost from prevailing wage increases annual sales revenue in this sector by about $13 million and employment by about 80 jobs. Minnesota's prevailing wage law also increases in-state construction employment that results in more spending and employment in hospitals, doctors' offices, and restaurants. These industry-level impacts reveal the economic development role of prevailing wage laws. By protecting work for local contractors and construction workers, prevailing wages direct more spending into the state's economy and support industries that are unrelated to the construction industry.

> Minnesota's prevailing wage law boosts the economy by $981 million and saves or creates about 7,200 jobs annually.

A Case Study: Construction Market Outcomes in Minnesota and Indiana Since 2014

Indiana offers a case study to compare and contrast with Minnesota. On July 1, 2015, Indiana lawmakers completely repealed the state's prevailing wage law, called the Indiana Common Construction Wage Act. While other states have recently repealed their prevailing wage laws, such as border-state Wisconsin in 2017, Indiana was the first state to repeal its law since 1995, when Oklahoma's law was invalidated by a court decision (WHD, 2017). Data has become available to begin assessing the early effects of repealing Indiana's prevailing wage law (Manzo & Duncan, 2018).

To evaluate the construction markets in Minnesota and Indiana, an intuitive approach called "difference-in-differences" is utilized. This technique is used in both the social sciences and the medical field to isolate the impact of a change in one group (the "treatment group") from a similar group (the "control group"). In a scientific experiment, Minnesota would be considered the "control group" because the state had and continues to have a prevailing wage law. Indiana would be the "treatment group" as a state that experienced a change, from having a state prevailing wage law to repealing the policy.

Economists generally agree that a worker's contribution to national gross domestic product (GDP) is a good measure of his or her annual productivity. The Bureau of Economic Analysis (BEA) at the U.S. Department of Commerce collects information on annual gross domestic product (GDP) by state that can be deconstructed by industry (BEA, 2017). Additionally, the BEA reports total full-time and part-time employment levels by industry in each state. Dividing the construction industry's contribution to GDP (value added) by the total number of employees in the construction industry provides a measure of per-worker productivity.

Figure 16 shows GDP per employee in the construction industry in 2014, 2015, and 2016. The two years of interest are 2014, which serves as the baseline because it is the year prior to Indiana repealing its prevailing wage law, and 2016. In 2014, annual GDP per worker (not adjusted for inflation)– including both blue-collar workers and white-collar employees– was $73,400 in Minnesota's construction industry and $64,400 in Indiana's construction industry. Construction productivity grew to $82,300 in Minnesota by 2016, an increase of 12.1 percent (over $8,900). Conversely, in Indiana– which repealed prevailing wage in July 2015– annual GDP per construction employee only increased to $67,300, a growth rate of 4.4 percent (about $2,900). As a result, construction productivity per worker grew 7.7 percentage-points faster in Minnesota than it did in Indiana after the latter repealed prevailing wage (Figure 16).

Figure 16: Change in Annual Construction Productivity, Minnesota vs. Indiana, Difference-in-Differences

Gross Domestic Product Per Worker, Construction Industry (Bureau of Economic Analysis)					
Area	2014 (Pre-Repeal)	2015 (Repealed in July)	2016 (Post-Repeal)	Growth Rate Since 2014	Dollar Change Since 2014
Minnesota	$73,438	$78,306	$82,344	+12.1%	+$8,906
Indiana	$64,374	$65,873	$67,227	+4.4%	+$2,853
Minnesota Advantage	**+$9,064**	**+$12,433**	**+$15,117**	**+7.7%**	**+$6,053**

Source(s): Authors' analysis of BEA (2017).

Construction productivity grew 7.7 percentage-points faster in Minnesota than it did in Indiana.

In addition, Quarterly Workforce Indicators (QWI) are compiled by the U.S. Census Bureau in the *Longitudinal Employer-Household Dynamics* survey and made available through their Local Employment Dynamics (LED) Extraction Tool (LEHD, 2017). Instead of studying all blue-collar construction workers or the entire construction industry, the QWI dataset includes information on the "heavy and civil engineering construction" sector. The vast majority of heavy and civil engineering construction involves public works, including the construction and maintenance of highways, streets, bridges, dams, parks, and trails. Dredging, land drainage, and utility line construction are also included in heavy and civil engineering construction (Census, 2017). In the QWI dataset, turnover data and employment counts are available on a quarterly (three-month) basis.

Figure 17 presents turnover data for heavy and highway contractors, showing the turnover rate for the four quarters leading up to repeal of prevailing wage in Indiana and the four quarters immediately following repeal. Turnover is highest in the third quarter of every year as firms hire additional workers to complete summer jobs. In the year prior to Indiana repealing its prevailing wage law, worker turnover in the heavy and civil engineering construction sector averaged 12.6 percent in Minnesota and 12.3 percent in Indiana. After Indiana repealed its prevailing wage law, however, average quarterly turnover in the sector fell to 12.2 percent in Minnesota but increased to 13.2 percent in Indiana (Figure 17).

Construction worker turnover decreased in Minnesota, while it increased in Indiana.

Figure 17: Descriptive Statistics on the Quarterly Turnover Rates in Heavy and Civil Engineering Construction

Turnover Rate	Minnesota	Indiana
2014Q3	32.6%	23.0%
2014Q4	6.3%	9.4%
2015Q1	6.2%	8.6%
2015Q2	5.4%	8.3%
Average	**12.6%**	**12.3%**
Indiana Repeals Prevailing Wage		
2015Q3	31.7%	23.6%
2015Q4	5.5%	10.6%
2016Q1	6.0%	8.6%
2016Q2	5.5%	10.1%
Average	**12.2%**	**13.2%**

Source(s): Authors' analysis of LEHD (2017).

Figure 18 shows the year-over-year change in turnover rates and provides a "difference-in-differences" estimate of the Minnesota advantage of maintaining prevailing wage compared to Indiana repealing its law. In Minnesota's heavy and civil engineering construction sector, worker turnover fell year-over-year in three out of four quarters, with an average decrease of 0.5 percentage point. Meanwhile, in Indiana's heavy and civil engineering construction sector, worker turnover went up year-over-year in three out of four quarters, with an average increase of 0.9 percentage point. By repealing its prevailing wage law, Indiana may have forced productive workers out of construction in search of another career while low-skilled employees entered the industry. In any case, relative worker turnover was 1.4 percentage-points lower in Minnesota than in Indiana in the year after the policy change in Indiana.

QWI data also offer a measure of public works employment. Because the U.S. Census Bureau uses payroll records from contractors for QWI data, employment counts for the heavy and civil engineering construction sector should align with the actual number of workers employed on public works construction projects. Figure 19 displays employment data for heavy and highway

Figure 18: Change in Turnover Rate in Heavy and Civil Engineering Construction, Minnesota vs. Indiana

Turnover Rate Change	Minnesota	Indiana	Minnesota Advantage
Q3 Year over Year	–0.9%	+0.6%	–1.5%
Q4 Year over Year	–0.8%	+1.2%	–2.0%
Q1 Year over Year	–0.2%	0.0%	–0.2%
Q2 Year over Year	+0.1%	+1.8%	–1.7%
Average	**-0.5%**	**+0.9%**	**–1.4%**

Source(s): Authors' analysis of LEHD (2017).

Figure 19: Descriptive Statistics on Quarterly Employment Counts in Heavy and Civil Engineering Construction

Employment	Minnesota	Indiana
2014Q3	28,782	17,166
2014Q4	27,535	17,422
2015Q1	18,465	12,951
2015Q2	21,034	15,580
Average	**23,954**	**15,780**
	Indiana Repeals Prevailing Wage	
2015Q3	29,730	17,678
2015Q4	28,584	18,338
2016Q1	18,729	13,071
2016Q2	21,513	15,173
Average	**24,639**	**16,065**

Source(s): Authors' analysis of LEHD (2017).

contractors in Minnesota and in Indiana. In the year prior to Indiana repealing its prevailing wage law, there were an average of about 24,000 employees in the heavy and civil engineering construction sector in Minnesota and an average of about 15,800 in Indiana. In the year after, average sectoral employment improved to more than 24,600 workers in Minnesota and 16,100 workers in Indiana (Figure 19).

Similar to the previous analysis of worker turnover rates, Figure 20 shows year-over-year changes by quarter and provides a "difference-in-differences" estimate of the Minnesota advantage of maintaining prevailing wage compared to Indiana repealing its law. In Minnesota's heavy and civil engineering construction sector, total employment increased year-over-year in all four quarters, with an average increase of 2.9 percent. Meanwhile, in Indiana after the policy change, heavy and civil engineering construction employment increased in only three out of four quarters, growing by a smaller 1.8 percent. Accordingly, heavy and civil engineering construction employment grew 1.1 percentage points faster in Minnesota than it did in Indiana (Figure 20).

Minnesota's construction market has fared better than Indiana's construction market since Indiana repealed its prevailing wage law. Per-worker productivity has grown faster in Minnesota and turnover rates have fallen in Minnesota while rising in Indiana. While public works employment has increased in both states, it has grown faster in Minnesota than in Indiana following repeal of prevailing wage in the latter state. Ultimately, maintaining the prevailing wage law has produced positive effects on construction market outcomes in Minnesota while repeal has had negative consequences in Indiana.

Figure 20: Change in Employment in Heavy and Civil Engineering Construction, Minnesota vs. Indiana

Employment Change	Minnesota	Indiana	Minnesota Advantage
Q3 Year over Year	+3.3%	+3.0%	+0.3%
Q4 Year over Year	+3.8%	+5.3%	–1.5%
Q1 Year over Year	+1.4%	+0.9%	+0.5%
Q2 Year over Year	+2.3%	-2.6%	+4.9%
Average	**+2.9%**	**+1.8%**	**+1.1%**

Source(s): Authors' analysis of LEHD (2017).

Conclusion

The Minnesota Prevailing Wage Act keeps construction costs stable. The preponderance of peer-reviewed studies conducted since 2000 finds that prevailing wage laws have no effect on the cost of public construction projects, including 82 percent of the studies focused on school construction costs. An analysis of 640 subcontractor low bids on school construction projects in the Twin Cities region also finds that winning bids based on the payment of prevailing wages are no more costly than bids that do not require prevailing wages.

Prevailing wage promotes a skilled, middle-class construction workforce that completes high-quality public construction projects on time and on budget. Joint labor-management programs, which train 93 percent of all registered apprentices in Minnesota, account for the vast majority of human capital investment in the construction industry. By increasing apprenticeship training in these and other programs, prevailing wage also fosters self-sufficient construction workers. For blue-collar construction workers in Minnesota, prevailing wage boosts incomes, expands health insurance and pension coverage, and reduces reliance on government assistance programs. This attracts talented young workers into the construction trades and helps to meet contractor demand for skilled labor.

Minnesota's prevailing wage law also produces positive impacts on the broader Minnesota economy. By protecting local standards, prevailing wage supports work for local contractors and their employees. In total, prevailing wage increases employment in Minnesota by 7,200 jobs and boosts the economy by $981 million while generating $37 million in state and local tax revenue. Ultimately, the prevailing wage is the best deal for Minnesota taxpayers.

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Appendix

School Construction Costs in the Seven-County Twin Cities Region

Data for the examination of prevailing wage requirements on school construction costs in the seven-county Minneapolis-St. Paul metro area are based on 35 school projects that were supervised by construction managers– including three involving the construction of new schools. Construction managers provide assistance to project owners with the planning, design, and management of the construction project (CMAA, 2017). Several school districts in the seven-county metro area rely on construction managers to oversee projects that are, and are not, covered by prevailing wage standards. For the projects examined in this study, construction managers replace general contractors who typically self-perform some of the work and hire subcontractors to compete different portions of a project. Construction managers did not conduct any of the work on the school projects included in this study; rather, these managers assumed responsibility for subcontracting all work.

Under the construction manager approach, subcontractors submit bids for each specific work type (such as asphalt, carpentry, and concrete work) for the project. These specific-work bids are called "package bids." This means that each of the 35 school projects has multiple package bids for the specific types of work required by the project. One of the school projects included in this study has as few as three package bids while another has a total of 57 package bids. As a consequence, there were 761 subcontractor low bids for the 35 school projects. After removing bids for equipment and material purchases, as well as a few bids that do not have complete information, there are a total of 640 subcontractor low bids. These projects involve 26 different types of work ranging from asphalt paving to waterproofing.

Detailed information on these projects was obtained from Dodge Data and Analytics (Dodge, 2017). This organization collects and distributes project bid information to the construction industry and is the standard source of data for the research on prevailing wage laws (Duncan & Ormiston, 2017). Additional information on package bids was obtained from applicable school board meeting minutes. Between the Dodge data and the meeting minutes, information was collected on bid dates, whether prevailing wages were required, the amount of the winning bid for each package, and the winning contractor. As previously described, school districts can choose to apply state prevailing wage and benefit rates to projects that do not involve state funds. For the projects between 2015 and 2017 included in this study, prevailing wages were applied on school projects built in Districts 12, 191, 196, 271, and 833. Prevailing wages were not required for the projects built in Districts 110, 112, 273, 284, and 728. Prevailing wages applied to 286 of the projects. The other 354 projects did not require the payment of prevailing wage and benefit rates.

The advantage that this dataset has over the typical information available to researchers is that it includes detailed measures of the specific type of work ordered. This is an important consideration. For example, if prevailing wage projects are concentrated in particularly expensive types of work such as carpentry (and projects that do not require prevailing wages are concentrated in less-expensive work types such as asphalt paving), then statistical models would attribute higher costs to prevailing wages simply because

the type and complexity of work is not considered. Controlling for these detailed measures of the specific type of work performed allows for an apples-to-apples comparison on the effect of prevailing wage standards on schools that are, and are not, covered by the wage policy.

The data for the 640 package bids are used in the following model:

$$\textit{Log of Package Bid} = \beta_0 + \beta_1\ \textit{Prevailing Wage Project} + \beta_2\ \textit{Union Contractor} + \beta_3\ \textit{Total Project Cost} + \beta_4\ \textit{Out-of-Metro Contractor} + \beta_5\ \textit{New School} + \beta_6\ \textit{Work Type} + \beta_8\ \textit{Year} + \mu$$

Where *Log of Package Bid* is the natural log of the winning contractor's low package bid for the type of work performed. *Prevailing Wage Project* is equal to one if the project required the payment of prevailing wages and is equal to zero for projects that do not require prevailing wages. *Union Contractor* is equal to one if the winning contractor is signatory to a collective bargaining agreement and zero if not. *Total Project Cost* is the cost of the school project inclusive of construction costs, expenditures on furniture, fixtures, and equipment, as well as contingency funds. The total cost of the project is a measure of the size and complexity of a project. The square foot size of a project is typically used as the measure of project size, but this standard is not applicable to the detailed work types included in this study, such as plumbing and electrical work. It is expected that the larger the school project, in terms of its total cost, the larger the individual packages will be as more aggregate work means more work at the package level. *Out-of-Metro Contractor* is equal to one if the winning contractor has a business address outside of the seven-county metro area and zero otherwise. *New School* is equal to one for package bids on the construction of a new school. This variable is equal to zero if the package bids are for renovations, remodels, or additions. There are 26 dummy variables in the *Work Type* vector that capture cost differences from asphalt to waterproofing projects. *Year* is a vector of dummy variables for bids submitted in 2015, 2016, and 2107. The error term is μ. This specification provides the opportunity to examine the effect of prevailing wages on school construction costs at the level of the package bid, taking into consideration the overall size of the project, whether or not a contractor was signatory to a collective bargaining agreement or from outside the metro area, whether the construction was new or a renovation or addition, the type of work involved, and the time period.

Summary statistics for the variables included in the regression model are presented in Table A. These data indicate that average package bids and the total project costs for prevailing wage projects are lower than comparable cost data for projects that do not require the payment of prevailing wages. Package bids on prevailing wage projects range from about $8,000 to over $4 million, with a mean of $411,323. The project costs of prevailing wage projects range from a low of $1.9 million to $37 million, with a mean of $11.3 million. For projects that do not require the payment of prevailing wages, package bids are as low as $4,000 and as high as $12 million, with a mean of $554,929. Total project costs range from $2.8 million to approximately $53 million, with a mean of $17.5 million for non-prevailing wage projects. The standard deviations are larger than the variable means because the data for all of the cost measures are skewed. For example, the median low package bid for both prevailing wage and non-prevailing wage projects is approximately $193,000. This is less than half of the average package bid for projects that do or do not require the payment of prevailing wages. Skewed data for the dependent variable may affect average-based (ordinary least squares) regression analysis. This issue is addressed by also including an estimate based on quantile (median) regression.

Union contractors won 77 percent of prevailing wage projects and about 66 percent of bids that were not based on prevailing wages (Table A). The high percentage of union contractors participating in school construction regardless of the wage policy is due to union density in the metro area. For example, data from the *Current Population Survey Outgoing Rotation Groups* for construction and extraction occupations indicate that the Minneapolis metropolitan area has the second-highest rate of unionization (44.9 percent) among the cities included. The Chicago metro area had the highest rate of unionization over the 2005-2013 period (45.9 percent).

Table A: Summary Statistics of Subcontractor Low Bids on School Construction Projects in the Seven-County Minneapolis-St. Paul Metropolitan Region, 2015-2017

Variable	School Projects with Prevailing Wage	School Projects without Prevailing Wage
Winning Package Bid	$411,323** (602,091)	$554,929 (1,178,372)
Union Subcontractor	0.773** (0.42)	0.661 (0.47)
Project Cost	$11.3 million** (11.4 million)	$17.5 million (15.3 million)
Out-of-Metro Area Subcontractor	0.301 (0.46)	0.285 (0.45)
New School	0.105** (0.31)	0.172 (0.38)
Work Type (Asphalt)	0.028 (0.16)	0.023 (0.15)
2015	0.231** (0.42)	0.073 (0.26)
2016	0.378** (0.49)	0.779 (0.40)
2017	0.392** (0.49)	0.127 (0.33)
N	286	354

Source: Authors' analysis of School District Board Meeting minutes and Dodge Data and Analytics (Dodge, 2017). Standard deviations in parentheses. **Indicates the mean for prevailing wage projects is significantly different at p<|0.05| compared to the mean for projects that do not require the payment of prevailing wages.

Finally, Table A includes other interesting summary statistics. About 10 percent of subcontractor low bids on prevailing wage projects involved new school construction while the comparable share was 17 percent

on projects that were not covered by prevailing wages. There is no statistically significant difference, however, in the percent of work that involves asphalt paving between projects that do and do not require prevailing wages. More prevailing wage projects were awarded in 2015 and 2017 and more non-prevailing wage projects were awarded in 2016. Differences between years are significant that the 95-percent level of confidence.

Regression results are reported in Table B, with standard errors corrected for heteroskedasticity. Model 1 is based on an average ordinary least squares (OLS) regression. To determine if the skewed package bid data influence the results, a quantile (median) regression is used in Model 2. However, since school districts may choose to apply prevailing wages to a project, the prevailing wage variable may be endogenous. That is, both the outcome measure (school construction costs) and the treatment effect (prevailing wage project) may be related to omitted characteristics of the Minneapolis metro area that contribute to more expensive school construction and to the greater likelihood that a school project will require prevailing wages. For example, urban schools with relatively high enrollments and greater resources may build schools with more amenities that are more expensive. To address this issue, Model 3 is based on an endogenous treatment effects regression (Stata, 2017).[2]

Regardless of the approach, all models indicate that the effect of prevailing wage regulations on construction costs is small, ranging between -1.8 percent and 2.6 percent, and statistically insignificant (Table B). Results also indicate that winning bids by union contractors are no different, in terms of statistical significance, than the low bids of nonunion contractors. The elasticity of the subcontractor low bid with respect to the overall cost of the project indicates that winning package bids increase by approximately 0.7 percent for each 1 percent increase in total project costs. Low bids by subcontractors with business addresses outside of the seven-county metro area are 30 percent to 35 percent lower than the low bids of metro-based subcontractors. These latter two effects are statistically significant at the 99-percent level of confidence. Subcontractor low bids on new school construction are no different than subcontractor low bids on other types of projects. Results for all 25 work type dummy variables are not reported to conserve space. For illustration purposes, the results for the carpentry work dummy variable are reported. These findings indicate that work involving carpentry is from 65 percent to 72 percent more expensive than the reference work type (asphalt paving). Package bids involving carpentry work are from 65 percent to 72 percent more expensive than the reference work type (asphalt paving). Subcontractor low bids do not differ in a statistically significant way with respect to the year they were submitted.

[2] This procedure involves the auxiliary estimation of a probit model of the treatment variable. It is hypothesized that the likelihood of prevailing wage coverage depends on two factors: 1) the road distance between the school construction site and the city core (Minneapolis City Hall) and 2) the complexity of the project. Road distance is a proxy for union density and union influence over a district's decision to include prevailing wages, with the effect of union density decreasing as distance from the urban core increases. Project complexity is measured by the number of separate package bids for a project under the assumption that construction managers may recommend that districts not add prevailing wage standards to large and complex projects. The results of the probit model are consistent with expectations. The coefficient for the miles of distance variable is -0.032 (p-value= 0.000) and the coefficient for the number of package bids is -0.022 (p-value= 0.000). While the results of the probit are strong, the Wald test statistic of independence is 0.17 (p-value= 0.921), suggesting weak identification of endogeneity. The endogeneity of prevailing wage decisions remains a subject for further research.

Table B: Regression Results for Package Bids on School Construction Projects in the Seven-County Minneapolis-St. Paul Metropolitan Region, 2015-2017

Dependent Variable = Natural Log of the Wining Package Bid; Model 1 = Ordinary Least Squares (Mean) Regression, Model 2 = Quantile (Median) Regression, Model 3 = Endogenous Treatment Effects Regression.

Variable	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient
Prevailing Wage Project	0.026 (0.08)	-0.018 (0.12)	-0.014 (0.33)
Union Contractor	0.059 (0.09)	0.120 (0.11)	0.063 (0.09)
Log of Project Cost	0.702*** (0.05)	0.736*** (0.05)	0.697*** (0.05)
Out-of-Metro Area Contractor	-0.350*** (0.09)	-0.296*** (0.10)	-0.353*** (0.09)
New School	0.170 (0.11)	0.202 (0.14)	0.168 (0.11)
Work Type (Carpentry)	0.712*** (0.19)	0.647* (0.34)	0.720*** (0.19)
2016	0.083 (0.12)	-0.023 (0.15)	0.080 (0.12)
2017	0.068 (0.13)	-0.004 (0.95)	0.069 (0.13)
Constant	1.015 (0.82)	0.595 (0.95)	1.140 (0.95)
N	640	640	640
R^2 Pseudo R^2 F Wald χ^2 Wald Test of Independence χ^2	0.622 – 48.80 – –	– 0.441 – – –	– – – 1557.88 0.170

Source: Authors' analysis of School District Board Meeting minutes and Dodge Data and Analytics (Dodge, 2017). Standard deviations in parentheses. ***p<|0.01|; **p<|0.05|; *p<|0.10| (two-tailed tests).

Results with respect to the prevailing wage coefficients do not change substantially when the models are estimated without measures of contractor characteristics. When the variables for union subcontractor and out-of-metro area subcontractor are omitted from models 1 through 3, the prevailing wage coefficients (and standard errors) are 0.038 (0.08), –0.021 (0.09), and 0.053 (0.44), respectively. Consistent with the results reported in Table B, the prevailing wage coefficients remain statistically insignificant when

contractor characteristics are omitted. Similarly, the effects of contractor characteristics are stable when the prevailing wage dummy variable is not included in the estimate. Results from models 1 and 2 indicate coefficients (and standard errors) for union subcontractor equal to 0.062 (0.08) and 0.114 (0.11) for models one and two, respectively. The coefficients for out-of-metro area contractor are –0.351 (0.09) and –0.302 (0.10) for models one and two when the prevailing wage dummy variable is omitted.

Additional Information on the Effect of Prevailing Wage on Income, Poverty, and Reliance on Public Assistance

To understand the actual and unique impact that having a strong or average prevailing wage law has on labor market outcomes, the statistical method of *difference-in-differences* regression analysis is utilized. This statistical technique, a "curve fitting" method, allows researchers to compare outcomes between workers in the two groups of states, taking other individual characteristics as well as the broader labor market into consideration. Statistical analysis also allows researchers to determine if a measured difference is statistically significant or not. A statistically significant finding is an indication of that the relationship may be causal. All wage and salary income are adjusted by the Consumer Price Index (CPI-U) and reported in constant 2017 dollars.

"Interaction terms" are included to more precisely assess the relationships. For instance, there are a number of factors that influence the annual incomes of an individual worker, such as demographic and educational factors. A regression can account for these variables when evaluating the impact of strong or average prevailing wage laws. However, states with strong or average prevailing wage laws may have other public policies– such as collective-bargaining laws, higher minimum wages, or more investment in education and human training– that raise annual incomes of non-construction workers. Through an interaction term, a difference-in-differences analyses accounts for the relatively higher incomes of all workers in these states and separates out the association between strong or average prevailing wage laws and blue-collar construction workers.

Table C: Summary of Regression Results on the Effect of Having An Effective Prevailing Wage Law on Blue-Collar Construction Workers in the Seven-State Region, 2008-2017

Impact	Regression Type	Effect	Standard Error	Constant	N =
ln(wage and salary income)	OLS Diff-in-Diff	+0.052**	(0.02)	5.652	112,030
ln(wage income | median)	Quantile D-I-D	+0.052**	(0.03)	5.764	112,030
P(has private health insurance)	Probit D-I-D	+0.050***	(0.02)	0.601	119,247
P(has pension plan at work)	Probit D-I-D	+0.053***	(0.02)	0.548	119,247
P(receives food stamps)	Probit D-I-D	-0.021***	(0.01)	0.054	119,247

***p<|0.01|; **p<|0.05|; *p<|0.10|. All samples are weighted using sample weights provided by the Census Bureau (*wtsupp*). In all regressions, controls include: age, age^2, female. race dummies, marital status, veteran status, immigration status, educational attainment dummies, usual weeks worked, usual hours worked, and year dummies. For full regressions in .txt format, please contact study author Frank Manzo IV at fmanzo@illinoisepi.org.

The income, health coverage, pension coverage, and food stamps statistical analyses also include quantile and probit regressions on March data from 2008 through 2017. A *quantile regression* fits data to

understand impacts for different points, such as the median point of the income distribution. Median regression is more robust to outliers than ordinary least squares (OLS) regressions, which report the *average* relationship. Quantile regressions can help understand the effect, if any, on the middle class. Finally, probabilistic models called *probit regressions* help in calculating how much a certain factor increases a given individual's chance of achieving a certain binary outcome. Probits control for other variables and separate out the effect that having a strong or average prevailing wage law has on the likelihood that a blue-collar construction worker has health insurance or a pension plan at work.

Table D: Regression Results for the Effect of Having An Effective Prevailing Wage Law on the Incomes of Blue-Collar Construction Workers in the Seven-State Region, 2008-2017

Dependent Variable = Natural Log of Annual Wage and Salary Income; Model 1 = Ordinary Least Squares (Mean) Regression, Model 2 = Quantile (Median) Regression.

Variable	Model 1: Average Coefficient	Model 2: Median Coefficient
Interaction term: Strong or Average PWL x Construction Occupation	**0.052** **(0.02)**	**0.052** **(0.02)**
Strong or Average PWL	0.105*** (0.00)	0.088*** (0.00)
Construction Occupation	0.092*** (0.01)	0.101*** (0.02)
Usual Hours Worked Per Week	0.031*** (0.00)	0.034*** (0.00)
Weeks Worked Last Year	0.040*** (0.00)	0.038*** (0.00)
Educational Attainment Variables	Y	Y
Demographic Variables	Y	Y
Year Dummy Variables	Y	Y
Constant	5.652*** (0.03)	5.764*** (0.02)
N	112,030	112,030
R^2	0.597	0.373

***p<|0.01|; **p<|0.05|; *p<|0.10|. All samples are weighted using sample weights provided by the Census Bureau (*wtsupp*). In all regressions, demographic controls include: age, age^2, female. race dummies, marital status, veteran status, and immigration status. For full regressions in .txt format, please contact study author Frank Manzo IV at fmanzo@illinoisepi.org.

Table D provides example regression results for the analyses of the relationship between strong or average prevailing wage laws on the annual incomes of blue-collar construction worker wages. The models demonstrate that strong or average prevailing wage laws are statistically associated with an 8.8 to

10.5 percent increase in incomes for all workers (i.e., not just construction workers). The models also indicate that blue-collar construction trades earn 9.2 to 10.1 percent more than their counterparts in other occupations after controlling for other factors– a pay premium that exists regardless of whether a state has a strong or average prevailing wage laws (e.g., construction employees may be compensated for the occupational hazards and risks that they have taken on by entering the trades). The variable of interest, however, is the interaction term between strong or average prevailing wage laws and blue-collar construction occupations, which reveals that the wage policy is statistically associated with a 5.2 percent increase in the annual incomes of blue-collar construction workers, both on average and on median.


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