The Economic, Fiscal, and Social Effects of Ohio's Prevailing Wage Law

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Introduction

For decades, opponents have argued that prevailing wage regulations drive up the cost of public works construction. Claims of savings ranging between 10% and 40%, or the ability to build up to "five schools for the price of three," have consistently been made by those seeking a repeal or considerable weakening of the law.[1] While acknowledging that local governments and other public agencies need to limit costs, cutting wage rates for construction workers is unlikely to result in any savings because labor costs are typically a low percentage of total construction costs (approximately 23% nationally). Furthermore, the claim that prevailing wage laws increase construction costs is not supported by the overwhelming majority of peer-reviewed research, including new research for Ohio reported in this study.

Recent examples of Ohio legislation drafted to repeal or severely weaken Ohio's prevailing wage law include HB 190 (Hood; 130th GA); HB 282 (Roegner; 131st GA); and more recently, SB 72 (Huffman; 132nd GA).[2] These efforts are incompletely conceived because they contain no plans to replace many of the functions of Ohio's present prevailing wage policy. Prevailing wage standards support apprenticeship programs and training that reduce injury rates. The wage policy also contributes to self-sufficient, blue-collar careers – particularly for military veterans who are disproportionately employed in Ohio's construction industry. By protecting local wage rates, Ohio's prevailing wage law protects work for local contractors and their employees.

The results of this study indicate that weakening or repealing Ohio's prevailing wage standard is unlikely to save taxpayer dollars. In fact, a weaker policy would increase taxpayer burdens as construction worker incomes decrease and their reliance on public assistance increases. Ultimately, a weaker law means fewer resources for apprenticeship training in this fast-growing sector, less work for Ohio businesses and Ohio workers, and negative overall impacts on the Ohio economy.

[1] For an example, see "The Case for Repealing Ohio's Prevailing Wage Law," Associated Builders and Contractors, Inc., 2005.
[2] See HB 190, 130th General Assembly. Accessed at: https://legiscan.com/OH/bill/HB190/2013. HB 282, "Repeals the Prevailing Wage Law," 131st General Assembly. Accessed at: https://legiscan.com/OH/text/HB282/2015. Senate Bill 72, 132nd General Assembly, Ohio Legislature. Accessed at: https://www.legislature.ohio.gov/legislation/legislation-summary?id=GA132-SB-72.

Executive Summary

The main purpose of a prevailing wage law is to protect local construction labor standards from distortions associated with publicly-funded construction. Large infusions of government spending into an area, along with a contract award process that favors the lowest bidder, may attract contractors from areas where construction worker wage rates are relatively low. Any appreciable infusion of low-wage contractors could result in the erosion of local compensation standards. Prevailing wage laws create a level playing field for all contractors by ensuring that public works expenditures maintain and support local area standards. This study examines the effects of Ohio's prevailing wage law on the cost of public construction, apprenticeship programs, military veterans employed in the construction industry, construction worker income, poverty and reliance on public assistance as well as the economic impact of the wage policy. This study is based on publicly available data. As a consequence, the results reported here are reproducible.

Research on Prevailing Wage Laws and Construction Costs

Seventy-six percent of peer-reviewed research conducted since 2000 fails to find evidence that federal, state, and municipal prevailing wage policies increase the cost of public construction. Why don't prevailing wages increase costs? Labor costs are a low and historically declining share of total construction costs– approximately 23% of all building costs in the United States. Consequently, minor changes in labor productivity and other construction costs are needed to offset the effect of the wage policy.

To provide recent evidence of the effect of prevailing wage requirements on the cost of public construction in Ohio, we use a sample of school projects that received federal funding and were covered by the federal Davis-Bacon Act. The results of our analysis of school projects built between 2013 and 2016 indicate that prevailing wage laws are not associated with increased construction costs. This result is consistent with the preponderance of peer-reviewed research. Additionally, the level of bid competition– an important determinant of project cost– is higher when prevailing wages apply to these projects. Finally, substantially more work is completed by in-state contractors when prevailing wages are required. In the absence of the wage policy, more of Ohio's tax dollars are used to employ companies and workers from other states, such as Indiana, Iowa, Kentucky, Michigan, and Pennsylvania.

Since 2001, five studies have examined the effect of prevailing wage laws or similar labor policies on school construction costs in Ohio. Three of these studies find that prevailing wages or similar labor requirements are unrelated to school construction costs. This includes the findings of the controversial 2002 report by the Ohio State Legislative Service Commission (LSC), when the results of this study are properly interpreted.[3] Two other studies find that, while bids based on the payment of union rates are generally no higher than bids that are based on open

[3] Professor Herbert Weisberg was the first to identify the shortcomings of the 2002 LSC report in stating that "… the cost-savings estimates are statistically fiction" because "the LSC equations find prevailing wage to be statistically insignificant, meaning that there is not statistical reason to believe that prevailing wage affects costs." James Burley, Director of the LSC in 2002, did not dispute Weisberg's criticism (see page 6 for references). Our analysis of the LSC study echoes Professor Weisberg's observations. When the analysis employed by LSC is properly interpreted, it shows that prevailing wages do not have a statistically significant effect on the cost of school construction, meaning that LSC had no valid basis upon which to claim a 10% cost savings resulting from the non-application of the prevailing wage law to school construction.

shop rates, there are some cases where bids are higher when union rates are paid. There are also cases where bids based on the payment of union rates are lower than bids based on open shop rates.

Ohio's Prevailing Wage Law and Income, Poverty, and Reliance on Public Assistance

Prevailing wage repeal decreases construction worker income and increases poverty and reliance on public assistance. Repealing or weakening prevailing wage in Ohio would lower blue-collar construction worker incomes by 16%, reduce employer-provided health insurance coverage by 2 percentage points, and decrease employer-provided pension coverage by 10 percentage points. Weakening or repealing prevailing wage in Ohio would significantly decrease private health and retirement coverage, forcing blue-collar construction workers who were previously self-sufficient to rely on public insurance programs.

Repealing prevailing wage reduces worker earnings and slashes employee benefits, resulting in fewer construction workers in the middle class. As a result, approximately 3,900 blue-collar construction workers would lose their employer-provided health insurance coverage and another 21,700 would lose their employer-provided pension plan if Ohio were to repeal or weaken its prevailing wage law. For approximately 16,000 workers, the wage cut would be so significant that they would fall below the official poverty line, qualifying them for Supplemental Nutrition Assistance Program (SNAP) government benefits. In addition, an estimated 13,800 blue-collar construction workers would newly qualify for Earned Income Tax Credit (EITC) assistance. Weakening or repealing prevailing wage in Ohio would thus force thousands of blue-collar construction workers onto public insurance programs, increasing costs to taxpayers.

Ohio's Prevailing Wage Law and Military Veterans

Military veterans employed in the construction industry would be particularly worse off from repealing or weakening prevailing wage. Veterans are more likely to work in construction than non-veterans. In 2014, veterans accounted for 8.5% of Ohio's blue-collar construction workforce but only 6.0% of total employment in the state's economy, a 2.5 percentage-point difference. Additionally, over the next decade, construction and extraction jobs are expected to grow faster than the state average – providing middle-class job opportunities for blue-collar veterans who populate the trades at higher rates than non-veterans.

Applying results from a peer-reviewed national study commissioned by VoteVets.org reveals that veterans would be negatively affected if the state were to weaken or repeal prevailing wage. Blue-collar construction occupations would become less attractive to veterans because these middle-class careers would be converted into low-wage, low-benefit jobs. In fact, weakening or repealing prevailing wage in Ohio would result in 4,100 blue-collar veterans separating from their construction jobs. Additionally, the total income of all veterans employed in construction jobs would decline by $275 million in the state and at least 3,900 veterans would lose their employer-provided health coverage. The market share of veteran-owned construction companies would also decrease. Gutting prevailing wage would increase burdens on taxpayers and disproportionately impact veteran workers who served their country.

Ohio's Prevailing Wage Law and Apprenticeship Training in the State

Formal apprenticeship training is the foundation of skill development in Ohio's construction industry. Prevailing wages create a strong incentive to employ apprentices because contractors are allowed to pay trainees a lower rate than journeyworkers. This incentive increases demand for apprentices and draws more resources into training programs. The result is a stable supply of trained construction employees available for work throughout Ohio.

In the nonunionized segment of Ohio's construction industry, apprenticeship programs are sponsored by a single contractor or by groups of employers. In the unionized sector, apprenticeship training is jointly determined and managed by unions and contractors who are signatories to collective bargaining agreements. Union programs are financed by a "cents per hour" contribution that is part of the total wage and benefits package negotiated with contractors. Consequently, more of Ohio's construction apprentices are enrolled in, and graduate from, union-sponsored programs. Between 2004 and 2015, fully 79% of construction apprentices were enrolled in union training programs, which had a completion rate that is 21% higher than nonunion programs. As a result, 83% of apprentices graduated from union programs. These programs also provide training for the full-range of trades, while at least 47% of apprentices completing nonunion programs trained to be electricians. Data for 2016 indicate that 94% of female apprentices and 88% of minority apprentices are enrolled in union training programs. The substantial apprenticeship enrollment in union training programs is matched by an equally substantial financial commitment to training by building trades unions and their signatory contractors that spent over $48 million on training programs in 2015. The investment in a strong workforce does not end after training. Pension contributions exceeded $960 million in 2015 with $750 million in health and welfare benefits. The overall contribution to fringe benefits and training programs by Ohio's building trades unions and their signatory contractors was approximately $1.75 billion in 2015.

The Economic Impact of Ohio's Prevailing Wage Law

By protecting local wages, prevailing wage laws also protect work for local contractors and construction workers. The prevailing wage allows local contractors to submit competitive and profitable bids while attracting local workers possessing the skills needed for the project. When local companies and workers are employed on a state-funded project, more project funds remain in the local economy and stimulate additional economic activity. However, without adequate prevailing wage protection, more work is completed by out-of-area contractors and more project funds, jobs, income, spending, and economic activity leak out of the local economy.

Weakening or repealing Ohio's prevailing wage law would be associated with a $725 million net leakage of construction business out of Ohio's building industry. This loss of construction business and spending would ripple throughout Ohio's economy and reduce economic activity by approximately $1.4 billion. The corresponding total employment loss would be 9,700 jobs– including 5,500 construction jobs and 4,200 jobs in other industries, such as retail, service, and restaurants. The reduction in economic activity is associated with an approximate $45 million decrease in state and local tax revenue. This is a statewide impact that would be experienced each year if the wage policy is repealed.

Finally, prevailing wage repeal represents a strong-head wind for an Ohio construction industry that has not yet fully recovered from the Great Recession. Construction employment remains approximately 8.8% below the 2007 level with the number of construction firms 17.2% below the pre-recession level. The consequences of repeal would further reduce construction industry employment and the number of establishments in Ohio. Weakening or repealing Ohio's prevailing wage law would open an industry that is still recovering to increased competition from workers and builders from other states.

The Purpose of Prevailing Wage Laws and Ohio's Prevailing Wage Policy

The main purpose of a prevailing wage law is to protect local construction labor standards from distortions associated with publicly-funded construction.[4] Large infusions of government spending into an area, along with a contract award process that favors the lowest bidder, may attract contractors from areas where construction worker wage rates are relatively low. Any appreciable infusion of low-wage contractors could result in the erosion of local compensation standards. Prevailing wage laws create a level playing field for all contractors by ensuring that public works expenditures maintain and support local area standards.

Ohio's prevailing wage law became effective in 1931, the same year that the first federal prevailing wage law, the Davis-Bacon Act, was enacted.[5] Since its inception, Ohio's prevailing wage law has undergone numerous revisions regarding the types of projects covered and the value threshold for coverage. For example, Ohio exempted school construction projects from prevailing wage coverage in 1997.[6] Changes in 2011 increased threshold coverage levels that trigger prevailing wage requirements.[7] These changes also exempted numerous projects from prevailing wage requirements. For example, Port Authority construction and projects involving Department of Development loans, Minority Business Enterprise loans, Industrial Development Bonds, and other projects that received public assistance were exempt from the wage requirement. The changes in 2011 also prohibited school districts from voluntarily paying prevailing wages.

The payment of prevailing wage rates to laborers, mechanics, and other workers is required on covered public works projects. The prevailing wage rate is the wage and benefit rate determined by the relevant collective bargaining agreement in the project's immediate locality.[8] If there is no collective bargaining agreement that applies to the immediate locality, the terms of the agreement in the nearest locality are the prevailing rates.

Compared to other states, Ohio's prevailing wage law can be considered average in terms of "strength," where strength is determined by the ability of a policy to protect local wage rates.[9] As of January 1, 2017, there were 29 states (plus the District of Columbia) with prevailing wage

[4] As an example, see "The Davis-Bacon Act Protecting Wage Equality Since 1931," Wage and Hour Division, U.S. Department of Labor. Accessed at: http://www.dol.gov/whd/programs/dbra/Survey/conformancefaq.htm.

[5] For a description of Ohio's prevailing wage law see "The Effects of the Exemption of School Construction Projects from Ohio's Prevailing Wage Law," S.B. 102 Report, Staff Research Report No. 149, Legislative Service Commission, May 20, 2002. Accessed at: http://www.lsc.ohio.gov/research/srr149.pdf.

[6] For more specifics see "Ohio Prevailing Wage Exemption for School Construction," OLR Research Report, August 30, 2006. Accessed at: https://www.cga.ct.gov/2006/rpt/2006-R-0545.htm.

[7] See "New Ohio Prevailing Wage Laws Explained," AIA Ohio News, July 2011. Accessed at: file:///G:/Consulting/Ohio/New%20Ohio%20Prevailing%20Wage%20Laws%20Explained.htm.

[8] See "Chapter 4115: Wages and Hours on Public Construction," LA Writer Ohio Laws and Rules. Accessed at: http://codes.ohio.gov/orc/4115.

[9] In 1995 Armand Thieblot rated state-level prevailing wage laws based on factors including coverage thresholds, type of work excluded/included, and the determination of wage rates, etc. See Thieblot Armand J.*1995. "State Prevailing Wage Laws. An Assessment at the Start of 1995." Prepared for Associated Builders and Contractors, Inc.* At the time of Thieblot's report, Ohio's prevailing wage law could be considered relatively strong based on the breadth of coverage and use of union rates. However, the changes in 1997 and 2011 have reduced the types of projects covered and the law can currently be considered average in terms of strength.

laws.[10] 23 of the state-level laws can be considered average or strong in terms of policy strength.[11] Six states have weak laws and 21 states do not have a wage policy. Much of the analysis in this report is based on differences in construction industry and construction labor market characteristics in states with average and strong prevailing wage laws compared to states with weak or no prevailing wage laws.

[10] For a list of states with prevailing wage laws, see "Dollar Threshold Amount for Contract Coverage," Wage and Hour Division, U.S. Department of Labor. Accessed at https://www.dol.gov/whd/state/dollar.htm. Since this information was compiled, Indiana and West Virginia have repealed their prevailing wage policies.

[11] For a list of states with average/strong and weak/no prevailing wage laws see "How Weakening Wisconsin's Prevailing Wage Policy Would Affect Public Construction Costs and Economic Activity," by Kevin Duncan and Alex Lantsberg, May 22, 2015. Accessed at: http://www.faircontracting.org/wp-content/uploads/2015/05/How-Weakening-Wisconsin%E2%80%99s-Prevailing-Wage-Policy-Would-Affect-Public-Construction-Costs-and-Economic-Activity2.pdf. Information in this report is based on data from 2012 and does not reflect the repeal in prevailing wage laws in Indiana and West Virginia in 2015.

Prevailing Wage Laws and School Construction Costs

Current Research Results for School Construction in Ohio (2013-2016)

Federal funding for public school construction in Ohio provides an opportunity to examine the effect of prevailing wage requirements on construction costs. Part of the American Recovery and Reinvestment Act of 2009 included federal refunds for interest costs on school construction bonds (the Quality School Construction Program).[12] When funds from this federal program were used in school construction in Ohio, prevailing wage payments under the federal Davis-Bacon Act were required. To examine the effect of prevailing wages on construction costs in Ohio, we compare differences in construction bid-costs between school projects that were, and were not covered by prevailing wage regulations.

Our study is based on information available from the Ohio Facilities Construction Commission (OFCC).[13] The OFCC record of school construction projects extends from 2013 to the present and includes capital construction projects for state agencies, state-supported universities and community colleges, and Ohio's comprehensive public K-12 school construction and renovation program.[14] We collected information on all projects (132) available from the OFCC between August 2013 and October 2016 that involved K-12 school construction. These projects consist of school construction that received state support.

We used information from the Ohio School Facilities Commission and McGraw-Hill Construction to identify school projects that received funding through the Quality School Construction Program to determine which projects were and were not covered by prevailing wage requirements.[15] While projects receiving federal funds are covered by the federal Davis-Bacon prevailing wage law, all of the specifications for the projects included in this study reference the payment of Ohio's prevailing wage rates. As described previously, union rates prevail under Ohio's wage policy. Union rates prevail under Davis-Bacon if they are the majority wage rate.[16] Consequently, the comparison of school projects built with prevailing wages and those without prevailing wages is a strong test of Davis-Bacon when union rates prevail.

Of the 132 OFCC school projects that were open to bid between 2013 and 2016, we were unable to determine the prevailing wage status of 8 of these projects. Another fourteen projects

[12] See "Ohio School Facilities Commission. FY 2010 Annual Report. Accessed at: http://ofcc.ohio.gov/Portals/0/Documents/Resources/Publications/Annual%20Reports/Annual%20Report%20FY10_FINAL.pdf.
[13] See "Welcome to the OFCC," Ohio Facilities Construction Commission. Accessed at: http://ofcc.ohio.gov/.
[14] See "Construction Bidding," Ohio Facilities Construction Commission. http://ofcc.ohio.gov/Opportunities.aspx. Prior to 2013, information on state sponsored K-12 construction was reported by the Ohio School Facilities Commission accessed at: https://cmw.osfc.state.oh.us/guest/.
[15] See "Ohio School Facilities Commission. Annual Report FY 2010." Accessed at: http://ofcc.ohio.gov/Portals/0/Documents/Resources/Publications/Annual%20Reports/OSFC%20Annual%20Report%20FY2011_Update.pdf. Project specifications obtained from McGraw-Hill Dodge Data and Analytics include statements by school districts and other contract information indicating if prevailing wages were required on the project. For more information about Dodge Data Analytics see: http://construction.com/.
[16] Prevailing wage determination under the Davis-Bacon Act utilizes a modal/average approach. If the results of a wage survey indicate a majority wage rate for a particular job classification in a county, the majority wage is the prevailing rate. If there is no majority wage, the prevailing wage is the average wage, weighted by total employment in the job class. For more details on Davis-Bacon wage rates see "Davis-Bacon Surveys," Prevailing Wage Resource Book 2010. U.S. Department of Labor. Accessed at: https://www.dol.gov/whd/recovery/pwrb/Tab12DBSurveys.pdf.

did not include the engineer's estimate (or agency estimate) of the project cost. As a consequence, the study is based on 110 school projects containing complete information. These projects involved asbestos abatement, demolition, renovations, additions, and other building construction. Bids on these projects ranged from approximately $23,000 to over $28 million. The statistical technique of regression analysis is used to compare low bids for projects covered by prevailing wages (33) and projects that were not covered by the wage policy (77). Regression analysis allows for this comparison taking into consideration project type, size, and complexity, the level of bid competition, and the state residence of the winning contractor.

Results of the statistical analysis can be found in the Appendix. The findings reveal no statistically significant difference in low bids for projects that were and were not covered by prevailing wage regulations. This means that project costs are not discernibly higher when prevailing wage standards apply, a result that is consistent with the preponderance of peer-reviewed research summarized on the next page of this report. The effect of prevailing wage requirements on the level of bid competition is also a matter of concern. Many assert that the wage policy reduces bid competition without offering any empirical evidence to support this claim.[17] While this issue draws considerable attention, only two studies have examined this topic using bid data and statistical techniques. Neither of these peer-reviewed studies finds a difference in the level of bid competition between projects that do, and do not require the payment of prevailing wage.[18] Results from our analysis indicate that the level of bid competition is 30% higher on projects that require prevailing wages. This effect *is* statistically significant.

Since the OFCC data include the business address of participating contractors, it is also possible to determine if prevailing wages protect work for local contractors. Of the 110 school projects included in this study, 15% (17/110) of the low bids were submitted by contractors from other states (Indiana, Iowa, Kentucky, Michigan, and Pennsylvania). For projects that did not require prevailing wages, 21% (16/77) of low bids were submitted by out-of-state contractors. This contrasts to 3% (1/33) on projects paying prevailing wages. Of the 17 out-of-state contractors included in the study, 94% (16/17) participated in projects that did not require prevailing wages. Only 3% (1/33) of contractors on prevailing wage projects were from another state.

Consistent with the preponderance of peer-reviewed research, the results of our analysis of recent school construction projects in Ohio indicate that prevailing wage laws are not associated with increased construction costs. Additionally, the level of bid competition– an important determinant of project cost– is higher when prevailing wages apply. Finally, substantially more work is completed by in-state contractors when prevailing wages are required. In the absence of the wage policy, more of Ohio's tax dollars are used to employ companies and workers from other states, such as Indiana, Iowa, Kentucky, Michigan, and Pennsylvania.

[17] For an example, see George Leef. 2010. Prevailing Wage Laws: Public Interest or Special Interest Legislation? *Cato Journal*, 30(1):137-154.

[18] See Kevin Duncan. 2015. "The Effect of Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations on Highway Maintenance Costs." *Industrial and Labor Relations Review*, Vol. 68, No. 1, pp. 212-237 and Jaewhan Kim, Chang Kuo-Liang, and Peter Philips. 2012. "The Effect of Prevailing Wage Regulations on Contractor Bid Participation and Behavior: A Comparison of Palo Alto, California with Four Nearby Prevailing Wage Municipalities." *Industrial Relations*, 51(4): 874-891.

Previous Research on School Construction Costs in Ohio

A 2002 report by the Ohio State Legislative Service Commission (LSC) examined the effect of the exclusion of public school construction from prevailing wage regulations.[19] This study examines school projects that were built before and after the policy change in 1997. The analysis is based on F. W. Dodge data collected from 1992 to 2001.[20] The estimated results for new school construction and additions indicate that bid-costs were lower after 1997, suggesting an overall cost savings of 10.7% due to the exemption of the wage requirements. This study ignores the statistical significance of the estimated cost effect on the basis that the projects included in the study represent the population, not a sample. As a consequence, statistical tests do not apply. However, since the data were collected between 1992 and 2001, school projects built prior to 1992 are not included.[21] Therefore, the study is not based on the examination of the population, but on a sample of projects. Under these conditions, tests for statistical significance are relevant.[22] Such tests are important because an estimate that is *not* statistically significant is likely to have occurred due to chance. On the other hand, a statistically significant result is likely due to causation. None of the estimates of the cost effect of prevailing wage requirements that are reported in the study achieve conventional levels of statistical significance. When properly interpreted, the 2002 study by the LSC indicates that the cost of schools built before the prevailing wage exemption did not differ, in a statistically significant way, from the cost of schools built after the exemption.[23]

Professor Herbert Weisberg was the first to criticize the 2002 LSC report by stating that "the cost-savings estimates are statistically fiction" because "the LSC equations find prevailing wage to be statistically insignificant, meaning that there is not statistical reason to believe that

[19] See "The Effects of the Exemption of School Construction Projects from Ohio's Prevailing Wage Law," S.B. 102 Report, Staff Research Report No. 149, Legislative Service Commission, May 20, 2002. Accessed at: http://www.lsc.ohio.gov/research/srr149.pdf.

[20] For more information about this data source, see Dodge Data & Analytics. Accessed at: http://www.construction.com/dodge/ .

[21] Evidence indicates that prevailing wage coverage applied to school construction in Ohio at least to 1991. See Peter Philips, "A Comparison of Public School Construction Costs in Three Midwestern States that have Changed Their Prevailing Wage Laws in the 1990s," February 2001. Accessed at: http://www.faircontracting.org/PDFs/prevailing_wages/Public_School%20Peter%20Phillips.pdf.

[22] Professor Weinberg of Ohio State University makes a similar criticism. See "Analysis of Regression and Surveys in Ohio LSC Report on S.D. 102 on Claimed Cost Savings from Exempting School Construction from Prevailing Wage Requirements." Accessed at: http://www.faircontracting.org/PDFs/prevailing_wages/Analysis%20of%20Regression%20and%20Surveys%20in%20Ohio%20LSC%20on%20SB%20102%20onClaimed%20Cost%20Savings.pdf .

[23] The LSC study also examines bid-costs from Westlake School District that requested contractors to submit two bids where one bid was based on the prevailing wage requirement while the other bid was not. Comparisons indicate that prevailing wage bids were 5.8% higher. Maryland's Public School Construction Program also uses 'side-by-side bids' in claiming that prevailing wage requirements increase costs by over 11%. While side-by-side bids are compelling evidence at first glance, one of the authors of this report has found that the gap between prevailing wage and non-prevailing wage bids varies with the level of bid competition, contractor accumulated experience in bidding, contractor eagerness to win a project. Because the gap between side-by-side bids varies with bid and bidder characteristics, these are not accurate measures of the effect of the wage policy. See "The Cost of School Construction: A Comparison of the Monarch Global Academy and Conventional School Facilities." Public School Construction Program. October 28, 2015. Accessed at: http://www.pscp.state.md.us/Reports/Monarch%20Final%20Report%2010-28-15.pdf and Kevin Duncan. 2017. "Prevailing Wage Regulations, Contractor Bid Behavior, and School Construction Costs in Maryland: Evidence from Side-By-Side Bids." Accessed at: https://webcache.googleusercontent.com/search?q=cache:P0aKiMzQ8GsJ:https://www.aeaweb.org/conference/2017/preliminary/paper/5Zysz9sy+&cd=1&hl=en&ct=clnk&gl=us.

prevailing wage affects costs."[24] Furthermore, James Burley, Director of the LSC in 2002, did not dispute Weisberg's criticism.[25] Our analysis of the LSC study echoes these criticisms. When the analysis employed by LSC is properly interpreted, it shows that prevailing wages do not have a statistically significant effect on the cost of school construction. **Put plainly, the LSC had no valid basis upon which to estimate a 10% cost savings resulting from the non-application of the prevailing wage law to school construction.**

In addition to the 2002 study by the LSC, there have been four other studies that examine the implications of prevailing wages or similar construction labor market policies on the cost of building public schools in Ohio. The results of these studies are consistent with the proper interpretation of the study by the LSC described above. For example, Professor Alan Atalah tests the hypothesis that prevailing wages increase Ohio school construction costs in two studies. Both are based on the examination of over 8,000 bids obtained from the Ohio School Facilities Commission. The first study compares winning bids that were submitted by contractors who are signatories to collective bargaining agreements and who pay union wage and benefit rates to the bids submitted by open shop contractors who typically pay lower rates. While schools were exempted from Ohio's prevailing wage law in 1997, union rates prevail for other construction funded by the State of Ohio.[26] Consequently, Atalah's union-nonunion comparison is an indirect test of the impact of prevailing wage and benefit rates, omitting any other unique administrative costs associated with the policy. A comparison of average bid-costs per square foot indicates that there is no statistically significant difference in this cost measure between the two groups of contractors across the state.[27] This is the case when all bids are compared and when only the low, winning bids are considered. When Ohio counties are divided into three regions (north, central, and southern), the results are the same for the northern and central regions. There are no statistically significant differences in union and nonunion bid costs, even if only winning bids are considered. The noteworthy exception is the southern region of the state that constitutes 33% of all of Ohio's counties where all bids and winning bids by union contractors are *lower* than comparable bids placed by nonunion contractors. These differences are statistically significant. Since union rates are used to determine prevailing wage and benefit levels in Ohio, the implication of these results is that extending prevailing wage and benefit rates to state-funded school construction would not increase bid-costs. To the contrary, bids on prevailing wage projects would be lower in a large part of the state.

The second study by Professor Atalah yields mixed results regarding the cost impact of prevailing wages.[28] This examination is based on the same sample of over 8,000 school project bids used in the study described above. This study compares bids that were submitted by different trades that did and did not pay union rates. Results indicate that all bids and winning

[24] See Herbert Weisberg. 2002. "Analysis of Regression and Surveys in Ohio LSC Report on S.B. 102 on Claimed Cost Savings from Exempting School Construction from Prevailing Wage Requirements," p. 1. Accessed at: http://www.ctnewsjunkie.com/upload/2015/OSU_Study.pdf.

[25] "Union studies dispute prevailing-wage claim," Catherine Candisky, *Columbus Dispatch*, July 21, 2002. Accessed at: http://www.necanet.org/news/news-release-archive/news/2002/07/31/union-studies-dispute-prevailing-wage-claim-.

[26] See "Chapter 4115: Wages and Hours on Public Works," LA Writer, Ohio Laws and Rules. Accessed at: http://codes.ohio.gov/orc/4115.

[27] Atalah, Alan. 2013. "Comparison of Union and Nonunion Bids on Ohio School Facilities Commission Construction Projects," *International Journal of Economics and Management Engineering*, Vol. 3, Issue 1, pp. 29-35.

[28] Alan Atalah. 2013. "Impact of Prevailing Wages on the Cost among the Various Construction Trades," *Journal of Civil Engineering and Architecture*, Vol. 7, No. 4, pp. 670-676.

bids– adjusted by school square foot size– were not higher for 15 of the 18 trades (83.3%) that paid union rates compared to the same trades that did not pay union rates. Specifically, all bids and winning bids were higher for union contractors doing three types of work (existing conditions, plumbing, and earthwork). In 2 of the 18 trade categories (11.1%), all bids and winning bids submitted by union contractors were lower. Specifically, HVAC and electrical union contracts had lower bid prices. There were no statistically significant differences in bid-costs per square foot for 72.2% of the other trades (13 out of 18 classifications), regardless of payment of union wage and benefit rates.[29] In sum, the studies by Professor Atalah find that, by and large, the payment of union wage rates are not associated with increased bid costs. There are a few cases where bids are higher for some trades when union rates are paid, but there are also a few cases where bids are lower for some trades when union rates are paid. Moreover, there is additional evidence that, for the southern region of the state, bids based on the payment of union wages are lower than bids based on nonunion wage rates.

In a study that is particularly relevant to Ohio, Professor Peter Philips examined school construction costs in Kentucky, Michigan, and Ohio during periods in the 1990s when prevailing wage policies for school projects changed within these states. Professor Philips finds that there was no statistically significant difference in school construction costs as Kentucky, Michigan, and Ohio introduced and repealed prevailing wage requirements for public school construction.[30]

A 2014 study by Jeffrey Waddoups and David May examines the effect of responsible contracting polices on school construction costs in Ohio.[31] These policies required contactors to incorporate health insurance benefits and other obligatory practices into their bids. For some school districts, the standards included the payment of prevailing wages and related requirements, such as the payment of retirement benefits and the participation in apprenticeship programs. The responsible contractor policies started in 2000, and an examination of school construction bids from 1997 to 2008 reveals no statistically discernible impact of the policies on construction bid costs.

Other Studies on Prevailing Wage Laws and School Construction Costs

The studies from Ohio are consistent with the preponderance of peer-reviewed research examining the effect of prevailing wage requirement on school construction costs. For example, in two studies that examine costs of over 4,000 schools built in the United States, Professors Azari-Rad, Philips, and Prus fail to find any statistically significant[32] cost difference between schools built in states with and without prevailing wage laws.[33]

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[29] These projects include the trades involved in the following Construction Specifications Institute categories: communications, concrete, conveying equipment, electronic safety and security, equipment, finishing, fire suppression, furnishings, masonry, openings, structural steel, thermal and moisture protection, and wood, plastics and composites work.

[30] See Peter Philips, "A Comparison of Public School Construction Costs in Three Midwestern States that have Changed Their Prevailing Wage Laws in the 1990s," February 2001. Accessed at: http://www.faircontracting.org/PDFs/prevailing_wages/Public_School%20Peter%20Phillips.pdf.

[31] See Jeffrey Waddoups and David May, "Do Responsible Contractor Policies Increase Construction Bid Costs?" Industrial Relations, Vol. 53, No. 2, April, 2014. Accessed at: http://onlinelibrary.wiley.com/doi/10.1111/irel.12056/abstract.

[32] A statistically significant difference is likely not due to chance, implying causation. A difference that is not statistically significant is likely due to chance, implying the lack of causation.

[33] See Hamid Azari-Rad, Peter Philips and Mark Prus. 2003 'State Prevailing Wage Laws and School Construction Costs.' *Industrial Relations*, Vol. 42, No. 3, pp. 445-457 and Hamid Azari-Rad, Peter Philips and Mark Prus.

Several studies have taken advantage of the introduction of a prevailing wage policy in British Columbia to compare school construction costs. This policy is similar to the relatively strong prevailing wage laws in Washington and Illinois. Professors Bilginsoy and Philips were the first to examine the impact of British Columbia's Skill Development and Fair Wage Policy on school construction costs.[34] This study takes a number of factors into consideration– including the construction business cycle, number of competitors, type of school, and a time trend. Results from the analysis of 54 projects indicate that construction costs under the policy were not statistically different from costs of schools built before the introduction of prevailing wages.[35]

Professors Duncan, Philips, and Prus examine the effect of British Columbia's prevailing wage standard by including a control group of private school projects.[36] This analysis indicates that before the introduction of the prevailing wage policy, the cost of building public schools was approximately 40% more expensive than the costs of comparable private schools.[37] This cost differential did not change after the wage policy was introduced. These authors have also used the British Columbian example to study the effect of prevailing wage laws on the productivity and efficiency of construction. They find that prior to the introduction of the wage legislation, public school projects were 16% to 19% smaller, in terms of square feet, than comparable private structures (given the same project expenditure). This size differential did not change after the policy was in effect.[38] These results suggest that prevailing wage requirements do not alter labor or other input utilization in a way that significantly affects the relative size of covered and uncovered projects. The authors also find that average total efficiency for public school construction is 94.6% (100% is optimal construction efficiency).[39] Average efficiency for projects covered by the introductory stage of British Columbia's construction wage legislation was 86.6%. However, this policy mandated apprenticeship training requiring journeymen to divide time between teaching and building, which can explain the decrease in efficiency when the policy was first introduced. On the other hand, by the time of the expansion of the policy 17 months later, the average efficiency of covered projects *increased* to 99.8%. These findings suggest that the introduction of prevailing wage laws initially disrupted construction efficiency. However, in a relatively short period of time, the construction industry adjusted to wage requirements by actually improving overall construction efficiency in a way that is consistent

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2002. "Making Hay When It Rains: The Effect Prevailing Wage Regulations, Scale Economies, Seasonal, Cyclical and Local Business Patterns Have on School Construction Costs." *Journal of Education Finance*, Vol.27, 997-1012.

[34] Cihan Bilginsoy and Peter Philips. 2000. "Prevailing Wage Regulations and School Construction Costs: Evidence from British Columbia." *Journal of Education Finance*, Vol. 24, 415-432.

[35] Statistical analysis makes a distinction between 'statistically significant' and 'statistically insignificant' results. A statistically significant result is unlikely to have occurred due to chance. If a result is statistically insignificant, then the measured result is likely to have occurred due to chance.

[36] Kevin Duncan, Peter Philips, and Mark Prus. 2014. "Prevailing Wage Regulations and School Construction Costs: Cumulative Evidence from British Columbia." *Industrial Relations*, Vol. 53, No. 4, October, pp. 593-616.

[37] Professors Duncan and Prus examine the effect of the British Columbian wage policy on assorted building types, (assembly halls, hospitals, offices, schools, etc., and find a similar effect. See Duncan, K. and Prus, M. 2005. "Prevailing Wage Laws and Construction Costs: Evidence from British Columbia's Skills Development and Fair Wage Policy" in *The Economics of Prevailing Wage Laws*, Azari-Rad, Hamid, Philips, Peter and Prus, Mark, eds. (Aldershot, G.B.: Ashgate), pp. 123-148.

[38] Kevin Duncan, Peter Philips, and Mark Prus. 2006. "Prevailing Wage Legislation and Public School Construction Efficiency: A Stochastic Frontier Approach," *Construction Management and Economics*, Vol. 24, June 2006. pp. 625-634.

[39] Kevin Duncan, Peter Philips, and Mark Prus. 2009. "The Effects of Prevailing Wage Regulations on Construction Efficiency in British Columbia," *International Journal of Construction Education and Research*, Vol. 5, No.1, pp. 63-78.

with stable total costs. A similar pattern was observed with respect to cost efficiency.[40] All of these studies are based on the examination of between 420 and 550 school projects. Taken together, these studies of prevailing wages in British Colombia provide a comprehensive analysis that fails to find an effect on construction costs or efficiency consistent with the view that prevailing wages increase construction costs.

Professors Keller and Hartman compare labor costs under prevailing wage regulations and "open shop" conditions and report that Pennsylvania's prevailing wage law adds, on average, 2.25% to the cost of building public schools, though this analysis is based on the flawed wage differential method.[41] In a comparison of about 2,600 schools built in the United States, Vincent and Monkkonen report a prevailing wage cost effect ranging between 8% and 13%.[42] The data used in this study is similar to that used in the studies by Professors Azari-Rad, Philips, and Prus who find no statistically significant prevailing wage cost impact. One flaw, however, in Professor Vincent and Monkkonen's analysis is that they do not consider the effect of economic conditions on costs. Professors Azari-Rad, Philips and Prus find that doubling the unemployment rate within a state can reduce school construction costs by as much as 21%. If states built under prevailing wage requirements also have lower unemployment rates, then the prevailing wage cost estimate of 8% to 13% is too high in Vincent and Monkkonen's study.

In addition to these studies that focus on school construction, six other peer-reviewed studies have examined the effect of prevailing wage laws on construction costs for different types of projects, such as highways, low-income housing, and offices.[43] Results from only two of these studies (33%) suggest that prevailing wage requirements increase costs. Of the combined 17 peer-reviewed studies that examine this issue, fully 76% find that prevailing wages are not associated with increased construction costs.

Why don't prevailing wages increase construction costs? First, labor costs are a low and historically declining percentage of total costs in the construction industry– approximately 23% of all building costs in the United States.[44] As the data presented in Figure 1 indicate, contractors reduce expenditures on materials, fuels, and rental equipment, and accept marginally lower profit margins when wages are higher.[45] Finally, peer-reviewed research indicates that when wages increase in the construction industry, contractors respond by utilizing more capital equipment

[40] Kevin Duncan, Peter Philips, and Mark Prus. 2012. "Using Stochastic Frontier Regression to Estimate the Construction Cost Efficiency of Prevailing Wage Laws." *Engineering, Construction and Architectural Management*, Vo. 19, No. 3, pp 320-334.
[41] This 2001 study is the last peer-reviewed paper based on the wage differential method. See Keller, Edward C. and William T. Hartman. 2001 'Prevailing Wage Rates: The Effects on School Construction Costs, Levels of Taxation, and State Reimbursements,' *Journal of Education Finance*, Vol. 27, pp. 713-728.
[42] See Jeffrey Vincent, Jeffrey and Paavo Monkkonen. 2010. "The Impact of State Regulations on the Cost of Public School Construction," *Journal of Education Finance*, Vol. 35, No. 4, spring, pp. 313-330.
[43] For a review of these studies see Kevin Duncan, "The Effect of Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations on Highway Maintenance Costs," *Industrial and Labor Relations Review*, January, 2015, Vol. 68, No. 1, pp. 212-237. Accessed at: http://ilr.sagepub.com/content/68/1.toc.
[44] See the 2012 U.S. Census Bureau, *Economic Census of Construction*, Construction: Geographic Area Series: Detailed Statistics for Establishments, accessed at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_23A1&prodType=table.
[45] Kevin Duncan and Alex Lantsberg. 2015. "How Weakening Wisconsin's Prevailing Wage Policy Would Affect Public Construction Costs and Economic Activity." Accessed at: http://www.faircontracting.org/wp-content/uploads/2015/05/How-Weakening-Wisconsin%E2%80%99s-Prevailing-Wage-Policy-Would-Affect-Public-Construction-Costs-and-Economic-Activity2.pdf.

and substituting skilled workers for less-productive counterparts.[46] Since labor costs represent a small portion of overall costs, relatively minor changes are needed to offset the effect of the wage policy.

Prevailing Wage Laws and Construction Worker Income, Poverty, and Reliance on Public Assistance

Background on the Statistical Analysis of Repealing or Weakening Prevailing Wages

This section compares labor market outcomes for construction workers residing in a 9-state region with Ohio near the center (Figure 1). The states are categorized by those with strong or average prevailing wage laws (PWLs) and those with weak or no prevailing wage policies.[47] Note that Indiana observations starting in July 2015 and West Virginia observations starting in May 2016 are classified as occurring in weak or no law states because these states repealed prevailing wage during the period of analysis.[48] Data from the Annual Social and Economic Supplement (ASEC) of the *Current Population Survey* contain economic and demographic information on a large number of construction workers.[49] 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. Weights are provided by statisticians at the U.S. Census Bureau to match the survey sample to the overall population in each state.

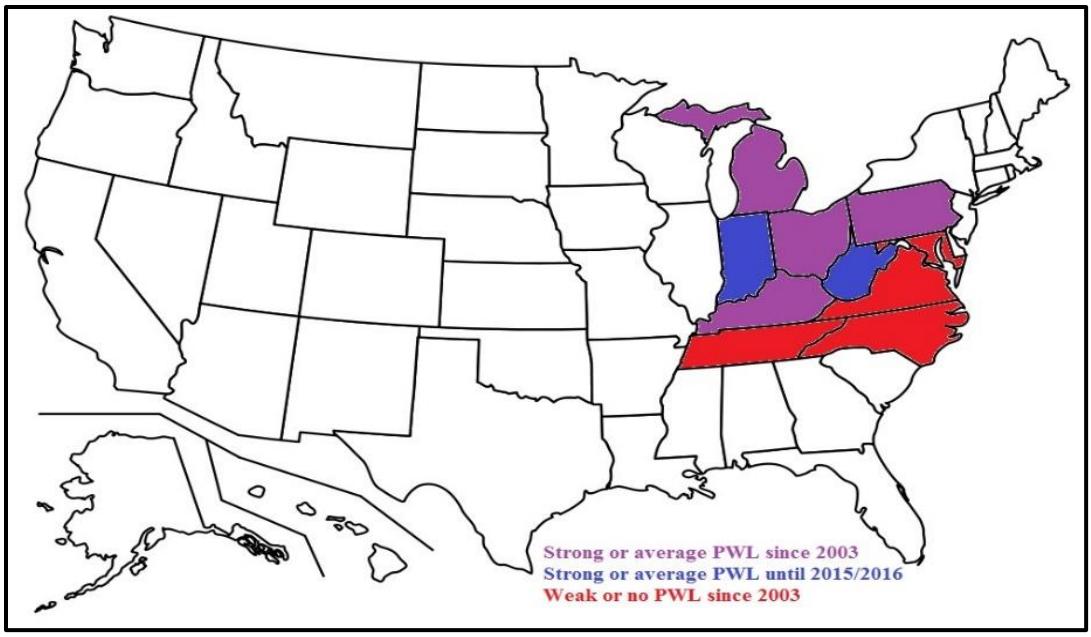
Figure 1. Map of Ohio and Eight Neighboring States Used in Analysis, 2003-2016

[46] See William Blankenau and Steven Cassou, "Industry Differences in the Elasticity of Substitution and Rate of Biased Technological Change between Skilled and Unskilled Labor." *Applied Economics*, 2011, Vol. 43, pp. 3129-3142 and Edward Balistreri, Christine McDaniel and Eina Vivian Wong, "An Estimation of U.S. Industry-Level Capital-Labor Substitution Elasticities: Support for Cobb-Douglas." *The North American Journal of Economics and Finance*, 2003, Vol. 14, No. 3, 343-356.

[47] In 1995 Armand Thieblot rated state-level prevailing wage laws based on factors including coverage thresholds, type of work excluded/included, and the determination of wage rates, etc. See Thieblot Armand J.*1995. "State Prevailing Wage Laws. An Assessment at the Start of 1995." Prepared for Associated Builders and Contractors, Inc.* We updated Thieblot's classifications reflective of subsequent policy changes and other research. A description of state-level prevailing wage laws is available at: http://www.dol.gov/whd/state/dollar2011.htm#1. A summary of recent state-level prevailing wage characteristics is available at www.cga.ct.gov/2010/rpt/2010-R-0526.htm.

[48] See Indiana Department of Labor, "Common Construction Wage Home." Accessed at http://www.in.gov/dol/2723.htm. See *WSAZ*, "UPDATE: West Virginia repeal of state prevailing wage takes effect" (May 5, 2016). Accessed at: http://www.wsaz.com/content/news/West-Virginia-House-to-vote-on-repeal-of-prevailing-wage-366679441.html

[49] See "Poverty," *Current Population Survey* Annual Social and Economic Supplement, US Census Bureau. Accessed at: http://www.census.gov/hhes/www/poverty/publications/pubs-cps.html.



To understand the actual and unique impact that repealing or weakening prevailing wage laws have on worker incomes and public sector budgets, the statistical method of "regression analysis" is utilized. This statistical technique, a "curve fitting" method, allows researchers to compare labor market outcomes between workers in the two groups of states, taking other individual characteristics 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.

Results are reported from a regional analysis of the nine states– Ohio and eight neighboring states– using Heckman regression models and Heckman probit models– and are compared to an advanced national analysis of all states using similar data from 2004 to 2013.[50] States that had a prevailing wage statute classified as either "strong" or "average" from 2003 through 2016 include Ohio, Michigan, Pennsylvania, and Kentucky. States in the region with a "weak" law or without a prevailing wage law include Maryland, North Carolina, Tennessee, and Virginia. As discussed previously, Indiana and West Virginia are in the strong or average group of states until the month in which their respective repeals became effective.

There are limitations to this statistical approach. First, data from the *Current Population Survey* reports a worker's state of residence rather than state of employment, so the results may be biased by workers who live in states with a weak or no prevailing wage law but work in states with a strong or average prevailing wage law (e.g., living in Virginia but working on a project in Ohio during the year) and vice-versa. Second, the data is based on household survey responses rather than on administrative payroll reports. There may be more potential for human error in reporting income and government assistance than official payroll records. A recent paper by Professor Bruce Meyer at the University of Chicago and Nikolas Mittag at CERGE, Charles

[50] See Frank Manzo IV, Alex Lantsberg, and Kevin Duncan, "The Economic, Fiscal, and Social Impacts of State Prevailing Wage Laws: Choosing Between the High Road and the Low Road in the Construction Industry." Illinois Economic Policy Institute, Smart Cities Prevail, and Colorado State University–Pueblo. Accessed at: https://illinoisepi.files.wordpress.com/2017/03/pw-national-impact-study-final2-9-16.pdf.

University has found that the *Current Population Survey* and other household data considerably underreport government transfers of income.[51] Using data from New York, the researchers find that the *Current Population Survey* misses 40% of all Supplemental Nutrition Assistance Program (SNAP) food stamp recipients. The largest instance of underreporting is for single mother households. However, blue-collar construction occupations are male-dominated, so underreporting is a smaller issue for this industry. Nevertheless, all government assistance findings are likely to be *conservative* estimates as a result. The final limitations are those associated with all statistical models, such as lurking and unobservable variables.

Summary Statistics of the CPS-ASEC Data

Table 1 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. These numbers also describe "what is." For example, without considering any other factors, what is the average wage and salary income of a blue-collar construction worker in a state with a strong or average prevailing wage law compared to the same income in a state with a weak or no law?

The blue-collar construction workforce is better-educated in states with a strong or average law than in states with a weak or no law (Table 1). For blue-collar construction workers in both types of states, white non-Latino workers account for the majority of the workforce and only about 3% of the workforce is female. However, the share of blue-collar construction workers with a college degree or some college-level instruction (which can include apprenticeship training) is 29.9% in states with a strong or average prevailing wage law, compared to just 23.0% in states with a weak or no law. An estimated 30.3% of the blue-collar construction workforce in Ohio has some college experience or a college degree.

Table 1. Information on Blue-Collar Construction Workers in Ohio and Eight Neighboring States, 2003-2016

Summary Statistics	Ohio	Strong/Average PWL (incl. OH)	Weak/No PWL
Observations in labor force	37,543	196,131	76,636
(Weighted)	(6,214,553)	(27,765,631)	(12,735,942)
Employed construction worker observations	1,326	7,550	3,992
(Weighted)	(219,155)	(1,054,188)	(640,407)
Demographics			
White, non-Latino	88.7%	82.0%	59.5%
Female	3.3%	2.6%	2.7%
High school degree or less	69.7%	70.1%	77.0%
Some college, no degree	19.8%	16.4%	13.1%
College degree	10.5%	13.5%	9.9%
Poverty, Government Assistance, and Taxes			
Real wage and salary income*	$42,379	$43,327	$37,700

[51] See Bruce Meyer and Nikolas Mittag, "Using Linked Survey and Administrative Data to Better Measure Income: Implications for Poverty, Program Effectiveness and Holes in the Safety Net." National Bureau of Economic Research (NBER), 2015, Working Paper 21676. Accessed at: http://www.nber.org/papers/w21676.

Usual hours worked per week	34.2	35.0	33.9
Included in employer-provided health plan	93.1%	89.8%	85.0%
Has a pension plan at work	47.6%	42.9%	27.0%
Lives below official poverty line	8.1%	7.1%	12.4%
Receives Earned Income Tax Credits (EITC)	12.6%	11.3%	16.4%

Source: *Current Population Survey*, Annual Social and Economic Supplement (2003-2016). *Reported only for those workers with positive earnings.

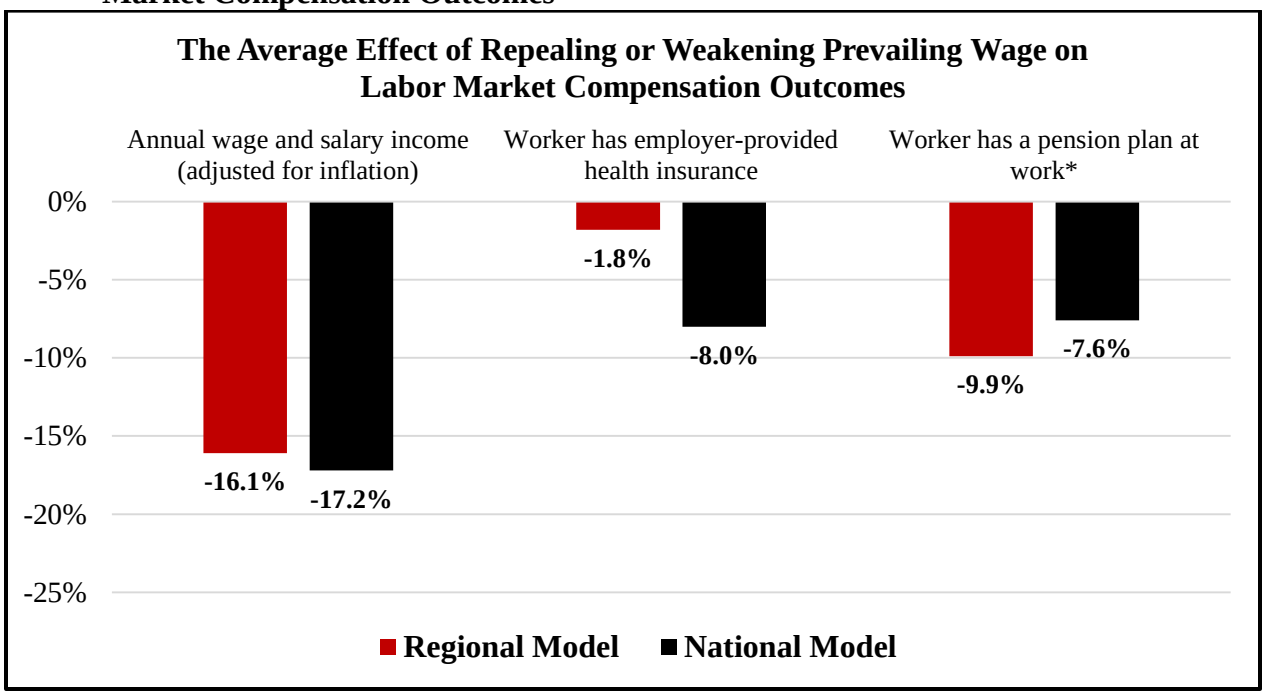
As shown in Table 1, personal economic outcomes contrast sharply between the two groups of states. The average wage and salary income for blue-collar construction workers was $43,327 in states with a strong or average prevailing wage law in the region, or $5,627 greater than their counterparts in states with a weak or no law ($37,700). Isolated from their regional peers in states with a strong or average prevailing wage law, blue-collar construction workers in Ohio also earned $4,679 more annually ($42,379) than their counterparts in states with a weak or no law. In the region's states with an effective prevailing wage law, 89.8% of blue-collar construction workers had health insurance and 42.9% had a pension plan at work. Conversely, in nearby states without an adequate prevailing wage law, only 85.0% of blue-collar construction workers had employer-provided health insurance and just 27.0% had a pension plan at work. The respective figures for Ohio were 93.1% covered by an employer-provided health insurance plan and 47.6% covered by a pension– both significantly better than the outcomes in neighboring states with a weak or no law.

Other data reported in Table 1 indicate that blue-collar construction workers are more likely to be impoverished and require public assistance in states with a weak or no prevailing wage law. Fewer blue-collar construction workers earned an annual income that placed them below the official poverty line (7.1%) and fewer qualified for, and received, Earned Income Tax Credits (11.3%) in the states with strong or average prevailing wage laws than in those without (12.4% and 16.4%, respectively). Once again, when isolated from their strong or average law peers, Ohio fared much better than neighboring states with a weak or no law; in Ohio, 8.1% of the blue-collar construction workforce earns less than the poverty line and 12.6% received Earned Income Tax Credits.

The Cost of Weakening or Repealing Prevailing Wage on Worker Incomes and Employee Benefits

While the summary statistics of Table 1 report "what is," the remainder of this section investigates "how much" strong or average prevailing wage legislation is uniquely responsible for these outcomes. Determining the causal impact of prevailing wage after netting out the effects of other variables allows us to assess the costs of legislation that would weaken or repeal prevailing wage laws.

Figure 2. The Impact of Repealing or Weakening Prevailing Wage on Labor Market Compensation Outcomes



Source: Authors' analysis of the *Current Population Survey*, Annual Social and Economic Supplement (2003-2016). For full regression results in .txt format, please contact author Frank Manzo IV at fmanzo@illinoisepi.org. *For the effect on pension coverage in the national model, the results are only significant at P<|0.10|.

The effect of strong or average prevailing wage laws in the region appears to be consistent with overall estimates for the rest of the country, as depicted in Figure 2. The average impact of repealing or weakening prevailing wage is to reduce blue-collar construction worker incomes by 16.1% in the region (Figure 2). In addition, gutting strong or average prevailing wage laws lowers the probability that a blue-collar construction worker has employer-provided health insurance by 1.8 percentage points and the probability that he or she has a pension plan at work by 9.9 percentage points. All of these results are statistically significant. The advanced national model by Manzo, Lantsberg, and Duncan finds that the impact of repealing prevailing wage across the country is a 17.2% decrease in wages, an 8.0 percentage-point reduction in health coverage, and a 7.6 percentage-point drop in pension coverage– but the latter is not significant at the traditional 5% confidence level.[52] Weakening or repealing prevailing wage in Ohio would significantly decrease private health and retirement coverage, forcing blue-collar construction workers who were previously self-sufficient to rely on public insurance programs.

Other academic research that examines the benefits of prevailing wage laws by Professor Waddoups has explored the connection between the lack of employment-based health insurance and the disproportionate uncompensated care costs that accrue to public hospitals and, by

[52] See Frank Manzo IV, Alex Lantsberg, and Kevin Duncan, "The Economic, Fiscal, and Social Impacts of State Prevailing Wage Laws: Choosing Between the High Road and the Low Road in the Construction Industry." Illinois Economic Policy Institute, Smart Cities Prevail, and Colorado State University–Pueblo. Accessed at: https://illinoisepi.files.wordpress.com/2017/03/pw-national-impact-study-final2-9-16.pdf.

extension, the community.[53] In particular, Waddoups' study documented the particularly low incidence of employment-based health insurance among construction workers and the corresponding disproportionately high incidence of uncompensated care among construction workers at a local public hospital. The findings clearly demonstrate that a large share of uncompensated care is attributable to the construction industry relative to its size, which means that local taxes supporting the hospital are higher than they would otherwise be. To the extent that cross-subsidies from paying patients cover uncompensated care costs, prices of health care– and thus, insurance prices– are higher than they would be without the high levels of uncompensated care.

The Social Cost of Weakening or Repealing Prevailing Wage

Repealing prevailing wage reduces worker earnings and slashes employee benefits, resulting in fewer construction workers in the middle class. Accordingly, these economic realities should tend to increase reliance on government programs– hurting public sector budgets. Table 3 presents results from regional analyses and compares them to national findings by Manzo, Lantsberg, and Duncan.[54]

Results reported in Table 3 indicate that weakening or repealing prevailing wage laws increases the probability that a blue-collar construction worker earns less than the official poverty line and that he or she receives Earned Income Tax Credits (EITC). In the regional models, gutting a strong or average prevailing wage law is found to increase poverty by 7.3 percentage points and EITC reliance by 6.3 percentage points. Though larger, the regional findings are similar to the national estimates. Note that the regional models account for the types of workers who self-select into blue-collar construction occupations, who may otherwise be more likely to fall below the poverty line due to demographic factors or lower levels of educational attainment on average.

Table 3. The Impact of Repealing or Weakening Prevailing Wage on Poverty and Earned Income Tax Credits

Average Effect of Repealing or Weakening a Strong or Average PWL on:	Regional Model	National Model
Worker living below official poverty line	+7.3%	+3.1%
Worker receiving Earned Income Tax Credits (EITC)	+6.3%	0.0%

Source: Authors' analysis of the *Current Population Survey*, Annual Social and Economic Supplement (2003-2016). For full regression results in .txt format, please contact author Frank Manzo IV at fmanzo@illinoisepi.org.

[53] See Jeff Waddoups, "Health Care Subsidies in Construction: Does the Public Sector Subsidize Low Wage Contractors?" Accessed at: http://www.researchgate.net/publication/237102337_Health_Care_Subsidies_in_Construction_Does_the_Public_Sector_Subsidize_Low_Wage_Contractors.

[54] See Frank Manzo IV, Alex Lantsberg, and Kevin Duncan, "The Economic, Fiscal, and Social Impacts of State Prevailing Wage Laws: Choosing Between the High Road and the Low Road in the Construction Industry." Illinois Economic Policy Institute, Smart Cities Prevail, and Colorado State University–Pueblo. Accessed at: https://illinoisepi.files.wordpress.com/2017/03/pw-national-impact-study-final2-9-16.pdf.

Table 4 aggregates the findings to forecast the number of affected workers if Ohio were to weaken or repeal its strong or average prevailing wage law. Note that, given the finding by Professors Meyer and Mittag that government assistance is actually underreported by the *Current Population Survey* Annual Social and Economic Supplement (ASEC), Table 4 likely provides conservative estimates.[55] This predictive analysis is also a "static" assessment and assumes that nothing else changes other than the state's prevailing wage law.

Table 4 applies the regional impacts to Ohio. The top-line figure in Table 4 is the average annual number of blue-collar construction workers in each state from 2003 through 2016. These estimates do not include extraction occupations, which are often grouped with construction workers. The rest of the table incorporates the data to understand how Ohio would be different by gutting its prevailing wage law, reported in percentage values and total worker values.

The data forecast that thousands of Ohio construction workers would require government assistance if the state weakened or repealed its prevailing wage law (Table 4). The average annual income of Ohio's blue-collar construction workforce would be expected to decline by 16.1%. For over 16,000 workers, the wage cut would be so significant that they would fall below the official poverty line, qualifying them for Supplemental Nutrition Assistance Program (SNAP) government benefits. In addition, approximately 13,800 blue-collar construction workers would newly qualify for Earned Income Tax Credit (EITC) assistance.

Furthermore, thousands of blue-collar construction workers would lose their employer-provided health insurance and pension plan if Ohio were to weaken or repeal its prevailing wage law. About 3,900 blue-collar construction workers would lose their employer-provided health insurance coverage and 21,700 would lose their employer-provided pension plan if Ohio were to gut prevailing wage. By reducing pension and health coverage, repeal of prevailing wage would force thousands of blue-collar construction workers onto public retirement and public health insurance programs, increasing costs to taxpayers.

Table 4. Estimated Social Impact of Repealing or Weakening Prevailing Wages in Ohio

Economic or Public Sector Budget Outcome	Actual (2003-2016)	With Weak or No PWL	Estimated Change
Average workers in construction occupations	219,200	219,200	--
Worker living below official poverty line	8.1% *17,800*	15.4% *33,800*	+7.3% *+16,000*
Workers receiving Earned Income Tax Credits (EITC)	12.6% *27,600*	18.9% *41,400*	+6.3% *+13,800*

[55] See Bruce Meyer and Nikolas Mittag, "Using Linked Survey and Administrative Data to Better Measure Income: Implications for Poverty, Program Effectiveness and Holes in the Safety Net." National Bureau of Economic Research (NBER), 2015, Working Paper 21676. Accessed at: http://www.nber.org/papers/w21676.

Workers with employer-provided health insurance	93.1% *204,000*	91.3% *200,100*	-1.8% *-3,900*
Workers with a pension plan at work	47.8% *104,800*	37.9% *83,100*	-9.9% *-21,700*

Source: Authors' analysis of the *Current Population Survey*, Annual Social and Economic Supplement (2003-2016). All estimates rounded to the nearest hundred.

Prevailing Wage Laws and Military Veterans in the Construction Industry

A recent, first-of-its-kind national study commissioned by VoteVets.org in May 2016, *The Impact of Prevailing Wage Laws on Military Veterans: An Economic and Labor Market Analysis*, finds that veterans in particular are worse off by weakening or repealing prevailing wage laws.[56] Independent of the authors, this report was peer-reviewed by Abdur Chowdhury, Professor of Economics at Marquette University in February 2017. Chowdhury notes:

> *"Their research uses reliable data and is based on sound analytical work. Therefore, their conclusions are robust. They convincingly show that a repeal of state prevailing wage laws would be an economic disaster for veterans."*[57]

This section applies results from the national study to estimate the impact that weakening or repealing prevailing wage would have on veterans working in Ohio's construction sector.

Veterans are more likely to work in construction than non-veterans (Table 5). Nationally, veterans accounted for 6.9% of all blue-collar construction workers in 2014. In Ohio, veterans made up an even larger share of the construction workforce. Approximately 8.5% of all blue-collar construction workers in Ohio were military veterans, well above the U.S. average. Any given construction worker was 2.5 percentage-points more likely to be a military veteran than another individual in the overall Ohio economy. Note that the difference between the veteran share of the construction workforce relative to the veteran share of all workers is generally higher in states with strong or average prevailing wage laws in the region.

Construction and extraction careers are among the fastest-growing major occupations for workers in Ohio (Table 6). Construction and extraction jobs are the 3rd-fastest growing occupation in the state, offering opportunities for many blue-collar workers– veteran and nonveteran alike. By 2022, construction and extraction occupations will have grown by 16.0%, adding nearly 30,000 new jobs.[58] This expected growth exceeds projected employment growth in all occupations (8.3%). The U.S. military has responded to these employment projections through the United States Military Apprenticeship Program (USMAP), which now accounts for 21.4% of all registered apprentices in the country.[59] The typical construction apprenticeship through USMAP requires 8,000 hours of both classroom time and on-the-job training. As the construction industry grows and replaces retiring workers, apprentices from the military will become an increasingly important source of skilled construction labor.

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[56] See Frank Manzo IV, Robert Bruno, and Kevin Duncan, "The Impact of Prevailing Wage Laws on Military Veterans: An Economic and Labor Market Analysis." Illinois Economic Policy Institute, University of Illinois at Urbana-Champaign, and Colorado State University–Pueblo. Accessed at: http://b.3cdn.net/votevets/62350ae9afd6c4c714_0jm6bsc5b.pdf.

[57] See Abdur Chowdhury, "The Impact of Repealing Prevailing Wage Laws on Military Veterans," Marquette University. Accessed at https://medium.com/@abdur.chowdhury/the-impact-of-repealing-prevailing-wage-laws-on-military-veterans-9c537366304a#.t3s1elaw1.

[58] See Ohio Department of Job and Family Services, "2022 Ohio Job Outlook: Employment Projections." Accessed at: http://ohiolmi.com/proj/Projections/Ohio_Job_Outlook_2012-2022.pdf.

[59] See Frank Manzo IV, Robert Bruno, and Kevin Duncan, "The Impact of Prevailing Wage Laws on Military Veterans: An Economic and Labor Market Analysis." Illinois Economic Policy Institute, University of Illinois at Urbana-Champaign, and Colorado State University–Pueblo. Accessed at: http://b.3cdn.net/votevets/62350ae9afd6c4c714_0jm6bsc5b.pdf.

Table 5. Share of Veterans Employed in the Workforce, by State and Occupation, 2014

State	Veteran Share of All Workers	Veteran Share of Construction Workforce	Difference: 2014
Strong/Average PWL			
Ohio	**6.0%**	**8.5%**	**+2.5%**
Michigan	5.3%	8.4%	+3.1%
Pennsylvania	5.6%	8.2%	+2.6%
Kentucky	6.4%	7.5%	+1.1%
Indiana*	5.8%	8.6%	+2.8%
West Virginia*	6.6%	7.4%	+0.8%
Weak/No PWL			
Maryland	6.9%	8.6%	+1.7%
North Carolina	6.9%	5.6%	-1.3%
Tennessee	7.0%	8.2%	+1.2%
Virginia	9.6%	11.3%	+1.7%
United States	5.8%	6.9%	+1.1%

Source: Authors' application of Frank Manzo IV, Robert Bruno, and Kevin Duncan, "The Impact of Prevailing Wage Laws on Military Veterans: An Economic and Labor Market Analysis," 2016. Study commissioned by VoteVets.org.
*Indiana became a weak/no PWL state in July 2015 and West Virginia became a weak/no PWL state in May 2016.

Table 6. Top 10 Fastest Growing Major Occupations in Ohio, by Growth Rate, 2012-2022

Rank	Fastest-Growing Major Occupations in Ohio	Growth: 2012-2022
OH	*Total*	*8.3%*
1	Healthcare support	24.1%
2	Healthcare practitioners and technical	16.8%
3	**Construction and extraction**	**16.0%**
4	Computer and mathematical	14.7%
5	Community and social services	13.7%
6	Personal care and service	13.5%
7	Education, training, and library	11.8%
8	Legal	10.8%
9	Cleaning and maintenance	9.6%
10	Business and financial	9.5%

Source: Ohio Department of Job and Family Services, 2022 Ohio Job Outlook: Employment Projections. Figure 14.

Ohio veterans who return home to become blue-collar construction workers and open construction companies have benefited substantially from prevailing wage. Prevailing wage protects local construction standards and ensures that blue-collar construction workers earn livable wages that reflect the markets in the communities where they live. By taking labor costs out of the equation, prevailing wage incentivizes contractors to compete efficiently over other factors– such as worker productivity, materials costs, technological advances and proficiencies, management practices, and profit margins. By preventing governmental units from undercutting privately-negotiated local wages, prevailing wage creates a level playing field for local businesses competing with out-of-area or foreign bidders.

Construction companies are more likely to be owned by veterans than non-construction businesses in Ohio (Table 7). Economic data reveal that 10.9% of all construction firms with paid employees in Ohio are majority-owned by veterans. By contrast, veteran business owners account for 9.8% of all companies throughout the state, a 1.1 percentage-point difference. The higher veteran share in construction means that prevailing wage changes would have disproportionate impacts on veteran contractors.

Veterans in Ohio's construction industry would be negatively affected if the state were to weaken or repeal prevailing wage. Blue-collar construction occupations would become less attractive because the middle-class careers would be converted into low-wage, low-benefit jobs. As discussed previously, gutting prevailing wage would reduce annual incomes by 16.1% in Ohio. Veterans working in construction would not be immune to this pay cut. It is worth noting, however, that the 16.1%-drop in this analysis is slightly above the national VoteVets.org study, which uses other data sources but finds that blue-collar construction workers would see their incomes fall by between 7% and 11%.[60]

Table 7. Veteran-Owned Share of Businesses, Construction vs. All Firms, 2012

Veteran-Owned Share of Businesses	Share: 2012
Construction firms with paid employees	10.9%
All firms with paid employees	9.8%
Difference in veteran share of businesses	**+1.1%**

Source: Authors' analysis of Census Bureau (2012), 2012 *Survey of Business Owners*.

The cumulative economic impacts of weakening or repealing prevailing wage on military veterans working in construction are presented in Table 8. An estimated 4,100 blue-collar veterans would be expected to separate from their jobs in Ohio's construction occupations if prevailing wage was weakened or repealed, mainly because the occupation no longer provides for well-paying, middle-class careers. Additionally, the total income of all veterans employed in construction jobs would decline by $275 million in the state and about 3,900 veterans would lose their employer-provided health coverage.

Table 8. Impact of Repealing or Weakening Prevailing Wage on Ohio Veterans

Impact of Repealing or Weakening Prevailing Wage on Ohio Veterans	2014 Value	As a Weak/No PWL State	Total Change
Veterans employed as construction workers	18,600	14,500	-4,100
Total wages and salaries for BCCW veterans	$789.4 million	$514.3 million	-$275.1 million
BCCW veterans without health insurance	15,100	19,000	+3,900

Source: Authors' application of Frank Manzo IV, Robert Bruno, and Kevin Duncan, "The Impact of Prevailing Wage Laws on Military Veterans: An Economic and Labor Market Analysis," 2016. Study commissioned by VoteVets.org.
Non-monetary estimates rounded to the nearest hundred.

There are significant costs to weakening or repealing prevailing wage for Ohio's veterans. Weakening prevailing wage standards reduces the attractiveness of employment in a

[60] See Frank Manzo IV, Robert Bruno, and Kevin Duncan, "The Impact of Prevailing Wage Laws on Military Veterans: An Economic and Labor Market Analysis." Illinois Economic Policy Institute, University of Illinois at Urbana-Champaign, and Colorado State University–Pueblo. Accessed at: http://b.3cdn.net/votevets/62350ae9afd6c4c714_0jm6bsc5b.pdf.

construction occupation for veteran workers. By cutting the hourly wages of veterans, reducing the number of veterans with employer-provided health insurance, and shrinking the market share of veteran-owned construction companies, gutting prevailing wage would increase burdens on taxpayers and disproportionately harm veteran workers who served their country. Maintaining or strengthening prevailing wage in Ohio, on the other hand, would promote a middle-class, self-sufficient lifestyle for veterans choosing to work in construction.

Prevailing Wage Laws and Training in the Construction Industry

In addition to the fundamental goal of protecting local wage rates from distortions associated with public construction procurement, prevailing wage laws also facilitate worker training in the industry. Construction is distinct from other industries in that the 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.

Due to fluctuations in seasons and economic activity, construction is the most unstable sector of the U.S. economy. Much of construction is outdoor activity and as a result, construction employment varies with the season. For example, comparing employment during the four peak summer months to the slowest-four winter months indicates that construction employment decreased by 5.3% in the United States over the 2014-2015 period.[61] This rate outpaced employment fluctuations in other seasonally-sensitive industries: a similar comparison over the same period indicates that employment in the U.S. leisure and hospitality industry and in retail trade fluctuated by 5.2% and 4.3%, respectively.[62]

The end result of instability in the construction industry is a loose attachment between contractors and their employees. When work is available, contractors take on additional workers, but shed employees when a project is completed, the season comes to an end, or the economy slows. As a consequence, there is little incentive for contractors to incur the expenses associated with training. 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 due to intermittent spells of unemployment between building projects, transitions to work in other industries, and seasonal layoffs.[63] Economic fluctuations exacerbate the training problem in construction with downturns resulting in fewer jobs for trainable young people followed by a shortage of skilled workers when the economy expands.

The challenges associated with training workers exist alongside the need for a skilled labor force that can build customized projects. Unlike manufacturing where the product and the production process are uniform, the majority of construction "output" is not standardized. Outside of residential construction, the majority of building sites, designs, and logistics vary from project to project. Broadly trained craft workers are needed to adjust to the non-routine aspects of customized construction.

The industry has responded to the mismatch between strong disincentives to train and the need for a skilled, safe, and sustained workforce by creating formal apprenticeship training

[61] These data are for all blue and white collar employees in the industry. The peak months in construction employment are typically June-September across the nation. December-March is marked by the lowest levels of employment. Data obtained from the Quarterly Census of Wages and Employment of the Bureau of Labor Statistics, U.S. Department of Labor. Accessed at: http://www.bls.gov/cew/.

[62] Peak employment in the leisure and hospitality industry typically occur between May and August with the lowest employment between November-February. Peak employment in the retail industry occurs between October and January with low months between February and March. See the Quarterly Census of Employment and Wages. Accessed at: http://www.bls.gov/cew/.

[63] For a detailed explanation see Philips, Peter, "Dual Worlds: The Two Growth Paths in U.S. Construction," in Building Chaos: An International Comparison of the Effects of Deregulation on the Construction, (Peter Philips and Gerhard Bosch, eds.) Routledge Press, London, 2003.

programs. Apprenticeships typically involve a mix of on-the-job training and in-class theoretical education that covers the basic and specialized skills of a particular craft (for carpenters, electricians, and plumbers, etc.).[64] During the on-the-job component of training, the apprentice earns less than the fully-trained journeyworker.[65] With this arrangement the cost of training workers is shared between the apprentice and the employers who are sponsoring the training. Accordingly, apprenticeship programs address the disincentives that discourage employers and workers from pursuing training. Upon successful completion of the program, the apprentice becomes a certified journeyworker. The program results in a relatively homogenous skilled workforce in an industry that is otherwise largely free of certifications that reveal worker quality.

The Office of Apprenticeships at the U.S. Department of Labor works in conjunction with approved State Apprenticeship Agencies to set basic standards 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.[66] In the "open shop" segment of the construction industry, apprenticeship programs are sponsored by a single contractor or by groups of nonunion employers. These employers unilaterally determine program content, set entry requirements, select apprenticeships, and monitor trainee progress. In the unionized sector, apprenticeship training is jointly determined and managed by unions and signatory contractors.

There are other significant differences between "open shop" and union-sponsored apprenticeship programs. Funding for training in union programs is financed by a "cents per hour" fee that is part of the total wage and benefit package negotiated with signatory contractors. These types of fees are rare in open shop training arrangements where sponsoring contractors pay for the cost of training directly. The important distinction is that, under the union system, the costs of training the next generation of workers is included in the project bid and is paid by the project owner. This is not the case under the "open shop" arrangement.[67] Also, nonunion training programs such as those offered by the Associated Builders and Contractors are characterized by task driven and modular training with a lower priority placed on the full-scope craft training characteristic of union-sponsored training programs.[68] Training is obligatory for all construction workers in the unionized sector where the rotation of trainees among different contractors increases exposure to multiple aspects of the trade. On the other hand, formal apprenticeship training is not mandatory in the open shop segment where arrangements to rotate trainees among different contractors are not common.[69]

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[64] On-the-job training ranges between 6,000 to 8,000 hours (3-4 years) with in-class instruction ranging between 430 to 580 hours. See Bilginsoy, Cihan. 2003. "The Hazards of Training: Attrition and Retention in Construction Industry Apprenticeship Programs." *Industrial and Labor Relations Review*, Vol. 27, Issue 1, pp. 54-67.

[65] Compensation varies with the program, but usually starts at 50% of the hourly rate for the corresponding journey worker and increases with progression through the training program. See Bilginsoy, Cihan. 2007. "Delivering Skills: Apprenticeship Program Sponsorship and Transition from Training." *Industrial Relations*, Vol. 46, No. 4, pp. 738-763.

[66] See "What is Registered Apprenticeship?" ApprenticeshipUSA, Employment and Training Administration, U.S. Department of Labor. Accessed at: https://www.doleta.gov/OA/apprenticeship.cfm.

[67] See Construction Industry Institute. 2007. "Construction Industry Craft Training in the United States and Canada." Accessed at http://ps.businesssocialinc.com/media/uploads/abceastflorida/craftstudy.pdf

[68] See Associated Builders and Contractors, Inc. "Craft Training & Apprenticeship." Accessed at: http://www.abc.org/en-us/educationtraining/crafttrainingapprenticeship.aspx and See Vincent, Jeff. 2004. "Analysis of Construction Industry Apprenticeship Programs in Indiana." Accessed at: http://www.faircontracting.org/PDFs/prevailing_wages/AnalysisofApprenticeshipProgramsinIndiana.pdf.

[69] Cihan Bilginsoy. 2007. "Delivering Skills: Apprenticeship Program Sponsorship and Transition from Training." *Industrial Relations*, Vol. 46, No. 4, pp. 738-763.

Apprenticeship Training in Ohio: A Comparison of Joint Labor-Management and Nonunion Programs

Apprenticeship programs are either registered with the federal Office of Apprenticeship or are registered with state agencies.[70] Apprenticeship data for programs registered with the Ohio State Apprenticeship Council were obtained through an open records request. These data contain information on detailed trainee characteristics, enrollment-completion status, and an identification number that can be matched to training programs.[71] This information allows us to examine and compare the outcomes and characteristics of apprentices enrolled in joint labor-management (union) training programs with those in non-joint (nonunion) programs.

The most recent data available from the Ohio State Apprenticeship Council (2016) indicates that, of the 10,550 apprentices registered in construction training programs, approximately 83% (8,730) are enrolled in joint (union) programs. The remaining 17% are enrolled in non-joint, nonunion programs. Furthermore, joint labor-management programs disproportionately train the vast majority of female and minority apprentices. Fully 94% of female apprentices and 88% of minority apprentices are enrolled in union training programs.[72]

Data collected between 2004 and 2015 are used to examine trends in apprenticeship programs as well as program completion (graduation) rates. These aggregated data are reported in Tables 9 and 10 and indicate that approximately 82% of the registered programs were joint (union) programs and about 18% were nonunion programs. Approximately 79% of apprentices were enrolled in union programs between 2004 and 2015, with the remaining 21% enrolled in nonunion programs. Union programs cover the full-range of trades, from laborers to operating engineers. On the other hand, apprentices completing nonunion programs were heavily concentrated in electrical programs. At least 47% of apprentices completing nonunion programs trained to be electricians compared to 19% of apprentices in union programs. The completion rate in union programs was 29.4%.[73] This is 21% greater than the completion rate for nonunion programs. Because of the larger percentage of apprentices in union programs, as well as the higher completion rates of these programs, 83% of graduating apprentices come from union programs.

[70] See "Office of Apprenticeship Sponsors Website," Employment and Training Administration, U.S. Department of Labor. Accessed at: https://oa.doleta.gov/.
[71] Personal information (name, age, address, Social Security number, and wages, etc.) were redacted.
[72] This information was obtained from an open records request submitted by ACT Ohio. In 2016, there were 461 female apprentices, of which 435 were enrolled in union programs. In the same year, there were 1,968 minority apprentices, with 1,732 enrolled in union programs.
[73] The completion rate used here is defined as those who completed apprenticeship programs as a percent of the larger group of trainees who completed and did not complete their apprenticeship programs. This definition of the rate of program completion is consistent with the definition used elsewhere. The Ohio State Apprenticeship Council defines the "completion rate" as the ratio of those who completed training programs to those who exited apprenticeship programs prior to completion. Based on this definition, the completion rate for union programs is 41.6% and 30.1% for nonunion programs, a 27.6% difference. Regardless of the definition, the data indicate that the completion rate for union apprenticeship programs is substantially higher than the rate for nonunion programs.

Table 9. Construction Crafts Apprenticeship Program Completions, Joint Labor-Management (Union) Programs, 2004 to 2015

Joint Labor-Management Apprenticeship Program	Enrollment	Completion Rate
Sheet Metal Workers JATC, Cleveland LU 33	357	32.7%
Carpenters JATC, Northeast Ohio	3,258	22.4%
Electricians JATC, Cleveland	484	45.5%
Roofers & Waterproofers JATC, Cleveland LU 44	196	29.0%
Pipefitters JATC, Cleveland LU 120	190	43.9%
Plumbers JATC, Cleveland LU 55	164	38.1%
Insulation Workers JATC, Cleveland LU 3	90	37.5%
Electricians JATC, Lorain County	112	42.0%
Electricians JATC, Akron	232	44.2%
Plasterers & Cement Masons JATC, Akron LU 109	109	22.5%
Painters & Allied Trades - Sign/Display JAC, DC 6	3	50.0%
Electricians JATC, Cincinnati Area	903	29.5%
Butler County Electrical JATC	262	35.8%
Tile, Marble & Terrazzo JATC, Cincinnati Area	32	23.8%
Painters District Council 6 JATRTF	271	9.4%
Carpenters JATC, Southwest Ohio	1,436	20.7%
Electricians JATC, Portsmouth	131	39.5%
Plumbers, Fitters & MES JATC, LU 392	689	36.7%
Plumbers & Pipefitters JATC, Portsmouth	203	39.3%
The Electrical Trades Center	411	38.8%
Sheet Metal JAC, Columbus	397	29.6%
Electricians JATC, Mansfield	90	32.0%
Insulators JATC, Local 50	158	8.7%
Plumbers & Fitters JAC, Columbus	272	38.9%
Finishing Trades Institute of the Ohio Region	887	22.7%
Northern Ohio Admin District Co of Bricklayers	688	21.5%
Construction Craft Laborers Heavy Highway	1,415	22.6%
Plumbers & Pipefitters JATC, Marietta	163	39.6%
Electricians JATC, Newark	136	29.8%
Carpenters JATC, South Central Ohio District	1,677	21.1%
Ironworkers JATC, Columbus LU 172	342	29.6%
Electricians JATC, Marietta	82	47.3%
Plumbers & Pipefitters JATC, Cambridge	268	40.9%
Sheet Metal Workers JATC, Akron LU 33	228	28.8%
Ironworkers JAC, Canton Area LU 550	363	28.3%
Roofers JATC, Akron-Canton	104	26.7%
Bricklayers JAC, Dayton	69	13.7%
Plumbers & Pipefitters JATC, Dayton	150	32.8%
Roofers JATC, Miami Valley	214	12.1%

Electricians JATC, Dayton	357	39.2%
Ironworkers JAC, Dayton	591	25.2%
Electricians JATC, Lima Area LU 32	118	38.7%
Plumbers & Pipefitters JATC, Lima Area LU 776	136	44.2%
Electricians JATC, Toledo	598	40.0%
Sheet Metal Workers JATC, Toledo Area	128	35.2%
Piping Industry Training Center	315	42.9%
Cement Masons & Plasterers JAC, Toledo Area	118	38.0%
Operating Engineers JATC, Ohio	1,505	34.3%
Cement Masons JATC, Youngstown Area	77	25.8%
Electricians JATC, Youngstown Area	194	42.9%
Ironworkers JATC, Mahoning Valley	286	26.3%
Sheet Metal Workers JATC, Youngstown	67	33.8%
Electrical JATC, Warren	85	41.6%
Totals	**21,811**	**29.4%**

Source: Compiled from data supplied by the Ohio State Apprenticeship Council, Ohio Department of Jobs and Family Services. Completion Rate = [# of Program Completers / (# of Program Completers + # of Program Exits)].

Table 10. Construction Crafts Apprenticeship Program Completions, Non-Joint (Nonunion) Programs, 2004 to 2015

Non-Joint (Nonunion) Apprenticeship Program	Enrollment	Completion Rate
Crawford Mechanical Services	54	14.3%
Calgie Electric Co, Ltd	9	37.5%
Associated Builders & Contractors - Northern Ohio Chapter	631	33.2%
Scott Bernholt Electric, Inc	2	50.0%
Cincinnati Electrical Apprenticeship & Training	1,024	22.7%
ABC Inc, Central Ohio	1,057	20.7%
AEC / IEC Central Ohio	915	22.1%
Accurate Electric Construction, Inc	221	20.2%
Claypool Electric	279	19.6%
Gilcrest Electric	9	35.7%
Master Electrical Contractors Association	236	23.5%
ABC Inc, SW Chapter	1,261	22.6%
Totals	**5,698**	**23.2%**

Source: Compiled from data supplied by the Ohio State Apprenticeship Council, Ohio Department of Jobs and Family Services. Completion Rate = [# of Program Completers / (# of Program Completers + # of Program Exits)].

The substantial apprenticeship enrollment in union training programs is matched by an equally substantial financial commitment to training by building trade unions and their signatory contractors. Table 11 reports spending by craft on joint labor-management training programs for 2015.[74] The contributions to training depend on the size of each craft. For example, elevator constructors are a relatively small craft with few members and apprentices. As a consequence, training contributions are relatively low (approximately $249,000 in 2015). On the other hand,

[74] These data were submitted by individual crafts to the Ohio Building and Construction Trades Council and provided to the authors upon request.

the International Brotherhood of Electrical Workers is a large trade with high skill requirements and a training budget exceeding $10 million. Regardless of differences between trades, the overall total training expenditures in 2015 exceeded $48 million. The joint investment in a strong workforce does not end after training. Additional fringe benefit data reported in Table 11 indicate pension contributions of over $960 million in 2015 with $750 million in health and welfare benefits. The overall contribution to fringe benefits and training programs by Ohio's building trades unions and their signatory contractors was approximately $1.75 billion in 2015.

Table 11. Building Trade Contributions to Apprenticeship Training Programs and to Member Pension and Health & Welfare Benefits in 2015.

Craft	Apprenticeships	Pensions*	Health & Welfare
Asbestos Workers	$584,203	$19,885,149	$15,016,283
Boilermakers	$645,254	$25,098,825	$11,765,448
Bricklayers	$2,000,631	$76,825,092	$19,143,923
Carpenters and Millwrights	$6,030,000	$137,746,104	$103,940,509
Elevator Constructors	$248,740	$6,201,907	$5,980,115
Electricians	$10,563,048	$151,561,497	$132,585,048
Iron Workers	$2,394,867	$117,128,280	$53,431,986
Laborers	$5,253,486	$172,896,025	$139,631,690
Operating Engineers	$9,606,568	$83,772,252	$109,057,760
Painters and Glaziers	$1,557,648	$26,698,200	$26,396,335
Plasterers and Cement Masons	$261,040	$6,731,272	$5,228,809
Roofers and Waterproofers	$67,297	$1,210,137	$982,366
Sheet Metal Workers	$2,640,508	$36,691,839	$32,199,583
Plumbers and Pipefitters	$6,355,027	$100,272,689	$79,823,410
Totals	**$48,208,318**	**$962,719,269**	**$735,183,265**
Overall Total	**$1,746,110,852**		

Source: Union-level data submitted to the Ohio Building and Construction Trades Council. * Pension includes annuity contributions where applicable.

The data on apprenticeship training and funding is consistent with the preponderance of research indicating the union-sponsored apprenticeship programs are characterized by larger numbers, higher completion rates, and more training resources. For example, Kevin Duncan and Frank Manzo find similar results in an examination of apprenticeship programs in Kentucky between 2008 and 2016.[75] Fully 80% of apprentices are enrolled in union programs that offer a full-range of training opportunities while nonunion apprentices are concentrated in programs for electricians. The completion rate for union programs in Kentucky is 35% higher than in nonunion programs. Professor Cihan Bilginsoy also finds that apprentices in joint programs are more likely to complete training and receive certification while those who quit open shop programs do so before a substantial build-up of skills.[76]

[75] See Kevin Duncan and Frank Manzo, "The Economic, Fiscal, and Social Effects of Kentucky's Prevailing Wage Law," December 2016. Accessed at: https://illinoisepi.files.wordpress.com/2016/12/kentucky-report-duncan-and-manzo-2016-final.pdf.

[76] Cihan Bilginsoy. 2007. "Delivering Skills: Apprenticeship Program Sponsorship and Transition from Training." *Industrial Relations*, Vol. 46, No. 4, pp. 738-763.

Recent studies also find that joint labor-management programs finance the vast majority of human capital investment in the construction industry. A 2015 report of apprenticeship programs in Indiana found that union programs were responsible for 94% of annual training expenditures, with the "open shop" segment representing the remaining 6%.[77] The corresponding figures for Wisconsin were 95% and 5%, respectively.[78] Similarly, a 2016 study by Manzo and Bruno found that 98% of all active apprentices are enrolled in joint labor-management programs in Illinois. Union programs account for 99% of all privately-funded apprenticeship expenditures in the state, have a significantly lower apprentice-to-program-employee ratio, and return $11 in economic and tax benefits per dollar invested in Illinois.[79]

Regulatory incentives to encourage training are not extensive in the U.S. construction industry. Prevailing wage laws play an important role in training by providing strong incentives for union and nonunion contractors to employ apprentices on covered projects. For example, under Ohio's prevailing wage law apprentices are paid as indicated by the approved program.[80] Typically apprentice wage rates are based on a fraction of the corresponding journey rate, starting as low as 40% and increasing with program progress. This wage savings creates a high demand for apprentices that drives skill development for the entire construction industry. With increased demand for apprentices on prevailing wage projects, more resources are expended on training. The result is an increase in the number of skilled workers who are available for work on publicly- and privately-funded construction in Ohio.

It is not surprising that research shows a strong connection between prevailing wage laws and training in the construction industry. For example, Cihan Bilginsoy finds that enrollments are from 6% to 8% higher in states with prevailing wage laws than in states without the wage policy.[81] Bilginsoy also finds that apprentices in states with prevailing wage laws complete their on-the-job and classroom training at a faster rate than apprentices in states without the wage policy. This effect is strongest in states with stronger prevailing wage laws.[82] It is also not surprising the prevailing wage repeal is associated with a decrease in apprenticeship training. For example, Philips finds that training decreased in Kansas by 38% after the state repealed its prevailing wage law in 1987.[83] After repeal in Colorado in 1985, apprenticeship training decreased by 42%.

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[77] Philips, Peter. 2015. "Indiana's Common Construction Wage Law: and Economic Impact Analysis.: Accessed at: http://www.isbctc.org/Uploads/UploadedFiles/docs/Philips_Indiana_Report_January_2015.pdf.

[78] Peter Philips. 2015. "Wisconsin's Prevailing Wage Laws: An Economic Impact Analysis." Accessed at: http://www.wisconsincontractorcoalition.com/application/files/9914/2889/7832/Wisconsin_Report_April_2015.pdf.

[79] Frank Manzo IV and Robert Bruno. 2016. "The Impact of Apprenticeship Programs in Illinois: An Analysis of Economic and Social Effects." Accessed at: https://illinoisepi.files.wordpress.com/2016/08/pcmr-ilepi-impactofapprenticeshipprograms_newcover.pdf.

[80] For an example, see "Construction Careers," Construction Education Center of Northwestern Ohio. Accessed at: http://www.nocec.com/apprenticeship_req.php.

[81] Cihan Bilginsoy. 2005. "Wage Regulation and Training: The Impact of State Prevailing Wage Laws on Apprenticeship," in Hamid Azari-Rad, Peter Philips and Mark J. Prus (eds.) *The Economics of Prevailing Wage Laws*, Aldershot, UK: Ashgate, pp.149-168.

[82] Armand Thieblot developed a classification system for state prevailing wage laws into weak, average, and strong polices. These are based on the contract value threshold that prevailing wages apply, the level of coverage at the municipal, county, or state level, the types of work/trades excluded, the determination of prevailing wage rates, and other item. See Thieblot, Armand. 1995. *State Prevailing Wage Laws: An Assessment at the Start of 1995*, Associated Building Contractors, Inc., Rosslyn, VA.

[83] Philips, Peter. 1998. "Kansas and Prevailing Wage Legislation." Accessed at: http://www.faircontracting.org/PDFs/prevailing_wages/kansas_prevailing_wage.pdf.

The Economic Impact of Prevailing Wage Laws

The main purpose of a prevailing wage law is to protect local construction labor standards from distortions associated with publicly-funded construction.[84] Large infusions of government spending into an area, along with a contract award process that favors the lowest bidder, may attract contractors from areas where construction worker wage rates are relatively low. Competition between these out-of-area and local contractors may result in the erosion of local compensation standards. 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 prevailing wage allows local contractors to submit competitive and profitable bids while attracting local workers possessing the skills needed for the project. As a consequence, local contractors have an advantage over competitors from areas where wages are relatively high or low. When local companies and workers are employed on a state-funded project, 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.

Several studies and publicly available data lend support to the notion that prevailing wage laws are associated with more work for local contractors and construction workers. For example, data from the *Economic Census of Construction* indicates that states with weak or no prevailing wage laws have about 2.4% more of the total value of construction completed by contractors from other states compared to states with average or strong wage policies.[85] This is not just a reduction in state-funded construction, but 2.4% of the value of all private and public construction. An examination of library construction in Santa Clara County, California reveals that 39% of subcontractors employed on prevailing wage projects are county-resident businesses.[86] The corresponding figure when prevailing wages do not apply is 23%. Since local contractors are three times more likely to use local construction workers, more labor income and spending remains in the county when prevailing wages apply. 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.[87] Along the southern border with Kentucky, public works construction employment in Indiana decreased by over 800 jobs after the wage policy was weakened. Along the bordering counties in Kentucky, public works construction employment grew by over 700 jobs over the same period. Average construction wages were about 24% lower

[84] As an example, see "The Davis-Bacon Act Protecting Wage Equality Since 1931," Wage and Hour Division, U.S. Department of Labor. Accessed at: http://www.dol.gov/whd/programs/dbra/Survey/conformancefaq.htm.

[85] The national average for states with average or strong prevailing wage laws in 93.2% and the average for states with weak or no wage policy is 90.8%. The difference between these averages (2.4%) is statistically significant. Data are obtained from Table 23SG04, Value of Construction Work for Location of Construction Work," 2012 *Economic Census of Construction*, U.S. Census Bureau. Accessed at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_23SG04&prodType=table .

[86] See the "Economic, Fiscal and Social Impact of Prevailing Wage in San Jose, California." Economic Policy Brief, April 25, 2011. Accessed at: http://wpusa.org/5-13-11%20prevailing_wage_brief.pdf.

[87] See Frank Manzo, "Weakening Prevailing Wage Hurts Local Contractors and Workers: A Case Study of Southern Indiana." Economic Commentary #40, Midwest Economic Policy Institute, June 15, 2016. Accessed at https://illinoisepi.files.wordpress.com/2016/06/ilepi-economic-commentary-southern-in-case-study1.pdf.

in Kentucky, suggesting that weakening the wage policy resulted in greater demand for low wage, out-of-state workers.

The amount of work that is completed by out-of-state contractors depends on 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. Ohio has a prevailing wage law. The state is relatively large compared to neighboring states. As a consequence, 93.4% of the total value of construction value is completed by Ohio-resident contractors according to data obtained from the U.S. Census Bureau's *Economic Census of Construction* for 2012.[88] Because of the relative size of Ohio's construction industry and the state's prevailing wage laws, a small amount of construction value (6.6%) is completed by contractors from other states. Table 12 reports the value of construction work completed by out-of-state contractors for the five neighboring states that do most of the work in Ohio.

Table 12. Top Five States by Value of Construction Work Completed in Ohio

State	Work Completed in Ohio*	Percent of Ohio Construction Value
Indiana	$628,000,000	1.4%
Michigan	$599,000,000	1.3%
Kentucky	$554,000,000	1.2%
Pennsylvania	$485,000,000	1.1%
Illinois	$204,000,000	0.4%

Source: *Economic Census of Construction*, 2012. *Adjusted to 2016 dollars.

Contractors from the states of Indiana, Michigan, Kentucky, Pennsylvania, and Illinois represent 5.4% of the 6.6% of value of construction work is completed by contractors from other states. However, if the prevailing wage policy in Ohio is weakened or repealed, contractors can expect increased competition from builders from other states, primarily from the states listed in Table 12.

Why can Ohio contractors expect increased competition from out-of-state contractors with the repeal or weakening of the state's prevailing wage law? Based on the evidence presented in this report, there are two answers to this question. First, repealing or weakening prevailing wage opens state-funded construction to competition from low-wage, out-of-state contractors. Second, repealing or weakening prevailing wage means less work for union contractors and building trades unions that are responsible for the preponderance of worker training in Ohio's construction industry. Less work for these parties means a reduction in training resources and opportunities. With a less-skilled workforce, contractors involved in technologically-demanding work, such as industrial construction, will need to recruit skilled workers from other states.

Ohio's current prevailing wage law is considered to be in the strong or average category.[89] Based on the data from the *Economic Census of Construction*, further weakening or

[88] Data are obtained from Table 23SG04, Value of Construction Work for Location of Construction Work," 2012 *Economic Census of Construction*, U.S. Census Bureau. Accessed at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_23SG04&prodType=table .

[89] In 1995 Armand Thieblot rated state-level prevailing wage laws based on factors including coverage thresholds, type of work excluded/included, and the determination of wage rates, etc. See Thieblot Armand J.*1995. "State Prevailing Wage Laws. An*

repeal of Ohio's prevailing wage laws would be associated with an additional 2.4% increase in construction work for out-of-state contractors. This would represent approximately $1.073 billion more in construction value completed by contractors in surrounding states (based on 2016 dollars).[90] When contractors travel to other states to conduct work, supplies, materials, fuels, and rental equipment are typically purchased in the state where the work is to be completed. According to information from the *Economic Census of Construction*, materials, components, fuels, power, and rental equipment represents 32.4% of overall costs.[91] This indicates that only 32.4% of the $1.073 billion, or $348 million in construction value completed by out-of-state contractors, would remain in Ohio. Conversely, the net leakage of construction business and spending associated with prevailing wage repeal would be $725 million.

The IMPLAN Economic Impact Software

The impact of the loss in construction industry business and spending associated with the repeal of Ohio's prevailing wage law can be measured using the IMPLAN economic impact software. This economic impact analysis is based on the multiplier, or ripple effect, associated with the leakage of construction incomes and spending from Ohio's economy. Specifically, this software is used to estimate the impact of the loss in incomes on state-level economic activity, employment, and tax revenue. IMPLAN (IMpact analysis for PLANning) was originally developed by the U.S. Department of Agriculture to assist the Forest Service with land and resource management planning. The Minnesota IMPLAN Group (MIG) started work on the data-driven model in the mid-1980s at the University of Minnesota. The software was privatized in 1993 and made available for public use. The software contains an input-output model with data available at the zip-code, county, state, and national levels.

Input-output analysis measures the inter-industry relationships within an economy. Specifically, input-output analysis is a means of measuring the market transactions between businesses and between businesses and consumers. This framework allows for the examination of how a change in one sector affects the entire economy. In this way, input-output analysis is able to analyze the economic effects of policy alternatives by measuring the multiplier, or ripple effect, as an initial change in labor income stimulates further changes in transactions between other businesses and households. The results reported in this study are based on industry figures from the 2012 *Economic Census of Construction* and the most recent IMPLAN data for state of Ohio (2014). IMPLAN deflators are used to adjust for changes in prices over time. The results are reported in 2016 dollars. The specific model used here is based on the leakage of $1.073

Assessment at the Start of 1995." Prepared for Associated Builders and Contractors, Inc. We updated Thieblot's classifications reflective of subsequent policy changes and other research. A description of state-level prevailing wage laws is available at: http://www.dol.gov/whd/state/dollar2011.htm#1. A summary of recent state-level prevailing wage characteristics is available at www.cga.ct.gov/2010/rpt/2010-R-0526.htm.

[90] Data are obtained from Table 23SG04, Value of Construction Work for Location of Construction Work," 2012 *Economic Census of Construction*, U.S. Census Bureau. Accessed at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_23SG04&prodType=table. The 2012 data is adjusted for inflation based on the "Producer Price Index by Commodity for Construction," *U.S. Bureau of Labor Statistics*. Accessed at: https://fred.stlouisfed.org/series/WPU80.

[91] See the 2012 U.S. Census Bureau, *Economic Census of Construction*, Construction: Geographic Area Series: Detailed Statistics for Establishments, accessed at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_23A1&prodType=table.

billion in construction value with the return (addition) of $348 million in spending as out-of-state contractors make local purchases of materials, components, supplies, fuel, and other items.[92]

Economic Impact Results

The impact results obtained from IMPLAN are reported in Table 13. The net leakage of $725 million in construction business and spending results in an overall reduction in economic activity in Ohio of approximately $1.4 billion. The corresponding employment loss would be about 9,700 jobs. About 5,500 of these jobs would be in the construction industry (direct jobs) with 4,200 jobs lost in other industries that are no longer supported by the spending of in-state construction worker, such as retail, service, and restaurants. The reduction in economic activity would also be associated with an approximate $45 million decrease in state and local tax revenue. This is a statewide impact that would be experienced each year if the wage policy is repealed.

Table 13. Economic Impact of the Leakage of Construction Business if Ohio's Prevailing Wage Law is Repealed

Category	Direct Effect	Total Impact
Economic Activity	–$725 million	–$1.4 billion
Jobs	–5,500 jobs	–9,700 jobs
State and Local Tax Revenue	–	–$44.6 million

Source: IMPLAN economic impact software and 2014 data for the state of Ohio.

The total economic impact is the sum of all industry-level impacts. The impacts for selected industries are reported in Table 14. For example, with the leakage in construction business if the prevailing wage law is repealed, revenue in Ohio's wholesale and retail businesses would decrease by over $125 million in sales revenue with the loss of about 1,000 jobs. The reduction in economic activity would also depress home values. IMPLAN measures this effect by the loss $38.7 million in imputed rental value should home owners let their dwellings. Real estate is particularly sensitive to economic activity and repeal would reduce sales revenue in this sector by over $34 million and reduce employment by about 150 jobs. Repeal would reduce construction employment and with fewer jobs, incomes, and spending, hospitals, doctors' offices, and restaurants would experience business and employment decreases. As is the case with the results above, these industry-level impacts are statewide impacts that would be experienced each year if the wage policy is repealed. These industry-level impacts reveal the economic development role of prevailing wage laws. By protecting work for local contractors and construction workers, prevailing wages prevent the leakage of construction business spending and increase both sales revenue and employment in industries that are unrelated to the construction industry.

Finally, prevailing wage repeal would represent a strong headwind for an Ohio construction industry that has not yet fully recovered from the Great Recession. Before the

[92] The leakage of $1.073 billion is allocated across construction categories according to the distribution of the value of construction in Ohio as reported in the 2012 *Economic Census of Construction*. The distribution of $348 million across specific Ohio producers of materials, fuels, power, and rental equipment is based on the induced impact of the initial $1.073 billion leakage impact. IMPLAN's induced impact identifies that portion of the overall impact that is due to spending changes by suppliers.

economic downturn in 2007, there were 27,566 construction establishments and 238,495 construction workers in Ohio.[93] The impact of the economic crisis was much more severe and long-lasting in the construction industry with the decrease in the number of establishments and employment reaching their lowest levels in 2010 and 2014, respectively. Construction employment reached its lowest level during the downturn in 2010, indicating a 29% reduction from the 2007 level. The number of construction establishments reached its lowest level in 2014, with a reduction of 18.5% from the 2007 level. The building industry in Ohio is recovering but employment remains approximately 8.8% below the 2007 level and the number of construction firms is still 17.2% below pre-recession levels. The consequences of repeal would further reduce construction industry employment and the number of establishments in Ohio. Weakening or repealing Ohio's prevailing wage law would open an industry that is still recovering to increased competition from workers and builders from other states.

Table 14. Industry-Level Economic Impacts of the Leakage of Construction Business if Ohio's Prevailing Wage Law is Repealed, Selected Industries

Industry	Revenue/Income Loss ($)	Employment Loss (Jobs)
Wholesale trade	–$65.8 million	–285
Retail trade (general, non-store, clothing, gas, etc.)	–$59.9 million	–671
Imputed rent, owner-occupied dwellings	–$38.7 million	N/A
Real estate	–$34.1 million	–149
Hospitals	–$21.6 million	–148
Restaurants (full and limited service)	–$16.2 million	–283
Offices of physicians	–$10.4 million	–66

Source: IMPLAN economic impact software and 2014 data for the state of Ohio.

[93] Data obtained from the Quarterly Census of Wages and Employment, Bureau of Labor Statistics, U.S. Department of Labor. Establishment data is based on Q2 to Q2 comparisons with employment based on the month of June for 2007 and 2016. All other comparisons are based on annual figures. Accessed at: http://www.bls.gov/cew/.

Conclusions

The preponderance of peer-reviewed research fails to find consistent evidence that prevailing wage laws increase construction costs. Over the past 16 years, 76% of the studies examining the effect of prevailing wage laws on construction costs find no impact, including 82% of the studies focused on public school construction. Using bid data obtained from the Ohio Facilities Construction Commission for over 100 school construction projects between 2013 and 2016, this study provides new statistical analysis that corroborates the consensus view. After considering the engineer's estimate, there is no statistically significant difference between projects paying federal Davis-Bacon wages and those without prevailing wage requirements.

Prevailing wage repeal decreases construction worker income and increases poverty and reliance on public assistance. Repealing or weakening prevailing wage in Ohio would lower blue-collar construction worker incomes by 16%, reduce employer-provided health insurance coverage by 2 percentage points, and decrease employer-provided pension coverage by 10 percentage points. As a result, thousands of blue-collar construction workers would lose their employer-provided health insurance coverage and pension plan if Ohio were to repeal or weaken its prevailing wage law. Additionally, about 16,000 construction workers in Ohio would fall below the official poverty line due to the severity of the wage cut, forcing them onto public insurance programs and increasing costs to taxpayers.

Military veterans employed in construction would be particularly worse off from repealing or weakening prevailing wage. Blue-collar construction occupations would become less attractive to veterans because the middle-class careers would be converted into low-wage, low-benefit jobs. Veterans would not be immune to this pay cut. In fact, weakening or repealing prevailing wage in Ohio would result in 4,100 blue-collar veterans separating from their construction jobs. Additionally, the total income of all veterans employed in construction jobs would decline by $275 million in the state. Gutting prevailing wage would increase burdens on taxpayers and disproportionately impact veteran workers who served their country.

Prevailing wage laws support training and safety in the construction industry. Ohio's prevailing wage law creates incentives to employ apprentices. The majority of the construction apprentices in Ohio are enrolled in joint labor-management programs. Between 2004 and 2015, fully 79% of construction apprentices were enrolled in union-sponsored training programs. The completion rate is also 21% higher in union-sponsored programs than in non-joint, nonunion programs.

By protecting local wage rates, prevailing wage laws protect work for local contractors and construction workers. Prevailing wage repeal would reduce work for Ohio-resident contractors by approximately $725 million annually. This loss of business would ripple throughout Ohio's economy, reducing overall economic activity by about $1.4 billion annually. Construction industry employment would fall by about 5,500 jobs. With the loss of these good-paying jobs and their consumer spending, an additional 4,200 jobs in retail and service industries would be lost, bringing the total employment decline with repeal to 9,700 jobs. The decrease in economic activity would also reduce state and local tax revenue by $45 million.

The highest-quality research available indicates that repealing or weakening Ohio's prevailing wage law will not result in any savings. Eliminating or reducing prevailing wages will impact taxpayers as more construction workers qualify for public assistance. Undermining current standards will also adversely affect military veterans who are more likely to work and own businesses in the construction industry compared to other industries in Ohio. Apprenticeship training would also decrease. With an effective prevailing wage law, more of Ohio's tax dollars are used to employ Ohio workers at Ohio companies. Repeal, on the other hand, would mean that more of the state's tax dollars will be used to employ contractors and workers from other states.

Appendix

Statistical Analysis of School Construction Costs

This analysis is based on the 110 school construction projects that are discussed in the text. Summary statistics are presented in Appendix Table 1 and indicate that, on average, the real low bid for these projects was approximately $3.2 million (with an engineer's estimate of about $3.3 million).[94] Prevailing wage projects represent 30% of the sample (33 projects). There were an average of 6 bidders for each project, and 15% of the sample consists of contractors with business addresses in states other than Ohio (Indiana, Iowa, Kentucky, Michigan, and Pennsylvania). Work involving asbestos abatement and demolition (or a combination of the two) represents almost half of the total number of projects. Additions and other building construction represent 25% of the projects included in the sample. Projects involving electrical and mechanical work, as well as renovations and site preparation represent 13% and 15%, respectively. Prevailing wage projects were distributed across all of these project types. Five percent of the projects had bids due in 2013. Over 50% of bids were submitted in 2014, with about 20% each in 2015 and 2016.

Regression results are reported in Appendix Table 2.[95] Model 1 examines the effect of prevailing wage requirements on low bids, holding the number of bidders, state residence of contractors, type of work, and year of the bid date constant. Model 2 includes the log of the real engineer's estimate that is a measure of project size and complexity.[96] Others report very high coefficients of determination when this variable is included in the estimate of highway bid costs.[97] In Model 3, the dependent variable is the log of the number of bidders. The effect of prevailing wage requirements on the level of bid competition is controversial, with claims often made in the absence of empirical support. The two peer-reviewed papers that examine this issue find no difference in the level of bid competition between projects that are and are not covered by prevailing wages.[98]

Results for Model 1 indicate that the effect of prevailing wages on the low bid fails to achieve conventional levels of statistical confidence. This result persists in Model 2 when the engineer's estimate is included. The only model reporting a statistically significant prevailing wage effect is Model 3, indicating that projects covered by the policy have approximately 30%

[94] Adjusted for inflation using the "Producer Price Index by Commodity for Intermediate Demand by Commodity Type: Materials for Construction," U.S. Bureau of Labor Statistics. Accessed at: https://fred.stlouisfed.org/series/WPSID6121.

[95] The estimates have been corrected for heteroskedasticity.

[96] The construction engineer's or architect's estimate is the projected cost of a project prior to bid announcements and is based on the market unit cost at the location and time for that work. That is, the engineer's estimate is typically independent from the labor cost. Contractors subsequently prepare their bids based on a detailed estimation of the labor, equipment, and material needed to complete the project. Therefore, the engineer's estimate can be used as a benchmark market cost against which we can determine if the requirement of prevailing wage rates impacts the final cost. See D. J. Pratt. 2003. Fundamentals of Construction Estimating: Second Edition, Thomson Delmar Learning, Clifton Park, NY.

[97] See De Silva, Dakshina, Timothy Dunne, and Georgia Kosmopoulou. 2003. An examination of entrant and incumbent bidding in road construction auctions. *The Journal of Industrial Economics*, 21(3): 295-316.

[98] See Kevin Duncan. 2015. "The Effect of Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations on Highway Maintenance Costs." *Industrial and Labor Relations Review*, Vol. 68, No. 1, pp. 212-237 and Jaewhan Kim, Chang Kuo-Liang, and Peter Philips. 2012. "The Effect of Prevailing Wage Regulations on Contractor Bid Participation and Behavior: A Comparison of Palo Alto, California with Four Nearby Prevailing Wage Municipalities." *Industrial Relations*, 51(4): 874-891.

more bidders.[99] Other results reported in Appendix Table 2 indicate that the number of bidders has a statistically significant impact of the low bid that is consistent with theory (negative coefficient) when the engineer's estimate is included in Model 2. Significant differences exist between the work classifications included in the table and the default classification (asbestos abatement and demolition). Low bids are not influenced by yearly trends.

In sum, the results reported in Appendix Table 2 (models 1 and 2) are consistent with the overwhelming majority of peer-reviewed research, indicating the absence of statistically significant prevailing wage cost effects. The results from Model 3 are novel, indicating more bidders and higher bid competition on prevailing wage projects.

[99] The correct interpretation of the percentage change for the coefficient for a dummy variable in a semi-log estimate is given by $(e^{\beta i}-1)$, or in this case, $e^{0.265}-1= 0.30$. See Peter Kennedy. 1981. Estimation with Correctly Interpreted Dummy Variables in Semilogarithmic Equations. *American Economic Review*, 71(4): 801.

Appendix Table 1. Summary Statistics. The Effect of Prevailing Wage Requirements on Construction Costs and Bid Competition in Ohio. Results for State-Sponsored School Construction Covered by the Federal Quality School Construction Program, 2013-2016

Variable	Mean
Low Bid (Real)	$3,195,622 (5,396,299)
Engineer's Estimate (real)	$3,313,607 (5,415,458)
Prevailing Wage Projects	0.30 (0.46)
# Bidders	6.08 (2.74)
Out-Of-State Contractors	0.15 (0.36)
Abatement & Demolition Projects	0.47 (0.50)
Additions & Other Building Construction	0.25 (0.43)
Electrical & Mechanical	0.13 (0.33)
Renovation, Site Prep & Other	0.15 (0.36)
2013 Bid	0.05 (0.23)
2014 Bid	0.55 (0.50)
2015 Bid	0.19 (0.39)
2016 Bid	0.20 (0.40)
N=	110

Source: Ohio Facilities Construction Commission. Standard errors in parentheses.

Appendix Table 2. The Effect of Prevailing Wage Requirements on Construction Costs and Bid Competition in Ohio. Regression Results for State-Sponsored School Construction Covered by the Federal Quality School Construction Program, 2013-2016. Dependent Variable = Log of Low Bid (Models 1 & 2), Log of Number of Bidders (Model 3).

	Model 1	Model 2	Model 3
Variable	Coefficient	Coefficient	Coefficient
Prevailing Wage Project	0.057 (0.20)	0.018 (0.04)	0.265** (0.10)
Engineer's Estimate (log)	–	1.020*** (0.02)	0.159*** (0.05)
# Bidders	0.114*** (0.04)	–0.028*** (0.01)	–
Out-Of-State Contractor	–0.487 (0.30)	–0.084 (0.07)	–
Additions & Other Building Construction	4.151*** (0.26)	0.220* (0.09)	–0.903*** (0.19)
Electrical & Mechanical	2.271*** (0.40)	0.264*** (0.07)	–1.035*** (0.19)
Renovation, Site Prep & Other	2.479*** (0.34)	0.201* (0.07)	–0.675*** (0.15)
2014 Bid	0.516 (0.47)	–0.054 (0.07)	–0.128 (0.26)
2015 Bid	0.605 (0.53)	–0.073 (0.09)	–0.099 (0.29)
2016 Bid	–0.077 (0.45)	–0.057 (0.07)	0.122 (0.26)
Constant	10.574*** (0.58)	–0.371 (0.22)	–0.209 (0.60)
N=	110	110	110
F=	71.05	1962.8	8.94
R^2 (adj.)=	0.789	0.991	0.384

Source: Ohio Facilities Construction Commission. Standard errors in parentheses. * Statistically significant at the 0.1 level. ** Statistically significant at the 0.05 level. *** Statistically significant at the .01 level.