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Comparison of Union and Non-Union Bids on Ohio School Facilities Commission Construction Projects

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Abstract

In 1997, the Ohio senate passed Senate Bill 102 which established the Ohio School Facilities Commission as a separate agency to oversee the rebuilding projects of the public schools in Ohio. To lower the construction cost, the bill exempted construction contractors from paying prevailing wages on these projects based on the hypothesis that this exemption would save the Ohio tax payer 10.7%. Many other studies concluded that these savings would range from 1.5 to 26%. The purpose of this research was to investigate this hypothesis through the statistical analysis of 8093 bids received for the schools' construction from the years 2000 through 2007. Union contractors- who paid their workers union wages-and non-union contractors- who did not pay prevailing wages-bid these projects. By comparing the bids/SF from both groups (union and nonunion), the hypothesis was tested. The research indicated that there was no significant difference between the bids for union contractors and the bids for non-union contractors.

Introduction

The Davis-Bacon Act of 1931 and its related acts require that all contractors and subcontractors performing on federal contracts or federally assisted contracts in excess of $2,000 pay their laborers not less than the prevailing wage rates and fringe benefits, as determined by the Secretary of Labor, for corresponding classes of laborers and mechanics employed on similar projects in the area(U.S. Department of Labor, 2008).Generally,the Ohio labor laws mandate that the laborers working on projects funded by the State of Ohio have to be paid prevailing wages and benefits. However, in 1997,Ohio Senate Bill 102 of the 122nd General Assembly created the Ohio School Facilities Commission (OSFC) as a separate and distinct agency to oversee the rebuilding of public schools in Ohioand exempted construction undertaken by school districts from Ohio's prevailing wage laws (PWL) to lower the cost of construction to the tax payer. This exemption does not conflict with the federal PWL because this project was fully funded through the state of Ohio (Burley, 2002).

Considerable literature and news articles debated the merit of PWL; some estimated cost increase of more than 30% and others stated that there would be no cost increases. While these studies agree that Davis-Bacon raises wage rates and, by implication, costs to the government, there is wide variation in the estimates. Kessler & Katz, (2001) estimated that the Davis-Bacon Act increased the cost of construction to the federal government from 1.4 to 24%. There are many factors that affect the cost of a construction project which make it difficult to isolate the impact of PWL from other factors.

The rebuilding of the public schools project in Ohio provided an excellent (but not perfect) opportunity to study the impact of PWL on prices for the owner. In this study, the authors compared the cost / square foot (SF) from 8093 bids from the years 2000 through 2007. Some of the contractors were union contractors who paid union wages; and some were non-union contractors who were exempt from paying prevailing wages after the passage of Ohio Senate Bill 102. These public schools were equitable and built to the same design guidelines and quality (personal communication with Eric Bode, OSFC). This paper adds to the studies that analyze the impact of PWL on the cost of construction by presenting a summary of literature against and for PWL followed by the analysis of 8093 bids to build these Ohio public schools.

Arguments against PWL

PWL increase labor costs, and consequently, the project construction costs. The Ohio Legislative Service Commission State House (OLSC) in its report titled"The Effects of the Exemption of School Construction Projects from Ohio's PWL"estimatedthe exemption saved the Ohio tax payer $487.9 million in aggregate during the post-exemption period, an overall savings of 10.7%. Estimated savings on new construction projects were $24.6 million (1.2%), estimated savings on school building additions to be $408.0 million (19.9%),and estimated savings on school building alterations were $55.2 million (2.7%). Estimated savings in urban counties totaled $310.5 million (15.13%) while estimated savings in rural counties totaled $177.4 million (8.65%).The report stated that these savings were at least partially attributable to the prevailing wage exemption, but their research team could not confidently confirm that this was the case(Burley, 2002).The OLSC report,citingFraundorf, Farrell, & Mason(1984)in their study of the effect of the Davis-Bacon Act on construction costs in rural areas, concluded that "a project subject to the Act would cost on average 26.1% more than the same project not subject to the Act." Fraundorf, et al, stated that the reason for the increase isbased on how workers are utilized.

The OLSC report further elaborated that analyses done in conjunction with the repeal or attempted repeal of the PWL in Florida, Iowa, Kentucky, Louisiana, Maryland, Minnesota, andNew Hampshire expected construction savings of 9.4%. The report cited the following reasons for the cost increase under PWL: (1) PWL reduce competition - non-union contractors may choose to not bid on a project that is subject to prevailing wage requirements, reducing competition for union contractors, (2) PWL discriminate against minority and small contractors, (3) PWL hurt rural contractors and workers, (4) PWL do not guarantee quality, and (5) PWL do not increase local tax bases.

While empirical evidence related to productivity differentials was mixed, the contention that unions, on average, significantly raise productivity could not be sustained (Addison & Hirsch, 1989). Freeman and Medoff(1983) argued that unions reduced profitability in general because their productivity effects, though substantive, were nevertheless insufficient to offset increases in wage costs and greater capital intensity(Freeman & Medoff, 1983).

Returns accruing from other correlates of market power (e.g., market share, foreign competition, and government entry restrictions) and from long-lived capital appear to be more important sources of union rents. Union rent seeking at the expense of long-lived tangible and intangible capital appears to lower firms' investment in physical capital, as well as to decrease R&D and other innovative and risk-taking activities. As a consequence, productivity growth tends to be slower in unionized firms and industries (Addison & Hirsch, 1989).

The savings estimates found in other literature are presented in Table 1. Although the studies indicate savings from the removal of prevailing wage requirements, none of these estimated savings meet the standards of statistical significance. A statistically significant result is unlikely to have occurred due to chance(Statistical Assessment Service at George Mason University, 2012).The estimated savings are considerably lower than the 20 to 25% savings that some opponents of PWL have claimed.

Table 1 Estimated Savings (Burley, 2002)

Author(s)	Savings
(Thieblot, 1975)	0.6%
(Gould and Bittlingmayer, 1980)	4 to 7%
(Prus, 1996)	5.1%
(Prus, 1999)	3.8%
(Phillips, 1999)	2.4%
(Phillips, 2001)	0.7%

Arguments for PWL

The studies that refute the argument that PWL increase project costs are based on the premise that higher wages encourage the use of more productive workers that partially offset the direct effect of higher wages on cost. The National Heavy and Highway Alliance reviewed and analyzed records for highways built from 1994 through 2002.

The findings confirmed that when workers skills and productivity justified higher wage rates, highways were built at the same, or even lower, cost per mile than when lower wage, lower skilled workers were employedas shown in Table 2 (Construction Labor Research Council, 2004).

Table 2: Wages and the cost per mile (Construction Labor Research Council, 2004)

	Low Wage	High Wage
Average Hourly Wage	$15.68	$26.34
Hours Per Mile	10, 276	6,991
Labor Costs Per Mile	$161,128	$184,138
Total Costs Per Mile	$857,965	$826,509
Difference	$31,456	

Philips (2001) compared the cost/SF of 201 public schools without PWL to the cost/SF of 190 public schools with PWL built in Kentucky, Ohio and Michigan from 1991 to 2000. The study concluded that there was no statistically significant difference between those two groupsafter adjusting for inflation.However, a review of costs one year after Ohio exempted school construction from prevailing wage requirements showed that the cost for new school construction increased from $77/SF before the exemption to $90/SF one year later. A more complex statistical model-that estimated cost/ SF for new public schools-found that school boards could save 10% of construction costs by starting in the spring compared to winter(Phillips, 2001).

Gillena, Baltz, Gassel, Kirsch, & Vaccaro(2002) evaluated injured construction workers' perceptions of workplace safety climate, psychological job demands, decision latitude, and coworker support, and the relationship of those variables to the injury severity sustained by the workers. There were statistically significant differences between union and nonunion workers' responses regarding perceived safety climate. Union workers were more likely than non-union workers to: (a) perceive their supervisors as caring about their safety; (b) be made aware of dangerous work practices; (c) have received safety instructions when hired; (d) have regular job safety meetings; and (e) perceive that taking risks was not a part of their job.

OLSC (2002) also stated the following benefits for prevailing wage laws: (1) PWL protect both the wages and jobs of local workers by preventing "wage dumping" by outside contractors, (2) PWL reduce total construction costs by encouraging the use of more qualified and productive workers, (3) PWL assure quality construction and reduce delays and overruns, (4) PWL help maintain local tax bases, and (5) PWL provide stability in the construction industry.

Background for the Rebuilding of Ohio Public School Project

The OSFC provides funding, management oversight, and technical assistance to local school districts for the construction and renovation of the Ohio school facilities in order to provide an appropriate learning environment for Ohio's children. The agency builds partnerships with school districts, design firms, construction managers, and trade contractors to construct quality schools (About OSFC: Mission). The OSFC works with the local school districts through each stage of construction and breaks the process into the following categories: financial partnership, facility planning, and project management (About OSFC: What We Do).

The OSFC serves as a funding partner for the school districts to finance their school construction projects. The program is designed to provide different levels of state funding assistance to the districts according to their financial abilities (the districts' assessed property valuation per pupil). In other words, the amount or share of the total project cost a district paysis based on the property valuation per pupil. This share for each district is calculated based on the Derolph, v.the state of Ohio(1997)case that preceded the creation of the OSFC. The calculation ensures that schools throughout the state are "adequate and equitable," in other words the schools are similar (personal communication with Eric Bode, OSFC). The OSFC also provides funding assistance in the form of loans to the districts that need funding (Ohio School Facilities Commission, 2008).

The goal of OSFC is to ensure statewide equity and quality for school facilities using a comprehensive standardized facilities assessment program and the Ohio School Design Manual (OSDM)to standardize the process. The OSFC Planning Group is responsible for the assessment and master planning of classroom facilities for schools participating in the OSFC program.

As districts are permitted to choose their own architects, the OSDM provides districts and architects with standards of design and construction that assure a statewide standard of quality (Ohio School Facilities Commission, 2008).

The Bidding Process of OSFC

OSFC uses an efficient project delivery model utilizing the private sector by employing private construction management firms to oversee projects. The bidding process for the OSFC projects is similar to that of other public projects. The process begins with public advertisement to bidders, which divides the work into trade packages and describes each package. The contractors' bids are publicly opened, read, and tabulated.Following the bid-opening meeting, the low bidders are evaluated against predetermined qualifications to determine whether they are responsible bidders (Ohio School Facilities Commission, 2008).

The Research Problem

There are many factors that affect the cost of a construction project which make it difficult to isolate the impact of PWL from other factors. As presented earlier, considerable literature and news articles debate the merit of PWL; some claim estimated cost increases of more than 26% and others claim that there are no cost increases. Labor unions, from the neoclassical view, use their monopolistic power to raise wages, thereby increasing costs(Byrnes, Fare, Grosskopf, & Lovell, 1988). From this point of view, it appears obvious that projects completed by union contractors would bemore expensive than projects completed by non-union contractors. However, it is suggested that unions reduced turnover, increased quality, and improved productivity (Byrnes et al., 1988). These conflictingviews raise the question:can unions pay more and still submit a competitive bid due to higher productivity?The objective of this research was to testthe hypothesis that bids-from contractorswho did not pay prevailing wages-were significantly less than those from union contractors in the construction of the OSFC projects.

In order for a trade union to survive and bring the above cited PWL's qualities to the construction industry, union contractors must be competitive in a capitalistic market. If the compensation differential exceeds the productivity differential, then non-union firms will underbid union firms; therefore, union contractors will need to adopt corrective actions to survive. Some examples of these corrective actions include: lower union labor wages, provide more and better union training, re-evaluate the bidding strategy, utilize equipment more and worker less, etc. However, if the union workers are more productive than non-union workers, then the union workers should be able to obtain higher wages without having a negative impact on cost. Unions can use this research to be more competitive and turn around the decline in union membership that has been occurring since 1979 (Belman & Voos, 2006).

Data Analysis

The OSFC provided the authors with several standard reports that were combined into one spreadsheet. The collected data for the research included: county name where the school is located, school district, school name, contractor's name, contractor's address, contractor's trade, contractor's union affiliation, contractor's bid amount, architect/engineers' (A/E) estimate, and the square footage for eachschool. Upon review of the received data, nearly half of the bids did not have a union/non-union affiliation of the contractor. Extensive efforts were made to find out the union/non-union status of every contractor. These efforts included (1) internet search, (2) contacting the regional union offices across Ohio, and (3) contacting the contractors directly. However, it was not possible to collect the affiliation for all the contractors because some had disconnected phone lines and/or had gone out of business. The research team determined the union/nonunion affiliations of the contractors for 8093 out of 8325 bids (97.23%). The total value of the known union/non-union affiliations bids was $12,495,822,258 of the total $12,667,724,130 or 98.64% of all bids based on dollar amount. The bids of unknown contractor affiliations were deleted from the data set.

Because the schools across the state of Ohio have different sizes, the comparison between union and non-union bid amounts was faulty. However, the bid amount/SF of the school neutralized the variations in school size. Therefore, the first step was dividing the bid amount and the A/E's estimates over the area of the school for every bid.

The concentration of unions varied across the state of Ohio; for example, there wasa higher concentration of union contractors in the northern region of the state than in the rest of Ohio. Investigating the existence of significant differences between the union and non-union bids /SF in the different regions identified the regions that need corrective actions. For the purpose of this research, the state of Ohiowas divided into the following three regions: northern, central, and southern regions as shown in Figure 1. The northern thirdwas made up of 31 counties, the central was made up of 28 counties, and the southern was made up of 29 counties.

Figure 1. The three regions of the state of Ohio

The lowest bids-for the same work in every school/project -were the most competitive, and they were based on the most economical method of construction and markup. The research team created another subset of records that contained only the lowest bid for every contract. Eliminating the inefficient and uncompetitive bids from this set of data allowed the comparison between the most competitive bids of the union and non-union contractors. OSFC mostly employed the contractors with the lowest bids; therefore, this was the cost to the owner excluding the change order cost during construction. The Statistical Consulting Center (SCC) at Bowling Green State University (BGSU) conducted the statistical analysis of the data.

The SCC conducted ANOVA analysis using the General Linear Model (GLM) with a 95% confidence level. The SCC analyzed two data sets: the first consisted of all bids and the second consisted of the lowest bid for the same work.

Results of the Data Analysis

The GLM analysis tested the hypothesis H_o: significant statistical differences in the bids /SF between union and non-union contractors existed. The statistical analysis for all bids from the whole state indicated that the hypothesis H_o should be rejected (i.e. there was no significant statistical difference between union and non-union bids) for the OSFC projects. Table 3 displays the average and standard deviation (SD); the SD measures the statistical dispersion of data around the average. The determining factor for the presence of significant statistical difference was the P-value generated by the GLM analysis. Using a confidence level of 95%, if the P-valuewas greater than the significance level of 0.05, no significant difference exists. If the P-valuewas less than 5%, a significant difference between union and non-union bids for OSFC projects exists. A statistically significant result with a 95% confidence levelindicates that there was a 5% probability that it occurred due to chance. If a result is not statistically significant, then the measured result is likely to have occurred due to chance. The five percent line is arbitrary, but has become standard in in many fields of research; statistical significance is the golden measuring stick for evaluating data(Statistical Assessment Service at George Mason University, 2012). Table 3 indicates that the average bid/SF for the non-union contractors ($20.49/SF) was greater than that for the union contractors ($19.22/SF).

Table 3 Result of State Level GLM Analysis Using All Bids

Union / Non-Union	Number of Bids	Average $/SF	SD	P-value	Accept / Reject H_o
Union	2,307	19.22	25.31	0.1936	Reject
Non-union	4,286	20.49	43.03		

The analysis of the filtered set of lowest bids indicated that the hypothesis H_o was also rejected and there was no significant difference between union and non-union bids. Table 4 indicates that the average bid/SF for non-union contractors is $18.49/SF where the average bid/SF for union contractors are $16.99.

Table 4 Result of State Level GLM Analysis Using the lowest Bids

Union / Non-Union	Number of Bids	Average $/SF	SD	P-value	Accept / Reject H_o
Union	547	16.99	23.54	0.4199	Reject
Non-union	949	18.49	39.57		

The Three Regions Analysis

To identify the locations where significant differences existed between the bids of union contractors and non-union contractors, the state of Ohio was broken down into three regions as discussed earlier. Table 5 presents the results of the three region GLM analysis using all bids, and Table 6 presents the results using the filtered set of the lowest bids. The tables indicate that there wasno significant difference in the bids /SF between union and non-union contractors in the North and the Central regions. However, there was significant difference between the bids of union and non-union contractors in the Southern region. The average of the bids/SF of union contractors was significantly less than that of the non-union contractors in both sets of data in the Southern region.

Table 5 Results of the Three Region GLM Analysis Using All Bids

Region	Union / Non-Union	Number of Bids	Average $/SF	SD	P-value	Accept / Reject H_o
North	Union	1,804	19.34	24.68	0.2988	Reject
	Non-union	2,790	18.16	30.37		
Central	Union	168	13.44	17.59	0.9714	Reject
	Non-union	447	13.56	18.84		
South	Union	335	21.49	30.98	0.0005	Accept
	Non-union	1,049	29.64	69.63		

Table 6 Results of the Three Region GLM Analysis Using Minimum Bids

Region	Union / Non-Union	Number of Bids	Average $/SF	SD	P-value	Accept / Reject H_o
North	Union	406	17.38	24.66	0.3908	Reject
	Non-union	679	15.54	30.99		
Central	Union	39	15.27	20.04	0.6067	Reject
	Non-union	89	11.90	17.23		
South	Union	102	16.08	20.08	<0.0001	Accept
	Non-union	181	32.78	65.00		

Conclusion

The overall analysis for the state of Ohio suggested the rejection of the hypothesis H_o: the average of the bids/SF for the union contractors was not significantly different than the average of the bids/SF for the non-union contractors. This conclusion was valid in the case of all the bids and in the case of only the lowest bids.

The three region analysis resulted in the rejection of the hypothesis in the Northern and Central regions while the Southern region resulted in the acceptance of the hypothesis. These results led to the conclusion that there was no significant difference between bids of union and non-union contractors in the Northern and Central regions of Ohio. However, the analysis of bids in the Southern region indicated a significant difference between the two groups with an average union bid of $21.49/SF and an average non-union bid of $29.64.

The definitive reasons for the lack of a statistically significant difference between the bids of the two groups need to be further researched. Production function studies indicated small overall union impacts on productivity; positive effects where they existed, appear to result from management response to decreased profit expectations and from a natural selection process. Positive union productivity effects were more evident where competitive pressures are present (Addison and Hirsch 1989). A potential reason for the lack of a statistically significant difference might be that the wages and benefits for non-union workers were close to those of union workers due the boom in the construction market during the years from 2001 to 2007. The boom created a shortage in the skilled workers market, which put a competitive pressure to raise the wages of nonunion workers. Why were bids of contractors in the southern counties so significantly different? Further research into the bid competitiveness of the counties in Southern Ohio is an area that deserves further research.

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