Prevailing Wage Laws and School Construction Costs

An Analysis of Public School Construction in Maryland and the Mid Atlantic States

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About the Author

Mark Prus grew up in Northeastern Ohio and Arizona. He lived in Cumberland, Maryland briefly. He received his B. A. in economics from the University of Notre Dame in 1979. Prus received his Ph.D. (1985) from the University of Utah where he was the Marriner S. Eccles Fellow in Political Economy. Prus is an Associate Professor of Economics, and Chairman of the Economics Department at the State University of New York at Cortland. Prus has published widely on labor market issues in journals such as the *Journal of Economic History, The Journal of Economic Issues,* the *Cambridge Journal of Economics, Research in Economic History, and the Quarterly Review of Economics and Finance.* Prus is a respected expert on prevailing wage laws and their effects on construction costs. He has served as a consultant to the Construction Labour Relations Association of British Columbia and testified before the Department of Industrial Relations in California on their state prevailing wage law. He has presented the results of his research on the construction industry at the Western Economics Association Annual International Conference and the Economics Research Network.

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A

Executive Summary

At the request of the Prince George's County Council, I conducted this analysis of the impact of prevailing wages on public school construction projects. The county council commissioned this study to guide them as they consider the adoption of a bill to require adherence to state prevailing wage rates in the construction of public schools. While the state of Maryland has a prevailing wage law, it mandates the payment of prevailing wages only for those school projects for which the state provides 75 percent or more of the funding. Prince George's County is embarking on a six year capital program for the construction and /or renovation of eighteen schools in the county.

I have attempted to address the following four concerns of the county council:

- Compare school construction costs in states with prevailing wage laws to those in states without prevailing wage laws in the mid Atlantic region.
- Compare school construction costs within Maryland for those local jurisdictions that pay prevailing wages to costs in those areas where prevailing wage rates are not required.
- Analyze the extent to which local contractors have been harmed by unfair competition from outside contractors due to the absence of prevailing wage requirements on school construction projects.
- Examine the extent to which the absence of prevailing wage rates in school construction impacts construction wages across the construction industry.

The analysis presented here provides answers to each of these questions primarily through the statistical manipulation of data on individual school construction projects provided by the F. W. Dodge Corporation. The analysis exploits variations across the mid Atlantic region, or within the state of Maryland, in the application of prevailing wage requirements. Within the mid Atlantic region, Delaware, Pennsylvania and West Virginia have prevailing wage laws that apply generally to public school construction. North Carolina and Virginia do not have state prevailing wage laws, and while Maryland has a state prevailing wage law, it only applies to public school construction projects if the state government provides 75 percent or more of the funding for the project. The Maryland state law does, however, allow for voluntary adherence to prevailing wages, and two local jurisdictions (Allegany County and Baltimore City) have elected to do so.

Chapter 1 presents a brief history of prevailing wage laws and their impact on construction costs. In Chapter 2 of this study, I examine the actual square foot construction costs of schools built in mid Atlantic states with and without prevailing wage laws over the period 1991 to 1997. This study includes data on school construction projects for Delaware, Pennsylvania, West Virginia, Maryland, North Carolina and Virginia. The first three states have prevailing wage laws that apply to school construction; the latter three do not. While square foot costs for new school construction are generally higher in prevailing wage law states, this may be due to regional differences in the cost of living. Public school construction costs also tend to be higher than private school construction costs, but this is true irrespective of whether or not a state has a prevailing wage law. A formal linear regression statistical model capable of controlling for these and other factors confirms the hypothesis that there is no measurable or statistically significant increase in construction costs associated with prevailing wage regulations.

Chapter 3 examines school construction costs within the state of Maryland. A previous study by the Department of Fiscal Services, which found that prevailing wage requirements within the state raised school construction costs by 15 percent, is examined. The results of that study are shown to be very sensitive to the inclusion or exclusion of particular variables. At the time of that previous study most schools were built in Maryland with prevailing wage requirements. Since that time changes in the allocation of state funds have led to the vast majority of schools being built without prevailing wages. Some local jurisdictions, however, have already adopted prevailing wage requirements of the kind being considered by Prince George's County. These include Allegany County and Baltimore City. A comparison of school construction costs between those jurisdictions with prevailing wages and those without is conducted. Controlling for other influences on costs, prevailing wage requirements do not measurably affect the costs of school construction.

Chapter 4 examines the relationship between prevailing wage laws and the extent of competition between contractors. One of the original intents of prevailing wage laws was to limit competition from itinerant contractors who would import low wage labor from outside the local labor market. Little empirical work has been done in the past to determine the extent to which this original intent has been fulfilled. Regression analysis is used to determine the nature of the correlation between prevailing wage laws and whether contractors from outside the local construction labor market are successful in bidding for school construction projects. Prevailing wage regulations appear to restrict the ability of urban contractors to win rural construction contracts but encourages rural contractors winning of urban jobs.

Chapter 5 looks at the impact that prevailing wage laws have on construction workers' wages. Using data from the U.S. Census Bureau's County Business Patterns, the wages of construction workers relative to all employees' wages are compared for prevailing wage and non-prevailing wage jurisdictions. Construction workers earn a premium in prevailing wage jurisdictions over other nonagricultural workers. This premium ranges from 7 to 16 percent.

1

Prevailing Wage Laws in Maryland and the U. S. : Their History, Intent And Impact

Nationally, prevailing wage laws date back to the Republican Congress of 1868 that passed a National Eight-Hour Law that provided for an eight-hour day on public construction. Congressional debate made it clear that when the working day was shortened from 12 or 10 hours per day to eight, workers were still to be paid the prevailing daily wage. Ulysses Grant was the first President to call for the enforcement of prevailing wage regulations. Kansas was the first state (1891) to pass a prevailing wage law. In upholding the constitutionality of this law, Supreme Court Justice John Marshall Harlan stated that the purpose of the law was to raise labor standards not only in construction but by example for all blue collar workers. Seven states passed prevailing wage laws between 1891 (Kansas) and 1923 (Nebraska). Sixteen states passed prevailing wage laws between 1931 and 1937. Maryland's prevailing wage law was originally passed in 1945. Eventually all but nine states would pass prevailing wage laws. (See Table 1.)

At the national level, the Davis-Bacon Act, passed in 1931, required payment of prevailing wages on federally financed construction projects. However, the original language of the law was vague, and prevailing wages generally were not determined before the acceptance of bids. In 1935, President Roosevelt signed clarifying amendments to the act, which became the basis of the current Davis-Bacon Act.

Prevailing wage laws emerged from a concern that cutthroat competition over wages in construction would lead the industry down a low-wage, low-skill development path. This was said to put the quality of construction at risk and lead to an itinerant, footloose, low-wage construction labor force. Poor construction workers would make poor neighbors and potential burdens on the community. Reasonably paid construction workers, on the other hand, held out the possibility of being solid neighbors, good citizens and productive members of the community. Government, by the operation of prevailing wage laws, was supposed to get out of the business of cutting government costs by cutting the wages of its citizens. Whatever labor standards had been established, whatever wages prevailed in a local community; that is what the law said government should pay on public works.

Like other prevailing wage laws, Maryland's prevailing wage law establishes minimum wage levels to be paid on public construction projects. Maryland's current law enacted in 1969, requires that prevailing wages be paid to workers on any public construction project which receives 50 percent or more in state funding and is valued at $500,00 or more. An earlier prevailing wage law, adopted in 1945, applied to highway projects in certain parts of the state. Public school construction is subject to prevailing wage requirements in Maryland if 75 percent or more of the funding comes from the state. While this threshold appears to have been met in the majority of school construction projects in the 1980s, changes in the method of allocating state funding for school construction in 1989 reversed this situation so that most schools in Maryland are built without prevailing wage requirements. Allegany County and Baltimore City have enacted local prevailing wage laws that typically apply to school construction projects. Baltimore City's Ordinance, approved in 1973, required the payment of minimum wages on "each and every contract in excess of five thousand dollars made by the Mayor and City Council of Baltimore." The minimum wages required in these contracts would be set by the Board of Estimates at least once every year to conform to area prevailing wage rates.

Since the late 1970s, prevailing wage laws at both the national and state level have come under pressure. Calls for repeal or reform of prevailing wage laws have been motivated by the suspicion that they increase public construction costs and hinder competition. Opponents of prevailing wage laws argue that they raise construction costs. Repeal of these laws would result in cost savings on the order of 20 to 30 percent according to some. If such savings were possible, it is argued, school districts could build five schools for the price of four.

But while a number of states have moved to repeal their prevailing wage laws, Prince George's county is not alone in considering the adoption of stronger prevailing wage statutes. Kentucky, for example, recently re-extended its state prevailing wage law to cover school construction costs. Outside of the United States, the provincial government in British Columbia adopted a prevailing wage regulation through its Skill Development and Fair Wage Act in 1992.

Estimating the Impact of Prevailing Wage Laws on Construction Costs

In all cases, policy makers are concerned with the costs associated with prevailing wage laws. Claims of the added cost associated with prevailing wage laws and of cost savings from repeal have not been adequately supported by empirical evidence. Some efforts to estimate the impact of prevailing wages are construction costs have used differences in wage rates between union and nonunion construction workers. Yet wage differences have a moderate effect on total construction costs. Labor costs are less than a third of total construction costs and may have been falling. In 1972, for instance, in an analysis of school construction costs, John Olsen found that onsite wages and salaries excluding benefits were 28.2 percent of total costs. (Monthly Labor Review, 1979, p. 40) According to the Census of Construction, labor costs, counting benefits, on all types of construction were 30 percent of total costs in 1977 and had fallen to 26 percent by 1987.

A second problem leads us to question estimates of the impact of prevailing wage legislation on construction costs based on an analysis of wage differences. Because they assume implicitly that the same number of hours of each type of labor will continue to be employed and that labor is of invariant productivity the impact on costs is driven by the wage differential. Neither of these assumptions is necessarily appropriate. The payment of prevailing wages may serve to attract workers with more experience and training. Increased labor productivity may result in fewer hours of labor being required thus offsetting the higher wage rate. For instance, Allen has shown that unionized labor in the construction industry is between 17 and 52 percent more productive than nonunion labor. (Allen, 1984) Additionally, higher wage rates may lead contractors to substitute capital or other inputs for labor, mitigating the impact of higher wages rates on total construction costs.

These possibilities, alone or in combination, make the assumptions underlying the analysis of construction costs based on wage differences inappropriate and cast doubt on the estimates of cost savings. Specifically, it is difficult to imagine how savings of 20 to 30 percent are possible. To get a true picture of the impact of prevailing wage legislation's impact on total construction costs, one could evaluate not only differences in wage rates, but also productivity differences, the incidence of substitution, administrative costs and other ways in which the impact of these laws is either mitigated or enhanced. An alternative approach is to simply examine total construction costs directly and compare costs in the presence and absence of prevailing wage laws controlling for project differences.

Few studies have attempted to estimate the impact of prevailing wage legislation based on ***actual total construction costs***. Fraundorf, et. al., in "The Effect of the Davis-Bacon Act on Construction Costs in Rural Areas," examined 215 new, non-residential construction projects built in 1977 and 1978. (Fraundorf, 1983) Approximately half of these projects were federal projects built under the purview of the federal Davis Bacon Act specifying that prevailing wages be paid. The other half were privately owned projects constructed without the requirement that prevailing wages be paid. Data on total construction costs were then compared using multivariate regression analysis to control for the effects of factors other than the presence of prevailing wage requirements. This study controlled for differences in the type of structure, the types of materials used, and project size in an effort to focus on cost differences associated with labor cost differentials resulting from the dichotomy in regulatory regimes. It also attempted to control for regional differences in construction costs by grouping projects into four regions; Northeast, North Central, South and West. The dependent variable in their regression analysis was the natural log of the project's bid price deflated to 1977 dollars. The authors of the study found, somewhat surprisingly, that federal construction projects governed by Davis Bacon were 23 percent more expensive than private construction projects controlling for other cost influencing factors.

When they re-estimate their basic model to correct for disproportionate response rates by region and building type, Fraundorf finds that the impact of Davis Bacon on total construction costs is as high as 30 percent. While they admit that these results are high, especially in light of a public-private wage differential estimated at 20 percent, they point out that the results are consistent with other aspects of the data. In particular they do not find evidence of factor substitution which would mitigate the impact of prevailing wage requirements. However, this does not explain why the impact on total costs is greater than the wage differential. They explore other factors that might contribute to the higher costs of federal Davis Bacon projects such as record keeping and reporting, and decreased competition. Neither of these factors appear to significantly contribute to costs on federally funded construction. (Fraundorf, et. al, 1983, p. 145)

One possible problem with the Fraundorf study is that regional differences in construction costs may have been inadequately controlled for. Given the relatively small sample size, the authors of this study had to group construction projects into relatively broad regions. This creates the potential for comparing a private project in a low cost state such as Idaho with a public project in a high cost state such as California. Since both projects are considered to be in the same region the cost differential is incorrectly attributed to the impact of prevailing wages when in fact it is due to differences in the cost of living or cost of materials between Idaho and California.

Another problem may result from the way in which building types were classified. Each construction project was placed into one of six categories; recreational buildings, storage facilities, industrial buildings, office-commercial, medical and other. These categories were then used to find matches between public and private construction projects. However, these six categories were sufficiently broad to allow rather dissimilar buildings to be considered comparable. For instance, in the category storage facilities, warehouses were grouped with barns as well as airplane hangars. Likewise office buildings were in the same category as restaurants. Differences in costs between public and private buildings may have resulted from differences in structure type and not from prevailing wage requirements. (Fraundorf, 1982, pp. 14-15)

A second and potentially more serious problem with this study is that it fails to adequately isolate the impact of prevailing wage legislation on construction costs. Specifically, Fraundorf compares private projects constructed in the absence of prevailing wage legislation with federal (i.e., public) projects built using workers paid the prevailing wage. This comparison, while seemingly appropriate, contains the potential for confounding cost differences related to prevailing wage laws with cost differences resulting from other differences between private and public construction projects. The authors recognize this possibility when they point out, “If the government is more exacting than private owners in its quality standards, labor hours (and costs) and possibly material costs would be higher on government projects." (Fraundorf, 1983, p. 145) It may also be that the difference in bidding procedures for public and private contracts or differences in the time horizon of public and private owners may contribute to higher costs in the public sector. In other words, the cost differential that Fraundorf attributes to the effect of prevailing wage legislation may in fact be due to differences between public and private construction.

While the Fraundorf study suffered from certain problems in the specification of the model, it opened the way for the use of regression analysis for studying the impact of prevailing wage laws on public construction costs. I have used a regression model patterned after the Fraundorf study to analyze total construction costs and prevailing wage laws in the U.S. and in British Columbia. In my analysis of state prevailing wage laws, I found that while public projects were significantly more expensive than similar private projects, this was true in both prevailing wage law states and non-prevailing wage law states. Consequently, the higher costs of public projects could not be attributed to the presence of prevailing wage laws. In fact, the estimated effect of prevailing wage laws, controlling for other factors, including differences in the type of ownership, was not statistically different from zero.

Table 1: Prevailing Wage Laws by State, Year Passed and Repealed

States having prevailing wage laws	Year passed
Alaska	1931
Arkansas	1955
California	1931
Connecticut	1935
Delaware	1933
District of Columbia	1931
Hawaii	1955
Illinois	1931
Indiana	1935
Kentucky	1940
Maine	1933
Maryland	1945
Massachusetts	1914
Michigan	1965
Minnesota	1973
Missouri	1957
Montana	1931
Nebraska	1923
Nevada	1937
New Jersey	1913
New Mexico	1937
New York	1894
Ohio	1931
Oklahoma*	1909
Oregon	1959
Pennsylvania	1961
Rhode Island	1935
Tennessee	1953
Texas	1933
Washington	1945
West Virginia	1933
Wisconsin	1931
Wyoming	1967

States without prevailing wage laws
Georgia
Iowa
Mississippi
North Carolina
North Dakota
South Carolina
South Dakota
Vermont
Virginia

States that repealed prevailing wage laws	Year passed	Year of repeal
Alabama	1941	1980
Arizona	1912	1984
Colorado	1933	1985
Florida	1933	1979
Idaho	1911	1985
Kansas	1891	1987
Louisiana	1968	1988
New Hampshire	1941	1985
Utah	1933	1981

*The enforcement of Oklahoma's law was judicially suspended in 1995.

2

The Impact of Prevailing Wage Laws on School Construction Costs

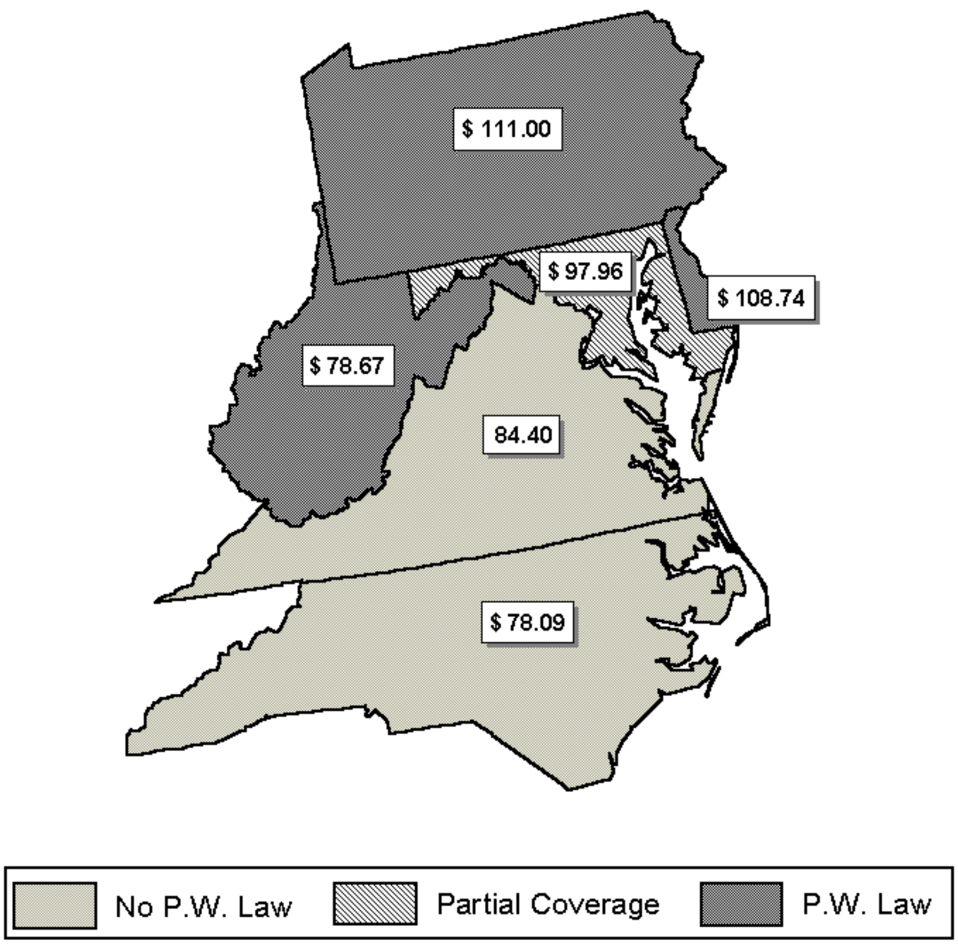
A Case Study of the School Construction Costs in Mid Atlantic States with and without Prevailing Wage Laws

One way of estimating the impact of prevailing wage laws on school construction projects that avoids the problems associated with the necessarily restrictive assumptions involved in wage rate comparisons, is to compare actual total school construction costs in the presence and absence of prevailing wage regulations. Maryland, while it has a state prevailing wage law, constructs most schools in the 1990s without requiring prevailing wages. In contrast, a number of surrounding states in the Mid Atlantic region have prevailing wage laws that generally apply to school projects. These include Pennsylvania, Delaware and West Virginia. Other states, namely, Virginia and North Carolina do not have a state prevailing wage law. This regional variation creates the opportunity for a "here and there" analysis of school construction costs using a multiple regression model similar to both the Fraundorf model and the model I have used previously to estimate the impact of state prevailing wage laws on public construction costs. Before that model is presented, I develop a more intuitive comparison of square foot costs for school construction.

A Comparison of School Construction Costs

As a first exercise in comparing school construction costs, the median square foot costs of new public schools built from 1991 to 1997 in each of the six states in the Mid Atlantic regionare presented in Figure 1. As can be seen, square foot costs are highest in Pennsylvania and Delaware and lowest in North Carolina, Virginia and West Virginia. While Pennsylvania and Delaware are two states with prevailing wage laws, and North Carolina and Virginia are states without prevailing wage laws, it would not necessarily be appropriate to conclude that prevailing wage laws raise school construction costs.

Figure 1: Median square foot school construction costs for Mid-Atlantic States with and without Prevailing wage laws.



Tables 2 and 3 show the median square foot construction costs for school construction projects in the mid Atlantic region over the period 1991 to July, 1997. The accepted bid price of the schools were inflated to 1997 dollars using the consumer price index-housing. This allows for a direct comparison of square foot costs for school construction projects in different years.[1] For all schools included in Table 2 the cost of schools in states without prevailing wage laws is $75.57 per square foot, while the square foot cost of schools in prevailing wage law states is $94.07. Schools in prevailing wage law states appear to cost 24.5 percent more. When school construction projects are disaggregated into elementary, middle and high school projects, we see that this difference is attributable to substantial differences in middle school and high school construction projects. The cost of elementary school projects in prevailing wage law states is actually lower.

Table 2: Square Foot School Construction Costs by States with and without State Prevailing Wage Laws (notice caution in footnote)

Square Foot School Construction Cost by States with and without State Prevailing Wage Laws						
LEGAL STATUS	ELEMENTARY SCHOOLS Median	Number of Obs.	MIDDLE SCHOOLS Median	Number of Obs.	HIGH SCHOOLS Median	Number of Obs.
No Law	**$82**	**N=14**	**$80**	**N=6**	**$67**	**N=8**
Has Law	**$60**	**N=4**	**$112**	**N=4**	**$124**	**N=1**
% Increase in Cost	**-26.7%**		**40.5%**		**85.4%**	

Note: Data are for 1991 to 1997 Inflated to 1997 Dollars Using the Consumer Price Index-Housing
Source: F.W. Dodge Corporation Start Cost Data
Caution: these data are for private schools only--no public schools are included

However, Table 2 presents data for private schools only. These schools were built without prevailing wage regulations regardless of whether or not they were in a state with a prevailing wage law. Prevailing wage laws cover public projects only. The fact that the median square foot cost was higher for private schools in states with prevailing wage laws simply reflects the fact that the states without prevailing wage laws in the Mid Atlantic region are generally further south and may have dramatically different costs of living and costs of construction. Square foot construction costs are generally lower in these regions for private as well as public projects for a variety of reasons. Thus, in assessing school construction costs in states with and without state prevailing wage laws, we will need to take into consideration overall differences in construction costs in these groups of states.

[1] The data are from the F. W. Dodge Corporation, the standard service provider of project information in the construction industry. Alternative price indices were tried to examine whether results were dependent on the price index chosen. Results were basically the same regardless of the price index used to translate information into constant 1997 dollars.

Table 3 divides school construction into publicly and privately built schools. Combining all school construction projects, public schools cost $84.09 per square foot compared to $75.57 for private schools. Public schools cost 11.3% more per square foot than private schools. When school projects are disaggregated by type, public elementary schools cost 3 percent more than private schools, and public high schools cost more than 26% more per square foot to build than private high schools. **These data, however, refer only to public and private schools built in states that do not have a state prevailing wage law.** Thus, the public-private cost differential cannot be laid at the foot of prevailing wage regulations. This reminds us that in assessing the effects of prevailing wage regulations on building costs, we must keep in mind that similar public and private buildings, such as elementary schools or high schools, may differ in the quality and nature of their construction.

Table 3: Square Foot School Construction Costs by Public and Private Projects

Square Foot Public and Private School Construction Costs Compared							
OWNERSHIP OF PROJECT	**Number of Obs.**	**ELEMENTARY SCHOOLS Median Sq. Ft. Cost**	**Number of Obs.**	**MIDDLE SCHOOLS Median Sq. Ft. Cost**	**Number of Obs.**	**HIGH SCHOOLS Median Sq. Ft. Cost**	**Number of Obs.**
Private Project	**N=80**	**$81.85**	**N=14**	**$79.78**	**N=6**	**$66.87**	**N=8**
Public Project	**N=52**	**$84.40**	**N=170**	**$80.43**	**N=48**	**$84.73**	**N=34**
% Increase in Public Cost		**3.1%**		**0.8%**		**26.7%**	

Note: Data are for 1991 to 1997 Inflated to 1997 Dollars Using the Consumer Price Index-Housing
Note: Public Projects exclude Federal projects.
Source: F.W. Dodge Corporation Start Cost Data

Table 4 presents a more appropriate comparison, though it points to the problem of small subsample sizes at the same time. The square foot cost of new construction for elementary, middle and high schools is presented. These data are first broken down into states with state prevailing wage laws and states that do not have state prevailing wage laws. Then the data are broken down a second time into public schools and private schools. Finally, for both states with laws and states without laws, a comparison is made. How much more or less expensive is it to build a public school? Table 4 compares 76 public elementary schools in states with a prevailing wage law to the construction of 4 privately built elementary schools in those states. The public elementary schools cost 80% more per square foot than the private elementary schools. Perhaps this implies that prevailing wage laws raise elementary school construction costs by about 80%, though the magnitude of this cost differential exceeds virtually all estimates of the impact of prevailing wage requirements on costs.

Public middle schools actually cost 2.8% **less** than private middle schools in prevailing wage law states—compared to the .8% difference in states without prevailing wage laws. Public high schools in non-prevailing wage law states cost 26.7% more than private high schools in those states. In stark contrast, in prevailing wage law states, public high schools cost 32.7% **less** than private high schools, though there is only one private high school (and an exceptionally costly one at that) in prevailing wage law states. While these small subsamples make any inference drawn from these comparisons shaky, the data in Table 4 do not provide strong support for the contention that prevailing wage laws raise school construction costs.

Table 4: Square Foot Cost of New School Construction Broken Down by State WITH and WITHOUT State Prevailing Wage Laws and then Broken Down by Public and Private Schools

LEGAL STATUS	OWNERSHIP OF PROJECT	ELEMENTARY SCHOOLS Median Sq. Ft. Cost	Number of Obs.	MIDDLE SCHOOLS Median Sq. Ft. Cost	Number of Obs.	HIGH SCHOOLS Median Sq. Ft. Cost	Number of Obs.
NO LAW STATE	**Private Project**	**$81.85**	**N=14**	**$79.78**	**N=6**	**$66.87**	**N=8**
	Public Project	**$84.40**	**N=170**	**$80.43**	**N=48**	**$84.73**	**N=34**
	% Increase in Public Cost	**3.1%**		**0.8%**		**26.7%**	
LAW STATE	Private Project	**$59.97**	**N=4**	**$112.09**	**N=4**	**$124.35**	**N=1**
	Public Project	**$107.96**	**N=76**	**$108.99**	**N=22**	**$83.65**	**N=22**
	% Increase in Public Cost	**80.0%**		**-2.8%**		**-32.7%**	

Note: Data are for 1991 to 1997 Inflated to 1997 Dollars Using the Consumer Price Index-Housing
Note: Public Projects exclude Federal projects.
Source: F.W. Dodge Corporation Start Cost Data

Using a Linear Regression Model to Measure the Effect of Prevailing Wage Laws on School Construction Costs.

In economics, a statistical technique called linear regression is a standard method for measuring the effect one factor has upon another controlling for other things. For instance, we can develop a model designed to predict the cost of building a school based on

- Whether it is an elementary, middle or high school
- how many square feet are in the project
- how many stories the building is
- what kind of building materials are used in construction
- whether or not the school is public or private, and

Controlling for these factors, we can then ask the question: if the school is being publicly built in a state with a prevailing wage law, will it cost more? This statistical technique is the same used by Fraundorf, et. al. to examine the impact of the Davis Bacon Act on public construction costs.

Table 5 presents a linear regression model that predicts total school construction costs (excluding land acquisition, architect fees and construction management fees) based on the size of the building, the number of stories, the type of building materials used, whether or not the school is an elementary, middle or high school, whether the school is public or private and whether the school was built under a prevailing wage law.

Table 5: A "Here-There" Cross State Linear Regression Model Predicting Total Construction Costs for New Elementary, Middle and High Schools, 1991-1997

Variable	Estimated Effect	Statistically Significant	Significance Probability
Constant	-9.866	Yes	0%
Log of Total Square Feet	0.872	Yes	0%
Log of the Number of Stories	0.066	Yes	10%
Marker for Wall Board Framing	-0.016	No	60%
Marker for Wood Framing	0.055	Yes	8%
Marker for Steel Framing	-0.239	No	31%
Marker for Cement	-0.051	No	49%
Middle School	0.007	No	84%
High School	0.046	No	26%
Public Project	0.264	Yes	0%
Log of Regional CPI	3.334	Yes	0%
Effect of Prevailing Wage Law	0.038	No	26%

Dependent Variable: Log of the Total Project Value in 1997 Dollars Deflating with the CPI-Housing
Adjusted R Square = .887
Number of Observations = 358

This linear regression model covers the construction of schools in Delaware, Maryland, North Carolina, Pennsylvania, Virginia and West Virginia. In order to control for cost of living differences across states a cost of living index was included as a control variable. The model is a good fit of the data (as indicated by an adjusted R-square statistic of 89%).

The model indicates that as the size of a school goes up, the total cost of the school rises. But it also indicates that there are economies of scale associated with larger schools so that while the total cost goes up with increasing size, the square foot cost goes down. This is shown in the estimated effect (or coefficient) for the variable--the log of total square feet for the school being built. This coefficient is .87. This means that if you doubled the size of a school from (say) 50,000 square feet to 100,000 square feet, the size would go up by 100% but the cost would only go up by 87%. This indicates that as schools get larger, the total cost goes up, but the square foot cost goes down.

The model in Table 5 controls for a variety of technical factors--total square feet, number of stories, type of building materials--and the model also controls for whether or not a middle school costs more than an elementary school or whether a high school costs more than an elementary school. For a middle school of exactly the same size as an elementary school, built of the same material, having the same number of stories, the model estimates that a middle school will cost .7% more. A high school of identical size, using the same materials will cost 4.6% more. Neither of these results, however, are statistically significant. There are three standard levels of statistical significance--1%, 5% and 10%. In simple terms, 10% means statistically I have a 1-in-10 chance of being wrong, and 1% means I have a 1-in-100 chance of being wrong. Rarely do economists accept higher levels of probability in this test as statistically significant. This means that for all practical purposes, an elementary school, a middle school and a high school of the same size will cost the same amount.

Now the model asks the question whether or not public schools cost more than private schools controlling for other factors such as size. The model estimates that public schools (in states with and without prevailing wage laws) cost 26.4% more than private schools. The estimated cost difference associated with public school buildings is statistically significant at all standard levels of probability. This cost difference may be due to design differences or other features typically found in public schools compared to private schools. Public school buildings may have a longer life span than private school buildings, or other factors may account for this cost difference. But this cost difference exists in both states with and without prevailing wage laws. This is not a cost differential that can be attributed to prevailing wage laws simply because this cost differential is found where there are no prevailing wage regulations.

Finally, the model estimates the cost effect of prevailing wage laws. The model estimates that controlling for other factors, building a public school in a prevailing wage law state will cost 3.8% more than building the same public school in a state without a prevailing wage law. However, this is not a statistically significant estimate. For all practical purposes there is no statistical difference between building a public school in a state with or without a prevailing wage law. How can the model say there is no difference in the cost of public school construction in states with prevailing wage laws compared to states without prevailing wage laws when Table 4 suggests that on average square foot public school construction costs are higher in states with prevailing wage laws? Once again, the answer is that, on average, private school construction costs are also higher in states with prevailing wage laws. Once these cross-state differences in construction costs are accounted for, there is no statistically measurable effect on total construction costs associated with prevailing wage regulations.

Conclusion

A "here-and-there" linear regression model was developed to estimate the effect of prevailing wage regulations on total construction costs for schools, controlling for other factors. This model controlled for the type of school, the size of the project, and building characteristics. It also controlled for general differences in construction costs between states with and without prevailing wage laws and general differences between the cost of public and private construction (whether or not done under prevailing wage regulations). Controlling for these factors, this model could find no statistically significant impact on total construction costs due to prevailing wage requirements.

3

The Impact of Prevailing Wage Laws on School Construction Costs in Maryland

Introduction

In Chapter 2 we compared school construction costs in mid Atlantic states that have prevailing wage laws with costs in those states without prevailing wage laws in the mid Atlantic region. In this chapter, we exploit local variation in the application of prevailing wage laws to compare school construction costs within the state of Maryland. Unlike the previous comparison where the opportunity for dramatic differences in the cost of living could contaminate the results, comparing school construction costs in those jurisdictions with prevailing wage requirements in Maryland to costs of school construction for those jurisdictions where prevailing wages are not paid provides a clearer focus on the law's impact.

A Reconstruction of the Department of Fiscal Services' Study

This is not the first time the impact of prevailing wage laws on school construction costs in Maryland has been examined. A report prepared by the Department of Fiscal Services (January 1989) ten years earlier evaluated the impact of Maryland's prevailing wage with a special focus on public school construction.

The study examined 20 school projects funded by the Interagency Committee for Public School Construction in 1987 and 1988. Of these projects, 14 were built under the guise of prevailing wages while the remaining 6 were not. A multiple regression analysis was performed using square foot cost as the dependent variable and proxies for building design, location, and the applicability of prevailing wage regulations as independent variables. The model estimated that prevailing wage requirements raised school construction costs by approximately $11 per square foot, or roughly 15 percent.

The report by the Department of Fiscal Services includes a detailed discussion of the methodology and data used in coming to this conclusion. These data allow me to replicate the earlier study and discuss some problems associated with the methodology and findings. I have reproduced the data from the Appendix 4 of the Department of Fiscal Services report in Table 6.

Table 6: Data on School Construction Projects Used in the 1989 Department of Fiscal Services Report on Maryland's Prevailing Wage Law

School Name	County	Year	% Sq Ft Renovation	% Est Site Preparation	% Special Conditions	Sq Ft Cost	Prevailing Wage ?
S. Middle	A. Arundel	1986	53	9	0	76	No
G. Fox	A. Arundel	1987	88	8	0	44	No
G. Washington	B. City	1987	0	11	0	88	Yes
Garrison	B. City	1987	91	10	0	73	Yes
Dundalk	B. County	1986	100	0	0	50	Yes
Sunderland	Calvert	1987	0	10	0	88	Yes
Appeal	Calvert	1987	40	9	0	90	Yes
Manchester	Carroll	1987	35	12	0	76	Yes
Voc/Tech	Carroll	1986	0	11	0	104	Yes
Jenifer	Charles	1986	0	11	0	82	Yes
Hillcrest	Frederick	1987	0	11	0	77	Yes
Dublin	Harfors	1986	92	3	1	38	Yes
F. Douglas	P. George's	1987	79	5	0	70	Yes
Flow Hill	Montgomery	1984	0	11	0	79	No
Oak View	Montgomery	1984	79	5	1	50	No
G. Lake	Montgomery	1986	0	7	11	106	No
B. Hills	Montgomery	1983	55	5	0	52	No
8th District	St. Mary's	1988	0	12	0	92	Yes
Bester	Washington	1987	99	5	0	75	Yes
Pinehurst	Wicomico	1988	82	6	2	70	Yes

Source: Department of Fiscal Services, "Maryland's Prevailing Wage Law: A Study of Costs and Effects"

Two potentially serious, and related, problems with the 1989 study are the limited number of observations and the intermingling of new schools with renovation projects. Of the 20 projects listed, 8 are new schools and the remaining 12 involve at least some renovation work. If we look only at the 8 new schools included in the study, there are 2 projects built in the absence of prevailing wage requirements and 6 schools constructed with prevailing wages. Comparing the mean square foot costs of construction, we find that schools built with prevailing wages cost $88.50 per square foot while schools built without prevailing wages averaged $92.50 per square foot. Prevailing wage schools were, on average, 4.5 percent less expensive. Given the variation even amongst new school costs, this difference is not statistically significant. In fact a careful examination of the raw data indicates that the most expensive new school in the sample was built without prevailing wage requirements. This observation is responsible for inflating the average cost of new schools in the absence of prevailing wages.

In order to overcome the problem of small sample size, school projects that included renovation work were added to the sample. When all 20 school construction projects are compared, the average square foot costs of projects not requiring prevailing wages is $67.83 compared to $76.64 for those projects paying prevailing wages. This difference of 13 percent is not, however, statistically significant given the variation across both groups.

A large part of the variation in school construction costs can be attributed to the amount of renovation work included in the project. Renovation work itself is variable and affects square foot costs differently. For example, renovation work such as installing a new boiler would increase square foot costs significantly both because of the expense of materials and the small square footage involved. Painting, on the other hand, may be far less expensive overall, but also involve a large area, substantially lowering the square foot costs. Overall, square foot costs appear to decline as the percentage of square foot renovation work increases.

In order to illustrate some of the problems with the Department of Fiscal Services study I reconstruct their regression analysis. To begin with I use the 8 observations on new school projects and regress square foot costs against a dummy variable for the prevailing wage. Dummy variables are variables that indicate the presence or absence of a quality or characteristic, in this case, the presence or absence of prevailing wage requirements. The results of this regression are presented in Table 7. In the first model the estimated effect of prevailing wages on square foot costs is negative though not statistically significant. In addition, overall, the regression equation does not produce statistically significant results, pointing to the need to increase the number of observations. In the next model, renovation projects are included with new school projects. In addition to the prevailing wage variable, the percent of renovation work in the project is included as an explanatory variable. As expected, the percent of renovation work is negatively correlated with square foot costs as indicated by the minus sign on the coefficient. The effect of prevailing wage requirements, controlling for renovation work, is now positive though not statistically significant. In other words, while the sign of the estimated coefficient is positive, we cannot conclude that the effect is significantly different from zero. Thus prevailing wage requirements do not appear to have a measurable impact on costs!

The Department of Fiscal Services study also included information on other factors that could affect costs. These included the percent of total costs attributable to site preparation, and a control for region. Including site preparation in our regression equation, we find that site preparation is positively correlated with square foot costs but not significantly so. The percent renovation work remains significantly negatively correlated to square foot costs. Most importantly, while the estimated coefficient on the prevailing wage variable is still positive it is not statistically significant. Including the regional control, which identifies school projects in the Baltimore area, leaves the prevailing wage variable still not statistically different from zero.

Table 7: Regression Results for 20 Public School Projects Used in the Department of Fiscal Services Report on Prevailing Wage Laws, 1989

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Prevailing Wage	-4	8.222	5.987	7.468	12.3
	(-.426)	(-1.351)	(0.82)	(1.11)	(2.05)
% Sq Ft Renovation	-	-0.348	-0.294	-0.295	-0.177
		(-5.006)	(-2.734)	(-2.636)	(-1.684)
% Site Preparation	-	-	0.87	0.872	2.238
			(0.66)	(0.64)	(1.77)
Regional Control	-	-	-	0.733	0.906
				(0.08)	(0.12)
% Special Conds.	-	-	-	-	3.215
					(2.62)
Constant	92.5	83.76	74.784	74.825	52.731
	(11.38)	(13.95)	(5.01)	(4.85)	(3.39)
No. of Observations	8	20	20	20	20
Adjusted R Square	-0.132	0.57	0.555	0.525	0.659

Note: t-statistics are in parentheses.

Only when the control for special conditions costs is included in the regression model, as I do in the last column in Table 7, does the effect of prevailing wage requirements become significant. But this result, in which the prevailing wage variable is significantly positive for the first time, appears to hinge on the inclusion of one variable. This exercise in replication, if nothing else, points out the fragility of the results reported in the earlier study and calls for further efforts to estimate the effect of prevailing wage laws on school costs.

A Regression Analysis of School Construction Costs in Maryland

In order to overcome the primary limitation of the earlier analysis of school costs in the presence of prevailing wages, I use Dodge data from 1991 to 1997 to estimate a regression model like that presented in Chapter 2. In this case the observations used are limited to the state of Maryland. In contrast to the period used in the Department of Fiscal Services report, when a majority of schools were built with prevailing wages, changes in the way school projects were funded have reversed the situation so that the vast majority of school construction projects do not require the payment of prevailing wages. Consequently finding a sufficiently large number of prevailing wage projects for comparison was a challenge. Allegany County and Baltimore City have enacted local prevailing wage requirements for school projects, providing the bulk of observations. In addition, the Maryland State Department of Labor has identified a limited number of other school projects for which prevailing wage determinations were requested. These were projects for which the Maryland state law (requiring 75 percent state funding) applied.

The distribution of school projects by county and by type of construction within Maryland is presented in Table 8. Of the 186 school construction projects from 1991 to 1997, seventy one projects (38%) were new schools. The vast majority of projects were concentrated in Anne Arundel, Baltimore, Montgomery, and Prince George's counties. Eleven projects (6%) were identified as prevailing wage projects. Nearly 60 percent of the projects were elementary schools, with the others almost evenly divided between middle schools and high schools.

Table 8: Distribution of School Projects by County and type of Construction

County	Elementary	Middle	High School
Allegany	2	0	1
Anne Arundel	13	3	5
Baltimore	15	5	4
Calvert	3	1	1
Caroline	1	1	0
Carroll	4	4	0
Cecil	0	2	0
Charles	3	1	1
Dorchester	3	0	0
Frederick	3	5	0
Garrett	1	0	1
Harford	7	1	0
Kent	0	1	0
Montgomery	23	10	5
Prince George's	12	1	4
Queen Anne's	1	0	0
St Mary's	2	0	1
Somerset	0	1	1
Talbot	2	0	1
Washington	4	0	5
Wicomico	0	0	1
Worcester	1	0	0

Source: F. W. Dodge Corporation

Table 9 presents the results of a linear regression model identical to that used in the previous chapter that predicts total school construction costs (excluding land acquisition, architect fees and construction management fees) based on the size of the building, the number of stories, the type of building materials used, whether or not the school is an elementary, middle or high school, whether the school is public or private and whether the school was built under a prevailing wage law.

Table 9: Regression Results Estimating School Construction Costs within Maryland

Variable	Estimated Effect	Statistically Significant	Significance Probability
Constant	7.383	Yes	0%
Log of Total Square Feet	0.678	Yes	0%
Log of the Number of Stories	-0.02	No	84%
Marker for Wall Board Framing	-0.017	No	86%
Marker for Wood Framing	0.162	Yes	10%
Marker for Cement	-0.022	No	90%
Marker for Steel Framing	-0.167	No	57%
Middle School	-0.019	No	85%
High School	0.329	Yes	0%
Renovation	-0.252	Yes	0%
Public School	0.406	Yes	0%
Effect of Prevailing Wage Law	0.018	No	90%

Dependent Variable: Log of the Total Project Value in 1997 Dollars Deflating with the CPI-Housing
Adjusted R Square = .817
Number of Observations = 124

Just as in the case of the Cross state regression model presented in Chapter 2 the model used here to analyze school construction costs within Maryland is a good fit of the data (as indicated by an adjusted R-square statistic of 82%). In other words, 82 percent of the variation in total school construction costs is accounted for by the explanatory variables listed in Table 9.

Again, the model indicates that as the size of a school goes up, the total cost of the school rises. But it also indicates that there are economies of scale associated with larger schools so that while the total cost goes up with increasing size, the square foot cost goes down. The estimated effect (or coefficient) for the variable--the log of total square feet for the school being built-- is .68 indicating that as the square feet of a school project doubles, the cost increases by only 68 percent.

The model in Table 9 controls for a variety of technical factors--total square feet, number of stories, type of building materials--and the model also controls for whether or not a middle school costs more than an elementary school or whether a high school costs more than an elementary school. For a middle school of exactly the same size as an elementary school, built of the same material, having the same number of stories, the model estimates that a middle school will cost 2 percent less. This result, however, is not statistically significant. On the other hand, a high school of identical size, using the same materials will cost 33% more.

Now the model asks the question whether or not public schools cost more than private schools controlling for other factors such as size. The model estimates that public schools (in areas with and without prevailing wage laws) cost 40.6% more than private schools. The estimated cost difference associated with public school buildings is statistically significant at all standard levels of probability. This result is consistent with the result for the cross state comparison in Chapter 2 and, again, is likely due to design differences or other features typically found in public schools compared to private schools. It is important to recognize that this cost difference exists in both areas with and without prevailing wage laws, and, as such, is not a cost differential that can be attributed to prevailing wage laws simply because this cost differential is found where there are no prevailing wage regulations.

Finally, the model estimates the cost effect of prevailing wage laws. The model estimates that controlling for other factors, building a public school in a prevailing wage law jurisdiction within Maryland will cost 1.9% more than building the same public school without prevailing wage requirements. However, this is not a statistically significant estimate. For all practical purposes there is no statistical difference between building a public school with prevailing wages and building a public school without prevailing wages.

4

Prevailing Wage Laws And Competition Between Contractors

Date Limitations

One of the original rationales for prevailing wage laws was the proposition that such regulations would discourage outside contractors from bringing into an area low wage labor that undercut local wage and working conditions. No academic studies have been done to test whether or not this is indeed one of the effects of these regulations.

This report is able to shed some light on this question using F.W. Dodge reports of public school contracts awarded to general contractors in the six states of Maryland, Pennsylvania, Delaware, West Virginia, Virginia and North Carolina over the period October 1996 to September 1998. The data are limited to information regarding the origin of general contractors. No information regarding the origin of subcontractors is available.

The data also do not provide information regarding the workers employed by the contractor. It is possible for an outside general contractor to come into an area and hire many, if not all, workers locally. In other words, the data do not distinguish between an outside contractor bringing in cheap labor and an outside contractor hiring local labor at wage rates consistent with local labor market conditions.

Definition of Outside Contractor

With these data limitations in mind, the following analysis looks at three questions. First, within states, do prevailing wage laws influence the movement of urban contractors from major metropolitan areas to suburban and rural areas? Second, within states, do prevailing wage laws influence the movement of suburban and rural contractors into major metropolitan areas? Three, across states, do prevailing wage laws influence the movement of out-of-state contractors into other states influenced?

Analytical Framework

Obviously factors other than prevailing wage regulations can influence whether or not outside contractors bid on distant jobs. In this analysis we are able to control for two of these factors.

First, the size of the project will influence the universe of contractors willing to bid on that project. Presumably there are economies of scale that will make distant projects that are larger more attractive to potential bidders. Thus, all other things being equal, the larger the project the more likely it is that outside contractors will bid on the job and the more likely it is that one of those outside contractors will win the bid. Thus, we predict that the dollar value of a school project will be positively correlated with the probability that the general contractor is an outside contractor.

Second, population density will make it more likely that an "outside" contractor will be close at hand. Heavily urbanized areas, such as around Philadelphia or Baltimore, are more likely to be exposed to and provide outside contractors compared to rural areas of West Virginia or Eastern North Carolina. Using the percent urban of a state's population as a proxy for the density of economic activity and the proximity of outside contractors, we predict that the more urban an area, the more likely will the contractor winning a school project be an outside contractor.

With these two controls in place, we examine whether or not prevailing wage regulations influence the probability that the winning contractor on a public school job is an outside contractor.

General Patterns in the Data

Urban-Suburban-Rural Patterns within State

Within the six states--Maryland, Delaware, Pennsylvania, West Virginia, Virginia and North Carolina, the data provide 601 cases where a public school project was awarded to a general contractor. Of these awards, 368 were awarded without the influence of prevailing wage regulations while 233 were awarded under prevailing wage regulations. In order to examine the flow of contractors between urban, suburban and rural areas, these contract awards and contractors were divided into urban and non-urban areas based on the zip codes of the school owner and the zip codes of the general contractor. Within the six states under analysis, Baltimore, Philadelphia, Wilmington, Pittsburgh, Richmond, Norfolk-Virginia Beach-Newport News, Greensboro-Winston Salem-High Point and Raleigh-Durham-Chapel Hill were determined to be major metropolitan areas. No area in West Virginia was classified as a major metropolitan area.

Whenever the zip code of a general contractor or owner fell within the urban boundaries of one of these major metropolitan areas, that owner or contractor was labeled an urban owner or contractor. All remaining owners and contractors within these six states were put in one suburban-or-rural group. This labeling allows us to analyze the movement of contractors within these six states across this line drawn between major metropolitan centers and other areas within each state.

Table 10: Distribution of Contractors Working Inside and Outside "Local" Area

	Law	No Law
City Contractor Working in Suburban or Rural Area	11%	13%
Suburban or Rural Contractor Working in City	10%	5%
Cross-Boundary Work Subtotal	**21%**	**18%**
City Contractor Working in City	8%	31%
Suburban or Rural Contractor Working in Suburbs or Rural Area	71%	51%
Within Boundary Work Subtotal	**79%**	**82%**

Table 10 excludes out-of-state contractors in order to focus on the movement of general contractors within each state working on public school projects. Table 10 shows that within these six states most bids are won by general contractors coming from within the sector from which the bid is offered. This is true both for jurisdictions that enforce prevailing wage regulations and jurisdictions that do not have these laws. For instance, 79% of all bids under prevailing wage regulations were won by contractors coming from within the sector from which the bid originated. In comparison, 82% of the bids offered without prevailing wage regulations were won by contractors coming from within the sector from which the bid originated. Thus, regardless of legal regimes, roughly four-out-of-five in-state general contractors working on public schools came from the same sector as the school owner.

Movement of Contractors within the Suburban-Rural Sector

In this analysis, the suburban-rural sector in each state is geographically large. There may be considerable geographical movement of contractors within each state within the suburban-rural sector. The potential distance traveled, of course, depends upon the size of the state.

Table 11: Measurement of Distance Traveled by Differences in Zip Code

		Average Zip Code Difference Between Owner and General Contractor	Zip Code of Owner			Average Difference as a Percent of the Range
			Minimum	Maximum	Range	
WV	Law	347	24740	26807	2067	17%
MD	No Law	14	21629	21740	111	13%
VA	No Law	294	22030	24588	2558	12%
DE	Law	21	19711	19901	190	11%
PA	Law	412	15037	19609	4572	9%
NC	No Law	147	27016	28906	1890	8%

Table 11 measures the distance traveled by suburban and rural general contractors to build public schools by using zip codes. This table only looks at suburban and rural contractors within a state who received a public school construction contractor within the suburban-rural sector of that state. In column three the average difference between the zip code of the school owner and the general contractor is reported.[2] Columns four, five and six report the minimum and maximum zip codes of school owners in each state and the range or difference between the top zip code and the bottom zip code. The range of zip codes is correlated to the size of suburban-rural sector of the state. The range for Maryland is smaller than the range for Delaware simply because the school projects put out to bid in Delaware during the period of this study were geographically more disperse than the suburban and rural jobs let out to bid in Maryland. Thus, the zip code range measures the size of the public school market within the suburban-rural sector of each state rather than the geographical size of this sector. Only when every corner of the state has jobs open to bid will the zip code range be perfectly correlated with the geographical range of the state.

The focus column in Table 11 is the last column which shows the average difference between the zip code of the owner and the zip code of the general contractor as a percent of the range of zip codes for owners. Obviously in-state contractors in Delaware cannot move as far to jobs as instate contractors in Pennsylvania or Virginia. This percentage standardizes for the different sizes of each state. In absolute terms, Delaware contractors do not move nearly as far as Pennsylvania contractors. In relative (or percentage) terms, Delaware and Pennsylvania contractors move similar distances.

In either absolute or relative terms, there is no clear pattern of movement correlated to the presence or absence of prevailing wage laws. In absolute terms, Pennsylvania and West Virginia suburban and rural contractors move the most while Delaware contractors move second to the least. These are the three states where prevailing wage laws govern suburban and rural public school construction. In relative terms, West Virginia contractors move the most followed by Virginia and Maryland. There is no obvious stacking of these states' contractor mobility patterns in relative terms by legal policy. It may be that patterns would emerge if the suburban-rural sector was broken apart into two sectors and/or additional states were added to the analysis. However, these research extensions were not possible within the time frame of this report.

[2] In technical terms, the absolute value of the difference is reported. Using absolute values avoids the problems created by two equally distant contractors but where one has a lower zip code than the owner and the other has a higher zip code. Using absolute values treats these two hypothetical contractors as equally distant from the owner.

An Analysis of the Influence of Prevailing Wage Laws on the Movement of Contractors across the Major Metropolitan Boundary Controlling for Other Factors

The basic conclusion of the foregoing analysis is that most general contractors building schools are local. However, at the margin, distant contractors do come into local areas. And their impact on local labor markets and construction markets may be disproportional to their numbers. Consequently, it is reasonable to pursue the question--what determines the crossing of the line? What determines the movement of an urban contractor into the suburban-rural sector of public school construction. What determines the movement of a suburban or rural contractor into the urban sector? What determines the movement of an out-of-state contractor into a state?

To answer these questions we again use the statistical technique of multivariate regression analysis. The specific form of regression analysis used to answer the above questions is called logistic regression analysis. This is the appropriate tool when asking a yes-no question such as is the contractor an outside contractor? What a logistic regression model does is ask a question such as--will the contractor be an urban contractor working in a rural area (yes-no)--and then pose a set of variables designed to predict whether or not under certain circumstances the contractor in the rural area will have come from a major metropolitan area. What we want to do is design such a model and insert into it the presence or absence of prevailing wage regulations to focus on the question do prevailing wage laws influence the presence or absence of outside contractors.

What other variables might influence whether or not a contractor will be a local or outside contractor? We propose three factors or variables that might help decide whether or not a local contract is won by an outside general contractor. First. the size of the contract. Our reasoning here is as follows. It costs money to bid on contracts. The farther away the project, the more information the contractor has to gather, the more costs and risks the contractor undertakes. Larger jobs are more likely to cover these risks and costs. So distant contractors are more likely to bid on and therefore more likely to win big jobs compared to smaller jobs. Our data set includes both new school construction, and additions, renovations and repairs. We expect outside contractors to be more common when these jobs are large. We will measure size by the total dollar value of the project.

Second, economies can be densely populated or sparsely populated. In heavily urbanized areas the physical distance between a major metropolitan area and suburban and rural areas will be closer than in less urbanized, more sparsely populated areas. The cost of crossing the line between the suburbs and the city or even between states will be lower the extent to which states are more urban.

So we hypothesize that the states within our sample that are more urbanized are more likely to experience the use of outside contractors.

Third, the wider the difference between the wages paid between a city and the surrounding suburban and rural areas the more likely it will be that suburban and rural contractors will move into the urban area and that urban contractors will not move out into suburban and rural areas. Furthermore, we expect that the higher one state's wages are relative to another, the more likely will out-of-state contractors come into that state. These are the expectations that we had in building what turned out to be four logistic regression models. One asks what is the probability that a urban contractor would win a suburban or rural school construction project? The second asks what it the probability that a suburban or rural contractor would win and urban school project? And the last two ask the question what is the probability that an out-of-state contractor would win an in-state school job? Table 12 shows the results of this statistical modeling.

Table 12: Regression Results Predicting the Probability of a Contractor Being Awarded a School Construction Project

Variables in Model:	Urban Contractor to Rural Owner		Rural Contractor to Urban Owner		Out of State into State			
					Model 1		Model 2	
	(a)	(b)	©	(d)	(e)	(f)	(g)	(h)
Constant	8.14	14%	**-21.56**	**0%**	**-5.15**	**2%**	**36.56**	**0%**
Total Cost of Project	**5.67E-09**	**1%**	**-9.90E-08**	**5%**	**7.73E-08**	**0%**	2.87E-08	32%
Urbanization of State	0.02	12%	**0.05**	**4%**	**0.04**	**2%**	0.02	35%
City Wage Relative to State Wage	**-12.26**	**2%**	**14.79**	**0%**			**-41.55**	**0%**
Prevailing Wage Regulation	-0.41	12%	**1.02**	**2%**	**-0.82**	**1%**	-0.51	28%
Model Statistics:								
Chi Square Test of Fit	**15.46**	0%	**21.08**	**0%**	**25.69**	**0%**	**204.00**	**0%**
Total Number of Contractors	572		572		634		633	
Number of Contractors Working Across Line	57		39		61		61	

Numbers in Bold Are Statistically Significant

In columns a and b of Table 12, the results of modeling the question what is the probability that an urban contractor would win a suburban or rural school project are presented. There is a constant and four variables in the model. There are 572 observations, 57 of which are urban contractors who won suburban-rural public school projects. The Chi Square statistic indicates that the model does a reasonable job of predicting the observed outcomes. In all these models the constant is in for technical reasons. Thus for purposes of general exposition this variable can be ignored. Now to the interesting stuff.

As we expected, the sign on the coefficient in column (a) for total cost of project is positive indicating that the larger the rural project--all other things being equal--the more likely is an urban contractor to bid on that project and therefore the more likely is the prospect that an urban contractor will win that project. The model also reports that the more urbanized a state, the more likely will urban contractors venture across the line into suburban and rural school construction. However, this result is not statistically significant. The higher the urban wage relative to suburban and rural wages--the wider is this wage gap--the less likely is the urban contractor to win jobs in suburban and rural areas. This result is statistically significant. Finally, controlling for these factors, the presence of a prevailing wage law discourages urban contractors from working in rural areas but again this is not statistically significant. In short, we can say that the bigger the project the more likely an urban contractor will venture forth into outlying areas but the wider the wage gap between higher paying urban areas and lower paying outlying areas, the less likely will the urban contractor move out into these areas. Prevailing wage laws do not appear to strongly affect this dynamic.

The dynamic determining whether a rural contractor comes into the city is somewhat different. Not surprisingly, the wider the wage gap between the rural and urban area, the more likely will the rural/suburban contractor win jobs in the urban area. The more densely packed the economy as measured by urbanization, the more likely will the suburban/rural contractor cross the line into urban school construction. These are both expected and statistically significant results. Now for some surprises. First of all, rural contractors are more likely to take on urban school construction to the extent that the urban project is small (not large). This result is statistically significant and is contrary to the expectations we had when we built the model. Why would it be that urban contractors go after larger projects in rural areas but that suburban/rural contractors go after smaller projects in urban areas? Our data include both new school construction, additions, renovations and repairs as long as the total value of the project exceeded $750,000. The average value of a project was over $4 million. We suspect that suburban/rural general contractors competing in urban areas are at a disadvantage if the project is large or technical. They may have a less skilled work force or support staff. Consequently, they aim at smaller, less demanding projects. Conversely, the city contractors may be best positioned in suburban/rural markets when the project is large and technically demanding. Thus, the result we obtained may not be as surprising as it seems.

But prevailing wage laws (all other things being equal) encourage the use of suburban/rural contractors in urban areas. This is told from the positive sign to the coefficient for prevailing wage laws in column (c) and this result is statistically significant. Now this is a surprise. Urban areas have higher wage rates. In Virginia and North Carolina there are no regulations requiring that a suburban/rural contractor pay those higher wage rates. But in Maryland, a suburban/rural contractor working in Baltimore must pay those higher rates. This is also true in Pennsylvania and Delaware. (West Virginia does not have a major metropolitan area.) Why would forcing suburban/rural contractors into paying urban wage rates facilitate suburban/rural contractors winning urban jobs?

We can think of two possible explanations. First, this result may be an artifact of the age and structure of cities in the North versus the South. The Southern cities in our sample are conglomerate cities--Greensboro, Winston Salem, High Point--Raleigh, Durham, Chapel Hill. Our Northern cities (Baltimore, Pittsburgh, Philadelphia) are not sprawling conglomerates. Furthermore, Table 10 shows that a greater proportion of all school construction in the South is occurring in the major metropolitan areas compared to the metropolitan areas in the North. Perhaps in the Northern city contractors have moved their offices to the suburbs where more work is occurring and yet these contractors maintain their city operations as well. Perhaps in the South the institutional gap between city and suburb-rural areas has not been bridged by the movement of city contractors outside the metropolitan areas.

A related explanation involves unionization. Construction is more unionized in the North. Union contractors move from area to area but hire locally and pre-determined locally bargained wages. Collectively bargained contracts and the provision of local labor from hiring halls reduces the uncertainty of ramping up a job in a distant area. Perhaps the positive effect of prevailing wage regulations on the probability of a suburban/rural contractor obtaining an urban school project is capturing the effect of collective bargaining reducing the cost of bidding and working at a distance. Further research is required to test these and possibly other explanations for this result.

Models 1 and 2 presented in columns (e) through (h) examine the factors that influence the hiring of out-of-state contractors. Model 1 includes all the explanatory variables except the wage gap between construction workers within the state compared to construction workers from the state of the out-of-state contractor.[3] The cross-state wage is eliminated from model 1 simply because its effect shown in model 2 is so strong that it is helpful to see what the model shows without including this variable.

Model 1 shows what we expected. The larger the project, the more likely it is to go to an out-of-state contractor. In more economically dense urbanized states, the more likely is the job to go to an out-of-state contractor. This is capturing the effect of the urban corridor running from New York City to Washington DC on the use of out-of-state contractors. Finally, prevailing wage laws discourage the use of out-of-state contractors. All of these are statistically significant results. But the statistical significance of these results disappear when we add the wage of the state compared to the wage of the state from which the outside contractor comes from. This variable swamps the measurable effects of

[3] Data on state wages come from the 1992 Census of Construction. Data on metropolitan wages are from the 1994 BLS Occupational Wage Survey . By normalizing on wage rates in each year relative to the US average for that year and then comparing them, the inflationary differences between the years is eliminated.

all other variables, and more surprisingly it says that the closer the wage is between the two states, the more likely will an outside contractor be used. What is going on here? We think this captures a proximity effect. Namely, New York contractors are working in Pennsylvania and Eastern Tennessee contractors are working in Western North Carolina. For the most part, contractors cross state lines where those lines are close at hand and consequently the wage differences will be minimal. In model 2, the signs of the other variables have not changed compared to model 1, but their statistical significance has fallen away. We believe that the tentative conclusion should be that prevailing wages do discourage the use of out-of-state contractors but to be confident about that conclusion more research is necessary.

Conclusion

Most construction work is done by local contractors. Less than 10% of all school projects valued above $750,000 in the six states under study are done by general contractors from outside those states. Within states, 80% of all school projects are done by contractors that come from the urban or suburban/rural sector within which the job was let. Within the suburban/rural sector of each state, general contractors move farthest in states that are larger. With only six states under study, prevailing wage regulations do not appear to effect the distances over which suburban/rural contractors look for work.

Do prevailing wage laws discourage the use of outside contractors? Multivariate logistic regression analysis provides only tentative answers to this question. Across state lines we believe the answer is yes--prevailing wage laws discourage out-of-state general contractors. But more research is required to be confident in this answer. Prevailing wage laws may discourage urban contractors from working in rural areas and conversely, may encourage suburban/rural contractors working in urban areas. But these results also are fragile and require further research. Our data were limited to information on general contractors. The relationship of prevailing wage laws to the movement of specialty contractors may differ to some extent.

5

The Impact of Prevailing Wage Laws on Wages in the Construction Industry

Introduction

In the preceding portions of this report I have shown that prevailing wage requirements do not have the dire negative consequences on either school construction costs or the competitive environment that many of the laws opponents espouse. The question to which I now turn considers one possible positive consequence of prevailing wage laws, namely, the extent to which they serve their intention of promoting the path of high wage, high skill development within the construction industry. In this chapter, I analyze construction wages in prevailing wage and non-prevailing wage environments to determine whether they are significantly higher in prevailing wage jurisdictions compared to non-prevailing wage jurisdictions.

In thinking about this question, economists tend to employ a simple labor market model in which prevailing wage regulations impose a minimum wage above the equilibrium wage that would exist if supply and demand were left unfettered. Consequently, prevailing wages are assumed to always be above the competitive equilibrium wage in a local labor market.

This conception of the issue, however, ignores the institutional detail of how prevailing wages are determined. The idea underlying the administration of nearly all prevailing wage laws is to protect local labor market standards. In other words, the determination of what contractors must pay as the prevailing wage is based on existing local labor market conditions. Of course, the devil is in the details. Workers within a single trade may not always receive exactly the same wage; wage rates will different depending on a number of factors. These include unionization, seniority, and differences in certification or training, urbanization and possibly others.

In the state of Maryland, prevailing wages are determined by the Prevailing Wage Unit of the Department of Labor according to the following formula. If 50 percent or more of all workers in a trade are paid exactly the same rate, that rate is considered the prevailing wage. If less than 50 percent are paid the same rate, then the prevailing wage is the wage paid to 40 percent or more of the workers within a trade. If less than 40 percent receive the same rate, then the prevailing wage is determined as the weighted average of the wage rates received by workers within a trade. Prevailing wage determinations are made for each county within Maryland, and Baltimore City.

Especially in cases where the weighted average method for determining the prevailing wage is used, the prevailing wage may not differ significantly from what economists imagine to be the "equilibrium" wage. Consequently, prevailing wage laws, far from increasing wage rates, may simply reinforce existing labor market conditions. On the other hand, in areas with concentrations of unionized construction workers high enough for the 40 percent rule to kick in, there can be a significant difference between the prevailing wage and the nonunion wage. In the final analysis, whether prevailing wage laws inflate wage rates is an open question subject to empirical verification.

Empirical Analysis of Construction Industry Wages

Data for such an analysis of construction industry earnings is available from the U.S. Bureau of the Census through their County Business Patterns series. These data report number of employees and annual payroll by two digit Standard Industrial Classification (SIC) code. County Business Patterns reports on the construction industry in general and also disaggregates the industry into general contractors, heavy and highway construction, and specialty contractors. A limitation of these data is that workers in school construction cannot be distinguished from workers in other market segments. Consequently, it is not possible to draw any direct inference about the impact that the inclusion or exclusion of school construction from prevailing wage requirements might have on construction workers' wages. Similar data are also available through the Census Bureau on a statewide level. These data can be used to construct an index of relative earnings in the construction industry for prevailing wage and non-prevailing wage areas.

In Table 13, I present results of a statewide comparison of relative earnings levels for the years 1993 through 1996, the most recent year for which data are available. The states included are the Mid-Atlantic states used throughout this study. For the purposes of this analysis Maryland was excluded from the analysis. The prevailing wage states used here include Delaware, Pennsylvania and West Virginia. The "no law" states include North Carolina and Virginia. The relative earnings index was calculated by dividing the average annual earnings per employee in the construction industry by the average annual earnings per employee in all nonagricultural industries. A comparison of the relative earnings indexes indicates that for the construction industry as a whole

(SIC 15), the relative earnings of employees is higher in prevailing wage law states than in non-prevailing wage law states. Earnings in non prevailing wage law states were approximately equal to average nonagricultural earnings. In prevailing wage law states, construction workers earned a 9 to 15 percent premium over average nonagricultural employees. These results are consistent with the proposition that prevailing wage laws tend to raise the wages of workers in the construction industry.

Table 13: Earnings of All Construction Industry Workers Relative to All Non-Agricultural Employees by Prevailing Wage and No Prevailing Wage Law States

Year	Prevailing Wage Law	No Prevailing Wage Law
1993	1.12	1.01
1994	1.15	1.02
1995	1.09	1.00
1996	1.11	1.01

Source: U.S. Bureau of the Census

The Census Bureau's County Business Patterns reports number of employees and payroll by SIC code for the years 1988 to 1996. In Table 14, I use these data to calculate the relative earnings of construction workers to all nonagricultural workers with Maryland. For the state as a whole, construction workers earn premiums similar to the premiums earned in other prevailing wage law states, namely from 7 to 16 percent more than nonagricultural employees.

Table 14: Relative Earnings of Construction Workers in Maryland

Year	Relative Earnings Index
1988	1.16
1989	1.14
1990	1.14
1991	1.14
1992	1.11
1993	1.11
1994	1.13
1995	1.07
1996	1.08

Source: County Business Patterns, 1988-1996

Disaggregating the data for Maryland by county allows us to examine the impact of the differential coverage of school construction by prevailing wage laws. Counties were characterized as having a prevailing wage law or not depending on the existence of a local statute covering school construction for that jurisdiction. This is an imperfect test because, as mentioned earlier, it is not possible to identify only those workers employed in school construction. Consequently, the impact of prevailing wage laws covering school construction could be overwhelmed by Maryland's general prevailing wage law covering public construction. Nevertheless, it appears that in most years, those jurisdictions having prevailing wage laws covering schools have higher relative earnings for construction workers, as shown in Table 15.

Table 15: Relative Earnings of Construction Workers to All Non-Agricultural Workers, by School Prevailing Wage Law Jurisdiction, 1988-1996

Year	Prevailing Wage Law	No Prevailing Wage Law
1988	1.38	1.14
1989	1.08	1.14
1990	1.22	1.13
1991	1.33	1.12
1992	1.17	1.11
1993	1.19	1.11
1994	1.12	1.13
1995	1.06	1.08
1996	1.15	1.07

Source: County Business Patterns, 1988-1996

A statistical test of the difference between the average relative earnings index in prevailing wage law jurisdictions and non-prevailing wage law jurisdictions indicates that, overall, earnings are higher in prevailing wage law jurisdictions. One might be tempted to conclude that, since Baltimore City is a prevailing wage jurisdiction, that high wages in this urban center are pulling the average up. But this would not be an appropriate inference because it ignores the fact that construction worker wages in Baltimore are being compared to the earnings of other workers in Baltimore. What this test, and all of the numbers presented throughout this chapter, indicates is that construction industry earnings do appear to be higher in areas with prevailing wage laws. This conclusion is consistent with one of the original intents of prevailing wage laws, namely, to promote a path of high wage economic development.