Project Labor Agreements and the Cost of Public School Construction Projects in Connecticut

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EXECUTIVE SUMMARY

In the fall of 2003 the Beacon Hill Institute completed an extensive statistical analysis of the effects of Project Labor Agreements (PLAs) on the bid and final costs of school construction projects in Massachusetts. PLAs are agreements between construction clients (such as towns) and labor unions, which establish the rules to be followed by firms that bid on construction projects. PLAs typically require that all workers be hired though union halls, that non-union workers pay dues for the length of the project, and that union rules on pensions, work conditions and dispute resolution be followed. In an analysis of 126 school construction projects undertaken in the Greater Boston area since 1995, the study found bid costs to be significantly higher when a school construction project was executed under a PLA.[1]

This report extends our empirical analysis of PLAs to public school construction projects in Connecticut. We have applied the methodology and procedures used in our Massachusetts study to school construction projects undertaken in Connecticut since 1996. Our key finding is that PLA projects cost more than non-PLA projects, holding the effects of project size and type constant. This is true whether one considers bid costs or final project costs. The effect is statistically significant and robust.

Specifically, we find that the presence of a PLA increases a project's *actual* or final base construction costs by $30 per square foot (in 2002 prices) relative to non-PLA projects. We obtain this figure after adjusting the data for inflation (using an index that includes the trend in both construction wages and in materials costs), controlling for both the size of projects (both in square feet and number of stories), for whether they involve new construction or renovations and for the type of school (elementary versus middle, junior and senior high schools). Using the same methodology, we find that the presence of a PLA increases base construction *bids* by nearly as much as it increases *actual* construction costs. Since the average cost per square foot of construction is $167.08, PLAs raise the cost of building schools by almost 18%.

Our findings show that the potential savings from not entering into a PLA on a school construction project range from $3 million for a 100,000-square-foot structure to $9 million for a 300,000-square-foot structure. Connecticut policymakers and taxpayers should consider these substantial additional costs when determining whether PLAs are best for school construction projects in their towns or school districts.

INTRODUCTION

Project Labor Agreements (PLAs) discourage non-union contractors from bidding on state construction projects by requiring them to conform to union rules and hire through union halls. It is widely believed that construction projects are more expensive when a PLA is in effect. A 2003 study of school construction projects in the greater Boston Metropolitan area, undertaken by the Beacon Hill Institute (BHI), found that the presence of PLAs increased construction *bids* by an estimated $18.83 per square foot, or almost 14%, and that PLA projects, using final construction costs, increase costs by an estimated $16.51 per square foot, or 12%, over non-PLA projects.[2] However, without additional information it is hard to tell to what extent these findings are applicable outside the Boston area.

The current study extends our research of PLAs to school construction projects in the state of Connecticut using the same methodology as the BHI Boston study. It too finds clear statistical evidence of a difference in cost per square foot between PLA and non-PLA projects. This measure is based on an examination of the cost of school construction projects in the state of Connecticut since 1996.

HISTORICAL BACKGROUND TO PROJECT LABOR AGREEMENTS

PLAs are a form of a "pre-hire" collective bargaining agreement between contractors and labor unions pertaining to a specific project, contract or work location. They are unique to the construction industry. The terms of PLAs generally recognize the participating unions as the sole bargaining representatives for the workers covered by the agreements, regardless of their current union membership status. They require all workers to be hired through the union hall referral system. Non-union workers must join the signatory union of their respective craft and pay dues for the length of the project. The workers' wages, working hours, dispute resolution process and other work rules are also prescribed in the agreement. PLAs supersede all other collective bargaining agreements and prohibit strikes, slowdowns and lockouts for the duration of the project.[3]

PLAs in the United States originated in the public works projects of the Great Depression, which included the Grand Coulee Dam in Washington State in 1938 and the Shasta Dam in California in 1940. PLAs have continued to be used for large construction projects since World War II, from the construction of the Cape Canaveral Space Center in Florida to the current Central Artery program (the "Big Dig") in Boston. The private sector has likewise utilized PLAs for certain projects, including the Alaskan Pipeline and

Disney World in Florida. Connecticut has seen the use of PLAs in school construction projects, the multi-use development Adriaen’s Landing in Hartford and a power plant in Killingly.

THE ARGUMENTS FOR AND AGAINST PLAs

As PLAs have become more common in publicly-financed construction projects, and as the number of non-union construction firms has grown, PLAs have become increasingly controversial. Opponents of PLAs argue:

1. that PLAs raise the cost of undertaking projects, and
2. that non-union contractors are discouraged from bidding on jobs that have PLAs.

Opponents cite the PLA requirements that all employees must be hired in union halls, pay union dues, contribute to union-sponsored retirement plans, and follow union work rules. They argue that the use of a union hiring hall can force contractors to hire union workers over their own work force. The contractors and their employees are required to pay union wages, dues and contributions into union benefit plans even if they are covered by their own plans. The work rules restrict the contractors from using their own more flexible operating rules and procedures. These restrictive conditions cause costs to rise for a project that requires a PLA. It is worth noting that whether or not a PLA is in effect, all contractors must adhere to any “prevailing wage” rules that may be in effect.

Furthermore, open-shop (non-union) contractors contend that their competitive advantages are nullified by the PLA. The result is that in practice, if not in principle, they are unable to bid competitively on jobs that have a PLA requirement. In turn, the absence of open-shop bidders for PLA projects results in fewer bidders for the project, and with fewer bidders, the lowest bids come in higher than if open-shop contractors had participated. Therefore, the cost of the project will be higher, with fewer bidders attempting to under-bid each other for the contract. Some opponents also argue that requiring a PLA violates state competitive bidding laws that require a free and open bidding process. A number of critics even see PLAs as a form of extortion, with an implicit threat that if a town does not agree to a PLA, then there is more likely to be disruption at the workplace.

Proponents of PLAs counter:

1. that PLAs keep projects on time and on budget, and

2. that PLAs help assure the use of qualified skilled labor.

PLA supporters argue that the agreements provide for work conditions that are harmonious, and that they guarantee wage costs for the life of the contract. They contend that the combination of work rules and provisions that prohibit strikes, slowdowns and lockouts keep the project on time and prevent cost overruns due to delays. They argue, furthermore, that the wage stipulations allow firms accurately to estimate labor costs for the life of the project and thus have more accurate bids that will keep the project on budget.

Advocates insist that the union rules allow for a safer work environment, thereby reducing accidents and thus lowering the number of workmen's compensation claims. In addition, workers' union certifications and employer apprenticeship programs ensure the quality of the work and save money by avoiding costly mistakes. These features, they argue, save money in the long run by keeping projects on budget by reducing cost overruns. In addition, proponents assert that through union apprenticeship programs PLAs help assure local workers are hired and trained.

The controversy over the use of PLAs in public construction projects has become more intense since the late 1980s. Open-shop construction firms and industry organizations have challenged PLAs in the courts. As discussed below, the executive and legislative branches at the federal, state and local levels of government have at times taken positions in favor of the use of PLAs.

PLAs AT THE FEDERAL LEVEL

The executive branch of the federal government has been involved in the PLA debate for over a decade. The administration of George H. W. Bush issued an Executive Order in 1992 forbidding the use of PLAs on federally funded projects.[4] The Clinton Administration rescinded that order in February 1993 and attempted to go further in 1997, when it planned to issue an executive order requiring all federal agencies to use PLAs on their construction projects. However, after extensive lobbying, President Clinton instead issued a memorandum encouraging the use of PLAs on contracts over $5 million for construction projects, including renovation and repair work, for federally owned facilities.[5] President George W. Bush canceled the Clinton order on February 17, 2001 by issuing an Executive Order prohibiting PLAs on federally funded and assisted construction projects.[6]

Some of largest unions in the country, including the AFL-CIO, insisted that the order illegally interfered with their collective bargaining rights under National Labor Relations Act. They filed suit in federal court (*Building & Construction Trades v. Allbaugh*), and on November 7, 2001 a United States District Court Judge issued an injunction blocking the President's order. Upon appeal by the United States Justice Department, the United States Court of Appeals for the District of Columbia overturned the lower court decision and ordered the judge to lift the injunction on July 12, 2002. The appeals court contended that the National Labor Relations Act did not preempt the executive order.[7] The unions disagreed and filed to have the case reviewed by the United States Supreme Court. In April 2003, the court declined to review the case and the executive order remains in place today.[8]

PLAs IN THE NORTHEAST

It is necessary to analyze PLAs from a regional standpoint in order to create a clear picture of Connecticut's history with the agreements. Like Connecticut, the nearby states of Massachusetts, Rhode Island, New Jersey and New York regularly use PLAs on public projects. Given these states' intertwined economies, their collective history with PLAs is generally applicable to Connecticut.

Contention over PLAs in the Northeast rose to a crescendo in 1993 with the United States Supreme Court's *Boston Harbor* decision. In 1988, a federal court directed the Massachusetts Water Resources Authority to clean up the pollution in Boston Harbor. The Authority's project management firm, IFC Kaiser, negotiated a PLA with the local construction unions for the project. The precedent-setting aspect of this PLA was that its use was mandated in the project's bid specifications.[9] A non-union trade group filed a lawsuit contending that requiring the PLA as a part of the bid specification violated the National Labor Relations Act. However, the United States Supreme Court held, in a concise decision, that a state authority, acting as the owner of a construction project, was legally permitted to enforce a pre-hire collective bargaining agreement negotiated by private parties.[10] Since the *Boston Harbor* decision, most litigation regarding PLAs has been based on the competitive bidding requirements of state and local law.

The 1994 New Jersey Supreme Court case *George Harms Construction Co. v. New Jersey Turnpike Authority* provides an example of a successful court challenge of PLAs based on competitive bidding laws. In the *Harms* decision, the Court held that the PLA requirement created a sole source of labor and a sole source of construction services in violation of the state's competition statutes, which were set in place to promote "unfettered competition." The Court recognized that, while all parties were ostensibly permitted to bid, the specification of a PLA nevertheless limited "real competition."[11]

The New Jersey Supreme Court again weighed in on PLAs in the 1995 case *Tormee Construction Inc. v. Mercer County Improvement Authority*. Once again, the Court decided that the PLA requirement's monopolistic characteristics choked off real competition, in opposition to the competitive bidding laws of the state. Furthermore, the Court found that PLAs increased labor costs because the number of employable non-union workers was reduced. [12]

Despite the New Jersey Supreme Court decisions, however, some states in the Northeast have encouraged the use of PLAs. In Massachusetts, PLAs appeared on the legislative agendas of local and state governmental bodies as efforts were made to require them on local construction projects. The City of Cambridge enacted a local ordinance that put in place many of the same requirements that are found in PLAs, for all public projects. The Massachusetts legislature attempted to require PLAs on a bond authorization for the rebuilding and repair of courthouses throughout the state. Under intense negotiation between the legislature and Governor Cellucci's Office, a bill was produced in 1998 that mandated PLAs for funds allocated to courthouse construction projects in Boston, Worcester, and Fall River only. The legislation created a commission to recommend establishing circumstances in which PLAs should be used. The legislation instructed the commission to consider the "appropriateness and function and the size, complexity and duration of the public construction projects" when deciding whether or not to use PLAs.[13]

Yet PLAs in Massachusetts have remained controversial. The city of Lynn, Massachusetts agreed to PLAs for a series of new school construction projects in 1997. According to the Lynn Building Department, the projects were bid and construction began that year. However, several non-union construction firms challenged the PLA in court on the grounds that it violated Massachusetts competitive bidding laws. The Court ruled that the plaintiffs suffered "irreparable harm" because "they would be required to conform to a variety of union practices and would be limited in their autonomy to negotiate employment with non-union workers."[14] The Court allowed that the city had the authority to enter into a PLA but that it "may not exercise its authority arbitrarily or capriciously" and added, "a PLA must be evaluated in the light of a project's size, complexity, and duration."[15] The Court then found that the Lynn schools failed to meet these criteria, and granted a preliminary injunction preventing the city from requiring bidders to sign a PLA in order to work on the project.[16] The City of Lynn subsequently opened the bidding for the projects without requiring firms to sign a PLA.

New York's state government, like that of Massachusetts, has taken steps to encourage the use of PLAs. In 1997 Governor George Pataki signed an executive order directing state agencies to establish protocols for the consideration of PLAs with respect to individual projects. While the order does caution that courts have struck down PLAs where the owner could not show a "proper business purpose" for entering into the agreement, it is widely understood to be responsible for the expansion of government-mandated PLAs, along with the expansion of litigation over their legitimacy.[17]

The mayor of Providence, Rhode Island also followed the tradition of political encouragement for PLAs when he issued a 1998 executive order to require their use in certain city construction projects. In 1999, a PLA was specified for a school construction project in Providence, and only two contractors bid on the work. The Associated Builders and Contractors of Rhode Island moved for an injunction against the PLA stipulation and received it when the Court held that the PLA would irreparably harm open-shop builders. A subsequent 1999 decision against the Rhode Island Public Transit Authority resulted in another injunction against the stipulation of a PLA.[18]

The Rhode Island State Supreme Court continues to hold the issuance of PLAs by public entities to strict guidelines. In early 2002, the court rejected a PLA on a $73 million University of Rhode Island construction project. Citing the rulings in New York and Massachusetts, the court said, "It is our opinion that before adopting a PLA, an awarding authority must carry out an objective, reasoned evaluation that has incorporated reviewable criteria in order to fulfill the goals and purposes of the state purchases act, given a PLA's anti-competitive effect. … An objective, reasoned evaluation is necessary to dispel any suggestion of caprice or arbitrariness in imposing this type of contract."[19] The court ruled that since some of the bid packages for the project were issued without a PLA, withdrawn, and then issued with the PLA as an addendum, the process was "arbitrary and capricious" and the court upheld a lower court ruling that struck down the PLA requirement.[20]

PLAs IN CONNECTICUT

Following much the same pattern as the rest of the Northeast, Connecticut has seen an expansion in the use of and the challenges to PLAs in recent years. Former Governor John Rowland came out in support of PLAs, even encouraging President George W. Bush to remove his ban on federally-supported PLAs. PLAs have seen continuing use – and controversy – in numerous school projects throughout Connecticut, along with the Killingly Power Plant; the Adriaen's Landing mixed-use development, the Waterbury wastewater treatment plant, St. Francis Hospital, Yale University's Congress Avenue Building, and a new classroom building at Connecticut State University in New Britain.

The use of PLAs in construction projects in Hartford has been especially contentious. PLA opponents in Connecticut continued the trend in other states by challenging PLAs in court, contending that PLAs violate competitive bidding statues. In two separate, but related, court cases involving the use of a PLA in the construction of a parking garage in Hartford (*Connecticut Associated Builders and Contractors, et al. v. City of Hartford, 251 Conn. 169, 1999* and *Connecticut Associated Builders and Contractors, et al v. Theodore Anson, Commissioner of Public Works, 251 Conn. 202, 1999*), the Connecticut Supreme Court held that contractors and trade associations did not have the right to challenge the award of a contract unless there were alleged illegalities in the bidding process which "amount to fraud, corruption, favoritism or acts that undermine the objective and integrity of the competitive bidding process."[21] The Court, in essence, restricted the ability of non-union contractors to challenge PLAs in Connecticut courts.

EVIDENCE ON PLAs

The evidence on whether PLAs drive up construction costs or not has, until recently, been largely anecdotal. For example, in 1996 the town of Middletown, Connecticut put the Snow School renovation project out to bid with a PLA requirement in place. The project attracted four bids; with the lowest bid of $9.1 million, coming in at $600,000 over the approved project budget.[22] The town subsequently removed the PLA requirement and re-bid the project, it attracted ten bidders, the lowest being $7.8 million, for a savings of $1.5 million over the previous round of bidding.

The current Hartford Public High School construction project has run into a series of problems that has kept the project on the drawing board for more than seven years and threatens its accreditation. The High School project is the centerpiece of an $800 million, decade-long school renovation program that includes a PLA bidding requirement. As with the Snow School, the initial round of bidding attracted few bidders resulting in the lowest bid being $25 million over budget. Two architectural firms pulled out of the project and a second bid cycle resulted in the lowest bids exceeding the budget by over $12 million, with some parts of the project receiving few or no bids. In the wake of the latest setback, the project management firm subsequently pulled out of the project.[23] Hartford Mayor Eddie Perez plans to ask the city council for an additional $20 million to cover the higher bid costs, while the city looks to the state for additional reimbursement and the Hartford School Building Committee looks for ways to cut costs.[24]

Nonetheless, the Middletown and Hartford experiences remain anecdotes and they provide no scientific evidence that PLAs systematically increase the value bids and construction costs for public school construction projects Connecticut. Surely, examples exist in which bids for school construction projects without a PLA requirement have come in over budget.

However, using the approach taken in our previous study, *Project Labor Agreements and the Cost of School Construction in Massachusetts*, it is possible statistically to test whether PLAs raise construction costs.[25] In the next section we review our variables and data sources and the methodology. We then report the results of our regression analysis and the cumulative effect of these results on the construction costs.

DATA SOURCES

Like many other states, Connecticut is going through a process of upgrading or replacing older schools and building new schools to meet the needs of a rising school-age population. Unlike other states, the Connecticut State Department of Education's Division of Grants Management has a central, web-based database that lists public school construction projects receiving reimbursement from the state. Unfortunately this database does not contain all the information necessary for building our model.[26] However, it serves as a good starting point to identify projects suitable for our study. To complement the state data source, we obtained data on school construction projects from F.W. Dodge, McGraw-Hill Construction Information Group, a division of the McGraw-Hill companies, in Lexington, Massachusetts. Dodge provides us with information on school construction projects in Connecticut for the period 1996 though 2004, including contact information for town and school district officials, construction companies, and architectural firms.

The information provided by Dodge served as a tool to screen the data set for projects that were over $1 million dollars, under the assumption that projects below $1 million would not attract the interest of union contractors. These small projects were not included in our study.

Using Dodge and other contact information, we contacted town and city officials, architects and contractors and requested data for each school construction project, including the base construction bid, final actual base construction costs[27] (if the project was completed), the size of the project measured in square feet, whether there was a PLA requirement for the project[28], the nature of the construction work (new versus addition or renovation) whether a renovation project includes code upgrades or other "light" renovations and the method of organizing the project (construction management or general contractor).[29] Almost all of the information is in writing (e-mails, faxes, etc.), and all the sources and dates have been fully recorded.

ADJUSTING FOR INFLATION

Our sample covers the period 1996 to the present. In order to compare the actual construction costs of PLA with non-PLA schools, it was first necessary to correct for the fact that construction costs rose during this period, in order that all costs could be expressed in 2002 prices. Specifically, we constructed a cost index that included both the trend in construction wages and the trend in materials costs between 1996 and 2002. Using 2002 as the base year, we first constructed a wage index, which was based on total wages and salaries for construction workers in Connecticut divided by the total number of construction workers in that sector.[30]

In order to account for the changes in materials costs, we constructed a price index based on the producer price index for the "other" subcomponent of *intermediate materials, supplies, and components*, as reported in *The Economic Report of the President, February 2004.*[31] To construct the final cost index used in our analysis, we weighted the wage index and the adjusted producer price index equally, to reflect the relative importance of wages and materials costs in a typical construction project.

COMPARING PLA TO NON-PLA PROJECTS

It would be tempting, but technically incorrect to measure the effect of a PLA on project costs by comparing the average (mean) cost per square foot of PLA projects with that of non-PLA projects.

To see why this would be inappropriate, consider the following (hypothetical) example: we observe a sample of 20 elementary schools, half of them PLA projects where the mean construction cost is $160/sq ft and the other half non-PLA projects where the mean construction cost is $150/sq ft. Suppose further that our sample also has 10 high schools, 8 of them non-PLA projects costing $190/sq ft and 2 of them PLA projects costing $200/sq ft. In this example, PLA projects are clearly more expensive than non-PLA projects, yet the average cost of non-PLA projects is $167.8/sq ft while that of PLA projects is $166.7/sq ft! In this case, a comparison between the two means is clearly misleading.

The solution to this problem is to use regression analysis, which controls for the effects of such influences as the size of the project, the number of stories, whether it is an elementary school, and whether it represents greenfield construction. Generally we would expect larger projects and elementary schools to be cheaper (per square foot), and multi-storied buildings and greenfield construction to be more expensive. Only after controlling for these effects can one hope to isolate the effects of whether the project was built under PLA arrangements.

In our regressions, the dependent variable is the actual cost per square foot of construction (in 2002 prices). The independent variable of most interest to us is a dummy variable that is set equal to 1 for PLA projects and to 0 otherwise. We control for whether the project involves new construction or a renovation by including a dummy variable set equal to 1 for new projects and to 0 otherwise. To capture the effect of economies of scale, we include a variable consisting of the log of the square footage of construction, which ensures that the effect of additional size diminishes as the project becomes bigger. In addition we include a measure of the number of stories, and whether the project is an elementary school. The ordinary least squares regression results are presented in Table 1.

TABLE 1: ORDINARY LEAST SQUARES ESTIMATION OF REAL CONSTRUCTION COSTS PER SQUARE FOOT

Variable	Coefficient	Standard Error	p-value (one-tailed test)
Constant	91.4	14.9	0.000
PLA	30.0	12.6	0.010
New	67.6	10.4	0.000
Square Feet*	-52.6	7.5	0.000
Story	23.5	5.8	0.000
Elementary	-27.1	11.6	0.011

Adjusted R^2 is 0.5253. Sample size is 71. *Square footage is measured as the logarithm of square feet.

Our results show that PLA projects add an estimated $30 per square foot (in 2002 prices) to the final cost. The important point here is that this amount represents the effect of PLA projects after controlling for other measurable influences on costs; these other influences are important, but in explaining why construction costs differ from project to project the estimates in Table 1 show that it also matters whether the project is built under PLA arrangements.

A formal (one-tailed) test of the statistical significance of the PLA coefficient gives a p-value of .01, which means that there is less than a 1% chance that we have accidentally found that PLA projects are more expensive than non-PLA projects. Put another way, there is at least a 99% probability that PLA projects really are more expensive than non-PLA projects, holding other measurable aspects of a project constant. The equation also shows that projects involving new construction, rather than renovations, experience significantly higher costs per square foot; larger projects are indeed cheaper, as are elementary schools; and multi-story schools are more expensive.

With an adjusted $R^2 = 0.53$, the equation "explains" a solid 53% of the variation in construction bid costs across towns. Clearly, other factors also influence the cost of construction – the exact nature of the site, the materials used for flooring and roofing, the outside finish, and the like. As a practical matter, collecting viable information at this level of detail, for all 71 projects, would be impossible. Thus our equation necessarily excludes these unobservable variables. However, this does not undermine our finding of a substantial PLA effect. For the PLA effect shown here to be overstated, it would have to be the case that PLA projects systematically use more expensive materials, or add more enhancements and "bells and whistles," than non-PLA projects. Our conversations with builders, town officials and architects suggest that PLA projects are not systematically more upscale. This gives us confidence that the PLA effect shown here is real.

ROBUSTNESS

It is helpful to explore the robustness of our results. In other words, is there still a PLA effect if we only look at elementary school construction projects, or new projects, or mid-size projects, or if we use bid costs rather than actual costs. The results of this exercise are summarized in Table 2.

The first column indicates the sample, or sub-sample, used in estimating the regression equation. We performed this analysis by running separate regressions for the following samples:

1. the "baseline" sample, which consists of all the cases for which information was available on actual construction costs (excluding cases where a substantial part of the spending was to bring the building up to code); this was also used to give results weighted by project size (row 6 of the results in Table 2);
2. small projects (defined as below the median of 94,175 square feet) and large projects;
3. elementary and non-elementary schools; and
4. a larger sample, consisting of the cases for which information was available on bid costs.

The "PLA effect" column shows the estimate of the effect of having a PLA on the cost of construction (in dollars per square foot, in 2002 prices), and the adjoining "p-value" column measures the statistical significance of these coefficients. In every case the PLA effect is statistically significant at the 10% level or better. The size of the PLA effect differs somewhat depending on the sample examined and the other

TABLE 2. REGRESSION ESTIMATES OF THE "PLA EFFECT" FOR DIFFERENT SUB-SAMPLES AND MODEL SPECIFICATIONS

	PLA effect ($/sq ft)	p-value	Other variables included	Sample size (# of PLA projects)	Adjusted R^2	Mean cost/sq ft Non-PLA projects	Mean cost/sq ft PLA projects
Actual sample costs/sqft							
Project actual costs	**30.00**	**.010**	**New[a], lnsqrft[b] [c]stories, [d]elem**	**71(14)**	**.52**	**167.33**	**166.08**
Small projects only	45.10	.012	New,lnsqrft,stories,elem	35(6)	.59	176.60	157.51
Large projects only	43.45	.006	New, lnsqrft, stories,elem	36(8)	.67	157.73	172.51
Elementary schools only	23.36	.081	New, lnsqrft, stories	34(11)	.48	169.86	152.92
Jr. Hi & Hi schools only	47.09	.029	New, lnsqrft, stories	37(3)	.54	165.61	214.13
Weighted by Sqrft	32.60	.008	New,lnsqrft,stories,elem	71(14)	.52		
Bid sample cost/sqft							
Project bid cost	**26.07**	**.019**	**New,lnsqrft,stories,elem**	102(20)	.20	153.68	172.78
Same sample as actual costs	44.30	.000	New,lnsqrft,stories,elem	70(14)	.49	147.08	165.74

Notes: [a]New = 1 if new construction, 0 if renovation. [b]lnsqrft = logarithm of the square footage for each project. [c]stories is the number of stories above ground. [d]elem = 1 if elementary school, 0 if junior high or high school.

variables that are included. The results of the "baseline" regression analysis presented in Table 1 are reproduced here in the first row of Table 2.

Following standard practice, our regressions use ordinary least squares, which means that each observation (here, a school building project) carries equal weight in the regression. However, we also estimated our preferred equation using weights, where each project is given a weight that is in proportion to the square footage that it represents. This means that a project of 150,000 square feet, for instance, would have twice as much weight in the equation as a project of 75,000 square feet. The weighted regression shows a PLA effect of $32.60/sq.ft., again statistically significant, and similar to the "baseline" regression.

The bottom two rows of Table 2 contain regression results using base construction bid cost, as opposed to final construction costs, and include the same variables as the "baseline" regression. The first row labeled "Project bid cost" uses a larger sample size, since we were able to confirm more bid costs than actual final costs, as some projects are not yet finished. The results indicate a slightly lower PLA effect ($26.07/square foot) for bid costs than for actual final costs. The last row uses the same sample as our "baseline" regression and indicates a higher PLA effect ($44.30/square foot) than for the regression using actual cost. In both of these regressions, as indicated by the respective "p-values," the PLA effect proves to be statistically significant—more evidence pointing to the robustness of our results.

CONCLUSION

Based on data on construction costs and related variables for school projects in Connecticut since 1996, we find the following:

(i) PLA projects have higher actual construction costs than non-PLA projects; we are more than 99% confident of this assertion, based on the available data.

(ii) PLA projects have higher bid costs; again we are more than 99% confident of this finding, based on the available data.

(iii) The finding that PLA projects have higher construction costs is robust, in that:

  a. The effect persists even when the data are subdivided, so that the effect is evident separately for large projects, small projects, and elementary schools.

  b. A regression that weights observations by project size also shows the effect.

(iv) PLA projects add an estimated $30 per square foot to the actual cost of construction (in 2002 prices), representing an almost 18% increase in costs over the average non-PLA project.

In sum, the evidence that PLAs have increased the cost of school construction in Connecticut since 1996 is strong. The effect is also substantial; our estimates find that PLAs increase actual project costs by 17.9%;[32] the estimates find that bid costs are raised by 16.6%.[33] Taken together, PLA projects accounted for 1.32 million square feet of construction with a combined actual cost of $224.8 million (in 2002 prices), based on the projects that we were able to include in our study. Our estimates show that this cost was $39.5 million higher than it would have been if PLAs had not been used.[34]

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ENDNOTES

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[1] Bid cost is a project base construction bid that includes site work and, for many projects, both PLA and non-PLA, the figure includes the demolition costs.
[2] Paul Bachman, Darlene C. Chisholm, Jonathan Haughton, and David Tuerck, *Project Labor Agreements and the Cost of School Construction in Massachusetts,* The Beacon Hill Institute, September 2003.
[3]United States General Accounting Office, *Project Labor Agreements: The Extent of Their Use and Related Information*, (Washington D.C.: 1998), Publication No. GAO/GGD-98-82; Internet; available at http://www.gao.gov/achives/1998/gg98082.pdf.
[4] Ibid, p 3.
[5] Ibid, p 3.
[6] Worcester Municipal Research Bureau, "Project Labor Agreements on Public Construction Projects: The Case For and Against," Report No. 01-4, p. 7 May 21, 2001.
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[12]*Ibid*, p 67.
[13] *Ibid*, p. 91.
[14] *Ibid*, p 91.
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[26] Missing data includes the base construction bids, final base construction costs, year construction began, stories above grade, whether there is a PLA requirement or not.
[27] For some projects the construction management firms reported a guaranteed maximum price (GMP) which can include contingency funds, insurance, and bond costs. On the advice of a construction manager, we reduced the GMP figure for these projects on a scale that ranged from 8% for the smallest projects to 3% for the largest projects to strip out these "soft" or non-construction costs.

[28] PLA contracts were in effect in the following towns: Ansonia, Hartford; New Haven; West Haven and Waterbury. A school project in Danbury also has a PLA, however it will be rebid due to an issue regarding access though state of Connecticut property.

[29]Some of the renovation projects were reported to include "code renovations," such as upgraded fire suppression and lighting systems or asbestos removal. These project features do not consist of actual construction and cover nearly the entire structure of a building and ultimately they drive down the cost per square foot of the whole project. Since it is difficult to separate the code renovation costs from the total project costs (especially for older projects) we have eliminated these projects from out data set.

[30] The main source of wage and salary data is the Bureau of Economic Analysis web site, www.bea.gov, accessed July 10, 2004. The series used was the SIC classification through 2002. We used the NAICS series for wages and salaries for 1996 through 2002 (BEA table SA05), and employment through 2002 (BEA table SA25).

[31] The source of the producer price index is Table B-66, "Producer Price Indexes by Stage of Processing, Special Groups, 1974-2002," *The Economic Report of the President, February 2004.* We assume growth in this index between 2002 and 2003 of 2.4%, in line with recent historical experience.

[32] PLA effect from sample 1 for actual costs ($30.00/sq.ft.) divided by average actual costs for this group ($167.08/sq.ft.).

[33] PLA effect from the larger sample (102 observations) regression for bid costs on full sample ($26.07/sq.ft.) divided by average bid costs for this group ($157.42/sq.ft.).

[34] $34.4 million = 1.318 million sq.ft. times $26.07 per sq. ft.; $39.5 million = 3.318 million sq.ft. times $30.00 per sq.ft.

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