

Do Responsible Contractor Policies Increase Construction Bid Costs?*

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Beginning in 2000, some school districts in Ohio required contractors to incorporate health insurance coverage, among other items, into their bids. Such responsible contractor policies (RCPs) are controversial because they may raise costs. This study sheds empirical light on the controversy. We estimate construction bid costs using data on elementary school projects bid in Ohio from 1997 to 2008, some of which were covered by an RCP and others of which were not. The results indicate that once we account for variation in geographic location of schools, RCPs exert no statistically discernible impact on construction bid costs.

Introduction and Background

STATE LAW IN OHIO, LIKE LAWS IN OTHER STATES, ESTABLISHES CRITERIA FOR determining lowest responsible bidders for public construction projects. Such criteria include responsiveness to bid specifications, experience of the bidder, and performance of the bidder on previous contracts. Beginning in 2000 some school districts in Ohio extended bidding criteria to include concerns for the quality of jobs being created with public money and the potential impact on communities of “low-road” employment practices. The enhanced bidding requirements, which we refer to in this study as responsible contractor policies (RCPs), obligate contractors to incorporate into their bids some combination of employment-based health insurance, contributions to employee retirement plans, workforce training requirements for skills and safety, opportunities for minority workers, and community workforce agreements.

Although there are no studies that have quantitatively estimated the incidence of RCPs for public construction projects in the nation more generally, it

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is safe to say that the practice is relatively rare. The limited research available is generally conducted by advocacy groups, such as the National Employment Law Project and the Foundation for Fair Contracting, which have conducted case studies detailing the heterogeneous nature of RCPs and outline the various methods state and local governments have used to incorporate RCPs into their contracting practices (National Alliance for Fair Contracting 2010; Sonn and Gebreselassie 2009). A review of several case studies suggests a variety of methods for incorporating RCPs into the bidding process. For example, RCPs may be structured so that some subset of provisions must be contained within a bid for it to qualify, or so that inclusion of the provisions simply increases the likelihood that a bid will be accepted.

Not surprisingly, RCPs are controversial because they set additional bidding standards that potentially impose costs on contractors. The Associated Building Contractors (ABC), an advocacy group representing open-shop construction firms, argues that such policies often preclude nonunion contractors from bidding on public projects, and that limited competition originating from RCPs leads to higher costs, which must eventually be borne by the taxpayer (ABC 2009). On the other hand, arguments in support of RCPs emphasize the potential for destructive competition in construction bidding, which undermines wages, lowers the incidence of health insurance and pension coverage, produces less training, and applies more pressure on the safety-net infrastructure of communities. Proponents of RCPs also argue that productivity differentials between high- and low-standards contractors tend to negate higher compensation costs in the former (e.g., Sonn and Gebreselassie 2009).

The purpose of the present study is to shed empirical light on the controversy by providing a reasonable estimate of the impact of RCPs on construction bid costs. We focus the analysis on elementary school construction in Ohio between the years 1997 and 2008. Several factors make the Ohio case particularly useful. First, a negative U.S. Government Accountability Office (GAO) report on the quality of Ohio's school facilities prompted an increase in school construction starting in 1997 (GAO 1996). The building boom in new schools produced a relatively large, homogeneous sample of new school construction projects. Second, school construction was exempted from Ohio's prevailing wage law (PWL) in 1997, which allows us to assess the effects of RCPs on bid costs without the confounding effects of a PWL. And third, by focusing on a relatively uniform type of construction (elementary schools), we are better able to control for factors associated with a project's complexity, which allows us to more specifically isolate the RCP effect from other factors that may otherwise remain unobserved and thus bias bid cost estimates.

The Nature of Construction Employment and RCPs

The use of RCPs may be understood as a public policy response to the unique challenges construction employers face in compensating, producing, and maintaining a skilled workforce. Construction work is typically characterized by smaller firms engaging in a highly competitive bidding process for projects of relatively short duration. Such conditions create a turbulent demand for labor from the perspective of individual firms, which may try to win bids by reducing the quality of jobs to lower labor costs. Not only can firms compete by paying lower wages, but also by not offering health insurance or pensions, cutting corners on safety, and not investing in training. Although this may be in the best short-term interest of individual firms seeking to win the next bid, it arguably produces external costs that are borne by the community in the form of lower-quality buildings, less health and economic security for construction workers and their families, taxpayer-financed uncompensated care costs at public health-care providers, and a less-skilled and less-productive construction labor force in the community. Adoption of RCPs can be seen as an attempt by public sector decision makers to avoid such negative outcomes.

Indeed, a claim that the organization of production, which includes procurement processes that allocate jobs among contractors, produces a significant amount of low-quality employment in the construction industry is not controversial. Empirical research shows that the construction sector lags behind others in terms of health insurance coverage, pension participation, job safety, and training. For example, Price (2005) shows that workers in construction are much less likely to be covered by health insurance than those in every other industry except agriculture (also see CPWR—The Center for Construction Research and Training [CCRT] 2008: 26). Other research indicates that the lack of employment-based health insurance leads to poorer health outcomes than would otherwise be the case. Hadley (2003) found that the uninsured tend to delay treatment, which results in more serious and costly health conditions. The uninsured also are at greater risk for bankruptcy and financial difficulties (Himmelstein et al. 2009). Although such costs are acutely borne by individuals, they are also felt by communities, because construction workers are significantly more likely than others to rely on uncompensated health care from publicly supported health-care providers (Waddoups 2005).

Workers in the construction industry are also less likely to be covered by a pension plan than workers in other industries. Lack of pension coverage decreases financial security for retired workers. Recent research from 2010 shows that the rate of poverty among householders aged 60 or older without defined-benefit pensions was nearly nine times greater than among householders with traditional defined benefit income in 2010 (Porell and Oakley

2012). Porell and Oakley (2012) also found that between 1998 and 2010 the incidence of persons aged 60 or older with a traditional defined benefit pension from their own (or spouse's) former employer dropped from 51.8 to 42.8 percent. The evidence indicates that pension coverage among construction workers is significantly lower than that of workers in other industries (Price 2005). Numbers from the CCRT (2008: 27) indicate that 57 percent of workers in the United States participated in some sort of employment-based retirement plan, while only 39 percent of construction workers participated.

Besides insurance and pension coverage, job safety is another issue that especially affects construction employment and is often addressed in RCPs. According to the CCRT (2008: 32), compared to other major industry categories, workers in construction face a higher risk of death on the job (11.1 deaths per 100,000 workers compared to the average of 4.2 per 100,000 for all industries), and a higher rate of injuries on the job. Construction workers report a rate of 239.5 nonfatal injuries resulting in days away from work per 10,000 workers. The average across all private sector employment is 135.7 per 10,000. Indeed, these CCRT numbers show that construction leads all industry categories except transportation in injury rates.

Generally RCPs' enhanced bidding requirements mandate that bidders demonstrate a good track record for safety. A bidder's Experience Modification Rating (EMR) is a ratio that compares a bidder's workers' compensation insurance claims history and those of their particular trade using several years of experience. An EMR of 1.0 indicates an average loss experience relative to the industry, while an EMR greater than 1.0 indicates the employer has a higher-than-average loss experience. An RCP, for example, may designate that an EMR greater than 1.5 would cause a contractor to be ineligible to bid for a project.

Typical RCPs also address skills training, which is of particular concern in the construction sector. Firms require workers with high levels of general skill that can most efficiently be produced with a large component of training that occurs on the job (Bilginsoy 2003). Because of training externalities construction firms are generally reluctant to provide training unilaterally. Recent research using data from the Survey of Income and Program Participation suggests that firms in the construction sector, along with retail trade and agriculture, are the least likely of all other broad industry sectors to provide employer-sponsored training (Waddoups in press).

Finally, RCPs often contain clauses that encourage use of minority contractors and workers from the community where the building projects are located. Such procurement practices have sought to develop the local work force by supporting the creation of jobs for residents. This is part of a broader trend in the American construction industry that has traditionally limited bidding

practices that would allow contractors from other geographic locations to bring in cheaper labor to undercut bids of local contractors (Finkel 2005).

Literature on Policy Interventions and Construction Costs

An important question that remains, however, is the extent to which such enhanced bidding standards embodied in RCPs affect construction costs. To the authors' knowledge, there has been no published quantitative research measuring the impact of RCPs on costs. However, because RCPs establish conditions that likely raise compensation to construction workers, their impact may be modeled similarly to studies of other policy interventions, such as PWLs and project labor agreements (PLAs). The Davis–Bacon Act in 1931 established PWLs for federally funded projects. Similarly, state-level PWLs apply to projects using state funds. Such laws directly intervene in wage setting on public construction projects by mandating specified wage rates and benefit contributions for a detailed set of construction occupations (Azari, Philips, and Prus 2003). PLAs, on the other hand, are collectively bargained by property owners and building trade unions for certain, usually large, construction projects. Such agreements require successful bidders, whether union or nonunion, to adhere to provisions in the agreement, such as union hiring hall referral and collectively bargained compensation packages, that apply only to the specified project (Belman et al. 2010).

Similar to arguments applied to RCPs, critics of PWLs and PLAs argue that they significantly increase construction costs on public projects at the expense of taxpayers, while proponents argue that they encourage the construction sector to develop along a high-wage, high-skill growth path, and that enhanced training, substitution of skilled labor for less-skilled labor, and substitution of capital for labor largely mitigate the higher wage costs (e.g., Azari, Philips, and Prus 2003).

A number of empirical studies provide evidence on the impact of PWLs and PLAs on construction costs (e.g., Azari, Philips, and Prus 2003; Belman et al. 2010; Bilginsoy and Philips 2000; Duncan, Philips, and Prus 2009; Duncan and Prus 2005; Dunn, Quigley, and Rosenthal 2005; Fraundorf, Farrell, and Mason 1984; Thieblot 1995). A major theme emerging from this research has been the problem of adequately controlling for unobserved heterogeneity. For example, if construction projects subject to the policies are systematically different than those not subject to them in ways that are not observable to the researcher, estimates of the policy effect may be biased. Ideally the researcher will be able to compare costs of projects that are exactly the same except for the policy intervention. For example, a study by Fraundorf, Farrell, and Mason

(1984) found significantly higher costs (as measured by construction bid prices reported in face-to-face interviews with the researchers) associated with PWLs. The study, however, compared public construction projects, which were subject to PWLs, to private projects, which were not. Thus differences in characteristics of public and private buildings not controlled for, but relevant to costs, likely biased the PWL effect upward.

Several studies have addressed the problem of bias associated with unobserved heterogeneity by focusing only on school construction (Azari, Philips, and Prus 2003; Belman et al. 2010; Bilginsoy and Philips 2000). Because schools are relatively homogeneous, focusing on them allows the researcher to more carefully control for unobserved heterogeneity that has arguably biased cost estimates of PWLs and PLAs upward. In the first study of PWLs and school construction costs, Bilginsoy and Philips (2000) examined the impact of British Columbia's Skill Development and Fair Wage Policy (SDFWP) of 1992, which is similar to a PWL in the United States. Initially, comparing the arithmetic means of construction costs before and after the policy without controls for project characteristics, the researchers found a 16 percent higher cost among projects built under the SDFWP. After controlling for a number of factors including the construction business cycle, number of competitors, type of school, district dummies, and a time trend, they still discovered higher point estimates of construction bid costs under the policy, but the differences were not statistically significant.

In another study clarifying the impact of SDFWP on bid costs, Duncan, Philips, and Prus (2009) used a stochastic frontier regression to estimate technical inefficiencies associated with raising prevailing wage rates on nonunion construction firms. Theoretically, technical inefficiencies represent the degree to which production inputs fail to yield output on the optimal production frontier, which leads to cost inefficiencies. They found that while cost inefficiencies were initially higher for schools built under SDFWP, within 17 months the inefficiencies had essentially disappeared, returning to the levels before the policy was in place. The finding suggests that the impact of prevailing wage policies does not remain constant over time, but rather contractors adjust to the new cost constraints. In similar work, Azari-Rad, Philips, and Prus (2003) modeled bid costs of school construction projects in the United States as a function of whether they were built in a state with a PWL. After controlling for other relevant factors, they found no evidence that schools built under PWLs were more costly.

Not all studies are as sanguine about the negligible impacts of PWLs on construction costs. Dunn, Quigley, and Rosenthal (2005), for example, used data on public housing projects in California, which included information on final construction costs, to find that PWLs increased public housing projects'

total costs by between 9.5 and 35.9 percent depending on the specification of the model. The larger number does not appear reasonable given that labor costs are generally only about 30 percent of total construction costs. The authors speculate that perhaps costs associated with more detailed reporting and other administrative expenses may be behind the higher estimate. Interestingly, Kessler and Katz (2001) find that repeal of state PWLs reduced wages of construction workers by a modest 4.5 percent, which appears to be inconsistent with Dunn, Quigley, and Rosenthal (2005).

Like PWLs, PLAs also provide institutional support for higher wages and more fringe benefits to construction workers, which could potentially raise construction costs. To test this hypothesis, Belman et al. (2010) gathered data on school construction projects in Massachusetts. Some of the projects were conducted under PLAs, while others were not. Although comparisons of mean construction costs in the PLA and non-PLA groups initially indicated statistically significant higher total construction costs associated with PLA schools, once researchers accounted for more detailed characteristics of the buildings, the estimate on the PLA variable dropped approximately 40 percent (from an estimate of 17 percent to 10 percent) and became statistically insignificant. When a control for whether the project was built in Boston was added, the size of the coefficient and *t* statistic fell still further, indicating that PLAs likely exerted little or no effect on construction costs.

The literature reviewed above establishes a sound methodology for estimating the impact of policy interventions, such as RCPs, on construction costs. In the remainder of the study we will further outline the nature of RCPs, describe institutional details of the Ohio case, explain and analyze the data associated with the construction of elementary schools between the years 1997 and 2008, and draw conclusions about the extent to which RCPs affect construction bid costs.

Ohio School Construction and RCPs

As previously mentioned, this study focuses on school construction projects in Ohio between the years 1997 and 2008, in part because there was an aggressive school building program following a 1996 U.S. Government Accountability Office (GAO) report (GAO 1996). The report, which gave school facilities in Ohio a poor ranking relative to the rest of the nation, prompted the legislature to begin a multi-year investment in educational infrastructure in 1997 and to establish the Ohio School Facilities Commission (OSFC) to administer state funding, provide management oversight, and offer technical assistance. At the same time, believing it would reduce construction

costs, legislators exempted school districts from PWLs (Senate Bill 102 1997). Based on financial need, the OSFC provided a percentage of school construction funding for qualifying districts. School funding was approved according to a school district ranking published by the Ohio Department of Education based on average per-pupil valuation. School districts typically raised the remaining funds through tax levies to issue and pay for bonds. The first OSFC-funded school opened in 2000, and as of the end of fiscal 2007, there were 531 new school buildings occupied, with another 306 in design or under construction (OSFC 2007: 15).

Under the normal bidding process, local boards of education determine the contractor who is the lowest responsible bidder. Ohio state law sets out factors to consider in determining whether a bidder is responsible. These include, but are not limited to, compliance with material aspects of the bid specifications, experience of the bidder, and performance of the bidder on previous contracts. Contracts involving school districts receiving funds from the OSFC are also subject to approval by the commission. Although not necessarily encouraged by the OSFC, beginning in 2000 a few school boards added workforce and community criteria to their bidding policies, thus establishing RCPs as we have defined them for the purposes of this study. Table 1 contains a list of school districts and dates when they adopted the additional responsible bidder criteria. The table also shows the core provisions of the various workforce RCPs, which consist of employment-based health insurance, pension payments, requirements for training and workplace safety, and other items.

In 2007 newly elected Democratic governor Ted Strickland gave more autonomy to local school boards with respect to the use of RCPs, by appointing new members to the OSFC, which, citing its commitment “to ensure that schools are built by responsible contractors employing a qualified workforce” (OSFC 2007), voted to establish Model Responsible Bidder Requirements (MRBR). School districts became free to utilize these elements in whole or in part, as their responsible contractor criteria, without further review by the OSFC. There were eighteen points included in the final MRBR. Boards could also adopt additional or other requirements for contractors bidding on construction jobs but as was the case before 2007, these additional requirements would be subject to the approval of the OSFC.

Inspection of the MRBRs in the Appendix shows that twelve of the eighteen requirements deal with the financial health of the contractor, compliance with existing statutes, contractors being appropriately licensed, and evidence that they have not been debarred from public contracts. Such requirements are similar to those used routinely by school boards for many years in their determination of responsible bidders. The additional requirements in the MRBR paved the way for school districts to adopt RCPs as we have defined them.

TABLE 1
SELECTED RCP REQUIREMENTS FOR ELEMENTARY SCHOOL CONSTRUCTION PROJECTS

School District (Year of Policy)	Number of RCP Schools (Prior/ After January 13, 2007)	Health Insurance	Retirement Benefits	Safety (Mod Rate or Safety Program)	Skilled Trade Personnel (Participation in Apprenticeship Program)	Prevailing Wages	Small Business Opportunities (And/Or Disadvantaged, Minority Enterprises)	Workforce Diversity	Project Labor Agreement	Community (Workforce) Inclusion Plan
Akron (2005)	0/1						X	X	X (2008)	
Cincinnati (2002)	14/4	X	X	X			X	X		
Cleveland (2001 and 2007)	6/10	X	X	X	X	X		X		X
Columbus (2003)	12/7	X	X	X	X		X			X
Evergreen Local (2003)	1/0	X	X	X	X					X
Ironton (2007)	0/1								X	
Oregon City (2000)	1/0	X	X	X	X					X
South Point Local (2008)	0/2	X	X	X	X	X			X	
Toledo (2007)	0/7	X	X	X	X		X	X		X

SOURCE: Authors' review of Ohio School Districts Responsible Contractor Policies.

They include provisions for a minimum health-care medical plan for employees working on the project, a safety provision that required a workers' compensation insurance experience modification rating (measure of workplace safety) of 1.5 or less, contributions to an employee retirement program or pension plan, and the use of skilled workers who had been trained through an approved apprenticeship program or the Ohio Career Technical Program. The policy also afforded school districts the ability to require prevailing wages and/or utilize a project labor agreement.¹

Discussion of the Data

We obtained construction bid cost data on elementary school projects bid in Ohio between 1997 and 2008 from Dodge Reports, which are provided by McGraw-Hill Construction.² Dodge data more generally provide information on accepted bid prices for construction projects nationwide. As previously mentioned, Dodge data have been used in a number of studies that have examined the cost effects of PWLs (Azari, Philips, and Prus 2003; Bachman et al. 2003; Legislative Service Commission 2002; Philips 2001; Prus 1996). Although the data observe accepted bid prices, they do not record final construction costs, some of which may vary significantly from bid costs. According to Belman et al. (2007), who investigated the impact of PLAs on school construction costs in Massachusetts, final costs were higher than Dodge bid costs in forty-one of the sixty-four projects in their database. In twenty of the projects the two cost measures were the same, and in only three projects did Dodge costs exceed final costs. Higher final costs are likely associated with additions and rework orders that are not observed in the Dodge data. Consistent with such findings, Belman et al. (2010) found that an average bid cost from Dodge data was \$17.5 million compared to the average final cost of \$18.6 million, which was computed using data generated from a more careful investigation of final costs for the same schools.³

The dataset used in the present study consists of information on 319 newly constructed elementary school (grades K–5) projects, excluding renovations

¹ Following the election of a new governor and administration in 2010, the resolution was rescinded on February 24, 2011. Included in the new resolution was the decree that "The Commission [OSFC] will not approve any contracts that require the adoption of agreements or specification that attempt to... (b) stipulate a specific source of insurance and benefits including health, life and disability insurance and retirement pensions." It should be noted that this revocation took place beyond the date of our study.

² A number of projects were bid in 2008, but were not scheduled to start until 2009.

³ Belman et al. (2010) also provide a useful summary of the problems involved in using Dodge data for construction cost research.

and additions to existing structures. Although the data include projects that combined elementary grades with middle schools, which include grades 6–8, they exclude stand-alone middle schools and high schools to keep the sample as homogenous as possible. High schools, especially, are more expensive to build because of specialized classrooms, labs, athletic fields, and other features.

To identify which of the 319 projects were bid under an RCP, we gathered information on bidding policies of specific school districts from knowledgeable entities such as the state and local Building and Construction Trades Councils, the OSFC in Columbus, and the Ohio Construction Coalition in Toledo. To protect against classification error, we further investigated the bidding policies of each school district that the knowledgeable entities identified as having an RCP.⁴ Because health insurance constitutes the largest component of benefits that are not legally required, we judged a district to have adopted an RCP if it required or encouraged employment-based health insurance and had at least one other workforce element, such as affiliation with construction trades training programs, compliance with residency and/or affirmative action requirements, provisions for safety training, or contributions to workers' pensions.⁵ Two school districts (Akron and Ironton) used PLAs to organize their construction projects, which were also included in the RCP group, because the provisions in the PLA are much like those in a typical RCP. To be considered an RCP project, the start date as recorded in the Dodge data had to follow the RCP implementation date. As indicated in Table 1, we used these criteria to identify sixty-three projects, which represent sixty-six schools, as being bid under an RCP.

This left 256 projects, or 277 separate schools, that were initially placed into nonRCP status. To make sure that these projects were not misclassified as non-RCP when in fact an RCP was in place, we attempted to gather bidding policies governing each of these projects. In all, we gathered information on bidding policies from 72 percent of the nonRCP projects (185 total projects) by investigating board of education Web sites, which contain bidding policy statements and minutes of meetings where bidding policies and procedures were discussed. We found no false negatives among this group. That is, none of the projects in the group initially identified as nonRCP were later classified

⁴ We corroborated claims of RCP coverage by a number of methods, including checking official Web sites of boards of education of information on bidding policies, looking at the minutes of school board meetings where bidding policies were discussed, reading local newspaper articles, and directly contacting administrative staff members. Two projects that were originally classified as being covered by an RCP were subsequently changed as a result of our corroborative investigation.

⁵ Although our rule for adoption was employment-based health insurance plus one other workforce element, all of the RCPs included multiple other workforce criteria.

TABLE 2
 DISTRIBUTION OF ELEMENTARY SCHOOLS BUILT UNDER RESPONSIBLE CONTRACTOR POLICIES (RCP)
 BY MAJOR CITY

City ¹	RCP	No RCP	Total
Cleveland	15	2	17
Columbus	18	3	21
Toledo	7	15	22
Dayton	0	11	11
Canton	0	9	9
Akron	1	10	11
Cincinnati	18	6	24
Not in major city	4	200	204
Number in sample	63	256	319

SOURCE: F.W. Dodge bid price data on elementary schools in Ohio 1997–2008. The authors determined whether the construction projects were bid under RCPs.

¹Location was determined by the owner address as listed in the Dodge Reports.

as having an RCP. We had no information on bidding policies for the remaining seventy-one projects in the nonRCP group. The school districts in this group were generally small, and did not post minutes of board meetings at which construction bidding policies were discussed, nor did they post policies or other documents on their Web sites that would allow us to definitively ascertain their nonRCP status. For a subset of these school projects we made telephone calls and sent emails to search for individuals with knowledge of specific bidding policies that were in force at the time that the projects were bid and built. After expending considerable resources to uncover bidding policies with no success, this effort was abandoned. Based on our experience finding no false negatives among the original nonRCP group, we determined that it was likely that the remaining seventy-one projects were not bid or built under RCP policies and we classified them accordingly as nonRCP projects.⁶

Schools bid under an RCP were mostly located in and around larger cities in Ohio. According to Table 2 most of the RCP projects are located either in Cleveland, Columbus, Toledo, or Cincinnati, all of which are relatively highly populated metropolitan areas. The data also reveal that school boards in some larger cities, such as Dayton and Canton, did not adopt RCPs within the time frame of the study.

Table 3 contains descriptive statistics of the sample broken down by RCP status. The table indicates that schools bid under RCPs have higher bid costs than schools not built under RCPs. The mean per-square-foot cost of \$150.05 for projects in the RCP category outpaces the \$133.84 per square foot for

⁶ Robustness checks in the Economic Model and Results section test whether this classification procedure had an impact on the results.

TABLE 3

CHARACTERISTICS OF ELEMENTARY SCHOOLS BID BETWEEN 1997 AND 2008 IN OHIO ACCORDING TO
DODGE REPORTS

Variable	No RCP		RCP	
	Mean	Std. Dev.	Mean	Std. Dev.
<i>School/Project Characteristics</i>				
Real bid cost (\$000s)	10,555	4,744	10,210	2,759
Square feet (000s)	81.9	41.6	69.0	20.3
Bid cost per square foot	133.84	23.06	150.05	18.93
Multiple story building	0.477	—	0.857	—
Gymnasium	0.422	—	0.492	—
Includes middle school	0.082	—	0.476	—
Multiple schools in project	0.066	—	0.048	—
No RCP policy observed	0.277	—	0.000	—
<i>Location of Project</i>				
Cleveland	0.008	—	0.238	—
Columbus	0.012	—	0.286	—
Toledo	0.059	—	0.111	—
Dayton	0.043	—	0.000	—
Canton	0.035	—	0.000	—
Akron	0.039	—	0.016	—
Cincinnati	0.023	—	0.286	—
Elsewhere	0.781	—	0.063	—
<i>Time</i>				
Year=1997	0.023	—	0.000	—
Year=1998	0.016	—	0.000	—
Year=1999	0.031	—	0.000	—
Year=2000	0.047	—	0.000	—
Year=2001	0.090	—	0.000	—
Year=2002	0.102	—	0.016	—
Year=2003	0.090	—	0.016	—
Year=2004	0.090	—	0.111	—
Year=2005	0.125	—	0.206	—
Year=2006	0.188	—	0.175	—
Year=2007	0.117	—	0.238	—
Year=2008	0.082	—	0.238	—
Number of Observations	256		63	

SOURCE: Dodge bid price data on elementary schools built in Ohio between the years 1997 and 2008. The authors gathered the incidence of construction under RCPs.

schools not built under an RCP, which amounts to a 12.1 percent premium. Note that all bid costs are adjusted for inflation by using the construction cost index (CCI) provided by the U.S. Census to adjust prices to their 2007 levels. Although schools bid under RCPs are somewhat smaller than their nonRCP counterparts (69,000 sq. ft. compared to 81,900 sq. ft.), they are more likely to include multiple-story buildings, which is probably a result of location in urban areas.

As previously discussed, school districts were given more autonomy in implementing RCPs under Strickland's gubernatorial administration beginning in January of 2007. The summary statistics show that just under half (47.6 percent) of the RCP school projects were bid in 2007 or later. Indeed, most RCP projects were bid and built between the years 2004 and 2008. School construction without RCP coverage, however, is more evenly distributed over the time period, but still tends to be somewhat concentrated in the period between 2002 and 2008.

Econometric Model and Results

To shed light on whether RCPs affect school construction bid costs, we model the construction cost of school projects bid in Ohio according to the following specification:

$$\ln cost_i = \alpha + \beta_1 RCP_i + \beta_2 \ln(Square\ Feet_i) + \beta_3 Building\ Characteristics_i + \lambda_i + \tau_i + \varepsilon_i,$$

where $\ln Cost_i$ represents the natural log of real bid costs, $Square\ Feet_i$ signifies the size of the building or buildings in the project, $Building\ Characteristics_i$ is a vector of variables that controls for characteristics of a building, λ_i represents location fixed effects, and τ_i represents year fixed effects. The parameter of particular interest, β_1 , summarizes the degree to which projects bid under RCP requirements differ with respect to cost compared to other projects, holding other observable factors constant.

The first set of results located in Table 4 estimates the natural log of real bid costs. The first specification (Specification 1) controls for size, RCP status, the number of schools in a given project, and year fixed effects. The estimate on the RCP variable is highly statistically significant and suggests that school construction under RCPs is characterized by an 11.3 percent higher bid cost than projects not bid under the policy. The elasticity of cost with respect to square feet equals 0.778, which suggests that a 1-percent increase in square footage raises bid costs by an estimated 0.778 percent. The number of schools in a project has no statistically significant relationship to bid cost per square foot, and none of the coefficients on the time variables reach conventional levels of significance. This suggests that after adjusting the bid cost estimates for inflation, overall elementary school construction costs have probably not risen over the period in Ohio.

The results for Specification 1, which estimate a statistically significant and positive correlation between bid costs and RCPs, likely suffer from omit-

TABLE 4
PARAMETER ESTIMATES OF REAL CONSTRUCTION BID COSTS: OHIO ELEMENTARY SCHOOLS BID
BETWEEN 1997 AND 2008

Variable	Spec. 1		Spec. 2		Spec. 3		Spec. 4	
	Coeff.	t stat.						
<i>School/Project Characteristics</i>								
RCP	0.107*	5.69	0.096*	4.21	-0.003	-0.09	0.010	0.32
Natural log of square feet	0.778*	23.12	0.768*	21.13	0.753*	19.60	0.768*	16.67
Multiple story building	—	—	-0.034	-1.65	-0.041	-1.89	-0.054*	-2.18
Gymnasium	—	—	-0.026	-1.27	-0.018	-0.86	-0.038	-1.61
Includes grades 6-8	—	—	0.065*	2.45	0.075*	2.48	0.074*	2.27
Multiple schools in project	0.035	0.58	0.047	0.79	0.058	0.98	0.030	0.38
<i>Location of Project</i>								
School built in Cleveland	—	—	—	—	0.096*	2.19	0.106*	2.02
School built in Columbus	—	—	—	—	0.072*	1.99	0.070	1.91
School built in Toledo	—	—	—	—	-0.055	-1.39	-0.042	-0.96
School built in Dayton	—	—	—	—	-0.121*	-2.28	-0.108*	-2.03
School built in Canton	—	—	—	—	-0.050	-1.01	-0.031	-0.63
School built in Akron	—	—	—	—	0.032	0.78	0.036	0.84
School built in Cincinnati	—	—	—	—	0.159*	4.16	0.172*	4.80
<i>Time</i>								
Year=1998	0.121	1.22	0.139	1.38	0.103	0.84	0.103	0.98
Year=1999	-0.031	-0.42	-0.032	-0.43	-0.031	-0.44	0.006	0.11
Year=2000	0.021	0.31	0.014	0.21	0.025	0.43	-0.005	-0.06
Year=2001	-0.051	-0.76	-0.051	-0.75	-0.053	-0.81	-0.039	-0.48
Year=2002	0.046	0.78	0.061	1.04	0.049	0.84	0.055	0.89
Year=2003	0.027	0.49	0.033	0.62	0.033	0.65	0.023	0.39
Year=2004	-0.118	-1.86	-0.112	-1.85	-0.125*	-2.15	-0.152*	-2.24
Year=2005	-0.039	-0.74	-0.022	-0.42	-0.008	-0.15	-0.005	-0.08
Year=2006	-0.061	-1.09	-0.051	-0.94	-0.055	-1.05	-0.043	-0.77
Year=2007	0.013	0.26	0.009	0.18	0.023	0.47	0.018	0.34
Year=2008	-0.014	-0.25	-0.014	-0.25	0.018	0.35	0.010	0.17
Constant	5.857*	38.52	5.915*	36.13	5.978*	34.88	5.921*	29.03
R squared	0.800		0.806		0.822		0.822	
Number of observations	319		319		319		248	

SOURCE: F.W. Dodge bid price data on elementary schools built in Ohio between the years 1997 and 2008. The authors gathered the incidence of construction under RCPs.

*Signifies statistical significance at .05 level or less.

ted variable bias in which unobserved factors correlated with the existence of an RCP are also correlated with higher bid costs. For example, if RCPs are more likely to be adopted for projects with characteristics that affect bid costs, such as perhaps multiple stories or location within larger urban areas, and such characteristics are not controlled for, then the coefficient estimate on the RCP variable will be biased upward. Specification 2 thus adds controls for whether the building is multiple stories, includes construction of a gymnasium, and

accommodates grades 6–8. Although other, more detailed characteristics are observed in the data, there are enough missing observations on such characteristics that it was not feasible to add them as controls. The fact that our analysis focuses only on elementary schools, however, implicitly controls for many of these characteristics and thus reduces the potential for unobserved heterogeneity bias on the RCP coefficient. Results of Specification 2 indicate that multiple stories, other things equal, may slightly reduce bid costs, while building a school that adds grades 6–8 to the lower grades raises bid costs. Controlling for the additional building characteristics, however, does not materially affect the RCP estimate.

Moving to Specification 3, we estimate a model that controls for location fixed effects. Recall from Table 2 that RCPs are concentrated in four locations, Cleveland, Columbus, Toledo, and Cincinnati. If such areas are also locations with high construction costs independent of whether projects were bid and built under RCPs, controlling for location should reduce the magnitude of the RCP coefficient. The estimation results for Specification 3 (columns 5–6), indeed, indicate that controlling for location fixed effects significantly alters the results on RCP bid cost effects. After controlling for location, the RCP estimates become essentially zero and statistically insignificant, suggesting that whether the school was bid with an RCP requirement in place has no detectable impact on bid costs. The coefficient estimates indicate that, everything else equal, elementary schools in Cleveland, Columbus, and Cincinnati have higher bid costs than other locations in Ohio, and that the higher costs accrue to schools regardless of whether an RCP is in place. An F-test on the joint significance of location variables easily rejects of the null hypothesis of no effect ($p = 0.0000$).

We made the coefficient estimates in the first three specifications in Table 4 using data on 319 construction projects. Recall that there was clear evidence of the existence or not of an RCP in 248 of 319, or 78 percent, of all projects. Because schools in the remaining 22 percent, where a policy was not observed, were primarily located in small school districts, and because we found no false positives for the projects initially assigned to nonRCP status, we assumed that no RCPs existed in this group. To test whether the results are sensitive to this assumption, we excluded the seventy-one projects from the database that previously were assumed to *not* be constructed under an RCP based on the unavailability of information on an RCP policy. The results presented as Specification 4 are qualitatively similar to those in Specification 3, in which we used the entire sample. An initially large and statistically significant estimate on RCP in a lean specification similar to Specification 2 (results not reported) falls to statistical insignificance when location fixed effects are added. The findings clearly indicate that the results reported in Specification 3

are not an artifact of the possible measurement error associated with the RCP classification procedure.⁷

Conclusion

The purpose of this study was to assess whether RCPs affect construction bid costs by analyzing data from a sample of elementary schools bid and built in Ohio between the years 1997 and 2008. Because RCPs extend bid requirements to include provision of health insurance, pension contributions, and training, among other community and workforce criteria, they tend to be controversial. Critics argue that RCPs inflate labor costs, limit competition, and expand administrative costs, which unnecessarily raises construction costs that will eventually be borne by the taxpayer. On the other hand, proponents highlight potential benefits of RCPs, arguing that raising the standard for bidding encourages high-standards employment practices. High-standards practices include a greater incidence of employment-based health insurance, and thus perhaps fewer uncompensated care costs for safety-net health-care providers in the community (Waddoups 2005), additional retirement security, more support for skill formation, and safer workplaces. Furthermore, proponents argue that productivity differentials between high- and low-standards contractors tend to negate higher compensation costs, which leaves construction costs largely unaffected.

Initially, the summary statistics in Table 3 show that the average cost of RCP schools is significantly higher than that of nonRCP schools (11.3 percent). However, when geographic controls are included in the model, the difference falls to nearly zero and no longer reaches statistical significance. RCPs appear to be adopted in locations where construction is relatively expensive regardless of the bidding policy employed. Further analysis also suggests that

⁷ Another important question of interest is whether the reduction in the RCP coefficient from Specification 2 to Specification 3 in Table 4 was the result of a better-specified model and the accompanying reduction of omitted variable bias, or whether it originated from multicollinearity introduced into the model through the location variables. To the extent that multicollinearity affects the data, it becomes difficult to definitively distinguish between RCP and regional cost effects. To test for multicollinearity, we initially controlled for location of the project in the first specification and then in the next specification added the RCP variable. If some of the coefficients on the location variables are large and statistically significant and then fall to insignificance when the RCP variable is added, then a problem with multicollinearity would be indicated. In both estimations the coefficients on the location variables were nearly identical, suggesting the multicollinearity is not a problem. In another test for multicollinearity, we computed the variance inflation factors (VIF) for Specification 2, which doesn't include the location variables and Specification 3, which does. If the VIF significantly increases when the location variables are added, then multicollinearity is indicated. The mean VIF for Specification 2 (3.20) was actually smaller than that of Specification 3 (3.03), which, again, suggests that multicollinearity is not a problem.

the results are not sensitive to the initial RCP classification procedure, which assigned projects from school districts where RCP policy information was unavailable to the nonRCP group.

It is also important to emphasize that there is a material difference between Dodge bid cost and final construction cost. School districts as buyers of construction projects, and by extension taxpayers, are of course ultimately interested in final cost, which we do not observe. Indeed, Belman et al. (2007) show that, at least for school construction in Massachusetts, there tends to be a systematic understatement of costs in the Dodge reports. It is possible that the characteristics of contractors that build schools under RCPs, that is, contractors who provide employment-based health insurance, who contribute to their workers' pensions, and who invest in training of their workers, are also contractors that are less prone to costly delays and higher costs associated with re-work orders. To the extent that this may be the case, one would expect that the estimates of RCP costs made using Dodge data would exceed analogous estimates made using final cost data if it were available. This could be an interesting avenue for additional research.

Adopting high-standards employment policies through RCPs provides obvious benefits to workers, their families, and the community. Because the most plausible estimates of RCP effects imply virtually no detectable impact on construction bid costs, our study lends support to the idea that adopting RCPs for publicly funded construction projects such as schools may be an effective way to improve employment conditions and living standards of construction workers without significantly raising costs for taxpayers.

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APPENDIX
MODEL RESPONSIBLE BIDDER REQUIREMENTS

Resolution 07-98

July 26, 2007

Attachment A

THE OHIO SCHOOL FACILITES COMMISSION MODEL RESPONSIBLE
BIDDER WORKFORCE STANDARDS

The following responsible bidder criteria may be included, by a resolution of a Board of Education, in the construction contracts for school building projects undertaken pursuant to Chapter 3318 of the Ohio Revised Code. These responsible bidder criteria are reasonable related to performance of the contract work within the statutory framework set forth in Section 9.312 of the Ohio Revised Code. The responsible bidder criteria shall be evaluated in accordance with section 3.4.3 of the Instructions to Bidders.

1. As a condition precedent to contract award after bid, The Board of Education may undertake with the Bidder a Constructability and Scope review on projects of One Hundred Thousand Dollars (\$100,000.00) or more to verify that the Bidder included all required work.
2. The Low Bidder whose bid is more than twenty percent (20%) below the next lowest bidder shall list three (3) projects that are each within seventy-five percent (75%) of the bid project estimate for similar projects and that were successfully completed by the bidder not more than five (5) years ago. This information shall be provided if necessary at the post-bid scope review.
3. The Bidder shall certify it will employ supervisory personnel on this project that have three (3) or more years in the specific trade and/or maintain the appropriate state license if any.
4. The Bidder shall certify it has not been penalized or debarred from any public contracts for falsified certified payroll records or any other violation of the Fair labor Standards Act in the last five (5) years.
5. The Bidder shall certify it has not been debarred from public contracts for prevailing wage violations or found (after all appeals) to have violated prevailing wage laws more than three times in the last ten years.
6. The Bidder shall certify it is in compliance with Ohio's Drug-Free Workplace requirements, including but not limited to,

maintaining a substance abuse policy that its personnel are subject to on this project. The Bidder shall provide this policy or evidence thereof upon request.

7. The Bidder for a licensed trade contract or fire safety contract shall certify that the Bidder is licensed pursuant to Ohio Revised Code Chapter 4740 as a heating, ventilating, and air conditioning contractor, refrigeration contractor, electrical contractor, plumbing contractor, or hydronics contractor, or certified by the State Fire Marshall pursuant to R.C. 3737.65
8. The Bidder shall certify it has not had a professional license revoked in the past five years in Ohio or any other state.
9. The Bidder shall certify it has no final judgments against it that have not been satisfied at the time of award in the total amount of fifty percent (50%) of the bid amount of this project.
10. The Bidder shall certify it has complied with unemployment and workers compensation laws for at least the two years preceding the date of bid submittal.
11. The Bidder for a trade licensed pursuant to Ohio Revised Code Chapter 4740 or requiring certification of the State Fire Marshall pursuant to R.C. 3737.65, shall certify that the Bidder will not subcontract greater than twenty-five percent (25%) of the labor (excluding materials) for its awarded contract, unless to specified subcontractors also licensed pursuant to Ohio Revised Code Chapter 4740 or certified by the State Fire Marshall pursuant to R.C. 3737.65.
12. The Bidder shall certify it does not have an Experience Modification Rating of greater than 1.5 (a penalty rated employer) with respect to the Bureau of Workers Compensation risk assessment rating.
13. The Bidder shall certify that it will provide a minimum health care medical plan for those employees working on this project, and shall provide the policy or evidence thereof upon request.
14. The Bidder shall certify it will contribute to an employee pension or retirement program for those employees working on this project, and shall provide the plan or evidence thereof upon request.
15. The Bidder shall certify it shall use only construction trades personnel who were trained in a state or federally approved apprenticeship program or Career Technical program, or who are currently enrolled in a state or federally approved apprenticeship program or Career Technical Program, or who can demonstrate at least three years of experience in their particular trade.

16. The Bidder shall certify it has not been debarred from any public contract; federal, state or local in the past five years.
17. The Bidder shall certify that it, and its subcontractors or any other contractor performing work on the project covered under the contract of the Bidder, shall pay the prevailing wage rate and comply with the other provisions set forth in Ohio's Prevailing Wage Law, R.C. 4115.03 through 4115.16, and O.A.C. 4101:9-4-01 through 4101:9-4-28. This includes, but is not limited to, the filing of certified payroll reports.
18. The Bidder shall certify that it, and its subcontractors or any other contractor performing work on the project covered under the contract of the Bidder, shall comply with the requirements of a project labor agreement adopted for use on the project.

A material breach of the responsible bidder criteria prior to, or during the contract performance, shall subject the contractor to all contractual remedies, including, but to limited to, termination for cause.