THE EFFECTS OF PREVAILING WAGE REQUIREMENTS ON THE COST OF LOW-INCOME HOUSING

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Recent California legislation extends the application of prevailing wage regulations to construction workers building subsidized low-income residential projects. Econometric evidence based on micro data covering 205 residential projects subsidized by the California Low Income Housing Tax Credit since 1996 and completed by mid-2002 demonstrates that construction costs increased substantially under prevailing wage requirements. Estimates of additional construction costs in the authors' most extensive models range from 9% to 37%. The analysis controls for variations in cost by geographical location and for differences in project characteristics, financing, and developer attributes. The authors estimate the effect of uniform imposition of these regulations on the number of new dwellings for low-income households produced under the tax credit program in California. Under reasonable assumptions, the mid-range estimate of the prospective decrease exceeds 3,100 units per year.

In October 2001, following heated political debate, the California legislature voted to extend the application of the state's "prevailing wage" laws to many construction projects not previously covered, including housing subsidized with public funds and even some private construction. The passage of Senate Bill 975 (SB 975) amended section 1720 of the California Labor Code, expanding the scope of "public funds" that trigger prevailing wage obligations when used to finance new construction.

The new law brings to the forefront of the policy debate concerns about the costs and benefits of prevailing wage laws, specifically in the context of subsidized housing for low-income households. Since prevailing wage rates are almost invariably higher than market wages, the new law may significantly increase construction costs in affected projects, perhaps to the point that they will no longer be financially feasible. Although SB 975 and subsequent enactments exempted some subsidized projects—

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such as those already under way at the time of the new law's passage, as well as certain self-help projects and transitional housing for the homeless—prevailing wage requirements have come to affect more and more residential development in California, including many housing projects targeted toward low- and moderate-income families.

While SB 975 itself applies only in California, the impact of prevailing wage policy is of national importance. Several studies have estimated the impact of the provisions of long-standing federal prevailing wage laws, the Davis-Bacon and Related Acts, on the cost of government contracts, but there is little hard evidence on the impact of prevailing wage policy on housing or residential construction costs, or on subsidized projects in particular. While some supporters argue that prevailing wage laws increase the efficiency or stability of construction labor markets, these claims remain unsubstantiated. Rather, redistribution of income appears to be the ultimate goal, and the principal effect (Allen 1983; Goldfarb and Morrall 1981).

This paper presents new evidence on some of these issues. It estimates the effect of prevailing wage requirements on the cost of construction of state-subsidized low-income housing in California. The evidence is based on micro data covering newly constructed units funded in part by the Low-Income Housing Tax Credit Program (LIHTC) from 1997 to 2002.

Prevailing Wage Legislation in California

California's prevailing wage law was passed in 1931, the same year as the Davis-Bacon Act. A 1995 study of state prevailing wage laws found it to be one of the most stringent in the nation (Thieblot 1995). The California statute extends to areas beyond the scope of the federal law, such as demolition work, site and sewer construction, and some janitorial and hauling work.

The administration of the California statute falls under the jurisdiction of the state's Department of Industrial Relations (DIR), and determination of the regulated wage rates is left to the discretion of the director of the DIR. California's determination of "prevailing wages" is similar to the federal standard, in that it effectively employs the modal wage rate. This usually results in the selection of a negotiated wage rate (under a union collective bargaining agreement), since free market wages are unlikely to be identical to the penny.

Local prerogative on construction wage regulation varies within the state. By 1995, two California localities had won judicial approval of ordinances exempting certain projects from prevailing wage requirements. A handful of other cities imposed prevailing wage obligations on some industrial construction projects wholly outside the public sphere (Thieblot 1995).

Since passage of the Davis-Bacon Act, construction of low-income housing sponsored directly by the U.S. Department of Housing and Urban Development (HUD), such as public housing and most Section 8 New Construction and Substantial Rehabilitation projects, has necessitated payment of "prevailing wages."[1] But there has been some ambiguity about coverage of housing projects subsidized indirectly through tax credits or federal grants to lower levels of government. The 2001 California law resolved this ambiguity. It extended this coverage to subsidized housing construction using federal, state, and local public funding sources such as the Community Development Block Grant Program and other common sources of grants for subsidized housing.

Effects of Prevailing Wage Requirements

Effects on Construction and Costs

A large literature has developed on the efficiency and distributional effects of mini-

[1]The application of the Davis-Bacon Act to HUD-sponsored construction is subject to a variety of detailed regulations, and HUD has provided wage surveys to assist the U.S. Department of Labor in its determination of wage rates (see HUD 1981).

mum wage laws generally (for a review, see Card and Krueger 1995) and Davis-Bacon and state prevailing wage legislation in particular. Goldfarb and Morrall (1981) reviewed a number of the early empirical studies of the costs of Davis-Bacon, and concluded that the legislation could hardly be attractive on efficiency grounds. The same authors (Goldfarb and Morrall 1978) examined construction wage data to estimate the large cost savings achievable by using mean wages (rather than modes) as the regulatory benchmark for defining prevailing wages. Metzger and Goldfarb (1983) developed an economic model to evaluate claims that output quality improves under a prevailing wage regime, and concluded that quality may easily decrease as a consequence of the increased costs imposed by regulation.

Estimates of increased project costs under Davis-Bacon vary considerably, most likely due to the difficulty in finding a control group unaffected by the Davis-Bacon Act with which to compare construction costs of Davis-Bacon projects. Two studies focused on a one-month suspension of the Act in 1971, which forced contractors to rebid for projects in the pre-award phase. Thieblot (1975) found an increase of about .5% on prevailing wage projects. By accounting more fully for institutional factors and inflation, Gould and Bittlingmayer (1980) estimated the increase to be between 4% and 7%. Using contractor surveys to compile a sample of affected and unaffected projects in rural areas, Fraundorf et al. (1984) concluded that the Act increased costs by an average of more than 26%.

More recent literature has addressed the control group problem by exploiting the variation in state prevailing wage laws among states and over time. A number of studies have used intrastate variation in prevailing wage laws resulting from the introduction of a new law, temporary suspension of an existing law, or the repeal of the state's prevailing wage law. Philips et al. (1995) examined the effect on construction wages of the repeal of state prevailing wage laws in nine states. They found that construction wages declined more in repeal states than in non-repeal states, but claimed that any savings to the government in construction costs was offset by losses in income tax revenue. Thieblot (1996) questioned these conclusions on methodological grounds. Bilginsoy and Philips (2000) used intra-provincial variation in prevailing wage laws to estimate the impact of the law on school construction costs, and found that the introduction of a prevailing wage law in British Columbia increased construction costs by at least 16% in the most restrictive model. The robustness of their results was limited by a small sample (54 projects). Philips (2001) also examined the impact of state prevailing wage laws on school construction using intrastate variation, finding a positive but not statistically significant effect of prevailing wage laws on construction costs.

Other studies have exploited the interstate variation in prevailing wage laws. Prus (1996) used FW Dodge data on various project types and found construction costs to be 18% higher in prevailing wage states than in states without prevailing wage laws, but the unconventional manner in which results were reported makes the level of statistical significance unclear. Prus (1999), Philips (1999), and Azari-Rad, Philips, and Prus (2003, 2002) all used the interstate variation and FW Dodge data on school construction costs and found positive yet statistically insignificant effects of prevailing wage laws on construction costs. The results of these latter studies are questionable, as the authors did not control for many important project characteristics, and some unmeasured differences among state institutions may affect the results.

Kessler and Katz (2001) examined the impact of repeal of state prevailing wage laws on construction wages, comparing variations across states and over time. The authors found a small (2–4%) but statistically significant decrease in the average wages of construction workers in a state after the repeal of its prevailing wage law.

Table 1. Rough Estimates of Increased Housing Costs Due to Prevailing Wage Requirements for Selected California Cities.

Location	*Labor Share of Construction Cost (%)*	*Prevailing Wage Differential (%)*	*Project Cost Increase (%)*
Major Cities			
Los Angeles	43.5	48.9	21.3
Sacramento	44.9	41.7	18.7
San Diego	43.6	37.6	16.4
San Francisco	47.2	28.7	13.5
Average Major Cities	44.8	39.2	17.5
Other Cities			
Bakersfield	42.6	60.0	25.6
Fresno	42.6	45.2	19.2
Marysville	45.0	50.1	22.5
Oxnard	43.9	50.1	22.0
Redding	43.2	56.5	24.4
San Bernardino	42.6	56.3	24.0
Average Other Cities	43.3	53.0	23.0

Source: http://www.building-cost.net; Newman and Blosser (2003). See text for assumptions and methods.

Effects on Housing Markets

One paper prepared for the President's Commission on Housing related housing construction costs to prevailing wage legislation (HUD 1981), but that document is merely a compendium of assertions. There is apparently no other direct evidence on the link between prevailing wage regulations and housing costs.

However, cost estimators used by house builders, and rules of thumb used by lenders, may yield rough estimates of the link between prevailing wage requirements and housing costs. For California, we can use existing information—on the labor share of residential construction costs, and on the premium of prevailing wages over market wages—to make some rough approximations.

Rough estimates for selected California cities—the labor share in housing output[2] times the wage premium—are presented in Table 1. Increases in project cost due to prevailing wages average 20.8% for the ten cities considered. Increases range from 13.5% in Stockton to 25.6% in Bakersfield. Major cities have a lower average increase in project cost (17.5%) than the six smaller cities included in the table (23%).

Of course, these rough estimates do not account for a number of influences prevailing wage legislation could have on overall project cost. For example, affected developers can substitute away from more expensive labor inputs by such means as using more prefabricated components, thus reducing the costs of on-site assembly. The enforcement of wage regulations might impose increased administrative cost due to more complex reporting requirements. There are likely labor and materials econo-

[2]The labor share of construction cost, available at http://www.building-cost.net, is based on a wood-frame, single-family home of average quality and size. Percent increases in mean market wages were obtained from the California Employment Development Department's "Occupational Employment Statistics" survey and state prevailing wage determinations published by the Department of Industrial Relations (as compiled in Newman and Blosser 2003). An average of wages from four construction occupations—Carpenters, Electricians, Plumbers, and Drywall Installers—was used to yield an overall labor rate.

mies present in multi-unit projects for lower-income families, compared to the single-family basis used in the published wage-share figures. Finally, increased wage levels may attract more productive workers, working fewer hours over the duration of an affected project. The subtle interactions of these effects are ignored in these rough approximations. We now turn to more precise econometric models estimating the cost effects based on the actual cost of housing projects completed in California.

Empirical Analysis

Our analysis extends the literature on the effects of prevailing wages by analyzing micro data on a large sample of individual construction projects, and by relying on observations from a single state. Our concentration on subsidized housing projects also permits explicit consideration of the tradeoff between the use of public resources to benefit two different sets of deserving households—low-income housing consumers, and workers within the residential construction industry.

We analyze the structure of costs for newly constructed dwellings for California Low-Income Housing Tax Credit (LIHTC) housing projects whose applications for funding were filed after January 1, 1997, and that were placed in service before May 1, 2002. All projects were selected to receive federal (and some state) tax credits by the California Tax Credit Allocation Committee (TCAC), the administrator of the federal LIHTC program in California.[3]

In accordance with program regulations, only rental housing projects are eligible for credits. The allocation process is competitive, so that projects that best fulfill housing needs and public policy objectives (as determined by TCAC) have priority. For newly constructed units to be eligible for tax credits, they must meet both rent and income requirements. The rents charged may not exceed 30% of the "imputed income" for the unit.[4] At initial occupancy, the income of a resident household may not exceed 50% or 60% of the area median income (AMI). Developers choose between a "20/50" or "40/60" minimum set aside, meaning that at least 20% (or 40%) of the units must be "affordable" to families with incomes at 50% (or 60%) of the median income. Only "affordable" units are eligible for tax credits. To increase the attractiveness of projects in the competition for credits, most applicants designate a greater proportion than the minimum set aside as "affordable," and many target occupants with incomes lower than the 50%/60% AMI threshold. Units receiving federal tax credits are required to remain "affordable" according to the above definition for 15 years.[5]

A number of criteria are considered in the allocation process. Federal guidelines grant priority to those projects that serve the lowest-income tenants and that maintain affordability for the longer periods. Other selection criteria include project location and the housing needs of that location (including consideration of public housing waiting lists and target populations with special needs), project characteristics, and projects intended for eventual tenant ownership. In California, the demand for credits usually exceeds their availability by about four to one, and elabo-

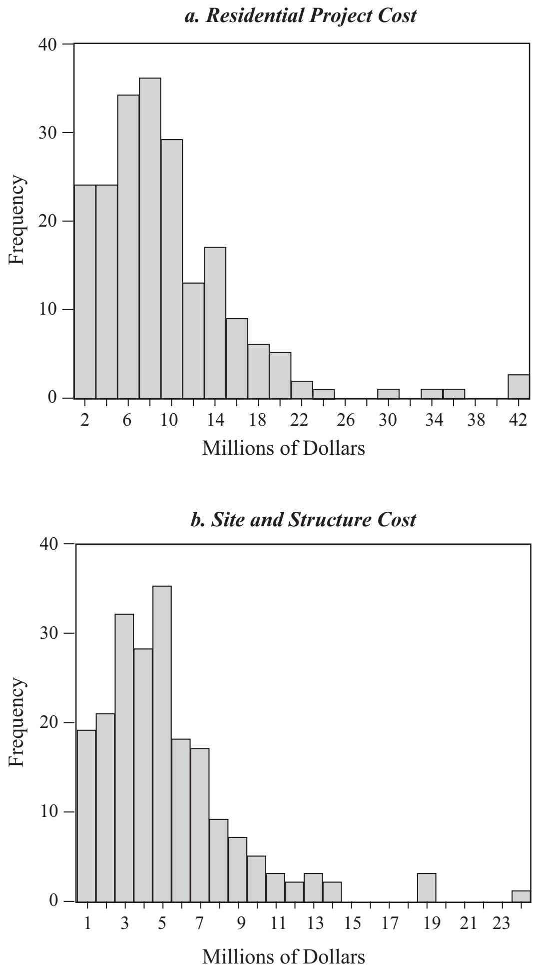
[3]The federal LIHTC program, authorized by Congress in 1986 and administered nationally by the Internal Revenue Service, enables developers of qualifying rental housing to raise project equity through the sale of federal tax credits to investors. TCAC allocates additional state tax credits to those projects that are selected to receive federal credits. TCAC may also authorize tax credits for rehabilitation of low-income housing. Due to their heterogeneity, housing rehabilitation projects are excluded from this analysis.

[4]Income is imputed assuming an occupancy of 1.5 persons per bedroom, and the area median income for a family of that size. The rent charged must not exceed 30% of this imputed income.

[5]Units benefiting from California state tax credits are generally required to maintain "affordability" for 55 years.

rate priorities and guidelines have been established.[6]

Figure 1. Cost Distributions for Sample Projects, 1997-2002.



Two hundred and ninety-two New Construction Projects were approved by TCAC from the application years 1997 through 2002 and completed before May 1, 2002. We compiled a dataset covering 205 of these projects, including *ex post* cost data on each project, reflecting certification by external auditors upon completion of construction.[7] Other project characteristics were assembled from the Committee's electronic database, from paper files of TCAC, and from telephone interviews.

Two measures of project costs were compiled based on expenditures reported *ex post* in the final cost certification. The first and most inclusive, *Residential Project Cost*, includes all costs associated with residential construction. These costs include land acquisition and development, construction (labor, materials, contractor profit, and overhead), survey and engineering costs, financing, legal fees, developer fees, and other expenses. *Site and Structure Cost* includes only site preparation and building-construction costs (that is, excluding contractor overhead and profit and general requirements). This measure of cost is most closely linked to changes in labor and materials costs. As shown in Figure 1, the distribution of these cost measures is highly skewed and roughly lognormal.[8] On a per unit basis, *Site and Structure Cost* averages about 56% of *Residential Project Cost*.

We also compiled information on a number of project characteristic variables: tar-

[6]For example, both state and federal law require that 10% of annual credit be awarded to projects that involve non-profit developers. In addition, the state law requires that at least 20% of the credits be used for projects located in rural areas, and at least 2% be set aside for small projects (consisting of 20 or fewer units). California also has guidelines to maintain geographic distribution of the tax credits, awarding a certain percentage of annual credits to each of 12 geographic regions across the state. Preference for credit allocation is also given to projects that promote certain public policies, such as smart growth, energy efficiency, and community revitalization efforts.

[7]There were a total of 454 approved projects, of which 162 were classified as Acquisition or Rehabilitation projects. Project files for 76 of 292 New Construction projects were not available at the time of data collection during the fall of 2002. (This typically meant that the files were in use by TCAC staff or other state officials at the time data were collected.) Complete data could not be assembled for 11 of the 216 remaining projects.

[8]In simple linear regressions, the intercept terms are insignificantly different from zero, implying a proportional relationship between *Residential Project Cost* and *Site and Structure Cost*.

get populations (senior citizens and special needs residents, for example), affordability levels, and the minimum set aside chosen by the applicant ("20/50" or "40/60"). All of these indicia are reflected in the criteria for allocating tax credits. In addition, we gathered information on project location, special facilities and features, structure and construction details, the applicant and developer, and financing.

We also determined whether project developers paid construction workers "prevailing wages." Beginning in 1999, applicants for LIHTC funding were asked to specify whether "use of federal, state or local subsidies requires that higher than normal wages must be paid."[9] We collected developers' responses to this question in the project information extracted from TCAC files. We then briefly interviewed developers by telephone to verify the payment of prevailing wages for each project. These interviews determined whether prevailing wages were paid on LIHTC projects whose applications were filed pre-1999 and also confirmed the "higher than normal wages" information extracted from TCAC files for project applications filed after 1998. We identified payment or nonpayment of prevailing wages for 175 of the 205 projects.[10] In the analysis below, the prevailing wage indicator variable has a value of one when we have confirmed that prevailing wages were paid, and is zero otherwise. We have made no independent determination concerning whether developers' choices about the payment of prevailing wages were legally mandated or, if so, whether the requirement arose from federal, state, or local requirements.

Table 2 presents summary information on the observed projects.

The Basic Statistical Models

Table 3 presents results of simple ordinary least squares (OLS) regressions[11] relating various measures of residential construction costs to the descriptors listed in Table 2. Regressions are presented for both measures of project cost: "site and structure" cost, including all construction wage expenditures, and total "residential project cost." In the first specification (columns 1 and 2), the dependent variable is the logarithm of cost, and the logarithm of the number of units is included as a regressor. In the second specification (columns 3 and 4), we impose constant returns to scale; the logarithm of cost per unit is the dependent variable.

As reported in Table 3, project costs vary by type of project, type of developer, and type of structure. There is also some evidence that projects with larger fractions of "affordable" units had lower total costs and lower costs per unit. Projects completed more recently tended to be more expensive, and those providing beneath-structure parking had higher costs. Projects with larger dwellings were more costly, as were those constructed on urban infill sites. There are some differences in costs by location; projects located in San Francisco, Sacramento, and Los Angeles tended to be more expensive to build.

The cost relationships reported in Table 3 are generally consistent for both specifications and both definitions of cost. In particular, the simple OLS models indicate that, holding other factors constant,

[9]The LIHTC application thus clearly refers to requirements imposed as conditions for the attainment of government subsidies, thereby eliminating the possibility that "higher than normal" wages are interpreted by the respondents to be higher-than-market union scale. Interviews with developers confirmed that builders understood "prevailing wages" to be those required by regulators, and hence the term is not to be considered synonymous with "union wages."

[10]In the remaining thirty cases, the developer lacked information or could not be reached.

[11]In preliminary regressions, eleven project characteristics in the TCAC data were individually and jointly statistically insignificant. Excluding them affected the magnitude of the prevailing wage coefficient only negligibly and therefore they were omitted from these regressions. Fourteen geographical identifiers are retained within the models but, for the sake of simplicity, are not reported in the tables below. These results are available from the authors on request.

Table 2. Variable Definitions and Descriptive Statistics.
(205 Observations on LIHTC Projects, Completed 1997–2002)

Variable	*Definition*	*Mean*	*Standard Deviation*
Prevailing Wages	One if prevailing wages were paid as a result of federal, state, or local requirements, zero otherwise.	0.20	0.40
Units	Number of units in project.	82.79	56.41
Affordability	Fraction of units in project that meet affordability guidelines.	0.95	0.14
Targeting			
Non-Targeted	One if units are not targeted to a specific population, zero otherwise.	0.09	0.28
Senior	One if units are targeted to seniors, zero otherwise.	0.28	0.45
SRO	One if units are single room occupancy, zero otherwise.	0.02	0.15
Needs	One if units are targeted to special needs populations, zero otherwise.	0.04	0.21
Time	Occupancy date. Elapsed time in days from July 19, 1995.	1,700	376
Parking	One if project contains parking beneath the structure, zero otherwise.	0.17	0.37
Three Bedrooms	One if ≥ 50% of units have ≥ 3 bedrooms, zero otherwise.	0.31	0.46
Island	One if project is on an island, zero otherwise.	0.00	0.07
Special Facilities	One if project contains special needs facilities, zero otherwise.	0.03	0.18
Mitigation	One if project requires substantial environmental mitigation, zero otherwise.	0.05	0.23
Applicant Non-Profit	One if applicant is a non-profit organization, zero otherwise.	0.22	0.42
Developer			
For Profit	One if developer is a for-profit organization, zero otherwise.	0.22	0.42
Non Profit	One if developer is a non-profit organization, zero otherwise.	0.41	0.49
Funding	Fraction of project funding from public sources.	0.19	0.21
Sources	Number of different funding sources.	3.63	1.45
Bonds	One if project received tax-exempt bond finance.	0.40	0.49
Structure			
Townhouse	One if project is a townhouse, zero otherwise.	0.18	0.39
Cooperative	One if project is a cooperative, zero otherwise.	0.00	0.07
Two Stories	One if project has two or more stories, zero otherwise.	0.50	0.50
Single Family	One if project is single family detached, zero otherwise.	0.01	0.10
Infill	One if development is an inner city infill site, zero otherwise.	0.15	0.35
Residential Project Cost	See text (millions of $).	9.39	6.54
Site and Structure Cost	See text (millions of $).	5.14	3.50

projects paying prevailing wages were about 9–11% more costly than otherwise identical projects not subject to these regulations.[12] In columns (1) and (2), the estimated coefficient for the logarithm of the number of units is statistically significantly less than one, suggesting that there were modest economies of scale in projects containing more dwellings. Despite this, models using the logarithm of cost per unit as the dependent variable (thereby constraining the model to reflect constant returns to scale) are quite similar; the magnitudes and statistical significance of the coefficients are also similar.

When the geographic identifiers are removed from the specification, the explained variation is slightly lower, but the magnitudes of the other coefficients and their statistical significance are quite comparable. However, the estimated coefficients for the prevailing wage variable are substantially larger, suggesting cost increases of about 18% for those projects paying prevailing wages as compared to projects for which this requirement was not imposed. Results from specifications including interactions between geography and regulation suggest that prevailing wage effects on construction costs did vary by region within California.[13]

Instrumental Variables Estimates

It is possible that the requirement to pay prevailing wages imposed on some of these construction projects is not exogenous to the other factors determining project costs. If projects located in higher-cost areas (for example, in highly urbanized areas) were more likely to be required to pay prevailing wages (for example, because unions were able to exercise more political influence in these regions), then simple ordinary least squares regression models would falsely attribute these higher costs to the payment of prevailing wages. Alternatively, lower-cost areas of California may feature relatively more intensive advocacy for prevailing wages adoption and enforcement, in which case OLS might falsely bias estimates of regulatory effects downward.

Estimation of the models by the method of instrumental variables (IV) eliminates this source of bias and yields consistent estimates of the effect of prevailing wage requirement on construction costs. Appropriate instruments are variables that are correlated with the regulatory classification of projects—that is, identifying those paying prevailing wages as opposed to those paying market wages—and that do not themselves cause construction costs to vary.

From computerized voting information, we obtained the election results on ten statewide California propositions for the city in which each of the 205 sample projects was located. We also measured the party registration of voters in each jurisdiction, and the percentage of workers in highly unionized industries and occupations by census place.[14] Finally, we tabulated homeownership rates and age distributions of the population in each jurisdiction, as well as union membership in the relevant geographical location, as a fraction of total wage and salary employment.

[12]Since the dependent variable is the natural logarithm of costs, the percentage change in cost due to payment of prevailing wages is the exponentiated coefficient on that dummy variable.

[13]Geographic identifiers specify project location by metropolitan statistical area (MSA). Geographic differences in cost appear to have been significantly greater in certain regions (for example, San Francisco/Oakland/San Jose, Los Angeles, Sacramento, and Modesto) whether or not the prevailing wage variable is included in the basic OLS model. When models include interactive variables reflecting both geographic and regulatory effects, it appears that prevailing wage regulation added significantly greater cost in the San Francisco metropolitan area than in other high-cost construction areas in California. These results are also available from the authors on request.

[14]Highly unionized industries and occupations are defined based on Current Population Survey data analyzed by Barry T. Hirsch and David A. Macpherson (2003). U.S. Census data on employment by industry and occupation for employed persons 16 years and older in each census place were used to compute the variables “highly unionized industries” and “highly unionized occupations” associated with each of the 205 housing projects.

Table 3. OLS Models of Construction Costs.
(Dependent Variables in Logarithms)
(t-ratios in parentheses)

Variable	Total Cost: Site and Structure Cost	Total Cost: Project Cost	Cost per Unit: Site and Structure Cost	Cost per Unit: Project Cost
Prevailing Wage	0.103	0.097	0.097	0.091
	(2.41)	(2.82)	(2.22)	(2.56)
Log Units	0.913	0.917	—	—
	(33.39)	(41.67)	—	—
Affordability	–0.352	–0.144	–0.303	–0.097
	(2.91)	(1.49)	(2.47)	(0.97)
Targeting				
Non-Targeted	–0.150	–0.065	–0.138	–0.053
	(2.56)	(1.39)	(2.30)	(1.10)
Senior	–0.168	–0.200	–0.184	–0.215
	(4.06)	(5.99)	(4.37)	(6.27)
SRO	–0.541	–0.641	–0.577	–0.675
	(5.62)	(8.28)	(5.88)	(8.46)
Needs	–0.011	–0.093	–0.009	–0.091
	(0.13)	(1.40)	(0.11)	(1.32)
Time	4.878	6.561	4.597	6.290
	(3.04)	(5.08)	(2.79)	(4.70)
Parking	0.173	0.155	0.201	0.182
	(3.35)	(3.73)	(3.87)	(4.30)
Three Bedrooms	0.144	0.082	0.156	0.094
	(3.86)	(2.74)	(4.11)	(3.04)
Island	0.625	0.379	0.625	0.379
	(2.94)	(2.22)	(2.87)	(2.14)
Special Facilities	–0.223	0.035	–0.257	0.002
	(2.19)	(0.42)	(2.47)	(0.02)
Mitigation	–0.061	0.053	–0.073	0.041
	(0.84)	(0.90)	(0.98)	(0.68)

Continued

Arguably, these demographic and political variables affect the propensities of local government and regional officials to require payment of prevailing wages. These demographic and political variables have no direct causal effect on construction costs. Table 4 summarizes these measures of political and demographic variation across the sample of construction projects, reporting the means and standard deviations. The table also reports the results of the first stage regressions of the instrumental variables procedure.

In this first stage, the dependent variable is the dummy representing whether prevailing wages were required to be paid. Two models are presented, both including the complete set of instruments and including all other variables presented in Table 2. As shown in the table, a number of the instruments are individually significant at about the 0.10 level. An F-test for the joint significance of the instruments when no other regressors are included is highly statistically significant. When the other regressors are included, the F-ratio is significant at the 0.10 level.

Table 3. Continued.

Variable	*Total Cost*		*Cost per Unit*	
	Site and Structure Cost	*Project Cost*	*Site and Structure Cost*	*Project Cost*
Applicant				
Non-Profit	–0.005	0.029	–0.008	0.026
	(0.10)	(0.78)	(0.16)	(0.68)
Developer				
For Profit			–0.017	–0.006
			(0.14)	(0.06)
Non Profit	0.115	0.052	0.147	0.083
	(2.69)	(1.53)	(3.46)	(2.40)
Funding	–0.118	0.142	–0.015	0.241
	(1.25)	(1.87)	(0.17)	(3.26)
Sources	0.016	0.005	0.014	0.003
	(1.39)	(0.54)	(1.18)	(0.31)
Bonds	–0.065	–0.035	–0.098	–0.067
	(1.59)	(1.08)	(2.43)	(2.05)
Structure				
Townhouse	0.155	0.134	0.168	0.146
	(3.17)	(3.39)	(3.35)	(3.57)
Cooperative	0.697	0.459	0.874	0.629
	(2.81)	(2.30)	(3.51)	(3.11)
Two Stories	0.102	0.061	0.106	0.065
	(2.65)	(1.96)	(2.69)	(2.01)
Single Family	0.371	0.243	0.399	0.271
	(2.43)	(1.98)	(2.55)	(2.13)
Infill	0.161	0.073	0.179	0.091
	(3.15)	(1.77)	(3.44)	(2.14)
Constant	6.313	4.951	6.190	4.831
	(3.80)	(3.70)	(3.63)	(3.48)
R^2	0.932	0.955	0.732	0.802

Note: Regressions based on 205 observations on LIHTC projects in California completed from 1997 to 2002. All models include 14 additional controls for geographic location (by MSA).

Table 5 presents instrumental variables estimates of the same models reported in Table 3. The pattern of magnitudes and statistical significance of the coefficients in Table 5 is nearly identical to that previously reported. The coefficient on the logarithm of the number of units is significantly less than one, again suggesting modest scale economies. When the coefficient is constrained to one, representing constant returns to scale—in the third and fourth columns of the table—the substantive results are unchanged.

Note that when the model is estimated using instrumental variables, the coefficient on the prevailing wage variable is larger in magnitude and is more precisely measured than in the ordinary least squares regression. The results in Table 5 imply that—for otherwise identical low-income projects—prevailing wage construction is between 19% and 28% more costly. Importantly, the finding that prevailing wage legislation increases housing costs does not arise simply because prevailing wages are more likely to be required in high-cost housing markets.

Table 4. First Stage Instruments in Two Stage Least Squares Models.
(Dependent Variable: Prevailing Wage)
(t-ratios in parentheses)

Variable	*Mean (Standard deviation)*	*First Stage Coefficient*	
		Model 1[a]	*Model 2*[b]
Number of Adjacent Jurisdictions	7.440	0.002	0.002
	(9.49)	(0.49)	(0.40)
Fraction Yes Vote on Prop. 199	0.386	–0.013	0.057
Low-Income Rental Assistance, 1996	(0.08)	(0.02)	(0.10)
Fraction Yes Vote on Prop. 107	0.533	1.090	1.084
Housing and Homeless Bonds, 1990	(0.09)	(1.24)	(1.23)
Fraction Yes Vote on Prop. 168	0.422	–1.283	–1.306
Low-Rent Housing Projects, 1993	(0.10)	(1.56)	(1.59)
Fraction Yes Vote on Prop. 155	0.496	–0.877	–0.973
School Facilities Bonds, 1992	(0.12)	(0.93)	(1.03)
Fraction Yes Vote on Prop. 156	0.483	0.723	0.757
Passenger Rail and Clean Air Bonds, 1992	(0.09)	(0.82)	(0.86)
Fraction Yes Vote on Prop. 157	0.330	–0.275	–0.427
Toll Roads and Highways, 1992	(0.13)	(0.26)	(0.41)
Fraction Yes Vote on Prop. 160	0.503	1.734	1.762
Project Tax Exemptions, 1992	(0.07)	(1.74)	(1.77)
Fraction Yes Vote on Prop. 164	0.575	–0.617	–0.776
Term Limits, 1992	(0.12)	(0.72)	(0.89)
Fraction Yes Vote on Prop. 167	0.413	–1.730	–1.724
State Taxes, 1992	(0.07)	(1.65)	(1.64)
Fraction Yes Vote on Prop. 210	0.649	1.769	1.770
Minimum Wage Increase, 1996	(0.09)	(1.47)	(1.47)
Percent of Voters Registered as Democrats	0.597	–1.136	–1.102
	(0.13)	(1.35)	(1.31)
Percent of Population over 40 Years Old	0.341	–0.209	–0.117
	(0.06)	(0.34)	(0.19)
Percent of Housing Units Owner-Occupied	0.554	–0.682	–0.717
	(0.13)	(1.60)	(1.68)
Percent Working in Highly Unionized Industries	0.339	0.841	0.836
	(0.07)	(1.31)	(1.31)
Percent Working in Highly Unionized Occupations	0.265	–1.065	–1.093
	(0.07)	(1.57)	(1.61)
Percent Unionized	0.166	1.446	1.667
	(0.06)	(1.13)	(1.28)
F-ratio[c]		1.492	1.492
[p value]		[0.11]	[0.11]
F-ratio[d]		2.981	2.981
[p value]		[0.00]	[0.00]

[a]Regression includes all observed project characteristics (coefficients not shown).
[b]Regression includes log-units regressor, and all observed project characteristics (coefficients not shown).
[c]F-test for the joint significance of the instruments.
[d]F-test for the joint significance of the instruments in an equation including no other covariates.
Both models include 14 additional controls for geographic location (by MSA).

Conclusions

We have presented the first systematic evidence showing the effects of prevailing wage requirements on the costs of constructing low-income housing. A sample of 205 low-income housing projects subsidized by the California Tax Credit Allocation Commission during the 1997–2002 period formed the basis for the empirical analysis. We estimated statistical models using several definitions of cost certified by TCAC and by an independent auditor, in two specifications—one allowing for scale economies in construction and the other imposing constant returns to scale. Finally, we estimated models both by ordinary least squares regression and by instrumental variables techniques. *Ceteris paribus,* low-income housing projects were significantly more expensive if developers were required to pay prevailing wages. Importantly, these cost increases did *not* arise simply because prevailing wages were more likely to be required in high-cost housing markets.

The statistical models explain about 90% of the variation in construction costs across a broad sample of low-income housing projects, and about 80% of the variation in cost per unit built. The results confirm the variation in costs by type of project. Single room occupancy projects were considerably less expensive to build, while projects targeted toward large families were more expensive.[15] Underground parking and greater numbers of three-bedroom units also added significantly to project costs.

Construction costs may vary by type of applicant and type of developer. Cooperatives and single-family dwellings appear to have been more costly to build. Some differences in construction costs are also apparent by geographical region. In particular, newly constructed units in San Francisco were more than 20% costlier than elsewhere. There is also clear evidence of economies of scale in multifamily housing construction.

Table 6 provides a summary of the results of various econometric specifications as they pertain to prevailing wage requirements. It presents estimates of the percentage increase in construction costs arising from the imposition of prevailing wage regulation, holding constant characteristics such as the project's sponsorship, its financing, and its location.

Using the most realistic specifications of costs where geographic variation is accounted for, ordinary least squares models imply that prevailing wage requirements increased the cost of low-income housing construction between 9% and 11%.[16] The instrumental variables models imply that cost increases were higher—between 19% and 37% for the most realistic specifications.[17] These increases are far greater than those recently reported for construction wages (rather than overall projects) by Kessler and Katz (2001). There are several ways to harmonize our results with theirs. First, our study uses only California data rather than a multistate sample; the enforcement of prevailing wages may be more aggressive in California than elsewhere. Second, Kessler and Katz reported smaller *decreases* in wage levels *after repeal* of the regulation. Price effects of wage regulation, captured more directly by our project-cost analysis, may linger long after repeal. Finally, it is certainly possible that the process of complying with prevailing wage regulations exacerbates known administrative inefficiencies in tax-credit projects (Cummings and DiPasquale 1999).

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[15]Single room occupancy units lack individual bathrooms, kitchens, and living areas. To consider these aspects of housing costs, we also estimated the same models reported in the text using cost per square foot as the dependent variable. The results did not differ substantially from those reported in the text.

[16]Alternatively, if low-income housing is subsidized by 9–11% and if prevailing wage requirements are imposed, these results suggest that developer costs were unchanged, but income was transferred from taxpayers to construction workers.

[17]While it is possible that payment of prevailing wages attracts more productive construction workers, these results indicate that higher wage costs outweighed any unmeasured productivity gain in those housing projects.

Table 5. Instrumental Variables Estimates of Construction Costs.
(Dependent Variables in Logarithms)
(t-ratios in parentheses)

	Total Cost		*Cost per Unit*	
Variable	*Site and Structure Cost*	*Project Cost*	*Site and Structure Cost*	*Project Cost*
Prevailing Wage	0.225	0.177	0.248	0.196
	(2.58)	(2.50)	(2.76)	(2.67)
Log Units	0.910	0.914	—	—
	(33.26)	(41.25)	—	—
Affordability	–0.363	–0.152	–0.315	–0.105
	(3.01)	(1.55)	(2.58)	(1.05)
Targeting				
Non-Targeted	–0.187	–0.089	–0.182	–0.084
	(2.98)	(1.76)	(2.85)	(1.62)
Senior	–0.161	–0.195	–0.176	–0.210
	(3.87)	(5.78)	(4.18)	(6.08)
SRO	–0.554	–0.649	–0.595	–0.688
	(5.75)	(8.32)	(6.08)	(8.59)
Needs	–0.047	–0.117	–0.053	–0.122
	(0.55)	(1.68)	(0.61)	(1.70)
Time	4.327	6.200	3.900	5.806
	(2.64)	(4.67)	(2.33)	(4.24)
Parking	0.169	0.152	0.198	0.180
	(3.28)	(3.65)	(3.83)	(4.25)
Three Bedrooms	0.147	0.084	0.161	0.097
	(3.94)	(2.79)	(4.24)	(3.13)
Island	0.677	0.413	0.689	0.424
	(3.16)	(2.38)	(3.15)	(2.36)
Special Facilities	–0.236	0.026	–0.275	–0.011
	(2.32)	(0.31)	(2.66)	(0.13)

Continued

Increases in project cost due to prevailing wage regulation surely lead to reductions in the number of newly constructed low-income housing units produced through public subsidy. Consider, for example, new dwellings completed under the LIHTC. The federal allocation of tax credits provided financing for an average of 19,129 low-income housing units per year from 2000 to 2002 (including both new construction and rehabilitation).[18] We can estimate the effect of applying new prevailing wage requirements to the share of annual production (about 15,686 units annually)[19] not previously subject to these regulations. If costs were increased by just 9.5% as a result of prevailing wage legislation (the smallest increase predicted by any of

[18]See California Tax Credit Allocation Committee *Annual Reports* (2000–2002). The total credits reported combine those issued at the 9% and 4% levels, the latter being applied to projects using federal subsidies or tax-exempt fund sources beyond tax credits alone. The two categories are subject to different rules concerning the state's total credit-issuing authority.

[19]On the basis of our dataset, it appears that approximately 20% of the LIHTC units, or about 3,443 annually, may have been governed by prevailing wage prior to the application of SB 975.

Table 5. Continued.

Variable	*Total Cost*		*Cost per Unit*	
	Site and Structure Cost	*Project Cost*	*Site and Structure Cost*	*Project Cost*
Mitigation	–0.041	0.066	–0.049	0.058
	(0.56)	(1.11)	(0.66)	(0.94)
Applicant Non-Profit	–0.022	0.018	–0.029	0.011
	(0.46)	(0.46)	(0.61)	(0.28)
Developer Non-Profit	0.105	0.046	0.136	0.076
	(2.45)	(1.32)	(3.22)	(2.18)
Funding	–0.172	0.106	–0.078	0.197
	(1.73)	(1.31)	(0.81)	(2.52)
Sources	0.015	0.004	0.013	0.002
	(1.32)	(0.49)	(1.10)	(0.24)
Bonds	–0.073	–0.041	–0.110	–0.075
	(1.78)	(1.23)	(2.70)	(2.27)
Structure				
Townhouse	0.148	0.129	0.160	0.140
	(3.02)	(3.24)	(3.20)	(3.43)
Cooperative	0.725	0.477	0.916	0.659
	(2.92)	(2.37)	(3.70)	(3.25)
Two Stories	0.090	0.053	0.092	0.055
	(2.32)	(1.69)	(2.32)	(1.69)
Single Family	0.418	0.274	0.459	0.312
	(2.70)	(2.18)	(2.90)	(2.41)
Infill	0.159	0.072	0.179	0.090
	(3.13)	(1.74)	(3.46)	(2.13)
Constant	6.926	5.352	6.943	5.354
	(4.07)	(3.88)	(4.00)	(3.76)
R^2	0.932	0.955	0.736	0.802

Regressions based on 205 observations on LIHTC projects in California completed from 1997 to 2002. All models include controls for geographic location (by MSA).

our statistical models), 1,361 fewer subsidized dwellings would have been built. A cost increase of 25.2%, a mid-range level among the estimates presented in Table 6, would have resulted in 3,157 fewer low-income housing units. And at a cost increase of 37.2%—our upper bound estimate—the imposition of prevailing wage legislation would have prevented 4,253 low-income housing units from being developed. In this way, state regulation of construction wages conflicts with the federal goal of increasing access to new housing for California's low-income households.

These estimates are illustrative rather than definitive. But they do demonstrate how the imposition of prevailing wages affects the supply of low-income housing provided by the federal tax credit program. Of course, the LIHTC is not the only program providing low-income housing in California. In November 2002, California voters approved Proposition 46, a $2.1 billion bond measure dedicated to affordable housing development and related programs. About half these funds are directed toward new multifamily construction. If prevailing wage requirements are applied to dwellings built using proceeds from the tax-exempt bonds and those from other existing programs—the HOME program and the Community Development Block Grant Program, for

Table 6. Cost Increases for Low-Income Housing Projects in California Due to Prevailing Wage Requirements. (%)

Statistical Model	*Scale Economies Assumed?*	*Site and Structure Cost*	*Project Cost*
A. Ordinary Least Squares Estimation			
Extended	YES	10.4%	11.0%
	NO	9.3	10.0
Basic	YES	10.8	10.2
	NO	10.2	9.5
B. Instrumental Variables Estimation			
Extended	YES	34.9	33.9
	NO	37.2	35.9
Basic	YES	25.2	19.4
	NO	28.1	21.7

Notes: "Extended" models include all observed project characteristics. "Basic" models include only the variables reported in Table 3. Estimates are based on the antilog of coefficients on the prevailing wage indicator variable in multivariate regressions.

example—the effect on low-income housing production will be much larger. The requirement would effectively transfer income from low-income housing consumers in California to workers in California's construction industry.

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