The Interaction of Building Codes and Housing Prices

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The study analyzes the effect of restrictive building codes on the price of housing, and the simultaneous impact of housing values on the strictness of codes. A model is defined and estimated, using data for more than 1100 localities. The results show that strict codes raised housing values, in 1970, by about one thousand dollars. They furthermore show that the strictness of codes is in turn affected by housing values, as well as by the strength of construction unions. Homeowners and construction unions are thus both observed to gain from restrictive building codes, which can explain the prevalence of such regulations.

INTRODUCTION

A small but growing number of studies have investigated the effects of land use regulations on the prices of housing. The impetus for this research has come from two directions. First, governmental regulations in general have come under close scrutiny, and with them land use regulations; the second, land use controls have been suspected of being used as an instrument of socioeconomic exclusion, a charge that required substantiation.

Most studies have centered on the effect of zoning; their results are mixed: Crecine, Davis, and Jackson [1], Reuter [2] and Moser, Riker, and Rosett [3] did not find impacts of zoning on housing prices, though their methodologies

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have been challenged. Ohls, et. al. [4], Peterson [5], and Stull [6], Sagalyn and Sternlieb [7] and Lafferty and Frech [8], on the other hand, found some effects, using different techniques of analysis.

Other authors have investigated the effects of *growth control* laws. Ellickson [9], Seidel [10], Gleeson [11], and Dowall and Landis [12] concluded that, as one might expect, such laws result in higher housing prices. Schwartz, et. al. [13], in empirical research on controls in Petaluma, California, found further evidence to support the theory. Katz and Rosen [14], using an "index" of controls, also came to a similar finding.

However, there have been hardly any empirical studies of the effects of *building code* regulation. These codes have been discussed by Seidel [10] who reports a construction cost increase of $1100, or 5% of the selling price of a typical house. On the other hand, Babcock and Bosselman [15], after interviews, cite builders' belief in an increase of structure costs by as much as 250% in some areas of Ohio! Perhaps the most detailed investigation is that of the National Commission on Urban Problems (the Douglas Commission), which examined the cost of building codes and found a burden of $1838 per housing unit [16, p. 262]. Such figures, however, are of only limited use, since in the housing markets the cost of construction is but one factor. To overcome this limitation, Muth and Wetzler [17] have looked at actual market prcies and have found an approximately 1.7% increase in these prices if the local code instead of the national building code is used; they consider this to be the price effect of building codes. However, Muth and Wetzler's conclusion is predicated on the assumption that "less restrictive codes presumably (exist) under any of the four national codes as opposed to locally drafted codes." First, there is no information on how *much* stricter a local code is than a national one, leaving the scaling of the effect unknown. Second and more important, the assumption that national codes are less strict than local ones is not borne out by the evidence. Looking at more than 1100 American cities and towns, as we do in the following, one can observe that of the localities with local codes, a full 42% actually have *less* restrictions listed by the Douglas Commission [16, pp. 271f]. Hence, the Muth-Wetzler study is not conclusive, and the question of building codes' effect on housing prices is in need of further empirical analysis. This will be undertaken in the following.

The Role of Building Codes

Building codes affect housing prices in several ways. First, they influence the current construction of housing. Second, they affect the value of the existing housing stock by changing the supply of its replacement. When it comes to current construction, one frequent consequence of codes is to restrict the use of new or non-traditional building techniques, for example, the prefabrication of housing components or the introduction of new types of materials (President's

Commission [18]; U.S. House Subcommittee [19]; Nutt-Powell [20]; Keating [21]. It is not the intended public policy purpose of building codes to restrict new technology; rather, the stated–and often attained–goal is to control potentially negative externalities of construction, and to assure consumers of safe and sanitary homes. However, these aims also have been used to hide special interest regulation behind a public benefit facade.[1]

Building codes reflect political-economical as well as technical considerations. As Colwell and Kau [23] conclude in their wide-ranging analysis of building code costs and benefits to interested parties:

> Codes have been subverted by special-interest group in and out of government to accomplish a number of purposes, from selling more lumber to reducing the liability of code officials. In fact, there is no body of evidence that shows building codes add to health and safety in any way.

And, as Field and Ventre [24] observe in their study of building departments:

> Most local building officials . . . are very sensitive to political pressure. . . . Thus it is that building departments, by and large, have acquired reputations . . . for being responsive to the needs of their clients, the members of the local building community. Despite the tenuous hold that building officials have on their positions, their official actions have powerful economic consequences for a sizable portion of the local economy . . . . Builders are widely known for their aggressiveness and political sophistication. . . . One can readily visualize (the) pressures that converge on the local building officials in these circumstances. (p. 139)

Unions are similarly forceful; "When Kansas City changed . . . the building code to allow for the use of plastic and copper materials, the A.F.L.-C.I.O. cancelled a scheduled convention in the city and the local plumbers' union collected signatures to force a referendum on the issues." (Fortune [25]). Regulators respond to these pressures. As the classic study of New York governance (Sayre and Kaufman [26]) found, "each Commissioner of Buildings is brought back, whatever his initial aspirations, to the necessity of a settlement with the groups whose activities he regulates. It is with them that he must make his peace." (p. 272)

One effect of codes, then is, distributional; strict codes tend to reduce cost-efficiency in housing construction, making it more expensive. And since there exists a positive cross-elasticity of demand between new and already existing housing, one can expect the value of the existing housing stock to appreciate.

However, it would be simplistic as well as potentially misleading to see the relation between building codes and housing prices as unidirectional. Their interaction is more complex; as mentioned, it has frequently been charged that

restrictions of land use and housing have, in part, an exclusionary motive in that they help prevent the influx of people into high income areas. If such were the case, one could expect strict building codes to be more prevalent in areas where housing is relatively high priced to begin with. Therefore, a simultaneous relationship between housing prices and building codes may well exist, with each affecting the other. If this simultaneity is not taken into account, empirical results may lead to erroneous conclusions. In the following, these relations are subjected to an empirical estimation.

Empirical Model Formally, the assertion to be tested is, first, that the value of housing V is a function of the restrictiveness R of its building codes

$$V = f(R, X_i), \tag{1}$$

where R is a continuous variable measuring strictness, and X_i is a vector of other factors that contribute to housing prices. These include variables affecting the local demand for housing, such as the median household income Y and the population increase D. Other factors reflect supply conditions; they are the construction volume per capita C, and the vacancy rate A. Also potentially affecting housing values are the quality of the housing Q, the density of population L, and the location of the town, both within the city-suburb-rural spectrum M, and within a geographic region G.

The contribution of these factors to housing cost is not likely to be linear, but changing with the size of the variables. A logarithmic equation can capture these nonlinearities and express the relation in terms of elasticities. Hence, the following functional relation is specified:

$$\begin{aligned} \ln V = {} & b_0 + b_1 \ln R + b_2 \ln Y + b_3 \ln D + b_4 \ln C + b_5 \ln A + \\ & b_6 \ln Q + b_7 \ln L + b_7 M + b_8 G + \epsilon \end{aligned} \tag{2}$$

The second equation of the model takes into account that code regulation in turn, is a function of a variety of factors; among them, by hypothesis, the value of housing in the locality. As discussed, a locality with high priced housing and high incomes may well attempt to maintain its socioeconomic composition by constricting the construction of inexpensive housing.

This can be described by specifying restrictiveness R as a function of housing values V, income Y, and other factors (Z_j):

$$R = h(V, Y, Z_j) \tag{3}$$

Among the Z_j variables are the organized strength of construction labor unions U, since, as described above, unions frequently favor strict codes. Conversely, the strength of construction firms, F, should work in the opposite direction.

Another factor that may affect local building regulation is the political attitude that is prevalent. Thus, a politically conservative environment--where conservative voting is denoted by P--may be more responsive to builders' concerns, and less inclined towards restrictive regulation. Similarly, the prevailing strictness of regulation in the region may have an effect, since it points to common regional characteristics such as climate or building styles.

We therefore specify the strictness of regulation, again logarithmically to account for nonlinearities, as

$$\ln R = c_0 + c_1 \ln V + c_2 \ln Y + c_3 \ln U + c_4 \ln F + c_5 \ln P + c_6 \ln T + u \qquad (4)$$

which is an equation simultaneous with (2). This two-equation system can be estimated empirically.

The Data An excellent source of data on building codes is available for more than 1100 American localities.[2] The information has been collected by the International City Managers' Association for cities and towns across the nation, in a survey that includes details on the building codes themselves and on the agencies that enforce them. In addition to this data, socioeconomical statistics from census publications and other federal publications are used.

For purposes of estimation, the variables in equations (2) and (4) are defined as follows: R, the strictness of a code, is determined from the fourteen major code provisions which are listed by the Douglas Commission[3] as particularly prevalent. We define, with the help of that report, an index of restrictiveness

$$R_i = \sum_{j=1}^{14} C_j \qquad (5)$$

where C_j is the cost of restriction j to builders, with the mean cost standardized as $\bar{C} = 1$. In other words, the index of restrictiveness is an aggregate of the number of restrictions, weighted by the relative costliness to builders. (In that way, the more significant restrictions are recognized as such, whereas a simple addition of the number of code restrictions would not differentiate between costly and minor prohibitions.) Cost figures for the restrictions are obtained from the Douglas Commission report, supplemented by the results of a survey of construction firms for those restrictions about whose cost the Douglas Commission is silent.[4]

V, the value of housing, is defined as the median value of housing in 1970. Y, the median household income in 1970, and D, the percentage of population increase, are obtained from census information. Volume of construction, C, is from the same source,[5] while the vacancy rate A is obtained from the housing census.

Q, the quality variable of housing, is defined as the median number of rooms per housing unit in the jurisdiction.[6]

L is the density of population in the locality; Location M is defined as urban/suburban/rural location. The regions of country are defined as South, West, Midwest and Northeast.[7]

In equation (4), the strictness of regulation R is explained by factors such as housing values V and the strengths of construction unions and construction firms. R and V are specified as before. The interest groups variables are defined, in the case of union strength, as the percentage of unionized construction workers in the SMSA population, standarized by the national average.[8] For construction firms, the measure chosen is the SMSA concentration ratio, defined as the share of the large firms (100 + employees) in the industry.[9] Concentration in an industry contributes to effective political action by reducing the free-rider problem in the generation of influence (Olson [31]); a concentrated industry is also likely to have a history of oligopolistic cooperation and above-normal profits at stake which could be deployed.[10]

For the prevailing political conservatism P in the locality, voting in the 1964 Presidential election is used as a proxy, since that election provided a fairly pronounced ideological choice. Regional regulation T is the population-weighted average SMSA-wide restrictiveness of building codes.

Using these data, equations of the form (2) and (4) are estimated in a simultaneous estimation procedure, using two-stage least square estimation. The results are given in Exhibits 1 and 2, with ordinary (i.e., non-simultaneous) least square results as comparisons. Turning first to the coefficients (i.e., elasticities where variables are continuous) of housing in Exhibit 1: From the previous discussion, one would expect building codes to raise housing values. And indeed, we can observe a statistically significant[11] elasticity of housing values (.0415) with respect to building codes. It is interesting to observe that a simple ordinary least square regression would have obscured this relationship, since its t-value is considerably smaller.

These results also can be expressed in terms of dollars for an intuitively easier exposition. How much difference does a strict code make? If we define a strict code as one with all fourteen code restrictions in place, and compare it with the mean strictness of codes prevailing nationwide, R = 4.37, the difference in housing prices is V = $1060, certeris paribus. This figure is not insignificant, comprising as it does a percentage increase of 4.9% in housing values over the national mean.[12] This result is similar in magnitude to the above-mentioned increased cost of construction of new housing, estimated by the Douglas Commission [16], as $1838. (p. 262). The discrepancy suggests that a part of the increased cost is borne by builders rather than homebuyers, or that the magnitude of the cost increase is probably exaggerated.

We also can observe the expected, namely that higher housing values are associated with higher incomes, higher quality of housing and a lower vacancy rate. The other variables are not statistically significant.

EXHIBIT 1

COEFFICIENTS OF HOUSING VALUES

	OLS	2-SLS
Intercept	5.2217 (15.5810)	5.4440 (12.8129)
Strictness of Regulation	.0575 (.7711)	.0415 (2.2986)
Income	.0871 (2.9449)	0.938 (2.6885)
Vacancy Rate	−.0633 (3.3285)	−.0804 (3.3303)
Population Increase	−.0040 (.1406)	−.0027 (.0867)
Construction Volume per Capita	−.0013 (.0869)	.0031 (.1765)
Suburb-City	.0457 (1.2055)	.0395 (.8700)
South	−.0701 (1.7539)	−.0410 (.8485)
Density of Population	.0093 (.5360)	.0144 (.6965)
Quality of Housing	.7930 (13.0372)	.8033 (11.5415)
R^2	.6345	.6110

(t — statistics in parentheses)

The explanatory equation for regulatory strictness is reported in Exhibit 2. We find that housing values are indeed positively associated with regulatory strictness with a moderate statistical significance; in other words, high housing value localities are observed to have stricter building codes than lower-housing value localities. In addition, the regionally prevailing strictness of building codes is also firmly associated with each locality's code. And, as predicted, there is a positive association between construction unions and regulatory strictness. On the other hand, effect of industry concentration on that strictness is less certain.

EXHIBIT 2

COEFFICIENTS OF REGULATORY STRICTNESS

	OLS	2-SLS
Intercept	.0135	.4003
	(.0451)	(.9192)
Median Value	.0051	.0066
	(2.5441)	(1.7130)
Income	.0059	−.0057
	(.4431)	(.2460)
Firm Concentration	−.0111	−.0350
	(.4637)	(1.0304)
Unionization	.0173	.0395
	(.8782)	(1.5879)
Conservatism	−.0104	−.0225
	(.2359)	(.3689)
Regional Strictness	1.0009	.8939
	(13.6883)	(8.6770)
Political Appointments of Agency Head	−.0007	−.0196
	(.0427)	(.8867)
Term Appointment of Agency Head	−.0523	.0436
	(2.2473)	(1.2246)
R^2	.2667	.2388

(t — statistics in parentheses)

Summary

The empirical results confirm that building codes are associated with higher housing values and as such, appear to have an intended or unintended exclusionary effect. The strictness of codes, in turn, is affected by housing values. Both of these simultaneous effects are small but statistically significant at the .95 level. Also observed in a positive association of labor unions with the strictness of codes. Together with the effect of the codes on housing values, this suggests benefits accruing to unions and homeowners, a commonality of interest which could help explain the frequency of restrictive building codes.

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NOTES

1. "Codes are . . . powerful documents favoring certain ways of doing business and excluding others" (Field and Rivkin [22], p. 2).

2. International City Management Association, 1970 survey. Data made available by Richard Ventre and John Quigley, whose help is gratefully acknowledged. The data has been used by Oster and Quigley [27] for an analysis of the restraints to the diffusion of four building innovations.

3. National Commission [16], p. 259, Table 2. The code provisions are: Nonmetallic sheathed electrical cable; prefabricated metal chimneys; preassembled electrical wiring; wood roof trusses placed 24" apart; plastic pipe in plumbing systems; bathrooms or toilet continuous air space; single plates in non-load-bearing interior partitions; 2" or 3" studs in non-load-bearing interior partitions; 2" x 4" of 1" in lieu of corner bracing; wood frame exterior walls of multifamily structures.

4. Cost listing from the National Commission [16], p. 271, ff. Since these figures are not available in that source for several of the restrictions, cost is extrapolated, for those restrictions, in the following way: From a separate survey of home manufactures (Field and Rivkin, [20] p. 82), we have a ranking of the importance given to *all* restrictions by manufacturers. By using those restrictions for which both ranking and cost figures are known as calibrations, we can estimate the costliness of restrictions for which only rankings are variable.

5. Data, unless noted otherwise, is from the ICMA survey, note 3.

6. U.S. Bureau of the Census: [28], Table Series H-1.

7. In the estimation, a dichotomous variable is used whose value is 1 when the locality is in a suburban location and 0 otherwise. A second variable was used for rural locations, but did not appreciably contribute to the explanatory power of the equation. It has therefore been omitted. A similar procedure was followed for regions of the country; the variables for non-South regions do not contribute to the explanatory power of the equation and are not significant.

8. From Bureau of Labor Statistics, [29]; made available by J. Quigley.

9. Data from the U.S. Department of Commerce [30]; made available by J. Quigley.

10. Empircally, previous research has confirmed the significance of the concentration variable on building code regulation, in comparison with other measures of the market structure such as total industry volume, average firm size, number of firms, etc. (Noam, [32]).

11. The term "significant," as used herein, refers to statistical significance at the .95 level.

12. For housing values V, the 1970 census figures (used in the ICMA file) show a mean of $\mu = 21406$ and a standard deviation of $\sigma = 8555$. The range of R is σ-14, with a mean of $\mu = 3.37$ and a standard deviation of $\sigma = .60$. For income Y, $\mu = 11497$ and $\sigma = 5668$.

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